

THE DEVELOPMENT OF THE COAL  
INDUSTRY IN MID AND WEST LOTHIAN 1815-1873

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## SUMMARY

The nineteenth century Lothians' coal industry was based on two fields : the Mid and East Lothian field, to which the following comments primarily apply; and the West Lothian field, which presents many points of contrast.

Towards the close of the eighteenth century the supply of Lothian coal was becoming increasingly inelastic. With fuel demand rising rapidly in Scotland a crisis developed in the Edinburgh coal market. This coal shortage, which lasted until the mid-1810s, revealed serious shortcomings in the methods of producing and marketing Lothian coal. These deficiencies left the industry ill-equipped to face the much more competitive state of the coal trade over the next thirty years.

The Lothians' industrial structure of the late eighteenth century appeared to promise much for the future evolution of coal demand. During the Industrial Revolution, however, there was a shift of emphasis in Scotland's industrial development to the Glasgow region. The Lothians did not become an important manufacturing area, partly because earlier relative advantages with respect to the supply of vital industrial raw materials disappeared.

The chief impact of transport improvement during the first half of the nineteenth century was to undermine the already deteriorating competitive position of the Lothians' coal industry : fresh supplies of coal invaded the important Edinburgh market, which Lothian collieries had previously dominated. Only from about mid-century were the modernized Lothian collieries able to utilize the growing railway network with effect for the expansion of sales.

Reliance on the slow-moving Edinburgh market had vitiating mining entrepreneurship. Stagnationist tendencies were only overcome when more

favourable market conditions emerged after 1840, which created new opportunities for Lothian coalmasters. This development of demand elicited significant changes on the supply side.

Up to about 1850 landed proprietors were responsible for most of the Lothians' coal output. The subsequent modernization of the industry was carried out primarily by the mining tenant. By the early 1870s the local industry was growing as fast as the Scottish coal industry, and was to the forefront in the adoption of new techniques and methods of business organization.

Social change followed an even more backward path than economic development. Until the early 1840s in the Lothians large numbers of women and children were employed in the pits, the mining villages were squalid, and the colliers fitfully participated in violent unrest. High wages, spasmodic working patterns, and oppressive methods of social control in the early nineteenth century, gave way to low wages, regular working behaviour, and subtle methods of social control after the 1840s. The servile mining community was transformed into the community of deference. Paternalistic coal owners provided much improved social amenities. Trade unionism became docile. Between 1840 and 1870 the social significance of the landed presence in the mining communities increased, while its economic role declined.

The chief influences on the economic and social development of the Lothians' coal industry during the period under study were the evolution of the market, and the relative stability in employer-worker relationships.

## LIST OF ABBREVIATIONS

National Library of Scotland	NLS
Scottish Record Office	SRO
<u>Economic History Review</u>	<u>EHR</u>
<u>New Statistical Account</u>	<u>NSA</u>
<u>[Old] Statistical Account</u>	<u>OSA</u>
<u>Scottish Journal of Political Economy</u>	<u>SJPE</u>
<u>The Scottish Geographical Magazine</u>	<u>SGM</u>
<u>Transactions of the Mining Institute of Scotland</u>	<u>TMIS</u>
<u>Transactions of the Royal Scottish Society of Arts</u>	<u>RSSA</u>
Royal Commission	RC
Select Committee	SC

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PART ONE. THE DEVELOPMENT OF THE MARKET

CHAPTER ONE. THE MARKET FOR LOTHIANS' COAL IN THE  
EARLY NINETEENTH CENTURY

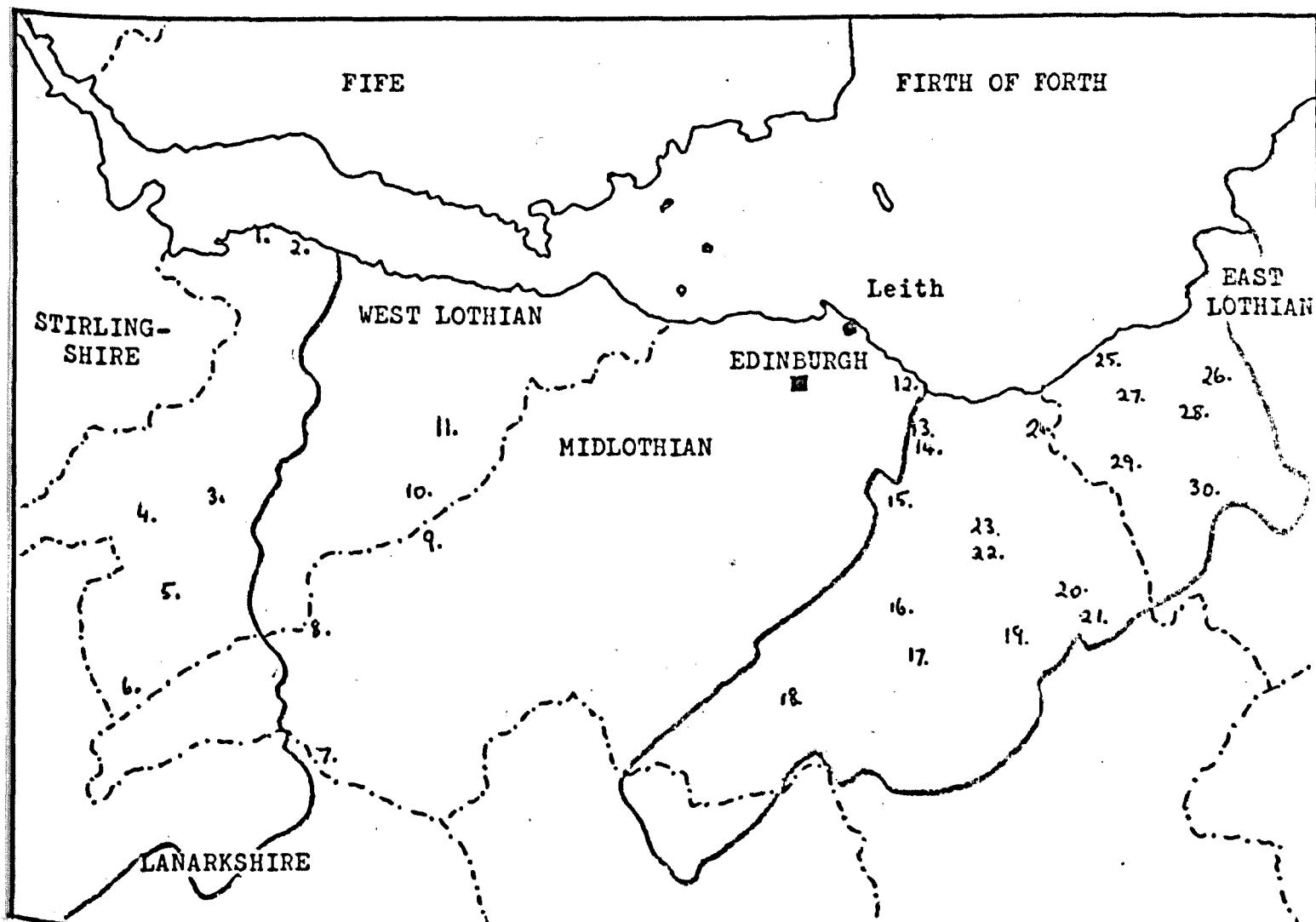
## CHAPTER ONE. THE MARKET FOR LOTHIANS' COAL IN THE EARLY NINETEENTH CENTURY

### Introduction

The region to be covered in this study encompasses the coalfields situated in the three Lothian counties of Scotland. The period 1815 to 1875 witnessed a considerable expansion of the Scottish coal industry. The Lothians' coal industry also grew but not to the same extent. Until the 1840s it exhibited many features of a backward sector, such as conservative management and the application of out-dated techniques. After the 1840s the Lothians' coal industry grew about as rapidly as the Scottish industry, and was modernized to an appreciable extent.

The coalfield of Mid and East Lothian, a few miles to the east and south of Edinburgh, was a small field isolated from the rest of the Scottish mining districts. It was of some antiquity, and indeed the Midlothian field had claims to be the oldest, and once the largest of the coal mining areas of Scotland. Mid and East Lothian constitutes the core of this study. Here the idiosyncratic features of the east of Scotland coal industry were found to the greatest extent in the nineteenth century: for example the resilience of the paternalistic coal proprietor, and a rather pacific tradition in industrial relations.<sup>1</sup> The coal works of West Lothian were really part of the coalfields of central Scotland, situated in the counties of Stirlingshire and Lanarkshire. The economic and social history of the industry in West Lothian corresponds more to that of west and central Scotland, and the area contrasts with the traditional Mid and East Lothian field.

<sup>1</sup> Mid and East Lothian and Fife were the most 'traditional' fields in the first half of the nineteenth century, with similar traits found to a lesser extent in Clackmannan and West Lothian. The East Lothian field, being intimately associated with the Midlothian coal industry, was considered an integral part of this study.

Map 1. The Lothian Coalfields

0 4 8 12 Scale of miles  
 - - - - -  
 Coalfield  
 County Boundary

Sites of Mining Villages or Collieries

- |                 |                  |                 |
|-----------------|------------------|-----------------|
| 1. Bo'ness      | 11. Broxburn     | 21. Vogrie      |
| 2. Grange       | 12. Portobello   | 22. Newbattle   |
| 3. Bathgate     | 13. Niddrie      | 23. Dalkeith    |
| 4. Armadale     | 14. Newcraighall | 24. Wallyford   |
| 5. Whitburn     | 15. Gilmerton    | 25. Prestonpans |
| 6. Fauldhouse   | 16. Polton       | 26. Gladsmuir   |
| 7. Cobbinshaw   | 17. Whitehill    | 27. Tranent     |
| 8. West Calder  | 18. Pencuik      | 28. Penstone    |
| 9. Mid Calder   | 19. Stobhill     | 29. Elphinstone |
| 10. Pumpherston | 20. Edgehead     | 30. Pencaitland |

A theme running throughout this study is that the character and evolution of the market was a major influence on industrial development and entrepreneurial performance. The growth of markets also stimulated transport improvements. For much of the first half of the nineteenth century the Mid and East Lothian coal industry exhibited many symptoms of a tired and 'comparatively exhausted' field. It is argued here that the legacy of a large, safe, and slowly growing market was partly responsible for this.

In this chapter attention is concentrated on market and transport developments that were particularly characteristic of the period from 1790 to about 1820, although for the sake of continuity certain demand sectors are examined beyond the latter date.

#### The Edinburgh Domestic Market 1790-1820

From 1790 to 1820 the city of Edinburgh suffered an acute coal shortage. Not all years were equally bad, but the expression 'coal famine' does not seem an exaggerated description of conditions at the time. To examine the causes of the scarcity will be the purpose of this section. This will reveal severe inadequacies in the production, transportation, and marketing of Midlothian coal. Only from the mid-1810s did the situation begin to improve.

Edinburgh constituted by far the most important market for Midlothian coal. Both Edinburgh and Leith coal consumption and the output of the Mid and East Lothian coalfield was in the region of 200,000 tons in 1800, and not very much coal was brought into

Edinburgh and Leith from other coal districts at this date.<sup>2</sup>

The Edinburgh coal market was dominated by household demand.

The Midlothian coalfield had for long been known as the Edinburgh citizens' 'own coal cellar'. Most of the important collieries were reckoned in 1800 to be not more than five miles distant, and few others not more than ten. Yet by this date the coalfield had become notorious for its inability to satisfy the city's growing fuel demands. The outcome was periods of dearth and high prices. The first such crisis was in 1792. Coal was so scarce that the city's magistrates offered a premium of one shilling per ton (besides giving up shore and other dues) on the first 10,000 tons of coal imported at Leith and sold to private families.<sup>3</sup> Such schemes brought scant relief. According to one authority peat was being carted into the metropolis for fuel in the 1790s.<sup>4</sup> Robert Bald estimated that from 1785 to 1808 the price of coal in Edinburgh more than doubled, and that by the latter date the pit-head price of coal near Edinburgh had reached 11s 8d per ton.<sup>5</sup> The year 1813 saw prices at new peaks - best Midlothian coals were costing the Edinburgh consumer 15s to 18s per ton, and imported coals were higher still.<sup>6</sup> Subsequently the situation eased, although prices remained at a high level.

2 C. Stewart, Considerations on the Use and Abuse of Scots and English Coal (Edinburgh, 1809), estimated that 250,000 tons of coal per annum were brought into Edinburgh and Leith 'for consumpt'; however, J. Grieve, Report on the Utility of a Bar Iron Railway from the City of Edinburgh to Dalkeith and to the Harbour at Fisherrow (Edinburgh, 1824), 17, estimated that 96,000 tons of coal passed through the two chief toll gates from Midlothian into Edinburgh annually. (But by then the Union Canal had been opened which would have altered things).

3 M. Sandilands, Letter to the Lord Provost of Edinburgh (Edinburgh, 1819), 1.

4 OSA, X, 419.

5 R. Bald, A General View of the Coal Trade of Scotland (Edinburgh, 1808), 2-3, 26, 30.

6 H. Baird, Report on the Proposed Edinburgh and Glasgow Union Canal (Glasgow, 1813), 17-19.

The years of Edinburgh's 'coal famine', 1790 to 1820, were ones when the Scottish economy as a whole was experiencing the 'Industrial Revolution', and naturally fuel demand was growing rapidly. The severity of the crisis in Edinburgh, against this background, stemmed from two sets of factors - firstly the unsatisfactory features of the coal market in Edinburgh itself, and secondly the rather inelastic supply of coal from the Mid and East Lothian coalfield.

One idiosyncracy of the Edinburgh market was the practice of classifying coals into three grades. The best grade was 'great coal', and was highly prized by the Edinburgh domestic consumer. It was produced by the collier hewing massive sections of coal from the seam. Indeed, the mark of a skilled collier was his ability to maintain a high proportion of 'great coal' to other grades. The intermediate grade was 'chows'. This had a certain sale in country districts in the Lothians, and for manufacturing concerns generally. The poorest grade was dross, but was known as 'panwood' or 'limewood' locally. In the Lothians this tended to be thrown away as rubbish, except near salt-pans or lime-kilns where it found employment - hence its name. At Sheriffhall Colliery from 1811 to 1827 the output of chows and limewood was barely 8% of the output of great coal, as registered in the colliery accounts.<sup>7</sup> This might indicate the great skill of colliers at this important Midlothian colliery in hewing great coal, or alternatively the disinterest of management in taking account of lesser grades of coal. On the other hand at Grange Colliery, West Lothian on the Forth, where the salt pans and shipping trade took large quantities

7. Buccleuch MSS, SRO GD224/986/3, Sheriffhall Colliery Account Book, 1793-1827.

of chows and panwood, the output of these two grades amounted to over half that of great coal in the 1790s.<sup>8</sup>

The Midlothian triple-grade system, according to certain authorities, limited the total quantity of coal coming onto the market, and pushed up prices.<sup>9</sup> Ironically, although meticulous attention was often paid to the production of great coals, the resultant blocks had to be reduced to smaller size for transportation, and the Edinburgh consumer had to break up great coals into manageable sizes for use in the home. Bald was still criticizing the triple-grade system in 1830,<sup>10</sup> although it was not until about 1850 that firm measures were being taken in the county for its abolition.<sup>11</sup>

In the Glasgow area (and East Lothian) a more logical system prevailed: there was no obsession with three grades of coal, only two being known - 'coals' or 'mixed coals' and 'dross'. There was a ready outlet for dross in the steam engines of the area. Only two grades being marketed led to no apparent disadvantage for the consumer.<sup>12</sup> The Midlothian custom probably originated from the quality Edinburgh domestic market. But the more rapid expansion of demand from manufacturing and shipping put the Midlothian collieries at a disadvantage, as they were geared to the three-grade system. Consequently, according to Bald, English competition was sweeping all before it in the Forth in 1829.<sup>13</sup>

8. OSA, I, 98.

9. Bald, Coal Trade of Scotland, 42-52; J. Dunlop, Observations on the Account of a Plan for the better supplying the cities of Edinburgh and Glasgow with coal, (by an 'old Coal-Master'), (Edinburgh, 1800), 9.
10. R. Bald, 'Mines', The Edinburgh Encyclopedia, vol. XIV (1830), 377.
11. Buccleuch MSS, SRO GD 224/582. At a 'Meeting of the Representatives of the Newbattle, Dalkeith and Arniston Collieries' on 25 October 1849, it was agreed 'that the practice of separating the coals into Greats and Chows should be given up immediately'.
12. Bald, Coal Trade of Scotland, 38-9, 44-5, 47.
13. Cadell MSS, R. Bald, 'Observations regarding the Present and Proposed mining operations at Bo'ness Colliery, property of the Duke of Hamilton, under lease to J.J. Cadell', 12 March 1829.

One reason why Edinburgh consumers may have preferred great coals was the malpractice of coal carters. Householders were said to order only 'large coals ... in blocks' from carters because of their belief that 'mixed coals' were of such an 'undefined and uncertain character that they never could rely on the carters for supplying them with such coals'. It was maintained that the carters would purchase poor quality coals, and mix these with their loads.<sup>14</sup>

Certainly by the early nineteenth century the Midlothian coal carter had earned quite a reputation for unscrupulousness and inefficiency. The transportation and marketing of Midlothian coal was primarily in their hands. The published confessions of one of this band, one John Drouthy, provides insights into contemporary conditions. Drouthy's deceits were carried on for a number of years after 1810. Allegedly these were typical examples of the 'infamous practices' committed by members of the carting fraternity against the public. Most commonly this involved selling underweight. Already by the time Drouthy was operating the police were trying to control the trade by requiring certificates to be affixed to coal carts, indicating their true weight. This practice Drouthy described as 'more as a cloak than a check' to dishonest dealing. The loads were simply lightened off their load (in many cases) after police certification, but before sale to the public. It further transpires that domestic servants were not averse to receiving bribes from carters for conniving at the latters' activities.<sup>15</sup>

14. Buccleuch MSS, SRO GD 224/582, 'An Extract from Mr. Farey's Report to His Grace The Duke of Buccleuch on his coal property in the parish of Dalkeith', C 1818.

15. J. Drouthy, The Life of John Drouthy, An Edinburgh Coal Carter; in which is contained a Full Confession of the practice of himself and others of his profession whereby The Public are daily defrauded to an almost incredible amount. Written by himself (Edinburgh, 1821), 4-24.

Drouthy's story was eccentric. But the future attempts by Rail and Canal authorities, as well as by the Police and Magistrates in Edinburgh, to counter such deceits as these, and also frequent convictions of carters for such offences suggests Drouthy's tale was not a total invention.

More serious than the business ethics of the coal carters was the overall system of marketing in Edinburgh. Independent carters dominated the trade from the pit-head to the consumers' cellar. Their equipment was often archaic, their work-load unimpressive and erratic, and buying arrangements at the pit-head were unorganised resulting in much waste of time. This chaos was repeated at the selling end of the operation. Typically, coals were '... hawked about, and set in the streets in 12 cwt. loads, waiting for sale, and loosing the time of a Horse, as well as of a Man'.<sup>16</sup> In 1800 there was a relative absence of firms of coal merchants, coal-yards and depots. This inefficient system was naturally costly. From the estimates that are available it appears likely that the price of coal to the Edinburgh consumer was about double the pit-head price at the pits in Midlothian a few miles away. The discrepancy compared to more distant, low-cost land-sale collieries was far greater.<sup>17</sup>

Not surprisingly schemes were mooted to bring coal from distant low-cost collieries to the fuel-starved capital. But the cost of land transport was prohibitive,<sup>18</sup> despite the inflated prices prevailing in Edinburgh. A more feasible proposition was

- 16. Buccleuch MSS, SRO GD 224/582, 'An Extract from Mr. Farey's Report to His Grace The Duke of Buccleuch on his coal property in the parish of Dalkeith', C 1818.
- 17. H. Stewart, Supplement to an Account of a Plan for the better supplying the City of Edinburgh with Coal (Edinburgh, 1800), 12.
- 18. B. F. Duckham, A History of the Scottish Coal Industry, I, 1700-1815 (Newton Abbot, 1970), 34-5.

shipment of coal by sea from coastal coalfields. This trade may have been greater had it not been for substantial transport and marketing costs even after delivery at Leith Harbour. In the 1810s the cost of cartage, tolls, weighing, etc. of sea-borne coal from Leith to Edinburgh was about 3s 8d to 3s 9d per ton.<sup>19</sup> Nevertheless 'coal famine' conditions did attract distant supplies to the capital. English coal shipments to Leith grew from about 1,500 tons in 1801 to 12,500 tons in 1820. Meanwhile the price differential between Best Midlothian and Newcastle coals in Edinburgh had narrowed from an estimated 13s 4d and 23s per ton respectively in 1800, to 16s and 19s per ton in 1812.

Scottish, especially Fife and Clackmannan, coals were also important. By 1786-7 shipments of 'Forth' coal into Leith were 15,000 tons.<sup>20</sup> In 1808 55,000 tons of Scottish coals were shipped into Leith. This, however, was a peak for the 1801-1821 period. Gross shipments of coal into Leith after spurring forward from 1801 to 1808 levelled off thereafter.<sup>21</sup> Shipments of Scottish and English coal do not appear to have ameliorated the coal shortage in Edinburgh, and 'famine' conditions abated from the mid-1810s mainly due to other factors.

One fruitful legacy of the rise of the sea-borne trade, however, was the spread of coal-yards and depots in Edinburgh and Leith. The advent of coal-yards in Leith in the late eighteenth century was related to the anxiety of shipmasters not to waste time at the quay disposing of their cargo.<sup>22</sup> By 1817 R. Stevenson

19. SRO Court of Session Processes, Miscellaneous Documents, RH 15/1461, John Walker, Coal Merchant, Leith, Day Book 1812-14; Ibid, RH 15/1480, Unknown Coal Merchant and Carrier, Edinburgh, Ledger 1809-17.

20. Duckham, Scottish Coal Industry, 227.

21. Report of the Commissioners appointed to inquire into the several matters relating to Coal in the United Kingdom, vol III, Report of Committee E, 76, (PP 1871, XVIII).

22. Duckham, Scottish Coal Industry, 227.

believed that the days of acute coal shortage in Edinburgh were past, because of new sources of supply opened up, and '... from the present system of depots or coal-yards for this article'.<sup>23</sup> The rise of firms of coal merchants with fixed premises helped counter irregularities in the trade, and short-term fluctuations in supply. By 1809 they helped to supplement the winter supply of coal in Edinburgh, in addition to that procured from Midlothian coal bings.<sup>24</sup> By the 1810s firms specializing in the sea-borne trade were common in Edinburgh and Leith. For the Midlothian trade, although one firm dated its existence back to 1784, the practice of hawking coal directly from the pits lingered on for many a year.

While primitive marketing and transport arrangements had aggravated the 'coal famine', inelasticity of supply from the Midlothian coalfield had also contributed to the crisis. This inelasticity derived from geological and managerial problems. The Midlothian coal industry had thrived in the eighteenth century on the exploitation of the steeply sloping 'edge seams' cropping out at the surface, or at shallow depths, and with drainage mostly 'level-free'.<sup>25</sup> By the 1790s these level-free workings were nearing exhaustion, and pit villages based on these shallow mines, like Duddington and Joppa, fell into decay in the nineteenth century.<sup>26</sup> Continued expansion of output necessitated investment in deeper pits and the installation of expensive steam pumps and winding equipment, which the Midlothian coalmasters were ill-disposed to do.

- 23. R. Stevenson, Report relative to a line of Canal upon One Level between the cities of Edinburgh and Glasgow (Edinburgh, 1817), 24.
- 24. Stewart, Scots and English Coal, 7-8.
- 25. 'Edge seams' inclined very sharply - right up to the vertical - and were characteristic of Mid and East Lothian. 'Level-free' drainage makes use of adits; that is no mechanical equipment or power is used.
- 26. W. Baird, Annals of Duddington and Portobello (Edinburgh, 1895), 30-2.

Technical standards in the early nineteenth century were backward: underground haulage relied heavily on female labour, and in the stoop-and-room method of coal working up to one-third of the coal strata was lost.<sup>27</sup>

The Edinburgh 'coal famine' was produced, therefore, by the coincidence of a rise in the demand for coal nationally, and a failure to overcome geological and technological challenges in the Mid and East Lothian coal industry at a crucial point in its development.

The inability of the local industry to meet Edinburgh's steadily growing demand was not entirely due to 'entrepreneurial failure'. Compared to others in Scotland the Midlothian pits were wetter, deeper, and suffered more dislocated strata. Wages and raw material costs had risen considerably since 1785. Bald estimated that the price of labour had doubled in the Forth area between 1800 and 1808.<sup>28</sup> And Midlothian was in any case a high-wage area compared to other British coalfields. Midlothian pits could not hope to compete on equal terms with the recently opened-out pits of east Lanarkshire, which were shallower and seams much thicker. It was estimated in 1800 that the cost of bringing one ton of coal to the surface at Cleland was not more than 2s 6d, while in Midlothian it was from 3s to 5s.<sup>29</sup>

Despite mitigating circumstances the general picture of entrepreneurial caution in Midlothian remains. In the area of sales promotion the Lothian coal producers were progressively losing their position as an important shipping district. As early as

27. The subject matter of this paragraph is dealt with more fully in chapter seven.

28. Bald, Coal Trade of Scotland, 24-6.

29. See, H. Stewart, Account of a Plan for the better supplying the City of Edinburgh with Coal (Edinburgh, 1800), 63, 67, 71; Dunlop, Observations on the Account of a Plan, 13-30.

1800 the 'coaleries on the Firth of Forth' no longer strove after London and Baltic markets, being content with local sales.<sup>30</sup> In 1790-1 foreign shipments from Forth ports were 33,417 tons of coal. In 1830 less than 3,000 tons were shipped abroad from Leith.<sup>31</sup> The coalmasters' narrow attitude to sales development is reflected in their chronic tendency to try to combine together to control the Forth or Edinburgh trades.<sup>32</sup> The complacency of Lothian coalmasters and reliance on the safe Edinburgh market (up to the mid-1810s) is manifest by no real effort being made to grapple with the appalling transport and marketing facilities of their coal in this trade.

Analysis of the Edinburgh coal shortage must be set against the background of a national inflation of fuel prices in 1790 to 1820. Elsewhere there was a similar lack of adjustment of ancient practices to modern conditions. The '... frauds and abuses, anomalies and grievances' of the Newcastle-London coal trade were notorious at this time.<sup>33</sup>

The Glasgow coal market, however, is much more comparable to the Edinburgh trade. By 1800 it was well organized. The Forth & Clyde and Monkland canals (opened in 1790 and 1793 respectively) brought large and growing quantities of coal into the city. The carting section of the trade, bringing in coal from local collieries, was much better organized than in Edinburgh. The carters were controlled by the collieries, who employed agents in the city responsible for taking orders and arranging coal deliveries.<sup>34</sup> It

30. Stewart, Account of a Plan, 26.

31. Report of the Commissioners appointed to inquire into the several matters relating to Coal in the United Kingdom, Appendix to Report of Committee E, 74-5, (PP 1871, XVIII). See also Duckham, Scottish Coal Industry, 230.

32. See chapter five, p.167.

33. R. L. Galloway, Annals of Coal Mining and the Coal Trade, I (Newton Abbot reprint 1971, originally published 1898), 457 et seq.

34. Bald, Coal Trade of Scotland, 29-34.

is true that there were a number of attempts by the Glasgow coal-masters to control the trade by combination in this period. These agreements did not stop a continued expansion of coal output. Output at all the collieries involved in selling coal in Glasgow doubled between 1793 and 1810 to 320,000 tons.<sup>35</sup>

Only from the 1810s does there appear to have been an effective and energetic response from Midlothian coalmasters to the situation in their region. Sir John Hope and the Marquis of Lothian raised output significantly at the collieries of Sheriffhall and Newbattle. Sir John Hope further constructed a colliery waggonway in the 1810s to expedite his Edinburgh sales. His drive, however, was quite unique in the Midlothian coal industry.

#### Toying with the Transport Problem

Roads and Ports. There was much awareness in Edinburgh circles of the deficient communications of the region, especially with regard to coal carriage. Various schemes were proposed during the 'coal famine' to remedy the situation, most ineffectually. This section deals with transport developments in the region up to the early nineteenth century, and the promotion of the Edinburgh & Glasgow Union Canal (opened 1822) and the Edinburgh & Dalkeith Railway (opened 1831) which eventually broke down the district's isolation.

In the eighteenth century modes of land transport in the Lothians had been extremely backward. Female carriers bore salt

35. H. Hamilton, The Industrial Revolution in Scotland (1966 edition), 171. See also H. Hamilton, 'Combination in the West of Scotland Coal Trade, 1790-1817', Economic History, vol. 2, 5 (1930).

into Edinburgh from the saltpans to the east,<sup>36</sup> and coal was brought in on horseback in loads of about 2½ cwt. The introduction during the eighteenth century of the two-wheeled cart in the Lothians (albeit inferior to the four-wheeled waggon common around Glasgow)<sup>37</sup> was therefore an advance of no small degree.

The advent of wheeled traffic depended on improvements in roads. This was effected during the great era in Scotland of road construction from 1750 to the 1790s associated with the activities of the Turnpike Trusts. By the latter decade many roads of high standard could be found in Midlothian.<sup>38</sup>

In the nineteenth century road improvement continued. From the 1820s there was a drive to 'Macadamize' the roads in parts of Midlothian, and there was a considerable agitation to improve the turnpike roads associated with the intention of improving communication and the mail service with London.<sup>39</sup> On the whole, by the 1840s, roads appear to have been quite good in the Lothians.<sup>40</sup>

In the coal districts the situation was different. Roads were incapable of being kept in good repair because of heavy mineral traffic, and were incapable of overcoming the transport problem suffered by the coal industry.<sup>41</sup>

During the first two or three decades of the nineteenth century there was a considerable growth of steam shipping around the waters of the Forth. This was not without importance as a developing market for coalfields on the Firth. The modernization

36. OSA, XVIII, 358.

37. Bald, Coal Trade of Scotland, 30-1.

38. G. Robertson, General View of the Agriculture of the County of Midlothian (Edinburgh, 1793), 40.

39. Morton MSS, SRO GD 150/2342, Report of John Loudon McAdam, Esq. of the City of Bristol, To the Trustees of the Turnpike and other High Roads in the County of Edinburgh, 27 August 1819; Stair MSS, SRO GD 135/82, General Documents.

40. See, NSA, I, 359; I (1845), 576; II (1839), 299; II (1843), 162.  
41. Stewart, Scots and English Coal, 41-2; NSA, I (1839), 71-2.

of harbour facilities, however, lagged well behind the growth of traffic. Masters of larger coal-carrying vessels were unwilling to call at Leith and Fisherrow harbours in 1824 because of deficient facilities.<sup>42</sup> Considerable sums were being expended on port and harbour improvements at Leith, but evidently never commensurate with the growing requirements of the shipping trade.<sup>43</sup> In 1839 it was stated of Fisherrow, that because of the proximate abundance of coal, the 'improvement of the harbour would unquestionably increase trade and manufactures'.<sup>44</sup>

In the eighteenth century certain larger coal proprietors on both banks of the Forth had improved shipping facilities: Allya,<sup>o</sup> Bo'ness, or Prestonpans were very much their creations.<sup>45</sup> But evidently the capacity of the Forth ports was strained in the first half of the nineteenth century. At the 'earnest request of steam-boat proprietors' the Duke of Buccleuch constructed a new harbour at Granton to the west of Leith. The work took place between 1835 and 1844, costing an estimated £500,000.<sup>46</sup> A much more modest project was conceived by the Cadells of East Lothian at Cockenzie, where a harbour was begun in 1835 'for the purpose of shipping coal', and costing £6,000.<sup>47</sup>

Only after 1850 was there a significant upturn in coal shipments from such Lothian ports as Leith, Bo'ness, and Granton.

42. Grieve, Report on Utility of a Railway, 13-14.

43. See, 'Nauclerus', The Question Stated as to Leith, Trinity, & Granton (Edinburgh, 1837), 11 *et seq.*; NSA, I (1845), 767-770.

44. NSA, I (1839), 304.

45. T. C. Smout, 'Scottish Landowners and Economic Growth 1650-1850', SJPE, vol. 9 (1964), 220.

46. Ibid., 222; NSA, I (1845), 601.

47. NSA, II (1839), 300.

This was after further improvements in harbour equipment had been effected, and rail links from the coalfields completed.

Canals. The opening of the Forth & Clyde and Monkland Canals in the early 1790s was a revolutionary departure in the mode of transport such as was badly needed in the Edinburgh district. Coal could be brought via the Forth & Clyde and Firth of Forth to Leith from the newly opened up Lanarkshire fields. But the route was too tortuous to make an impact on the fuel supply situation in the east.

Only a direct canal to Edinburgh from the west tapping the mineral districts of Lanarkshire, Stirlingshire, and West Lothian would achieve this. The bursts of promotion of such a canal coincided with periods of unusually high coal prices in Edinburgh: 1791-3, 1797-1800, and 1813-14. Only the last wave of promotion was sufficiently sustained so as to secure an Act of Parliament authorizing the Edinburgh & Glasgow Union Canal in 1817, and its completion in 1822.

The chief purpose of the canal was to bring cheaper coal to Edinburgh. The moving spirits behind the project were the Lord Provost, magistrates, and notables of Edinburgh. At a meeting of subscribers to the proposed canal in 1814, it was agreed that the line should be welcomed, 'as ... securing to the City of Edinburgh beyond all doubt an abundant supply of coal'.<sup>48</sup>

The delay in securing the success of the project was due partly to opposition from local interests, including those representing the port of Leith who feared that the canal would damage the town's trade. The Midlothian coal producers also offered some opposition.<sup>49</sup>

48. Union Canal Company Minute Books (hereafter indicated by annotation UCMB), SRO BR/EGU/1/1, 22 January 1814. See also Baird, Report on Proposed Union Canal, 13, 17-19.

49. Dunlop, Observations on the Account of a Plan, 20-2; UCMB, SRO BR/EGU/1/1, 12 March 1814.

More generally the success of the promotion depended on two factors: firstly, proof of the efficacy of canal transport in Scotland (the Monkland canal only became profitable after 1807),<sup>50</sup> and secondly, the cumulative aggravation of repeated coal shortages felt by the inhabitants of Edinburgh which drove home the need for a canal.

The approaching opening of the Union Canal in the early 1820s had two good effects. In the first place it encouraged coal-masters along the line to develop their works and make preparations for the Edinburgh market.<sup>51</sup> In the second place it bestirred the Midlothian coal producers to consider ways of countering competition from the west by improving communications in their own county.

Early Railways. Railway development may, perhaps, be conceived in three phases. Firstly, there is the age of colliery waggonways. These are privately owned,<sup>and</sup> used almost solely for carrying minerals. Horse-drawn traction is employed on wooden plateways. Secondly, there is the age of transition and experimentation between about 1800 and 1830, when railway projects of a hybrid nature are launched. Thirdly, the Liverpool & Manchester Railway inaugurates the 'Railway Age' in 1830. This is characterized by public companies who carry passengers and mail, as well as minerals and goods. Steam locomotives draw trains running on wrought iron edge rails.<sup>52</sup>

50. J. Lindsay, The Canals of Scotland (Newton Abbot, 1968), 59.

51. UCMB, SRO BR/EGU/1/2, 10 August 1821.

52. This periodization presents only a general picture. There are, obviously, exceptions and precursors. See M. J. Lewis, Early Wooden Railways (1970), chap 15; B. Baxter, Stone Blocks and Iron Rails (Newton Abbot, 1966), 37-53.

These phases can be identified in the Lothians, although predictably there is a considerable lagging behind national developments.

The first colliery waggonway in Scotland was the Tranent line in East Lothian. It was constructed in 1722 and ran from the coal pits around Tranent to the harbour of Port Seton. The line was acquired by the Cadell family who had the wooden track re-laid with cast iron rails in 1815. The Pinkie waggonway of Sir John Hope was a two-mile long track in Midlothian. It was completed before 1815, and constructed partly with cast iron and partly wrought iron rails. The Edmonstone waggonway was constructed about 1818 and belonged to the Don Wanchope of Edmonstone family. It was used to bring coal from their Midlothian colliery about half-way to Edinburgh.<sup>53</sup> There also appears to have been a short colliery waggonway built at Bo'ness, West Lothian about 1825-6.<sup>54</sup>

The hybrid phase of railway history was represented in the Lothians by only one completed project - the Edinburgh & Dalkeith Railway. The first suggestions for a public means of conveyance from the Midlothian coalfield to Edinburgh were made about 1800. They aroused little enthusiasm. In 1808 a suggestion was made that at some stage in the future a 'waggon road or iron railway' might be constructed from the pits about Dalkeith to Edinburgh.<sup>55</sup> But it was not until 1818 that the 'Duke of Buccleuch ... and other Noblemen and Gentlemen' commissioned Stevenson himself to make a survey for such a line.<sup>56</sup> Other coal proprietors like Sir John Hope

53. G. Dott, Early Scottish Colliery Waggonways (1947); D. Marshall, A History of British Railways down to 1830 (Oxford, 1938); Duckham, Scottish Coal Industry, chap 8; Grieve, Report on Utility of a Railway; R. Stevenson, Report on Proposed Line of Railway between Edinburgh and Dalkeith (1818).
54. Cadell MSS, H. F. Cadell to J. J. Cadell, 11 September 1826; NSA, II (1843), 72.
55. Stevenson, Proposed Railway between Edinburgh and Dalkeith, 35-6.
56. Ibid, 1.

and John Clerk of Eldin were involved in the promotion of the Midlothian railway.

The main reason why the Midlothian coal owners promoted the Edinburgh & Dalkeith Railway was to counter competition from coals borne from the west on the Union Canal into Edinburgh.<sup>57</sup>

Stevenson had emphasized in 1818 that the main purpose of the canal was the carriage of Stirlingshire and West Lothian coals to Edinburgh. If Edinburgh was so supplied (and coal also came from Fife across the Forth) the effect would be to:<sup>58</sup>

shut up the works of the Midlothian coal proprietors  
... a consequence which must follow if things are allowed to remain in their present state, from the disadvantages of an expensive land carriage, when brought in competition with the water-borne coal of West Lothian and Fifeshire, and it is no less so to the community of Edinburgh that a third avenue should be opened, or, to speak more properly, that the access to the present source for its supply from Midlothian should also be improved.

Grieve in his 1824 report mirrored similar fears of the Midlothian coal proprietors. He warned also of the consequences of railways (which had been authorized) bringing coal from Lanarkshire to the canal. After a further report by James Jardine, an Act authorizing the line was passed in 1826, and the railway opened in 1831.

The Edinburgh & Dalkeith was virtually obsolete by this time. It was a winding, horse-drawn line, intended primarily for mineral traffic. Cast iron, as opposed to wrought iron, rails were used, admittedly of the modern fish-bellied design. There were three other hybrid railway projects in the Lothians before 1830. Of

57. Buccleuch MSS, SRO GD 224/525, John Farey to Duke of Buccleuch, 21 May 1818. The Midlothian coal proprietors were prominent on the management committees of the Edinburgh & Dalkeith. Its shares were almost all held by local residents, and at least a third by persons representing the coal interest. Stair MSS, SRO GD 135/82, 'Roll of The Proprietors of The Edinburgh and Dalkeith Railway Company', January 1834, cited by W. Vampleur, 'Sources of Scottish Railway Capital before 1860', SJPE, vol 17 (1970), 429.

58. Stevenson, Proposed Railway between Edinburgh and Dalkeith, 27-8.

these only the West Lothian Railway even got to the stage of securing an authorizing Act of Parliament (1825). It was intended to use horse traction on cast iron rails. The main promoters were the managers of the Union Canal, who planned to link up the rich Benher coalfield of Stirlingshire with the Union Canal.<sup>59</sup> The project, however, was abandoned. In 1817 a railway was envisaged from Midlothian to the Borders to relieve the fuel scarcity there. Stevenson was commissioned to prepare a report on this proposal in 1821 by the gentry of the shires involved, including a notable Midlothian coalmaster, the Marquis of Lothian.<sup>60</sup> In 1824 Stevenson was also called upon to make a report on a proposed East Lothian Railway. The moving spirits included East Lothian coal proprietors, and the main purpose of the line was the better distribution of East Lothian coal, particularly for the Edinburgh market.<sup>61</sup>

In conclusion, before 1822 the transport problem had only been toyed with in the Lothians, and in the Mid and East Lothian coalfield it remained unsolved for another decade. In the west of Scotland canals had begun a Transport Revolution in the 1790s, and railways in Lanarkshire were to continue this in the 1820s. By comparison the achievements around Edinburgh were paltry. Vamplew argues that the railway mania of the 1830s experienced in England hardly touched Scotland.<sup>62</sup> Certainly as far as the Lothians are concerned the 'Railway Age' in its full implications did not arrive until the 1840s.

59. H. Baird, Report to the Subscribers for a Survey of the Proposed Railway from the Union Canal at Ryal to Whitburn, Polkemmet, and Benher; or the West Lothian Railway (18 December 1824).
60. R. Stevenson, Report on Proposed Roxburgh & Selkirk Railway (Edinburgh, 1821).
61. R. Stevenson, Report of a Survey for the East Lothian Railway (Edinburgh, 1826).
62. Vamplew, 'Sources of Scottish Railway Capital', 426.

### The Evolution of Fuel Demand

Introduction. This section examines the development of industrial demand for Lothian coal concentrating on those sectors which were typical of the Lothians' industrial structure of the late eighteenth and early nineteenth century. The survey continues beyond the 1820s (the period up to which this chapter is primarily concerned) for two reasons. The first is for the sake of continuity, and the second is to assess the impact of the coal demand of the industrial base which the Lothians inherited from the late eighteenth century on the longer-term development of coal mining in this region.

The theme pursued is that although the industrial pattern of demand for Lothian coal was diverse and varied, it hardly amounted to the explosive formula obtaining in the regional economy of the west of Scotland in the first half of the nineteenth century. One can also take into account the ponderously evolving Edinburgh domestic market. Then, it is broadly clear why the Lothians' coal industry did not display spirited entrepreneurship, and why transport and production problems were approached in a conservative manner.

Nevertheless during the first fifty years or so of the nineteenth century the closing phases of a fundamental transformation in fuel technology were being completed. The economy of the Lothians was achieving the final transition from a vegetable fuel to a mineral fuel base.<sup>63</sup>

Many typical Lothian industries like salt distilling, soap boiling, and glass making had long since converted to the use of

63. Or more generally the Lothians were relinquishing the use of 'pre-industrial' sources of energy (natural, animate, or vegetable sources of power) for 'modern' sources (inanimate and mineral sources).

coal as a fuel. More broadly in Scotland as a whole (unlike other parts of Europe) the charcoal phase in iron manufacture had been virtually left behind quite recently. On the other hand Scottish textiles continued to rely on water-power to some extent. This was especially true of the Border woollen industry, which became a significant market for Lothian coal after going over to steam later in the century. In land and sea transport reliance on the horse and wind was slowly giving way to steam.

The adoption of coal as a fuel depended to a great extent on adequate transport facilities. The difficulties in establishing lime kilns in remoter districts related directly to the expensiveness of the land carriage of coal in the early decades of the nineteenth century.<sup>64</sup>

In this context the evolution of the domestic fuel market outside Edinburgh deserves mention. In the Lothians the use of vegetable fuels (peat, turf, brushwood) persisted in a few remote districts in the 1790s.<sup>65</sup> But by the 1830s and 1840s this was very rare.<sup>66</sup> In the Borders, however, even in these decades the cost of Midlothian or Northumberland coal was such that it had to concede first importance to peat or turf in a number of remote parishes. Nevertheless this was becoming increasingly less typical. Of out-of-the-way Ettrick it could be said: 'But coal is beginning to be a favourite, and many would prefer a "coal fire" were it not for the expense, on account of the distance from which the material is to be brought'.<sup>67</sup>

64. NSA, III (1834), 3; NSA, I, (359).

65. Robertson, General View of Midlothian, 29, 78; OSA, I, 125.

66. NSA, II (1835), 128.

67. NSA, III (1834), 76. See also NSA, II (1834), 317; NSA, III (1834), 70, 317; (1837), 250-1; (1839), 406, 418, 439.

On balance for domestic hearths and industrial users coal was a more economical and cleaner fuel than its rivals, and its fuller adoption was but a matter of time and improved communications.

The Lime and Salt Industries. A determining factor in the location of the salt-distilling and lime-burning industries was access to supplies of fuel. The relationship between the coal industry and the salt and lime sectors in the Lothians was close. The latter industries benefited from supplies of a cheap fuel - dross. Coal mining benefited as there was little other outlet in the region up to the early nineteenth century for 'panwood' or 'limewood' - a derived product from the production of great coal. There were a large number of integrated coal and salt enterprises. The construction of waggonways to Pinkie and near Cockenzie was partly motivated by the need to supply the salt pans on the Forth with coal. There were also some integrated coal and lime works. In the 1860s one small entrepreneur, James Drysdale, carried on coal and lime works in the lands of Side, Midlothian, the bulk of coal output being consumed at the lime kilns.<sup>68</sup>

In the Scottish context the Lothians were an important centre for both these industries. In 1800 the Lothians produced an estimated 370,000 bolls of lime out of a total identifiable output for Scotland of about two million bolls.<sup>69</sup> As for the salt industry, the south shore of the Forth was the major concentration in Scotland.<sup>70</sup> For the Lothians' coal industry, however, both sectors declined in importance as markets during the nineteenth century.

68. Records of the National Coal Board (hereafter indicated by annotation CB), Geddes Records, SRO CB10/6, J. R. Williamson, 'Report on Coal and Limestone in lands of Side', 15 September 1866.
69. A. Clow and N. L. Clow, The Chemical Revolution (1952), 477.
70. See I. H. Adams, 'The Salt Industry of the Forth Basin', SGM, vol 81 (1965), 153 et seq.

Lime was used in farming and building, and the Agricultural Revolution and the construction of Edinburgh New Town exemplify the buoyant basis of the growth of the industry in the eighteenth century. For a considerable number of Lothian coal pits lime kilns were an important outlet for their produce. To take just one example, Loanhead Colliery, Midlothian was said to provide much of the 12,000 tons of coal consumed annually by the kilns at Burdiehouse in the 1830s.<sup>71</sup> Integration of activity was encouraged when the two chief raw materials, limestone and coal, were mined from the same workings. Duckham suggests that the Scottish lime industry consumed between 100,000 and 150,000 tons of coal per annum in peak years in the late eighteenth and early nineteenth centuries.<sup>72</sup> There is no doubt that for the coal industry in East Lothian in particular the local significance of the demand from lime burning was considerable.

During the course of the nineteenth century small rural lime kilns became far less common, many rendered unviable in periods of falling prices. Works became larger in scale and smaller in number. Only a minute handful of 'lime burners' in the Lothians returned coal usage figures to the 1871 Coal Commission (admittedly an uncertain guide).<sup>73</sup> By this time iron and shale-oil companies were assuming control of the industry regionally. But by the twentieth century most kilns in the Lothians had fallen into permanent disuse.<sup>74</sup>

By 1700 a large salt industry was established in Scotland, located in a limited number of coastal sites, especially the Forth

71. NSA, I (1839), 20-1.

72. Duckham, Scottish Coal Industry, 25.

73. Report on Coal, vol III, Appendix to Report of Committee E, appendices 191, 193, 196, (PP 1871, XVIII).

74. B. C. Skinner, The Lime Industries in the Lothians (Edinburgh, 1969), 34.

basin, where topographical features were particularly favourable. The principal raw material was sea-water which was evaporated in salt pans on the fore-shore through the application of heat. A salt residue remained. Salt was a vital ingredient for food preparation and preservation, and of especial importance in the Scottish herring industry. From the late eighteenth century it acquired growing significance as an industrial raw material. Salt was employed in the production of the common alkali, soda, which in turn was in growing demand from the glass, soap, textile, and other industries.

The Cheshire rock salt industry always threatened the Scottish industry. Largely owing to far lower fuel costs Cheshire salt was produced at up to one-eighth of the cost of Scottish salt. The Scottish industry owed its survival primarily to protective fiscal arrangements originating in the Union of 1707. The duties on Scottish salt were only about 30% of those levied on English salt. Scottish salt imported into England was not subjected to English rates, until 1780 - which expedited the decline of the Scottish industry. The death knell was not sounded until 1823. In that year, owing to pressure from industrialists, salt duties were removed almost entirely in both countries, and an open market in the Salt trade created.<sup>75</sup>

Originally vegetable fuel was used at the salt-pans. By 1714 there was only a handful using peat, the rest being coal-fired. Changes in fiscal arrangements determined the course of the industry. Bald in 1808 stated that most of the Forth saltpans were already 'in ruins', and 'their places only known by the retaining of the

75. The account of the last two paragraphs is drawn from E. Hughes, Studies in Administration and Finance, 1558-1825 (Manchester, 1934), 413 et seq; and Clow and Clow, Chemical Revolution, chapter two.

name'.<sup>76</sup> In 1700 there had been about 164 pans operating in Scotland. In 1836 there were apparently only 15 in production, all but two on the Forth.<sup>77</sup>

In its hey-day the salt industry was a very important market for Lothian coal. It was a voracious consumer of fuel, 100 tons of sea-water having to be evaporated to produce 3 tons of salt. As late as 1818 the Forth coalmasters claimed that the saltpans consumed 100,000 tons of coal annually, and ruin would come to the coal industry around the Forth and many thrown out of work if the fiscal protection was withdrawn.<sup>78</sup>

Despite the fiscal amendments of 1823 the Lothians' salt industry limped on through the nineteenth century, and for two main reasons. Firstly, there were improvements in technique. Salt-pans were reconstructed, better furnaces and pumps employed, and a certain amount of Cheshire rock-salt was introduced into the solution which greatly reduced the amount of boiling necessary, and therefore fuel costs.<sup>79</sup> Secondly, the much reduced scale of the industry appears to have enabled the limited quantity of salt to be viably manufactured and sold in local markets.

Thus at a handful of sites in the Lothians salt-distilling was carried on profitably, especially in the first half of the nineteenth century. Modest profits were made at Grangepans over the period 1801-1863.<sup>80</sup> About 1850 owing to difficulty in securing a steady supply of coal Sir John Hope was sinking a new pit near the pans at Pinkie. It was expected that the saltpans would 'give

76. Bald, Coal Trade of Scotland, 84.

77. Adams, 'Salt Industry of Forth', 157-161.

78. Hughes, Studies in Administration and Finance, 423-4.

79. See e.g. P. McNeill, Prestonpans and Vicinity (Edinburgh and Glasgow, 1902), 26.

80. Cadell MSS, Abstract of Profit & Loss Account in Saltmaking at Grange, 1801-1863.

a return of at least £500 per annum'.<sup>81</sup>

The industry, however, was always contracting in the region. The situation at Cockenzie reflected a universal pattern. The number of pans in operation here declined as follows:<sup>82</sup>

1639	12	saltpans
1790	10	"
1840	6	"
1883	2	"

The last pan at Grangepans was closed down as unremunerative in 1889. The last of the Cockenzie pans lingered on until 1939, and the industry finally expired at Prestonpans in 1959.<sup>83</sup>

The slow extinction of the salt industry, contrary to the fears of Lothian coalmasters in the early nineteenth century, did not spell disaster for the coal industry in the three counties. New markets emerged to compensate for the decline of old ones. The spread of steam power brought a growing use for dross. It is clear from the 1871 Coal Commission returns that compared to the early nineteenth century the uses for dross had multiplied in the Lothians especially from steam engines in 'miscellaneous' industries.<sup>84</sup>

The role of the salt and lime industries in the Lothians' coal trade remains clear. Once important markets were shrinking to a position of insignificance. Therefore the impact of these sectors on the Lothians' coal industry was extremely negative.

Miscellaneous industries. Edinburgh and Leith, by virtue of being capital city and port, attracted a large number of industrial activities, albeit most of them small. Commentators

81. Hope MSS, 'Undated document', re coal and salt works, c1850.

82. P. McNeill, Tranent and its Surroundings (Edinburgh and Glasgow, 1883), 200.

83. Adams, 'Salt Industry of Forth', 157-9.

84. See note 73.

like Baron Dupin<sup>85</sup> and Bald remarked upon the diversity of the industries and trades of Edinburgh. Similarly local centres like Haddington and Bathgate harboured a range of enterprises. In the New Statistical Account there is reference to the hand-loom weavers, the brick and tile works, the distillery, the brewery, and the flour and pot-barley mills of Bathgate.<sup>86</sup>

With a modest expansion of such activities, and the growing adoption of coal as a source of energy (especially in steam engines) non-domestic demand for coal grew significantly in the Lothians in the course of the nineteenth century. Baird in a plausible calculation of 1813 estimated that Edinburgh non-domestic coal consumption amounted to 20,000 tons.<sup>87</sup> From the 1871 Coal Commission returns it emerges that in the region of 150,000 tons of coal was consumed by the manufacturing industries of Midlothian,<sup>88</sup> many of which were sited in and around Edinburgh. This gives a rough idea of the growth in relative importance of non-domestic coal consumption in the region of the metropolis.

Before 1846 the primary stage of iron manufacture was absent in the Lothians, (although the growth of the Scottish iron industry, particularly during the Napoleonic Wars, exercised an indirect effect on the Lothians' coal trade).<sup>89</sup> But malleable iron works, forges, and indeed metal-working and engineering shops of various descriptions were dispersed throughout the region. These were of some significance for coal demand for the entire period under study.

85. Baron Dupin, The Commercial Power of Great Britain, vol II, (1825), 133-5.

86. NSA, II (1843), 161-2.

87. Baird, Report on Proposed Union Canal, 17-19.

88. Report on Coal, vol III, Appendix to Report of Committee E, Appendix 191, (PP 1871, XVIII).

89. See chapter 3, p.85.

The most important malleable iron works were at Cramond and Dalkeith. Cramond was owned by the Cadells, and was a lively place in the early nineteenth century. In 1805 the annual fuel requirement was about 1,600 tons of coal, which was brought in sloops from the Cadells' Bo'ness pits further up the Forth.<sup>90</sup> During the course of the century the works were mismanaged, and technological development stood still with steam power not being introduced until 1855. The Cadells sold the works in 1860, and iron-milling was continued on a reduced scale for a further twenty years.<sup>91</sup> There were two foundries in Dalkeith, which in 1862 were said to require 4,000 tons of pig iron per annum.<sup>92</sup>

There were a number of other metallurgical enterprises of some significance locally to coal mining. For example one of the important customers of Brunstane Colliery in 1849-1857 was Penicuik Foundry.<sup>93</sup> But it is unlikely that the heterogeneous group of metal working and finishing enterprises found in the Lothians very greatly influenced the evolving pattern of coal demand in the region.

It might be noted that textiles, although the first cotton mill in Scotland was founded at Penicuik in 1779, were relatively insignificant in the Lothians. What activity there was was often technologically backward. Up to the 1860s flax weaving was carried on largely by hand-loom weavers.<sup>94</sup>

90. R. Forsyth, The Beauties of Scotland : containing a Clear and Full Account of the Agriculture, Commerce, Mines, and Manufactures of ... Each County, I (Edinburgh, 1805), 287-8. At this date the works consisted of three forges, two slitting mills, and two 'steel furnaces'.
91. For a general account of Cramond see B. C. Skinner, The Cramond Iron Works (Edinburgh, 1965) and P. Cadell, The Iron Mills at Cramond (Edinburgh, 1973).
92. Geddes Records, SRO CB 10/4, J. R. Williamson, Draft Precognition, (North British Railway Proposed Branch, Ormiston Monktonhall & Dalkeith), 26 March 1862.
93. Clark of Penicuik MSS, SRO GD 18/1149/(6), Brunstane Colliery Sales Book, 1849-1857.
94. Hamilton, Industrial Revolution in Scotland, 116-7.

On the other hand there was a group of industries which did contribute positively to the growth of coal demand in the Lothians. Insertions were placed in the Edinburgh and Leith Post Office Directory by firms in the following trades for the years shown:

	Brewers and Maltsters	Candle-Makers	Glass Manufacturers
1833/4	31	13	8
1840/1	28	14	6
1850/1	19	10	7
1860/1	23	7	9
1870/1	31	5	9
1880/1	32	5	7

It might be assumed that all the above three industries, which were well established in Edinburgh and Leith, experienced a concentration of production during the nineteenth century, and total output grew. Brewing and the distilling of whisky were activities resolutely prosecuted in the Lothians, and these industries expanded during the period under study. For example the thirsty colliery village of Tranent had four breweries in the early nineteenth century, and examples could be multiplied. Brewing was a demand sector not without significance for the Lothians' coal industry as is evident from the incomplete returns to the 1871 Coal Commission.<sup>95</sup>

Edinburgh was an important centre of the whisky distilling industry in the nineteenth century. Distilleries being large consumers of fuel, access to coal supplies was a significant factor determining location.<sup>96</sup> Messrs. James Haig & Sons placed orders for 3,000 tons of coal at a time, and used their weight as a major customer to play off competing suppliers against each other in the 1820s and 1830s.<sup>97</sup> Distilleries themselves acquired

95. The consumption of coal at firms in Midlothian which returned circulars in the brewery trade was about 26,000 tons, distilleries 12,000 tons, and Brick and Tile, Earthenware, and Glass industries in region of 9,000 tons each. Report on Coal, vol III, Appendix to Report of Committee E, Appendix 191, (PP 1871, XVIII).
96. A. MacPherson, 'Scotch Whisky', SGM, vol 80 (1964), 101.
97. UCMB, SRO BR/EGU/1/4, 31 July 1826, 25 July 1828; Ibid, EGU/1/5, 5 June 1832.

coal concessions. Messrs. Aitchison, Brown & Co, East Lothian worked pits near Tranent for their own needs around the turn of the nineteenth century.<sup>98</sup>

Pottery and earthenware, glass manufacture, and soap and candle industries were all well established around Edinburgh and Leith in the period under study. Access to raw materials, such as coal, sand, salt, and clay, and proximity to an important market helped to determine location. In pottery manufacture it is no accident that entrepreneurs with an interest in coal mining, such as the Cadells and John Roebuck, were also involved in this sector in the late eighteenth century. Clow and Clow emphasize that the pottery industry generally became totally dependent on the coalfields in the nineteenth century.<sup>99</sup> By 1800 the glass industry had gone over to the use of coal as a fuel in place of wood. It was attracted to sites in Mid and East Lothian originally by access to coal and sand. From the early nineteenth century the other vital raw material in glass manufacture was becoming available locally at less cost. This was the alkali, soda, the synthetic manufacture of which depended in turn on cheaper supplies of salt and sulphuric acid, which were becoming available in the early nineteenth century. There were quite subtle interrelationships between the various Lothian industries,<sup>100</sup> which cannot be explored here. But it was no accident that at Duddingston a few miles to the east of Edinburgh, the following activities were carried on in 1843: glass and crystal manufacture, earthenware, tile and brick production, a 'chemical works', salt-distilling, an iron foundry

98. Forsyth, Beauties of Scotland, 432.

99. Clow and Clow, Chemical Revolution, 323-5.

100. *Ibid*, chapters 2-6, 12-15.

was also active, and coal mining was carried on near by.<sup>101</sup>

Lack of harder evidence has forced this survey of 'miscellaneous industries' to be impressionistic. Examples of Lothian pits supplying these sectors with coal could have been extended. The impression is that the industrial structure which the Lothians economy inherited from the late eighteenth and early nineteenth century was of importance for the subsequent development of the coal industry. It provided the basis for a modest growth of coal demand - but no more than this.

Conclusion. Nevertheless the industrial structure which the Lothians had inherited looked promising in the early nineteenth century for the future evolution of coal demand. Many sectors were in an expansive phase during the characteristic Industrial Revolution period, and more and more, <sup>were</sup> turning to coal for a source of energy. In view of the general growth of coal demand in Edinburgh and Leith in this period it is not surprising that a coal shortage occurred. It developed into a 'famine' on account of the ponderous response of the Lothian coalmasters to the transport and production difficulties which faced them.

Meanwhile there was, by 1800, an undoubted shift in the tempo of industrial activity to the west of Scotland. This region enjoyed relative advantages in the Iron and Cotton industries, which caused a transformation of the west of Scotland economy to an extent without any parallel in the Lothians. There had been an apparently promising industrial base in the Lothians in the late eighteenth century. This was established on a supply of important industrial raw materials, inter-related manufacturing activities,

101. NSA, I (1843), 391-2.

and the readiness of one or two entrepreneurs to forge ahead into new fields, (such as John Roebuck establishing a sulphuric acid works at Prestonpans in 1749). This promise withered away in the first half of the nineteenth century. Chemical works were closed down, and most sectors (for instance pottery and earthenware) while by no means stagnant, did not achieve really impressive rates of growth. The traditional industries of the Lothians, while often important for coal demand locally, failed to galvanize the situation into something more dynamic.<sup>102</sup>

Perhaps two basic causes militated against a regionalized Industrial Revolution profoundly affecting the Lothians. Firstly, the peculiar conditions creating a flourishing salt industry on the Forth were removed, and the industry declined rapidly. Salt was a vital industrial raw material, but the Lothians no longer possessed any special attractions in this sphere. Secondly the regional coal industry responded very slowly to changing circumstances, and its output was relatively costly. This surely was an important reason why the Lothians never became a great industrial area.

The very locational specialization of increasing industrialization in the Industrial Revolution hit an area, which had previously had a widely-based economy. Later phases of industrialisation caused the demand spectrum for Lothians' coal to undergo a major change. Areas of rapid market growth emerged in the 1840s and 1850s, and only then was the relative decline of the Lothians' coal industry in Scotland arrested.

102. Indeed static or declining markets (salt, lime, export), or only slowly growing markets (Edinburgh domestic demand) took up a large proportion of coal output.

## **CHAPTER TWO**

### **THE TRANSPORT REVOLUTION**

## CHAPTER TWO. THE TRANSPORT REVOLUTION

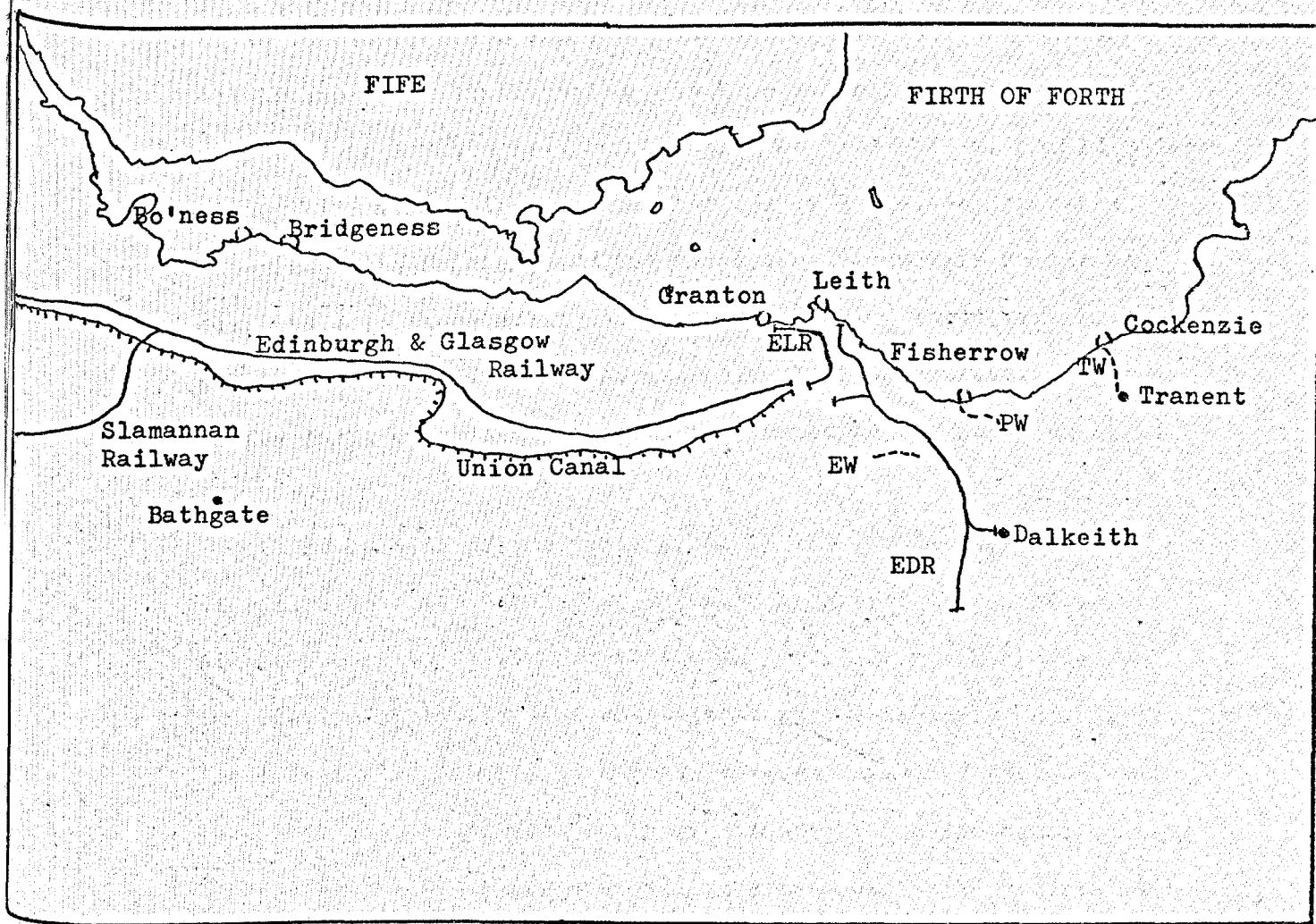
### Introduction

The Lothians' economy was greatly effected by improvements in transport between 1820 and 1875. The coal trade was revolutionized. The completion of canal and rail projects brought the keen winds of competition to every corner of the region. The Mid and East Lothian coalfield lost its traditional, almost monopolistic hold on the valuable Edinburgh market. Canal and rail-borne coal arrived in the capital in ever-growing quantities from other districts. On the other hand, not only was the whole market for coal growing over these decades, but transport improvements permitted the Lothian coalmasters, too, to look further afield for customers. Increased competition provided an incentive for the adoption of improvements in technique and organization. With expending markets an increase in output was achieved in the Lothians. But the process was at times painful, and never truly spectacular.

The Lothians' coal trade lost its idiosyncracies as the region was progressively drawn into the national economy. The railway manias of the 1830s and 1840s, and the collapse of the Newcastle Vend in the 1840s were developments which impinged (however distantly at times) on the Lothians' coal industry. The great growth in the output of the British coal industry between 1820 and 1875, and the parallel intensification of inter-regional competition were reflected by experience in the Lothians.

In this chapter attention will be concentrated on the evolution of the Edinburgh coal market, and railway development in particular as it affected the coal industry in the Lothians.

1. Aspects of this question are explored in J. Hassan, 'The Supply of Coal to Edinburgh 1790-1850', Transport History, vol 5 (1972).

Map 2. The Lothians: chief lines of communication in 1842

0 4 8 16 Scale of miles

- Railways
- Canals
- - - Waggonways
- Harbours

Key

- |     |                                   |
|-----|-----------------------------------|
| EDR | Edinburgh & Dalkeith Railway      |
| ELR | Edinburgh Leith & Granton Railway |
| EW  | Edmonstone Waggonway              |
| PW  | Pinkie Waggonway                  |
| TW  | Tranent Waggonway                 |

### The Impact of New Lines 1820-1842

The Union Canal and the 1820s. Although it was the railway which transformed the Lothians' coal trade, already in the 1820s the consequences of the opening of the Union Canal were foreshadowing the implications of the 'transport revolution'. The Canal was completed in 1822. Between then and the close of the period under study there were only two short periods of acute coal shortage experienced in Edinburgh during which conditions were in any way comparable to those during the 'coal famine'. These were in 1836-8 and 1872-3, and the result of exceptional circumstances. Comment in the 1820s suggested a new era had dawned in the coal market in Edinburgh.

The opening of the Union Canal in 1822, and later the completion of railways to the canal system enabled a greatly enhanced supply of cheap coal to be brought to the city from Stirlingshire and Lanarkshire. In addition coal depots were established around the canal basins in Edinburgh. These covered 'acres of ground', and were 'a sight new to the people of Edinburgh'.<sup>2</sup> The canal company imposed strict marketing and selling standards on the traders at the depots. Robert Bald and others reckoned that the opening of the canal had caused coal prices to drop by a third in the city.<sup>3</sup>

In certain years possibly as much as 100,000 tons of coal was carried on the canal, primarily to Edinburgh.<sup>4</sup> In the three years to December 1829 an average of only 81,652 tons of coal was borne on the waterway,<sup>5</sup> but even this represents a fundamental alteration in the coal supply situation in the Lothians.

2. J.E. Murray, Letter to the Lord Provost on present high price of Coal (Edinburgh 1837), 7-8.
3. The Scotsman, 11 November 1837.
4. The Scotsman, 31 January 1827.
5. Anon, Report relative to Railways between Edinburgh and Glasgow. By a Special Committee appointed by the Directors of the Union Canal Company (Edinburgh, Glasgow, 1830), 27.

The opening of the canal stimulated mineral activity in the coalfields adjacent to it. Foremost among the coalmasters who wished to exploit the opportunities of the new canal trade was the Duke of Hamilton. His collieries of Redding and Brighton in Stirlingshire were expanded and fitted out largely to exploit the new markets opened up. At Redding Colliery between 1829 and 1841 well over half the sales were in Edinburgh, and further quantities were sold at intermediate points along the canal.<sup>6</sup> The Duke of Hamilton and his agents set on foot an extensive coal marketing operation in Edinburgh. The capacity of the Duke of Hamilton depot in 1825 was 10,000 tons.<sup>7</sup>

The Duke of Hamilton and the Union Canal Company worked closely together to market Stirlingshire coal in Edinburgh. The canal allowed 15% dues rebate on his coal provided it was sold at a proportionately lower price in Edinburgh.<sup>8</sup> It is true that the early expectations of the Duke of Hamilton's coal traffic proved over-sanguine. It was firmly believed that as much as 125,000 tons of Duke of Hamilton coal would be brought along the canal to Edinburgh every year. The failure to achieve this volume of sales relates partly perhaps to insufficient capacity at the Stirlingshire collieries. Also, however, there was a clash of interests. The canal wished to expand coal traffic regardless of the price in Edinburgh. The Duke of Hamilton wished to sell coal at remunerative prices. Consequently the early euphoric relations between these two parties were not maintained, and indeed had soured considerably

6. Hamilton Estates MSS (Hamilton Public Reference Library), 'Accounts of Intromission of William Leighton as Manager of Redding and Brighton Collieries', (Redding Colliery Output and Sales, 1829-1841).
7. The Scotsman, 10 September 1825.
8. UCMB, SRO BR/EGU/1/2, 18 April 1823.

by the late 1820s.<sup>9</sup>

Although the canal's coal traffic fell well short of expectations, great advantages did accrue to Edinburgh as a result of the new supplies opened up. In 1828 the fear of coal famine was thought to have virtually disappeared on its account.<sup>10</sup> But the canal company was in considerable difficulties. A major problem was overcapitalization. The original estimated cost of construction was £240,500. By 1826 it had escalated to £600,000.<sup>11</sup> Coupled with disappointing trading results therefore, the shareholders' lot was not a happy one - the project was described in 1836 as a 'ruinous speculation'.<sup>12</sup> Thus the management soon had to cope with weightier problems than the illicit carriage of smuggled whisky and passengers in coal boats, which had come under discussion in 1823.

The Union Canal's ambitions in the coal trade were undermined because of generally depressed conditions in the trade in the 1820s.<sup>13</sup> The canals and the new railways being constructed in Lanarkshire encouraged an expansion of the productive capacity of the coal industry.<sup>14</sup> But in the Lothians, too, there was an attempt to increase output. And coals continued to arrive in Leith from Fife, Clackmannan, and Tyneside. Very competitive conditions were experienced in the Lothians' coal trade in the 1820s, following the previous period of dearth.

9. See UCMB, SRO BR/EGU/1/4, 23 May 1828; *Ibid*, BR/EGU/1/8, 12 January 1836.
10. The Scotsman, 27 February 1828.
11. Royal Commission appointed to enquire into the Canals and Inland Navigations of the United Kingdom, vol 1, (PP 1906, XXXII), 21.
12. The Scotsman, 9 January 1836.
13. While it was originally estimated that canal revenue would be approximately £52,000 per annum, actual revenue fell far short of this. In 1828 total revenue was under £17,000. Coal dues amounted to about 60% of total revenue for years for which figures are available. The Scotsman, 23 October 1830; UCMB, SRO BR/EGU/1/5, 'Union Canal States of Revenue &c &c', 31 December 1832.
14. The canal company actively encouraged the promotion of such railways in the 1820s as the Monkland & Kirkintilloch, the Glasgow & Garnkirk extension, etc.

In Midlothian there was a greater marketing effort to retain some hold on the Edinburgh market in the face of the influx of water-borne coals. Carters were cutting their rates to stay in employment. In the competitive conditions of the 1820s many Midlothian coalmasters suffered. At Sheriffhall Colliery both output and average prices fell in 1821-1824,<sup>15</sup> although economic recovery from recession was experienced nationally in 1822-1824. There <sup>was</sup> much contemporary complaint of intra-district competition, stagnation of trade, and the difficulties of small marginal pits in Midlothian.

Yet despite the difficult conditions and the influx of canal coals the Midlothian coalfield was not ousted from the Edinburgh market. There is a great deal of evidence that Midlothian 'Jewel Coal' was still accepted as the finest Scottish household coal in the city. The Union Canal had to struggle hard against these preferences - for example by barring coal merchants who used the canal basis premises from selling Midlothian coals from time to time.<sup>16</sup>

Besides consumer loyalty and the genuine quality of the best Midlothian coals there was another reason why the canal company (despite the benefit of a superior mode of transport and supplies from lower cost pits) was unable to swamp the Edinburgh market along the lines originally envisaged. This was the high cost of marketing. Duke of Hamilton 'Hard Coal' was only 6s per ton 'free on board' in 1827. But trackage, boat hire, dues, cartage, and profit put the price up to 1ls 6d for the Edinburgh consumer. This was only 1s per ton below the price of the superior Sheriffhall Jewel Coal.

15. Statistical Appendix, table 8.

16. See UCMB, SRO BR/EGU/1/2, 5 September 1823; Ibid, BR/EGU/1/4, 29 October 1827; Ibid, BR/EGU/1/5, 14 May 1830.

Monkland Coal from Lanarkshire could vie in quality with best Midlothian, but the marketing and transport costs were even more burdensome.<sup>17</sup>

There was a considerable 'loosening up' of coal markets in the 1820s, largely because of the new lines of communication, and the expansion of coal mining activity which they had induced. Consequently the 1820s and early 1830s were a period of low coal prices and active competition in the Edinburgh market, in strong contrast to earlier decades.

The Edinburgh & Dalkeith Railway and the 1830s. As already noted a major effect of the Union Canal was to expedite the promotion of a railway from the Midlothian coalfield to Edinburgh. The Edinburgh & Dalkeith, opened in 1831, was intended primarily as a mineral line.

As Matthias Dunn describes the railway opened up the more distant 'flat collieries' of Midlothian, where coal production was less costly.<sup>18</sup> Some of the edge collieries near to Edinburgh, but not served by the line, suffered as a result of new competition. Gilmerton was an edge colliery which had been opened up in the 1820s, and the winning of 96 fathoms was the deepest on the edge seams in 1829. But in the late 1830s mining activity was suspended because of the 'quantity of coal brought to the Edinburgh market by means of the Dalkeith Railway, from mines which can be worked at less expense'.<sup>19</sup>

17. Ibid, BR/EGU/1/4, 29 October 1827; Ibid, BR/EGU/1/5, 3 May 1830.

18. M. Dunn, Treatise on the Winning and Working of Collieries; including numerous statistics regarding ventilation and the prevention of accidents in Mines (Newcastle-upon-Tyne, 1852), 27-8.

19. NSA, I (1839), 18-19.

The major effect of the Edinburgh & Dalkeith was to stimulate coal production in Midlothian. In the mid and late 1820s Sir John Hope carried out extensive exploratory work around the collieries of Newhailes and New Craighall. The Marquis of Lothian developed Newbattle Colliery for an extended sale. A branch line was constructed from near Newbattle to the Edinburgh & Dalkeith at Dalhousie Mains. It was opened in January 1832 and involved 'great erections' over the River South Esk of some wonder to observers.<sup>20</sup>

Sir John Hope and the Marquis of Lothian together were responsible for as much as perhaps 75% of the coal traffic on the Edinburgh & Dalkeith in the 1830s and early 1840s. Their collieries were the biggest in the Mid and East Lothian coalfield, and sent most of their output down the railway for sale in Edinburgh and Leith markets.

Lesser coalmasters were also stimulated into activity by the railway. At all the pits on the Dundas of Arniston estate Edinburgh coal sales were 'trifling' before it was opened, being in 1827-8 'rather short of 200 tons per annum'. Considerable investment in new pits, equipment, and a branch line<sup>21</sup> resulted in a vastly increased Edinburgh sale. Another initiative was carried out by the Duke of Buccleuch; his coal properties near Dalkeith were opened up with energy after 1837. A branch line was completed from the main line to Dalkeith Colliery, which later came to represent an important addition to Midlothian coal production.

Fuller details of the coal traffic on the Edinburgh & Dalkeith are given in the Statistical Appendix,<sup>22</sup> but the table below presents

20. The Scotsman, 22 October 1831, 11 January 1832.

21. Dundas of Arniston MSS, Mr. Nibblie to Robert Dundas, 18 November 1828; Robert Bald to Thomas Cranstoun, 24 December 1828.

22. Statistical Appendix, tables 59-60.

a summary view of its growth:

Table 2, I. Average Annual Quantity of Coal and Culms carried on the Edinburgh & Dalkeith Railway

(years inclusive)	(tons)
1832-5	89,017
1836-9	105,491
1840-3	116,141

Source: Buccleuch MSS, SRO GD 224/554,  
Papers relating to the Edinburgh & Dalkeith Railway

In general, the Edinburgh & Dalkeith placed the Midlothian coal industry in a better position to expand sales in Edinburgh. It undoubtedly stimulated mining activity, and contributed to a growth of output in the 1830s. The Edinburgh consumer also benefited. In 1835 The Scotsman could happily report with reference to proposals for a railway between Edinburgh and Glasgow: 'With coal ... Edinburgh is now so amply and cheaply supplied by the canal and the Dalkeith Railway, that it would not be easy to divert any considerable portion of the trade into the new channel'.<sup>23</sup> In addition coal mining was very profitable during the coal boom in Scotland in 1836-8, and this also encouraged an upswing in mineral activity in the Lothians.<sup>24</sup>

Commercially the Edinburgh & Dalkeith suffered from the familiar problem of over-capitalization. Construction costs were originally estimated at £57,700. By 1830 these had already climbed to over £100,000, and were still rising. Although fair gross profits were made, these tended to decline over the years, and on at least one occasion capital was plundered for the payment of dividends.<sup>25</sup>

Passenger traffic soon became more important than the carriage of coal, but the line retained great significance as a mineral

23. The Scotsman, 30 September 1835.

24. The Scotsman, 11 November 1837; D. Milne, Memoir on the Mid-Lothian and East-Lothian Coalfields (Edinburgh, 1839), 146.

25. Statistical Appendix, tables 61-2. See Buccleuch MSS, SRO GD 224/554, Edinburgh & Dalkeith Railway, Abstract of Minutes for year to 31 December 1836.

railway. Economically it was quite superior as a mode of transport to carting - the only alternative in Midlothian for the carriage of coal. Even in the early 1840s when the carters were trying to reduce costs, while the management of the Edinburgh & Dalkeith was proving very unwilling to reduce dues, the railway had a slight cost advantage - even to an unimpartial observer like the manager of Dalkeith Colliery who, along with others, was complaining of the railway's policy on dues.<sup>26</sup> Before the railway was opened coal could be brought from Midlothian pits to Edinburgh at certainly no less than 2s 6d per ton. In 1835-7 the railway dues from even quite distant collieries, such as Whitehill, were only just over 9d per ton.<sup>27</sup>

On arrival in Edinburgh by whatever means, the coal was subject to other costs, such as tips and portage, which the consumer had to bear. The trade based on the Edinburgh & Dalkeith's depot in Edinburgh at St. Leonards, however, was subject to close supervision. With the full support of the Midlothian coal proprietors, the railway imposed strict conditions on the merchants and agents trading there with respect to standards of honesty. The unsupervised Midlothian coal carters still had an endemic tendency to various malpractices. In addition to the advantages of cost and speed, the railway was superior to carting, therefore, with respect to superior marketing methods introduced into the city.

The opening of the Edinburgh & Dalkeith inaugurated an even more competitive phase in the Edinburgh coal trade. In 1833 a Union Canal committee complained of,<sup>28</sup>

26. Ibid, GD 224/582, J. Wright to the Duke of Buccleuch, 11 February 1843.

27. Reports from the Select Committee appointed to inquire into the State of Communication by Railways, Third Report, (PP 1840, XIII), 340.

28. UCMB, SRO BR/EGU/1/5, 11 September 1833.

... the great competition in the Coal Trade occasioned by the Edinburgh and Dalkeith Railway, and the various collieries in its vicinity, and also the constant and progressive decrease of the consumpt of canal borne coal for the last  $3\frac{1}{2}$  years.

The railway and the canal engaged in a minor rate-cutting war.

This had the effect of bringing down the cost of fuel in Edinburgh to unprecedently low levels. For a time in 1835 canal coals were priced as low as 8s 6d per ton. At the very moment when an even more intense period of competition looked like developing in the Edinburgh coal market, the effects of a wider upswing in economic activity began to affect the Lothians' coal trade. The Scottish hot-blast iron industry led the country's heavy industry on a boom, which was to attain heady proportions in the coal industry in 1836-7. These developments contributed to a revival of the fortunes of the Union Canal. As early as March 1836 the canal reported:<sup>29</sup>

For a considerable time past the demand for coal has greatly exceeded the supply, and nothing but the limited supply on the line of the canal, has prevented the revenue from this source being very considerably increased.

The canal's revenue and dividend performance was much more satisfactory after 1837, and remained so until 1842.<sup>30</sup> In that year the Edinburgh & Glasgow Railway was opened. This event drastically affected the canal, the Dalkeith Railway, and the Lothians' coal trade, leading before long to the two lines of communications being taken over by more powerful transport enterprises.

The period from 1822 to 1836 was one of acute competition in the Lothians' coal trade, dominated by the effects of the Union Canal. From 1836 to 1842 the growth of the Scottish hot-blast iron industry

29. Ibid, BR/EGU/1/8, 1 March 1836.

30. Statistical Appendix, table 63; J. Lindsay, The Canals of Scotland (Newton Abbot, 1968), 223.

lent buoyancy to the regional coal industry. Notwithstanding fluctuating prosperity, throughout the period the Midlothian coal industry remained orientated to the Edinburgh market. This orientation was re-affirmed by the opening of the Edinburgh & Dalkeith in 1831.

The opening of the Edinburgh & Glasgow Railway eleven years later inaugurated the 'Railway Age' as far as the Lothians' coal industry was concerned. The bases of the dependency of the industry on the Edinburgh market were destroyed.

Marketing and the crisis of 1836-8. The twenty years after 1822 witnessed a general improvement in the Edinburgh domestic coal market.

For a short period, however, conditions reminiscent of the 'coal famine' returned. Early in 1835 good Midlothian coal was priced as low as 8s per ton in Edinburgh. Towards the end of 1836 prices climbed steeply, and reached 15s to 16s per ton in 1837, remaining at high levels for another year or so.

The coal shortage in Edinburgh was due not only to the expansion of the hot-blast iron industry, but also to the general buoyancy of the Scottish economy in the mid to late 1830s, which created a great increase in fuel demand. There had been a number of lean years in the coal trade which inculcated pessimistic attitudes in the minds of entrepreneurs. Consequently in the Lothians neither coal stocks nor the productive capacity of the mining industry were in a position to satisfy a sudden spurt forward in demand. (Between 1833 and 1838 there was no addition to the number of major collieries using the Edinburgh & Dalkeith). As one contemporary put it as early as December 1835: 'It was ebb

tide some time ago for both iron and coal masters - it is now full flood'.<sup>31</sup> Stirlingshire and Fife collieries, which had supplied Edinburgh to some extent, now concentrated on the booming iron industry. In Midlothian the trend to higher prices was reinforced by higher costs. Some miners were leaving for better wages in the coal and iron works of the west, and the remainder struck successfully for higher wages.<sup>32</sup>

The 'coal crisis' of 1836-8 led, in the context of hostile public feeling towards the Midlothian coalmasters (who were blamed for it), to schemes being embarked on to attract other supplies of coal to Edinburgh. A citizens' coal committee was formed with much popular support. It regularly advertised, up to April 1839, Fife, Clackmannan, and canal coals, which they claimed to have obtained for supplying the city.<sup>33</sup>

The longer-term effects of the crisis, in fact, included the entry of new supplies into the market. Many new Tyneside and Fife marketing firms made an appearance in the capital or Leith. The high coal prices also elicited an expansion of productive capacity in the Lothians. Therefore the longer-term consequences of the shortage may have been to intensify the tendency towards competitive conditions in the coal trade in the Lothians.

This was the general movement of these twenty years as a whole, under the impact also of new supplies opened up by the Union Canal, Edinburgh & Dalkeith, and other lines of communication. For example in 1828-9, following the opening of the Monkland Railway in Lanarkshire (which had links with the canal), firms marketing

31. The Scotsman, 30 December 1835.

32. The 'coal crisis' was discussed exhaustively in The Scotsman, especially in October-November 1837, and by Murray, Letter to Lord Provost.

33. The Scotsman, 11 November 1837, 10 February, 14 March, 10 October 1838, and 13 April 1839.

Monkland coals actively strove for customers in Edinburgh.<sup>34</sup>

These trends are reflected in the growth in the numbers of coal merchants. In 1831 there were 81 coal merchants in Midlothian, of which 78 carried on business in Edinburgh. In 1851 there were 182 coal merchants in the county.<sup>35</sup>

But ineptitude and roguery was not eliminated from the Edinburgh coal market. The main malpractice of those engaged in marketing coal in the city was selling underweight, and a variation on this theme was soaking coal in water to add to the weight. Independent carters primarily were responsible for such wrong-doings, and also perpetrated other evils like over-charging for portage. About 1830, for example, there was a veritable spate of successful prosecutions against such frauds.<sup>36</sup>

Improvements in the conduct of the Edinburgh coal market stemmed from a number of developments. As noted previously the opening of the Union Canal and the Edinburgh & Dalkeith led to the establishment of depots and firms of coal merchants with fixed premises. At the Union Canal depots firms such as the Mid Lothian Coal Company and the Pleasance Coal Yard sprang up in 1823.<sup>37</sup> The advent of these enterprises tended to drive the independent carters off the streets of Edinburgh. The merchants themselves gave impetus to the trend towards increased competition in the trade through spreading their risks by marketing coals from a range of areas. For example many firms at the canal depots marketed English, Fife, and Midlothian coals besides canal coals. Some of the larger firms had agencies or offices throughout Edinburgh and Leith.

34. The Scotsman, 10 November 1827, 10 January 1829.

35. Population Censuses, 1831, 1851.

36. The Scotsman, 17 February, 10 April, 24 May, 30 June 1830.

37. The Scotsman, 1 January, 15 January, 19 March 1823.

On the whole the progressive displacement of carters by merchants led to improvements with respect to regularity of supply, cost, and consumer service.

This was the case as the Union Canal and Edinburgh & Dalkeith - with a great concern in the good-will of consumers - took every step that the merchants using their depots should emulate the carters along these lines. In 1830 of the canal The Scotsman reported:<sup>38</sup>

The Company suffer no coal brought by the canal to leave the basin without being weighed at their own steelyards, and the weight marked on the ticket ...  
Further the company have repeatedly intimated, that if any person suspect any coals brought him to be short of weight, it is their special request that he send back the cart under the charge of a confidential person, to be re-weighed ... and if any fraud is discovered ... the Company prosecute the offender without any cost to the complaining party.

The Edinburgh & Dalkeith took similar steps. In July 1831 the railway announced an improved weighing and certification system: 'in order that an ill-disposed carter may not have it in his power to sell part of his load, under the mischievous system of hawking'.<sup>39</sup> Carters were still needed to distribute coal from the rail and canal depots. Coalmasters were increasingly taking direct control over the marketing of coal, however, right up to the delivery of coal at the customers door. By 1827, for instance, the agent for Sheriffhall Colliery employed his own carts.<sup>40</sup>

Finally an improvement in marketing practice in Edinburgh sprang from general public initiative. Around 1830 there was much complaint about the laxity of magistrates in punishing offenders in matters of weight, and the apathy of police and magistrates in response to the demand for official steelyards to be set up throughout

38. The Scotsman, 17 February 1830.

39. The Scotsman, 6 July 1831.

40. The Scotsman, 24 February 1827.

the town. This public pressure led to action being taken. An important step was the passing of the necessary Acts of Parliament. By an Act of 1837,<sup>41</sup> the Edinburgh Police Commissioners were empowered to erect steelyards, and make regulations for the weighing of coals. Coals could be re-weighed as necessary by portable machines. Coal sold by retail had to be weighed.

The Edinburgh coal market in the period up to 1842 was marked by two progressive, if contrasting, tendencies. The market became more organised and honesty and standards of service improved. At the same time the market became increasingly competitive because of the increase in suppliers and merchants. These developments anticipated the consequences of the 'Railway Age'.

#### The Railway Age 1842-1875

Introduction. As Vamplew indicates the British Railway mania of the 1830s scarcely touched Scotland. By 1840 there were only 137 route miles of railway completed in Scotland. A major factor was capital scarcity. The burgeoning Scottish pig iron industry attracted most of the venture capital that was available in the northern country.<sup>42</sup>

The 1840s witnessed the first great expansion of railway construction. By 1849 there were 1,568 miles of track laid in Scotland. Thereafter even greater additions to the system were made. Youngson Brown has argued that the main impact of the railway on the Scottish coal industry before 1850 was to open up land-locked fields. After 1850 much railway construction was

41. The Edinburgh Police Act (5 May 1837), 7 Gulielmi, Cap. xxxii.  
 42. W. Vamplew, 'Sources of Scottish Railway Capital before 1860', *SJPE*, vol 17 (1970), 426 *et seq.* W. Vamplew, 'Railways and the Transformation of the Scottish Economy', (unpublished PhD thesis, University of Edinburgh, 1969), chapter 1.

beyond the coalfield belt of Lowland Scotland, and the effect was to greatly extend the markets of the coal industry.<sup>43</sup>

The initial impact of the railway on the Lothians' coal industry was fairly disastrous. It destroyed for ever any lingering semi-monopolistic advantages in the Edinburgh market. On occasion, cheaper rail-borne coals were able to win ordinary domestic or manufacturing sales within the confines of the coalfield itself. Yet the 1840s witness the beginnings of technical and entrepreneurial progress in the Lothians' coal industry. This was a response to a number of factors, including no doubt the heightened intensity of competition in the coal trade due to the railway. The railway also made possible the acceleration of output in the Lothians from the 1840s, as more remote pits were opened up, and access to distant markets provided. During the third quarter of the nineteenth century the mining industries of the Lothians achieved some major successes - for example in the areas of the gas market, and the coal-oil and shale-oil sectors. These achievements awaited the coming of the railway.

Railways and the Coal Trade. The few railways that were promoted in Scotland in the 1830s tended to be inexpensive short mineral lines, reminiscent of an earlier period. Such Lanarkshire lines as the Wishaw & Coltness and Ballochney Railway extension fall into this category. It is of note that the Union Canal lent support to the promotion of such railways as these.<sup>44</sup> A major example of this type was the Slamannan Railway, opened in 1840.

43. A. J. Youngson Brown, 'The Scots Coal Industry, 1854-1886', (unpublished D Litt thesis, University of Aberdeen, 1952), 43-4.

44. UCMB, SRO BR/EGU/1/8, 1 March 1836, 7 March 1837, 7 March 1838.

It was promoted for, amongst other considerations, by means of the railway '... the superabundant supplies of coal in the Monklands, and in Slammanan parish, will have a cheap and ready access via the Union Canal to the Edinburgh market'.<sup>45</sup> Short, horse-drawn mineral lines, such as the Halbeath Railway in Fife, were still being promoted in the 1840s.<sup>46</sup>

But increasingly attention was being directed on more ambitious projects. A key group of inter-urban lines were under construction in Scotland from the late 1830s to the early 1840s.<sup>47</sup> The Edinburgh & Glasgow Railway, opened in 1842, was one of these. Although this project ante-dated the railway mania of the mid-1840s, as already stressed it fully embodied the implications of the 'Railway Age' as far as the Lothians' coal industry was concerned.

A railway between the two major Scottish cities had been envisaged as early as 1812. In 1825-1830 more concrete schemes were projected. It was anticipated that most of the revenue would be derived from the coal traffic, and that the Edinburgh coal trade would be a major source of receipts.<sup>48</sup> Only in 1838 were the promoters able to overcome the opposition of vested interests (such as the Union Canal) and secure incorporation of the company. By 1842 it is clear from the minute books that passenger traffic had now assumed the greatest significance for the company, although the importance of developing mineral traffic was also stressed.<sup>49</sup>

45. The Scotsman, 22 April 1836.

46. The Scotsman, 28 January 1843.

47. Vamplew, 'Railways and the Transformation of the Scottish Economy', 15-18.

48. See the various reports of T. Grainger and J. Miller, Report relative to the Proposed Railway to connect the ... Upper Coal Field of Lanarkshire with the city of Glasgow and the East and West Country Markets (Edinburgh, 1828); Observations on the Formation of a Railway Communication between the cities of Edinburgh and Glasgow (Edinburgh, 1830).

49. Edinburgh & Glasgow Railway Company Minute Books (hereafter indicated by annotation EGRMB), SRO BR/EGR/1/8, 25 August 1842, 14 November 1842.

For this study the most important effect of the Edinburgh & Glasgow in the 1840s was to reduce greatly the cost of conveying Lanarkshire and Stirlingshire coal to Edinburgh. The railway embarked on an intensive rate war with the Union Canal, fought primarily over the coal trade, with the apparent intention of destroying the canal company. The canal, however, managed to retain a large part of the goods traffic to Edinburgh, but only at the sacrifice of dramatic cuts in dues. The Edinburgh & Glasgow had reduced the average rate of its goods charges from 11s 3 $\frac{1}{4}$ d per ton in the seven months to July 1843, to 4s 1 $\frac{1}{4}$ d per ton in the six months to July 1844.<sup>50</sup> As early as January 1843 it was claimed that the canal had reduced coal dues by one-half since the opening of the railway.<sup>51</sup> The Edinburgh & Glasgow dramatically effected the Lothians' coal trade: for example it contributed to shattering the informal arrangements among Midlothian coalmasters for regulating their share of the Edinburgh market. Yet while the railway was able to win some coal traffic from the Union Canal, it was unable to capture it all. In or around 1845 the railway conveyed 36,000 tons of coal to Edinburgh, and the Union Canal 83,000 tons.<sup>52</sup>

The intense competition between these two arteries had the effect of making coal cheap and abundant for the Edinburgh consumer. But it was unpalatable to both companies, and the policy of trying to drive the canal out of business was not a success. From 1844 there were intermittent and protracted negotiations over some agreed division of the traffic between the two companies. The

50. The railway's average passenger charges per person were only reduced from 2s 7d to 2s 4d over this period. The Railway Times, 28 September 1844.

51. Buccleuch MSS, SRO GD 224/582, 'Petition by Midlothian Coal Owners to the Directors of the Edinburgh and Dalkeith Railway Co.', 7 January 1843.

52. NSA, I, 759.

direction of these negotiations was to give the canal company a monopoly of the heavy traffic, with the railway retaining the lighter goods trade. Only in 1848, however, was a working agreement between the two companies reached.<sup>53</sup> Meanwhile competition remained acute. Ultimately the canal succumbed to the greater strength of the railway. In April 1849, agreement was reached on the terms of a bill for vesting the canal in the railway company.

During the 1840s, even during the period of negotiations when the Edinburgh & Glasgow came close to conceding that the Union Canal (with its established contacts, and so forth) had an advantage in the coal trade, the railway never in practice abandoned the effort to expand mineral traffic. Many steps were taken to build up a large participation in the Edinburgh and other coal markets. These included the promotion of branch lines which tapped coalfields, such as the Shieldhill branch opened 1847, the Campsie branch (1848), and the Edinburgh & Bathgate (c1850).<sup>54</sup> Further the railway made arrangements with coal traders, and suppliers - such as the Stevenson Coal Co., Woodhall Colliery, and William Baird & Co. in 1843.<sup>55</sup> Other illustrations of the active intention of the railway to expand its share of the coal trade could be given. These efforts probably really became effective from the late 1840s, and the balance of advantage began slipping in its favour vis-a-vis the canal. (The railway company would certainly utilize the canal, now under its control, for the coal traffic where this was commercially viable). In the year to 31 January 1863 86,000 tons

53. For the competition between the Union Canal and the Edinburgh & Glasgow, and negotiations between them, see for example: UCMB, SRO BR/EGU/1/8, 1834-1849; EGRMB, SRO BR/EGR/1/8-12, 1842-1850.

54. The Railway Times, 5 September 1846, 13 March 1847, 15 December 1848; Edinburgh & Glasgow Railway Company, 'Report of Directors to Special General Meeting of Shareholders', 12 November 1847, SRO BR/RAC(S)/1/37; EGRMB, SRO BR/EGR/1/3, 26 August 1845.

55. Ibid, BR/EGR/1/74, 4 July 1843.

of coal was conveyed on the Edinburgh & Glasgow from certain points along the line alone to Edinburgh and Leith. 77,000 tons of coal was brought on the canal to Edinburgh.<sup>56</sup> By 1880-1 there were very few canal coal merchants still active in the city. On the other hand certain rail-borne Lanarkshire and Stirlingshire coals were establishing themselves well in the Edinburgh domestic market, such as Benhar household coals and Wishaw 'Ell' coals, during the third quarter of the century.

To return to the 1840s, the railway promotion mania of the decade left the coal trade drastically altered. Inter-regional competition greatly increased. Many projects promoted in the mania were completed, but it is not the present purpose to enumerate every extension to the Scottish railway map. Two major creations of the promotion boom, however, which did have important consequences for the Lothians' coal industry, were the North British Railway (incorporated 1844), and the Caledonian Railway (1845).

In the present context the significance of the empire building ambitions of the Caledonian Railway was that, (like the Edinburgh & Glasgow), with the spread of its branch and main line system the feasibility of marketing coal from central Scotland in the Lothians was greatly improved. By 1849-1850 an agent was marketing coal from the Chapel coal pits near Wishaw by arrangement with the company. Also the Caledonian was supplying coal to the city from the Earl of Carlisle collieries in Cumberland.<sup>57</sup> By 1869 the company 'distributed' over 100,000 tons of coal in Midlothian.<sup>58</sup> The opening up of Lord Belhaven's estates near Wishaw, for example,

56. Edinburgh & Glasgow Railway Traffic Statements, SRO BR/EGR/4/7.

57. The Scotsman, 6 January 1849, 15 December 1849, 16 October 1850, 7 December 1850.

58. Report on Coal, vol III, Report of Committee E, 156 (PP 1871, XVIII).

introduced a powerful new competitor in the trade by 1860-1. And the railway's position in the Lothians was strengthened by the completion of a link to Leith docks about 1864-5. Thus the growth of the railway system generally in central Scotland was paralleled by Lanarkshire and other rail-borne coals becoming increasingly common-place in Edinburgh.

Similar consequences followed the promotion of Edinburgh-Fife rail-ferry projects (which originally had as one of their chief aims the supply of the Edinburgh coal market), and the later extension of the railway network in Fife.<sup>59</sup> These concerns were taken over by the North British in 1862.

So far railway projects have been described which evidently made the position of the Mid and East Lothian coalfield more difficult. The energies of the North British, on the other hand, tended at first to work in the coalfield's favour. The power of the North British was based on the Lothians and Border counties. Their main interest was to develop east coast traffic between the Scottish capital and England. Also, however, they were concerned with building up the railway system in the region, and local coal traffic. The Edinburgh & Dalkeith were aware that the North British could 'annihilate' them, and thus acquiesced in the line being taken over by the stronger company in 1845.<sup>60</sup> The North British greatly modernized the Edinburgh & Dalkeith, which was the first operational part of their system. In the second half of the

59, Edinburgh, Leith & Granton Railway Minute Books, SRO BR/ELG/1/1, 31 January 1838. In the six months to January 1854, the Edinburgh, Perth & Dundee Railway carried over 120,000 tons of coal, see Report of Directors, 21 March 1854, SRO BR/RAC(S)/1/37.

60. Buccleuch MSS, SRO GD 224/554, J. Gibson to the Duke of Buccleuch, 20 March 1844; R. Scott Moncrieff to the Duke of Buccleuch, 23 April 1844, 19 June 1844; copy letter to W.H. Miller, 15 April 1844.

decade the North British system in the region was by stages slowly extended. As a result of improved transport facilities the Mid and East Lothian coalfield recovered from the weak competitive position it had fallen into in the early 1840s. Yet despite this improvement, the mineral traffic on the Dalkeith and Hawick lines had recovered to an annual rate of only 82,581 tons by 1849.<sup>61</sup> The completion of the line to Hawick in that year was, in fact, an important development. It gave the Midlothian coalfield a virtual monopoly of the rapidly growing market of the Border mill towns, until the early 1860s when other coalfields gained rail access to the region. Successful efforts were made by Midlothian collieries to increase sales in the Border towns, although the coalmasters also combined to regulate prices.<sup>62</sup> In addition the expanding North British system encouraged Mid and East Lothian collieries to expand sales in other directions - in country districts served by the railway, in the shipping trade based on improved access to Leith docks, and for East Lothian pits in the Edinburgh market.<sup>63</sup> The recovery of the rail-borne traffic of the Lothians' coal industry is reflected in the following table.

61. SRO BR/RAC(S)/1/112, North British Railway Directors' Reports, 17 February 1846, 26 September 1849.
62. Buccleuch MSS, SRO GD 224/582, 'Report of Meeting of the Representatives of Newbattle, Dalkeith, and Arniston Collieries', 25 October 1849; H. Cadell to the Duke of Buccleuch, 6 November 1849.
63. The Scotsman, 6 September 1848, 28 July 1849; Geddes Records, SRO CB 10/4, J.R. Williamson, Draft Precognition, (Caledonian Railway Leith Branch), April 1862.

Table 2, II. North British Railway: Statement of Traffic

Period (Year ending 31 January)	Passenger Receipts (£)	Mineral Traffic (tons)	Mineral and Goods Receipts (£)
1848	£39,251	77,018	£21,196
1849	36,551	103,256	31,825
1850	41,057	130,886	44,983
1851	44,137	131,197	45,346
1852	44,178	157,250	49,898
1853	46,237	152,076	57,004
1854	51,225	136,940	69,927
1855	55,916	132,971	71,275

Source: North British Director's Report, 20 March 1865,  
SRO BR/RAC(S)/1/112.

The North British were interested in expanding gross coal shipments. Frequently, however, the schemes they promoted resulted in an influx of coals from other regions into the Lothians. In 1862 the Border Union Railway was opened leading to the penetration of Dumfrieshire and North Tynedale coals into former Midlothian preserves in the Borders, and even Edinburgh.<sup>64</sup> This tendency was accelerated on the amalgamation of the North British with the Edinburgh & Glasgow in 1865. The company energetically facilitated the distribution of Lanarkshire coal throughout the Lothians on their extended railway network. Cries of alarm from Lothian coalmasters were numerous. In the year of the amalgamation East Lothian coalmasters complained that they could not compete effectively for their 'own customers' for 'Wishaw coal is already supplied to Portobello on the North British system ... and is asked for further east.'<sup>65</sup>

The relatively high-cost Mid and East Lothian coalfield was always vulnerable to such invasions of its markets. The

64. *The Scotsman*, 19 September 1862, 15 January 1863.

65. Geddes Records, SRO CB 10/5, J.R. Williamson, Draft Precognition, (Caledonian Railway Penicuik Branch), February 1865.

coalmasters of the region in particular had to surrender a large part of the great household demand of Edinburgh and Leith to other coalfields. An estimate of 1859 reveals the multiplicity of sources of supply for this market, and the preponderance of rail-borne coals. H. Cadell's calculation seems an underestimate overall, although the proportions are probably roughly accurate.

Table 2, III. Estimated Supply of Coal to Edinburgh in 1859

Source		(Tons)
Mid and East Lothian	: By Rail	100,000
" " "	: By Cart	25,000
Stirlingshire and Lanarkshire	: By Canal	90,000
" " "	: By Rail	105,000
North-East of England	: By Rail	10,000
" " "	: By Ship	20,000
Fife	: By Rail	40,000
"	: By Ship	10,000

Source: Cadell MSS, H. Cadell, Note-Book 1858-61, Queensferry Branch Notes

Continuously after 1842, with only a brief intermission in 1872-3, Edinburgh consumers enjoyed the benefits of a cheap and abundant coal supply. There were numerous complaints by Lothian coal-masters about the effect of railway competition in the Edinburgh market: the glutted market, the collapse and impossibility of understandings among participants in the trade, and the unprofitability of sales in the Edinburgh market. In 1847 the manager of Dalkeith Colliery, James Wright, commented wryly on a temporary improvement in the coal trade: 'but Edinburgh now receives coal from so many quarters that it is difficult to calculate what may be the state of matters next winter'.<sup>66</sup> In

1860 the Edinburgh market was described as being 'glutted ... with coals from all quarters'.<sup>67</sup> In 1905 it was reported that there

66. Buccleuch MSS, SRO GD224/582, J. Wright to the Duke of Buccleuch, 2 October 1847.

67. Carron Company Records, SRO GD58/18/52, William Johnston, Copy Report on Benhar Coalfield, 7 May 1860.

was very keen competition among suppliers in the city, and the people of Edinburgh were very particular about purchasing very good coals.<sup>68</sup> Such examples could be multiplied.

The shortage of waggons on the Scottish railway system, which occurred during the period under discussion, may have marginally worsened the supply position in some years. Many complaints emanated from traders on the lines serving the Edinburgh market, especially in the early 1850s against the North British.<sup>69</sup> Significantly the consumer does not seem to have aired a protest.

The waggon shortage appears to have had very little impact on the general situation in the domestic coal market in the Lothians. This was due to the multiplicity of sources of supply, alternative means of despatching coal to Edinburgh being available in periods of heavy railway usage,<sup>70</sup> and a gradual lessening of the problem as traders, for example, became more willing to put waggons into service themselves.<sup>71</sup>

The railway certainly contributed to easy coal supply conditions in Edinburgh. Three major consequences of the railway relevant to this study can be identified. Firstly, the establishment of large railway companies in Edinburgh accelerated the organizational improvement of the market. This aspect is discussed elsewhere. Secondly, the railways opened up hitherto remote mineral areas, which led to an expansion of mineral activity in such districts. Thirdly, the railways widened the market areas

68. Final Report of the Royal Commission on Coal Supplies, Part X, Minutes of Evidence, (PP 1905, XVI), evidence of H. Mungall, Q21879.

69. Buccleuch MSS, SRO GD 224/582, H. Cadell to the Duke of Buccleuch, 26 November 1850, 31 October 1853.

70. Such as carts and canal. In 1861, when a severe shortage of engine power developed on the Monkland and Caledonian Railways, the canals were able to lessen the strain and take considerable quantities of coal to the Edinburgh and Glasgow markets. The Colliery Guardian, 2 February 1861.

71. W. Vamplew, 'Railways and the Transformation of the Scottish Economy', EHR, second series, vol 24 (1971), 48-9.

of coalfields, especially after 1850. As Vamplew stresses, the railways in their willingness to stimulate their coal carrying business contributed (along with other factors) to the smashing of local monopolies and intensifying competition.<sup>72</sup>

It is evident that railways were more convenient for the carriage of coal than their predecessors. This was clearly the case after most collieries acquired their own sidings and direct link to the railway system. This could scarcely be paralleled by inland waterways. Railway stations, being more numerous and central than canal depots, were also more convenient for coal distribution in such cities as Edinburgh. Railway competition with canals, and later between railway companies appears to have kept down the cost of carriage to competitive levels. These factors contributed to the maintenance of low coal prices in Edinburgh.

For example the price of Midlothian household coals in 1800-17 rarely fell below 13s per ton. In the 1840s, on the other hand, such coals were infrequently priced above 10s, even in quite prosperous years for the coal trade like 1845. (Better grades like Jewel or Diamond coals were more expensive, but rarely above 12s per ton). The general level of coal prices in Edinburgh remained low in the 1850s and 1860s. The railway's chief effect on the industries and markets of the Lothians was to bring them more under the influence of national economic trends.

The Edinburgh Coal Market. From 1840 to 1875, partly under the stimulus of the effects of the railway, an intensification of earlier trends took place in the domestic coal market of Edinburgh.

72. W. Vamplew, 'Railways and the Transformation of the Scottish Economy', (unpublished PhD thesis, University of Edinburgh, 1969), 366.

The market became increasingly competitive, and more suppliers and marketing intermediaries were involved. Yet at the same time the market became better organized and more closely supervised.

Frauds and anomalies certainly persisted. In January 1843 the Edinburgh & Dalkeith felt the need to draw the public's attention to frauds committed by vendors of coals 'pretended to have been brought from the Railway Depots'.<sup>73</sup> In April 1852 'a

Meeting of the Coal Trade' in Edinburgh complained of the 'many, extensive, and varied frauds that are daily practised in the Coal Trade'.<sup>74</sup> The Scotsman during the 1840s, for example, reported a variety of misdeeds: coal merchants failing to carry out official

weighing procedures, porters and 'pokemen' who delivered coal to the customers' doorstep being accused of overcharging, and carters

being charged with selling underweight.<sup>75</sup> Although the carters

were certainly not the sole cause for fraud, much of the doubtful practice appears to have originated from the less regulated part of the trade associated with them. Besides servicing the canal and railway depots, independent carters still plied their trade

between the coal pits around Edinburgh and the city. In 1854 an

angry North British shareholder commented that the roads into the metropolis were 'clogged with coal carts' taking the traffic that

the railway had failed to win.<sup>76</sup> But the independent carters were

a dying breed. Hawking in the streets of Edinburgh was banned.

Thus, in June 1866 two coal carters were charged and fined 'for bawling their wares on the streets, to the annoyance of the neighbourhood'.<sup>77</sup>

73. The Scotsman, 14 January 1843.

74. The Scotsman, 10 April 1852.

75. The Scotsman, 21 October 1840, 10 February 1841, 27 February 1847, 28 March and 4 August 1849.

76. J. Thomas, The North British Railway, I (Newton Abbot, 1969), 55.

77. The Scotsman, 7 June 1866.

The conduct of the Edinburgh coal market was improved as a result of a variety of forces. A major force was direct action taken by the authorities, often under the influence of public opinion or powerful parties in the trade like coal firms, to take concrete measures to subject the trade to greater supervision, and in addition to enforce the regulations vigorously. The action against hawking just noted is an example of the latter development.

The power to regulate the coal market was originally given to the police and magistrates of Edinburgh by legislation passed earlier in the century. After 1850 increasing use was made of such powers. By October 1852 the Edinburgh Police Commissioners had appointed John Mitchell, 'Inspector over the Coal Trade, with full power to re-weigh Coal, and enforce the Penalties in the Act against Parties vending Coal without Certification of Weight ...', and with other duties.<sup>78</sup> Control was extended in the following years. By 1866 officially authorized weighers were responsible for most of the sales of coal in the city, and the Edinburgh magistrates laid down detailed regulations covering the most minute aspects of the trade - for example the magistrates fixed rates of portage down to the extra rates for delivering coal above a ground floor at so much per floor.<sup>79</sup> One consequence of the greater vigilance of the authorities was a spate of prosecutions in 1866, some on seemingly trivial offences.<sup>80</sup>

Another major force for order in the market was the presence of the railway companies. By the early 1850s the railway stations and depots had become the chief feature of the distributive side

78. The Scotsman, 27 October 1852.

79. The Scotsman, 10 December 1863, 23 December 1865, 1 February 1866, 10 November 1869.

80. The Scotsman, 15 March, 7 and 15 June 1866.

of the Edinburgh coal market. Large new coal depots and selling offices were established in the city - the Edinburgh & Glasgow at Haymarket, the North British at the North Bridge, the Edinburgh, Perth & Dundee at their Granton, Trinity, Leith and Scotland Street stations, and the Caledonian at the Lothian Road. Further, outside the main termini, such stations as at Portobello became 'considerable places' for the sale of coal.<sup>81</sup> The railway companies were anxious to build up good-will among the consumers, and closely supervised the trade based on their premises in an attempt to establish a good reputation in the coal marketing business. It is apparent from a reading of the minute books of the Edinburgh & Glasgow, for example, that the railways took an almost day-to-day concern in the conduct of the coal trade. Occasionally stringent conditions were laid down by the Edinburgh & Glasgow when new marketing firms wished to commence business at their depot.<sup>82</sup> The railway companies also began to emerge as large-scale merchants in their own right, as well as being carriers. In 1861 it was stated that the North British had 'for some time past' become extensive coal merchants. It was even suggested that the company was attempting to monopolize the coal trade along certain of its lines.<sup>83</sup> The growth of vertical integration led naturally to greater control in the trade. The tendency should not be exaggerated, however, as independent merchants continued to thrive at the depots of the North British.

In fact as stressed previously a major consequence of the

81. Buccleuch MSS, SRO GD 224/582, H. Cadell to the Duke of Buccleuch, 20 May 1850.

82. For example when the 'Western Coal Company' commenced business the railway's management committee resolved that 'no indulgence whatsoever' should be allowed them, and that dues should be paid weekly or sooner if necessary. EGRMB, SRO BR/EGR/1/50, 29 May 1844.

83. The Scotsman, 4 October 1861.

railways was an intensification of competition in the market.

The companies vied with each other in granting draw-backs on dues so as to win coal carrying contracts. The longer the distance the less the rate, so distance from the market became

proportionately less of an obstacle for a prospective supplier.<sup>84</sup>

The third major force making for improvements in the domestic coal market in Edinburgh was indeed the growth of competition in the trade, and the disintegration of attempts by suppliers to control the market to their advantage. These developments stemmed from pressures discussed in the last section. As it was put in 1861:

'The keen competition in the regular coal trade is notorious'.<sup>85</sup>

The increase in competition is reflected in a great rise in the number of intermediaries in the trade. In Midlothian in 1851 there were 182 coal merchants according to the census returns, and in 1871 there were 356.<sup>86</sup> A further factor adding to the competitive climate of the Edinburgh coal market was the tendency of the iron firms to become 'sale coalmasters' in times of slack in the iron trade. For example during the 1860s Shotts Iron Company frequently supplied Edinburgh from their coal mines in the west, such as Morningside Colliery, and the Forth Iron Company marketed Fife coal at their 'Cowdenbeath depot, Leith Walk'.<sup>87</sup>

The railway companies also contributed to the introduction in Edinburgh of better service for customers in the presentation of coal. In the competitive atmosphere of the Edinburgh market,

84. This was the principle adhered to by the North British, for instance. Thomas, North British Railway, 52-3.

85. The Scotsman, 4 October 1861.

86. Population Censuses, 1851, 1871. This increase is corroborated by the number of coal merchants with insertions in the Edinburgh and Leith Post Office Directory: 58 in 1833-4, 85 in 1850-1, and 185 in 1870-1.

87. Geddes Records, SRO CB10/3, Notes of the evidence of David Landale re Opposition to the Monklands Branch to Shotts Iron Works, 1 March 1860; The Scotsman, 13 January 1862, 10 November 1869. See Youngson Brown, 'Scots Coal Industry', 128, 147 for further discussion of this phenomenon.

consumers became increasingly fastidious in their demands.<sup>88</sup>

This placed considerable pressure on coal merchants to improve standards of service, and follow their more enterprising competitors

in adopting merchanting methods, which had been tried elsewhere,

and which the railway in a general sense helped to diffuse. This

development was associated with the abandonment during the 1850s

of the three-grade classification of coals.<sup>89</sup> The intermediate

category of 'chows' had little to recommend it. In place of

this traditional Lothian method of coal production and distribution,

more emphasis was placed on providing the customer with coal in a

convenient form. A more sophisticated form of the simple two-grade

classification of the Glasgow area of the early nineteenth century

evolved. Henceforth greater attention was paid to the selecting

and riddling or screening of coals. During the 1840s firms

marketing English coals emphasised that they were screened or 'double-

screened'.<sup>90</sup> In subsequent years the practice spread to Scottish

coals. For example, in 1862 Shotts 'Jewel Coal' was advertised in

Edinburgh as being '... filled from the Trucks, riddled and picked ...

so that no complaint whatever can exist'.<sup>91</sup> Changes in stipulations

in coal leases reflected the change. There was a growing tendency

to levy royalties on the basis of whether or not coal was screened,

rather than on the three grades as hitherto.<sup>92</sup> This, of course,

88. There is good evidence that relatively inferior coals could hardly find a market in Edinburgh, while fine coals commanded a fair price. Carron Company Records, SRO GD 58/18/52, W. Johnston, Copy Report on Benhar Coalfield, 7 May 1860; Geddes Records, SRO CB10/4, J.R. Williamson, 'Report on Strathbrock Colliery operations', 23 October 1860.

89. See chapter one, p.6.

90. The Scotsman, for example 10 February 1847.

91. The Scotsman, 31 January 1862.

92. Geddes Records, SRO CB10/1, Copy letter Williamson to J. Brown, 1854; CB10/5, 'Draft Heads of Agreement between Sir John Don Wauchope and William Springall', 30 April 1864, etc.

did not prevent the coal merchant presenting the produce to the customer in a whole variety of ways (for example, distinguishing between coals suitable for kitchens, drawing-rooms, etc.) But emphasis was increasingly placed on screened or riddled coals. A considerable dislike of 'mixed coals' had grown up in the trade, as being open to abuse and liable to give the trade a bad reputation.<sup>93</sup>

The delivery of coal to customers was also greatly improved.

In general some such very direct method as emptying straight into cellars was used. But in 1869 a firm of coal merchants in Edinburgh, Machean, Morrison & Co, introduced the 'New Method of delivering Coals' from the Slamannan and Wishaw districts in sacks containing  $1\frac{1}{4}$  cwt of coal. Similar methods were adopted by other merchants. Associated with this improvement was the replacement of the old Midlothian cart by waggons or drays. In January 1870 Machean, Morrison & Co took steps to 'completely supplant the old-fashioned or tumble-down style of delivery' with the 'London Style of Drays, carrying Three Tons, and drawn by a Pair of Horses'. A winding-machine was attached to each dray. Similar improvements were introduced by other coal merchants.<sup>94</sup>

During the 1840s and 1850s a further development occurred in the organization of the Edinburgh market, which would tend to result in greater control. This was the use of 'Sole agents' by leading collieries to handle their sales in the Edinburgh or other markets. The advantage for the consumer was allegedly the elimination of fraud and the coal merchant's agency. The sole agent of Lord Belhaven's collieries in Edinburgh announced in 1849

93. Cadell MSS, H.F. Cadell to H. Cadell, 1 January 1852; The Scotsman, 30 July 1857, 'Coal Notice', by committee appointed by the Coal Trade.

94. The Scotsman, 1 and 6 November 1869, 8 January 1870, and 8 February 1872.

that, 'to prevent Fraud ... in future will send a stamped invoice with every quantity of Lord Belhaven's Coal sold'.<sup>95</sup> By the 1850s many of the larger collieries of Mid and East Lothian were represented by a sole selling agent in Edinburgh. After about 1860, however, the trend appears to have been reversed. By 1864-5 Dalkeith Colliery (which for long had had a sole agent in the city) dealt with at least eighteen separate coal merchants in Edinburgh.<sup>96</sup> The reversal of this development was reflected in the mushrooming of the intermediary sector in the market - most of the great expansion in the number of coal merchants in Edinburgh between 1851 and 1881 took place in the 1860s. The decline of sole agents was related partly to the increasing competitiveness of the trade - as the management of Tranent Colliery decided in the mid-1850s, overall sales could be expanded most expeditiously by increasing the number of sales outlets.<sup>97</sup> The development probably also reflects improved official supervision and honesty in the Edinburgh trade, and therefore a diminished need for coal firms to control marketing in every detail.

Before concluding this section, firstly the performance of the coalfield of Mid and East Lothian in the Edinburgh market, and secondly the emergence of more ambitious and diversified marketing enterprises deserves mention.

Production and sales data for Lothian works is fragmentary. The impression is that until the 1840s the coalfield was heavily dependent on the Edinburgh domestic coal market. This was doubtless true for the four most important enterprises in Mid and East Lothian,

95. The Scotsman, 2 June 1849.

96. Buccleuch MSS, SRO GD 224/544, 'Statement of Trackage of Coals from the Pits to the Railway', April 1864 - March 1865.

97. Cadell MSS, H.F. Cadell to H. Cadell, 27 April 1857.

which were the three works of Newbattle, Arniston, and Dalkeith, and the pits worked by Sir John Hope. At those works which Hope leased, for example, the average quantity of his coal carried down the Edinburgh & Dalkeith in the six years to 1845 was 50,700 tons per annum. In the late 1840s an average quantity of still well over 40,000 tons annually was still so disposed of. This represented in the region of three-quarters of the output of these collieries.<sup>98</sup> Faced with railway competition Hope extended his marketing arrangements. Two sales establishments were already in existence in Edinburgh and Leith, and by 1848 a further two were added, at Scotland Street and Trinity. Four more new 'agencies' were set up elsewhere, for example at Linton and Dunbar.<sup>99</sup> In 1850 Sir John Hope abandoned his extensive but heavily capitalized mining enterprise in Midlothian, and these collieries were no longer so important in the Edinburgh market, or indeed at any level during the period under discussion.

After 1850 the collieries of Newbattle, Arniston, and Dalkeith still coveted the Edinburgh market. But as will become apparent in the next chapter they were increasingly developing other areas of sales. This is reflected in the following scanty information for Dalkeith Colliery:<sup>100</sup>

Table 2, IV Dalkeith Colliery: Disposals of Great Coal

Period	Hill Sales (%)	Edinburgh Sales (%)	Leith Sales (%)
January 1843 - December 1850	51.9	37.9	10.2
April 1864 - March 1875	61.3	11.8	26.9

Source: Buccleuch MSS, SRO GD 224/534-549, Dalkeith Colliery Account Vouchers, 1843-75.

- 98. Hope MSS, various papers including 'Coals carried by N.B. Railway since 1843'; Ibid, 'Copy Report by William Anderson, M.E. South Shields, Upon the Collieries of the E. of Wemyss', 11 June 1849.
- 99. Ibid, 'Notes for the Arbiters in the Submission between the Earl of Wemyss and Sir John Hope as to the Stoneyhill Colliery being unworkable to profit', 30 November 1848.
- 100. Some of the Hill Sales would have found their way to Edinburgh. The expansion in Leith Sales reflects increased shipments of coal.

Many other collieries in Mid and East Lothian supplied the Edinburgh market to some extent, without dominating or being dominated by it. For example one of the larger middle-rank Lothian collieries was that of Tranent, East Lothian, with an annual output of about 30,000 tons in the 1850s. Total Edinburgh sales in this decade varied between 4,853 tons and probably no more than 9,000 tons yearly.<sup>101</sup> What is perhaps more significant is that for the first time Mid and East Lothian collieries were beginning to depend on markets other than Edinburgh. In the late 1850s works like Pencaitland and Wallyford were sending a substantial part of their output to the iron industry,<sup>102</sup> and for some works the gas market was becoming extremely important.

Not unconnected with these last developments was the emergence during the third quarter of the nineteenth century of more enterprising firms of coal merchants. James McKelvie and James Waldie & Sons were two such examples, but for the sake of brevity only the latter firm will be examined.

Although the enterprise later dated its existence back to 1784, the first definite evidence I have of it is in 1840-1, when the firm had only one Edinburgh office. J. Waldie & Sons grew rapidly in the 1850s and 1860s, with four offices in 1860-1, and seven 'coal stations' or 'depot offices' as well as three 'order offices' throughout Edinburgh and Leith by 1870-1. The range of coals they marketed had widened to include a variety of English, Fife, and Lanarkshire household, industrial, and shipping coals by the 1870s.<sup>103</sup> By this decade the firm also specialized in

101. Cadell MSS, H.F. Cadell to H. Cadell, 27 April 1857.

102. Statistical Appendix, tables 48 and 54.

103. The Edinburgh and Leith Post Office Directory, 1840-1, 1860-1, 1870-1; The Scotsman, various advertisements during 1860s and early 1870s.

merchancing gas-coals with bases in the Glasgow district as well as in Edinburgh and Leith.<sup>104</sup> J. Waldie & Sons also became coalmasters in their own right. They took on the lease of Tranent Colliery, East Lothian about 1880.<sup>105</sup> And they took an active part in promoting and directing Arniston Coal Company - one of the earliest and most successful of the limited liability companies in the Lothian coal industry.<sup>106</sup>

In conclusion, the emergence of more sophisticated coal merchant firms reflects the changing demand spectrum for Lothian coal during the period 1840-1875, and the success of the coalfield in relinquishing to a great extent its dependence on the Edinburgh domestic coal market, and in capturing new areas of sales. This great urban market for household coal was itself marked by two main tendencies in the period. Firstly, commercially it became increasingly competitive. Secondly, it was subjected to official and quasi-official supervision which grew in effectiveness, and the organization of the market and customer service made notable improvements.

The crisis of 1872-3. The boom of 1872-3 brought conditions reminiscent of 1836-8 and 1790-1820 in the Edinburgh coal market. Whereas the coal shortage around the beginning of the nineteenth century was due primarily to local conditions, and that of 1836-8 to especially Scottish factors, the crisis of 1872-3 in the Edinburgh domestic coal market, however, was the outcome of developments of international proportions. It is not necessary

104. Note, J.F. Waldie, Analysis of Scotch Cannels, Gas Coals and Shales (Glasgow, 1891).

105. McNeill, Tranent and its Surroundings, 24.

106. One of the six original directors in 1874 was James Waldie Jnr., and in 1913 the family possessed over one-sixth of the paid-up capital and included one of the four directors.

Dissolved Companies SRO, BT/2/549, Arniston Coal Company Limited, Memorandum of Association, Lists of Shareholders.

here to consider the economics of the great cyclical upswing of 1872-3, beyond noting that it was the coal industry above all sectors which enjoyed unprecedented prosperity during the boom.

Its prime manifestation in Edinburgh was a major increase in coal prices. Household coals rose from 11s 6d per ton in November 1870 to 23s 6d by February 1873, and finer quality coals rose from 13s to 30s per ton over the same period.<sup>107</sup>

Coalmasters and merchants became the butt of considerable criticism as a result. J. Waldie & Sons went out of their way to try to absolve themselves from the causes of the rise in price. In October 1872 they gave notice of further price increases being imposed by the coalmasters, and pleaded: 'In self-defence, we think it right to explain ... that we are neither Shareholders nor Owners in any Colliery'<sup>108</sup> - although they shortly would be as noted above. It was mainly the coalmasters who were at the receiving end of hostile comment.<sup>109</sup>

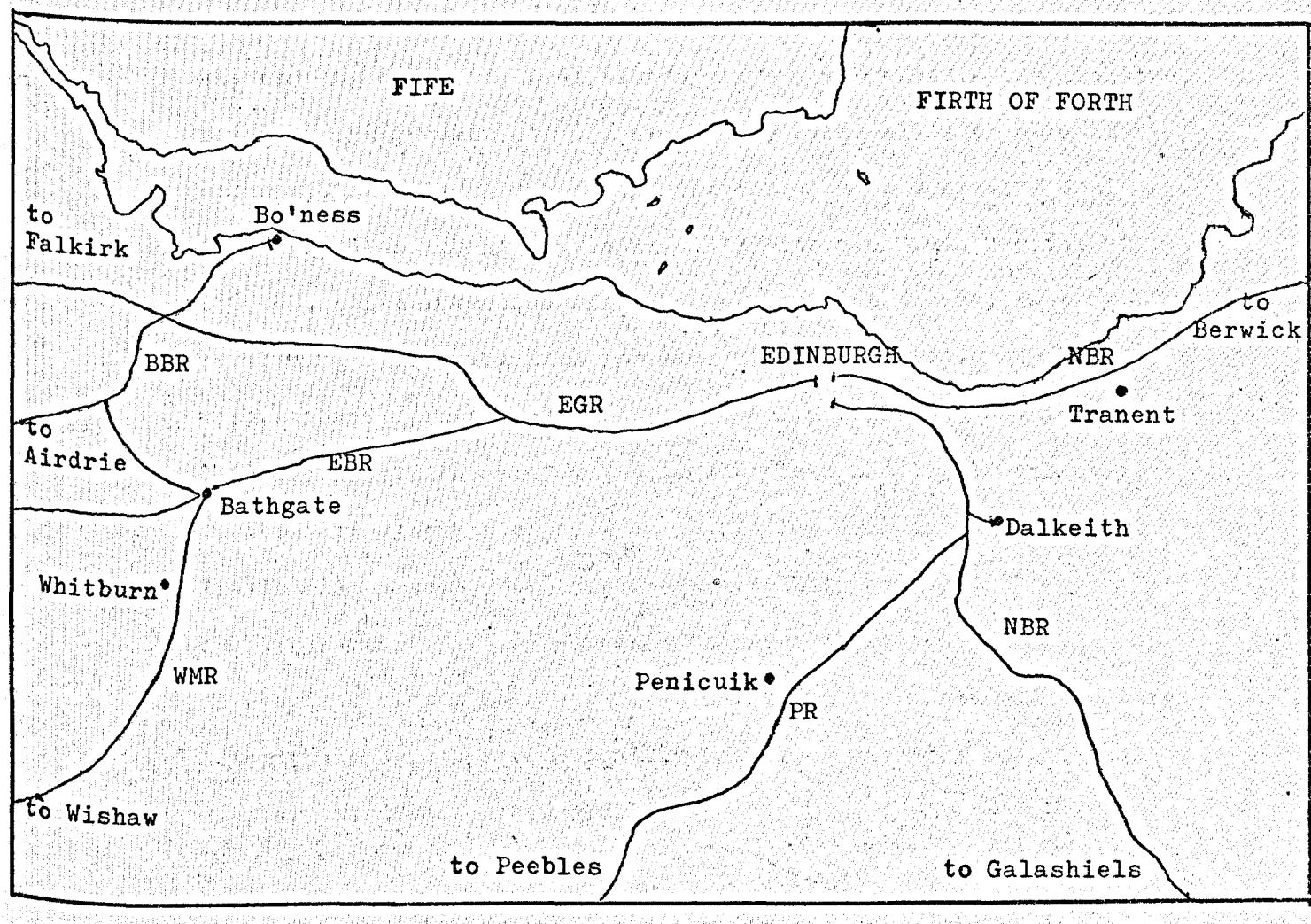
As in earlier periods of dearth publicly-minded citizens sought to strike at the core of the problem by securing supplies of coal from source, as was envisaged in the 1790s and embarked on by the Coal Committee in 1837-9. In the early 1870s such schemes were even more grandiose, and gave rise to the flotation of two limited liability companies. The Edinburgh Coal Company was formed in April 1872. Its nominal capital was £20,000, although under £3,300 was paid-up by November 1876. The object of the company was to carry on the business of coal merchants in Edinburgh, and to work coal and sell it cheaply to the general public by whatever means

107. See The Scotsman, November 1870, February 1873.

108. The Scotsman, 8 February and 10 October 1872.

109. While it cannot be validated whether coalmasters profiteered, it is noteworthy that over the years 1865-84 comfortably the best profits were made at Grange Colliery in 1872 and 1873. Cadell MSS, Grange Colliery Ledger No. 2, (1863-1884).

Map 3. The Lothians: some of the chief railways c1860

Key

- |     |                                  |
|-----|----------------------------------|
| BBR | Bo'ness to Bathgate line         |
| EBR | Edinburgh & Bathgate Railway     |
| EGR | Edinburgh & Glasgow Railway      |
| NBR | North British Railway            |
| PR  | Peebles Railway                  |
| WMR | Wilsontown & Morningside Railway |

were appropriate. A dividend was paid out of capital in 1873 and the company did bring coal to the city. The venture was abortive, however, and by October 1874 steps were being taken to have it wound up.<sup>110</sup> Less is known of the Scottish Co-operative Coal Company, which was set up in May 1873 with a nominal capital of £50,000. Its intention was to supply coal at a cheap rate by purchasing or leasing land for mineral exploitation. By May 1873 'provisional' arrangements to lease two coalfields 'within easy distance from Edinburgh' had allegedly been made. In February of the next year the company was marketing coal in the city, but little else has come to light regarding this project.<sup>111</sup>

The crisis of 1872-3 was an aberration in the general development of the Edinburgh coal market in the nineteenth century. After the boom, the traditionally keenly competitive conditions of previous decades returned.<sup>112</sup>

#### Railways in the Lothian Mineralfields after mid-century.

While the extension of the railway system on a national scale produced intense inter-regional competition, for example in the Edinburgh market, on a local scale railway development continued in the Lothians after mid-century to the great advantage of the region's mining industries. There was an ongoing expansion of the network of private colliery and public branch railways, which

110. The Scotsman, 31 July 1873, 26 February 1874; Dissolved Companies SRO, BT/2/410, Edinburgh Coal Company Limited, Memorandum of Association, Lists of Shareholders, Report of extra-ordinary General Meeting on 26 October 1874.
111. The Scotsman, 31 May 1873 (Prospectus of the Scottish Co-operative Coal Company, Limited), 26 February 1874.
112. On a proposal by Shotts Iron Company to re-introduce a Midlothian coal into Edinburgh in the early 1880s it was reported: 'Considering the keen competition that presently exists in the coal market, and the quantity of coal coming into Edinburgh from the west, the Shotts Company may have some difficulty in again introducing it into the market ...', Clark of Penicuik MSS, SRO GD 18/1156, G.H. Geddes, Precognition, c1883.

by the 1870s represented a close mesh of lines serving the area.

The energetic exploitation of the characteristic mineral resources of the Lothians - not only household coals, but also gas-coals, torbanite, rich ironstones, and oil-shales - depended on this development of transport facilities.

This section deals first with private colliery tracks, and secondly the activities of the railway companies.

By the close of the period under study virtually every pit in the Lothians had its own siding and link with the railway system.

Indeed for a colliery to be competitive this had become vital.

Colliery branch lines were the direct descendants of colliery waggonways. They were for much of the period technically primitive.

These short, privately-owned lines were of a less robust construction than the 'permanent way' of public railways. Horses

were often employed on narrow track. Locomotives, however, were beginning to be employed later in the period.<sup>113</sup> Indeed by the

1860s large collieries with an extensive railway sale were requiring more substantial railway fittings. For example at

Newbattle and Fauldhouse Collieries the colliery lines being built about 1870 were less of the character of temporary tramways, but were rather approaching the constructional standards of a public

railway.<sup>114</sup>

Little would be achieved by citing all the cases of colliery branch developments in the Lothians. Although, perhaps, the extensive system of private branch lines owned by Young & Co

113. See eg, SRO, CS 245/833, (*Gillespie v Miller*), Proof and Appendix, 1873, evidence of G. Simpson, 26.

114. Dundas of Arniston MSS, J. Geddes, Reports on Arniston Colliery and Esperston Line Works, 6 September 1869, 22 August 1870; Geddes Records SRO, CB 10/10, Messrs W. Robertson and Smith, Reference Fauldhouse Coal Co. v George McKenzie and others, Report on the Crofthead Colliery Plant Workings, 19 August 1875.

deserves mention. This network was built up in the 1860s and stretched from Bathgate to Addiewell serving the shale and coal pits and chemical works of the company.<sup>115</sup> This was an exceptional private system for the Lothians. Suffice to say that evidence suggests that the 1840s was a quiescent period for colliery branch construction in the region, while 1850 to 1875 was one of great activity.

Colliery valuations give a good picture of the real importance of railway equipment to the colliery enterprise, as the table below indicates.

Table 2, V Colliery Above-Ground Railway Facilities

Works, and date of valuation	Length of railways (yards)	Estimated valuation <sup>116</sup> (£)	Gross Colliery Valuation (£)
Arniston, Midlothian, 1867	3,428	£1,714	£19,944
Wallyford, Midlothian, 1870	1,841	£1,110 (all above-ground railway equipment: £2,101)	£13,173
Elphingstone, East Lothian, 1873	2,464	£397	£4,706
Fauldhouse, West Lothian, 1875	3,727	£5,189	£10,923
Tranent, East Lothian, 1877	Tramway to Harbour, 15,000 yards: £968 (other above-ground railway equipment: £1,982)		£5,284

Sources: see note 117

115. J. Butt, 'James Young, Scottish Industrialist and Philanthropist', (unpublished PhD thesis, University of Glasgow, 1964), 302.

116. Railway only.

117. The figures are drawn from colliery valuations. See note 114; Dundas of Arniston MSS, 'Inventory and Valuation of Machinery, Utensils, Railways ... at Arniston Colliery belonging to John Christie', 30 December 1867; Geddes Records SRO CB10/7, D. Landale, Copy Valuation of Wallyford Colliery, October 1870; Ibid, CB10/10, 'Tranent Colliery Valuation', December 1877; File relating to Elphingstone Colliery SRO, GD1/364, 'Inventory and Valuation of the Moveable Plant, Machinery, Railways ... at Elphingstone Colliery &c belonging to the firm of Durie and Nisbet, as at the 26th December 1873'.

While the 'main hurley road' at Elphinstone and the famous waggonway at Tranent were of some antiquity and had very low valuations, the other three colliery branch systems in Table 2, V were built up in the 1860s or 1870s and were of a far higher standard. It is clear that a sizeable railway plant was the concomitant of a modern, well-equipped colliery by the close of the period.

Attention can now be turned to public railways. The development of private colliery lines after 1850 followed, and to a great extent, depended on the expansion of the public system of railways. Only when the main lines penetrated close to the mineral workings did the rationale of constructing colliery branches become pressing. Until such time, many collieries - reliant on cart sales - languished in a world increasingly dependent on the railway for the distribution of goods.

There is much evidence of the mineral potential of certain districts of the Lothians lying dormant, and then being realised <sup>only</sup> fully, with the coming of the railways. This applies to the gas-coal district near Bathgate, the clayband ironstone deposits of southern West Lothian, and the rich blackband ironstone and gas-coals of remote Midlothian edge seams, which were all progressively opened up in the thirty years or so after 1850.<sup>118</sup> Completion of railway links would increase the value of mineral property to a considerable degree.

While in 1850 West Lothian was poorly served by railways, a decade later the situation had greatly improved. In addition to

118. Geddes Records, SRO CB10/1, John Williamson, 'Report as to the value of the Balbardie Mineralfield', 28 August 1854; Ibid, CB10/2, John Williamson, 'Remarks on Ironstone Deposits ... in the Lanarkshire and Stirlingshire districts', 23 April 1856.

the Edinburgh & Glasgow Railway in the north of the county, from Bathgate in the south a number of recently completed lines radiated to serve the neighbouring and adjacent mineralfields.

There were links to the coal and ironstone areas of Airdrie in Lanarkshire, Slamannan in Stirlingshire, and Bo'ness in the north of West Lothian, to the gas-coal and shale districts of Mid and West Lothian, and access to ports on the Forth, such as Leith.<sup>119</sup>

The first fruit of the railway promotion mania of the mid-1840s in West Lothian was the Edinburgh & Bathgate opened about 1850. It became important later, from the mid-1860s, when the shalefields were opened up. In the meantime it was used to some extent by a number of mineral enterprises, including those making <sup>120</sup> winnings of torbanite.

The main contribution to the mineral development of West Lothian during the third quarter of the nineteenth century was made by the Monkland Railway Company.<sup>121</sup> The first line of importance they constructed in the county was the Bo'ness line, which ran from Bo'ness to the Slamannan railway and was opened in 1851. In the mid-1850s a number of important branches were made to the Bo'ness line, for example to Bathgate, Polkemmet, and Armadale - all in West Lothian. James Russell & Son, the major torbanite producers, the mining ventures of the Monkland Iron Company at Armadale, and W. Wilson & Co coal and ironmasters were among the enterprises which

119. Note, W. Moore, 'Observations on the Supply of Coal and Ironstone from the Mineralfields of the West of Scotland', Proceedings of the Philosophical Society of Glasgow, vol 4 (1860).

120. SRO, UP McNeil H 33/14, (Hosie v Edinburgh & Glasgow Railway), Answers for Edinburgh & Glasgow Railway, 1856.

121. Over 180,000 tons of coal were interchanged between the Monkland Railway and the Edinburgh & Glasgow in 1864, destined for local industrial, Edinburgh, and shipping markets. SRO, BR/EGR/4/7, Edinburgh & Glasgow Railway Traffic Statements, Comparative Tables of traffic interchanged with the Monkland Railway Co. during years to 31 December 1864, and 31 December 1857 respectively.

were fairly heavy users of the Bo'ness & Bathgate line as it became known.<sup>122</sup>

The Monkland Railway also constructed lines which were designed mainly to develop the mineral resources of Lanarkshire or Stirlingshire, such as the Wilsontown, Morningside & Coltness Railway, opened by 1854, and the Airdrie, Coatbridge & Bathgate Railway, opened in 1861. But the gas-coals and ironstones of West Lothian were also distributed and tapped by these lines to no small degree. Such West Lothian properties as Torbanehill, Longridge, and those possessing clayband ironstone benefitted from these lines.<sup>123</sup>

A number of branches were constructed by the Monkland Railway between the late 1850s and early 1860s, which gave further impetus to the great leap forward in mineral activity in West Lothian, such as the Craigmill branch, and the Shotts branch. They were employed especially by the Iron Companies active in the county.<sup>124</sup>

Some major entrepreneurs lent support to the promotion of the schemes of the Monkland Railway in West Lothian, or some form of financial assistance. This applies to John Wilson, coal and ironmaster of Kinneil and Dundyvan, and James Russell with respect to the Bo'ness & Bathgate line. The Monkland Railway was fundamentally concerned with mineral traffic. Of a total revenue of £76,000 in the year to June 1857, £66,000 was from this source.<sup>125</sup>

In 1865 both the Monkland Railway Company and the Edinburgh & Glasgow were amalgamated with the North British. All the

122. Monkland Railway Company Minute Books (MMB), SRO BR/MNK/1-2, 1849-1858, various entries.

123. Geddes Records, SRO CB10/3, Notes of evidence of David Landale: Opposition to the Monklands Branch to the Shotts Iron Works, 1 March 1860; The Colliery Guardian, 2 February 1861.

124. MMB, SRO BR/MNK/1/3, 17 February 1859; Ibid, MNK/1/4, 20 August 1862.

125. Ibid, MNK/1/2, 20 August 1857.

<sup>so far</sup>  
railway projects discussed in this section came under the control of the North British, which thus acquired a powerful and extensive interest in the Lothian mineral districts to the west of Edinburgh.

The North British did not rest on the base built up by the companies that had been absorbed, but continued branch construction.

During the 1860s and 1870s emphasis shifted to the Shale-fields of the Lothians,<sup>126</sup> and in the north an important project locally was the Bridgeness Railway.<sup>127</sup>

Meanwhile the Caledonian Railway had developed their branch system in the shale and mineral area west of Edinburgh. Their 'loop line' was in particular heavily used by many shale-oil enterprises in the locality.<sup>128</sup>

The coalfield of Mid and East Lothian possessed household and common coals, but also valuable if small deposits of gas-coal and blackband ironstone. By the close of the period under discussion it was provided with a comprehensive branch system in a similar fashion to the mineralfields of West Lothian. The guiding and leading influence was the North British. It supported the promotion of all the important projects, and cooperated in their management, although only subsequently did the company formally take over these lines. The story is one of a deepening penetration of the coalfield by railway access, of particular importance to more remote edge collieries in Midlothian, and also for parts of East Lothian.

126. Geddes Records, SRO CB10/5, J.R. Williamson, Draft Precognition, (North British Railway branches), 1866.

127. This line, proposed in 1872 and opened in 1878, was constructed with financial guarantees of revenue from the main users including the Cadells, coal and ironmasters of Grange, and the proprietors of two foundries. Cadell MSS, Folder on Bridgeness Railway.

128. Geddes Records, SRO CB10/9, J.R. Williamson, Notes upon Caledonian Larbert and Carstairs Branches, 28 March 1873.

The projects in question fall into three groups. Firstly there was improved communication to the Borders. Following the Edinburgh & Hawick, the Peebles Railway was incorporated in 1853, opened in 1855, and of all the works in the coalfield was of most immediate value to Whitehill colliery.<sup>129</sup>

Secondly there were railway projects in the eastern part of the coalfield - east of the Edinburgh & Hawick. The Esk Valley Railway was incorporated in 1863 and opened about 1866. The Ormiston branch was opened about 1871. These lines were of considerable significance for many pits: for example those of Edmonstone, Woolmet, Pencaitland, Elphingstone, and others.<sup>130</sup>

Thirdly there were lines in the western part of the coalfield, which fed the Hawick railway or its branches, and served the more distant southerly and south-western parts of the field. The three projects which opened up this region were the Lasswade branch, the Penicuik Railway, and the Edinburgh, Loanhead & Roslin. The period of promotion and construction was from the late 1860s to the early 1870s. Extensive mining operations by west of Scotland iron firms followed.<sup>131</sup>

Frequently mining interests were involved - together with the North British - in the promotion, management, and even financing of these lines. R.B. Wardlaw-Ramsay was involved in the Peebles Railway and the Penicuik Railway, and Shotts Iron Company and Sir George Clerk took a part in financing extensions to the Edinburgh,

129. Peebles Railway Company Minute Books, SRO BR/PBR/1/1-2, 1852-7.

130. Geddes Records, SRO CB10/4, J.R. Williamson, Draft Precognition, (Esk Valley Railway), April 1861; Ibid, Draft Precognitions by C.J. Christie and J.R. Williamson, (North British Railway proposed branch, Ormiston, Monktonhall, Dalkeith), March 1862; The Esk Valley Railway Company Minute Books, SRO BR/ESV/1/1, 1861-71.

131. The Scotsman, 25 October 1871; Penicuik Railway Company Minute Books, SRO BR/PCR/1/1, 1870-6; Edinburgh, Loanhead & Roslin Railway Company Minute Books, SRO BR/EDL/1/1, 1870-7.

### Loanhead & Roslin.<sup>132</sup>

By the mid-1870s the collieries and mineral enterprises of the Lothians were very adequately served by a system of public railways and branch lines, and further projects were still being promoted.

### Conclusion

New means of communication wrought a revolution in the Lothians' coal trade between 1820 and 1875. In the earlier phases of the 'transport revolution' in the region conditions in the all-important Edinburgh domestic coal market became more competitive, without its position as the crucial market for the Midlothian coalfield being too seriously eroded. Indeed to some extent this orientation was re-affirmed when the Edinburgh & Dalkeith gave improved access to the Edinburgh market.

However when the 'Railway Age' struck the Lothians in its fullest manifestations, namely from the 1840s, the situation was transformed. Inter-regional competition in the coal industry greatly increased. The Edinburgh market could no longer support the relatively high-cost coalfields of the region. The salvation lay in the development of markets in which the Lothians' mineralfields had a particular advantage. These markets will be discussed in the following chapter. The exploitation of the special resources of the Lothians depended on the continuing filling-out of the railway map of the region.

132. Ibid, 7 April 1875; Ibid, BR/EDL/1/2, 29 March 1875; Clerk of Penicuik MSS, SRO GD 18/1155, Copy letter William Lindsay to Stuart Neilson, 23 June 1876.

Meanwhile the persistent influx of railway coals into Edinburgh, coupled with an alert public eye on the coal trade in the city had two long-term effects. The coal market of Edinburgh became more and more competitive from the commercial angle, and increasingly subject to official and quasi-official control.

### CHAPTER THREE

#### THE DEMAND PATTERN OF AN INDUSTRIAL SOCIETY

## CHAPTER THREE. THE DEMAND PATTERN OF AN INDUSTRIAL SOCIETY

### Introduction

According to P. Deane and W. Cole the period of the most rapid growth of the British coal industry was probably between 1830 and 1865, when total output increased some four and a half times.

This rate of growth rested upon buoyant market conditions.

Figures gathered by Deane and Cole<sup>1</sup> make clear that the origins of the demand growth were rooted in the diversifying fuel needs of a rapidly industrializing society.

Table 3, I Estimated distribution of coal in the United Kingdom  
(as percentages of U.K. coal tonnage raised)

	1840	1869	1887
	(%)	(%)	(%)
Iron Industry	25	30	16 $\frac{1}{2}$
Mines	3	6 $\frac{1}{2}$	6 $\frac{1}{2}$
Steam Navigation	1 $\frac{1}{2}$	5	12 $\frac{1}{2}$
Gas and Electricity	1 $\frac{1}{2}$	6	6
General Manufacturing	32 $\frac{1}{2}$	26	26
Domestic	31 $\frac{1}{2}$	17	17 $\frac{1}{2}$
Exports	5	9	15

Source: P. Deane and W. Cole, British Economic Growth 1688-1959 (Cambridge, 1969), 219.

The iron industry and exports contributed tremendously to the growth of demand, while new areas of rapid growth like the gas industry were beginning to vie in importance with old established areas of consumption.

In this chapter attention will be focussed on the period from roughly 1840 to 1880 - that of the 'second phase' of modern economic growth in Britain. The sectors of demand which were particularly significant for or characteristic of Lothians' coal demand in this period will be examined. For the sake of continuity

1. P. Deane and W. Cole, British Economic Growth 1688-1959 (Cambridge, 1969), 217. The period in question is one for which no official output figures exist.

brief references to the earlier history of these sectors will be made.

### The Iron Industry

Great stress has been laid on the dependence of the Scottish coal industry's prosperity on the level of activity of the iron industry in the first seventy years of the nineteenth century.<sup>2</sup> In the expansion of the mining industries of the Lothians the iron industry had an important although not crucial part to play.

The Scottish coke-fired pig iron industry developed between 1759 and 1830 in an unimpressive fashion. Production was small, total capacity in 1830 being only 48,000 tons.<sup>3</sup>

The years immediately after 1830 witnessed the application of the hot-blast technique (patented 1828). Recent work has tended to qualify the break-through represented by the hot-blast. The extent of the savings in fuel it permitted, and the novel opportunity it offered for the utilization of the rich native black-band ironstone deposits of Scotland (and the advantages brought by its use) were emphasized by earlier writers, but have more recently been questioned.<sup>4</sup> Nevertheless the innovation marked the commencement of a new phase in the Scottish pig iron industry.

Impressive results were achieved by widespread adoption of the hot-blast, associated improvements in furnace design, ironmasters

2. R.H. Campbell, Scotland since 1707 (Oxford, 1965), 130.
3. J. Butt, 'The Scottish Iron and Steel Industry before the Hot-Blast', Journal of the West of Scotland Iron and Steel Institute, vol 73 (1965-6), 202.
4. The older view is represented by Hamilton, Industrial Revolution in Scotland, chap 8 and Campbell, Scotland since 1707, chap 7, and qualifications have been made by Butt, 'before Hot-Blast', 207-210, C. Hyde, 'The Adoption of the Hot-Blast by the British Iron Industry: A Reinterpretation', Explorations in Economic History, vol 10 (1973), and R. Corrins, 'William Baird and Company, 1830-1914', (unpublished PhD thesis, University of Strathclyde, 1974), 74-7.

overcoming a conservative reluctance to use blackband, and other factors. The Scottish make of pig iron grew from about 40,000 tons in 1830 to 775,000 tons in 1852. Over the same years its share of national production grew from 5.5% to 28.7%.

From the 1840s there was a narrowing of the Scottish cost and locational advantages. By the 1850s the search for ores to supplement the exhausted deposits of blackband in the Monklands district was in full swing. Scottish production and technique stagnated.<sup>5</sup> The Scottish industry, however, remained a leading area of production, with a high plateau of output near or around 1 million tons being maintained up to 1880.

For one hundred years up to 1880 the impact of the iron industry in the Lothians can be distinguished by the key regional division. In Mid and East Lothian the effect on the coal trade was mainly indirect. For example, the upturn in iron manufacturing during the French and Napoleonic Wars contributed to the general tightness in coal supply in the east, without the Mid and East Lothian coalfield supplying the ascendant Lanarkshire iron industry at all. Consternation was expressed that 'the ironworks and foundries of Carron and Clyde alone consume as many coals as all the inhabitants of Edinburgh'.<sup>6</sup>

In West Lothian the impact was always more direct. Between about 1770 and 1830 iron firms, notably Carron Ironworks and Wilsontown Iron Company, intermittently exploited the coal and ironstone of the county. From time to time collieries around

5. A. Birch, The Economic History of the British Iron and Steel Industry 1784-1879 (1967), 174.

6. Considerations on the Present Scarcity and High Price of Coals in Scotland (Edinburgh, 1793), 20 cited by Campbell, Scotland since 1707, 129.

Bo'ness benefitted from the expansion of the iron industry's demand for fuel.<sup>7</sup>

After 1830 the role of the iron industry in mineral development in the Lothians was much greater than before. This was especially the case as the Scottish iron firms dispersed from their original concentration in Lanarkshire to more remote sites - both as mining enterprises and pig iron manufacturers. The dispersal brought them in some force to the Lothians after 1850.

For the period after 1830 West Lothian can be considered first, then Mid and East Lothian.

The geological series of West Lothian contained a number of coal and ironstone seams, but it was the slatyband ironstone found in the south of the county, especially around Crofthead, which mainly attracted the iron firms. The seams were up to thirteen inches thick, and vied in quality with blackband ironstone,<sup>8</sup> which was also found in the north of the county.

The expansion of the Scottish iron industry with the depletion of the originally abundant deposits of blackband around Monkland in Lanarkshire, forced iron firms to turn their eyes to these mineral assets. The Houldsworths of Coltness Ironworks were the first representatives of a new wave of exploratory and mining activity to reach West Lothian, and they commenced ore production in the late 1830s. The search for and mining of

7. C. Forsyth, 'On the Mines, Minerals, and Geology of West Lothian', Transactions of the Highland and Agricultural Society of Scotland, series 3, vol 2 (1846), 235-9; H.M. Cadell, 'An Historical Account of Grange Estate in West Lothian and of The Development of its Mineral and Industrial Resources after 1770', (1931), (private copy on temporary deposit at NLS), 82; Cadell MSS, letter J. Cadell of Cockenzie, 31 December 1808; Hamilton, Industrial Revolution in Scotland, 170.
8. Geddes Records SRO, CB10/2, John Williamson, 'Remarks on the positions which the Ironstone Deposits are found to occupy in the carboniferous formations in the Lanarkshire and Stirlingshire, etc districts', 23 April 1856.

minerals intensified in the 1840s and 1850s.<sup>9</sup> A significant number of iron firms were present in the county.<sup>10</sup> By the mid-1860s the tempo and scale of slatyband exploitation slackened, but more attention was being paid to the relatively inferior clayband ironstone, and the common and furnace coals of the district.

The iron firms contributed to a transformation of the economic and social structure of the mining industries of West Lothian. Some impression of the importance of the iron industry can be gleaned from the following figures.

<u>Table 3, II Number of Males employed in Mining in West Lothian</u>				
	Coal-miners	Iron-miners	Miners, unspecified <sup>11</sup>	Shale-miners
1851	751	988	-	-
1861	1703	1458	529	-
1871	1700	984	882	-
1881	1704	780	152	612

Source: Decennial Censuses.

Many enterprises were intimately geared to the supply of the iron industry. At Torbane in the 1850s the working of ironstone depended largely on whether Almond Ironworks was in blast. In the 1870s the major part of output at Boghead (amounting to 35,000 tons of coal and ironstone in 1876) was consumed at the Almond furnaces.<sup>12</sup> In the north the production of blackband ironstone was surplus to local requirements. Quantities of Kinneil ironstone were sent to John Wilson's Dundyvan works.<sup>13</sup> Over the years 1854-1884 32% of gross mineral output at Grange Colliery was calcined

9. See, for example, H.M. Cadell, The Rocks of West Lothian: An Account of the Geological and Mining History of the West Lothian District (1925), 243-4.

10. See chapter five, pp. 161-3.

11. Probably includes iron and shale-miners.

12. Geddes Records SRO, CB 10/3, J.R. Williamson, 'Report on Torbane Minerals', 22 August 1859; Ibid, CB 10/10, Abstract of Boghead Pay Bills for the Year 1876; Ibid, Cost of Making Almond Pig Iron, n.d.

13. MMB SRO, BR/MNK/1/1, 1 May 1849, 23 December 1851; Ibid, MNK/1/2, 28 May 1854.

blackband ironstone. It was supplied to customers in Teeside, Fife, and Lanarkshire.<sup>14</sup>

Yet the greatest impact was in the south around Crofthead and Fauldhouse. Initially the iron companies had come here to mine and return slatyband ironstone to the blast furnaces in the west. Coal was present in the strata alongside the ironstone, but little was extracted, except what was required for local purposes such as engine coal and miners' fire-coal.<sup>15</sup> However the iron firms were ultimately to have a more general impact on West Lothian. They came to see the advantage of mining the other riches of the county, especially gas-coal. One firm of ironmasters devoted themselves in the 1850s and 1860s almost entirely to the working of torbanite at the properties they leased near Bathgate.<sup>16</sup> This was entirely unintended at the outset. Further, with the approaching exhaustion of better quality coals and ironstones in Scotland, from the 1860s the iron firms showed greater interest in the furnace and 'ball' coals of West Lothian, as well as to its clayband ironstone. Coke ovens were erected to render the poorer quality coals serviceable for blast furnace use.<sup>17</sup>

The coming of the iron firms greatly affected the prosperity and shape of the mining industries of West Lothian. They brought an increase in the scale and improvement in the organisation of the 'typical' mining unit.

14. Cadell MSS, sundry correspondence, 1845-55; See, Statistical Appendix, table 46.

15. Forsyth, 'Mines of West Lothian', 237; Geddes Records SRO, CB10/9, Williamson & Paton, 'Report on Minerals at Eastfields and Fauldhouse', 4 September 1874.

16. See below, p.163.

17. For example Coltness Iron Company erected 98 coke ovens at Woodend Colliery. Cases decided in the Court of Session (Edinburgh, fourth series, vol 10, 1882), Coltness Iron Co. v Assessor for Linlithgowshire, 1882, 21.

Notwithstanding the greater attention given to the inferior ironstones, ore shortages became more severe in the 1860s and 1870s in Scotland. The Scottish ironmasters undertook searches for fresh supplies. For example Coltness Iron Companies carried out exploratory work in Cumberland, East Lothian, and abroad.<sup>18</sup> As part of a much wider phenomenon the eastward drift of ore-extraction continued. As a result in the 1870s a boost was given to the mining industries of Mid and East Lothian.

As noted earlier the chief impact of the Scottish iron industry on the Mid and East Lothian coalfield was indirect. The higher wages obtainable in the growing mines and ironworks to the west attracted labour from Midlothian and pushed up wage costs from time to time. In general, however, the prosperity of the coal industry in Midlothian was tied closely to the level of activity in the ironworks, especially between the mid-1830s and late 1840s.

A close study of economic conditions in the Midlothian coal trade and of wage rates and prices at Dalkeith and Brunstane Collieries in the period 1838-1848 reveals the pervasive effects of the expansive pig iron industry.<sup>19</sup> Compared to national economic trends the Midlothian coal trade followed an almost idiosyncratic course, lagging behind British patterns. In other words Midlothian appears to have been conforming to Scottish patterns. As Campbell and others have pointed out,<sup>20</sup> the Scottish experience of depression in these years was greatly ameliorated by the far-reaching influences of the hot-blast iron industry. James

18. J.L. Carvel, The Coltress Iron Company (Edinburgh, 1948), 42, 46.

19. Note, Statistical Appendix, tables 30, 37, 41, 42.

20. R.H. Campbell, 'The Growth and Fluctuation of the Scottish Pig Iron Trade, 1828 to 1873', (unpublished PhD thesis, University of Aberdeen, 1956), chapter 4, especially 188-190.

Wright, manager of Dalkeith Colliery, repeatedly referred to the connection between good trade in the coal industry and the iron industry. For instance towards the end of 1843, he thankfully reported that the coal trade had a 'better appearance' as the Lanarkshire iron trade had shown a considerable advance, and as he maintained: 'in a short time the coal trade must necessarily follow, especially as the manufacturers in the west are fully employed'.<sup>21</sup>

From the early 1850s it appears probable that the effects of the iron industry on the Scottish economy, and specifically on the fortunes of the Midlothian coal trade, diverged increasingly less from British patterns. The Scottish economic experience was becoming less unique, and shortly the Scottish pig iron trade was far from buoyant in any case. However because of the dispersal of activities of Scottish iron firms from the 1850s, the role of the iron industry in Mid and East Lothian became gradually more direct.

Blackband ironstone was first discovered in East Lothian at Penstone in 1846.<sup>22</sup> Discoveries at other sites in Mid and East Lothian followed before the close of the decade. A number of collieries in the two counties supplied local ironworks and foundries with coal or ironstone to some extent after 1850.<sup>23</sup> Other works also dispatched quantities of blackband ironstone outside the district, such as the collieries of Prestongrange and

21. Buccleuch MSS SRO, GD 224/582, J. Wright to the Duke of Buccleuch, 16 October 1843. Note also, *Ibid*, Wright to Buccleuch, 20 March 1843; *Ibid*, Box 511, Wright to Buccleuch, 20 April 1842.

22. R. Moore, 'On the Blackband Ironstones of the Edinburgh and East-Lothian Coal Fields, and the Advantages to be derived from their development', *RSSA*, vol 6 (1860), 18.

23. Note, Statistical Appendix, tables 48, 54.

Wallyford. In 1862 it was stated that Penstone blackband ironstone was purchased 'in considerable quantities by Ironmasters from the west'.<sup>24</sup>

The sharply deteriorating ore supply situation in Scotland by the late 1860s and the general interest in non-phosphoric ores for steelmaking caused much attention to be directed at the discovery of haematite iron ore at Gareleton Hills in East Lothian in 1868. In 1871 the property was purchased by Coltness Iron Company. The firm expended £2,166 in sinking two pits at Gareleton between 1871 and 1876.<sup>25</sup> The Gareleton ore deposits were reported on in 1872:<sup>26</sup>

It is very rich in metallic iron and of excellent quality. For several years it has been worked and used in that county, and large quantities of it have also been sent to the Coatbridge district in Lanarkshire.

This was an exaggerated picture, as county ore production figures make it clear that East Lothian did not reach a position of importance in the 1870s.<sup>27</sup>

Much more decisive was the arrival of west of Scotland based iron firms to exploit the blackband ironstone of the Penicuik district. Hitherto these deposits found in the steeply sloping edge seams had been untouched. Shotts Iron Company became the leading mineral lessee in the district after 1865, and the scale of mineral operations was large in the 1870s. Initially most of the output was blackband, but subsequently large quantities of other minerals were also produced.<sup>28</sup>

24. Geddes Records SRO, CB10/4, J.R. Williamson, Draft Precognition, (North British Railway, Proposed branch, Ormiston, Monktonhall & Dalkeith), 26 March 1862.

25. SRO, CS 246/418, (Coltness Iron Co v Solicitor of Inland Revenue), table IV, List of Pits exhausted from 1 January 1872 to 30 January 1878.

26. The Mining Magazine and Review, vol I (January 1872), 73.

27. R. Meade, The Coal and Iron Industries of the United Kingdom (1882), 725.

28. Note, Statistical Appendix, tables 55-6.

The impact of the iron industry on the mining industries of the Lothians was considerable. Firstly, the Scottish iron industry through its large and growing demand for fuel had important indirect consequences for the regional coal industry. Secondly, enterprises were active in the Lothians extracting especially iron ore for consumption mainly outside the region. The iron companies introduced larger and more modern methods of business organization into the Lothians. Thirdly, an iron industry was established within the region.<sup>29</sup> The direct role of the local iron industry should not, however, be exaggerated.

After 1864 its rate of growth was negative. Even before 1864 its advance was very uneven, and for much of the time the furnaces of the region were out of blast. Fourthly, the demand for coal from ironworks increased. This is associated with the last point.

The figure for Lothian coal consumed by the iron industry in 1864 may appear to represent an annual rate of growth of coal demand of over 5% as compared to about 1840.<sup>30</sup> However as most of the coal was consumed by the local iron industry, which had an erratic history, the significance of the direct demand for coal should not be over-estimated. Nevertheless the iron industry was a relatively important area of market growth for Lothian coal up to the mid-1860s. In the broadest sense the iron industry helped to stimulate technical improvements and more enterprising entrepreneurship.

#### Other Industrial Sectors

Introduction. Thus the iron industry was a major factor in the overall mineral development of the Lothians. After c 1864 its

29. See below pp.123-7.

30. See below p.121.

influence was problematic, however, and focussing exclusively on the evolution of coal demand perhaps negative.

On the other hand for the period 1840-80 as a whole there was a number of sectors whose influence was cumulative and positive. To some extent the mining entrepreneurs of the Lothians developed sales in markets where the particular features of their minerals gave them an advantage. The Lothians also contained coals of little interest to most customers. The disadvantage in this case could partly be overcome by coking. As noted elsewhere this was done by the ironmasters of West Lothian. Also in the 1860s the inferior 'ball coals' of the Bathgate district were coked to sell to railway companies,<sup>31</sup> (thus partly counteracting the unsuitability of Lothian coals for locomotive grates).<sup>32</sup> Coke ovens were in addition erected elsewhere - for example at the collieries of Grange and Newbattle by the latter part of the period.

Therefore the coalmasters of the Lothians were widening their horizons: they were beginning to take up some of the opportunities offered by an industrial society. There was, firstly, a miscellaneous group of sectors discussed in this section which provided a moderate and important base for market growth. Secondly, there was the gas-oil segment of the demand spectrum which had a more crucial role.

Paper, Brick and Tiles. The years 1800 to 1860 were a period of rapid growth for the paper industry, especially in Scotland which took an increasing share of national production.<sup>33</sup> Midlothian

31. Geddes Records SRO, CB10/6, J.R. Williamson, Draft Precognition, (Caledonian Railway: opposition to North British branches), 1866.

32. Vamplew, 'Railways and the Transformation of the Scottish Economy', 383.

33. D.C. Coleman, The British Paper Industry 1495-1860 (Oxford, 1955), 201.

was a major concentration in Scotland, with 22 of the 57 Scottish mills in 1868.<sup>34</sup> Individual local firms could record ten-fold increases in output and more in this period.<sup>35</sup> Paper manufacture was drawn to Midlothian by proximity to Edinburgh, the chief centre of printing in Scotland, and source of a vital raw material - rags. Fast flowing streams were also important for paper making. With the industry gradually going over to steam power, however, there was a growing concentration of the British paper industry on the coalfields.<sup>36</sup>

The relationship between coal mining and brick manufacture was even closer. The growing markets for bricks and tiles during the period under discussion derived from the secular expansion of the national economy, and from special factors such as the increase in demand for drainage tiles from agriculture in the period of 'High Farming'.

Brick manufacture was by no means peculiar to the Lothians, and indeed Lanarkshire was Scotland's most important centre of production.<sup>37</sup> However throughout the period and throughout the Lothians brick and tile making was carried on with energy. Frequently coal mining and brick and tile manufacture were prosecuted as closely integrated activities, with the collieries providing most of the raw materials. There were a number of important locations of the industry in the region, such as around Bathgate, Portobello, and Prestonpans.<sup>38</sup> During the third quarter of the century quite

34. D. Bremner, The Industries of Scotland (Edinburgh, 1869), 322-3.

35. A.E.R. Taylor, 'Paper', in C. Oakley (ed), Scottish Industry (1953), 249.

36. Coleman, British Paper Industry, 221.

37. J. Butt, Industrial Archaeology of Scotland (Newton Abbot, 1967), 100, 103.

38. NSA, II (1839), 312-13; II (1843), 161; Forsyth, 'Mines of West Lothian', 231; W. Baird, Annals of Duddingston and Portobello (Edinburgh, 1898), 39, 291-3, 434-7.

a large number of Mid and East Lothian collieries commenced brick and tile production.<sup>39</sup> A major instance was Polton Colliery where up to half the royalties were from the mining of fire-clay, and where in 1874 the annual output of composition bricks, made virtually from colliery debris and about one-third of brick production, was 41,162 tons.<sup>40</sup> In 1860/1 only four brick and tile concerns advertised in the Edinburgh & Leith Post Office Directory; in 1880/1 there were fifteen.

For paper making,<sup>41</sup> as for brick and tile manufacture, there is direct and circumstantial evidence that these constituted sectors not without importance as areas of market growth for Lothians' coal output.

The Borders. The Borders were an old-established market for Midlothian coal, but primitive communications kept sales small in quantity. The lack of a cheap fuel led industry to rely on water-power. In 1834 when coal prices in Edinburgh were scraping along at 10s to 11s per ton, the fuel was being sold in Melrose at 1s 3d per cwt.<sup>42</sup> At Hawick woollen manufacture was carried on with spirit in 1839, although:<sup>43</sup>

The expense of fuel, the distance of any sea-port town, and the want of railroads, canals, or navigable rivers, must have operated, it is to be supposed, very strongly against the introduction or prosperity of this branch of industry.

The opening of the railway from the Midlothian coalfield in

39. For example, Armiston, Dalkeith, Edmonstone, Wallyford, Dalhousie, Whitehill, Gorton, and Prestongrange.
40. Dundas of Arniston MSS, D. Landale, Reports on Polton Colliery and Largoward Quarry, 1872-4, especially, 28 May 1874.
41. NSA, I (1843), 324; Geddes Records SRO, CB10/5, J.R. Williamson, Draft Precognition, (Caledonian Railway, Penicuik branch), February 1865.
42. NSA, III (1834), 75.
43. NSA, III (1839), 406.

1849 brought a sharp drop in the price of coal. According to one writer:<sup>44</sup>

In 1849 the railway brought to Selkirk and Galashiels both transport and a source of power - coal. This led to the establishment of large steam-powered mills in the narrow valleys of the Gala and Ettrick Waters, often on the site of earlier water-powered mills.

As early as November 1849 sales along the line to Hawick from Dalkeith Colliery alone had risen to 70 tons a day,<sup>45</sup> and a number of other Midlothian collieries regularly supplied the region in the following years.

The improved communications and cheaper fuel evidently encouraged the Border woollen industry not only to replace water-power with steam, but also to expand. The number of carding machines in Galashiels increased from 39 in 1853 to 114 in 1886. By 1868 the turn-over of the industry had risen to upwards of £2 million.<sup>46</sup> The number of power-looms in the Scottish tweed industry (mainly concentrated in the Borders) in the space of only eleven years up to 1862 increased from 329 to 1,069.<sup>47</sup>

During the 1860s the completion of railways from Lanarkshire and Northumberland to the Borders broke the monopolistic hold of the Midlothian coalfield on the market. This had the alleged effect of 'shutting out' Polton and other Midlothian collieries 'from the only remunerative market they could depend upon'.<sup>48</sup> Borders' coal demand, however, was still growing rapidly. The precise influence of the Borders for Midlothian coal demand cannot

44. Butt, Industrial Archaeology of Scotland, 307.

45. Buccleuch MSS, SRO, GD 224/582, H. Cadell to the Duke of Buccleuch, 6 November 1849.

46. Bremner, Industries of Scotland, 156-8.

47. R. Hall, The History of Galashiels (Galashiels, 1898), 373.

48. Dundas of Arniston MSS, Copy letter A.C. Selkirk to Messrs. I. and F. Anderson, 1 February 1868.

be gauged accurately, but without doubt it was significant.<sup>49</sup>

Shipping. A.J. Youngson Brown has ascribed a 'dynamic role' to the expansion of the Scottish coal industry from the growth in exports. In 1854 not one ton in twenty was raised for export, but by 1885 one ton in seven was sent abroad.<sup>50</sup> The shipping trade in general will be considered here, including coastal shipments and bunker coal.

The Lothian districts of Bo'ness and Tranent had a long involvement in shipping coal. The Lothians as a whole were not devoid of the type of coal demanded for shipment.<sup>51</sup> Yet evidence indicates that until the mid-1860s the Lothians participated very slightly in the great expansion of the shipping trade. It was stated in 1862 that the major collieries of Mid and East Lothian shipped coal to a 'very limited extent', that in the six collieries responsible for 60% of the coal output of the coalfield only about 4% of their production was shipped from Leith, and that little more than one-third of Leith coal shipments was from Mid and East Lothian.<sup>52</sup> The increase in shipments from Lothian ports was from collieries in Lanarkshire and Stirlingshire - and even from Fife to take advantage of superior harbour facilities on the South Shore of the Forth.<sup>53</sup> The increase in shipments from minor Forth ports, used by local pits, reflects the faltering response to this market.

49. In 1869 the North British distributed 183,388 tons of coal in the Border counties. Report on Coal, vol III, Rept. of Committee E, 156, (PP 1871, XVIII).

50. Youngson Brown, 'Scots Coal Industry', 37-9.

51. Splint coals were not uncommon and could perform well as furnace, steam-raising coals. Geddes Records SRO, CB10/1, Copy letter John Williamson to James Burnet, 2 May 1854.

52. Ibid, CB10/4, J.R. Williamson, Draft Precognition, (Caledonian Railway, Leith branch), April 1862.

53. Ibid, CB10/5, J.R. Williamson, Draft Precognition, (Forth Bridge Scheme), May 1865.

**Table 3, III    Estimated shipment of coal from minor Lothian ports**

	1847 (tons)	1859 (tons)
Bridgeness	20,000	15,000
Cockenzie	15,000	10,000
Fisherrow	5,000	5,000

Source: Cadell MSS, H. Cadell, Draft Precognition, (Monklands Railway), c1860

There are many specific causes why the Lothians did not cultivate the shipping trade, such as high dues on the for-long anachronistic railway link to Leith docks.<sup>54</sup> Fundamentally the reason was that the Midlothian coalmasters could obtain better prices in other markets, and indeed would find it difficult to compete at the prices obtaining in the shipping trade.<sup>55</sup>

There is something of a dearth of evidence for the period after the mid-1860s. It is possible that the Lothians began to participate to a greater extent in the shipping markets. Even if the Lothian coalmasters maintained their small share of shipments from the ports in their region, then there would have been a great expansion in shipments of Lothian coal. Railway access to, and equipment at the ports on the South Forth was much improved by the late 1860s.<sup>56</sup> There is evidence that Arniston and Dalkeith Collieries took a greater interest in shipping.<sup>57</sup> It is probable that in the period up to 1875 seasale became a more important area of market growth for Lothian coal.

54. Ibid, CB10/3, North British Railways (consolidation of Acts &c), Queries for John Williamson with Answers, c1858.
55. Ibid, CB10/4, J.R. Williamson, Draft Precognition, (Caledonian Railway, Leith branch), April 1862. There is other evidence of indifference of Lothian coalmasters to shipping: Buccleuch MSS SRO, GD 224/582, H. Cadell to Duke of Buccleuch, 25 January 1851, 8 June 1853; Dundas of Arniston MSS, D. Landale, 'Report on Polton Colliery', 15 November 1864.
56. Geddes Records SRO, CB10/5, J.R. Williamson, Draft Precognition, (Forth Bridge Scheme), May 1865.
57. See table 2, IV p.68; Dundas of Arniston MSS, copy letter James Eaglesham to David Landale, 14 November 1873.. Note, Statistical Appendix, table 1, Coal Shipments from South Forth Ports, 1851-80.

## Gas

The Rise of the market for Lothian Gas-Coals. It has been pointed out that the impact of the gas industry's fuel demands on the coal industry was small.<sup>58</sup> Though doubtless true for Britain as a whole, the effect of gas demand might be expected to be quite important in regions like the Lothians well endowed with coals which were well suited for the rapidly growing gas industry.

If, for the opening generalizations in this section the related oil market is included, then a good case could be made out for arguing that gas and oil played a 'dynamic role' in the development of the Lothians' mining industries from 1850 to 1875.

In its history this was the period of greatest change yet. The rate of growth increased and kept pace with or even marginally surpassed that of the Scottish coal industry as a whole.

Techniques and business organization were modernized.

There appears to be grounds for arguing that the gas market alone played an unusually important role in encouraging more enterprising management and entrepreneurship in the Lothians. In 1840 the gas industry took a rather small share of Lothians' coal output. In 1860 the gas market may have been taking between 10 and 25 per cent.<sup>59</sup> of the value of Lothians' coal output. Such decisive changes at the margin would tend to exert a major impact on entrepreneurial attitudes and behaviour.

58. M.E. Falkus, 'The British Gas Industry before 1850', EHR, second series, vol 20 (1967), 504-5.

59. See below, pp. 120-1. The actual significance of the gas market to the coal industry was much greater than indicated even by its share of sales by quantity because of the higher prices commanded by gas-coal. In Edinburgh between the 1840s and 1860s common or manufacturing coals would generally be priced below 10s per ton, good Scottish household coals would fluctuate between 10s and 14s per ton, while the average price of coal (including furnace and inferior gas-coal etc) supplied to Edinburgh Gas Light Co. varied between 14s.4d and 20s.8d per ton in 1847-63. Torbanite and fine Midlothian gas-coals were very expensive. Abstracts of Return of Gas Companies in the United Kingdom, (PP 1850 and 1865, XLIX and I).

In the nineteenth century context 'gas-coal' can be defined as coal well suited for gas production on account of its high yield of volatile matter and high illuminating qualities. Scottish gas-coals were outstanding in these respects. Very high quality gas-coals were found in the Lothians, especially at the collieries of Newbattle and Arniston, and good quality gas-coals at many other sites. Almost unique in character were torbanite and similar minerals found in small quantities near Bathgate, West Lothian.

There was great argument as to whether torbanite was a coal (though discussed here as such), or a separate mineral. It was a prolific source of both gas and oil.<sup>60</sup>

As is well known William Murdoch achieved first practical success in his experiments with coal gas by 1802, and in 1812 the first company was formed in London for the supply of gas for public lighting. Among the earliest companies formed outside London were those in Glasgow and Edinburgh in 1817 and 1818 respectively. In the years up to the 1830s many other towns in Scotland received gas works.<sup>61</sup>

M.E. Falkus has indicated that initially the supply of gas was mainly for lighting purposes in industry, large public buildings such as railway stations, and for street lighting.<sup>62</sup> Only after 1850 did gas lighting in private homes emerge as an increasingly important section of the market. It was not until the 1880s that gas began to be used extensively for heating and cooking.

Individual gas companies achieved rapid rates of growth in the nineteenth century, including those in Glasgow and Edinburgh.<sup>63</sup>

60. See Statistical Appendix, table 4, and Table 3, V p. 112 below.

61. Clow and Clow, Chemical Revolution, chapter 19.

62. Falkus, 'British Gas Industry', 495.

63. Statistical Appendix, tables 2-3.

For technical and commercial reasons the gas companies employed a moderate number of coals in the carbonization process. The best gas-coals produced a gas that was unnecessarily rich for normal purposes, and made for difficulties in keeping burners clean.<sup>64</sup> Commercially, the gas companies shopped around among a number of suppliers to obtain the best possible prices. In 1867 the Edinburgh and Leith Gas Company took up to ten different coals from Lanarkshire, the Lothians, and Fife; the Glasgow City and Suburban Gas Company used twenty different gas-coals.<sup>65</sup>

Despite the policy of mixing coals, the gas companies of Edinburgh and Leith were, of course, an important market for Midlothian gas-coal. In 1866 J. Romans agent for Newbattle Colliery stated that Edinburgh was taking '... not more than 15,000 tons a year from us'.<sup>66</sup> In the year 1889-90 the Lothians supplied 34,000 tons out of a total of 106,500 tons contracted for by the two main gas works in Edinburgh and Leith by May 1889.

The Lothians supplied all the first-class grade of gas-coal required.<sup>67</sup> The gas works of Glasgow were supplied mainly from collieries in the west, although Midlothian pits also supplied the city in the 1870s.<sup>68</sup>

The Borders were an important market for Midlothian gas-coal. It was stated in 1862 that '... Midlothian must apparently send the

- 64. Report from the Select Committee on the Gas (Metropolis) Bill, (PP 1860, XXI), evidence of T. Hawksley, QQ 5000, 5137; Special Report from the Seledt Committee on the Metropolis Gas Bill, (PP 1867, XII), evidence of J. Reid and J. Young, QQ 2334, 2448-9, 2504.
- 65. Ibid, evidence of J. Reid and H. Bartholomew, QQ 2443-5, 4350.
- 66. Report from the Select Committee on London (City) Corporation Gas etc. Bills, (PP 1866, XII), evidence of J. Romans, Q 4647.
- 67. Edinburgh and Leith Corporations Gas Commissioners Minute Book, SRO GB 1, 29/1, 1888-9.
- 68. Dundas of Arniston MSS, John Geddes, 'Report on Arniston Colliery Operations', 25 September 1871; Cadell MSS, R. Marshall to H. Cadell, 3 June 1880.

entire supply to the whole of these south markets'.<sup>69</sup> The quantities taken by the Border gas companies were not particularly large. But naturally the amounts supplied increased as the companies expanded the scale of their operations.

Table 3, IV Gas-coal consumption in Hawick and Galashiels

Hawick Gas Company	Galashiels Gas Company		
Year	(tons)	Year	(tons)
1858/9	946	1858/9	930
1866/7	2,581	1874/5	3,025

Sources: Hawick Gas Company Minute Books, SRO GB1, 37/1, 1858-75; Galashiels Gas Company Minute Books, SRO GB1, 33/2, 1844-1902.

Nevertheless the 1,500 ton contracts that Newbattle Colliery entered into with Galashiels in 1871, and again in 1873, were large for this part of the market.<sup>70</sup>

The north-east of Scotland was another significant market. Dundee and Aberdeen were each taking about 30,000 tons annually in the early 1880s. Fife, naturally, was strong in these markets. J. Romans, on the other hand, made the exaggerated claim in 1866 that Newbattle Colliery supplied 'partially Aberdeen, and Perth almost exclusively, I believe'.<sup>71</sup> But it was for the West Lothian collieries of Grange and Kinneil on the shore of the Forth that the shipping trade in gas-coals to the north-east of Scotland assumed particular importance. Grange especially was a major supplier in this quarter.<sup>72</sup>

Scottish gas-coals became quite famous in the nineteenth century because of their fine qualities. Newbattle Colliery supplied a London company in the 1830s. J. Romans, although struggling to

69. Dundas of Arniston MSS, John Geddes, 'Report on Arniston Colliery Operations', 31 July 1862.
70. Galashiels Gas Company Minute Books, SRO GB1, 33/2, 18 April 1871, 12 April 1873.
71. SC on London Gas Bills, (PP 1866, XII), evidence of J. Romans, Q 4645.
72. In 1879 Aberdeen was taking 5,000 tons of Grange gas-coal and 2-3,000 tons of splint. Cadell MSS, R. Marshall to H. Cadell, 19 March 1879. See also other correspondence, 1850-80.

find customers in London in 1866, maintained that Newbattle supplied:<sup>73</sup>

... the Plymouth Gas Company with all ... they can use; the Torquay Gas Company, the Exeter Gas Company, the Brighton and Hove Gas Company, and some I send to London.

Grange gas-coal also found markets outside Scotland, such as Dublin, the Channel Isles, Italy in 1855, and the Baltic in 1877.<sup>74</sup>

The widest-flung markets of all were won by the producers of torbanite. Gas companies sought the stuff in Scotland, England, Paris, Belgium, and elsewhere.<sup>75</sup> Total shipments of torbanite from West Lothian were approaching 100,000 tons annually in the late 1850s according to one authority, and a figure of 70,000 tons is possible for 1864.<sup>76</sup> A substantial portion of these shipments were to coal-oil works at home and abroad, particularly in the United States. Possibly one-half of foreign shipments were going to oil works in 1864,<sup>77</sup> and the proportion may have been higher when American purchases spurted forward in 1858-9.

The London gas market, however, was certainly important for Scottish gas-coals.<sup>78</sup> Torbanite and the other very rich gas-coals from near Bathgate, and elsewhere were favoured for a time by those London gas companies which specialised in the supply of a high quality gas, known as 'cannel gas'. This was made by carbonizing measured quantities of rich gas-coals from Scotland or Lancashire

73. SC on London Gas Bills, (PP 1866, XII), evidence of J. Romans, Q 4656.

74. Cadell MSS, H. Cadell to J.J. Cadell, 11 June 1855; J. Romans to H. Cadell, 1 February 1877.

75. See eg, Ibid, G.P. Cadell to H. Cadell, 18 August 1863; SRO, CS 248/833, (*Gillespie v Miller et al*), Proof and Appendix, 1873, 68, 98-100.

76. Geddes Records SRO, CB10/5, J.R. Williamson, Draft Precognition, (West Calder Railway), June 1865. See Statistical Appendix, table 1. The following break-down of shipments are available for 1859: Bo'ness, gas-coals 34,130 tons, common coals 21,143 tons, and Leith, gas-coals 29,061 tons, common coals 11,000 tons. Cadell MSS, H. Cadell, Draft Precognition, (Monklands Railway), c 1860.

77. Geddes Records SRO, CB10/5, J.R. Williamson, Draft Precognition, (West Calder Railway), June 1865.

78. Statistical Appendix, table 5.

together with ordinary coals. A number of London companies used significant quantities of torbanite to raise the standard of their gas. In such cases the proportion of torbanite in the total quantity of coal carbonized was about 1% to 5%.<sup>79</sup> There is an extreme statement by a Scottish coal agent in 1867, that in the previous three years he had supplied 'perhaps 150,000 tons' of Scottish gas-coals to the Chartered Gas Company.<sup>80</sup> Admittedly its manager stated in 1860 that they took 'a large quantity' of torbanite.<sup>81</sup>

From the late 1860s there was a growing unpopularity and decreasing use of Scottish gas-coals in London. A major factor was rising cost: in 1869 the 74s. per ton asked for torbanite allegedly placed it beyond the reach of gas companies.<sup>82</sup> One major defect of Scottish gas-coals was the useless coke they frequently made, and their tendency to spoil the coke of the coals with which they were carbonized. The sale of coke was a vitally important source of revenue of many gas companies, including those in London.<sup>83</sup> Possibly improvements in gas manufacturing technique may have relieved the London gas companies from relying on Scottish gas-coals to the same extent for the richer gas. Undeniably a key factor in the reduced quantity of Scottish gas-coals consumed in

79. SC on the Gas (Metropolis) Bill, (PP 1860, XXI), evidence of S. Hughes and S. Beck, QQ 1855, 4430-1; SC on the Metropolis Gas Bill, (PP 1867, XII), evidence of H. Brother and S. Barber, QQ 2713, 3980-2.

80. Ibid, evidence of J. McKelvey, Q 1180.

81. SC on the Gas (Metropolis) Bill, (PP 1860, XXI), evidence of F. John, Q 5567.

82. Report on Coal, vol III, Rept of Committee E, 163, (PP 1871, XVIII).

83. The Equitable Gas Light Company derived £5,630 from coke sales, and £21,306 from gas rentals in first half of 1854, Journal of Gas Lighting, 11 December 1854. See also Report of the Select Committee on the Metropolis Gas Companies Bill, (PP 1875, XII), evidence of various witnesses, including W. Newton, G.T. Livesey, T.W. Keates, C. Woodhall, etc.

London, however, was their rising price. This was directly related to dwindling reserves.

The Coal Industry's Response. The sheer physical output of gas-coal in Scotland was not large compared to quantities being shipped or used in the iron industry. In Mid and East Lothian about 9% of output may have been gas-coals in 1865-9, as against possibly less than 3% for Scotland as a whole.<sup>84</sup> Turning to the ten years up to 1865 and taking the Lothians as a whole - thus accounting for the exploitation of the famous Bathgate gas-coals - it is possible that up to 25% of production in the region consisted of gas-coals.

It is demonstrable that for the Lothians an unusual amount of capital and innovational expertise was called forth to exploit the gas-coals. The gas-coals were often difficult to win. The seams of torbanite in particular, were not only very thin, but were found in geologically 'troubled' and wet strata. Other gas-coal seams were frequently thin, and a thickness of one foot would be regarded as exceptionally fair. The achievement in procuring a certain output, therefore, was all the greater.

Gas-coals were produced at many collieries in the region, but only the most dramatic cases where the gas market had a leading influence on colliery development will be noted. The collieries of Newbattle and Arniston became among the most modern and best equipped in Scotland. But it was the desire to win the deep gas-coal seams in the 1860s that encouraged the taking of pivotal decisions. Arniston became the second deepest colliery in Scotland in 1864 as a result of the sinking of the 'Emily pit' to command

84. Report on Coal, vol III, Rept of Committee E, 161, (PP 1871, XVIII).

a new gas-coal seam at a depth of 160 fathoms.<sup>85</sup> At Newbattle in 1861 a pit had been sunk to a gas-coal seam to the then great depth of 148 fathoms.<sup>86</sup> A decisive break with the former practice of level-free drainage at Newbattle had been made. Gas-coal production as a proportion of total output at Newbattle was 18% in 1839, 8% in 1883, and 16% in 1887; at Arniston it was 7% in 1839, 20% in 1863-5, and 25% in 1869-71.<sup>87</sup>

The edge seams of the Niddrie district of Midlothian contained very valuable mineral deposits. But the extreme steepness (up to the vertical), and wetness of the strata thwarted projects to exploit their full potential. Only the opportunities of the gas-coal trade elicited schemes sufficiently bold to overcome the difficulties. Three collieries and properties were to be worked as one enterprise - a major departure for Midlothian. John Grieve, a 'coalmaster of capital and enterprise', became tenant in 1862.

He modernized the colliery and showed spirit.<sup>88</sup> In 1872, however, total output was only 21,000 tons, about one-third of it gas-coal.

The full potential of the scheme was far from realised. An annual output of 180,000 tons, half being gas-coal, was visualized.<sup>89</sup> Accordingly a limited company was formed in 1874 to take over the operation, which was subsequently greatly expanded.

In West Lothian the development of Grange Colliery was conditioned by the potentiality of the gas-coal trade. From 1854 to 1884 gas-coals contributed 25% of gross mineral output. One

85. Bremner, Industries of Scotland, 10.

86. The Colliery Guardian, 21 and 24 December 1861.

87. D. Milne, Memoir on the Mid-Lothian and East-Lothian Coalfields (Edinburgh, 1839), Statistical Table in regard to some of the Principal Collieries in East and Mid Lothian, (at end); Newbattle Collection (NLS vol IV, 5813), Abstracts of Newbattle Colliery Accounts for 1882-3, 1887-8; Dundas of Arniston MSS, various reports on Arniston Colliery, 1863-72.

88. Geddes Records SRO, CB10/4, Copy Agreement for a joint working of Niddrie, Edmonstone, and Woolmet Edge Coals, c autumn 1862; Ibid, CB10/9, J.R. Williamson, 'Report on the Edge Coalfields of Niddrie, Edmonstone, and Woolmet', 31 October 1872.

89. Ibid, J.R. Williamson, 'Report on the Mineralfields of Niddrie, Edmonstone, and Woolmet', 25 June 1874.

practical example of the determination to maintain the output of profitable minerals was the feat in sinking a pit 58 fathoms deep on the Forth foreshore. The sinking had to commence through 100 feet of shifting mud, and was only successful on the third attempt in 1878-80.<sup>90</sup>

Often Lothian gas-coal works came under the control of more substantial interests during the middle decades of the nineteenth century. Not infrequently the personnel involved came from the west, nearer to the heartland of Scotland's industrial revolution.

George Simpson of Benhar Colliery and T. Coats the Paisley thread manufacturer took a major interest in the collieries of Niddrie and Arniston respectively. The tendency was also apparent where Lanarkshire-based iron firms took on mineral leases in the area. Although this movement was initiated by the search for fresh deposits of iron ore, the presence of gas-coal seams became a powerful incentive for the expansion of activities.

Shotts Iron Company became an important producer of gas-coal in the Bathgate district after 1850.<sup>91</sup> Similarly, after opening up the blackband ironstone of the Penicuik district, Midlothian, they turned more attention to gas-coal. In 1879 they produced 43,000 tons of gas-coal from their Midlothian pits.<sup>92</sup> At Kinneil gas-coal output was about 10% of gross mineral production around 1860. Wilson & Co. competed vigorously with neighbouring Grange Colliery in the gas-coal market, for example in the north of Scotland.<sup>93</sup>

90. Cadell, 'Historical Account of Grange', 218-226.

91. SRO, CS 242/1645, (Turnbull, Salvesen v Shotts Iron Co.), 1868.

92. SRO, CS 245/1310, (Clerk v Shotts Iron Co.), Output and Disposals: Loanhead and Penicuik Minerals, 1869-80.

93. Hamilton Estates MSS, (Hamilton Public Reference Library), Lanarkshire Mineral Accnts, Minneil Minerals, 1857-8, 1858-9, 1865-6; Cadell MSS, H. Cadell to J.J. Cadell, 17 May 1856, R. Marshall to H. Cadell, 21 March 1879.

The outstanding instance of iron interests taking on leases in the Lothians to exploit iron ore, but this intention being diverted subsequently by the presence of gas-coals, was the Russell's enterprise near Bathgate. A number of leases were held. In the 1850s and 1860s most of the output at these properties was torbanite - about 100,000 tons per annum in the late 1850s.<sup>94</sup> Between 1872 and 1886 seven limited companies were formed in the Lothians to carry on enterprises where gas-coals had at least some importance. In four cases west of Scotland interests were well represented as directors or shareholders. In the two instances of Niddrie and Arniston the presence of gas-coals was a strong inducement to the promoters of the companies.<sup>95</sup>

Marketing Methods. The marketing of gas-coal became a more sophisticated business than was typical of the coal trade as a whole. With a few important exceptions, such as railway companies who contracted for their coal supply, most nineteenth century customers purchased coal at short notice to their requirements at the prevailing market price. The gas companies, on the other hand, contracted for the supply of their works for periods of a year and more. The Chartered Gas Company in London entered into agreements lasting for up to 'three or four years'.<sup>96</sup> Among the advantages of long contracts for customers were discounts for large orders, and the possibilities of price forecasting.

The growing sophistication of the gas-coal trade is also manifest by the emergence of specialised intermediaries and the

- 94. Geddes Records SRO, CB10/6, J.R. Williamson, Draft Precognition, (Metropolis Gas Bill), May 1867.
- 95. Dissolved Companies SRO, BT/2/549, 567, 584, 720, 923, 1274, 1572.
- 96. SC on Metropolis Gas Bill, (PP 1867, XII), evidence of James McKelvey, Q 1223.

provision of information. The Journal of Gas Lighting provided a mass of technical and commercial information, and from 1851 monthly lists of 'prices current' of gas-coals from all parts of the country. (In 1851 advertisements for torbanite were appearing in English, French, and German.)<sup>97</sup> The Journal frequently reported analyses of the properties of gas-coals, and merchants in the trade strove to furnish similar information.<sup>98</sup>

After about 1850 gas-coal producers began to employ agents or salesmen to win orders, thus taking over a role generally performed by the colliery manager. The energetic John Romans, for instance, was agent for Newbattle Colliery gas-coal. Travelling salesmen in gas-coals were paid by commission and competed vigorously with each other.<sup>99</sup>

In a slightly different category - although their functions merged - were the independent merchants and brokers in gas-coals. The business was competitive, and the electric telegraph was used to clinch deals or give instructions for shipment. Besides bringing together two parties to a contract, the merchant-brokers organised transportation, secured ships, agreed freight rates, insurance, and other details.<sup>100</sup> The shipping trade in general lent force to the spread of more sophisticated trading practices and institutions.<sup>101</sup>

Some of the gas-coal dealers started out as ordinary merchants in domestic coal, but like J.F. Waldie & Sons or James McKelvie

97. The Journal of Gas Lighting, 1849 *et seq.*, 11 August 1851.

98. J.F. Waldie, Analysis of Scotch Cannels, Gas Coals, and Shales (Glasgow, 1891).

99. Cadell MSS, G. Boyd to H. Cadell, 18 April 1865, correspondence between H. Cadell and J. Romans, R. Marshall and others, 1877-80.

100. *Ibid.*

101. See SRO, CS 245/833, (Gillespie v Miller et al), Closed Record, 1873; <sup>sko</sup> CS 244/1029, (McKelvie v La Cour and Watson), Appendix for Reclaimers, August 1877.

branched out into the gas-coal business, company promotion, or active mineral extraction.<sup>102</sup> J. & W. Wood, for example, were gas-coal merchants, had coal and coke works at Barbauchlaw, coal works at Armadale, Shieldmuir, and sales depots at Partick, Govan and Renfrew.<sup>103</sup>

The decline of Scottish Gas-Coals. By the late 1860s there

was growing concern about the depletion of Scottish gas-coal reserves. The facts were noted before parliamentary commissions, and W.S. Jevons pointed out the dangers.<sup>104</sup> In 1885 it was alleged that whereas no new gas-coal field had been discovered in Scotland since 1869, existing fields were exhausted or maintained their output under increasing difficulties.<sup>105</sup> In London the solution to the growing scarcity and cost of gas-coals was the production of somewhat less high quality gas, in so far as standards prescribed by legislation permitted, and perhaps technical improvements in gas manufacture. Scottish gas companies, however, continued their tradition of marketing gas of high illuminating power, although there was an agitation to have these standards reduced.<sup>106</sup>

The problem, in fact, was not the most severe one facing the gas industry. The invention of Edison's incandescent electric light and the growth of public electric supply companies after 1882 posed a major threat to the lighting market.<sup>107</sup> The gas industry's

102. See chapter two, pp. 69-70.

103. Cadell MSS, J. and W. Wood to H. Cadell, 23 November and 15 December 1877.

104. W.S. Jevons, The Coal Question : an inquiry concerning the progress of the Nation and the probable exhaustion of our Coal-Mines (1906 revised edition, edited by A.W. Flux, originally published 1865), Preface to second edition (1866), xlivi.

105. Glasgow Corporation Gas : Synopsis of Evidence Given before Parliament in connexion with the Reduction of the Standard of the Illuminating Power of the Glasgow Gas, authorized by Secn. 4 of the Glasgow Corporation Gas Act, 1882 (Glasgow, 1885), 11.

106. Ibid.

107. R.H. Parsons, The Early Days of the Power Station Industry (Cambridge, 1939), chapter one.

response was to develop and expand the market for gas in heating and cooking. Scottish gas-coals had no special attributes in these areas, and therefore they would have become less significant relatively for the gas industry in any event. What totally destroyed the market for Scottish gas-coals, however, was the invention of Welsbach incandescent gas mantle (1887) used in conjunction with a second invention, Bunsen's non-luminous flame burner. These inventions not only made possible greater economy in the use of coal, but also enabled gas produced from ordinary coals to give a far higher standard of illumination than was possible formerly.<sup>108</sup> The demand for the expensive Scottish gas-coals collapsed almost overnight. The gas-coal seams of Grange, once so valuable, were abandoned in 1902 as unworkable to profit.<sup>109</sup>

But by then the role of the gas industry in the development of the Lothians' coal industry was complete. The gas-coal trade had helped to induce the modernization of colliery organisation and technique, to attract capital and expertise into the region, and to spur on developments in marketing.

### Oil

#### The Rise of the Scottish Coal-Oil and Shale-Oil Industries.

The British oil industry, to all intents and purposes, was founded in the Lothians between 1850 and 1873. It was based on the gas-coals and shales of a small district in West and Midlothian to the west of Edinburgh. Oil was produced from these minerals by a process of distillation. By the close of the period under discussion

108. W.H. Chaloner, People and Industries (1963), 129; Political and Economic Planning, Report on the Gas Industry in Great Britain (1939), 41-2.

109. Cadell, 'Historical Account of Grange', 5, 39-40.

the industry had grown to sizeable proportions, with sixty-five 'highly individualistic' firms in 1870.<sup>110</sup> In view of the tremendous impetus lent to mineral extraction in the Lothians by the oil industry, this section must include a certain amount of detail which does not strictly belong to coal mining.

The British oil industry expanded on the bases of complex but dynamic changes in the home market for oil products, as described by Dr. Butt. Superimposed on the steady growth of demand for lubricating oil, there was from the 1850s an increasing acceptance of mineral oil by consumers for illumination purposes, after obstacles to breaking into this section of the market previously supplied by animal oils had been overcome.<sup>111</sup>

The oil industry was based at first almost exclusively on torbanite. The reasons for this, and for the siting of the enterprise which dominated the industry for the first ten years and more (that of J. Young & Co.) near Bathgate are also explored in detail by Butt.<sup>112</sup> In fact torbanite was an eminently suitable mineral for the manufacture of oil compared to other gas-coals and shales.

Table 3, V Torbanite compared to Shales and Gas-Coals

	Ash (%)	Yield of Oil per ton	
		Actual gallons	Calculated to ash-free basis, gallons
Torbanite	31.25	123.7	180
Lothians shale	76.00	20.0	83
Cannel (Gas-)Coal	3.33	64.0	66
Mussleband shale	56.50	16.6	38

Source: H.R. Conacher, 'The Mineral-Oil Industry in Scotland, Its Raw Materials and Methods', in Oil Shale and Cannel Coal (Institute of Petroleum, London, 1938), 306.

110. J. Butt, 'The Scottish Oil Mania of 1864-6', SJPE, vol 12 (1965), 209.

111. J. Butt, 'Legends of the Coal-Oil Industry (1847-64)', Explorations in Entrepreneurial History, vol 2 (1964), 17-19.

112. Butt, 'Scottish Oil Mania', 196 et seq.

The unique properties of torbanite became well-publicized as a result of the famous Torbanehill case.<sup>113</sup> The case revolved around whether torbanite was a coal or not, and the legal judgement was that it was. Consequently as James Young had a patent on a process of distilling oil from coal, and as the early oil industry was based on torbanite, his firm had a potential monopoly. Other firms did establish themselves in the industry. They were either infringers of Young's patent, and included firms such as George Miller & Co. which carried on 'an extensive manufacture' of oil from torbanite.<sup>114</sup> Or, they were the licensees of Young, and included firms like Bain, Carlile & Co. of Cambuslang.<sup>115</sup> To reiterate, Young's firm nevertheless dominated the British coal-oil industry between 1850 and 1864. Other gas-coals were employed by the early British coal-oil industry, for example from Fife. But torbanite and similar very rich gas-coals from near Bathgate almost excluded all other minerals on the raw material supply side.

By the late 1850s the profit to be got from oil manufacture was sufficient to provide, in theory, a strong inducement to utilize shale, instead of coal or torbanite, for the distillation of oil. From 1859 there was a gradual shift in the direction of using shale instead of the gas-coals, thus avoiding Young's patent. The rationale for transferring the industry to a shale basis was becoming powerful. Torbanite was increasing in cost. In 1850 the pit-head price was only 11s per ton, but by 1862 it varied about 40s to 46s per ton.<sup>116</sup> There was a great competing market

113. The Torbanehill Case, (*Gillespie v Russel and Son*), Court of Session, (Edinburgh, 1853).

114. SRO, UP 1, Adams-Dal, B, bundle 21, no. 41, (*Binney v Miller*), Summons of Damage-Condescendance, 1861, VII.

115. Young Papers (Strathclyde University Library), Young and others v Fernie and others, (Chancery, 1864), evidence of R. Marshall and G. Vary, 2, 10.

116. J. Butt, 'Technical Change and Growth of the British Shale-Oil Industry (1680-1870)', *EHR*, second series, vol 17 (1965), 520.

for gas-coal in the gas industry itself. Yet the transfer to shale was exceptionally gradual. The reasons for this included the secrecy surrounding Young & Co.'s operations, the uncertainty engendered by their successful litigative actions, and confusion over the possibilities of the shale-oil trade.<sup>117</sup> Only from 1864 to 1866 did the shift to shale assume dramatic proportions; and then the company promotion attained such dimensions that Dr. Butt termed the phenomenon the 'oil mania'.<sup>118</sup> Butt has traced the entry of new firms into the Scottish oil industry as follows:<sup>119</sup>

1860-3	23
1864	38
1865-6	28

The increase in oil prices and the rising profits to be got from shale-oil manufacture had a dramatic impact on the shale-bearing region of West and Midlothian. Many mineral properties, which had been rejected in the past by mining engineers as worthless, now became the sites of shale mines and oil works. Examples include the lands of Livingstone, Inch, and Strathbrook.<sup>120</sup> The speed of the industry's advance threw experts into a state of confusion; one such commented in 1865:<sup>121</sup>

The demand for shale is at present so great, the arrangements projected for its manufacture are on a scale so large, and the whole trade and business is of so recent an origin, that we have felt great difficulty in forming our opinion ... as to the fair and proper terms on which leases ought to be given.

The rise of shale-oil manufacture was paralleled by the

- 117. Butt, 'Scottish Oil Mania', 197-202; Butt, 'James Young', 264-275.
- 118. J.R. Williamson spoke of the 'oil fever which raged' in 1866.
- 119. Butt, 'Scottish Oil Mania', 196-7.
- 120. Geddes Records SRO, CB10/5, J.R. Williamson, sundry mineral reports, 1865-6.
- 121. Cadell MSS, 'Memorandum as to Terms of Lease to be adopted in letting Shales in West Lothian (from a Land agent's point of view)', 6 December 1865.

decline in importance of the coal-oil section of the industry.

In 1866-7 one oil firm preferred to re-sell gas-coal on the open market, which they had previously contracted for, rather than use it for oil production.<sup>122</sup> The coal-oil industry, nevertheless, showed a certain perverse persistence, which was not surprising after all the years of waiting for Young's patent to expire in 1864. A number of coal-oil firms were established from 1864 in the Lothians and elsewhere in Scotland, but they did not meet with great success.<sup>123</sup> Young's company still employed gas-coal - but only at their Bathgate works, not at their new plant at Addiewell in the shalefields. In 1866 Young's works consumed 59,764 tons of shale, and only 8,857 tons of gas-coal.<sup>124</sup>

The coal-oil industry also lingered on obscurely as a result of oil produced by gas companies. In principle it was possible for the gas firms to use their retorts to produce oil from coal, instead of gas, simply by reducing the temperature to apply to the coal.<sup>125</sup> However, the amount of oil produced in this way appears to have been very limited, and commercially it was not an altogether sound practice.<sup>126</sup>

In 1872 the sources of the oil produced in Scotland were as follows: 690,700 tons of shale were used, and 30,700 tons of gas-coal. Of the shale, 636,000 tons was mined in the Lothians.<sup>127</sup>

The shale-oil industry followed an upward growth path from

- 122. Cases decided in the Court of Session (Edinburgh, third series, vol. 6, 1867-8), North British Oil and Candle Co. v Swann, 1868, 836-7.
- 123. I.I. Redwood, Mineral Oils and their By-Products (1897), 11-12.
- 124. Young Papers, Account or Valuation Book, 1863-7.
- 125. Young Papers, Young and others v Fernie and others, (Chancery, 1864), Grove address, 3-5.
- 126. Ibid, evidence of T. Neshem and H. Bartholomew, 10-17, 25 et seq.; SC on Metropolis Gas Bill, (PP 1867, XII), evidence of D. Campbell, Q 4499; Hawick Gas Company Minute Books, SRO, GB1, 37/1, 20 June 1866, sundry letters and reports on the oil manufacture 1867, 24 June 1868, 20 October 1870; Butt, 'British Shale-Oil Industry', 520.
- 127. Conacher, 'Mineral-Oil Industry in Scotland', 305.

1859 to 1880, punctuated by intense fluctuations which did not necessarily synchronize with those of the coal industry. The years 1864-6 were a heady period of growth. Those from 1866 to 1868 were a period of regression and witnessed a weeding out of the more speculative projects.<sup>128</sup> The years up to c1872 amounted to a more cautious period of recovery and consolidation.<sup>129</sup> From 1872 to 1874 the oil industry's prosperity was hit by the high price of labour and fuel,<sup>130</sup> and by increased American competition in the British oil market. The industry continued to expand, if erratically, over the 1870s as a whole.<sup>131</sup>

The impact of the Oil Industry on Mineral Activity in the Lothians. The impact of the coal-oil industry on mineral activity was very great indeed during the early explosive period of growth between 1850 and the early 1860s - but only on a limited area around Bathgate. Initially the only customer of any significance was Young's Works. Dr. Butt has estimated that the Bathgate works consumed the following quantities of torbanite:<sup>132</sup>

1851-6	10,000 tons
1856-61	40,000 tons
1861-4	35,000 tons

As previously noted, however, other firms were formed in Britain. After 1857-8 perhaps more torbanite was being supplied to the oil industry than the gas industry. From 1858 a major new developing

- 128. Ibid, 304; Geddes Records SRO, CB10/6, J.R. Williamson, Reports on Torbanehill, 10 April 1867, 26 May 1868.
- 129. Ibid, CB10/7, J.R. Williamson, 'Report upon the probable quantity of Boghead Gas-Coal unworked under J. Russell & Sons, Leaseholders', 12 May 1869; and various other reports 1869-71 in CB10/7-8.
- 130. Ibid, CB10/8, Landale, Frew & Landale, 'Report on the Shale workings of Westwood', 28 June 1872; Ibid, 'Report on the Shale Workings belonging to Capt. Stewart of Westwood', 12 June 1873.
- 131. Scottish shale output grew from an estimated 200,000 tons in 1866, to 524,095 tons in 1873, to 837,805 tons in 1880. Geddes Records SRO, CB10/3, Paper on shales contributed to The Scotsman, published 30 June 1866; H.S. Bell, Oil Shales and Shale Oils (New York, 1948), 3.
- 132. Butt, 'James Young', 106.

source of demand was oil works abroad, especially in the United States. By 1860 there were sixty plants in the eastern states, 'most of them using Scotch Boghead' (torbanite).<sup>133</sup> This export trade to the United States was rather ephemeral, although the oil industry abroad remained of importance as a source of demand for torbanite for a few years. J.R. Williamson estimated in 1865 that, 'Last year 70,000 tons were exported of which fully one half was for distillation and the other for gas works'.<sup>134</sup>

Easily the most important supplier to the coal-oil industry was James Russell & Sons. W. Gillespie, the proprietor of the lands let to the Russells, also produced significant quantities of torbanite on 'reserved' parts of their properties.<sup>135</sup> Shotts Iron Company supplied J. Young & Co. with significant quantities of 'Shotts Boghead gas-coal' from their pits in the same vicinity, as did John Watson & Son of Bathvale. Both these concerns had the productive capacity to negotiate with Young's firm in 1859-60 over the supply of 5,000 tons per annum of high quality gas-coals.<sup>136</sup>

In a broad sense the impact of the shale-oil industry on mineral activity in the Lothians was far greater than the coal-oil industry. There were three major aspects. Firstly, the economy and society of an appreciable part of the counties of West and Midlothian were transformed by the shale mines, crude oil works, and refining plants that were established there by the young industry. The population of the parish of West Calder grew from 1,927 in 1861

133. Ibid, 112; Connacher, 'Mineral-Oil Industry in Scotland', 303.

134. Geddes Records SRO, CB10/5, J.R. Williamson, Draft Revised Precognition, (West Calder Railway), June 1865.

135. In 1871 Gillespie sold 35,000 tons of torbanite to a Glasgow firm. SRO, CS 245/833, (Gillespie v Miller), Closed Record, 1873, 10.

136. Young Papers, Copy letter R. Brown (Shotts Iron Co.) to Messrs. E.W. Binney & Co, 9 December 1859; Meldrum to Young, 2 April 1860.

to 7,865 in 1871.<sup>137</sup>

Secondly and thirdly the shale-oil industry had an impact on coal mining. Secondly, in a general way the population and industries which serviced the oil industry contributed to the local demand for coal. Thirdly, the oil industry had a large demand for coal as a fuel to heat the retorts. This last aspect is the most easy to isolate and examine.

From a variety of sources it has been possible to calculate the following estimates of coal consumption:<sup>138</sup>

Table 3, VI Approximate Coal Consumption by the Scottish Shale-Oil Industry

Year	(tons)
1866	70,000
1873	130,000
1889	500,000

Sources: see note 138.

In 1866 it was estimated that 20 tons of shale required 7 tons of coal. In the following years various improvements in retort design brought possible fuel economies, but their effect appears to have been small within the period discussed, and were countered by the more inferior shales being employed.<sup>139</sup>

The coal used in the shale-oil industry came from three sources: from the coal seams located in the shalefields, and mined from the same pits as the shale, from collieries in the Lothians, and from collieries outside the Lothians. It has not been possible to gauge their relative importance, but all three seem to have been quite significant sources. In the Geddes Records there are many examples of each, which it would not be worthwhile to enumerate.

137. Dicennial Censuses.

138. Bell, Oil Shales, 3; Geddes Records SRO, CB10/3, Paper on shales contributed to The Scotsman, published 30 June 1866; Royal Commission on Mining Royalties, Second Report, (PP 1890-1, XLI), evidence of J. Wilson, 88.

139. Bell, Oil Shales, 4; D. Stewart and C.E. Forbes, 'The Retorting of Oil Shales in Scotland', in Oil Shale and Cannel Coal (Institute of Petroleum, London, 1938), 96-9.

However, perhaps of note among the oil works which derived their coal needs from the strata immediately beneath them were those of Young & Co. at Addiewell. The output of coal and dross from the lands of Briechmill and Muirhall in 1866 was 19,798 tons, compared to 74,305 tons of shale.<sup>140</sup> In 1872-3 the shale pits became an even more important source of coal for the Lothians' oil industry.<sup>141</sup> Regarding the second source of fuel, a number of small collieries in the remote southern parts of Mid and West Lothian were revived from a lingering death by this new demand.<sup>142</sup> Also, West Calder Oil Company leased Woolfords Colliery, West Lothian, specifically to supply their retorts. Output grew from 50 tons per day in March 1873 to 80 tons per day by September 1874.<sup>143</sup>

The type of coals demanded by the oil industry were very low in quality. They were the poor coals of the lower coal measures - the Hurlie Lime Coals, the Broxburn Ball Coals, and inferior Wilsontown Coals. A relatively very large demand for such coals had begun to spring up in the late 1860s, and a considerable boost to coalmining activity in the Lothians was therefore being given.

#### The Evolution of the Market for Coal

Youngson Brown is surely correct in emphasising the 'dynamic role' of exports in the expansion of the Scottish coal industry. To repeat, in 1854 not one ton in twenty was raised to be exported, while

- 140. Young Papers, Account or Valuation Book 1863-7, Memo of output at pits. In addition, an estimated 30,000 tons of coal were being brought annually from collieries on the North British to feed the retorts around Addiewell. Geddes Records SRO, CB10/5, J.R. Williamson, Draft Precognition, (North British branches), 1866.
- 141. Because of the high price of coal on the open market.
- 142. Geddes Records SRO, CB10/9, J.R. Williamson, 'Notes upon Caledonian Larbert and Carstairs branches', 28 March 1873.
- 143. Ibid, J.R. Williamson, reports on Woolfords Colliery, 2 and 25 March 1873, 17 September 1874.

by 1885 one ton in seven was exported.<sup>144</sup> The iron firms active in mineral extraction may have induced important structural and technical changes in the Scottish coal industry,<sup>145</sup> but only by diverting their sales effort away from the iron industry. The coal requirements of pig iron production as a percentage of Scottish coal output were already declining by 1854, when they were an estimated 32.3%. And the percentage continued to fall, to 16.2% in 1873, and 8.9% in 1886.<sup>146</sup>

In Lothians similarly the domestic coal market of Edinburgh and Leith, however large, cannot have had a very stimulating effect on the coal industry. On the other hand 'dynamic' areas of market growth did emerge after 1840.

On the basis of estimates discussed in Appendix 3, II the following tables have been constructed. The figures are highly approximate, but it is felt they do indicate the main trends, notwithstanding some serious omissions.<sup>147</sup>

Table 3, VII The Share of the Chief Markets for Lothians' Coal Output  
(Disposals of Lothian coal to the sectors indicated as a percentage of total coal output)

Edinburgh and Leith Domestic Consumption	Pig Iron Industry	Gas Industry	Oil Industry	Salt Industry	
1800	35	3	-	-	19
1840	31	4	5	-	5
1864	20	8	12	4	1
1880	16	4	10	13	-

144. Youngson Brown, 'Scots Coal Industry', 37-40.

145. See, Campbell, Scotland since 1707, 130-1.

146. Youngson Brown, 'Scots Coal Industry', 36.

147. The years have been chosen because of their convenience with regard to the collation of statistics. It is, however, fortunate that 1840 does demarcate the two characteristic periods in this study.

**Table 3, VIII      Growth of the Markets for Lothian Coal**

	Edinburgh and Leith	Pig Iron	Gas	Oil	Total
	Domestic Industry	Industry	Industry	Lothians' Consumption	Coal Output
(annual compound rate of growth, %, of coal output and chief markets for Lothian coal)					
1800-40	0.7	1.7	-	-	1.0
1840-64	0.7	5.9	5.9	-	4.0
1864-80	0.7	negative	1.4	11.1	2.4

A major conclusion of Part I of this study, and anticipating the findings of Part II, is that the character of the market and its rate of expansion appear to have been the major functional variables behind the structural and technical changes of the Lothians' coal industry. The period 1800 to 1840 was one of almost stagnating output. Entrepreneurial timidity, structural rigidity, and technical backwardness typified the Lothians' coal industry. This was due primarily, it appears, to the lack of dynamic areas of market expansion. Local coalmasters had to rely on slow-moving, or even declining, markets.

Transport also had an important function. Before the late 1840s many new inter-regional canals and railways enabled other coalfields to invade the former preserves of Lothian coal producers, without bringing easy access to new markets for the latter.

After 1850, although railway competition increased, the expanding railway network also had a permissive role, and Lothian coalmasters were able to reach new areas of market growth.

This, however, was only possible on account of the evolving pattern of the coal demand of an industrializing society. After about 1840 successive waves of areas of market growth for Lothian coal emerged, supported by a broadening of the market base. From the late 1830s to the early 1860s the iron industry was a leading area of market growth. From c1840 the gas industry played a leading

role, followed in 1850 to 1864 by the small explosive growth-point represented by the coal-oil industry. The shale-oil industry's demand for Lothian coal grew very rapidly from about 1860, although its effect was reduced because of the very inferior coals required. In addition, significant, although not necessarily spectacular markets for Lothian coal, also developed. They included the Border woollen industry and shipping.

Changes in the market for Lothian coal after 1840 also elicited major developments on the supply side. Technically and structurally the regional industry advanced, output grew quite rapidly, and more enterprising entrepreneurship was displayed.

The market therefore, and not the intrinsic qualities of the Lothian coalmasters or other factors on the supply side, is interpreted here as the main determinant in the development of the Lothians' coal industry, 1815-1875.

### Appendix 3, I

#### The Iron Industry on the South Forth

The emergence of the pig iron industry on the south shore of the Forth was part of the wider geographical dispersal of the Scottish industry following the depletion of the Lanarkshire mineralfields. It was, of course, only a minor aspect which was more pronounced perhaps in Fife and Ayrshire. The main details are as follows:

Table 3, IX      Ironworks on the South Forth

Name of works	Kinneil	Almond	Bridgeness	Gladsmuir
<u>Situation</u>	West Lothian	West Lothian / Stirlingshire border	West Lothian	East Lothian
<u>First Proprietors</u>	J. Wilson	J. Russell & Sons	H. Cadell	C. & A. Christie
<u>Approx. life-span of operation</u>	1846-85	1855-81	1863-75	1855-71
<u>Number of blast furnaces</u>	4	3	2	1
<u>Estimated approx. coal consumption, tons per annum</u>	80,000	60,000	40,000	20,000

Two other works were seriously proposed, but did not get off the ground - at Wallyford in 1861, and at Prestongrange in 1874 when a limited liability company was established for the chief purpose of making pig iron.

John Wilson set up the works at Kinneil in 1845-6, blowing in the furnaces shortly afterwards. A family partnership ran the works and the mines of Kinneil after Wilson's death in 1851. During the next twenty years the firm was fairly active, if not indeed prosperous. In 1860 it was reported that, 'The 4 Furnaces at Kinneil is considered doing well'.<sup>148</sup> Annual output of pig iron was 24,000 tons.

148. Carron Company Records SRO, GD 58/18/52, (8), Paper relating to Kinneil Iron Works, 25 August 1860.

In the 1870s the ironworks and colliery passed out of the Wilson family, and came under the management of a partnership which had the enterprise converted into a limited company in 1881. The new manager, Jonathan Hyslop, reported in 1879:<sup>149</sup>

... the non-success of these works during the past few years has been largely due to inefficient management and defective arrangements, which the judicious expenditure of capital, skill, and patience will speedily remedy.

Hyslop set about re-organising the blast furnaces to utilize waste gases, constructed coke ovens (104 being in operation by 1882), and variously superintended a large capital expenditure. Economic conditions proved adverse, however, and the company was able to pay only one dividend of 2½% in 1882. The company was wound up in 1889.<sup>150</sup>

J. Russell & Sons had interests in the iron trade before they established Almond Ironworks in the mid-1850s. This appears to have enjoyed at least periods of active prosperity. The Russell's mineral properties in West Lothian and Stirlingshire supplied the furnaces with the necessary fuel, ore, and limestone. After the death of father and son, a trustee management administered the firm. Henry Aitken, the managing trustee, was something of an innovator. A high furnace was constructed, 72 feet in height compared to the existing ones of 50 feet, which achieved savings of ten cwt of coal per ton of pig produced compared to the smaller furnaces. Improved coking methods were adopted, with the gases generated in the coke ovens utilized for the coking process.<sup>151</sup> These improvements were insufficient to save the enterprise from

149. Cadell MSS, J. Hyslop to C. & M.E., 'Report on the Mineral and other Properties belonging to Messrs George Wilson & Co. at Kinneil', 18 August 1879.

150. Ibid, Kinneil Iron and Coal Co. Ltd., Directors Reports, 1879-82; Dissolved Companies SRO, BT/2/923, Kinneil Iron and Coal Co. Ltd., Petition unto Lords of Council & Session for supervision Order, 23 February 1889.

151. St. John V Day, 'The Iron and Steel Industries of Scotland', Iron, (1876), 714.

economic decline. The make of pig iron was stopped in 1885.

Henry Cadell, impressed by the sight of the four furnaces at neighbouring Kinneil, made the ill-advised step of commencing pig iron manufacture at Grange in 1863. The works consumed local blackband, although selling it on the open market was much more profitable. The furnaces were only in blast for six months in 1863-4 and for two years in 1871-3. Cadell also was an innovator. Furnace gases were recovered to be employed in the heating of the heater and boiler for the hot-blast. But Bridgeness Ironworks at Grange was a serious entrepreneurial blunder in Cadell's otherwise impressive career.<sup>152</sup>

C. & A. Christie set up Gladsmuir Ironworks in the mid-1850s. In 1855-60 average annual sales of pig iron were reckoned to be about 2,000 tons.<sup>153</sup> The furnace was again in blast about 1865-71, until members of the firm ended up in the bankruptcy court (because of an unconnected disaster at Wallyford Colliery which they leased). There is no further record of the Ironworks after the early 1870s.

If all the furnaces of the South Forth were fully active at the same time as much as 200,000 tons of coal would have been required to feed them. This would have represented something in the region of 25% of coal production in the Lothians in the early 1860s. (It should be noted that the Scottish iron industry's requirement of coal as a whole was proportionately larger than this).<sup>154</sup>

Yet this figure exaggerates greatly the consumption of local coal by the iron industry. Part of the coal needs were supplied from

152. Cadell, 'Historical Account of Grange', 213 *et seq.*

153. Geddes Records SRO, CB10/9, C.J. Christie, Draft Precognition, (North British Railways, Proposed branch, Ormiston, Monktonhall & Dalkeith), March 1862.

154. Between 1854 and 1864 the coal requirement of the Scottish iron industry varied between 25.8% and 36.7% of Scottish coal output. Youngson Brown, 'Scots Coal Industry', 33-5.

outside the Lothians, and rarely were all the furnaces in blast.

The fluctuating fortunes of the regional iron industry were intense.

Table 3, X Number of Furances on the South Forth

Given dates	Kinneil (production started 1846)	Almond (production started 1856)	Bridgeness (production started 1863)	Gladsmuir (production started c1855)
	Total in blast	Total in blast	Total in blast	Total in blast
1854	4	2	-	-
1855	4	3	2	1
1856	4	4	2	1
1859	4	3	1	1
1860	4	4	1	1
1861	4	4	2	0
1862	4	3	2	0
1863	4	3	2	1
1864	4	3	2	0
1865	4	3	2	1
1869	4	2	2	1
1871	4	3	2	1
1880	2	1	1	-

Sources: various, including R. Hunt, Mineral Statistics of the United Kingdom of Great Britain and Ireland, and The Colliery Guardian.

By around the late 1880s most of the plant of the South Forth iron industry was scrapped. Over its brief history production was very erratic. What were the causes of the failure of the iron industry in the region? The question is significant as the region had the advantage of a good supply of ore, when others were running out of supplies. Kinneil and Bridgeness were sited on tidewater, and Almond was on the Union Canal with ready access to the Forth estuary. This was important for the supply of raw materials and outlet to markets. These may have been good sites for integrated iron and steel works later in the nineteenth century when access to imported foreign ores became an important locational factor.<sup>155</sup> Capable and innovative managers were in charge of the last three mentioned works.

The industry failed locally because of a variety of factors.

155. See also, H.M. Cadell, 'Industrial Possibilities of the Forth Estuary', SGM, vol 34 (1918).

Firstly, the raw material supply position was not entirely advantageous. Kinneil and Bridgeness were short of supplies of good furnace coal, and Gladsmuir suffered from the high cost of local fuel. On the Kinneil estate the best blackband ironstone deposits were worked out by 1865.<sup>156</sup>

Secondly the industry may have suffered because of a reduction of the local market for pig. The location of the Scottish malleable iron industry in the second half of the nineteenth century was tending to revert to its original concentration in the Motherwell-Wishaw district.<sup>157</sup>

The main reasons for the failure of the South Forth industry are tied up with the general causes of the relative decline of the Scottish pig iron industry after 1850. Campbell has described the lack of co-ordination between pig iron production and steel-making in Scotland. Not until 1879, with the invention of the basic process, could Scottish ores and pig be used for steelmaking. But by then Scotland had no greater claim than several other areas to be the supplier of the steel-makers. The Scottish steel industry had already developed, but 'on the basis of the older, or acid, methods',<sup>158</sup> which had used imported Cumbrian and Spanish ores. By being unable to supply what was required by an expanding steel industry before 1880, the Scottish pig iron trade missed an opportunity for further growth. It is evident that the Lothian ironworks were established at an unpropitious time.

156. Geddes Records SRO, CB10/5, J.R. Williamson, Draft Precognition, (Forth Bridge Scheme), May 1865; The Colliery Guardian, 6 January and 6 April 1861; Cadell, Rocks of West Lothian, 349.

157. K. Warren, 'Locational Problems of the Scottish Iron and Steel Industry since 1760, Part 1', SGM, vol 81 (1965), 23.

158. Campbell, Scotland since 1707, 233. See also, Campbell, 'Scottish Pig Iron Trade', 41-2; I. Gibson, 'The Establishment of the Scottish Steel Industry', SJPE, vol 5 (1958), 25 *et seq.*

### Appendix 3, II

#### Derivation of the Market for Lothians' Coal

A number of sources of varying trustworthiness have been used to construct the following approximate estimates of the sources of demand for Lothian coal. The sources include population censuses and the 1871 Coal Commission Report.

Table 3, XI Sources of demand for Lothians' coal output  
(tons)

Year	Edinburgh and Leith	Pig Iron Industry	Gas Industry	Oil Industry	Salt Industry	Total of Five sectors	Total Coal Output noted
c1800	130,000	10,000	-	-	70,000	210,000	370,000
c1840	170,000	20,000	30,000	-	30,000	250,000	550,000
c1864	200,000	80,000	120,000	40,000	10,000	450,000	990,000
c1880	225,000	70,000	150,000	200,000	5,000	645,000	1,450,000

Elsewhere I have made calculations for Edinburgh coal consumption.<sup>160</sup> It should be emphasised that the figures in Table 3, XI refer to Lothian coal supplied to domestic consumers in Edinburgh and Leith, not total coal consumption in the urban area.

The pig iron industry has been discussed in a previous section in this chapter, and most of the relevant sources have been cited therein. The same applies to the gas and oil sectors. For gas it should be noted that the gas-coal output figures for 1865-9 returned to the 1871 Coal Commission appear to be underestimates, especially for West Lothian.<sup>161</sup> For oil, it is possible that official coal output statistics did not include coal put out at shale pits, otherwise it is difficult to understand the sagging West Lothian coal output figures in the 1870s.<sup>162</sup>

159. In the three Lothian counties.

160. Hassan, 'Supply of Coal to Edinburgh', 126.

161. Report on Coal, vol III, Rept of Committee E, 161, (PP 1871, XVIII).

162. Inspectors of Mines Reports, 1871-81.

The statistics for the salt industry are even more speculative than the others. An estimate of 100,000 tons of panwood for the Forth basin in 1818 can be cited.<sup>163</sup>

Obviously there are some important omissions. Perhaps the most serious gap in the evidence relates to shipping between 1864 and 1880.

Coal production statistics are discussed in Appendix 5, I.

163. Cited in Hughes, Studies in Administration and Finance, 423-4.

**PART TWO. INDUSTRIAL DEVELOPMENT****CHAPTER FOUR. THE LANDED ESTATE**

## CHAPTER FOUR. THE LANDED ESTATE

### Introduction

In 1800 control of the Midlothian coal industry was associated with such gentry families as 'the Hopes, the Wauchopes, and the Clerks'.<sup>1</sup> The phenomenon of landowning families taking a direct involvement in coal mining was a common one throughout the British coalfields in the early nineteenth century. J.T. Ward states: 'From the viewpoint of the historian of landed estates, the landowner's connection with mineral ventures is seminal'.<sup>2</sup> What is of interest for this study was the unusually high representation of the landed classes in the coal industry of Mid and East Lothian, and its longer persistence through the nineteenth century than was common elsewhere.

At the outset it is necessary to define the 'estate mine', and to question whether a valid distinction can be made between the functions of the landed estate and 'private enterprise' in the history of the nineteenth century coal industry. At one extreme there was the shallow pit worked by a small landowner for immediate needs like heating the house or firing lime-kilns, and with perhaps a little coal surplus to the estate's requirements for sale locally. At the other extreme there were the big capitalist mining companies, leasing minerals from a number of landlords for large-scale exploitation and sale in diverse markets. Between the two extremes there were numerous enterprises which possessed the characteristics of both these stereotypes to a varying degree, and it is almost impossible in certain cases to make a valid demarcation.<sup>3</sup>

1. Dunlop, Observations on the Account of a Plan, 22.

2. J.T. Ward, 'Landowners and Mining', in J.T. Ward and R.G. Wilson (eds), Land and Industry : The Landed Estate and the Industrial Revolution (Newton Abbot, 1971), 106.

3. Thus in this study the awkward decision was made to discuss Sir John Hope's enterprises in this chapter, although he leased most of his mines from other proprietors, and to examine Henry Cadell's career in the next chapter on 'Private Enterprise', although he was the local 'laird' of Grange, and owned land and the colliery there.

The essential feature of the landed coalmaster was that he owned the mine, and directly worked it. 'Private enterprise' typically leased mines. The landed coalmaster owned agricultural land and woods, and the 'estate mine' had been usually managed by the estate-steward or 'grieve', but in the nineteenth century more and more it was run by a full-time colliery manager.<sup>4</sup> To some extent the 'estate mine' supplied estate needs. For example at Prestonhall Colliery belonging to Sir John Callender, Bt., which was directly worked by him, a significant part of the tiny output was disposed of for estate uses. In 1811 there were 2,166 loads of great coal and 462 bolls of limewood delivered to the house or the servants. Total output was 13,032 loads of great coal, and 9,528 bolls of limewood, much of the latter doubtless being used at local and estate lime-kilns.

The profit from sales on the open market was under £80.<sup>5</sup> Duckham makes clear that estate requirements provided the initial motivation for landowners to start coal production in eighteenth century Scotland.

In the Lothians, salt manufacture was often a major estate activity (though determined by commercial factors), and provided an additional incentive to start coal mining. 'Estate mines' survived because they were mostly small, and required modest inputs of capital.<sup>6</sup>

Sombart indicated that he understood the 'estate mine' to be essentially non-capitalistic, and to be defined by production being geared solely for estate uses.<sup>7</sup> This definition would exclude virtually all British collieries in the nineteenth century. It must be allowed that the 'estate mine', even in the eighteenth century, was

4. S. Pollard, The Genesis of Modern Management : A Study of the Industrial Revolution in Great Britain (1965), 28-9; Duckham, Scottish Coal Industry, 117.

5. J.C. Brodie Collection SRO, GD247/84/2, Papers relating to Prestonhall Coal, 'General State of the Produce of Prestonhall Coal from 29 Dec. 1810 to 31 Dec. 1811'.

6. Duckham, Scottish Coal Industry, 141-2.

7. He was not, admittedly, considering eighteenth and nineteenth century Britain. W. Sombart, The Quintessence of Capitalism : A Study of the History and Psychology of the Modern Business Man (English translation 1915, first published 1913), 76-83.

orientated partially to the sale of coal on the open market.<sup>8</sup>

Duckham emphasises that the chance of a 'neate profit' was a powerful inducement for the landowner to produce coal over and above estate needs for sale.<sup>9</sup> Nevertheless it does appear that there has been some confused treatment of the 'estate mine' in the literature on the nineteenth century coal industry. The term hardly describes the great enterprises of the Earl of Durham or the Marquis of Londonderry, which were capitalistic and virtually identical in production and sales policies to mining companies.<sup>10</sup> For the 'estate mine' to mean anything it must refer to collieries where the servicing of estate needs was important, and where the colliery was only a part - perhaps a minor part - of the landlord's economic interests.<sup>11</sup>

The 'estate mine', thus narrowly defined, diminished rapidly in importance during the nineteenth century, even in Mid and East Lothian. The role of the landed classes in the Lothians' coal industry, during the period under study, was to develop and expand estate mines into fully-fledged capitalist enterprises, run by professional colliery managers, and orientated to competition in the open market. Having emphasised this, it is true that the social relationships of Lothian mining communities was somewhat different from elsewhere, partly on account of the presence of the paternalistically-minded landed coalmasters.<sup>12</sup> It is certainly valid to distinguish the roles of 'private enterprise' and the landed estate.

8. It should be remembered that by the late eighteenth century in Britain 'large landowners ... were already attuned to a bourgeois society'. E.J. Hobsbawm, The Age of Revolution : Europe 1789-1848 (1973, first published 1962), 188.

9. Duckham, Scottish Coal Industry, 141.

10. J.H. Clapham indicates that in the period 1850-1886 such 'feudal colliery enterprises' had become 'among the greatest business concerns in the country'. An Economic History of Modern Britain, II, Free Trade and Steel 1850-1886 (Cambridge, 1932), 120.

11. This function was recalled subsequently, when the mines were leased, by stipulations in the lease that the tenant supply certain quantities of coal yearly for use in the proprietor's home. Eg, Shairp of Houston MSS, SRO GD 30/699, Copy Tack by Thomas Shairp to Christopher Armstrong, 25 May 1805.

12. See, chapter ten, pp301-3.

For the first forty years or so of the nineteenth century it was the landed classes - ranging from minor gentry to powerful aristocrats - who were mainly responsible for the development of the Lothians' coal industry. About 1840, although a number of mining partnerships had sprung up, only one relatively important colliery in Midlothian was let to 'private enterprise' (or not controlled by a landed proprietor).<sup>13</sup>

The achievements of Sir John Hope and the Marquis of Lothian were undoubtedly, but otherwise the landed coalmasters of the region scarcely displayed great entrepreneurial flair in the early decades of the nineteenth century. The share of Mid and East Lothian in Scottish coal output was certainly declining. In the eighteenth century Lothian coalmasters had expanded production by 'extensive' methods. There were a moderate number of small shallow workings. Some of these were crop workings - limited attempts to win coal from the edge seams cropping out at the surface. The effect of the high prices of the coal famine of 1790-1820 was to accelerate the process of exhaustion of the more easily won upper seams. This applied particularly to the upper levels of the rich and valuable 'great seam' of the Mid and East Lothian coalfield. It was remarked in 1824 that the best coals of Midlothian were exhausted from existing fittings, although there were still exploitable deposits of second-rate coals.<sup>14</sup> It was largely impossible (with the notable exception of the Newbattle Estate) to expand production without the installation of costly steam pumps, and on the basis of the traditional Mid and East Lothian method of level-free drainage. It was only, however, the Marquis of Lothian and Sir John Hope who expanded production considerably at the pits they controlled in the twenty years or so after 1810.

13. Edmonstone Colliery was let to Messrs. Stenhouse. See Milne, Memoir on Mid and East-Lothian, Statistical Table at end; Children's Employment Commission, Royal Commission, Appendix to First Report, (PP 1842, XVI), 379.

14. Grieve, Report on Utility of a Railway, 3, 18.

As stressed below very competitive conditions obtained in the Lothians' coal trade in the 1820s and 1830s. The opportunities opened up by the Edinburgh & Dalkeith, however, and the return of prosperous conditions in 1836-8 stimulated mining activity in Midlothian. The landed proprietors fitted out new pits and collieries in the county during the 1830s. The initiative was taken not only by Sir John Hope and the Marquis of Lothian, but also by the Dundas of Arniston family, the Duke of Buccleuch, and the Clerks of Penicuik.

After about 1842 the coal trade of the Lothians was influenced by very competitive conditions on the whole. Yet at last the mining entrepreneurs of the region were realising and accepting that to exploit the lower seams of the Mid and East Lothian coalfield, and in order to maintain a reasonable level of output, deeper pits and more ambitious ventures were necessary. The fact is that after 1850 it was increasingly 'private enterprise' that was responsible for the advance of the Lothians' coal industry. The economic role of the landed estate was in decline.

### The Landed Presence

The east of Scotland was a bastion of landed coalmasters in the nineteenth century, but no more so than in Midlothian itself. Amongst them the Marquises of Lothian, who developed the mineral resources of the Newbattle estate, were outstanding. Unfortunately data relating to Newbattle is sparse. Contemporary accounts and estimates yield the following figures (rounded-up) of gross mineral output at Newbattle Colliery:

1822	30,000 tons
1838	53,000 "
1858	60,000 "
1862	100,000 "
1867	116,000 "
1883	196,000 "
1887	201,000 "

For much of the period Newbattle Colliery was the largest colliery in Mid and East Lothian, and at every stage of appreciable size by Scottish standards.

Operations had been modest in the eighteenth century. In 1816 an important part of the estate was relieved of an entailment, which then allowed coal mining there, and John Williamson was appointed manager.<sup>15</sup> From that date forward mineral activity was prosecuted with energy and skill. Williamson remained at Newbattle until c1837, and was succeeded by other competent managers, such as James Davidson who had 'sole management' of the colliery for at least ten years after 1858.

Technically the colliery was always close to the forefront of best practice in the Lothians. The sinkings of 1840-1 were 'splendid examples of the pits of that date'.<sup>16</sup> The deep fittings of the early 1860s were complete with modern pumping equipment.<sup>17</sup> An account of 1868 reveals the high technical standards and considerable scale of Newbattle Colliery.<sup>18</sup> Referring to it in this period Youngson Brown described the works as 'one of the finest and most extensive collieries in Scotland'.<sup>19</sup>

A certain degree of uncertainty remains as to the actual business organisation of the colliery. For most of the period it was a typical unleased enterprise, worked directly by the proprietor, and managed by a salaried employee. A.S. Cunningham wrote of the formation of the Lothian Coal Company by the Marquis of Lothian and

15. Geddes Records, SRO CB10/4, John Williamson, 'Report on Newbattle Colliery Property of the Marquis of Lothian', 1 August 1860. Note, Statistical Appendix, tables 16, 20, 24.
16. A.S. Cunningham, Mining in Mid and East Lothian : History of the Industry from Earliest Times to the Present Day (Edinburgh, 1925), 116.
17. The Colliery Guardian, 21 and 28 December 1861.
18. Report of the Commissioners appointed to inquire into the several matters relating to Coal in the United Kingdom, vol II, (PP 1871, XVIII), evidence of James Davidson, QQ 1161, et seq.
19. Youngson Brown, 'Scots Coal Industry', 98.

Archibald Hood,<sup>20</sup> and appears to suggest a date sometime after 1860.<sup>21</sup> This enterprise worked both Newbattle and Dalkeith Colliery for a while. The Lothian Coal Company, as far as can be judged, was not formed as a limited company until the 1890s.<sup>22</sup> Meanwhile Newbattle Colliery was a lucrative source of income for the Marquis of Lothian, yielding him £6,296 about 1876 and £5,094 in 1883.<sup>23</sup>

Without a doubt the greatest mining entrepreneur in the Lothians in the first half of the nineteenth century was Sir John Hope Bt. (1781-1853). R. Stevenson stated in 1818 that extensive mining operations in Midlothian had begun only 25 to 30 years previously with the activities of Sir Archibald Hope (1735-94).<sup>24</sup> His successor raised the scale of the Hope mining enterprises to a much greater level. Sir John Hope owned Pinkie Colliery and worked it directly throughout the period. But Hope became a great coalmaster by leasing collieries from other landowners. Foremost amongst these was Sheriffhall Colliery, which he leased from the Duke of Buccleuch in 1808.<sup>25</sup> Gross coal output rose to about 60,000 tons in certain years in the 1810s. Between 1812 and 1817 Hope was paying royalties on Sheriffhall coal output which averaged over £4,500 per annum.<sup>26</sup>

In 1825 Hope leased the mineral properties of Monktonhill, Stoneyhill, Woolmet, and the Hill from the Earl of Wemyss. Here Newcraighall Colliery was established, which subsequently vied in size with Sheriffhall. Of Newcraighall John Geddes stated in 1838:<sup>27</sup>

20. Hood was a famous mining entrepreneur, see pp.158-9.

21. Cunningham, Mining in Mid and East Lothian, 116, 140.

22. Youngson Brown, 'Scots Coal Industry', 102.

23. J. Bateman, The Great Landowners of Great Britain and Ireland (Leicester, 1971 edition introduced by D. Spring, first published in 1876), 379; Newbattle Collection, (NLS vol IV, 5816), 'Account of Charge and Discharge between Marquis of Lothian, and Messrs. Tod, Murray, and Jamieson W.S., 31 December 1882-31 December 1883'.

24. Stevenson, Proposed Railway between Edinburgh and Dalkeith,

25. Hope MSS, 'Copy Lease of Sheriff, Hall Colliery for 14 years from October 15th 1808'.

26. Buccleuch MSS, SRO GD 224/986/4, Sheriffhall Colliery Account Book, 1793-1827.

27. Hope MSS, J. Geddes, 'Report regarding Stoneyhill', 28 September 1838.

... the machinery provided for the colliery has been of ample power, the pits have all been sunk with energy, and no expense has been spared in forming railroads above and below ground ... other pits are in progress to gain additional coalfields.

Hope had a number of other mineral interests in Midlothian during the 1820s and 1830s. These included Newhailes Colliery, of which he became tenant in 1826. In 1829 it was reported that '... the colliery is now fitted in a substantial manner and wrought with vigour, the raising of coal being carried on night and day.'<sup>28</sup>

Hope's exceptional drive had made him by 1842 one of the biggest coalmasters in Scotland, and a very large employer of labour for the times. In all 731 persons worked in his coal mines, including almost 500 men and youths over 13.<sup>29</sup>

In actual fact by this date Hope's mining empire had been in a state of crisis for a number of years. Sheriffhall was nearing

exhaustion, and Newcraighall suffered from very heavy water and 'troubled' strata. Clashes with the North British occurred over the interpretation of agreements to ship coal. Hope's indefatigable character was illustrated by his response to this deterioration of conditions. A new colliery was planned at his property in Inveresk.<sup>30</sup> Sheriffhall was not abandoned as it could have been, but carried on by a year-to-year arrangement with the Duke of Buccleuch.<sup>31</sup> Above all a major new project was embarked on in 1843.

Hope undertook a new lease, that of Edmonstone Colliery, and planned to work the coal from this and four adjacent properties

28. Dalrymple of Newhailes MSS, SRO GD 246/63/4, J. Geddes, 'Report regarding the Colliery Operations at Newhailes', 9 December 1829.
29. This can be compared with 393 persons employed at the mines of Carron Ironworks, Stirlingshire (with over another 1,000 at the Ironworks), and 349 persons employed by Alloa Coal Company in Clackmannanshire. Children's Emp. Comm., Appendix to First Report, (PP 1842, XVI), 379-80.
30. Hope MSS, D. Landale, 'Report on proposed Coal Winning at Inveresk', March 1842.
31. Ibid., 'Copy Letter', D. Landale to R.S. Moncrieff, 1 April 1844.

(embracing also Newcraighall and Sheriffhall) as one enterprise in a bid to command the deep 'Jewel Coal' seams. Two new deep pits were sunk by 1847. The Earl of Wemyss contributed £5,000 and John Wauchope £5,500 towards the cost of this project on their properties.<sup>32</sup>

The outcome of the venture was disastrous for Hope. In all it lost him almost £35,000.<sup>33</sup> Yet even during the sinkings he had maintained a high coal output at the properties in question, averaging over 70,000 tons per annum in 1844-8.<sup>34</sup> But the deep, wet edge seams had proved too much for him. Painful legal disputes developed with the proprietors of the minerals, and finally in May 1850 Sir John Hope left Midlothian and the family seat for London in disgust.<sup>35</sup>

Following the two largest mining enterprises in the Lothians before 1850 were a number of more modest collieries run by landed coal proprietors. The Dukes of Buccleuch owned a number of mines in Scotland, but tended to lease them in the first three decades of the century. Nevertheless the 5th Duke of Buccleuch (1806-95) became a power in the industrial life of Midlothian. In the second half of the 1830s he began construction of the Granton Harbour Scheme, and the establishment of coal and brick works on the Dalkeith estate. The Duke controlled Dalkeith Colliery directly. It developed into one of the larger Midlothian collieries, with high outputs being achieved particularly in the 1850s.<sup>36</sup> The Duke of Buccleuch took a lively interest in the week-to-week running of the colliery, especially under

32. Ibid, 'Copy Report by William Anderson, M.E. South Shields, Upon the Collieries of the E. of Wemyss', 11 June 1849.

33. Ibid, 'Copy Letter', Sir John Hope to John Wauchope, 6 May 1850.

34. Ibid, 'Copy Report by William Anderson, M.E. South Shields, Upon the Collieries of the E. of Wemyss', 11 June 1849.

35. Ibid, various papers. Hope had a seat in the Houses of Parliament in the late 1840s. The Duke of Buccleuch helped him with his election expenses. Hope was in severe financial straits owing to the flooding of Edmonstone Colliery, and had to rely for a time on his salary as a Commissioner on the Scottish Fisheries Board. Letter, J.I. Brash to Sir Archibald Hope, 25 May 1971, kindly shown to me by Sir Archibald Hope.

36. Statistical Appendix, table 28.

the managements of James Wright (1837-49) and Henry Cadell (1849-55).

For example he showered Cadell with papers on mining subjects, and worked closely with him in the drawing up of the Special Rules.<sup>37</sup>

The colliery's affairs deteriorated during the 1860s, and the Duke had become somewhat jaundiced with production and labour problems by the 1870s.<sup>38</sup>

Certainly as important coal proprietors within Midlothian as the Duke of Buccleuch were the Dundases of Arniston. The minerals in the estate had been leased, but in 1832 Robert Dundas of Arniston (1797-1838) gave up a political career, apparently, to devote his attention to the colliery. The lease was renounced, and Dundas 'at once took up developments' himself.<sup>39</sup> By the year of his death output had grown to 28,000 tons. Thereafter the tempo of activity declined, and after 1850 the family once again leased the colliery.

The Wardlaw Ramsays were yet another old-established landed family. In 1837 they possessed very extensive assets, including land yielding £1,600 to £1,700 per annum, some 'valuable coal-leases', and moveable estates in Scotland, England and France to the value of £111,000.<sup>40</sup> One of their most valuable properties was Whitehill Colliery in Midlothian. Robert Balfour Wardlaw Ramsay (b. 1815) ascended to the family seat in Midlothian in 1837. He pursued an idiosyncratic career in the coal industry of the county for the next forty years or so, variously leasing, sub-leasing or being let a number of coal properties. The output of Whitehill Colliery grew from

37. Buccleuch MSS, SRO GD 224/582, H. Cadell to the Duke of Buccleuch, 6 October 1853; Ibid, Box 512, H. Cadell to the Duke of Buccleuch, 14 April 1854, 25 January 1856.

38. In later years the Duke became more concerned with pollution than production and brought an action against the Lothian Coal Company for discharging pit water into the River South Esk. SRO, CS 249/732, (*Buccleuch v Lothian Coal Co.*), 1892.

39. Cunningham, *Mining in Mid and East Lothian*, 112, 142.

40. Cases decided in the Court of Session (Edinburgh, vol 1, 1838-9), *Ramsay v Ramsay*, 1838, 83 et seq.

22,000 tons in 1838 to 40,000 tons about 1860. But during the 1860s Whitehill was let to the entrepreneur, Archibald Hood, with whom Ramsay had close business connections. Meanwhile during the 1850s Ramsay had taken on the lease of four other Midlothian mines. These ventures were ill-founded by and large, and Ramsay withdrew from these commitments in the following decade.<sup>41</sup> His retreat from the coal industry was taken a further stage when he let his own coalfield of Eldin in 1869, and sub-let to Hood certain other properties which he had taken on previously.<sup>42</sup> By the 1870s Ramsay doubtless found the role of rentier more satisfactory than that of entrepreneur, with a mineral income of £2,312 - apart from a rent roll of over £11,000 gross.<sup>43</sup>

The Clerks of Penicuik and Don Wauchope of Edmonstone were stalwart gentry families of Midlothian, who also had a long history of active involvement in coal mining. They too were withdrawing that involvement in this period. The Clerks leased most of their more important Midlothian mineral property after 1850, although they continued to work Brunstain Colliery. This was an extremely small and backward undertaking.<sup>44</sup> The Wauchopes, on the other hand, resumed an earlier tradition of active coal working between 1851 and 1862, when Sir John Don Wauchope Bt. (d. 1874) ran 'Edmonstone Coal and Brick Company' with himself as 'sole partner'. Wauchope showed himself briefly to be an enterprising entrepreneur, but once again the depth

41. Eg. Geddes Records, SRO CB10/1, copy letter John Williamson to James Burnet, 2 May 1854; Don Wauchope of Edmonstone Papers, Bundle 3/7, D. Landale, 'Report on the working and increase of water in the south parott seam at Niddry Colliery', 14 March 1861.

42. Geddes Records, SRO CB10/10, R. Johnstone and Rankine, 'Excerpt from Report on Whitehill, Eldin, and Carrington Mineral Workings', 31 December 1869; Ibid, CB10/6, Carrington Lease, 1866; Ibid, J.R. Williamson, 'Report on R.B.W. Ramsay's Searches on the Carrington Estate', 13 November 1868.

43. Bateman, Great Landowners of Britain, 374.

44. Clerk of Penicuik MSS, SRO GD 18/1153, D. Landale, Copy Report on Brunstain Colliery belonging to Sir George Clerk, Bt. of Penicuik, 15 November 1864.

and wetness of the edge seams defeated attempts to command them.<sup>45</sup>

In 1862 Edmonstone was let to a tenant.

East Lothian also had its batch of landed coalmasters. The

Cadells of Cockenzie worked Tranent Colliery, but it was a declining concern after 1850. The Callanders of Crichton held extensive mineral property in the county, although in 1812 only one small pit was worked directly.<sup>46</sup> Sir George Grant-Suthe Bt. (1797-1878) was

an active coalmaster throughout most of the period, developing

Prestongrange Colliery into a fairly significant enterprise for the region.<sup>47</sup> At times he strenuously attempted to find a tenant for the colliery, noticeably in the 1840s. This was not achieved until 1874.

In contrast to Mid and East Lothian, the development of the mineral resources of West Lothian during the first half of the nineteenth century was already chiefly to the credit of the mining tenant. Landed coalmasters were becoming exceptional. Sir William

Baillie Bt. worked Polkemmet Colliery in 1842, but it then employed less than 50 persons.<sup>48</sup> Close relations of the Cadells of Cockenzie were the Cadells of Grange. This family in many respects does not fit the category of landed coalmasters, and includes members who stand out as almost archetypal nineteenth century entrepreneurs. Therefore discussion of them is deferred until chapter five.

It is evident that during the course of the nineteenth century the landed estate progressively withdrew from active involvement in coal

45. Geddes Records, SRO CB10/4, J.R. Williamson, Draft Precognition, (Esk Valley Railway), April 1861; Don Wauchope of Edmonstone Papers, Bundle 3/7, D. Landale, 'Report on the working and increase of water in the south parott seam at Niddry Colliery', 14 March 1861; Ibid, John Williamson, 'Remarks on the Coal Workings at the Wisp by John Wauchope', 14 March 1861.

46. J.C. Brodie Collection, SRO GD 247/84/2, miscellaneous papers relating to Coal, 1811-13.

47. Note advertisements in The Scotsman, 21 February 1852, 25 February 1854, etc.

48. Children's Emp. Comm., Appdx. to First Report, (PP 1842, XVI), 380.

mining in the Lothians. It became as recipients of mining royalties that their presence was felt. Already before 1850 in Mid and East Lothian there were a number of coal proprietors who consistently preferred to enjoy the benefits of mineral rents rather than the risks of direct coal working. The Earls of Wemyss and the Dalrymples of Newhailes were prominent amongst them. Twenty to thirty years later their numbers were swollen as a result of defections from the group of landed coalmasters. By the mid-1870s the Dundases of Arniston were deriving over £3,000 per annum from Arniston Colliery.<sup>49</sup> The Clerks received over £12,000 from Shotts Iron Company between 1872 and 1879 for Loanhead Colliery, and Penicuik Colliery was also yielding large royalties.<sup>50</sup> Sir G. Grant Suttie was getting over £1,000 per annum from Prestongrange Coal and Iron Company in 1876-8.<sup>51</sup>

Meanwhile the traditional collectors of mineral rents were not suffering. The Earl of Wemyss received £20,000 from the working of Wallyford Colliery alone between 1857 and 1871.<sup>52</sup> The Earl of Rosebery enjoyed royalties from shale-oil as well as coal properties: £2,616 per annum in all in the 1870s. The annual value of the minerals of the Earl of Hopetoun was £3,974.<sup>53</sup> In addition there were a large number of Scottish landowners who possessed property in the

Lothians and elsewhere, and enjoyed small to extremely large mineral incomes.<sup>54</sup>

49. Dundas of Arniston MSS, reports on Arniston Colliery, 1873-6.

50. SRO, CS 245/1310, (Clerk v Shotts Iron Co.), Output and Disposals Loanhead Colliery, Output and Disposals Minerals at Penicuik, 1872-9.

51. Geddes Records, SRO CB10/10, Prestongrange Royalty Returns, 1875-9.

52. Ibid, CB10/3-7, Wallyford Colliery Disposals, 1857-71.

53. Bateman, Great Landowners of Britain, 226, 386.

54. Most of these are noted by Ward, 'Landowners and Mining', 79-88.

### The Role of the Landed Estate

Yet the importance of mineral income to the landed classes, in the Lothians as elsewhere, should not be exaggerated. Bateman's returns make clear that even in notable cases like the Earl of Hopetoun, mining royalties were fractional in relation to the total rent roll.<sup>55</sup>

This fact should not obscure the great influence of the landed estate on the development of the Lothians' coal industry. Although in Scotland as a whole the interest of the aristocracy in mining was by 1869 'a very inconspicuous affair', this was not the case in the Lothians. Of seven aristocratic coalmasters in Scotland identified by Youngson Brown four were active in Mid and East Lothian.<sup>56</sup> The persistence of the landed estate appears to have been due to the great age, old traditions, and slow development (to c 1840) of the coal industry in this region. In the first half of the nineteenth century there was an insubstantial geographic expansion of mining in the Lothians, and much less social and industrial upheaval in general than in the west of Scotland. By contrast in Lanarkshire and Renfrew

it has been argued that the mercantile and industrial wealth of Glasgow challenged that of the land, and contributed to the rise of the mining lessee. It appears that on the whole the 'country laird' had more modest resources in the region dominated by Glasgow than his counterparts in the east, and less able to prosecute mining operations with the vigour of a Duke of Buccleuch.<sup>57</sup>

But the Lothians were not insulated from the forces which contributed to the decline of the landed coalmaster in the nineteenth

55. Bateman, *Great Landowners of Britain*, 226.

56. The Duke of Buccleuch, Marquis of Lothian, Sir G.G. Suttie, and Sir G. Clerk. Youngson Brown, 'Scots Coal Industry', 98.

57. Duckham, *Scottish Coal Industry*, 150, 154.

century. On occasion there were difficulties created for the landed gentry by the unlikelihood of their estates being capable of sustaining the family's desired 'life-style' and commitments.

Annuities and gratuities for numerous relatives were often a heavy burden on estate revenue. An immediate source of cash was the lease or sale of coal mines.<sup>58</sup>

There were also major economic factors, arising from the

development of the coal industry, which encouraged landowners to

withdraw from direct involvement in collieries. As Smout and Ward

have both emphasised mines were becoming deeper, returns often 'more speculative', capital equipment more elaborate, and technique more

complex.<sup>59</sup> The demands and circumstances of a new industrial age called for different qualities of entrepreneurship than those of the 'Stuart and Georgian pioneers'. Thus the '... comparative tranquility ... of a rentier status had obvious attractions'.<sup>60</sup>

It has been indicated that with two exceptions the Lothian landed coalmasters contributed little to the productive or technical advance

of the coalfield before about 1840. Subsequently Hopes, Wauchopes,

and Wardlaw Ramsays were all defeated by the magnitude of the task of commanding Midlothian's deep edge seams. The four noble coalmasters

active in 1869, noted by Youngson Brown, all withdrew from the industry not many years afterwards. By 1890 Newbattle Colliery was

being worked by the Lothian Coal Company.<sup>61</sup> This marked the final

extinguishing of the landed presence, as a directly involved force, in the Lothians' coal industry in the nineteenth century.

58. This problem affected Sir John Callander's estate. J.C. Brodie Collection, SRO GD 247/84/2, miscellaneous papers re Prestonhall Coal and the Estate, 1812.

59. Smout, 'Scottish Landowners', 221.

60. Ward, 'Landowners and Mining', 72.

61. RC on Mining Royalties, Second Report, (PP 1890-1, XLI), evidence of R. Brown, QQ 5729 et seq.

The role of the landed estate in the region was by no means purely negative. The landed coalmasters, in the absence of private initiative, had been responsible for the first attempts to really open up the coalfield, and some had been outstanding entrepreneurs in their own right. The coal proprietors who decided to lease rather than work their minerals also made contributions to the industry's development. Capital assistance to tenants from lessors was

occasionally significant.<sup>62</sup> Now and then the lease was used to force innovational decisions on mining tenants; for example, the tenant would be only allowed to work coal only if he sank deep pits or

erected a steam engine.<sup>63</sup> The lease was, indeed, a powerful instrument of control in the hands of proprietors once they had relinquished direct involvement in their mines. Terms of the lease included such matters as methods of working, rights of inspection of workings, periodic delivery of accounts, and restrictions on the scale or location of workings in the light of the amenities of the owner or the effects on the environment. Moreover in some important

cases the coal proprietors retained an influence in the companies to whom they leased their minerals as directors or shareholders.<sup>64</sup> (It

was not always certain that the old families exercised a dynamic

influence on the enterprises with which they remained involved in this way.) Socially the gentry and aristocracy of the Lothians had an important role in the nineteenth century coal industry, and in this

62. See chapter six, p. 180.

63. Shairp of Houston MSS, SRO GD 30/699, Copy Tack by Thomas Shairp to Christopher Armstrong, 25 May 1805; Geddes Records, SRO CB10/4, J. Geddes, 'Report on Wallyford Colliery', 23 January 1861.

64. The Dundases of Arniston were important shareholders and provided a director in the Arniston Coal Company. The Marquises of Lothian had a strong influence in the Lothian Coal Company, the 9th Marquis being chairman until 1900. Dissolved Companies SRO, BT/2/549, Arniston Coal Company Limited, List of Shareholders, 30 September 1875; A.E. Thompson, 'Industrial Relations in the Fuel and Power Industries with particular reference to selected undertakings in Midlothian', (unpublished PhD thesis, University of Edinburgh, 1953), 3-4; Cunningham, Mining in Mid and East Lothian, 140.

context it did not make much difference if they were coalmasters or merely rentiers.

Whether or not the landed coal proprietors of the Lothians

were on balance a positive source of initiative and progress in the development of the coal industry is difficult to assess. Over the century as a whole their role was declining, and although they made important contributions to the industry's advance, they were also at times a conservative influence. They were more and more unwilling or unable to overcome the challenges facing the industry and left this largely to private enterprise after 1850. It is certain that the landed presence imparted a definite character to the economic and social life of the Lothian mining communities during the period under study.

#### Appendix 4, I

##### The Lease

The contract between the coal proprietor and tenant was the mining lease. 'Minerals were not held to be in the nature of a crop', and there was 'a gradual consumption of the subject by the lessee'.<sup>65</sup> Hence the landlord owned a declining asset, and used the lease to try to ensure he would gain maximum advantage from it, to discourage wasteful working of coal, and possibly to encourage the tenant in his enterprise.

Leases were not framed entirely from the proprietors' point of view. In most leases there were clauses to the effect that if the coal was agreed by stated arbiters to be unworkable to profit, then the lease could be renounced. Admittedly there were many protracted

65. D. Ross Stewart, A Treatise on the Law relating to Mines, Quarries and Minerals in Scotland (Edinburgh, 1894), 83.

negotiations and litigations between the parties involved on this matter. 'Breaks' were included in some leases. For instance,

Shotts Iron Company were able to give up their lease of Midlothian minerals at the end of every fifth year of the lease, on giving twelve months notice to the proprietor, Sir George Clerk.<sup>66</sup> Finally, increasingly common after 1850 was the use of a trial period at the beginning of the lease. It would be laid down that no (or a reduced) rent would be charged in the first one to three years of the lease, while the tenant was bound to lay out certain sums to prove and explore the field.

Much of the lease, however, contained clauses of most immediate interest to the proprietor. Frequently he was concerned about protecting surface land and amenities. Surface damages caused by mining generally had to be made good by the tenant. A lease of

Houston in 1817 forbidding the working of coal underground within sixty yards of the house and the sinking of pits within three hundred yards<sup>67</sup> was paralleled by similar clauses in numerous other leases.

Also, however, the proprietor and the mining experts on whom he drew for advice were concerned in channeling entrepreneurial initiative in the most productive direction - with respect to the long-term coal and income bearing potential of the colliery. The covenant to work 'in a proper and workmanlike manner' was almost a universal clause.

Many leases laid down detailed stipulations regarding the methods of winning the coal, and measures to prevent wasteful plundering of the

66. Clerk of Penicuik MSS, SRO GD 18/1156, 'Abstract of Mineral Leases on Penicuik and Loanhead Estates', 1882.

67. Shairp of Houston MSS, SRO GD 30/706, 'Tack by Thomas Shairp to George Foster', June-July 1817.

most easily got seams. Leases frequently gave the proprietor a variety of rights and powers over the tenant's conduct of affairs.<sup>68</sup>

The terms of leases varied enormously, but in the Lothians they were commonly for between nineteen and thirty years. A short lease would encourage reckless working. The proprietor required some control and the eventual return of his land, but against this had to balance the need to give the lessee some security of tenure.

By law rent, including the 'Fixed' or 'Certain Rent', was an essential of the contract. Fixed Rent was payable by the tenant whether or not the colliery was producing coal. It gave the landlord a guaranteed return on his assets. Fixed Rent bore some relation to geological and economic conditions. Royalties most frequently exceeded Fixed Rent (therefore the former only was payable), and in general it might be said that if the tenant was forced to pay Fixed Rent then the conduct of the mine was going badly.

Royalties were levied on the gross value of output or sales in most cases. It was royalties (not Fixed Rent) which provided the bulk of the mineral income of the coal proprietors.<sup>69</sup> For most of the period under study a proportion of the value of sales was levied as royalties in the Lothians. The landlords' share of gross mineral income was declining. In the eighteenth century very high royalties were charged. Grange was leased in the 1770s at two-sevenths of the bill price.<sup>70</sup> Sir John Hope paid one-fifth at

Sheriffhall in 1808 and one-sixth after 1822.<sup>71</sup> The rates continued to fall in a jerky fashion reaching one-twelfth or even one-fourteenth

68. See above p. 146.

69. Royal Commission on Mining Royalties, First Report, (PP 1890, XXXVI), 312.

70. Cadell, 'Historical Account of Grange', 82.

71. Hope MSS, 'Copy Lease of Sheriff Hall Colliery For 14 years from October 15th 1808'; 'Copy Lease of Sheriff Hall Colliery', 1822.

by the 1840s.<sup>72</sup> On the whole, however, rates settled down to about one-ninth in the Lothians after 1850. During the 1850s and 1860s there was a move to levy fixed royalties on the basis of quantity produced. This was perhaps encouraged by relative price stability.

The widely fluctuating prices of the early 1870s played havoc with this system, and there was a tendency to return through a hybrid stage to proportional rates again.

Following the depression which set in the coal trade after 1873 there was a commonly held belief that royalties constituted a tax on the coal industry, and retarded its development. This view was rejected by the majority of those who gave evidence before the Royal Commission on Mining Royalties in 1890, and by the commissioners themselves.<sup>73</sup>

Leases did have a certain flexibility, or at least some lessors were flexible. Abatements or reductions in rent were common when tenants struck difficult times. There were widespread modifications of shale leases, for example, in 1874 in favour of the tenants.<sup>74</sup> Some lessors and lessees worked closely together. But mining leases were frequently also a vexed source of contention between the two parties involved. Those drafting leases tried to anticipate all eventualities, and consequently during the course of the nineteenth century leases became even longer, more detailed and complex than they had previously been.

72. M. Dunn, An Historical, Geological, and Descriptive View of the Coal Trade of the North of England (Newcastle-upon-Tyne, 1844), 126.

73. Royal Commission on Mining Royalties, Fifth and Final Report, (PP 1893-4, XLI), 79; J. Hamilton, 'On the Report of the Royal Commission on Mining Royalties', TMIS, vol 15 (1893-4), 9 *et seq.*

74. Geddes Records, SRO CB10/9, J.R. Williamson, 'Report on proposed agreement between His Grace the Duke of Sutherland and others ...', 24 June 1874.

## CHAPTER FIVE

### PRIVATE ENTERPRISE

## CHAPTER FIVE. PRIVATE ENTERPRISE

### Introduction

From 1800 to c1840 Lothian coal output grew at a very modest rate, probably in the region of 1% per annum. Landed coalmasters largely controlled the industry during this period. After c1840

the rate of growth of production increased,<sup>1</sup> and the tendency for

Mid and East Lothian's share of Scottish coal output to decline was reversed. Between 1864 and 1880 Scottish and Lothian output grew at almost exactly the same rate.

Table 5, I Estimated Coal Output of the Lothians and Scotland

Year	Mid and East Lothian (tons)	Scotland (tons)	Mid and East Lothian as a percentage of Scotland
1800	250,000	2,000,000	12.5
1840	400,000	-	-
1864	619,000	12,700,000	4.8
1880	1,037,106	20,417,857	5.1

Source: Appendix 5, I

The landed coalmasters can take a large part of the credit for initiating the recovery. But after 1850 the direct economic role of the landed estate declined markedly as has been seen. Private enterprise must therefore take the laurels for the progress in technique and output achieved by the Lothians' coal industry during the third quarter of the century. This chapter examines the rise and character of private enterprise. The emergence of individual adventurers, partnerships, and companies as a vital force in the

Lothians' coalfields will be traced, and the question of coalmasters' combinations will be examined.

### The Rise of Private Enterprise

Obscure beginnings : to 1850. By 1815 in the coalfields of

Scotland and other parts of Britain partnerships, and unincorporate

1. See chapter 3, p. 121.

'cost-book partnerships' involving a consortia of interests and often termed 'mining companies' were becoming common.<sup>2</sup> In the Lothians, on the other hand, before the 1840s even the most elementary advance in organizational sophistication - the joint-tenancy - was rare.

The early mining tenants of the Lothians were usually very small men, of limited resources and business acumen. The unpredictable and speculative character of mining resulted in a number of brief and inglorious careers. T. Stephens was a tenant of the Wauchope family in the 1810s and 1820s. The latter tried to eject Stephens from the lease, but for long without success on account of his being an imprisoned bankrupt.<sup>3</sup> The Shairps of Houston repeatedly leased their minerals between 1803 and 1833, but were singularly unsuccessful in obtaining a reliable tenant.<sup>4</sup> In 1808 a partnership was formed to work Drum Colliery. Within five years its affairs had fallen 'into confusion' and the parties were ejected from the lease.<sup>5</sup>

Not all the mining tenancies were small affairs. In 1834 William Hogarth 'builder in Newcastle' and Henry Campbell 'some time

Coal-Viewer in Newcastle' took on the lease of Wardie, Midlothian.

They expended £13,000 in fitting out a colliery, after a favourable mineral survey. But '...the works after a short trial had to be finally abandoned as unprofitable'.<sup>6</sup>

Despite these and other warnings of the pitfalls of mining the

2. Duckham, Scottish Coal Industry, chapter 7; B.C. Hunt, The Development of Business Corporations in England 1800-1867 (Harvard, 1936), 87.

3. Cases decided in the Court of Session (Edinburgh, vol 4, 1825-6), Wauchope v Stephens, 1826, 766.

4. Shairp of Houston MSS, SRO GD 30/697-706, various tacks dated 1803, 1805, 1811, 1817; Cadell MSS, H. Cadell, Journal, 1833-1834, entry dated 27 February 1833.

5. SRO, UP 2nd Division Inglis B 10/23, (Bairds Trustees v Mitchell), Defences for Alexander Mitchell, 11 February 1846.

6. Cases decided in the Court of Session (Edinburgh, second series, vol 3, 1840-1), Campbell v Boswall, 1841, 639-645.

number of parties prepared to take on leases in the Lothians slowly increased. The long-established firm of Durie and Nisbet worked coal successfully at Elphinstone, East Lothian almost throughout the nineteenth century. The partnership was formed in 1810.<sup>7</sup> Dalhousie Colliery was let in 1827. By the 1840s mining tenants and partnerships had become quite common in the Lothians. Among the concerns was Messrs. Taylor, Kenneth & Co., also known as Dryden Glen Colliery Company (Kenneth being managing partner).<sup>8</sup> In the vast majority of cases, however, it was relatively minor collieries which were let. Very little has come to light regarding those frequently obscure ventures, except the names of the parties involved.

#### The Advance of Enterprise. To maintain a large, deep colliery

like Arniston 'in an efficient working condition' it was necessary to be under the control of a 'large capital'.<sup>9</sup> Mining consultants constantly emphasised to coal proprietors the desirability of finding men of wealth and ability as lessees of their minerals.

In the third quarter of the nineteenth century, with the expansion of the market providing novel opportunities especially in the iron, gas and oil sectors, men of such quality did come forward to take on mining leases in the Lothians. In the earlier period the humble lessee of sometimes lowly social origin flits across the records, often not revealing his entrepreneurial character or contribution to coal mining.<sup>10</sup> After 1850 they are superseded by men who stamp their personalities on the history of the coal industry in

7. Cunningham, Mining in Mid and East Lothian, 139.

8. Children's Emp. Comm., Appdx to First Report, Part 1, (PP 1842, XVI), Evidence collected by R.H. Franks, 441 *et seq.*

9. Dundas of Arniston MSS, J. Geddes, 'Report on Esperston Limeworks and Arniston Colliery', 7 September 1868.

the region.<sup>10</sup> These are the self-confident entrepreneurs, the

'triumphant' representatives of the mid-Victorian middle-class, who emerge as figures of important social standing and appreciable economic power.

Ironically the description of such cases can begin with a landed family, the Cadells of Grange (West Lothian). The two chief figures for the present purposes were James John Cadell (1779-1858) and Henry Cadell (1812-88), grandson and great-grandson respectively of William

Cadell one of the three founding partners of Carron Ironworks in 1759. In 1788 the estate of Grange was purchased, and thus the West Lothian branch of the Cadell family was firmly established and acquired the trappings of a landed family. But the Cadells of

Grange were 'arriviste' landowners with origins in industry and commerce which they never relinquished during the period under study.

Further what set them apart from the Hopes, Wardlaw Ramsays and the other gentry of the Lothians was that they managed their own enterprises, and did not delegate such tasks to subordinates.

The family had involvements in numerous ventures: these included coal, chemical, salt, and pig iron operations as well as

agricultural land and woods near Bo'ness, and wrought iron and paper manufacture at Cramond. J.J. Cadell took over management of the

Grange undertakings, including the coal mines, by 1808. From 1821 to 1845 he leased Kinneil Colliery from the Duke of Hamilton. The affairs of both works were disasterously affected by floods during these years. In his later years J.J. Cadell tended to rely heavily on his son.<sup>11</sup>

10. They did, of course, co-exist with 'small fry' who worked minor collieries.

11. See, eg, Cadell, 'Historical Account of Grange', 11-12.

Henry Cadell was a much more interesting character. By the age of nineteen he was clerk of his father's mineral activities. He exhibited great restlessness, dislike of his life being broken up 'into fragments', and longing for 'some active business' to keep him in 'close employment'.<sup>12</sup> At the age of twenty-one in 1833 he achieved the independence he desired, and became lessee of Inzievar Colliery, Fife. After a disappointing start Inzievar prospered greatly, primarily on account of the inflation of gas-coal prices in the late 1830s, about half of output consisting of gas-coal.<sup>13</sup> In 1836 he was formally appointed manager of Grange Colliery, but kept Inzievar until 1845 to retain some independence from an interfering father. From 1845 to 1847 he was manager of Muirkirk Ironworks, and from 1847 to 1849 of the East of Scotland Ironworks, Dunfermline.<sup>14</sup> He also spent much time on visits to the industrial regions of England, always making copious notes and observations.

From 1849 to 1855 he was appointed manager of Dalkeith Colliery, against very able competition, and showed characteristic skill and energy in this post. Meanwhile Grange Colliery was being opened up more actively, under the stimulus of higher prices of gas-coal and blackband ironstone. In 1855 Henry Cadell took over direct control of operations at Grange, which he retained until his death. In 1855 the gross profit of the Grange estate was derived as follows:<sup>15</sup>

Coal	£ 686 - 0 - 10d
Ironstone and Gas-Coal	5,289 - 14 - 10
Rest, including Farm,	
Salt, Property, etc.	3,870 - 9 - 10
Total	£9,846 - 5 - 4d

12. Cadell MSS, H. Cadell, Journal, 1832-1834, entries 14 February and 10 July 1833.
13. Cadell, 'Historical Account of Grange', 179.
14. Cadell MSS, H. Cadell, Draft Precognition, (Hawick & Carlisle Railway), April 1858.
15. Cadell, 'Historical Account of Grange', 199; note, Statistical Appendix, table 46.

Cadell developed Grange into a rather small, but profitable colliery on the basis of its ironstone and gas-coal. His obstinate and foolhardy venture into the pig iron trade in 1863 against strenuous advice from friends and relatives<sup>16</sup> reveals another side to his character.

Cadell was a tall, physically powerful man with a 'mind of his own'. He showed great drive in everything he applied himself to. He was a part-time mining consultant, and was constantly being sought for advice and references. He was an active member of professional organizations. His life revolved around coal and iron, but he also found time for involvement in local government, church activities, learned societies in Edinburgh, invention, writing and other fields.

He 'was a clever, and very active minded man, the best of his family': one of the outstanding entrepreneurs in the Lothians' coal industry of the nineteenth century.<sup>17</sup>

Yet there were others who were on a par with Cadell. John Christie, as lessee of Arniston Colliery between 1850 and 1874, was responsible for developing it into 'a first class colliery in Midlothian'.<sup>18</sup> When David Bremner visited the works in 1867 he found a well appointed colliery with up to date methods of working, haulage, and ventilation.<sup>19</sup> Christie also leased the neighbouring collieries of Vogrie and Edgehead, which with a combined output of 90,000 tons about 1860, made him 'one of the most extensive coalmasters in Scotland'.<sup>20</sup> From 1868 he worked Arniston in partnership with T. Coats,

16. Ibid, 213.

17. Ibid, 181-2, 201, 206, 234.

18. Dundas of Arniston MSS, J. Geddes, 'Report on the Colliery Operatives at Arniston', 31 July 1862.

19. Bremner, Industries of Scotland, 10-17.

20. Ibid, 10; Cadell MSS, H. Cadell, Draft Precognition, (Hawick & Carlisle Railway), estimated outputs of Lothian collieries, c1858; see also Statistical Appendix, table 50.

capital'.<sup>21</sup>

George Simpson showed his talent as an inventor and mining consultant before by 1865 proving 'himself a most energetic coalmaster, having succeeded in raising Benhar colliery from a losing into a very large and prosperous one'.<sup>22</sup> The total fixed rental of the properties he worked in the border region of Stirlingshire and West Lothian in 1872 was £5,150.<sup>23</sup> From 1866 he also worked in partnership with Edward Meldrum, one-time partner of James Young, in developing extensive fields of oil-shale in the Lothians.<sup>24</sup> Simpson was the chief promoter of the Benhar Coal Company (Limited) in 1872, the Niddrie Coal Company (Limited), and the merger of these two companies in 1874. He was managing-director of the amalgamated concern, and had other interests in Midlothian coal. He invested in coal, iron, and oil companies, with £85,000 alone in the Benhar and Niddrie by 1878.<sup>25</sup>

His fall from grace was even more precipitous than his ascent to power. His reckless use of the managing-director's powers caused the company to become overdrawn, necessitated it being wound up, and his landing up as a bankrupt in 1879.<sup>26</sup>

One of the most influential personalities in the Midlothian coal industry was Archibald Hood. Morris and Williams state that Hood was the son of a colliery official, and found time to study after a fourteen-hour day as a surface engineman to become a mining engineer.<sup>27</sup>

21. Dundas of Arniston MSS, J. Geddes, 'Report on Esperston Limeworks and Arniston Colliery', 7 September 1868.
22. Geddes Records, SRO CB10/5, J.R. Williamson, 'Remarks on the offer for leases of minerals on the lands of Livingston', 27 March 1865.
23. Ibid, CB10/8, William Armstrong, 'Report Benhar Coalfield', 13 January 1872.
24. Ibid, CB10/6, J.R. Williamson, 'Notes regarding the disputed clauses in the Lochhead Clayfield Lease', 3 March 1868; Ibid, CB10/10, 'Minutes of Agreement Livingston', 1877.
25. Dissolved Companies SRO, BT/2/389 and 567, Benhar Coal Company and Niddrie Coal Company, various papers, including Lists of Shareholders.
26. SRO, CS 318/23/455, Petition for Sequestration of the Estate of George Simpson, 1879-80; Cadell MSS, H. Cadell to W. Tulloch, 14 November 1878.
27. J.H. Morris and L.J. Williams, The South Wales Coal Industry 1841-75 (Cardiff, 1958), 127, 142.

He was colliery manager of R.B. Wardlaw Ramsay from 1856, and later his lessee.<sup>28</sup> By 1869 he worked three collieries in Midlothian.<sup>29</sup> Meanwhile he had become an even more powerful figure in South Wales, ultimately being appointed to a number of extremely important posts in coal mining and transport concerns.<sup>30</sup> He had also become joint-lessee of a colliery near Glasgow in the 1860s. Subsequently he joined with the Marquis of Lothian in promoting the Lothian Coal Company (Limited), and became chairman of this company in 1900.<sup>31</sup>

Besides these really powerful men, others made their mark in the Lothians in a less dramatic way. John Grieve showed ability and technical competence in developing the steeply sloping edge seams of Niddrie and adjacent coal properties in the 1860s and early 1870s,<sup>32</sup> as well as having other interests in the coal business. James Eaglesham after making money in the Ayrshire coal trade, demonstrated a dogged persistence in working the heavily watered collieries of Polton and Eldin from the late 1860s.<sup>33</sup>

Finally, the oil industry helped bring vitality to the Lothians. James Young, Edward Meldrum, and Robert Bell, for example, became considerable mineral lessees, and were also involved more or less directly with the coal trade. They, too, contributed to the advance of enterprise.

#### The Development of Organisation. During the third quarter of

the nineteenth century control of the Lothians' coal industry came more

28. Whitehill, Carrington and Dalhousie, Geddes Records, SRO CB10/10, R. Johnstone and Rankine, 'Excerpt for Report on Whitehill, Eldin, and Carrington Mineral Workings', 31 December 1869.

29. These posts included President of the Mining Association of Great Britain, and Chairman of the Glamorgan Coal Company, Cunningham, Mining in Mid and East Lothian, 116, 140.

30. Ibid.

31. Geddes Records, SRO CB10/9, J.R. Williamson, 'Report on the Edge Coalfields of Niddrie, Edmonstone, and Woolmet under lease to Messrs. J. & C. Grieve', 31 October 1872.

32. Dundas of Arniston MSS, D. Landale, 'Report on Largoward and Polton Collieries and Quarries', 30 September 1872.

into the hands of tenants who were bolder and possessing greater capital resources than their predecessors. In addition to the advance of entrepreneurship, developments also occurred in the field of business organisation. The sinking of deep pits and the maintenance of bigger and heavily watered collieries extended to the utmost the resources of individual tenants. It was necessary to cast the net wider to raise the requisite capital. In the thirty years after 1850 joint-tenancies, larger partnerships, and limited liability companies were increasingly resorted to in the Lothians.

Of the entrepreneurs described above, Christie, Grieve, Hood, Simpson, and Eaglesham all to a greater or lesser extent mobilized assistance from other parties for the expansion of the enterprises in which they were involved.

The partnership became commonplace as a method of business organisation. C. & A. Christie were active between c1855 and 1871 as mineral lessees and ironmasters of Gladsmuir in East Lothian. In addition they built up Wallyford Colliery into one of the larger collieries in Midlothian.<sup>33</sup> Also based in East Lothian were Deans & Moore who worked five collieries in the county during this period, noticeable amongst these being Pencaitland.<sup>34</sup> One of the oldest established firms was Durie & Nisbet with roots in farming, who worked Elphinstone Colliery also in East Lothian. On the death of George Nisbet about 1873, John Durie grandson of the first lessee was assumed as partner, and the firm was carried on as Messrs. R. and J. Durie.<sup>35</sup>

Much briefer associations were those of Messrs. Selkirk and Hamilton who worked Polton Colliery inefficiently for a few years before 1868, William Lindsay and David Hynd who leased Prestonhall in 1852, and

33. Statistical Appendix, table 53.

34. Statistical Appendix, table 47.

35. McNeill, Tranent and its Surroundings, 165-6.

Messrs. W. and R. Wood who followed in their footsteps as lessees of this colliery in 1862. James Snowdowne, coalmaster of Tranent, and James Fyfe, lately coalmaster of Tranent and residing in Yorkshire formed the Tranent Coal Company in 1870. Messrs. Lindsay, Jamieson, and Haldane relieved an embarrassed tenant of the lease of Brunstane Colliery in 1883.<sup>36</sup>

From the early 1870s more extensive partnerships were formed to work amongst others the collieries of Prestongrange, Eldin, Ormiston, and Vogrie. For example, six persons were involved in the partnership which operated Eldin Colliery before 1883.<sup>37</sup>

Meanwhile the rise of the iron and oil sectors had caused a considerable change in the character of the typical mining unit in the Lothians west of Edinburgh. Partnerships flourished in the shale-oil industry. Far-reaching changes in the structure of the West Lothian coal industry were brought about by developments in the iron sector. As noted elsewhere, although it was presence of ironstone which attracted the iron firms initially to West Lothian, in due course many of them produced significant quantities of coal.

As early as the 1840s Coltness Iron Company and Shotts Iron Company had made their mark on the southern part of the county. In 1846 it was stated that 'the whole of the slatyband as yet worked in West Lothian' was held in tack by the two firms.<sup>38</sup> The scale of the operations of the Coltness Iron Company in West Lothian was very large. By 1874 they had 'all but exhausted' the slatyband of Fauldhouse. In a previous period, possibly of fourteen years, they had

36. Dundas of Arniston MSS, D. Landale, 'Report on Polton Colliery', 20 December 1867; Geddes Records, SRO CB10/2, 10, Prestonhall Draft Leases, 1853, 1865; SRO, CS 247/4865, (Polson v Tranent Coal Co.), 1878; Clerk of Penicuik MSS, SRO GD 18/1153, 'Memorandum to Brunstane Colliery', 10 April 1883.

37. Dissolved Companies, SRO, BT/2/584, 1274, 2395, 2427, Memorandums of Association for Prestongrange, Eldin, Ormiston, and Vogrie.

38. Forsyth, 'Mines of West Lothian', 235.

extracted the following minerals from the southern division of the lands of Fauldhouse alone:<sup>39</sup>

Furnace coal	104,403 tons of 22½ cwt.
Raw ironstone	51,492 " "
Calcined slatyband	462,000 " "

Shotts Iron Company produced significant quantities of minerals from their Polkemmet pits, and later from around Penicuik, Midlothian.

In the north of the county John Wilson of Dundyvan Ironworks leased the Kinneil estate in 1845, and reinvigorated a declining mining area. After his death in 1851 Kinneil Colliery and Ironworks was carried on as a family partnership. Gross mineral output at the colliery for certain twelve month periods (ending Whit) was as follows:<sup>40</sup>

1857-8	76,535 tons
1858-9	67,522 tons
1865-6	69,638 tons

Among other firms active in West Lothian were Messrs. William Dixon & Co. of Govan. Their single most valuable mineral works in 1873 were at Fauldhouse.<sup>41</sup> Likewise Monkland Iron and Steel Company were 'extensive mineral lessees' in the same neighbourhood.

Grangemouth Coal Company, Summerlee Iron Company, John Watson & Son,<sup>42</sup> and in Midlothian the Glasgow Iron Company which leased Gilmerton Colliery in 1870,<sup>43</sup> were among the firms of coal and ironmasters which contributed to the important structural changes taking place in the Lothian coal industry.

39. Geddes Records, SRO CB10/9, J.R. Williamson, 'Report on the value of the minerals in the lands of Fauldhouse', 9 July 1874.

40. Hamilton Estates MSS (Hamilton Public Reference Library), Lanarkshire Mineral Accounts, 1857/8, 1859/9, 1865/6.

41. According to a valuation which put 'Fittings, Stock &c' there at £36,729. Dissolved Companies SRO, BT/2/491, William Dixon Limited, Appendix No. 1, 1873.

42. Geddes Records, SRO CB10/3, J.R. Williamson, 'Report on the Explorations for Minerals in the portion of the Harthill Estate let to Grangemouth Coal Co.', November 1859; The Colliery Guardian, 2 February 1861; SRO, CS 246/898, (Hamilton v Turner et al), First Division, Reclaiming Note, 16 July 1866, evidence of Thomas Watson.

43. Edinburgh, Loanhead & Roslin Railway Company Minute Books, SRO BR/EDL/1/1, 26 September 1870.

One of the most dynamic enterprises in the region was James Russell & Son. They were Falkirk ironmasters and took on a number of mineral leases in the Bathgate area in 1849-50. It was the slatyband ironstone which brought the firm to West Lothian but little ore was discovered. The expansion of their mineral operations around Bathgate was almost entirely based on torbanite, after its unique qualities became better known after about 1851. By November 1854 76,000 tons of torbanite had been raised and sold, and production later was 'upwards of 100,000 tons a year'.<sup>44</sup> In the 1860s rate of output was as follows:

Table 5, II. Estimated Approximate Average Annual Rate of Output of Torbanite on the Mineral Properties under Lease to James Russell & Sons, or Trustees thereof

Period	(tons)
December 1859 - January 1861	67,000
January - July 1862	130,000
Year to April 1864	53,000
March - October 1864	39,000
October 1864 - March 1865	30,000
April - June 1865	40,000
July 1865 - March 1866	60,000
April - October 1866	50,000
November 1866 - March 1867	32,000
Year to May 1868	36,000
Year to May 1869	24,000
Year to May 1870	22,000

Source: Geddes Records, SRO CB10/4-7, sundry reports.

Besides extracting torbanite and carrying on other mineral activity in West Lothian, the firm owned Almond Ironworks, and in addition leased the Stirlingshire collieries of Blackbraes and Redding, the latter having an annual output of over 100,000 tons of coal in 1858-9.<sup>45</sup> By 1864 both James Russell and his son had died, and the firm was managed with initiative by Henry Aitken, the managing trustee. It was still a considerable enterprise in the 1870s although the torbanite was exhausted.<sup>46</sup>

44. SRO, UP Currie Dal G 15/13, (Gillespie v Russell), First Division, Summons of Reduction, 18 February 1855, 19; Geddes Records, SRO CB10/6, J.R. Williamson, Draft Precognition, (Metropolis Gas Bill), May 1867.

45. Hamilton Estates MSS (Hamilton Public Reference Library), Lanarkshire Mineral Accounts, 1858/9.

46. Geddes Records, SRO CB10/10, 'Abstract of Leases of James Russell & Son as at 1877'; Note chapter three, p. 124.

The final stage in the development of organisation was the rise of limited liability. A handful of shale-oil firms in the Lothians had registered as limited companies before 1866.<sup>47</sup> Between 1872 and 1881 three major west of Scotland-based iron firms, with important mining interests in the Lothians, similarly took advantage of the new legislation easing incorporation.<sup>48</sup> Above all, between 1874 and 1886 there were seven Lothians-based coal and iron firms established as limited companies.<sup>49</sup> Youngson Brown identified 43 limited liability companies formed in the Scottish coal industry before 1886 (including the iron firms noted above).<sup>50</sup> These facts indicate that this method of business organisation was better represented in the Lothians than the region's share of Scottish coal output might lead one to expect.

**Concentration.** Parallel to the progress in entrepreneurship and business organisation was a growth in the size of the average mining unit.

**Table 5, III. Estimated Size of Collieries and Enterprises in Midlothian**

Year	Collieries	Enterprises
	(tons)	(tons)
1800	10,000	10,000
1842	20,000	26,700
1868	23,500	40,000
1880	49,500	61,000

**Source:** Appendix 5, I.

The tentative nature of the above figures cannot be stressed too much.

The calculation has been confined to Midlothian, for which data is less poor than the other two counties. The main thrust of developments is clear, namely that there was a considerable increase in the concentration of production and ownership in the Midlothian coal industry in the

47. Butt, 'Scottish Oil Mania', 205.

48. Youngson Brown, 'Scots Coal Industry', Appendix B, 270-1. (The Monkland, Dixon, and Coltness companies).

49. See chapter six below, pp.183-8.

50. Youngson Brown, 'Scots Coal Industry', 102.

nineteenth century. The statistic for 1880 underestimates the size of the average enterprise, as by that date there were large corporate concerns with mines outside Midlothian, which production has not been taken into account: average output relates to Midlothian production only.

In 1800 the Midlothian coal industry was composed of a number of small pits, and concentration of ownership had hardly started.

Colliery output figures, as opposed to the averages derived from the aggregate data used for Table 5, III, would suggest an even smaller average output than 10,000 tons.<sup>51</sup>

By 1842 average colliery size had grown appreciably. The increase in the scale of only two or three collieries, including Newbattle, was doubtless an important cause of this. With the major exception of Sir John Hope, concentration in the ownership of collieries and pits had made little progress.

A generation later the process of concentration had made significant strides forward. The statistics appear to underestimate the increase in average colliery size during the thirty years or so up to 1870. In 1838 only three collieries in Mid and East Lothian had outputs greater than 40,000 tons per annum. By the late 1860s

there was an appreciable number of works with outputs around or above that figure. The average size of the ten largest collieries in Mid and East Lothian in 1838 was 25,400 tons, and in 1862 it was 42,200 tons.<sup>52</sup>

A significant number of enterprises worked three or more

51. See e.g. Statistical Appendix, tables 6, 9, 12, 13.  
 52. Milne, *Memoir on Mid and East - Lothian*, Statistical Table at end; For 1862 the information is drawn from estimates by H. Cadell, *Draft Precognition*, (Hawick & Carlisle Railway), April 1858, in Cadell MSS; and by J.R. Williamson, *Draft Precognition*, (Caledonian Railway, Leith branch), April 1862, in Geddes Records, SRO CB10/4; with adjustments made in the light of better information in the Statistical Appendix.

mineral properties by 1868. Up to 1880 the process of concentration continued at an even faster rate than before.

By 1880 although there were only one or two really large collieries in the Mid and East Lothian coalfield, that is with outputs above 150,000 tons per annum, concentration of production was probably as far advanced in this region as in most of the other British coalfields. In the Eastern District of Scotland as a whole the average colliery output was under 40,000 tons in 1879.<sup>53</sup> Regarding concentration of ownership, in the 1880s in Scotland, the West Midlands, Yorkshire, and North Staffordshire there was an average of only 1.6 mines or collieries to each owner or company.<sup>54</sup>

It might be argued that from the 1880s the British coal industry's development was retarded by a structure composed of too many small undertakings. If Midlothian appears to have reached only the same unsatisfactory level of development by then, this should not disguise the fact that during the course of the century a great advance in structure had occurred.

### Combination

Arrangements on Marketing. Despite the progress of concentration there was still in the Eastern District of Scotland alone 191 firms active in 1879.<sup>55</sup> With the growing integration of the economy during the nineteenth century conditions of 'atomistic competition' obtained.

It was a strong desire of most of the representatives of the landed coal owners and private enterprise to curb the competitive aspects of the coal trade. In addition coalmasters combined to thrash out a

53. Inspectors of Mines Reports, 1880, Report by R. Moore, 213; Ibid, 1881, Report by R. Moore, 211. (The Eastern District included the Lothians, Fife, Stirlingshire, and a major part of the Lanarkshire coalfield).

54. Clapham, Economic History of Modern Britain, II, 121.

55. Inspectors of Mines Reports, 1881, Report by R. Moore, 211.

common approach on such matters as labour relations and parliamentary legislation.

In the late eighteenth century there was coordinated action by coalmasters in the Forth coal trade to control the price of coal.<sup>56</sup>

During the period of the 'coal famine' (1790-1820) the limited number of Midlothian coal producers who supplied Edinburgh were able to effect 'a local monopoly', and it is evident that only informal arrangements were necessary to control the market.<sup>57</sup>

The opening of the Union Canal in 1822 destroyed this situation.

The Edinburgh & Dalkeith (in use from 1831) enabled the Midlothian coalmasters to participate in the Edinburgh market on equal terms to those of the canal. This led the two groups of suppliers to respect each others' interests, and according to Murray, to 'disdain to compete with each other for the favour of the public'.<sup>58</sup> For the 1830s there is good evidence of combinations of coalmasters which attempted to fix the level of prices in the Forth and Edinburgh trades.<sup>59</sup> As The Scotsman put it:<sup>60</sup>

We are prepared to admit that the decrees of the Coal Synod are not positively trading on any body, but the tie of interest is strong enough to give them force.

The upward swing in economic activity from 1835 presumably permitted agreements on price increases to be adhered to. Despite a public outcry against coalmasters' combinations, they were meeting again in 1840 in an effort to raise prices.<sup>61</sup>

From the 1840s the Railway brought nationwide competition in the

56. Cadell MSS, 'At a Meeting of the River Forth coal proprietors at Edinburgh', 10 January 1776.

57. Dunlop, Observations on the Account of a Plan, 48; Murray, Letter to Lord Provost, 7.

58. Ibid., 16.

59. Cadell MSS, H. Cadell, Journal, 1831, entry dated 23 February 1831; Journal, 1832-1834, entry dated 21 October 1833; Journal, 1834-1840, many entries especially 1835-7.

60. The Scotsman, 4 November 1837.

61. Buccleuch MSS, SRO GD 224/649, J. Wright to the Duke of Buccleuch, 28 November 1840.

coal trade, against which the Lothian coalmasters fought a vigorous, if futile, rear-guard action. H.F. Cadell of Cockenzie noted in 1852:<sup>62</sup>

In former times the Coal trade could occasionally be managed by good faith amongst the then limited number who supplied Edinburgh - now matters are altogether altered and success is more, more hopeless.

Nevertheless in 1842-3 the old principle of unity of action among Midlothian coalmasters on price changes was not entirely dead. In 1849-53 there were frequent meetings of the 'coal trade', and periodic agreements on prices, which in general followed the tempo of economic activity. Representatives of both Lothian and 'west country' collieries were present at these meetings.<sup>63</sup>

In closely defined markets like the Borders (up to 1862) and the gas-coal trade the Midlothian coalmasters were able to pursue a common marketing strategy to some extent. In the Borders agreed scales of prices were implemented in 1849-50.<sup>64</sup> The Border gas companies got their coal supplies chiefly from four Midlothian collieries. Three were controlled by John Christie, the other was Newbattle, and 'practical good results' followed from a close understanding between the two chief parties in this market.<sup>65</sup> Later the gas-coal trade was subject to much more extensive and formal control. In 1865 and

1866 most of the major Scottish producers met in Glasgow. Gas-coal prices were raised by agreement by 12½% both in January and November 1866. John Christie chaired the November meeting, and representatives of Niddrie and Newbattle collieries were also present.<sup>66</sup> A London gas

62. Cadell MSS, H.F. Cadell to H. Cadell, 2 October 1852.

63. Buccleuch MSS, SRO GD 224/582, H. Cadell to Duke of Buccleuch, 26 October 1852, 31 October 1853.

64. See chapter two, p. 56.

65. Dundas of Arniston MSS, John Geddes, 'Report on the Colliery Operations at Arniston', 31 July 1862.

66. Cadell MSS, 'Proceeds of Meeting of Parrot Coal Masters at Glasgow', 27 December 1865; *Ibid.*, 'Proceedings at Meeting of Gas Coal Masters, Glasgow', 14 November 1866.

company representative complained in 1875 that the greater the demand the more they found themselves in the 'hands of the cannel-coal dealers'.<sup>67</sup>

This situation had become quite untypical of the coal trade as a whole. The intensity of inter-regional competition in the age of the Railway precluded this possibility. After the early 1850s the Scottish coalmasters appear to have abandoned as quite unpractical efforts to combine to raise prices.

Even in the Midlothian coal industry between the 1820s and 1850s there was great difficulty in establishing a control of markets.

Uniformity on price changes was, in any case, only the result of informal, unwritten understandings. There was no attempt to enforce quotas. The difficulties in implementing decisions of the trade were reflected in repeated demonstrations of wayward independence. In 1840 H.F. Cadell of Cockenzie complained of the 'stubborness of one concern' in thwarting the purpose of a meeting of the coal trade, although three years earlier he had cut his coal prices when a meeting

had agreed on a rise.<sup>68</sup> In 1843, against common practice, James Wright combined an aggressive selling campaign with drastic cuts in the pit-head price of Dalkeith household coal to 6s 8d per ton without any consultation with neighbouring coalmasters.<sup>69</sup>

In sum, the Midlothian coalmasters up to the early 1850s persistently tried to fix prices by informal understandings. After the early nineteenth century they were rarely successful, and only when their action swam with the tide of economic events.

67. SC on Metropolis Gas Companies Bill, (PP 1875, XII), evidence of C. Woodhall, Q5639.

68. Cadell MSS, H. Cadell, Journal, 1834-1840, entry dated 29 March 1837; Ibid, H.F. Cadell to H. Cadell, 24 December 1840.

69. Buccleuch MSS, SRO GD 224/649, large bill 'GREAT REDUCTIONS IN PRICES OF DALKEITH COAL', 4 December 1843; Ibid, J. Gibson, 'Report on recent reduction of the price of Dalkeith Coal, and other complaints against the management', 27 December 1843.

Other forms of Cooperation. If the ability of private enterprise to influence trading conditions was limited, then at least the Lothian or Scottish coalmasters could cooperate in an endeavour to protect their 'freedom' to act according to their own interests in spheres which related to labour relations and governmental interference.

The coal industry was very labour-intensive, wages were the only major cost easily altered in the short-run, and movements in wages and prices bore a close relationship to one another.<sup>70</sup> It was only natural that coalmasters should combine in an attempt to enforce a rigorous control of wages.

During the great strikes in Midlothian in 1837 and 1842 and in West Lothian in 1856 coalmasters acted together to agree on a common policy, such as resolving 'to be firm' or bringing in strike-breakers.<sup>71</sup>

Coalmasters kept in close contact on other matters pertaining to labour relations. Fairly successful efforts were made to coordinate changes in piece rates at the different collieries, and common ground was reached on such matters as the requiring colliers seeking jobs to present certification from their old employer.<sup>72</sup> The coalmasters of Midlothian presented a united front in announcing wage cuts in 1857, as did the employers of West Lothian coal and ironstone miners in 1860.<sup>73</sup>

By the latter date the twin threats of Mines Legislation and more assertive trade unionism challenged the coalmasters' interests to an unprecedented degree. As a result more ambitious associations of coalmasters were formed to discuss these issues and press a common

70. See chapter eight, p.241.

71. These events are discussed more fully in chapter nine.

72. Buccleuch MSS, SRO GD 224/649, J. Wright to the Duke of Buccleuch, 30 December 1842.

73. Ibid, Box 512, A. Gordon to the Duke of Buccleuch, 26 November 1857; The Scotsman, 26 June 1860.

policy.<sup>74</sup> The 'Associated Mine Owners of Scotland' was formed in Glasgow in 1862 as an,<sup>75</sup> ... organization, for the purpose of watching over measures that may from time to time be introduced to Parliament, and for adopting joint action with reference thereto.

William Burns was secretary of the Scottish Association which led a shadowy existence in the 1860s. Mines legislation presented to the House of Commons in the early 1870s, forceful lobbying by the miners on these questions, and their belligerent industrial mood led to the resuscitation of a Scottish coalmasters' combination. In 1872 the constitution of the 'Associated Scottish Mine Owners' was agreed on and subscribed to by 36 firms and individuals. From West Lothian

the following subscribed:<sup>76</sup>

Henry Cadell	Messrs Young & Co
George Simpson	Messrs J. Watson & Sons
George Wilson & Co	Robert Bell

There were five office bearers from the Lothians out of a total of 24.

The Association's chief purpose was to resist 'unreasonable claims and demands by Miners ...' by agreeing not to hire men out on strike, and by mutual cooperation and financial support.<sup>77</sup> In fact the Association was able to do very little to stem the tide of wage increases in the boom of 1872-3, although it may have contributed to the depth of wage cuts in 1874. Another objective of the Association was to watch and seek modification of legislation pertaining to the coal industry. The Mines Inspection Act of 1872 aggrieved the Scottish coalmasters on a number of points. They were worried about

.74. The Lothian coalmasters had acted together on many issues other than prices and wage rates for decades. In the early nineteenth century they had lobbied politicians on the questions of coal and salt duties. They had come together to discuss the 1842 legislation banning child employment in mines and ways of implementing the Act, and worked together on less significant matters, such as in relations with railway companies.

75. Cadell MSS, document re Associated Mine Owners of Scotland, 12 March 1862.

76. Ibid, W. Burns to H. Cadell, 17 December 1872.

77. Ibid, 'Constitution and Rules of The Associated Scottish Mine Owners', 1872.

the liability of mine owners or managers for accidents occurring in collieries due to their negligence, and resented the stigma attached to the disqualification of any mining official (and close relations) from acting as a Justice of the Peace on any case relating to the

Act.<sup>78</sup> Nothing appears to have transpired as a result of representations on these issues.

Combinations involving Lothian coalmasters appear to have gained little in the nineteenth century. The one exception was perhaps in the field of labour control, but the coalmasters' power to manipulate labour related to wider economic and social conditions, not the fact

of association.<sup>79</sup> In the legislative and trading spheres little was achieved. Growing state intervention in the coal industry limited private enterprise's freedom of action in areas which impinged on production methods and safety. With reference to marketing and

pricing Youngson Brown noted: '... the generalisation that the trade in Scotland was as close an approximation to an economist's concept

of pure competition as the real world will allow is not a rash one'.<sup>80</sup>

Factors which in particular militated against the effectiveness of Scottish combinations were the disparate regional and sectoral

interests of Scottish mining firms,<sup>81</sup> and the rapid development of the coalfields with freedom of entry into the industry.

### Conclusion

Private enterprise played a vital role in the development of the Lothians' coal industry after 1850. It was instrumental in the reorganization of collieries and re-structuring of the industry, which

78. Lord Advocate Papers, SRO Box 46, W. Burns to the Lord Advocate for Scotland, 25 March 1872.

79. See chapter eight, pp. 224 *et seq.*

80. Youngson Brown, 'Scots Coal Industry', 110.

81. Firms of ironmasters producing coal, 'sale' masters, and shale-oil firms frequently had a clash of interests in such areas as labour recruitment and over the price of coal in the open market.

better enabled the coalfield to capture valuable new or growing markets for coal.

Yet the same entrepreneurs who appeared to flourish in the capitalist environment of mid-Victorian Britain, were amongst the first to lead attempts to control the consequences or implications of an expanding highly competitive industry. Private enterprise preferred its own means of controlling the industry, despite their limited success, rather than those of the State. On the other hand there was a movement amongst certain West Lothian masters in 1856 in favour of some return of the laws of the State against combinations of workmen.<sup>82</sup> There were certain paradoxes in the character of private enterprise in the region. But its part in the modernization and growth of the Lothians' coal industry during the third quarter of the nineteenth century was crucial.

#### Appendix 5, I

##### Notes on Production Estimates

Gross production figures used elsewhere in this study are based on material noted in this Appendix, or interpolations of it. A number of estimates and calculations have been made giving the following coal output figures.<sup>83</sup>

Table 5, IV Estimates of Lothians' Coal Output

Year	Midlothian (tons)	Mid and East Lothian (tons)
1800	200,000	
1809	250,000	
1838	300,000	390,000

Sources: see footnote 83.

82. Lord Advocate Papers, SRO Box 117, E.F. Maitland to the Lord Advocate of Scotland, 22 May 1856.

83. Duckham, Scottish Coal Industry, 29; Stewart, Scots and English Coal, 18; The Scotsman, 13 October 1838; Milne, Memoir on Mid and East Lothian, 139.

From 1854 there are the official returns, although doubt has been cast on their accuracy, especially for the earlier years.

Regional break-downs of Scottish coal output are not available until 1864.

Table 5, V Lothians' Coal Output, 1864-80

Year	Midlothian (tons)	Mid and East Lothian (tons)	East Lothian (tons)	West Lothian (tons)
1864	-	619,000	-	-
1865	-	619,000	-	-
1867	489,160	-	114,250	383,383
1868	471,973	-	176,310	333,658
1871	-	715,286	-	-
1873	555,939	-	205,759	457,290
1874	567,998	-	193,964	454,566
1875	695,696	-	222,399	406,374
1876	715,803	-	225,031	368,911
1877	718,158	-	251,436	404,667
1878	725,122	-	221,639	394,721
1879	758,371	-	233,276	464,823
1880	793,804	-	243,302	448,955

Source: Inspectors of Mines Reports, 1865-81,  
Reports by R. Moore.

To determine approximate average output of colliery or enterprise it is necessary to discover the number of such units in the Lothians.

Official returns<sup>84</sup> and contemporary accounts<sup>85</sup> yield this type of information, although they often omit very small pits.

84. Children's Emp. Comm., Appendix to First Report, (PP 1842, XVI), 379-80; R. Hunt, Mineral Statistics of the United Kingdom of Great Britain and Ireland, 1855-65; Report on Coal, vol III, Appendix to Report of Committee E, (PP 1871, XVIII); Inspectors of Mines Reports, 1874-81, Reports by R. Moore.

85. Stewart, Account of a Plan, 121; Milne, Memoir on Mid and East Lothian, Statistical Table at end.

## CHAPTER SIX

### CAPITAL FORMATION

## CHAPTER SIX CAPITAL FORMATION

### Introduction

Coal mining was an extremely speculative industry. The trade cycle and fickle twists in geological and market conditions lay traps for the not-so-wary. Yet adventurers were always forthcoming to risk their wealth in the Lothians' coal industry.

The character and scale of the capital required in the coal industry is suggested by colliery valuations. These reveal the heavy investment that was necessary in fixed assets, such as railways and steam equipment and in particular on the sinking and fitting out of pits. The Arniston Colliery valuation of 1867 put the pits at £11,435 out of a gross figure of £19,944; that of Wallyford in 1870, £5,580 out of total of £13,173.<sup>1</sup> However these valuations - related to the value of moveable equipment - quite underestimate the sums invested in the sinking of pits, which were wasting assets par excellence. Between 1858 and 1878 Coltness Iron Company expended £165,825 on sinking pits (probably not less than one-third of this was in West Lothian). From 1872 to 1878 19 pits became exhausted, which had an average cost of £2,300, and had had an average life of only nine and a half years.<sup>2</sup> These shafts were probably relatively shallow on the whole. In 1864 it was estimated that the cost of sinking and fitting a 100 fathom pit was £7,000.<sup>3</sup>

As the nineteenth century progressed collieries became more heavily capitalized. Units not only became larger, but also pits deeper and more expensive drainage and haulage equipment necessary.

1. See chapter two, p. 74.

2. SRO, CS 246/418, (*Coltness Iron Co v Solicitor of Inland Revenue*), Amended Case, 1880, Statements, I-III.

3. W. Moore, 'Principal Seams of Coal and Ironstone in Glasgow Coalfield', *Proceedings of the Institute of Mechanical Engineers*, (1864), 240.

Legislation also tended to necessitate greater outlays. For example every colliery was required to have a second pit by a law in 1862.

In the early nineteenth century few Midlothian pits were as deep as 30 fathoms, and the estimated cost of fitting out a 24,000 ton

colliery was £6-7,000.<sup>4</sup> Sir John Hope spent tens of thousands on

his abortive Midlothian project in the 1840s. James Eaglesham

expended an alleged £18,000 on improving Polton Colliery in 1868-73.<sup>5</sup>

The large capitals involved in developing collieries in the 1870s is reflected in the paid-up capital of limited companies.

In coal mining and iron making the proportion of a firm's assets tied up in fixed capital was large compared to other sectors. But

this does not contradict the fact that much 'circulating capital' was required to finance day-to-day needs, such as financing coal stocks

and allowing merchants credit. Possibly over half of total capital was in the form of variable capital.<sup>6</sup> Further the 'long gestation

period' of colliery investments underlined the need to secure

adequate sources of capital and credit. Youngson Brown estimated

that the period between the decision to sink a pit and accomplishment

was usually five to ten years.<sup>7</sup> Brunstane Colliery was opened up

from January 1837. Yet cumulative revenue did not exceed cumulative expenditure until 1849.<sup>8</sup>

### Capital Accumulation

The diversity of the historical sources of accumulated wealth

available for investment in the coal industry was reflected by the

4. Stewart, Supplement to a Plan, 79; Dunlop, Observations on the Account of a Plan, 24.

5. Dundas of Arniston MSS, Copy letter James Eaglesham to David Landale, 14 November 1873.

6. P. Mathias, The First Industrial Nation : An Economic History of Britain 1700-1914 (1969), 148.

7. Youngson Brown, 'Scots Coal Industry', 116.

8. Statistical Appendix, table 43.

heterogeneous social-occupational background of the coalmasters.

Naturally the initial investment by the latter, as they embarked on a new mining venture, was an important source of long-term capital.

A major source of capital in the Lothians' coal industry, especially up to 1850, was that of the landed estate. This, in fact, represented an important sectoral transfer of wealth as most of the landed coalmasters derived most of their income from the land.

But as the mining lessees grew in significance, so naturally they became a vital source of capital. Frequently they had been involved more or less directly with the coal industry, and occasionally emerged as tenants from the lower ranks of the colliery hierarchy itself. Matthew

Foster co-tenant of Houston Colliery from 1811 to 1817, had previously been an overseer at Rumford Colliery.<sup>9</sup> John Grieve (senior) and John

Williamson became lessees in the 1830s after being managers.<sup>10</sup> On a more substantial scale James Eaglesham and George Simpson had made their fortunes in the coal industry in Ayrshire and Stirlingshire respectively, before turning their attentions to the Lothians. Profits made in an

expanding iron industry in the 1830s and 1840s enabled extensive new investments in coal and ironstone pits subsequently.<sup>11</sup> Gas-coal merchants, coal agents and insurancebrokers were amongst those with associations with coal mining which drew them in more closely to the industry in the Lothians as lessees in the 1870s.

The infusion of capital into the region's coal industry was very much the result of sectoral and regional transfers of wealth. Tile makers and surgeons became coalmasters, and hotel-keepers coal merchants. A distillery worked its own coal in East Lothian in the

9. Shairp of Houston MSS, SRO GD 30/703, Tack Thomas Shairp to George and Matthew Foster, February-July 1811.

10. Midlothian Sheriff Court Decrees, SRO SC 39/7, (*Hope v Muir et al*), Deposition of A. Telfer, 25 June 1834; SRO, CSP 46 Box 841, (*Foster v Marquis of Lothian*), Defences, 6 April 1837.

11. Campbell, 'Scottish Pig Iron Trade', 208 *et seq.*

1790s,<sup>12</sup> and in the 1830s the magistrates of Haddington got 'on foot a colliery' in the county, losing £2,000 by so doing.<sup>13</sup> It was Newcastle interests which lost money on the Wardie venture in the same decade. Middlesbrough ironmasters ran Prestongrange and Drum collieries with a little more success in the 1870s.<sup>14</sup>

In sum, accumulated and transferred landed, industrial and mercantile wealth was a fruitful source of capital for the initial investments in fixed assets for the Lothians' coal industry during the nineteenth century.

#### Capital Formation

Long-term capital. The process whereby capital was embodied in the fixed and circulating assets of the coal industry was often complex. And - partly on account of incomplete evidence - it is difficult to distinguish between the supply of capital and credit, and to ascertain to what extent the provision was short or long-term. At the outset emphasis can be placed on the longer-term provisions.

The ploughing back of profits provided some scope for the financing of colliery extensions and new equipment. In view of the long gestation periods this aspect should not be exaggerated.<sup>15</sup> Evidence of profits in the Lothians' coal industry is fragmentary.

At the small, and ill-sited Stobhill Colliery an average annual profit rate of £660 was made between 1809 and 1820.<sup>16</sup> Robert Bald (although his purpose was to reveal the unprofitability of mining) indicated that profits of £1,000 per annum for a 20,000 ton Midlothian colliery

12. See chapter one, p. 31.

13. NSA, II (1836), 176.

14. Dissolved Companies SRO, BT/2/584, Prestongrange Coal and Iron Company, Memorandum of Association, 1874.

15. See the experience at Brunstain above, p. 177, note 8. Similarly Wallyford Colliery was started in 1856, but after eleven years it had made a total loss of £10,000. Geddes Records SRO, CB10/7, 'Tranent Colliery Valuation', December 1877.

16. Dundas of Arniston MSS, 'Sales of Coal at Stobhill, 1809-1820'.

were normal in 1837.<sup>17</sup> Grange Colliery lost money in 1881-2, but otherwise a good average annual sum of £1,902 was made in profits between 1865 and 1884.<sup>18</sup> The 'extraordinary prosperity' of the early 1870s financed much colliery expansion in subsequent years.

Against this evidence must be set the many financial disasters suffered by mining entrepreneurs. Notwithstanding the undoubtedly contribution of profits, other sources of capital were necessary to satisfy the long and medium-term needs of the industry.

The landed estates after they had relinquished a direct role in mining continued to contribute to the process of capital formation as lessors. For example abatements on rents were allowed, and the terms of leases relaxed to encourage tenants. There is considerable evidence that it was the traditional custom for proprietors to assist tenants financially when they embarked on substantial projects.<sup>19</sup> Sir John Hope received thousands of pounds in this way in the 1840s. A number of other examples have come to light ranging from the £100 contributed by W. Burn Callander to the tenant of Prestonhall for the purchase of a steam engine and colliery equipment in 1853, to the £2,000 advanced by the Earl Rosebery to the tenants of Dalmeny Shalefield in 1870.<sup>20</sup>

Potentially the banks could have contributed to the mobilization of capital and credit. The old presumption that banks contributed very little to long-term capital formation in British industry in general, and the coal industry in particular, has undergone

17. Noted in Milne, *Memoir on Mid and East-Lothian*, 143.

18. Cadell MSS, Grange Colliery, No. 2 Ledger, (1865-84).

19. Eg, see John Grieve's (senior) advice to a proprietor.

Dalhousie MSS, SRO GD 45/19/185, 'Copy Report re Dalhousie Colliery', 17 February 1827.

20. Geddes Records, SRO CB10/2, Prestonhall Copy Lease, September 1853; Ibid, CB10/7, J.R. Williamson, 'Report on the Dalmeny Shale Workings', 7 December 1870.

revision in the light of recent evidence.<sup>21</sup>

By 1857 there was no shortage of banks in and around the Lothian coalfields, and the region became even better served during the course of the second half of the century. Peter Mathias has stated:<sup>22</sup>

Where a merchant or industrialist or a mineowner was a partner in a bank he felt he had special claims for accommodation. This has been widely documented.

It is a fact that many of the landed coal proprietors of the Lothians held influential positions in the banks. Two outstanding examples were Sir John Hope who was director of the Royal Bank between 1821 and 1839, and the Duke of Buccleuch who was its deputy governor from 1832 to 1838, and governor from 1838 to 1884.<sup>23</sup>

In the light of this information it would be somewhat surprising if the banks did not make some contribution to capital formation in the Lothians' coal industry. Although some material has come to light regarding short and medium-term credit, there has been almost a void with respect to evidence on long-term advances.

This possibly relates to the sources of information available to the researcher. One highly significant exception in the dearth of evidence are the apparent debits which the Duke of Buccleuch was allowed to accumulate with the Royal Bank during the 1840s when

21. Morris and Williams, South Wales Coal Industry, 143-7; See, references cited by P. Mathias, 'Capital, Credit, and Enterprise in the Industrial Revolution', The Journal of European Economic History, vol 2 (1973), 140-3.

22. *Ibid.*, 136. Note also, R. Cameron, 'Scotland, 1750-1845' in R. Cameron (ed), Banking in the Early Stages of Industrialization (Oxford, 1967), 76-7.

23. For more information on the distribution of banks in the Lothians and posts by coal proprietors on them see: Report of the SC on the Bank Acts and Causes of the Recent Commercial Distress, (PP 1857-8 V), 509 *et seq.*; C.A. Malcolm, The History of the British Linen Bank (Edinburgh, 1950), 196 *et seq.*; C.A. Malcolm, The Bank of Scotland 1695-1945 (Edinburgh, nd), 175 *et seq.*, 293 *et seq.*, chap XII; J.L. Anderson, The Story of the Commercial Bank of Scotland Limited (Edinburgh, 1910), 93, 106-111; N. Munro, The History of the Royal Bank of Scotland 1727-1927 (Edinburgh, 1928), 214, 397 *et seq.*

Dalkeith Colliery was being opened up, and the Duke heavily involved with other industrial ventures. The 'Coal Account' 'balance to' the Royal Bank grew from £25,758 on 31 December 1839 to £51,979 on 31 December 1846. By 1850 it appears that the Duke had been permitted advances on his coal and transport enterprises totalling over £200,000.<sup>24</sup>

Finally, from the 1870s the limited liability companies had a crucial part to play in the process of capital formation in the Lothians coal industry.

Short and medium-term credit. A pressing day-to-day need of the mining entrepreneur was to secure the means to finance his working capital, especially coal stocks and credits advanced to customers. One method by which they eased the problem was by themselves obtaining trade credit. Expensive items like railway waggons were purchased on virtual hire purchase schemes.<sup>25</sup> Often the granting of credit was formalized into the use of credit instruments like bills of exchange and promissory notes. The Cadells of Grange, for example, made use of bills in their dealings with other businessmen.<sup>26</sup> The use of negotiable instruments reduced the coalmasters' requirements for working capital, and could take the form of medium, almost long-term advances. In 1808 the partnership of Wight and Armstrong purchased a feu of minerals and colliery equipment at Drum, Midlothian. The price was payable by three bonds

24. Buccleuch MSS, SRO GD 224/500, 'Balance on Coal and Branch Railway Accounts to Royal Bank of Scotland', 1839-56; Ibid, J. Wright (of Royal Bank) to Duke of Buccleuch, 9 January 1851. Banks were prepared to invest, partly as trustees, in limited companies. Dissolved Companies SRO, BT/2/923 and 2427, Lists of Shareholders, 1881 and 1894.

25. Cf, File relating to Elphingstone Colliery, SRO, GD 1/364, 'Inventory and Valuation of the moveable Plant, Machinery, Railways, Wagons ... at Elphingstone Colliery, as at 26 December 1873'.

26. Cadell MSS, J.J. Cadell to H. Cadell, 25 October 1855.

(in annual instalments) as follows:<sup>27</sup>

£9,500 payable 1808-23
£4,500 payable 1824-28
£3,700 payable 1829-32

On the other side of the coin, coalmasters granted credit to merchants for minerals awaiting sale. W.H. Gillespie sold 35,000 tons of torbanite to a firm of merchants in 1871. Of a total price of £65,000, £45,000 was settled by the granting of two promissory notes payable twelve and eighteen months respectively after the date of the contract.<sup>28</sup> By granting such credit coalmasters obviously sacrificed liquid capital. But to the extent that such bills were negotiable or discountable then the whole process of credit mobilization was expedited. There is evidence that banks were prepared to accept such bills, and generally advance short-term credit.<sup>29</sup> The British Linen Bank negotiated bills drawn upon the Coltness Iron Company in the 1840s. John Johnstone, a Falkirk coalmaster, was granted a cash-credit up to the value of £10,000 by the Commercial Bank in 1840.<sup>30</sup> The Cadells at Grange did banking business through the Commercial and Clydesdale banks, and A. Bowie, the Duke of Buccleuch's manager at Canonbie, was allowed advances by the bank in lieu of customers' accounts which were in arrears.<sup>31</sup>

#### Limited Liability

##### The Rise of Limited Liability. As the final phase in the

evolution of business organization in the Lothians coal industry

27. The firm in fact collapsed in 1813. See chapter five, p. 153.

28. SRO, CS 245/833, (*Gillespie v Miller et al*), Closed Record, 1873.

29. Cameron, 'Scotland 1750-1845', 76-81.

30. Cases decided in the Court of Session (Edinburgh, second series, vols 16 and 20), *Houldsworth v British Linen Bank*, 1850, 376 et seq; *Johnston v Commercial Bank of Scotland*, 1858, 790.

31. Cadell MSS, J.J. Cadell to H. Cadell, 25 October 1855; A. Bowie to H. Cadell, 3 May 1861.

(during the period under study), limited liability companies played a significant role, harnessing and applying new sources of capital and expertise to the task of commanding and developing the deep seams of the region.

The joint stock form of organization had, of course, been virtually unknown in the coal industry before 1850, bar one or two notorious exceptions. Incorporation was not considered appropriate on the whole for such a speculative activity as mining. In principle the door was opened to wide adoption of incorporation as a result of the legislation of 1855-6 and 1862. Little use was made of this facility in the coal industry before 1864. Thereafter the pace quickened, but it was not until the great investment boom of the early 1870s that Scottish coal firms registered as limited companies in significant numbers.<sup>32</sup>

The way to limited liability in the Lothian mining sectors had been led in fact by the burgeoning shale-oil industry in the 1860s, although there was very little recourse to the capital market.<sup>33</sup> It is possible that experience gained in oil in the 1860s was of some relevance for coal in the 1870s.

By the early 1870s the idea that coal firms might adopt the corporate form of organization was gaining acceptance in the Lothians. In 1872 a coal marketing enterprise was formed as a limited company.<sup>34</sup>

In August John Geddes noted the 'present tendency of parties of capital to embark in mining concerns', and suggested Arniston Colliery

32. B.C. Hunt, The Development of Business Corporations in England 1800-1867 (Harvard, 1936), 87, 112-14; Morris and Williams, South Wales Coal Industry, 148-152; H.A. Shannon, 'The Limited Companies of 1866-1883', EHR, vol 4 (1933), 393 *et seq.*; Youngson Brown, 'Scots Coal Industry', 102.

33. See chapter five, p. 164.

34. Chapter two, p. 71.

should be formed into a limited company in order to mobilize sufficient capital to develop deep fittings at the works.<sup>35</sup>

Moreover a number of iron firms, with important mining interests in West Lothian, became limited companies between 1872 and 1881.<sup>36</sup>

Of some significance for the Lothians' coal industry was the incorporation of the Benhar enterprise in 1872.<sup>37</sup> Edward Meldrum and Peter McLagen of Pumpherston, MP, and proprietor of a major shale property were amongst the promoters. This success was followed by the flotation of the Niddrie Coal Company in 1874 by the same group. Also in 1874 the Collieries of Arniston and Prestongrange were taken over by limited companies. A number of other Lothian coal and iron companies were established in subsequent years, including the following:

Table 6, I Limited Liability Companies in the Lothians' Coal Industry,

1872-93

Name of Company	Date of Incorporation	Nominal Capital	Paid-up Capital within ten years	Approximate number of shareholders of Incorporation
		(£)	(£)	
Benhar Coal	1872	200,000	200,000	289
Arniston Coal	1874	65,000	52,000	175
Niddrie Coal	1874	310,000	61,980	299
Prestongrange Coal and Iron	1874	250,000	199,800	29
Polton Coal	1877	30,000	21,880	72
Kinneil Iron and Coal	1879	60,000	60,000	55
Eldin Colliery	1883	20,000	14,055	22
Gilmerton Gas Coal	1886	12,000	12,000	23
Ormiston Coal	1892	25,000	13,700	24
Vogrie Coal and Fireclay	1893	20,000	1,300	7

Sources: see footnotes 40-3

35. Dundas of Arniston MSS, John Geddes, 'Report on Arniston Colliery and Esperston Lime Works', 26 August 1872.

36. See chapter five, p. 164.

37. The Benhar company is considered along with the Lothian companies because it did have some small leases in West Lothian, and because of its merger with Niddrie Coal Company, completed in 1876.

The Role of Limited Liability. Limited liability encouraged an injection of dynamism and enterprise into the Lothians' coal industry. The scale of mineral production was raised to a new level as a result of extensive new fittings. The Prestongrange concern raised output to 95,000 tons at their East Lothian pits in the year to October 1878. The Kinneil company put out 200,000 tons of minerals in a 19 month period in 1881-2. Annual production at Arniston Colliery reached 180,000 tons in the 1880s.<sup>38</sup> Niddrie came under new management in 1883, and it was developed into one of the deepest and most technically advanced collieries in Great Britain.<sup>39</sup>

Coal and iron interests from various parts of the country promoted the Lothian companies. The Benhar and Niddrie concerns were the brainchild above all of George Simpson. He was supported amongst others by Henry Aitken (manager of the Russells' enterprise) and Robert Orr (a Glasgow merchant), who were directors and important shareholders in both firms.<sup>40</sup> Iron interests were behind the Kinneil and Prestongrange companies, from the west of Scotland in the former case, from Middlesbrough in the latter.<sup>41</sup> Ayrshire coal interests predominated in the promotion of the Eldin and Polton companies (with Eaglesham a moving force in the second instance),<sup>42</sup> Lothian coal interests were an important promotional force in the other four companies noted on table 6, I.<sup>43</sup>

38. Statistical Appendix, table 52; J. Hislop, 'Haulage Experience', TMIS, vol 3 (1881-2), 311; Anon, 'Description of Arniston Colliery', TMIS, vol 10 (1888-9), 149.

39. Cf, Jevons, The Coal Question, 57-9, footnotes.

40. Orr did not have shares in the Niddrie company. Information on the promoters is drawn from Memoranda and Articles of Association. Information on sources of capital is drawn from shareholders' lists. Dissolved Companies SRO, BT/2/389 and 567, Benhar Coal Company Limited, and Niddrie Coal Company Limited.

41. Ibid, BT/2/584 and 923, Prestongrange Coal and Iron Company Limited, and Kinneil Iron and Coal Company Limited.

42. Ibid, BT/2/720 and 1274, Polton Coal Company Limited, and Eldin Colliery Company Limited.

43. Ibid, BT/2/549, 1572, 2395 and 2427, Arniston Coal Company Limited, Gilmerton Gas Coal Company Limited, Ormiston Coal Company Limited and Vogrie Coal and Fire-clay Company Limited.

The people who promoted these projects were not necessarily synonymous with those who financed them. The major role of limited liability in the Lothians' coal industry's development lay in the fields of capital accumulation and formation.

The Lothian companies can be divided into three groups. The first were effectively private limited companies, where indeed the promoters, directors, and chief shareholders were all one and the same. Small groups of business associates held the majority of shares in four companies: those controlling Eldin, Ormiston, Prestongrange, and Vogrie.

The second and most important group was where the promoters were again a major source of capital but where reliance had to be placed upon a generally large number of small investors who supplied most of the capital. This category embraces the Benhar, Niddrie, Kinneil, Polton, and Gilmerton companies.

Arniston alone represent the third group. Its capital was based on a considerable mobilization of the savings of small investors, which was not a feature of the other cases to the same extent.

In all the groups the regional distribution of shareholders was influenced by the origins of the promoters. For example most of the investors in the Kinneil company came from Glasgow, although the enterprise was in West Lothian. The contrast between Arniston and Kinneil, as a representative of the second group, is quite clear from an analysis of the shareholders' lists.

While the limited companies by no means 'democratized' the capital base of the Lothians' coal industry, they did facilitate the raising of capital for investment in ambitious projects. For all the more important promotions there appears to have been a fairly

genuine issue of shares to the public, to which there was a good response. This was expedited by the use, in all ten cases, of shares of a nominal value of only £10 - considerably less than was the practice in some big new coal companies elsewhere. Limited liability encouraged entrepreneurs and investors to back projects which contributed to the expansion of the Lothians' coal industry.

### Conclusion

In the earlier decades of the nineteenth century the landed estate utilized its great resources to some extent to finance the development of the Lothians' coal industry. When the burden of financing the industry fell more onto the shoulders of private enterprise, the emergence of more sophisticated methods of business organization (initially larger partnerships and culminating in the corporate form) eased the problem of capital mobilization. A flexible system of credit met most short-term requirements. The problems of the Lothians' coal industry did not include a shortage of capital. The trouble was more that many abortive ventures could easily swallow up the capital that was so readily forthcoming, to the bitter loss of the adventurer or investor.

Appendix 6, IDistribution of shares in two Lothian Limited Liability CompaniesTable 6, II Arniston Coal Company (Ltd). Shares held as at September 1875<sup>44</sup> (%)Part 1. Percentage holding of shares by Occupation

Coal interests (including coal proprietors, merchants and colliers)	20.8
Paper manufacturers	7.7
Professional (including accountants, solicitors, surgeons)	15.8
Farmers	2.2
Tradespeople and shopkeepers	2.7
Small businessmen (including builders, contractors)	3.1
Border woollen and other manufacturers	1.9
Clerks and other non-manual employees	2.7
Unspecified	43.1
	<u>100.0</u>

Part 2. Percentage holding of shares by District

Edinburgh and Leith	40.6
Midlothian	39.9
The Borders	7.6
Rest of Scotland	5.4
England	4.4
Uncertain	2.1
	<u>100.0</u>

Table 6, III Kinneil Iron and Coal Company (Ltd). Shares held as at January 1881.<sup>45</sup> (%)Part 1. Percentage holding of shares by Occupation

Iron interests (ironmasters and iron merchants)	38.4
Coal interests (coalmasters and coal merchants)	18.5
Traders and other businessmen	21.7
Professional (including stock brokers, solicitors)	2.7
White-collar workers	0.4
Landed proprietors	5.0
Bankers (including money held in trust by banks)	13.3
	<u>100.0</u>

Part 2. Percentage holding of shares by District

Glasgow and suburbs	92.0
Coatbridge, Wishaw and other west of Scotland	2.7
Stirling and Bo'ness	1.1
Kent	4.2
	<u>100.0</u>

44. Ibid, BT/2/549, Arniston Coal Company Limited, List of shareholders, as at 30 September 1875.

45. Ibid, BT/2/923, Kinneil Iron and Coal Company Limited, List of shareholders, as at 11 January 1881.

## CHAPTER SEVEN

### MANAGEMENT AND TECHNIQUE

## CHAPTER SEVEN MANAGEMENT AND TECHNIQUE

### Trends in Productivity

Improved business organization and more thrusting entrepreneurship set the conditions for a growth in coal production in the Lothians. The latter depended in turn on an application of improved techniques and supervision of the colliery labour force to achieve a greater output. Management carried out the details of these tasks. In common with other regions standards of management and technique rose in the Lothians between 1840 and 1880,<sup>1</sup> especially at those collieries well placed to secure a share of the leading areas of market growth. On the other hand between 1815 and 1840 technique advanced very gradually in the Lothians, and the picture painted by the Children's Commissioners of 1842 was extremely bleak.<sup>2</sup>

While coal mining remained very labour-intensive, an important manifestation of improved techniques was the growth in productivity.

Youngson Brown has shown that output per man in the coalfields of the East of Scotland grew from an estimated 302.6 tons in 1864 to 353.26 tons in 1886, having been as low as 265.27 tons in 1867 and as high as 387.77 tons in 1881.<sup>3</sup>

The data which has been assembled for this study lacks, unfortunately, the definitiveness of Youngson Brown's material.

Estimates have been made of newer productivity over relatively short periods at a number of Lothian pits and collieries.<sup>4</sup> Use has also

1. A.J. Taylor, 'Labour Productivity and Technological Innovation in the British Coal Industry 1850-1914', *EHR*, second series, vol 14 (1961-2), 57-8.

2. Children's Employment Commission, Royal Commission, First Report, (PP 1842, XV), see chapter five for example.

3. Youngson Brown, 'Scots Coal Industry', 52. Youngson Brown urges caution in the use of these figures.

4. See Statistical Appendix, *passim*.

been made of literary evidence.<sup>5</sup> This material reveals no clear trend in hewer productivity at the works studied between 1800 and 1875. Locally there were enormous variations, but in the early nineteenth century Lothian hewers characteristically put out between 300 and 600 tons per annum, and little different can be said for later periods.

These results are not surprising. Hewing was virtually the only aspect of mining which underwent negligible change in this period. However, in haulage and winding, and in areas which bore less obviously on productivity like ventilation, there were great improvements after 1840. These gains are revealed in the statistic utilized by Youngson Brown, which was the average output of all workers employed in the coal industry, including not only the hewers but also the rest of the colliery labour force known as 'oncost' workers.

It is possible that these changes would be reflected in the changing structure of the colliery labour force. For this study attention has been paid to the ratio of oncost wages to hewing wages.

In the light of improved haulage arrangements etc one might expect oncost wages to decline as a proportion of colliery wages.<sup>6</sup> The information to hand is fragmentary but again indicates no clear trend for the Lothians between 1800 and 1875. For the period after 1850 the fullest information relates to Dalkeith Colliery, but is otherwise very sparse. Dalkeith, however, was probably fairly typical of Midlothian pits.

5. There are a considerable number of literary sources on hewer productivity including those in OSA, I, 98, 349; VII, 318; NSA, II (1843), 70.

6. See Statistical Appendix, passim.

Table 7, I Dalkeith Colliery Colliers' and Oncost Wages Proportion, 1850-74

Period	Ratio (where Oncost Wages = 1)
23 April 1850 - 4 April 1854	1.61
7 April 1855 - 27 March 1860	1.47
28 March 1860 - 22 March 1864	1.21
18 April 1865 - 15 March 1870	1.22
16 March 1870 - 16 March 1874	1.36

Source: Buccleuch MSS, SRO GD 224/539-549,  
Dalkeith Colliery Account Vouchers, 1850-74.

The findings, which might in other circumstances be compatible with a decline in technical standards, in fact reflect the obstacles standing in the way of an expansion of output in the Lothians after 1850. The increase in production that was obtained was achieved – perhaps more than elsewhere – through a sinking of deeper pits, and in general in the context of geological conditions which involved an increase in the 'oncost expense'. Unlike Govan Colliery in the west it was not possible to keep the number of oncost workers down to only about one-third of the labour force.<sup>7</sup>

Moreover there is a vital aspect of this question which none of the statistics yet discussed takes into account. In the early nineteenth century a very large proportion of the colliery labour force in the Lothians were female and child bearers employed by the hewers, and not treated in colliery accounts. As late as 1842 35% of the Midlothian coal industry's labour force were women, and children under 13 years of age.<sup>8</sup> Legislation in that year forced the industry to shed virtually all of this large section of the labour force, and the work was progressively mechanized. No statistic (discussed here) demonstrates the improvement in productivity which this process involved. Conditions were much more challenging in the

Lothian coalfields in the third quarter of the nineteenth century

7. This level obtained at Govan Colliery between 1876 and 1884.

A. Slaven, 'Earnings and Productivity in the Scottish Coal-Mining Industry during the Nineteenth Century: the Dixon Enterprises', in P.L. Payne (ed), Studies in Scottish Business History (1967), 219-46.

8. Children's Emp. Comm., Appendix to First Report, (PP 1842, XVI), 379.

compared to its opening years. Therefore the achievement in expanding output, and maintaining hewer productivity at probably roughly the same level throughout the period, was no mean one.

### Technique

#### Exploration and Winning. By the early nineteenth century

there was little scope left for the successful discovery of workable coal by relying on any evidence of nature, such as exposed seams, or luck. It was necessary to sink 'trial' (i.e. exploratory) pits or make bores, and occasionally the two methods were used together.

Trial pits were expensive and chancy and tending to go out of favour.

Greater reliance was placed on boring. As early as 1804 F. Beaumont, a Viewer, declared:<sup>9</sup>

Indeed I never do advise saving money upon boring as it is the only true method of proving how far it is safe to adventure in an undertaking.

The technique of boring advanced greatly in the nineteenth century. From the 1840s a number of improvements were effected, such as the utilization of steam power. About 1870 the 'diamond-studded crown' was introduced which enabled a complete core of the strata to be obtained and brought to the surface for examination.<sup>10</sup> With the

growing improvement in the science of geology and availability of geological maps the whole task of proving a coalfield became grounded on a more rational basis.

It was, however, an expensive item for the entrepreneur. The cost of boring increased progressively with depth. For example a borer working at Woolmet in 1856 charged only 4s 9d per fathom for the

9. Hope MSS, 'Copy Report by F. Beaumont respecting Somerside Coal', 25 August 1804.

10. The National Coal Board (Scottish Division), A Short History of the Scottish Coal Mining Industry (1958), 51-62; E.O.F. Brown, 'The History of Boring and Sinking', in The Mining Association of Great Britain, Historical Review of Coal Mining (1925?)

first 5 fathoms, and 28s 6d per fathom after reaching the depth of

25 fathoms.<sup>11</sup> The Coltness Iron Company expended £22,787 on boring

alone on its mineral properties between 1858 and 1878.<sup>12</sup>

Having determined the location of coal seams the next objective was to devise means to command the prospective underground workings.

In the case of coal cropping out at the surface the workings were often driven straight into the seam. The consequent 'ingaeen ees'

were a familiar sight in Scotland, and were still in use in parts of Fife and the Lothians in the 1860s.<sup>13</sup> A primitive advance of these old levels were 'crop pits', which were very shallow pits sunk to

edge seams which cropped out at the surface.

But to command the deep seams of Midlothian it was necessary to sink pits well to the dip of the seams, involving greater depths and engineering difficulties. Pits in West Lothian and Stirlingshire

described by Robert Bald in 1814 varied in depth between  $6\frac{1}{2}$  and  $36\frac{1}{2}$

fathoms,<sup>14</sup> and although some rather deeper pits were by then being

sunk in Midlothian this probably indicated a situation not very

different in the three Lothian counties as a whole. By 1829 a pit

of 96 fathoms had been sunk at Gilmerton.<sup>15</sup> By the 1840s over 100

fathoms was reached in Midlothian, and over 150 fathoms by the 1860s.

Twenty years later even these depths were commonplace, and there was a decline in production at all pits under 66 fathoms in the East of

Scotland.<sup>16</sup>

11. Geddes Records, SRO CB10/2, 'Expenses of Boring within Lands of Woolmet in 1856'.

12. SRO, CS 246/418, (Coltness Iron Co v Solicitor of Inland Revenue), Amended Case, Table II, Statement of Pits exhausted from 30 June 1858 to 30 June 1878.

13. Bremner, Industries of Scotland, 3.

14. R. Bald, Report of a Mineral Survey of the proposed canal betwixt Edinburgh and Glasgow (May, 1814), 4-10.

15. M. Dunn, 'Notice on the Edge Seams of Midlothian', Transactions of the Natural History Society of Durham and Newcastle-upon-Tyne, vol 1 (1831), 168-9.

16. J.B. Atkinson, 'The Commercial Aspects of Coal Mining', TMIS, vol 15 (1893-4), 243-4.

In the early nineteenth century many Scottish pits were left unlined. Wooden tubing or lining became common, and cast iron or brick or stone tubing replaced the wooden. Among early examples of pits with iron tubing were those at Prestongrange in 1830 and Tranent in 1839.<sup>17</sup>

The art of pit sinking made great strides in the course of the nineteenth century. At the outset reliance was placed on human labour. At the pit sunk under Henry Cadell's superintendence at Grange in 1878-80 a 'Milroy Excavator' or digger was employed with a 'grab' of 12 blades bringing up 1-2 tons 'each time'.<sup>18</sup>

Having sunk a pit it was possible to drive off levels at the base and get the coal. In the Lothians, however, the dangerous and somewhat unavoidable practice of mid-workings was common. This involved driving off levels at various points down the shaft to win the edge seams.

Pit sinking was an extremely hazardous and awkward task. Many obstacles and disasters were encountered. Also, as indicated in the previous chapter, it was a major item in the capital expenditure of enterprises.

Bald in 1830 stated: 'In Scotland, boring for coal is scarcely known as a profession, but there are master sinkers who occasionally bore'.<sup>19</sup> In fact there are many examples of specialists skilled in either or both of these two tasks. For instance at Brunstane Colliery in 1844 three were employed 'Boring and Sinckin in search for coal',<sup>20</sup> while one William Edwards stated in 1853 that his profession was

17. J. Holland (Anon), The History and Description of the Fossil Fuel, The Collieries and the Coal Trade of Great Britain (second edition, 1841), 393; NSA, II (1839), 296.

18. Cadell, 'Historical Account of Grange', 221.

19. Bald, 'Mines', 328. But see Duckham, Scottish Coal Industry, 42.

20. Clerk of Penicuik MSS, SRO GD 18/1149/(2), Wages and Sales Book, 1843-9.

'following after sinking', and emphasized that he did not bore much.<sup>21</sup> There are indications that these experts were often independent of mind and easy to offend: suggestive of a large demand for a skill essential to colliery development.

Working. The getting of coal at the face remained virtually unmechanized in the nineteenth century. Nevertheless there was scope for refinements in the means employed to extract coal.

Before considering these methods some general questions can be raised. The development of underground operations at the colliery was a major managerial problem, which was greatly facilitated if good plans of previous workings were to hand. In the early nineteenth century standards of plan keeping in the Lothians were abyssmal, and in many cases none were kept. In 1847 it was stated that twenty years previously only about one-third of Scottish collieries had regular plans.<sup>22</sup> From 1842 mines officials constantly promoted good plan keeping practice. Mining consultants were allies in this respect, and thanks partly to their influence most Lothian leases after 1850 stipulated that tenants must keep good plans. By the 1850s and 1860s the Inspector of Mines for the East of Scotland reported much improved upkeep of colliery plans.<sup>23</sup>

Many dangers plagued the colliery manager. There were, for example, subterranean movements of strata known as 'creeps' 'crushes' and 'sits' where the pressure of superincumbent strata bore down on working walls, pillars, or wastes left to support the roof, and ground

21. The Torbanehill Case, (*Gillespie v Russel and Son*), Court of Session, (Edinburgh, 1853), evidence of William Edwards, 77.

22. S. Tremenheere, Report of the Commissioners of Mines, 1847, 17.

23. Inspectors of Mines Reports, 1855, Report by R. Williams, 91;

*Ibid*, 1864, Report by R. Williams, 158.

them to dust. These problems were well known in the Lothians as elsewhere.

The particular difficulties of working the characteristic edge seams of the district require specific mention. On the Edmonstone estate in Midlothian there were two groups of seams, the 'edge seams' and the 'easter seams'. The first were vertical, and second had an angle of 50 degrees. Diagrams 7, II and III indicate the state of working in March 1862.<sup>24</sup> The working of edge seams always for many reasons involved heavy 'oncost expense'. The greatest disadvantage was drainage. Because the seams cropped out at the surface water descended very readily to the lowest points of the workings. For such reasons only the most ambitious schemes could command the edge seams.

The most common means of working coal in the Lothians in the first half of the nineteenth century was by the 'stoop and room' method. Coal was left as supports for the roof as pillars, output being got from passages between them. The main disadvantage was waste, up to one-third or more of the coal being lost as pillar supports.<sup>25</sup> Its main advantage was that it lent itself more readily to the working of very steep or thick seams than the long-wall system.

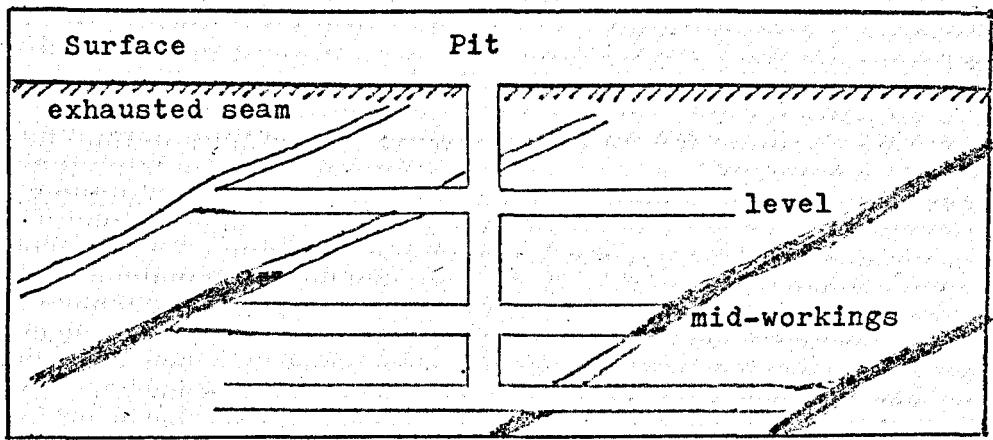
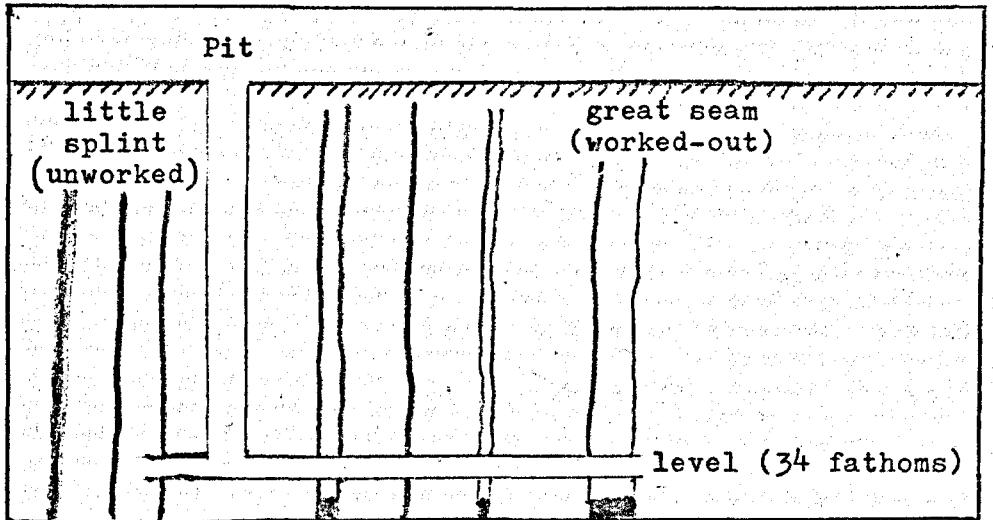
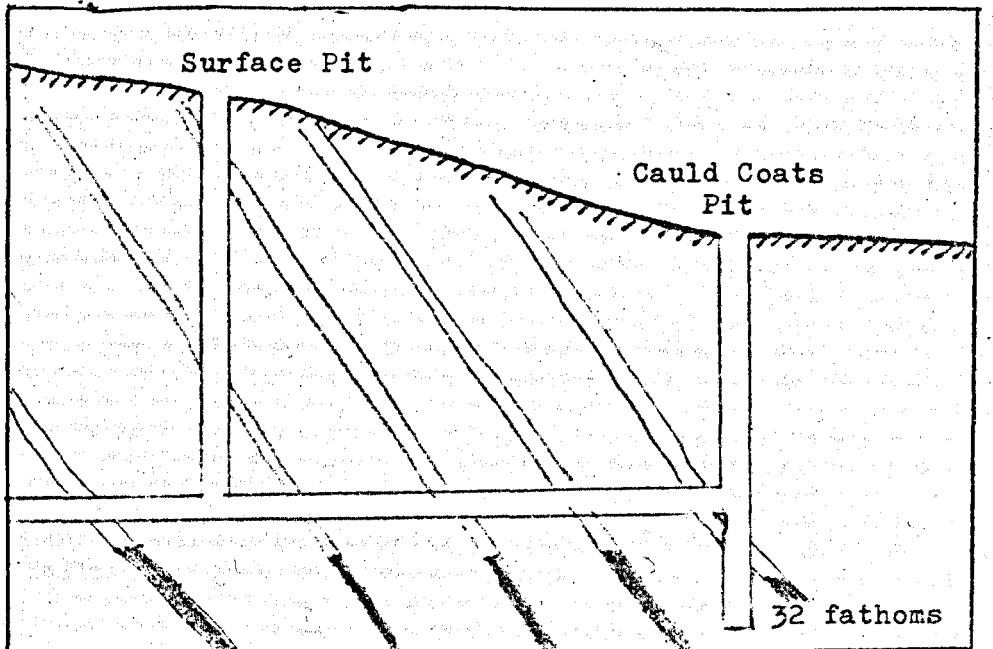
The stoop and room method could be improved, and a major step was the spread of back-working in Midlothian after 1860.<sup>26</sup> Large pillars were left on the forward working of the seam, which were later stripped on a retreat back to the pit bottom. Up to 85% of the coal could be extracted in this way,<sup>27</sup> and this method was common in the

24. Geddes Records, SRO CB10/4, J.R. Williamson, 'Report on the present condition of the Edge and Easter Seams of Edmonstone', 25 March 1862.

25. Bald, Coal Trade of Scotland, 52-3.

26. Eg at Drumore, Geddes Records, SRO CB10/4, J.R. Williamson, 'Report on the proposed site for a Poor House, Drumore, Inveresk', 23 April 1860.

27. Moore, 'Glasgow Coalfield', 238.

Diagram 7,I Midlothian mid-workingsDiagram 7,II Edmonstone Colliery: The Edge Seams in 1862Diagram 7,III Edmonstone Colliery: The Easter Seams in 1862

deep edge seams in the 1870s.

In the 'long-wall' method of working the whole coal seam was removed and the roof was allowed to sink towards the pavement; the height of the underground road was maintained by 'brushings' or waste to support the roof. This system was superior to the stoop and room mainly because of the minimization of waste. It was introduced into Scotland in the eighteenth century, but spread only gradually in the Lothians. By the 1840s, however, its use was fairly common, and becoming increasingly more so.<sup>28</sup>

Although the improved stoop and room system reduced waste, there were still misgivings over the loss of coal. A strange method of working the edge seams of Mid and East Lothian was evolved, which reduced waste further. This was known as the 'room and rance' method.<sup>29</sup> Long pillars or rances were left between the rooms, which were worked long-wall. On a back-working most of the coal of rances was removed, by working inwards towards the pit. It was an awkward system, and could only be recommended in the peculiar circumstances of the edge seam. It was quite widely adopted in the region between the 1860s and the 1880s. In the latter decade, however,

considerable difficulties were encountered on the back-working at the greater depths then being worked, on account of the enormous roof weight.<sup>30</sup>

Finally the long-wall system itself was applied to the edge seams. Its use was pioneered by John Wauchope of Edmonstone in the

1850s,<sup>31</sup> but there was considerable resistance to its introduction

28. See, for example, Forsyth, 'Mines of West Lothian', 232-251.

29. Cadell MSS, H.M. Cadell, Note Book, section on methods of working coal.

30. H. Johnstone, 'Longwall Working in the Edge Seams at Niddrie Collieries, Midlothian', TMS, vol 10 (1888-9), 205-7.

31. Don-Wauchope of Edmonstone Papers, D. Landale, 'Report on the working and the increase of water in the south parrot seam at Niddry Colliery', 14 March 1861.

in the edge seams. It was successfully applied at Roslin Colliery in 1878. Thereafter its use spread rapidly - even to the vertical seams of Niddrie.<sup>32</sup>

The beginnings of machine mining can be traced to the closing years of the period under study. The early coal cutting machines did little more than replace the hewer's pick axe, their job being to undercut the coal seam. Not until 1863 was a practical solution to developing an effective coal cutter reached.<sup>33</sup> Before 1880 the new technique spread very gradually, the chief difficulties including high cost, frequent break-downs, and lack of expertise in handling the machines.

Among early examples of coal cutters in Scotland were a number in use in the Lothians in the 1870s. The West Calder Oil Company introduced one at Woolfords Colliery in 1874 at a cost of £2,000.<sup>34</sup> Deans & Moore used coal cutters at their pits in East Lothian. In 1879 it was said that the firm had 'long employed' such equipment, and were presently using a Rigg and Meiklejon machine which gave 'excellent results'.<sup>35</sup> The Lothian Coal Company were evidently among the first in Scotland to introduce coal cutters, apparently at Whitehill Colliery,<sup>36</sup> although documentation of this step is poor.

By 1902 the collieries of Grange, Arniston, and Newbattle had all adopted mechanized mining techniques. Considering only 1.8% of British coal output was machine cut by then, the area was well up to best practise (along with Scotland as a whole) in the British coal industry.<sup>37</sup>

32. Johnstone, 'Longwall Working at Niddrie', 204 et seq.

33. S.G. Begg, 'Notes on Coal-Cutting Machinery', TMIS, vol 1, (1879-80), 269.

34. Geddes Records, SRO CB10/9, J.R. Williamson, Reports on Woolfords Colliery, 25 March and 22 September 1874.

35. Begg, 'Coal-Cutting Machinery', 270-1.

36. Cunningham, Mining in Mid and East Lothian, 117.

37. Thompson, 'Industrial Relations in Fuel and Power Industries', 26; Cadell, 'Historical Account of Grange', 54-5.

Drainage and Ventilation. Efficacious working of coal benefitted from clean air and dry workings, and the task of achieving these ends naturally grew greater as collieries became deeper and more extensive.

In the eighteenth century there were a variety of quaint methods employed to drain workings in the east of Scotland, and early in the next century the use of water-wheels for this purpose was not unknown in Midlothian.<sup>38</sup>

In this period, however, the vast majority of works in Mid and East Lothian were level-free. Day-levels drained off the water without any mechanical assistance. As late as 1839 many collieries were still level-free.<sup>39</sup> Extensive levels had been constructed in the previous century, and drained large parts of the coalfield. For example a day level drained the collieries of Woolmet, Edmonstone, Niddrie, and Duddingston before emptying into the sea.<sup>40</sup> The day-levels were of value even after steam drainage had to be resorted to. For instance at Loanhead the works were level-free to the depth of 40 fathoms, and when deep mining was commenced after 1866 the depth the pumps had to draw water was reduced by that amount, by depositing water into the day level.<sup>41</sup>

During the course of the nineteenth century inevitably increasing resort had to be made to the steam engine. Yet early on there was hesitancy on the part of some Midlothian coalmasters to expend capital on steam pumps, as mirrored in some mineral reports.<sup>42</sup>

38. Dundas of Arniston MSS, William Renwick, Document on Stobhill Colliery Report, 20 March 1810; Records of National Coal Board (hereafter shown by annotation CB), Marquis of Lothian Mines, SRO CB9/26, Easthouses Colliery Pay Bills Account Book, 1815-19, entry for week to 14 December 1816.

39. Milne, Memoir on Mid and East-Lothian, Statistical Table at end.

40. Baird, Duddingston and Portobello, 30.

41. Cases decided in the Court of Session (Edinburgh, third series, vol 10, 1871-2), Clerk v Clerk, 1872, 649 et seq.

42. Dundas of Arniston MSS, R. Bald, 'Report relative to the Colliery upon the Estate of Arniston', 3 May 1809; Geddes Records, SRO CB10/12, 'Excerpt from Mr. Bald's Report on the Coal in the Estate of Chesterhall', 7 July 1818.

Standards of drainage were poor in general in the Lothians up to the 1840s.<sup>43</sup>

Nevertheless the Midlothian coalfield was not entirely backward in drainage practice in the first half of the century compared to other Scottish regions. The Newcomen engine was beginning to come into use in the late eighteenth and early nineteenth centuries including a major fitting at Dalkeith in 1804.<sup>44</sup>

In the next fifty years Watt or condensing engines, and improved Cornish or high-pressure engines became very much more common. In the 1830s the 'Monster' steam engine of New Craighall aroused wonder. Allegedly 'the largest steam-engine of which this country can boast', it was a condensing engine of 140 horse-power.<sup>45</sup> Yet the engine which drained the 160 fathom Emily Pit at Arniston in the 1860s was of 400 horse-power.<sup>46</sup> During the third quarter of the nineteenth century Cornish, high-pressure engines were the major stand-by for drainage in the Midlothian coalfield, and engines with improvements and refinements continued to be adopted.

Drainage could be an appreciable running cost for collieries on account of the engines' voracious consumption of fuel. At Torbane in the 1850s coal had to be obtained from other pits to feed the engines. At Arniston in the year 1874-5 14,241 tons of coal and dross was consumed by the engines.<sup>47</sup> The initial outlay on steam engines could also be very large. The Newcomen engine installed at Dalkeith in 1805 cost £5,000, and the condensing engine at New Craighall in the 1830s £6,000. However second-hand Newcomen

43. Children's Emp. Comm., First Report, (PP 1842, XV), p. 61, para. 268.

44. Duckham, Scottish Coal Industry, 85, 363-5; Forsyth,  Beauties of Scotland, 269.

45. NSA, I (1839), 251-2.

46. Bremner, Industries of Scotland, 11.

47. Dundas of Arniston MSS, 'Report on Arniston Colliery by John and G.H. Geddes Mining Engineers', 26 June 1875.

engines were cheap,<sup>48</sup> and improvements in manufacture and design led evidently to a decline in the relative price of engines of a given capability. The new engines which drained to a considerable depth at Dalkeith in 1859 and Arniston in 1867 cost about £2,000.

The area in underground working where the Lothians were at an advantage compared to other districts was in the field of ventilation.

This was on account of the absence of fire-damp (an inflammable gas) in Mid and East Lothian, although it was not unknown in West Lothian.

This helped to encourage very lax attitudes towards ventilation, notwithstanding the fact that choke-damp (a poisonous gas) or 'foul air' did occur in the region, and was a killer. Ventilation in the east of Scotland was reported in 1842 to be in a deplorable state, and eleven years later matters had not improved much.<sup>49</sup>

The early method of ventilation in the Lothians was 'natural ventilation': that is, it was left to the vagaries of wind and weather.

Mines inspectors and a heightened public concern in safety were sources of pressure for improvement. As early as 1844 standards of ventilation at certain Midlothian collieries, noticeably Newbattle and Dalkeith, were not bad.<sup>50</sup> Furnace ventilation had become not uncommon by 1850, and was the typical method in the Lothians by the 1870s.<sup>51</sup> The circulation of air in the workings was produced by a furnace being placed at the base of one of two shafts or on the surface. Legislation in 1862 made two shafts compulsory at collieries, and led to a scurry of activity at some Lothian enterprises to comply

48. J.R. Harris, 'The Employment of Steam Power in the Eighteenth Century', History, vol 52 (1967), 144.

49. Children's Emp. Comm., First Report, (PP 1842, XV), pp. 60-1, para 267; Inspectors of Mines Reports, 1851, Report by M. Dunn, 5.

50. S. Tremenheere, Report of the Commissioners of Mines, 1844, 8-9.

51. See the returns of the Inspectors of Mines for 1873-80.

with the law.<sup>52</sup> General and Special Rules were introduced, which had to be approved by Mines Inspectors. They generally laid down stringent terms regarding ventilation.

The furnace method of ventilation, though an advance on earlier practice, had dangers. Further progress was represented by the speedy adoption of machine fans in the Lothians after 1870. Of 33 fans in operation in Scotland in 1875, 8 were in Mid and West Lothian, and Newbattle Colliery had a particularly fine system. Five years later up to 15 collieries in the Lothians had adopted fan ventilation systems.<sup>53</sup>

Haulage and Winding. The underground haulage of coal and its raising to the surface was an area where enormous improvements became not only imperative in the Lothians (and other regions) in the nineteenth century, but where innovation yielded major increases in productivity.

In the first half of the century underground transport arrangements in the Lothians were primitive, and led to grisly accidents. The east of Scotland - and the Lothians especially - was a region where the practice of using women and children for underground haulage was very common. The technical justification of the bearing system was that it was 'quite impracticable to use wheel carriages in the conveyance of coals' in the sloping levels of the edge works. However hundreds of women were also employed at 'flat' collieries

52. Dundas of Arniston MSS, D. Landale, 'Report on Polton Colliery', 30 November 1863; Clerk of Penicuik MSS, SRO GD 18/1153, 'Copy Report on Brunstane Colliery belonging to Sir George Clerk, Bart of Penicuik by D. Landale', 15 November 1864.

53. Inspectors of Mines Reports, 1876, Report by R. Moore, 186; Ibid, 1881, Report by R. Moore, List of Mines in the Lothians.

where this explanation did not apply.<sup>54</sup> The survival of the system was related to social conditions, the conservatism of the coalmasters, and support for it by the mining population. Bearers were usually paid by the hewers, who preferred employing their wives or daughters in order to keep family earnings intact.<sup>55</sup>

In 1808 it was common in the Lothians for women to carry coal on their backs from the coal face to the surface by means of 'stair pits'.<sup>56</sup> By 1842 this method had been superseded to a considerable extent by a system whereby women bore coal to the pit bottom, whence it was wound to the surface by gins.

The bearing system was perhaps in a state of relative decline in the Lothians and Scotland for a hundred years prior to 1842.<sup>57</sup> A few Midlothian coal proprietors anticipated the legislation of that year banning the employment of women and young children underground, as at Whitehill Colliery in 1836 and Arniston in 1840. At Dalkeith Colliery (opened up from 1838) women were never employed. However the practice had a very tenacious hold. Colliers and their families left Whitehill and Arniston for works like Newbattle where women could get work.<sup>58</sup> In 1842, despite the long decline of bearing, to every three adult male underground workers in the Mid and East Lothian coalfield there was one female.<sup>59</sup> This ratio meant that the region was a bastion of female employment in the British coal industry.

Despite the very backward conditions some improvements had been made in underground haulage in the Lothians up to the 1840s. A significant number of works introduced cast iron, and later malleable

54. Dunn, 'Edge Seams of Mid-Lothian', 169-71.

55. Duckham, Scottish Coal Industry, 94-104, 269-270.

56. Bald, Coal Trade of Scotland, 128-38.

57. See, T.C. Smout, 'The Erskines of Mar and the development of Alloa 1689-1825', Scottish Studies, vol 7 (1963), 64; Bald, 'Mines', 357.

58. Buccleuch MSS, SRO GD 224/649, Mr. Maxton to James Wright, 17 January 1842.

59. I. Pinchbeck, Women Workers and the Industrial Revolution (1930), 247.

iron, rails underground, and boy 'putters' hauled or dragged baskets of coal set on trams or hurleys. Ponies were also beginning to replace women underground. In 1839 three of the more important Mid and East Lothian works used ponies, and at Arniston Colliery they were 'soon to be introduced'.<sup>60</sup> However different methods of haulage and raising coal often co-existed at the same collieries, and primitive techniques persisted until well after mid-century (including the use of boy labour). The 1842 legislation, nevertheless, did act as a spur to innovation. Confirming earlier experience<sup>61</sup> the replacement of bearing by improved haulage systems was usually found to be satisfactory from the point of view of colliery economics. Where the use of ponies was impractical the adoption of inclined planes driven by steam engines, or self-acting devices on rise workings, represented a definite step in the direction of mechanized haulage. In the 1860s the collieries of Niddrie, Arniston and Newbattle were among those making use of these methods.<sup>62</sup>

As in underground haulage, the means of bringing coal to the surface had been extremely backward in the Lothians. In the 1840s at Grange Colliery coal - and colliers - were raised to the surface bumping off the sides of a pit, which was 'off the plumb', by a system which was devoid of any guidance.<sup>63</sup> Yet the progressive replacement during the fifty years or so before 1842 of bearers by horse gins was a technical advance. Almost parallel with this process was the spread of steam winders, where the introduction by

60. Milne, Memoir on Mid and East-Lothian, Statistical Table at end.

61. Buccleuch MSS, SRO GD 224/649, J. Wright to the Duke of Buccleuch, 17 January 1842; Children's Emp. Comm., Appendix to First Report, (PP 1842, XVI), evidence collected by R.H. Franks, evidence of J. Wright, (No. 28), 441-2.

62. Don Wauchope of Edmonstone MSS, D. Landale, 'Report on the working and increase of water in the south parrot seam at Niddrie Colliery', 14 March 1861; Bremner, Industries of Scotland, 17; Report on Coal, vol II, (PP 1871, XVIII), evidence of J. Davidson, QQ 1179-90.

63. Cadell, 'Historical Account Grange', 169-70.

Watt of rotary motion in 1781 was of great pertinence. As early as the 1820s there were a number of steam engines applied to winding in the Lothians. Often it was common for the same engine to be applied to both winding and pumping, as in West Lothian in the 1840s.<sup>64</sup>

This decade witnessed the beginnings of greatly improved winding practice in Midlothian. A cluster of innovations, compounding each others effects, was adopted, for example at the collieries of Dalkeith and Edmonstone. These included much improved ropes (wire in the case of Edmonstone), and guides and cages in the shafts.<sup>65</sup>

In 1855 the Inspector of Mines for the East of Scotland stated:

'Upwards of nine tenths of the working pits are now fitted with guides and cages; twenty years ago there were very few pits in Scotland so provided'.<sup>66</sup> Flat wire ropes were also being introduced in Lothian collieries.

A final development in underground transport towards the close of the period was the spread of 'continuous' or 'endless' rope haulage systems. Improved ropes enabled extensive systems to be adopted, as at Kinneil in the late 1870s, and at Newbattle and a number of other collieries in the following decade.<sup>67</sup>

### Management

The Function of Management. The advance of technique in the Lothians lay partly to the credit of management, which was responsible

- 64. Forsyth, 'Mines of West Lothian', 235-8; Bald, Coal Trade of Scotland, 87-8.
- 65. Buccleuch MSS, SRO GD 224/649, J. Wright to the Duke of Buccleuch, 3 September 1840; Ibid, Box 582, J. Wright to the Duke of Buccleuch, 13 June 1844; Hope MSS, 'Inventory of the Engines, Machinery ... &c at Edmonstone Colliery', 6 October 1849.
- 66. Inspectors of Mines Reports, 1855, Report by R. Williams, 91.
- 67. Hislop, 'Haulage Experience', 304 et seq; A.M. Grant, 'A System of Endless Rope Haulage at Newbattle Collieries', TMIS, vol 9 (1887-8), 215.

for the day-to-day conduct of colliery development. As demonstrated by Pollard the technical and organizational problems of the coal industry made it one of the first to require a managerial cadre.<sup>68</sup> The form of the managerial profession was already quite clear in the Lothians by the early nineteenth century. Firstly, there were salaried managers responsible for the management of one enterprise. And secondly, there was a higher class of independent viewers or mining engineers who were free-lance consultants. There was to remain, nevertheless, an imperceptible shading of status and function throughout the entire spectrum of the mining hierarchy.<sup>69</sup>

Early in the nineteenth century in many cases it is evident that the status and duties of the colliery manager, or grieve as he was still termed, were not as considerable as they were to become. His remuneration was often the same as that of the oversman and check.<sup>70</sup> But in subsequent decades coalmasters followed Sir John Hope and the Marquis of Lothian in appointing able managers with wide responsibilities.

These were expensive. It was the manager's duty to superintend all production matters, to organize the sales and marketing effort, to ensure accounts and plans were maintained, and to deal with all labour questions including recruitment and industrial unrest.

The management's role might be described as primarily 'executive', while the entrepreneur's was a risk-taking one involving the supply of capital. However functions were not always as well demarcated as this. The manager's job could include making 'entrepreneurial

68. Pollard, Genesis of Modern Management, 61 *et seq.*

69. See Duckham, Scottish Coal Industry, 126.

70. Clerk of Penicuik MSS, SRO GD 18/1148, 'Account of Labour at Loanhead Colliery from 7th August 1813 to 29th January 1814 being 25 weeks as rendered for Oncost'; Marquis of Lothian Mines, SRO CB9/16, Bryans Colliery Output Summing Book, 1814; *Ibid*, CB9/26, Easthouses Colliery Pay Bills Account Book, 1815-18.

'decisions', especially at some of the large enterprises of the landed coal proprietors who had a concern in the success of the mine perhaps less than the mining tenant's. Therefore the coal proprietor might be prepared to delegate to the manager more responsibility than a lessee would. This is reflected in the fact that occasionally the manager's pay included a share of the profits, or was adjusted according to the colliery's performance.

Sometimes the mining tenant was the manager. Even at the large colliery of Arniston, the redoubtable John Christie took 'personal management' of the works until 1867.<sup>71</sup> The growth of firms and increasing complexity of capital structures made this an increasingly rare occurrence.

Table 7, II

Name	Colliery	Colliery Managers' Conditions of Service				Other terms
		Approximate date	Annual salary	Share of Profits (£)		
J. Campbell	Loanhead	1812	-	15%	-	
A. Maxton	Arniston	1832	£150	5%	-	
Advertisement	In Fife	1833	£130-£156	-	free house and garden	
J. Wright	Dalkeith	1841	£373	-	house allowance	
H. Cadell	Dalkeith	1850	£350	-	-	
A. Bowie	Canonbie	1863	£250	-	house and cow's grass	
R. Clark	Arniston	1874	£120	-	free house	
W. Carey	Bridgeness	1888	£150	5%	-	

Sources: see footnote 72.

The extent of managerial responsibility could be very wide. The Duke of Buccleuch's managers between 1837 and 1875 frequently intimated price and wage changes to him after the event. It was argued in 1837 that colliery managers in England and Scotland had 'large powers in everything connected with their management'.<sup>73</sup> In

71. Dundas of Arniston MSS, J. Geddes, 'Report on Esperston Limeworks and Arniston Colliery', 22 August 1870.

72. The information is derived from mainly manuscript sources noted in this chapter. Clark's salary in 1874 was regarded as unusually low. The information is noted where it is available; no entry under a heading does not mean the manager did not receive such a benefit.

73. SRO, CSP46 Box 841, (*Foster v Marquis of Lothian*), Defences, Outer House, 6 April 1837.

fact the limits of managerial responsibility were ill-defined. Wright's job at Dalkeith regarding the sinking of a new pit was to advise and submit figures; but the final decision lay with the Duke of Buccleuch.<sup>74</sup> He probably overstepped his authority when he slashed prices and mounted a vigorous selling campaign in 1843 to the injury of his employer's aristocratic neighbours. In 1836-7 a major clash took place between John Williamson, manager of Newbattle Colliery, and his employer the Marquis of Lothian. It was over the consequences of the former's marketing strategy over the previous three years. It was claimed in the Court of Session by the Marquis's counsel that Williamson had exceeded his authority, and that important decisions should have been reported to the Marquis or his steward, 'who had a higher and more general superintendence than Williamson'.<sup>75</sup> The legal decision went against the Marquis, thus implicitly exonerating Williamson's independent action who, however, lost his job.

While the breadth of management's responsibility probably increased during the nineteenth century, its depth was in some cases being reduced. This was because clerks with accounting ability, travelling salesmen and others were easing the burden of the manager's duties. On the other hand the growing complexity of mining required more and more the appointment of technically qualified and expert men. But for much of the period under discussion only a sound empirical command of mining methods derived from practical experience was looked for in colliery managers. Some managers were appointed because of their general qualities. And R. Clark, who was appointed manager

74. Buccleuch MSS, SRO GD 224/649, J. Wright to the Duke of Buccleuch, 26 April 1842.
75. SRO, CSP46 Box 841, (*Foster v Marquis of Lothian*), Summons, 3 February 1837; Defences, Outer House, 6 April 1837; Copy Judgement.

of Arniston Colliery as late as 1874 had 'an excellent knowledge of colliery working and machinery' but was 'not a great Book man'.<sup>76</sup>

The Supply and Recruitment of Managers. Duckham has stressed that by 1815 Scotland was producing a regular 'flow of mining and managerial skills' for the coal industry.<sup>77</sup> There is no doubt that there was a certain amount of vertical mobility within the lower ranks of the colliery hierarchy which permitted the accession of humbler officials to the post of manager. But it is very unlikely that the 'proletarian' mass of colliers was tapped as a reservoir of managerial talent to any extent. Potential (middle-class) managers were groomed for a career, and occasionally we encounter them in lowly positions gaining practical experience. The labour market in colliery management was emmeshed in a web of patronage, influence, and family connections. This is not to say that nepotism was rife, or that a modicum of competence was not indispensable for important posts. However a career in management was a very unusual escape route for a collier from proletarian status.

Patronage was important at the highest levels. When Ralph Moore applied for a post of Government Inspector of Mines, he made supplications to Sir George Grant Suttie to press his case with the requisite member of the government. Suttie, speaking of this application, noted to the Lord Advocate of Scotland:<sup>78</sup>

The situation is now worth £600 a year and is in the Gift of Sir George Grey - Like all Government situations it requires influence, for, although there is an examination to pass, other things being equal, influence carries the day ... I am therefore desirous of securing all the influence I can.

76. Cadell MSS, H. Cadell to D. Landale, 23 March 1874.

77. Duckham, Scottish Coal Industry, 140. See also, B.F. Duckham, 'The Emergence of the Professional Manager in the Scottish Coal Industry, 1760-1815', The Business History Review, XLIII (1969).

78. Lord Advocate Papers, SRO Box 46, Bundle : Applications for Post of Inspector of Mines, 1853-81, Sir G.G. Suttie to Lord Advocate of Scotland, 4 March 1862.

Moore was appointed to the post he was seeking.

At a lower level there is abundant evidence that successful application for managerial posts required the support and favourable references from influential colormasters like Henry Cadell or Archibald Hood, whose opinions carried great weight with one another.<sup>79</sup>

Further suggestion that colliery management was not a career open to talent was the strong family tradition which pervaded the profession.

There is a multitude of examples of sons following fathers' footsteps in the careers of mining management and consultancy.<sup>80</sup>

Despite the rather closed nature of the profession there is little evidence that the supply of managers was felt to be insufficient. The apparent adequacy of the supply is reflected in the rather low salaries paid.

Mining Consultancy. The expansion of the coal industry in the nineteenth century demanded a growing number of viewers or mining consultants. In the Lothians mining consultants were free-lance specialists. Mining consultancy frequently represented a stage in a career beyond successful management and entrepreneurship.

A major function of mining consultants was to give assistance to coal proprietors. They advised on the formation and conduct of leases, and superintended extensive new colliery fittings. Areas of employment were also provided by the demand for their services as witnesses in legal cases and before parliamentary commissions, and as arbiters in favour of particular railway schemes.

Mining consultants had to possess real technical expertise, and be able to liaise with persons as diverse as a collier and a duke.

79. Cadell MSS, various correspondence especially for 1860s and 1870s.  
 80. Among relevant family names are Bald, Williamson, Grieve, Geddes, Cadell, Johnston, Clark, and Lynn. See also Pollard, Genesis of Modern Management, 127.

The independent character of their work was marked, especially vis-a-vis mining tenants. One tenant offered a different interpretation to that of the well-known expert, David Landale, over the cause of heavy water at Polton Colliery in 1867. Landale <sup>81</sup> exclaimed:

He says in as many words I have been Hoodwinked  
... It would be no great loss suppose these unskilled  
people would be off. Their bad management is so  
well known.

The following year the tenant was replaced.

In the first half of the nineteenth century the supply of native Scottish viewers, although improving, was still not entirely satisfactory. As in the previous century the lack was made up by a flow north of English expertise. <sup>82</sup> Matthias Dunn and John Farey were among well-known English viewers active in the Lothians.

The Scottish coal industry, however, was increasingly satisfying its own needs. The trail was blazed gloriously by Robert Bald (1776-1861), a source of ubiquitous activity in the Lothians in the first half of the century, and probably the most famous Scottish viewer. <sup>83</sup> Other figures of stature were John Grieve (died c1841), John Geddes, and John Williamson. After the latter's health failed about 1860, his outdoor work was taken over by his son J.R. Williamson, author of so many of the reports cited in this study.

One of the most sought after mining consultants was David Landale. His working life in coal stretched from 1825 to at least 1892. He was a colliery manager and a lessee at some point, before specialising in consultancy. H.M. Cadell described him as a

81. Dundas of Arniston MSS, Copy letter, D. Landale to Messrs. I. and F. Anderson, 14 September 1867.

82. Duckham, Scottish Coal Industry, 129-130.

83. Ibid, 137-8.

'... wiry little man, very capable and sly'.<sup>84</sup> His successful career was perhaps a model for the aspiring mining consultant.

Forces for improvement. Notwithstanding room for much improvement in certain areas, it is unquestionable that standards of management and technique advanced greatly in the Lothians up to the 1870s. The greater depth and extent of collieries brought managers and entrepreneurs to accept the need for technical improvement. Three broad sources of progress can be identified: legislation, improved information, and education.

1. Legislation frequently had a direct effect on technique.<sup>85</sup> This was evident in the 1842 Act banning women and child employment underground,<sup>86</sup> and the 1862 measure requiring a second shaft at collieries. The 1842 legislation also paved the way for the appointment of a Mines Inspectorate. This bore fruition when in 1850 the Mines Act set up a rather 'mild' advisory inspectorate of six officials. Mines inspection was given stronger teeth by further legislation in 1855, 1860 and 1872. Inspectors were increased in number and their powers were extended. General Rules were introduced which applied to every colliery, and embraced a wide field touching on safety, ventilation and winding practise. Special Rules were to be drawn up for every colliery, and had to be approved by the Mines Inspector. The prospect of a visit by an Inspector could prompt coalmasters to act expeditiously in complying with mining law. Youngson Brown has concluded that the influence of Mines Inspection and legislation in spreading the knowledge and the application of

84. Cadell, 'Historical Account of Grange', 181. Note also Landale's cantankerous performance before RC on Mining Royalties, Second Report, (PP 1890-1, XLI), QQ 6639-6679.

85. The treatment of Mines Legislation is cursory because it has been dealt with thoroughly elsewhere, and because the Lothians' experience was unexceptional. See Youngson Brown, 'Scots Coal Industry', 73-93, 275-81. (See also below, chapter nine, pp. 278-81).

86. Youngson Brown, 'Scots Coal Industry', 275-6. The 1842 measure laid down, inter al, that women and children under ten years of age were not to be employed underground, and that no steam or other engine was to be left under the care of any person under fifteen.

improved techniques was considerable.<sup>87</sup>

## 2. Improved information derived from a number of sources.

Bald's works paved the way in Scotland to a more critical appraisal

of mining methods.<sup>88</sup> The treatises of Matthias Dunn and others

added to a growing stock of mining text books after mid-century.<sup>89</sup>

Developments in the science of geology were of great significance in increasingly requiring skill and judgement of the prospector and entrepreneur rather than good luck. The improvements in geology are reflected in the increased output of geological maps and memoirs on the Lothians from the late 1830s.<sup>90</sup> About 1860 the Lothians were covered by the official Geological Survey, of which it was stated in 1862: '... the importance from an economic point of view, it is really difficult to estimate too highly'.<sup>91</sup> The practical use of the surveys was demonstrable in the case of the nascent shale-oil industry.<sup>92</sup>

Colliery management also benefited from improvements in facilities for chemical analysis of coal, and assistance from educational establishments in this direction.<sup>93</sup>

A considerable number of learned societies and journals published material of interest to colliery managers, thus contributing to the dissemination of information. These included the Royal Scottish Society of Arts and the Edinburgh Geological Society. A significant number of specifically mining journals also commenced publication,

87. Ibid, 91. The setting up and reports of parliamentary commissions in themselves heightened consciousness of the problems concerned.

88. See Duckham, Scottish Coal Industry, 137-8.

89. Dunn, Treatise on the Winning of Collieries.

90. E.O.F. Brown, 'History of Geology', in The Mining Association of Great Britain, Historical Review of Coal Mining (1925?), 19-20. Note also, C. MacLaren, A Sketch of the Geology of Fife and the Lothians (Edinburgh, 1866 first edition 1838); R.J. Cunningham, The Geology of the Lothians (Edinburgh, 1839).

91. The Mining and Smelting Magazine, vol 1 (1862), 41.

92. Butt, 'James Young', 264-5.

93. See the various reports by A. Fyfe, in RSSA, vols 2-4, 1841-54.

notably The Colliery Guardian about 1860. In 1877-8 the Mining Institute of Scotland was formed, and from 1879-80 its proceedings were published. Its deliberations explored in depth aspects of mining geology and technique, though rarely were managerial standards or economic questions discussed.

3. The history of mining education in Scotland was hardly glorious. Much depended on support by the coalmasters. Probably almost all the managers and entrepreneurs encountered in this study obtained their expertise from on-the-job training. Only towards the close of the period was there much support for practical and theoretical training of a formal character. A Glasgow Mining School had been established in 1859 aimed at giving instruction to junior management (oversmen etc), but it folded up after five years when support from the west of Scotland coal and ironmasters wilted.<sup>94</sup>

The Coal Mines Regulation Act of 1872 provided inter alia that all mine managers should be required to be in possession of certificates of competency obtainable by public examination.<sup>95</sup> This led in the following year to the appointment of a board for the examination of managers in the Eastern District of Scotland. The board sat in Edinburgh. The syllabus included a grounding in arithmetic and surveying, and the bases of practical and theoretical mining practice.<sup>96</sup> In 1880 R. Moore stated that the annual examination for managers in Edinburgh was 'fairly attended'. He added that the 'standard is being gradually raised, but it appears to me that it might still be further raised'.<sup>97</sup> Only after 1880 did Scottish mining education make notable strides forward.

94. A.M. Bryan, 'Mining Education in the West of Scotland', The Colliery Guardian, 7 September 1934, 427; Campbell, 'Scottish Pig Iron Trade', 52.

95. Youngson Brown, 'Scots Coal Industry', 281.

96. Inspectors of Mines Reports, 1874, Report by R. Moore, 138, 143.

97. Ibid, 1880, Report by R. Moore, 206.

### Conclusion

The description of technical methods in the Lothians suggests that a kink occurred in the technological development of the coalfield during the 1840s. This brought a considerable improvement in technique in the region, bringing it probably close to best Scottish practice in many instances by the close of the period. During the third quarter of the nineteenth century managers and entrepreneurs became more technically skilled and daring than hitherto. They had to be in the Lothians in order to overcome the formidable challenges of the coalfield. These changes are not contradicted by the somewhat inconclusive statistical evidence for the Lothians which is available, while the Eastern District of Scotland as a whole achieved a definite increase in productivity between the 1860s and the 1880s.

This description of progress requires qualifications. While managerial standards in general improved, there were areas where management was found wanting. The litter of 'mistakes and crudities'<sup>98</sup>, of human errors and inefficiencies continued. The manager of Arniston Colliery in the 1830s lost his job after being seen drunk in Glasgow, which confirmed 'various reports ... regarding his inebriety'.<sup>99</sup>

The same fine colliery came under inept management in the late 1860s, suffering the same fate as had recently befallen Polton Colliery.<sup>100</sup>

In addition to isolated and pardonable failures, Lothian management also exhibited faults in other directions. In the sphere of labour management there was not much that the managers of the region could congratulate themselves on.<sup>101</sup> It is true that some

98. Duckham's phrase. Scottish Coal Industry, 140.

99. Dundas of Arniston MSS, letter from Alexander Maxton, 7 February 1833.

100. Ibid, J. Geddes, 'Report on Esperston Limeworks and Arniston Colliery', 22 August 1870; J. Geddes, 'Report on Arniston Colliery Matters', 5 August 1873; D. Landale, 'Report on Polton Colliery', 15 November 1864; D. Landale to Messrs. Selkirk and Hamilton, 15 November 1865.

101. Labour management is frequently touched on in Part Three.

paternalistic employers avoided many of the worst abuses of labour exploitation, but they also demanded excessive deference from the work-force, as was illustrated by their authoritarian reaction to any industrial unrest.

Management was not itself a great source of innovation. James Wright was regarded as an innovator when he introduced double-entry book-keeping to Dalkeith Colliery in the late 1830s!<sup>102</sup> The conservatism of managers and coalmasters was reflected in their hesitant response to proposals for improved management training. Archibald Hood, for example, at best was indifferent to schemes for augmenting the supply of managers other than the methods prevailing in the 1860s.<sup>103</sup> And these methods, where training was not only based almost solely on practical experience, but which also were open to weaknesses arising out of nepotism and influence, are vulnerable to criticism. In fact the undoubted advance in management and technique that took place during the period under study derived for the most part from forces exogenous to the managerial profession itself; these forces included the inexorable logic of the expansion of the coal industry, and the impact of legislation and public concern in mines' safety. Moreover, it might yet be questioned - in the light of the condition and performance of the coal industry in late-Victorian Britain - whether the improvement in management which did take place was sufficient.<sup>104</sup> The contribution of Lothian managers to the modernization of the region's coal industry was limited and passive in character. Nevertheless management was still the crucial instrument

102. By when the principles of double-entry had been long established in Britain. Buccleuch MSS, SRO GD 224/511, sundry papers.

103. Report from the Select Committee on Master and Servant, (PP 1866, XIII), evidence of A. Hood, QQ 13334-13342.

104. See, Taylor, 'Labour Productivity and Technological Innovation', 49 et seq.

of the great technical changes which occurred in the Lothians' coal industry between 1815 and 1875.

**PART THREE. LABOUR AND SOCIAL CONDITIONS****CHAPTER EIGHT****THE SUPPLY AND REMUNERATION OF LABOUR**

## CHAPTER EIGHT. THE SUPPLY AND REMUNERATION OF LABOUR

### The Colliery Labour Force

The nexus between economic conditions in the coal industry and the social conditions of the mining communities was the evolving relationship between employer and worker. The main expression of this relationship was, of course, the payment of a wage. But to properly appreciate the very complex character of the employer-worker relationship the importance of not only the economic but also the social and legal aspects must be allowed for.

The level of wages in the coal industry of nineteenth century Scotland was determined fundamentally by the conditions of labour supply and coal demand. But the individual miner's 'reward', conceived in the broadest sense, was influenced also by the infinitely varying circumstances of the local situation, and the means the employer adopted to control and discipline the labour force. Wages were a very large proportion of total costs, and early in the nineteenth century manpower was difficult to recruit. The employers, therefore, found the need pressing to place the turbulent colliers in a dependent and closely supervised position.

Before exploring further the methods of controlling and rewarding the colliery labour force, it is necessary to distinguish the chief groups of which it was formed.

The three sections of the labour force were the hewers, the oncost workers, and the supervisory staff. The first were certainly the most numerous.

The hewer's task of removing coal from the strata was virtually untouched by technical improvements in the period under study.<sup>1</sup> The rise

1. For a fuller description of the hewer's work see Duckham, Scottish Coal Industry, 66-72.

of long-wall working required some re-organisation of the hewing section, but no major change in hewing methods. The skills of the hewer were not very difficult to pick up, especially after the premium placed on huge blocks of 'great coal' waned in the Lothians during the first half of the nineteenth century. The long orderly system of apprenticeship which prevailed in the north-east of England does not appear to have been followed in the Lothians or elsewhere.<sup>2</sup>

The chief business of the hewer was hewing. But he was often called on to do oncost work as well - not only keeping his own working place in order, but also for special tasks like driving levels. For special oncost work he was often, but not always, paid by shift as opposed to piece rates. Hewing was remunerated by piece rates, which were the dominating constituent of the hewer's wage.<sup>3</sup>

The task of the oncost workers was to keep the colliery in working order, whether coal-getting was underway or suspended. Oncost work, like keeping the underground roads and drainage in good order, was essential, and was of the nature of a fixed expense. Coalmasters nevertheless frequently regarded oncost expenditure as unremunerative, and made every effort to diminish it.<sup>4</sup> In the Lothians, however, oncost remained a relatively large proportion of total expenses during the period studied.<sup>5</sup> There is, in fact, an impression that the structure of the colliery labour force became more complex in the course of the century, reflecting the difficulties of reducing the oncost in the Lothians.

Among the oncost workers, 'Bottomers' supervised traffic entering and departing from the pit-bottom. 'Roadsmen' kept underground roads

2. Note, A.H. John, The Industrial Development of South Wales (Cardiff, 1950), 146.

3. See, Statistical Appendix, table 32.

4. For example by making the hewers responsible personally for more oncost work. Buccleuch MSS, SRO GD 224/582, H. Cadell to Duke of Buccleuch, 9 August 1850.

5. See Chapter Seven, pp. 192-3.

and air-passages in good order, and undertook repairs to underground roads, roofs, partitions, etc. 'Brushers' or 'Redesmen' followed closely behind hewers at the coal-face. They were required to finish off the formation of the working roads, and keep them in working order. The 'Fireman' had to check the colliery for noxious fumes. Other members of the oncost team were the 'Pit-headman', the 'Engineman', and working under the latter was the 'Furnaceman'.<sup>6</sup>

Great aberrations in the wages of oncost workers were not typical, unlike those of the hewers. It would be difficult to say whether in the long-run one section was better paid than the other. Despite the greater regularity of work performed by oncost workers, and payment by shift being more common than piece work, considerable fluctuations also occurred in oncost wages.<sup>7</sup>

In the third, supervisory section of the labour force, the 'Cheque' was a clerical worker, responsible for giving out wages and keeping books. His daily rate of pay was similar to that of some of the oncost workers', although he also received certain prerequisites. The oversman was the foreman of the colliery, or part of it. His duty was to supervise the daily operations of the colliery, and ensure management's instructions were carried out. In the early nineteenth century Lothian oversmen were often very close to the colliers, from whom they were recruited. There were instances of oversmen being on the side of labour in disputes.<sup>8</sup>

During the course of the century the weight of their responsibilities increased doubtless, and they became clearly identified with management.

6. For the duties of oncost workers see, Anon, General and Special Rules in terms of the Act 23 and 24 Vict. Cap. 151, (Burdiehouse Colliery Office, March 1867); Buccleuch MSS, SRO GD 224/512, 'Special and General Rules in terms of Act 18 and Act 19 Vic. Cap. 108 for Dalkeith Colliery', 1856.

7. Statistical Appendix, tables 32, 35-6.

8. Home Office, Correspondence and Papers, Scotland, SRO RH 2/4, 155, Declaration of William Wilson, underground oversman Sherriffhall Colliery, April 1825.

The improvement in the oversman's position was reflected in the experience of that post at Cowden Pit, Dalkeith Colliery. In the 1840s the incumbent was remunerated on the basis of daily shifts giving him 48s. per fortnight. In 1874 this position earned £4 per fortnight (paid on a fortnightly basis) and the title of the job was changed to 'manager of Cowden Pit'.<sup>9</sup>

A loyal, ambitious, intelligent and hard-working collier might catch the eye of a manager, and thereby attain a post on the lower rungs of the colliery hierarchy as an oversman. This was, naturally, not possible for the vast majority of those who worked in the coal industry.

#### The Relationship between Employer and Worker

The Legacy of Serfdom. In the eighteenth century workers at Scottish coal and salt works were bound to their employers for life.<sup>10</sup> The custom of 'arling' cemented the tendency for the inhabitants of the mining communities to assume the characteristics of a 'hereditary caste'. A gift was made by the employer to the parents of a new-born child at its baptism; the acceptance by the parents of the offering was taken to imply an undertaking to bring up the child as a collier, bound to the employer for life.<sup>11</sup> Legislation in 1775 enabled colliers in principle to throw off serf status, but according to Ashton and Sykes until the end of the century many remained in servile bondage.<sup>12</sup> Not until 1799 was serfdom entirely abolished in the Scottish coal industry. The chief motive of the proponents of the legislation was to increase the supply of

9. Buccleuch MSS, SRO GD 224/534-549, Dalkeith Colliery Account Vouchers, 1838-75.

10. For further details on serfdom in Scotland see, Duckham, Scottish Coal Industry, chapters 9-10; J.R. Philip, 'Early Labour Law in Scotland', The Juridical Review, XLVI, 121-32; J. Barrowman, 'Slavery in the Coal-Mines of Scotland', TMIS, vol 19 (1897-8), 117 et seq.

11. T.S. Ashton, 'The Coal Mines of the Eighteenth Century', The Economic Journal, Economic History Supplement, iii (1928), 308.

12. T.S. Ashton and J. Sykes, The Coal Industry of the Eighteenth Century (Manchester, 1929), 80-1.

labour to the coal industry, as it was felt that the existence of serfdom acted as a deterrent to potential recruits.

Serfdom was a major feature of the social environment of the eighteenth century Scottish coal industry. The industry's rapid expansion from the late eighteenth century rendered the system untenable, but the legislation of 1799 could not wash away entirely the taint of serfdom from the colliers' profession. Indeed in the Lothians social relationships were not greatly altered. Some colliers may have feared that emancipation would have resulted in the loss of security and employment which their owners had previously assured for them.<sup>13</sup> In fact the coalmasters did not want a social revolution, and were anxious to maintain control over their colliers.

The means by which the coalmasters achieved their ends and effected the transition to an industry based on 'free' labour was through the system of 'annual bonds'. Annual bonds were associated with long intervals between pays often of three months, and heavy debts being accumulated by the colliers to their employers. These debts gave the coalmaster considerable control over the collier. To take T.S. Ashton's phrase out of context slightly, in practice 'debt slavery' replaced 'legal slavery'.<sup>14</sup> In addition the colliers surrendered much freedom when they took employment under the terms of the bonds.

The system of binding was general in the Lothians immediately after 1800, and common until 1831. At the outset the collier might bind not only himself over to the coalmaster, but also his family as well.

The period of binding was most frequently for one year. Occasionally shorter periods were agreed on, but the most frequent exceptions to the

13. See, R.N. Boyd, Coal Pits and Pitmen (1892), 10; D. Davies, 'Some Aspects of Mining Reform', Quarterly Review (1941), 103.

14. Ashton, 'Coal Miners of the Eighteenth Century', 310. See also, Forsyth, Beauties of Scotland, 274-5; McNeill, Tranent and its Surroundings, 23-4.

one-year rule was where colliers bound themselves for longer intervals, as for example for 5 years in one instance at Loanhead Colliery in 1812. A common minor inducement in the Lothians for the colliers to sign the bond was the granting of a 'bounty' when they did so, usually of one guinea.<sup>15</sup>

Annual bonds gave employers pervasive control over the workers. 'Deserted' colliers were resolutely pursued.<sup>16</sup> The employer-worker relationship was still a proprietorial one, as evidenced by the indignation of certain coalmasters and their threat of legal action, when in the early 1810s they learnt that other coalmasters had knowingly employed 'their' colliers.<sup>17</sup> The bonds stipulated detailed conditions of employment, and laid down scales of remuneration and minimum outputs and periods to be worked by the colliers, while permitting management to alter the terms of the agreement. Extensive disciplinary powers were also granted to management, and a rigorously applied system of fines and penalties gave the regulations embodied in the bonds effective teeth.

By 1831 the terms of the annual bonds at New Craighall Colliery had become a little less stringent than had recently been usual.<sup>18</sup> Nevertheless they did still greatly reduce the colliers' independence of action, and reflected the slow tempo of social change in the Lothian coalfields. Mildly repressive, paternalistic regimes were being established at many collieries.

15. Cadell MSS, various bonds at No 4 Pit, Grange Colliery, 1803-4; Clerk of Penicuik MSS, SRO GD 1148, 'List of colliers at work and engaged to come', 20 July 1812; Ibid, various bonds, 1813-15; McNeill, Tranent and its Surroundings, 166-8 cites in full a bond of 1811; Children's Emp Comm., Appendix to First Report, (PP 1842, XVI), p. 390, para. 40 quotes a Tranent Colliery bond of 1827.
16. Home Office, Correspondence and Papers, Scotland, SRO RH 2/4, 114, (January-February 1817), newspaper advertisement relating to 'Colliers Deserter'.
17. Cadell MSS, copy letter William Dixon to W. Cadell, 4 January 1811. See also Ibid, W.C. & Sons to Shotts Iron Co, 27 July 1805; W. Cadell & Son to Wm. Symington, Falkirk, 20 November 1805.
18. Midlothian Sheriff Court Decrees, SRO SC 39/7, 3580, (Hope v Muir et al), Copy Summons and Citation, 19 December 1831. (Gives details of annual bonds).

With the fading of the memory of serfdom, from the 1830s long hirings rapidly went out of practice in the Lothians. This was the result of a number of factors, notably the much easier conditions which had begun to obtain in the labour market of the Scottish coal industry. Perhaps a greater awareness among coalmasters and workers in the Lothians of the iniquities or deficiencies of long pays had some consequence. Long intervals between pays probably encouraged irregular working, and therefore reduced the effective return on capital invested in colliery plant and equipment.<sup>19</sup> In 1842 the Children's Employment Commissioners indicated that while yearly contracts of a kind may still have occurred in the Lothians, and six-week contracts were not unknown, in practice monthly contracts had become the rule.<sup>20</sup> By the late 1840s most colliers in the Lothians were probably working fortnightly notices and receiving fortnightly pays. This was the prevailing custom for the remainder of the period. The practice of daily or 'minute' hirings sprang up in the mid-1860s,<sup>21</sup> but does not appear to have been of lasting significance in the Lothians as far as can be judged.

Means of Labour control. In the Lothians the coalmasters in general stood in an immediate relationship to their colliers as their employers. From the 1840s, however, it was not unusual for some of the larger firms in West Lothian to sub-contract the raising of minerals to small men.<sup>22</sup> In Mid and East Lothian sub-contracting was unusual, and restricted to special work like pit-sinking.

19. Note, John, Industrial Development of South Wales, 71.

20. Children's Emp Comm, Appdx to First Rept, (PP 1842, XVI), p. 405, para. 109.

21. SC on Master and Servant, (PP 1866, XIII), evidence of Alexander MacDonald, QQ 497-516; evidence of Archibald Hood, QQ 1226-1245. But 'minute' contracts were also associated with long pays of up to one month in West Lothian, and long pays with truck. See below, p.231.

22. Eg, SRO, CS 245/833, (*Gillespie v Miller et al*), Proof and Appendix, 1873, evidence of H. Aitken, 7.

Thus in the great majority of cases the Lothian coalmasters were intimately concerned with the question of labour management. With the demise of annual bonds, and probably a breaking up of old servile attitudes among colliers,<sup>23</sup> coalmasters found it necessary to employ other means to subordinate and control the labour force. Various devices were developed for these ends. In the old-established coalfield of Mid and East Lothian the more objectionable aspects of such methods were not resorted to so vigorously as in West Lothian. The rapidly growing and turbulent mining villages of this district witnessed somewhat different approaches to the problems of labour management during the 1850s and 1860s.

As has been made clear the annual bonds incorporated colliery regulations. With the onset of shorter pays they became distinct documents, but were often added to the normal fortnightly agreements which the colliers signed at the commencement of their employment. By 1842 this was the common practice in the east of Scotland.<sup>24</sup> Regulations for Lothian collieries which have come to light were not very much less comprehensive than those of the bonds. Considerable authority was entrusted to the manager and oversman, details of working were specified, as in the bonds there were clauses against the use of foul language (probably as a safeguard against petty insubordination), and again a system of fines and penalties was in force. At the Duke of Buccleuch's Dalkeith Colliery, however, regulations for the 1840s and 1862 were quite mild, and much concerned with standards of house-keeping.<sup>25</sup>

23. In Lanarkshire in the 1850s and 1860s there was a strong social and cultural movement among the miners to recapture the independence of an earlier age, and resist the mining entrepreneurs' demands for a greater industrial discipline. A. Campbell, 'Honourable Men and Degraded Slaves: A Study of trade unionism in two Lanarkshire mining communities, 1841-71', (1974), 6.
24. Children's Emp Comm, Appdx to First Report, (PP 1842, XVI), p.391, para.40.
25. Buccleuch MSS, SRO GD 224/582, 'Regulations for all Colliers and other Workmen Employed at Dalkeith Colliery', (1840s); Ibid, Box 649, 'Rules to be Observed for Encouraging Cleanliness and Order in the Work-Men's Houses at Dalkeith Colliery', 20 April 1841; Ibid, Notice, 'The Workmen employed at Dalkeith Colliery are required to Observe the following Bye-Laws for the Regulation of the Work', September 1862.

From 1855 the official system of General and Special Rules probably at first supplemented, and then replaced colliery regulations.

This would have the effect of creating a more equitable balance of sanctions and responsibilities between employers and colliers than had been the case with old-style colliery regulations.

Quitting certificates, or 'free lines' as they were known in the Lothians, were used as an instrument of labour control. The free line was a document granted by an employer to the collier on his departure, certifying that the latter was free from debt or engagement to the employer. In 1835 a meeting of Lothian coalmasters agreed not to employ any colliers without a free line. In 1842 the system was extended among a number of the larger Midlothian employers by including in the free line information regarding the collier's character.<sup>26</sup> Even where certification in this manner was not enforced, it is evident that the coalmasters might exhibit impressive solidarity as a group in refusing employment to colliers who had become known as troublemakers.

Colliers' heavy debts to employers did tend to place the former in a weakened and subjected position. In the early nineteenth century colliers' debts in Midlothian were large, and probably increasing as a result of the working of annual bindings. For example at Sheriffhall Colliery between 1794 and 1808 a total of over £1,860 was advanced to the work force, with a definite tendency for the level of advances to increase after about 1804.<sup>27</sup> Subsequently, during the course of the first half of the century, evidence suggests indebtedness tended to become less pronounced among Midlothian colliers. For instance at separate collieries belonging to the Clerks of Penicuik the degree of collier

26. Ibid, J. Wright to Duke of Buccleuch, 12 and 30 December 1842. Coalmasters' power to evict troublesome colliers from their homes was another powerful instrument of social control. See chapter nine.

27. Ibid, Box 986/3, Sheriffhall Colliery Account Book, Colliers Debts Paid, 9 August 1794 - 15 October 1806.

indebtedness was much less in 1838-41 than it had been in 1812.<sup>28</sup>

This improvement was consistent with the trend to shorter pays, and probably reflects that collier indebtedness was becoming much less a deliberate aspect of coalmasters' policy. Nevertheless it was not eradicated: the colliery regulations of Grange Colliery in 1847 included a clause specifically referring to the procedure to be followed for colliers seeking advances.<sup>29</sup>

Indebtedness was closely associated with longish pays and truck.

Truck was the payment of wages in company stores in the form of goods, (which were often expensive and of poor quality). Credit was often advanced to the store's customers at very high interest rates. Truck shops frequently sprang up at recently established collieries at sites where ordinary shops were far and few between. The men of Kinnel Ironworks in 1847 actually petitioned their employers for the establishment of such a store.<sup>30</sup> Truck was also employed by masters faced with a shortage of coin, as a means of conserving capital.<sup>31</sup>

In Midlothian truck was not unknown, and occurred at some of the collieries around Edinburgh in the eighteenth century.<sup>32</sup> After the passing of the Truck Act of 1831 colliery stores were gradually abolished.<sup>33</sup> In 1846 the Midlothian County Police Superintendent stated that he believed the Act was, 'strictly observed with reference to the collieries in Midlothian'.<sup>34</sup> Later evidence underlies the virtual disappearance of truck in Mid and East Lothian.

28. Clerk of Penicuik MSS, SRO GD 18/1148, 'List of Colliers at work and engaged to come', (Loanhead Colliery), 20 July 1812; Ibid, GD 18/1149/(1), Brunstane Colliery Account Book, 1837-43, account showing debts due to Sir George Clerk.

29. Cadell MSS, 'Rules and Regulations for the Grange Colliery', March 1847.

30. S. Tremenheare, Report of the Commissioners of Mines, 1847, 17.

31. B.F. Duckham, 'Serfdom in Eighteenth Century Scotland', History, vol 54 (1969), 191.

32. Ibid.

33. Report of the Commissioners appointed to inquire into the Truck System, vol 1, (PP 1871, XXXVI), xv.

34. Report of the Select Committee on Railway Labourers, (PP 1846, XIII), evidence of A.J. List, Q 474.

In West Lothian, by contrast and reflecting the distinctive economic and social history of the mining industries of the region, truck became widespread in the 1850s and 1860s. In 1860 a miners' representative claimed that there was a 'truck shop to nearly every colliery'.<sup>35</sup> Alexander MacDonald provided figures which suggested that large numbers of miners were in thrall to truck at some of the biggest enterprises in West Lothian in 1866.<sup>36</sup>

It is clear that truck was a predatory act of exploitation by masters against men in the Scottish coal industry. The employers evaded the letter of the law as company stores themselves were not illegal, provided wages were actually paid in money. The stores were located close to the pay office with often only a partition between the two. The use of intimidation to enforce the use of truck was not unknown, but the practice was based on the chronic indebtedness of colliers. The latter situation stemmed from low and fluctuating wages, reduced further by fines and underweighing of outputs, and intervals between pays of up to one month.<sup>37</sup>

Truck gradually died out. The unfavourable publicity created by the Truck Commission of 1871 expedited its demise, although it did not finally disappear until the Truck Act of 1887.<sup>38</sup>

During the first seventy-five years of the nineteenth century the means available to, and employed by employers for the subordination of colliers appears to have decreased in effectiveness. Probably the ready supply of labour into the industry rendered the need for total

35. Bremner, Industries of Scotland, 23.

36. SC on Master and Servant, (PP 1866, XIII), Appendix No 3, Paper handed in by A. MacDonald, 524-5.

37. See, *Ibid*, Appendix No 9, Paper handed in by Mr. Ormiston, 537 (gives details of truck and debt at Shotts Iron Company); Bremner, Industries of Scotland, 23-4.

38. Youngson Brown, 'Scots Coal Industry', 224-5.

authority over the men less imperative. Labour, however, was becoming increasingly intolerant of such methods of control as were still enforced. This situation contributed to industrial unrest in the mineralfields, especially in the 1860s and 1870s.<sup>39</sup>

### The Supply of Labour

Role of female and child labour. The supply and mobility of labour naturally influenced wage movements in the coal industry. More broadly they were factors which had weighty implications for social conditions. It is obvious, for example, that Irish immigration was an event of major import, both economically and socially.

The technical explanation for the employment of women in the Lothian coalfields has been touched upon.<sup>40</sup> In the light of the labour shortage in the industry in the early nineteenth century the presence of large numbers of women and children in the pits might also be interpreted as an effort to make maximum use of all resources of labour which were available. In 1842 more women and persons aged seventeen or less worked in the mines of Mid and East Lothian than adult males.<sup>41</sup> Whatever the cause of this, women and children did provide a very low-cost factor of production. Nevertheless, while the technical justification of such practices may have had some force in earlier phases of the industry's development in the Lothians, by 1842 it had little.

Women were employed chiefly for bearing. At Shaws Colliery in the 1800s and Easthouses Colliery in the 1810s they were utilized for oncost work. At the latter works female workers even assisted in the hewing of coal in a minor capacity. In one exceptional week, ending 19 June 1818,

39. Youngson Brown described truck as one of three great issues facing Scottish mining trade unions. A.J. Youngson Brown, 'Trade Union Policy in the Scots Coalfields 1855-1885', EHR, second series, vol 6 (1953), 35.

40. Chapter seven, p. 204.

41. The numbers were 1,346 adult males, and 1,431 of the rest. Children's Emp Comm, Appedx to First Report, (PP 1842, XVI), 379-380.

the 'colliers' at Easthouses included five women.<sup>42</sup> The phenomenon, however, of women doing anything other than conveying coal underground was most unusual.

In the eighteenth century it was perhaps almost universal practice for Lothian hewers to employ female bearers. A good pickman on a rich seam might well hire two full-time bearers. Between 1800 and 1842 as horse-gins were progressively supplanting part of the bearers' task, presumably the proportion of women workers in the coal pits declined. Nevertheless the reliance on women and children for underground transport and other duties was still very great immediately prior to 1842. To take some outstanding examples, at Sir John Hope's two largest collieries in Midlothian in 1839, 286 'Boys and girls' were at work outnumbering the 204 men.<sup>43</sup> At Edmonstone Colliery in 1842 there were 160 women, children and lads under eighteen employed as against 88 men.

While the colliers themselves were usually immediately responsible for getting their family to work, and these parties resisted change, clearly it was managerial conservatism that was a decisive barrier to improvement by the 1840s. The manager of Newbattle Colliery declared in 1842,<sup>44</sup>

I see that no particular advantage would arise from excluding women from the pits, as they are used to the work, and fit for nothing else, and it might increase the price of coal 2d to 2½d per ton.

Women bearers in the early nineteenth century received in the region of 10d - 1s per day.<sup>45</sup> This was a miserly return for such arduous work. Whoever was directly responsible for the hiring of women, that their labour enjoyed a totally uncommensurate reward can hardly be questioned.

42. Marquis of Lothian Mines, SRO CB9/7, Shaws Colliery Pay Book (No. 21), 1803-7; Ibid, CB9/26, Easthouses Colliery Pay Bills Account Book, 1815-9.
43. Milne, Memoir on Mid and East-Lothian, Statistical Table at end.
44. Children's Emp Comm, Appdx to First Report, (PP 1842, XVI), evidence collected by R.H. Franks, evidence of Mr. Gibson (No. 52), 445.
45. Duckham, Scottish Coal Industry, 96. Duckham, who emphasizes that the situation regarding pay varied greatly depending inter al on whether the bearers worked for their husbands, explores the economics of bearing in some detail.

Despite the cheapness of the labour it appears likely that the economic and technical rationale for the system was losing its validity fast by 1842. The social conservatism of both sides of the industry was becoming the chief reason for its persistence in the Lothians.

The role of child labour was similar to that of women's. It provided very low-cost labour. As in the case of female employment the practice rested also on conservative attitudes among masters and workers, the latter seeing it as a means of defending family income. (It was also true that very young children - especially girls to some ways of thinking - were very useful for negotiating the narrow and tortuous workings of Lothian collieries because of their nimble agility). When H.F. Cadell, coalmaster of Tranent, defended the low wages paid to colliers in 1842, he used the family group to illustrate his case: a unit comprising one collier, two sons or nephews in their teens assisting him, and another young son as a putter could earn as much as 30s per week!<sup>46</sup> Parents were keen to take their children down the pits early. The Children's Commissioners noted that child earnings were not great, but formed a useful addition to family resources.<sup>47</sup>

The Commissioners summarized the chief employments of children in the west of Scotland in 1842 as follows:

Table 8, I Child Employment in the West of Scotland, 1842

Nature of employment	Weekly earnings	Payment method	Paid by
Hewers under 18	12s - 24s	Piece-work	Master
Putters and drawers	4s - 9s	Day, generally	Workmen
Trappers	4s	Day	Master
Horse-drivers	3s - 6s	Day	Master
Engine-boys	6s - 13s	Day	Master

Source: Children's Emp Comm, First Report, (PP 1842, XV), p. 158, para. 664.

46. *The Scotsman*, 28 September 1842.

47. Children's Emp Comm, First Report, (PP 1842, XV), p. 154, para. 637.

Trappers attended the shutters in the underground roads in order to regulate the flow of air for ventilation. They were paid a nominal wage: at Dalkeith Colliery in the 1850s and 1860s 9d per day.<sup>48</sup> Significant numbers of young girls had been used in the Lothians as bearers, and similarly young persons of both sexes as putters and drawers. Adolescent boys worked closely with their fathers as part of a team of hewers. Whatever their ability the custom of the Scottish coal industry, endorsed by the trade unions, was that they were not accorded full hewer status. The young hewer proceeded gradually through certain stages of a crude apprenticeship before he became a 'full man', and until that time earned only a fraction of a full wage. At Dalkeith Colliery in 1862 the rating was as follows:<sup>49</sup>

Those men above 17 years of Age, a full turn
under 17 and above 15, a $\frac{3}{4}$ turn
under 15 and above 13, a $\frac{1}{2}$ turn
under 13 and above 12, a $\frac{1}{4}$ turn

It is not easy to estimate precisely the distribution of the child labour force. After 1842 the proportion of younger boys would have declined and the proportion of hewers probably increased.

The legislation of 1842 banning the employment in mines of persons under ten years and girls obviously struck a blow at child employment.

Further it was laid down that engines must not be left in charge of persons less than fifteen years. In 1860 additional legislation had the effect in Scotland of virtually excluding children under twelve from labour in the mines.<sup>50</sup> A growing awareness among employers and trade unions of the scandal or disadvantages of child labour probably helped to accelerate the run-down of the practice in Scotland, although it remained a subject of considerable concern in the 1860s. By 1873 in the

48. Statistical Appendix, table 36.

49. Buccleuch MSS, SRO GD 224/649, 'The Workmen employed at Dalkeith Colliery are required to Observe the following Bye-Laws for the Regulations of the Work', September 1862.

50. Youngson Brown, 'Scots Coal Industry', 278-9.

East of Scotland division there were 6,571 young persons under sixteen years at work in the industry. This comprised 16% of the labour force - still a significant figure.<sup>51</sup> The vast majority were lads aged between thirteen and sixteen working as hewers. The abolition of female employment, and the gradual diminution in the utilization of child labour was accomplished almost painlessly from the angle of the coal industry's economics. The process was eased by inflows of fresh sources of labour and the adoption of labour-saving techniques.

The increase in the labour supply. The association of working in coal pits with unfree labour, and the expansion of fuel demand during the characteristic period of the Industrial Revolution created a shortage of labour in the Scottish industry by the late eighteenth century. The abolition of serfdom was supposed to rectify the situation. But Bald implied in 1808 that the Act of 1799 had resulted in a net loss of labour.<sup>52</sup> Many colliers wished to depart the occupation so long identified with serfdom, and few were attracted by the high wages of a despised profession. The scarcity of labour was reflected not only in these relatively large earnings, but also by the high feelings of coalmasters who had been victims of 'poaching' by other employers. A contemporary stated in 1805: '... the demand for coal is increasing faster than workmen can be found to supply that demand'.<sup>53</sup> Duckham, however, does not find the evidence conclusive regarding the effect of the 1799 Act on the labour supply. He does state that the worst of the labour shortage in the Scottish coal industry was over by 1825.<sup>54</sup>

By the 1820s the industry was beginning to assume its role as the dumping ground for uprooted peoples. During the course of the next

51. Inspectors of Mines Reports, 1874, Report by R. Moore, 138.

52. Bald, Coal Trade of Scotland, 75, 80. See also, Anon, 'Slavery in Modern Scotland', Edinburgh Review, CLXXXIX (1899), 148.

53. Forsyth, Beauties of Scotland, 276.

54. Duckham, Scottish Coal Industry, 309.

fifty years impoverished weavers, 'cleared' Highlanders, tin and copper workers from Cornwall, and starving Irish peasants entered the industry.<sup>55</sup> They materially effected conditions in the labour market.

Youngson Brown noted that during the coal industry's expansion between 1851 and 1881 the mining population in Scotland increased from 33,083 to 53,741.<sup>56</sup> The Scottish coal industry appears to have experienced only brief or localized labour shortages during most of the period under study, as in 1837, 1866 and 1872-3 when the industry was unusually active. Indeed from the 1840s very slack conditions normally obtained in the labour market. Attempts by colliers to inhibit entry into the industry by restrictive practices were ineffectual. Only in 1887 was it laid down officially that a two-year apprenticeship must be worked before a man was allowed at the coal-face.<sup>57</sup> During the 1860s and again in the late 1870s there is evidence of an almost glutted labour market in Scotland.<sup>58</sup> Underemployment and part-time working were widespread. Often the only restraint on the recruitment of men lay in the provision of houses. In West Lothian the rapid growth of mining in the 1850s was paralleled by some labour shortages, which were associated with a grossly inadequate supply of accommodation.<sup>59</sup>

While the easy movement of labour from other sectors explains the infrequency of shortages, there were also other inherent causes for the coal industry's tendency to approach a state of almost chronic over-supply of manpower in Scotland. A major factor was the industry's leaning

55. See, R.P. Arnot, A History of the Scottish Miners from the Earliest Times (1925), 17; T. Johnston, A History of the Working Classes in Scotland (fourth edition 1946, originally published Glasgow, 1920), 334; Inspectors of Mines Reports, 1867, Report by R. Moore, 175.

56. Youngson Brown, 'Scots Coal Industry', 194.

57. Coal Mines Regulation Act (16 September 1887), 50 and 51 Vict, Cap lviii.

58. Youngson Brown, 'Scots Coal Industry', 19-20, 55, 192, 204.

59. Geddes Records, SRO CB10/1, J.R. Williamson, 'Report on the value of the Balbardie Mineralfield', 28 August 1854; The Scotsman, 29 May 1862.

towards a condition of excess-capacity. Major investment decisions were often made in the optimistic atmosphere of a boom, were largely irrevocable, yet were realised only up to ten years later in a far less favourable economic climate.<sup>60</sup> Faced with this last situation Scottish coalmasters typically tried to cut costs through labour-saving innovations.<sup>61</sup>

Another factor which on balance contributed to fluid conditions in the labour market was the high degree of mobility of the nineteenth century Scottish miner. Of course this could take him away and out of the mining sector. An estimated 59,000 miners and quarrymen left

Scotland between 1863 and 1872.<sup>62</sup> Many showed occupational mobility.

William Duncan, a miner of Whitburn, became a builder and let houses in West Lothian about 1860 (only to see them damaged through underground subsidence!).<sup>63</sup> Usually the miners who left the industry found similar

industrial employment, for example as railway workers in 1874-5,<sup>64</sup> rather than becoming petty entrepreneurs.

But the chief effect of the miners' mobility was a movement of labour to those areas where the first signs of shortages were beginning to occur. From 1837 to the mid-1850s Mid

and East Lothian colliers left the two counties intermittently for the more active coal and iron works to the west, sometimes causing a local

tightness in the labour market. In 1854 Kinneil Ironworks (West Lothian) was working double-shifts, their owners 'drawing a great part of the men

from the Mid and E. Lothians for that purpose'. In November 1857 the

60. Youngson Brown, 'Scots Coal Industry', 113-5, 173-6.

61. Inspectors of Mines Reports, 1868, Report by R. Moore, 149; Ibid, 1871, Report by R. Moore, 119; Report from the Select Committee on Coal, (PP 1873, X), evidence of A. MacDonald, QQ 4683-7.

62. An estimate cited by Youngson Brown, 'Scots Coal Industry', 201.

63. SRO, CS 248/898, (Hamilton v Turner et al), Record, 2 March 1865; First Devision, Reclaiming Note, 16 July 1866, evidence of William Hamilton.

64. Inspectors of Mines Reports, 1876, Report by R. Moore, 185.

Tranent colliers were 'never more migratory', 67 leaving on one day 'to go to England and other places'.<sup>65</sup> The migratory instincts of the collier were also found in workers at the ironworks.<sup>66</sup>

But the Lothian coalfields could also draw labour. English and Fife men were brought to East Lothian about 1830, and Lanarkshire miners occasionally appeared in West Lothian.<sup>67</sup> Within the region significant increases or decreases in parish populations between 1821 and 1841 were attributed to alterations in the tempo of local mining activity.<sup>68</sup>

Another intrinsic cause of slackness in the labour market arose from the different sectors for which the homogeneous labour force toiled. One part of the labour force raised shale and coal for the oil industry, another part ironstone and coal for the iron industry, and another part coal for sale on the open market. Rarely did market conditions synchronize in the three sectors. Thus one sector could shed labour to another where the labour demand was relatively greater. For instance in 1866 sale coalmasters were taking up all hands from the pits of the ironmasters, who were faced with a much less favourable market for their finished product than the sale coalmasters.<sup>69</sup> In 1868 an estimated 3,000 shale miners were thrown out of the depressed oil sector to search for work in the coal pits. The coal trade was described by The Scotsman as 'very steady', and the men relieved from both the depressed shale and ironstone mining sectors, could be employed if only they were prepared to work short-time.<sup>70</sup>

65. Buccleuch MSS, SRO GD 224/512, H. Cadell to Duke of Buccleuch, 16 February 1854; Cadell MSS, H.F. Cadell to H. Cadell, 9 November 1857.
66. SRO, CS 248/1912, (Fox or Richardson et al v Wilson & Co), First Devision, 8 December 1865, evidence of various workers at Kinneil Ironworks, 6-11.
67. McNeill, Tranent and its Surroundings, 37, 209-210; Cases decided in the Court of Session (Edinburgh, fourth series, vol 4, 1876-7), Stewart v Coltness Iron Co, 1877, 952.
68. Population Censuses, 1821, 1831, 1841, Enumeration Abstracts for the Lothian counties.
69. The Colliery Guardian, 14 July 1866.
70. The Scotsman, 17 January 1868.

Mining communities had a relatively high birth rate in the nineteenth century.<sup>71</sup> In the light of the above factors it is scarcely surprising that the Scottish coalmasters were able to recruit labour cheaply for most of the period under study. But the crucial ingredient was the influx of the Irish into the Lowlands of Scotland. The flow began to reach appreciable proportions in the 1810s. By the 1830s significant numbers were employed in the Scottish coal industry.<sup>72</sup> It was, however, from the 1840s that the migration reached really large proportions and exerted a downward pressure on wages in the mining industries. The great migratory period lasted until the 1870s.<sup>73</sup>

It is well known that the poverty-stricken Irish made willing workers, prepared to accept very poor conditions and small wages. At first they were employed as bearers or oncost workers in the coal industry, but increasingly as time progressed as hewers as well.<sup>74</sup> The Irish came to the Lothians initially as seasonal workers in agriculture, and then in sizeable numbers as 'navvies' on the canals and railways.<sup>75</sup> They did not necessarily remain in the district after the completion of these projects, although many were attracted by the multivarious industries of Edinburgh and Leith to move there. By 1851 Edinburgh had the second largest proportion of Irish-born in its population among Scottish cities after Glasgow.<sup>76</sup> After the 1840s the Irish found work in the pits of West Lothian, although in 1841 the proportion of Irish-born

71. See, Youngson Brown, 'Scots Coal Industry', 193-4; A.K. Cairncross, 'Internal Migration in Victorian England', The Manchester School of Economic and Social Studies, vol 17 (1949), 78, 81.

72. Home Office, Correspondence and Papers, Scotland, SRO RH 2/4, 120, 'Report of the Committee appointed by the county meeting of Renfrewshire ... for the purpose of enquiring and reporting Irish pauper Immigrants', 30 April 1818; Arnot, History of Scottish Miners, 17.

73. S. Tremenheere, Report of the Commissioners of Mines, 1848, 13; Inspectors of Mines Reports, 1851, Report by M. Dunn, 7; Johnston, Working Classes in Scotland, 334; Youngson Brown, 'Scots Coal Industry', 204; Report on Coal, (PP 1873, X), evidence of R. Moore, Q1853.

74. Ibid, evidence of R. Moore, QQ 1853, 1872-3; Report from the Select Committee on Accidents in Coal Mines, Third Report, (PP 1854, IX), evidence of D. Landale, Q2870.

75. J.E. Handley, The Irish in Scotland (Glasgow, 1947), 18-19; SC on Railway Labourers, (PP 1846, XIII), evidence of W. Reed, Q416.

76. D.F. MacDonald, Scotland's Shifting Population 1770-1850 (Glasgow, 1937), 84, 160 Map C.

in the county was only 4.9% as against 11% in Lanarkshire.<sup>77</sup>

Investigation of census material would reveal further the extent of the Irish presence in the Lothians' coal industry; for the present reliance has been made on documentary evidence.

The Irish appear to have been almost absent from the collieries of Mid and East Lothian up to the 1870s. The surnames of the colliers working at Dalkeith Colliery seem to have remained typically Lowland Scot up to that decade. Despite the importance of Edinburgh as an Irish centre, the numbers of Irish-born in Midlothian fell between 1851 and 1881 from 15,317 to 14,767.<sup>78</sup> This is another reflection of the special character of the Mid and East Lothian coalfield, as contrasted with the west of Scotland.

Notwithstanding the probable absence of the Irish, it is evident that the Mid and East Lothians were greatly influenced by the conditions of abundant labour supply which effected the Scottish coal industry as a whole. The Scottish labour market in coal mining, then, was well stocked - as far as available evidence goes - between the 1840s and the 1870s. The progressive withdrawal of women and children from the early 1840s was more than countered by the net effect of other developments in the labour market, above all the increase in the supply and the high mobility of miners.

#### Wages and Work-Load

In a very labour-intensive and competitive industry like coal mining wages necessarily bore a close relationship with wider economic conditions. Coal prices and piece rates at a number of Midlothian collieries moved in close sympathy with one another.<sup>79</sup> In the industry

77. Handley, Irish in Scotland, 65.

78. Youngson Brown, 'Scots Coal Industry', 19-20.

79. See, for example, Statistical Appendix, table 42.

it was accepted that such a relationship would have to obtain, although there were different points of view as to its exact expression.

Within the limits set by broad economic conditions the individual hewer's piece rate would be determined by the technical and geological situation at the coal-face. For example at Dalkeith Colliery in 1854 the cutting price at a second-class parrot seam was reduced from 3s 1d to 2s 1ld per ton solely on account of it being 'easily wrought'.<sup>80</sup>

Social-industrial customs also influenced the daily wage of the individual hewer. The tradition of the 'darg' struck deep roots in the mining communities of Scotland, albeit more in the west than in the Lothians. It was a restriction of all personal outputs to an agreed level.<sup>81</sup> The darg had perhaps two main objectives: to limit total coal production in order to exert an upward pressure on wages; and for egalitarian motives to bring all colliers, weak and strong, down to the same wage. Management even acknowledged the concept after a fashion.

At New Craighall Colliery in 1831 colliers received a common weekly sum.

If they had been effectively overpaid for the work actually done, they had to work extra later to make up; if they 'overworked' they would receive the full proportion of their wage afterwards.<sup>82</sup> Obviously management did not support the darg as a method of restricting output, especially in the light of its use by the unions as a means of industrial action. For the men the policy was replete with contradictions, as for instance between its long-term aim of raising wages, and the immediate execution of the policy which reduced them.

It may have achieved some egalitarian levelling of wages in the long run.

80. Buccleuch MSS, SRO GD 224/512, H. Cadell to Duke of Buccleuch, 16 February 1854.

81. See, Bremer, Industries of Scotland, 21.

82. Midlothian Sheriff Court Decrees, SRO SC 39/7, 3530, (Hope v Muir et al), Pursuers Proof, 20 March 1834, evidence of George Phinn.

Such were the chief economic, technical and social determinants of wages. To calculate and compare actual colliers' earnings between districts is hazardous because of different deductions and allowances. One element which commonly reduced wages was the coalmasters' policy of persistently underweighing hewers' output, or resorting to petty rules which had the same effect, such as disallowing payment for coal not wrought in a rigidly specified way. The tactic soured industrial relations and contributed to strikes.<sup>83</sup> Fines and interest on credit advanced were among other deductions. There were stoppages for tools, schooling and doctors' expenses, for which the colliers obviously received some benefit. In the Lothians cheap housing, cheap fuel and gifts on festive occasions must be borne in mind when terms of employment are under discussion. Absenteeism, unemployment and underemployment further complicate the problem. A summary impression is that absenteeism was a common feature in the Scottish coal industry up to c1840, and underemployment in the 1860s and late 1870s.

While not overlooking such items which cumulatively must have had a significant impact on colliers' living standards, it appears worthwhile to focus attention on colliers' piece rates, and the weekly earnings which they yielded. From Midlothian colliery accounts, which are rich in raw data, contemporary statements, and other estimates of miners' wages, a fairly good picture can be built up of the behaviour of wages in Midlothian between 1815 and 1875.<sup>84</sup>

In the early nineteenth century Midlothian was a high wage area in the Scottish coal industry, and the Scottish coalfields were in Britain.<sup>85</sup> This was the outcome of the labour shortage and economic

83. See, chapter nine, p.279.

84. The generalizations on wages below are based on an examination of material in the Statistical Appendix, and a number of other sources including, Bald, Coal Trade of Scotland; The Scotsman; Children's Emp Comm, First Rept, (PP 1842, XV); S. Tremenheere, Report of the Commissioners of Mines, passim; Report on Coal, (PP 1873, X); and Youngson Brown, 'Scots Coal Industry', 219-28; Duckham, Scottish Coal Industry, chapters 9-10; Arnot, History of Scottish Miners.

85. Duckham, Scottish Coal Industry, 269.

expansion. The 'servile community' was more deeply entrenched in the Lothians than elsewhere. In the following decades the Lothians rapidly lost their high-wage status, and by 1850 had become if anything a relatively low-wage area in Scotland. An impression is that regional differences in wages were everywhere declining, without being eliminated. The state of the labour market naturally influenced wage trends significantly.

In 1800 Midlothian piece rates for hewers were typified as being 2s 2d to 2s 3d per ton, as against Lanarkshire rates of 10½d to 1s 2d.

In 1809 Midlothian average piece rates were reckoned to be 3s 4d per ton, compared to Tyneside rates of not more than 1s 1½d.<sup>86</sup> At the Marquis of Lothian's mines between about 1815 and 1820 average collier earnings fluctuated between roughly £1 and £2 per week, which compares well (in money terms) with later experience.<sup>87</sup>

S.J. Chapman's calculations of the course of wages in certain occupations indicate that while money wages in the Northumberland and Durham coalfield doubled between 1790 and 1840, in the 'south of Scotland' coalfield they rose by only 3%, and tumbled from a high peak in the 1810s.<sup>88</sup>

Wage movements in the Midlothian coalfield between 1820 and 1870 can be summarized briefly. Wages fluctuated violently. In good years 5s per day or 25s to 30s per week might be earned, and in bad years about 2s to 2s 6d per day and possibly under 10s per week. There is insufficient evidence to assess whether any decade contained a higher than average number of good or bad years. The impression is that there were no very great changes in their distribution throughout the period.

86. Stewart, Supplement to a Plan, 57; Stewart, Scots and English Coal, 36-7.

87. Statistical Appendix, tables 17-25.

88. S.J. Chapman, 'The Course of Average Wages between 1790 and 1860', Economic Journal, vol 9 (1899), 591.

The sequence was broken only in the exceptional boom of 1872-3.

One contemporary report put 'Miners' Wages in Scotland' at 20s per week in 1870, 26s in January 1872, and 42s 6d by March 1873.<sup>89</sup> Between July 1870 and October 1872 piece rates for parrott coal at Grange Colliery grew from 2s 8d to 8s 10d per ton, and for the 'Siller Willie' coal at Dalkeith Colliery from 2s 3d to 5s 3d per ton.<sup>90</sup> Between 20 December 1872 and 23 May 1873 average fortnightly hewers' wages at Brunstane Colliery were £4 8s 1d.<sup>91</sup> The 'golden days' passed quickly. Scottish miners' wages fell steeply in 1874-5 and were soon back to levels as low as almost any in the nineteenth century.

Associated with the relatively high wages of the Lothian collier in the early nineteenth century were very irregular working habits and high absenteeism. The Midlothian collier's working behaviour followed virtually no pattern - even in his choice of days of relaxation. There were wild aberrations in hours worked from day to day. Until the early 1840s under certain circumstances up to 18 hours a day might be worked, an average of 8 hours for the working day was sometimes referred to, and attempts were made to enforce 10 to 12 hour shifts. The number of days worked in the fortnight was in the region 8 or 9, but fluctuated greatly.<sup>92</sup>

It was this unpredictable attendance at work which stringent colliery regulations were intended to break. Perhaps as effective in taming 'pre-industrial' working habits was technical change. There is a piece of evidence which indicates that the rhythm of colliery machinery did dictate to some extent colliers' attendance at work.<sup>93</sup> The manager of

89. The Scotsman, 16 May 1873.

90. Cadell MSS, H. Cadell et al, Black Note-Book; Buccleuch MSS, SRO GD 224/547-8, Dalkeith Colliery Account Vouchers, 1869-73.

91. Clerk of Penicuik MSS, SRO GD 18/1154, Brunstane Colliery Account Vouchers, 1869-73.

92. The conclusions on work-load are based on the same sources as noted in foot-note 84. See especially Statistical Appendix, tables 27, 34.

93. Statistical Appendix, table 45.

Dalkeith Colliery looked forward in 1843 to greater regularity of working following the installation of a winding engine.<sup>94</sup>

During the third quarter of the nineteenth century, although Hogmanay and the summer fair would still play havoc with attendances, it is clear that working patterns were becoming more steady. Evidence suggests that as 1870 approached a 10 hour day and a 10 day fortnight were becoming normal in Midlothian, although exceptions were not infrequent.<sup>95</sup> In the early 1870s high wage rates and strengthened trade unionism brought a temporary reversal to an 8 hour day and 8 or 9 day fortnight.<sup>96</sup> By 1874, however, there was a return to the earlier patterns.

More effective management without doubt played its part in enforcing more consistent attendance in the 1850s and 1860s. But there is a suspicion that management's hand was supported by the desire of the miners to mitigate the effects of any downward pressure on wages, produced by the increase in the labour supply, by more regular attendance at work.

### Conclusion

Employers in the Lothians' coal industry imposed strict regulations on their colliers in the early nineteenth century, partly doubtless to counteract 'pre-industrial' working customs. How successful management was at first in carrying out this presumed objective is questionable, as

the men were able to indulge in erratic attendance at work in an environment of high wages and labour scarcity. These habits persisted

94. Buccleuch MSS, SRO GD 224/582, J. Wright to Duke of Buccleuch, 4 January 1843. The engine's hours of operation would limit the ability of hewers to work in spasmodic bursts.

95. Eg, Dundas of Arniston MSS, D. Landale, 'Report on Largoward and Polton Collieries and Quarry', 28 June 1871; *The Scotsman*, 18 April 1870 (letter from A. MacDonald).

96. Cadell MSS, 'Stirling and Linlithgowshire Miners' Association, Quarterly Balance Sheet, showing Income and Outlay', 9 June to 9 September, 1873.

until the 1840s, although the conditions which had encouraged them had by then disappeared.

With an increase in the labour supply in Scotland, money wages fell from the high levels of the 1810s. This development compounded later by the impact of technical change, led, it would appear, to more regular working patterns, even if this did not become apparent until after 1850. By then it was, therefore, not so necessary for employers to so minutely supervise and discipline the labour force. Nevertheless, especially in West Lothian, certain devices of exploitation were retained and developed by employers, noticeably truck and the under-weighting of hewers' outputs. In Midlothian where the master-worker relationship was more traditional and 'old-fashioned' than to the west, such aspects of labour subordination were in fact largely dispensed with.

The coalmasters of Mid and East Lothian could obtain some of their objectives in this sphere by acting as paternalistic employers, and receive obeisance from the colliers. In the Mid and East Lothian coal-field in the 1850s and 1860s social conditions were perhaps better than in the west, wages fluctuated less, but were probably lower on the whole.<sup>97</sup>

Brian Lewis and others have indicated that relative to other occupations colliers were well paid in the nineteenth century.<sup>98</sup> An addendum, which this study suggests is necessary to such a statement, is that for the Lothians up to 1870 there is very little evidence of an improvement in money wages. Periodic underemployment and bad working conditions were two factors to set against relatively high wages during booms. Possibly a close investigation of living standards would reveal trends not suggested by the findings so far. The present feeling is that if the Lothian colliers' 'lot' improved between 1815 and 1870 it was the result of small gains in social, sanitary and educational facilities, rather than an increase in real wages.

97. Youngson Brown, 'Scots Coal Industry', 228.

98. B. Lewis, Coal Mining in the Eighteenth and Nineteenth Centuries (1971), 45.

## CHAPTER NINE

### TRADE UNIONS

## CHAPTER NINE. TRADE UNIONS

### Introduction

The establishment of an effective trade union movement in the Scottish coalfields was an arduous process. In surveying the scene in 1875, with the collapse of organisation, recent cuts in wages, and an extension of the working day, it would not be difficult to finish on a negative note, and decide that the movement had accomplished very little. Such a conclusion, however, compares later union strength with the situation in a slump year, and disregards great strides that had been made over the preceding seventy-five years of the century. It overlooks legislative gains, and the ground-work that had been painfully laid for subsequent achievements in trade union organisation, and union-employer relationships. The servile bondsman of the 1800s contrasted to the militant union-member of the early 1870s exemplifies the change in miners' consciousness that had taken place. But the process in the 1870s was far from reaching fulfilment. Divisions within the Scottish miners remained great. Ethnic and sectarian differences, and the dissimilar social and economic structures of the various coalfields debilitated efforts to achieve cohesive union action among the miners. For example the movement in West Lothian followed a different path from that adopted in the more industrialised districts such as Fife and Lanarkshire in Midlothian, which from the mid-1840s to early-1870s was a comparatively pacific district.

Apart from a few documents such as union rule-books, no trade union records of relevance for this study have been discovered. The account has been constructed with the aid of secondary authorities, from newspapers and manuscript sources.

### Early trade unions in the Lothians : 1815-48

The beginnings of organisation to 1842. The impression which a

number of writers give of trade union development in the Scottish coalfields

during the first half of the nineteenth century is that very little of importance was achieved.<sup>1</sup> While it is correct to emphasize the nature of trade union organization in this period - its ephemeral and secretive character, and the rarity of successful strike action - yet it is also appropriate to stress that this was an important period in the emergence of organization. Duckham had demonstrated that before 1815 confrontations between labour and capital in Scotland were spasmodic in occurrence and unrelated to one another.<sup>2</sup> From the obscurity of this period the Scottish miners rapidly reached by the 1820s and 1830s a level of militancy and organization, beyond which further advance was very laborious over the next fifty years. In 1824-5, 1835-7 and 1842 there were inter-district miners' strikes and combinations in Scotland almost of national proportions. The culmination of this growth were the agitations of 1842. The Lothians were quite fully involved in these movements.

From 1842 to 1848 the Miners' Association of Great Britain and Ireland holds the stage, although these years witnessed in the Lothians a 'de-escalation' of union activity. After 1848 the Mid and East Lothian miners' bodies were often out of tune with the thrust of developments elsewhere in Scotland.

Between 1799 and 1824 the Combination Laws were in force. It is true that the laws themselves introduced little that was new in the British legal system. Workmens' combinations had been illegal before 1799. In Scotland in particular there was ambiguity as to the application of the laws, and according to W.H. Marwick most prosecutions against trade unions continued to be based on common as opposed to statute law.<sup>3</sup> However the Combination Laws did underline the atmosphere of the period, and the alarm of the authorities at any form of political

1. See, Youngson, 'Scots Coal Industry', 205; Campbell, 'Honourable Men', 1.

2. Duckham, Scottish Coal Industry, 304-6.

3. W.H. Marwick, A Short History of Labour in Scotland (Edinburgh, 1967), 6-7.

or industrial agitation, against which they took the most repressive action.

In view of the constraints against any form of trade union activity, workers' associations often disguised their existence as friendly societies. There is no evidence to suggest, however, that early friendly societies of Midlothian colliers behaved in this way.<sup>4</sup> Despite the repression there was much unrest in the Scottish coalfields in this early period, often in connection with political agitation. The colliers of Tranent, East Lothian were involved in violent disturbances of a political nature in 1797.<sup>5</sup> In 1817 it was considered necessary to have sworn in several hundred extra constables in Midlothian and Dumfries because of the situation - possibly, among other parts, in the coalfields. The colliers were certainly the origin of a 'spirit of insubordination' in Clackmannan and Kinross in that year.<sup>6</sup> There was also much industrial unrest among the miners, for example in Lanarkshire and Ayrshire.<sup>7</sup> In the Lothians there is no evidence to hand of any industrial action or trade union activity among the miners, until the early 1820s. Doubtless legal penalties and the instruments of social control were effective deterrents against industrial unrest in the coalfield of Mid and East Lothian; in addition the district was still a high-wage area.

But from the early 1820s the Lothian miners were involved frequently in industrial conflicts, which in many cases were clearly associated with wider movements. The Scottish miners' combinations in these early decades were faced with many tasks: to build the foundations

4. Report of the Committee of the Highland Society to inquire into the State of Friendly Societies (1820), Transactions of the Highland Society, vol 6 (1824), Appendix, table IV.

5. Marwick, History of Labour in Scotland, 3.

6. Home Office, Correspondence and Papers, Scotland, SRO RH 2/4, 114, Duke of Buccleuch to Lord Viscount Sidmouth, 5 February 1817; RH 2/4, 121, Letter to the Secretary of State for Scotland, 31 May 1818.

7. Arnot, History of Scottish Miners, 15.

of organisation itself, to reverse wage cuts, and to address themselves to a whole range of potential grievances, including truck, underweighing, and long-pays. But the movement was in its rudimentary phases, and the most that could be expected was to aim for the first two objectives.

The over-supply of labour was already beginning to effect union thinking. Consequently, together obviously with strike action, the main methods of fighting for these ends was through the restriction of personal outputs.

The darg, or 'wee darg', policy appears to have originated about 1824-5 in the aftermath of the repeal of the Combination Acts.<sup>8</sup> It is encountered during many episodes of industrial unrest in Scotland from that time.

From 1823 to 1825 the mining population of Scotland was unsettled, excited by the anticipated repeal of the Combination Acts and the actual repeal. Following strike action, good trade in the coal industry permitted some increases in wages. Much of the unrest was violent and eruptive, reflecting the primitive state of trade union development.

In August 1823 there was 'a violent dispute by the workmen regarding the rate of wages' at Stobhill Colliery, Midlothian. In January 1824 a 'riot' occurred at Gilmerton Colliery in the same district, which was the culmination of a recent series of 'outrages' perpetrated by the colliers, which had resulted in the master conceding to their demands for higher wages and sending strike-breakers back to their homes in Ayrshire. The latter had been subjected to much intimidation: their houses had been broken into and they had been dragged into the fields by night.<sup>9</sup>

In 1824-5 an '... alarming conspiracy and combination amongst the colliers all over Scotland, against the masters for the purpose of forcing them to pay an exorbitant rate of wages' sprang up. This appears to have been a widespread, if loose, colliers' association,

8. Ibid, 17.

9. Dundas of Arniston MSS, J. Geddes, 'Report regarding the operations at Stobhill Colliery', 11 August 1823; The Scotsman, 31 January 1824.

strongest in Lanarkshire and central Scotland. Lothian men were prominent as agitators and delegates, if not in numbers, at the meetings of this combination. Bo'ness colliers advocated the murder of strike-breakers at Redding and Brighton Collieries in Stirlingshire. Certainly during the dispute at these works violence was directed against the 'labourers, weavers, and others' who were employed in place of themen on strike.<sup>10</sup> During the ferment of 1823-5 there was considerable inter-district contacts and support among the colliers. However the bonds of unity were still weak. In the deteriorating economic conditions of 1825-6 the militant stand of the men was smashed. For example in Lanarkshire Lord Belhaven sacked all his colliers demanding a wage increase, and replaced them all - satisfactorily it was maintained - with new hands.<sup>11</sup>

In 1826 and 1828 further 'great strikes' of Scottish colliers broke out.<sup>12</sup> In 1828 the unrest spread from Lanarkshire to Midlothian, and then East Lothian. Restriction of output was being practised in the Lothians. Although 'ring-leaders' in Midlothian were refused employment in 1828, strike action appears to have achieved some advances in wages, and again in East Lothian in 1830. Intimidation was employed against English colliers, resulting from their departure from Tranent.<sup>13</sup> A further strike broke out at New Craighall Colliery, Midlothian in 1831-2. During these disputes inter-regional cooperation of a sort was again achieved, money being raised to finance the strikes from outside the collieries effected. By 1831 a 'County Committee of Colliers' met

10. Home Office, Correspondence and Papers, SRO RH 2/4, 155, Concerning Colliers' Association in Stirlingshire, Declarations of R. MacDonald and others, Copy Disposition of W. Bishop, and Answers by the Sheriff Deputy of Stirlingshire, April 1825; Ibid, RH 2/4, 156, Precognitions of J. Johnston, R. Bauchope, J. Neish and others, April 1825.
11. The Scotsman, 12 November 1825.
12. Johnston, Working Classes in Scotland, 331.
13. The Scotsman, 27 February, 1 and 5 March 1828; McNeill, Tranent and its Surroundings, 209-210.

periodically in Midlothian.<sup>14</sup> The New Craighall Strike of 1831-2, however, was decisively beaten.

Against the back-cloth of the reform agitation, discontent continued to simmer in the Scottish coalfields in the early 1830s. In West Lothian irregular working and stoppages by the colliers at Grange <sup>were</sup> was reported in 1832. The Scottish coal industry, however, was now in a state of deep depression, and the employers were using the Irish liberally to break strikes.<sup>15</sup>

The men fought back with the darg, and in 1835 with an attempt to organise workers throughout Scotland in a General Union of colliers. In 1835-7 trade was recovering smartly. For a time the colliers' combinations were better organised than those of the masters', and the men drove all before them, for example in 1836 in West Lothian and at Newbattle Colliery, Midlothian. Wages were pushed up to 5s per day by 1837.<sup>16</sup> In that year the most widespread stoppage yet in Midlothian's history took place. The funds of a colliers' Friendly Society in Dalkeith were used to aid the strike, but in vain.<sup>17</sup> Towards the end of the year coalmasters throughout Scotland took the upper hand. The boom was well passed its zenith, but the Scottish colliers were being replaced by the Irish, wages were cut, strikes defeated, and trade union organisation throughout the country mutilated.<sup>18</sup> There was a brief stoppage at Dalkeith Colliery in July 1838, but the miners had been mauled the previous year. No further industrial confrontations appear

14. Midlothian Sheriff Court Decrees, SRO SC 39/7, (Hope v Muir et al), Copy Summons and Citation, 19 December 1831; Defences for Sir John Hope, January 1832; Pursuers Proof, evidence of G. Phinn and others, 20 March 1834.
15. Cadell MSS, H. Cadell, Journal, 1832-1834, entries for 17 November and 17 September 1832; Johnston, Working Classes in Scotland, 331-2; Records of Lord Advocate of Scotland's Department, SRO AD 14, 31/302, 1831.
16. The Scotsman, 8 November 1837; Bremner, Industries of Scotland, 24; Murray, Letter to Lord Provost, 24-31, which includes in full the 'Articles and Regulations of the Operative Colliers' Union' in Scotland.
17. Children's Emp Comm, Appdx to First Report, (PP 1842, XVI), pp. 403, 405, paras. 100-1, 107.
18. Bremner, Industries of Scotland, 24; Arnot, History of Scottish Miners, 17-18.

to have broken out in the Lothians until 1842, reflecting the relative quiescence of the Scottish coalfields as a whole.

By 1842 the trade union movement in the mining industry in Scotland had come a long way since the early part of the century. There was a tradition of union activity and county associations evidently superior to that in England. Since 1824 there had been an appreciable amount of cooperation between districts. The length of many of the strikes reflects a militant mood and degree of organisation that could not be taken lightly by the coalmasters. The Stirlingshire disputes of 1824-5 lasted about five months, and strikes in East Lothian in 1829 up to twenty weeks and in Midlothian in 1837 up to four months at certain collieries. Nevertheless mining unionism in Scotland up to the early 1840s exhibited many signs of immaturity. The use of physical force or intimidation was rife, not only against strike-breakers but also against the colliers' colleagues who were less than enthusiastic in their support of the cause. At the least these episodes suggest a considerable lack of unity among the miners. Anonymous acts of sabotage were not rare, and appear to have taken place at Midlothian collieries in 1828 and 1831, and at Grange Colliery in 1832. Another symptom of weakness was the resort of the miners to organisations, whose proceedings took place in an air of mystery and were replete with secret signs, grips, and pass-words. These were the appurtenances of the 'free brethern of colliers' or 'brothered colliers'. Brotherings were common in Stirlingshire in 1824-5, New Craighall in 1831, and are encountered in Midlothian in 1842. While the ceremonies and oaths of brothered colliers may have been part of their 'moral culture',<sup>19</sup> it is also true that such customs fell out of use when trade unionism felt itself strong in organisation and in relation to the law. Moreover in Scotland the

19. E.P. Thompson, The Making of the English Working Class (Penguin edition, 1970), 511.

colliers' secret societies originated in response to the arrival of Irish immigrants in the coalfields of Ayrshire and Lanarkshire after 1815.<sup>20</sup>

The influx of Irish soon created deep divisions within the labouring population of the Scottish coalfields, and made the formation of stable unions an extremely difficult task. The unions which were flung up, indeed, showed themselves incapable of surviving a sharp downswing in the trade cycle. The miners, however, had had considerable experience of militant union activity. It was in this condition that the Scottish colliers entered the eventful year of 1842.

The Age of the Miners' Association, 1842-8. In 1842 a desperate and prolonged struggle broke out between the coalmasters and colliers of Mid and East Lothian. This was but one incident in the great eruption of disturbances which afflicted the Scottish coalfields in that year. Deteriorating economic conditions and cuts in wages guaranteed industrial unrest. But the extremely strained atmosphere which pervaded the mining districts was also, without doubt, related to wider events. The initial steps in the creation of a national (British) union of mine-workers was being taken. But it was surely the violent political and economic struggle between sections of the working-classes led by the Chartists, and those who wished to preserve private property and established authority, that raised tension throughout Britain in 1842. Yet, on the basis of the evidence to hand, any connection between Scottish miners' unions and Chartism before 1842 was tenuous.<sup>21</sup>

During 1842 wages were cut in the Scottish coal industry from 2s 6d to 1s 8d per day according to Bremner.<sup>22</sup> Through the summer and

20. Campbell, 'Honourable Men', 14.

21. See, A. Wilson, 'Chartism', in J.T. Ward (ed), Popular Movements C1830-1850 (Bungay, 1970), 118; Arnot, History of Scottish Miners, 18; The Scotsman, 22 June 1839, 30 September 1840, 26 May 1841.

22. Bremner, Industries of Scotland, 24-5.

autumn the coalfields were wracked by disputes. By 13 August the unrest had spread from Lanarkshire to Mid and East Lothian, and the ensuing dispute in the two counties was not totally resolved until 26 November.

The Mid and East Lothian strike of 1842 is extremely well documented.

A close case study therefore seems justifiable, especially in the light of the fact that it was the last great strike in the district for thirty years.

At the outset the unrest was sparked off by the agitation of miners' representatives seeking support for strikes in Lanarkshire. But the

subject of well-attended meetings of Lothian men in Mid-August soon turned to their conditions: a demand was made for 4s for an eight-hour day.

By 17 August the stoppage had become general in Mid and East Lothian.<sup>23</sup> Towards the end of the month there was a partial return to work.

The strike became almost universal again following further wage cuts, and agitation by more militant East Lothian colliers in Midlothian - 'most of them had stones in their pockets ... supposed to be delegates'.<sup>24</sup>

During September desperation and hunger visited the strikers.

Feelings ran high. To the county union miners carrying walking-sticks were to The Scotsman men 'armed with bludgeons'.<sup>25</sup> By mid-October the colliers were destitute, they had sold all their furniture and clothes, and their 'credit' was exhausted. Nevertheless when the strike began to crumble during October it was in the context of small advances being granted to the men at a number of smaller collieries, mostly those worked

by tenants.<sup>26</sup> The obstinacy of both sides was greater at the bigger works of the landed coal proprietors. The last collieries to hold out

23. The Scotsman, 13 and 17 August 1842; Buccleuch MSS, SRO GD 224/582, Sir J. Hope to Duke of Buccleuch, 14 August 1842; G. Spiers to Duke of Buccleuch, 18 August 1842, and other correspondence.

24. Ibid, Sir J. Hope to Duke of Buccleuch, 21 August 1842; The Scotsman, 24 August and 28 September 1842.

25. The Scotsman, 1 October 1842.

26. Buccleuch MSS, SRO GD 224/582, various correspondence between Duke of Buccleuch and J. Wright, R.S. Moncrieff, and others, 1-20 October 1842.

were those belonging to the Duke of Buccleuch, the Marquis of Lothian, and R.B. Wardlaw-Ramsay. The men returned to work only after they had secured small wage increases. The management which was the last and most reluctant of all to concede anything was at the works of the great paternalist, the Duke of Buccleuch.<sup>27</sup>

As it transpired the colliers had been outmanoeuvred by the coal-masters. The increased wages were conditional on a certain (artificial) level of coal prices being maintained, as it was made clear to the men. When prices slumped again wages were cut to even lower levels between December 1842 and March 1843. This time the dejected colliers offered no resistance.<sup>28</sup>

The course of the strike illuminates well some important themes:

1. the level of union organisation, 2. the coalmasters' methods of fighting strikes, 3. the law and order question, and 4. Chartist connections.

1. As already noted a tradition of county organisation had already been established in Midlothian before the strike. During the summer and autumn of 1842 a 'County committee' of the 'Combined Colliers' of Mid and East Lothian was in operation. Its funds must have been moderate, as it was only by the latter part of October that they became exhausted, (by which time Friendly Society funds were also being tapped). In the summer inter-district contacts were good. Meetings were held of representatives from '... all the collier districts in the Kingdom' (presumably Scotland) so that 'a perfect understanding' would take place. But during the autumn the effectiveness of inter-district action declined markedly.<sup>29</sup>

27. Ibid, various correspondence between Duke of Buccleuch and J. Wright, A. Hope, and others, 20 October - 10 November 1842; Ibid, Box 649, J. Wright to Duke of Buccleuch, 2 December 1842; The Scotsman, 26 November 1842
28. Buccleuch MSS, SRO GD 224/649, J. Wright to Duke of Buccleuch, 5 and 30 December 1842.
29. Buccleuch MSS, SRO GD 224/582, Copy letter sent to Colliers Committee at Dalkeith, 9 September 1842; Replies from Police Superintendents of Linlithgow (5 December 1842) and Alloa (1 December 1842) to Questions sent out by A.J. List, Edinburgh County Police Superintendent; G. Spiers to Duke of Buccleuch, 18 August 1842; J. Marshall to Duke of Buccleuch, 4 October 1842. The Midlothian union also hired a 'legal advisor', circulated placards etc.

The dispute mirrored many of the difficulties facing the Scottish trade union movement in the coal industry in the first half of the century.

Delegates understood the need for solidarity and co-ordinated action, but little was achieved practically. Most strikes were conducted, and certainly resolved, on a district basis. No major break-through in organisation had occurred since the mid-1820s.

2. The Lothian coalmasters had no sympathy with the strikers. There was only a desire to crush the dispute. The paternalist employers might show benevolence in the provision of social amenities, but they tolerated no challenge to their authority.

The employers as a whole took a number of measures to defeat the strike. The first step was to arrange meetings amongst themselves.<sup>30</sup> These were less effective than they might have been because the attitudes of the large aristocratic coal owners were more intolerant than those of the tenant coalmasters.

Secondly, steps were taken to change their position from a defensive to an offensive one. Strike-breakers were collected from the 'highways and by ways', including some of the '... most worthless characters about Dalkeith'. The impact of these measures was compounded by the eviction of the colliers and their families from colliery houses. Both these devices were in widespread use by the Lothian coalmasters. Strike-breakers were protected by the police from intimidation.<sup>31</sup>

Thirdly, the offensive action was subsequently followed up by victimization. This was done more selectively, but after the Strike the 'ring-leaders' at Arniston, Dalkeith, and Newbattle collieries were denied employment in the district.<sup>32</sup>

30. The Scotsman, 15 October 1842.

31. The Scotsman, 8, 12 and 15 October 1842; Buccleuch MSS, SRO GD 224/582, Duke of Buccleuch to G. Spiers, 7 October 1842; Ibid, Box 649, J. Wright to Buccleuch 19 and 28 October 1842; Hon. J. Talbot to Buccleuch, 10 November 1842, and other correspondence.

32. The Scotsman, 26 November 1842.

3. One reason why the employers were so aggressive in their reaction to the strike was because in common with 'the authorities' throughout Britain, they believed that the groundswell of violent unrest in the country represented a threat to the system of government itself. The normal forces of law and order were incapable of coping with the situation:<sup>33</sup>

In Airdie, a typical turbulent Scottish town, one superintendent and four constables attempted to control a mining community which, with surrounding areas, numbered 33,000 people.

In the Lothians the situation was certainly little different. (In West Lothian in 1856 the entire county police force of eight men was not able to maintain order during a colliers' strike unassisted.) As Challinor and Ripley state:<sup>34</sup>

Inadequacy of the police force meant that it was impossible to have a graduated deterrent. When the authorities were confronted with a challenge they were inevitably pushed into taking the most extreme counter-measures.

The Lothian colliers were in a belligerent mood. On two occasions large gangs of them attacked the police and rescued prisoners, who had been arrested for stealing vegetables from the fields. Intimidation was used against fellow-colliers who did not wish to join the strike, often with effect. By 1 October 1842 eighteen Midlothian colliers had been apprehended for a variety of offences such as intimidation and assaulting the police.<sup>35</sup> It is noteworthy that there was an unprecedented outbreak of lawlessness amongst the Scottish colliers in 1842, with many crimes committed - ranging from house-breaking to serious sexual offences, as

33. R. Challinor and B. Ripley, The Miners' Association, A Trade Union in the Age of the Chartists (London and Southampton, 1968), 33.

34. *Ibid.*, 34.

35. Records of the Lord Advocate of Scotland's Department, SRO AD 14, 42/356, (High Court Indictment and Precognitions, 1843); Buccleuch MSS, SRO GD 224/582, 'List of Persons against which warrants have been issued', 1 October 1842; R.S. Moncrieff to Duke of Buccleuch, 27 September 1842; a 'Police Report, Edinburgh', 25 September 1842, stated that the strikers had become '... so daring and reckless that the civil power without the aid of the military was insufficient to check them'.

well as offences which had occurred in relation to industrial disputes.<sup>36</sup>

It was only the arrival of the military in some force in the Mid and East Lothian which stopped the apparent drift into anarchy. By the end of September 70 troops had been stationed at Newbattle alone, and more detachments arrived in the following days.<sup>37</sup> A more repressive policy was embarked on by the authorities. The number of warrants served against colliers increased, the military was employed in aiding the execution of warrants, homes were searched, and vegetable-fields guarded. The new policy evidently achieved its ends. The audacious spirit of the colliers disappeared. Although the Strike continued for a while it was in a mood of sullen obstinacy, and the crisis situation in the county passed.<sup>38</sup>

4. At the start of the disturbances in Midlothian employers believed correctly that they were connected with events in the west of Scotland,

but moreover with 'ramifications still more extensive'.<sup>39</sup> To some extent the Lothian coalmasters were looking for a scapegoat. None better were the Chartists, who were thought at first to be behind the Midlothian strike.<sup>40</sup> Yet the best evidence that the Chartists were involved here is a statement by the Midlothian police chief on 1 October 1842, that Chartists were active at local works, and were seen '... going to the woods with parties of Colliers for the purpose of councilling them privately'.<sup>41</sup>

36. This statement is derived from a casual examination of the Lord Advocate Records. In the first half of the nineteenth century the Scottish colliers, compared to the carters or cotton-spinners, appear a relatively law-abiding lot - the early 1840s excepted. Records of the Lord Advocate of Scotland's Department, SRO AD 14, 31/91-358, passim, 1842.

37. Buccleuch MSS, SRO GD 224/582, Sir R. Kerr to Duke of Buccleuch, September 1842; G. Spiers to Duke of Buccleuch, 29 and 30 September 1842; 'Police Report, County Police Office', 11 October 1842.

38. Ibid, G. Spiers to Duke of Buccleuch, 4 and 18 October 1842.

39. Ibid, G. Spiers to Duke of Buccleuch, 17 August 1842; The Scotsman, 15 October 1842.

40. Buccleuch MSS, SRO GD 224/582, Sir J. Hope to Duke of Buccleuch, 14 August 1842; Duke of Buccleuch to Sir J. Graham, Bt., 17 August 1842.

41. Ibid, A.J. List to Duke of Buccleuch, 1 October 1842.

But a letter from a Lanarkshire miners' representative to his brothers in Midlothian advised them to have nothing to do with politics, and all other evidence suggests that the colliers locally had little interest in the movement in support of the Charter.<sup>42</sup> In Scotland as a whole the county police superintendents, who were ever on the look-out for any connections between the miners' unrest and the Chartists, failed to see any in most cases.<sup>43</sup> A work of 1882 on 'Political and Social Movements in Dalkeith' noted the activity of two 'eminent Chartists' in the district in 1842, but made no reference to the colliers whatsoever.<sup>44</sup> On occasion the Chartists may have attempted to capitalize on the miners' strikes in Scotland, although without much success. It cannot be said for certain whether this was because the miners' leaders disavowed any connection with the Chartists to avert repression and save their organisations from 'strangulation at birth', and this apparent disinterest was merely a facade.<sup>45</sup> There is no evidence that this was the case in the Lothians.

After the failure of the Strike in Midlothian in 1842 much of the interest over the next few years relates to the efforts of the Miners' Association of Great Britain to strengthen its organisation in the locality. In July 1843 two representatives from Tyneside and Lancashire canvassed for support in Midlothian. They found little encouragement, and left the county 'rather disappointed'.<sup>46</sup> By 1844 the Midlothian men were recovering better from the defeat of 1842, and the Miners' Association

42. Ibid, R.S. Moncrieff to Duke of Buccleuch, 17 August 1842; Copy letter from the Miners in the West to those in Midlothian, 25 August 1842.

43. Ibid, Replies from Police Superintendents of various Scottish Counties to Questions sent out by A.J. List, Edinburgh County Police Superintendent, 28 November - 5 December 1842.

44. A. Mitchell, 'Political and Social Movements in Dalkeith, 1831-1882', (Printed for Private Circulation, 1882, deposited at NLS), 31-3.

45. Note, Challinor and Ripley, The Miners' Association, 11-23.

46. Buccleuch MSS, SRO GD 224/582, J. Wright to Duke of Buccleuch, 3 July 1843.

made headway. By February appreciable numbers had joined, although coverage was patchy. A Dalkeith collier showed initiative in the cause of the Association, whereupon he was dismissed by the management. He was then employed by the Association as a lecturer at a guinea per week. During 1844 trade union activity was quite moderate in Mid and East Lothian. Delegates were sent to conferences, and large meetings of colliers were held in the district. There was one strike at Edgehead Colliery. Otherwise, unlike their brethren in other parts of the Scottish and English coalfields, the Midlothian colliers shied away from militant action.<sup>47</sup> In 1845-6 the separatist tendencies of the Scottish county unions came to the fore, and in 1846 they broke away from the Miners' Association. Hit by a number of such reversals the national union could not survive beyond 1848.<sup>48</sup>

Meanwhile the Lothian colliers had been very subdued. From the depths of early 1843 wage advances had been granted unconnected with any trade union activity. In 1848 there were rumours that the Midlothian colliers might join rioters in Edinburgh. These were totally unfounded, stated the manager of Dalkeith Colliery; the men had not been working so regularly for years.<sup>49</sup>

#### The Mid-Victorian Period : 1848 - c1865

The trade union movement in Midlothian and further afield. From the late 1840s there was a subtle re-orientation of British economy and society. The economy had overcome the crises of the Industrial Revolution, and was becoming based on firmer and broader foundations. Employers were able to allow some of the benefits of greater prosperity

47. Ibid, J. Wright to Duke of Buccleuch, 16 October 1843; R.S. Moncrieff to Duke of Buccleuch, 3 February 1844; The Scotsman, 7 August 1844; Challinor and Ripley, The Miners' Association, 73.
48. Ibid, 197-200.
49. Buccleuch MSS, SRO GD 224/582, J. Wright to Duke of Buccleuch, 9 March 1848.

to be passed onto the workers in the shape of better conditions. The labour movement left behind the violent years of Chartism, and became dominated by the 'New Model Unions' with their moderate policies and eager to work for acceptance within the capitalist system.<sup>50</sup>

Insufficient documentation of the labour movement in the Scottish coalfields means that much of what follows is in the nature of hypothesis. It has, of course, been indicated that developments in many sectors, coal mining included, did not conform to the mid-Victorian model of progress and social harmony. The hostility of colliers to employers scarcely abated. Most county associations were organised for strike-purposes, with hardly any wider objectives. Nevertheless the trade union movement in the Scottish coal industry appears to have been entering a new phase. Up to the mid-1840s it was dominated by the fight for an improvement in basic conditions. This bitter struggle often took the form of overt class conflict. After repeated set-backs the movement had become very weak by the early 1850s. When it rose again it was different in kind. At grass-roots levels there was little change, but the movement among the Scottish miners as a whole came more or less under an influential leadership which strove to further the miners' lot within capitalism, and conceived its objectives in much broader terms than just obtaining improved wages.

In fact, in the fields of wages and union organisation any achievements were small before the late 1860s. Partly this was because during the mid-Victorian period centrifugal forces within the Scottish mining population remained powerful. Great differences in social relations and the strength of trade unionism among the Scottish districts can be explained by reference to such factors as the role of the Irish immigrants, markets for coal, the structure of colliery ownership, and

50. See for example, E.J. Hobsbawm, Industry and Empire (Pelican edition, 1972), chapter six. G.D.H. Cole, A Short History of the British Working-Class Movement 1789-1947 (revised edition, 1947), 139-151.

social traditions. Mid and East Lothian was different from West Lothian. Both contrasted with two different Lanarkshire districts examined by A. Campbell.<sup>51</sup> There were probably many patterns of social and labour developments among the Scottish mining districts.

In the Mid and East Lothian coalfield a markedly pacific and individual course was taken by trade unionism between the late 1840s and late 1860s. This contrasts with the earlier period. The men of Midlothian had clearly decided to adopt less militant policies than the miners elsewhere in Scotland. The rationale of this will be returned to later.

In 1849-50 there were turbulent disputes in many parts of the Scottish coalfield. In December 1849 there was one one-day stoppage at one of the pits at Dalkeith Colliery led by a Hugh Cheynd, who was rewarded with dismissal. In the summer of 1850 agitators from Lanarkshire found little sympathy among Midlothian colliers, and despite great struggles in the west the Midlothian men were subdued.<sup>52</sup>

In 1853 there was a revival of interest in unionism in the district. In September four or five hundred colliers attended a meeting, which led subsequently to the appointment of colliery delegates, and the formation of a county union. At the original meeting 'a unanimous dislike to strikes' and a 'favourable feeling' towards labour restriction was expressed. The colliers were 'all sober and separately in perfect good humour'. One of the aims of the new union was to press for the adoption of the rules and regulations which were in force at the Duke of

Buccleuch's Dalkeith Colliery.<sup>53</sup> The preamble of the union's rule-book

51. Campbell, 'Honourable Men'.

52. Buccleuch MSS, SRO GD 224/582, H. Cadell to the Duke of Buccleuch, 3 December 1849, 13 and 17 June, 18 July 1850.

53. Ibid, H. Cadell to the Duke of Buccleuch, 27 September 1853; Police Reports, Edinburgh, 15 and 26 September 1853; Police Report, Mussleburgh, 29 September 1853.

included the statement:<sup>54</sup>

In former times it was usual to impute all our evils to our employers; but whatever truth there may have been in this, in most instances we are fully persuaded that we are attributable to ourselves ...

Another clause stated:

That since experience has demonstrated that strikes for the advance of wages have often in the end proven disastrous in every respect ... this association will give no countenance to general strikes.

There were however dissensions among the activists in the two counties.

Some were more militant than others, and proposed selective strikes in September - October 1853. Differences of opinion among the leaders, and lack of enthusiasm from the main body of Mid and East Lothian colliers rendered these suggestions still-born.<sup>55</sup> The union was probably still in existence in 1854, and in November 1855 the East Lothian colliers who were managing '... their matters in a more united fashion ... succeeded in establishing a rise everywhere'.<sup>56</sup> Colliers' combinations, however, gave management very few worries during these years.

The independent stand of the Mid and East Lothian colliers (and also those of Fife) was beginning to represent a source of weakness in the Scottish movement as a whole. During the great disputes of 1856 the Mid and East Lothian colliers remained aloof. On 8 May 1856 a colliery delegates' meeting came to the conclusion, '... that the collieries of Mid and East Lothian were not to join in the strike with the west country men', despite the ill-will this created. At a later meeting with west country delegates the Midlothian representatives explained their differing course of action: '... they had found that previous strikes had done no good'.<sup>57</sup>

- 54. Ibid, 'Rules and Regulations of the United Association of Colliers in the Counties of Mid and East Lothian, Scotland', 1853.
- 55. Ibid, correspondence between H. Cadell and Duke of Buccleuch, 1-31 October 1853.
- 56. Cadell MSS, H.F. Cadell to H. Cadell, 16 November 1855.
- 57. Buccleuch MSS, SRO GD 224/512, A. Gordon to the Duke of Buccleuch, 8 May 1856; S. Tremenheere, Report of the Commissioners of Mines, 1856, 36.

Nevertheless in 1856 there was trouble in the district, and again in 1861. Uncharacteristically this was due to grievances over the weighing of outputs, in which the Lothian coalmasters had a fair record.

In two collieries most effected in 1856, Arniston and Ruthven, a satisfactory solution was found after negotiations between masters and men had been held. At a county delegates' meeting the general feeling was against precipitative strikes on the issue, although if the worst happened the delegates were prepared to support those who had grievances.<sup>58</sup> Strikes were averted in this case, but not in 1861.<sup>59</sup> They appear to have been short in duration and inconsequential.

Again in 1864 there was a re-awakening of union feeling among the colliers, perhaps related to the improvement in trade which permitted some demands for increased wages to be conceded to, and the agitational work of Alexander MacDonald. A meeting of seven hundred Midlothian colliers which listened to MacDonald in November was described as 'very quiet'.<sup>60</sup> The slump in militancy shines through a report of another meeting where MacDonald spoke in March 1865. This was represented as an 'immense social meeting' of colliers and their wives, over 2,300 strong.

On arriving the colliers were provided with a bag of fruit and biscuits, music was played by the Arniston and Whitehill Colliery bands, and songs were sung.<sup>61</sup>

The Midlothian coalmasters encouraged this drift towards social equanimity and the retreat from activism by dismissing those who showed an unhealthy interest in union matters as at Arniston in 1856 and Newbattle in 1861.

58. Ibid, 46; The Scotsman, 12 and 19 March 1856, letters from Thomas Philip.

59. The Colliery Guardian, 1 and 15 June 1861.

60. The Scotsman, 28 November 1864.

61. The Scotsman, 25 March 1865.

West Lothian and Midlothian contrasted. From the 1840s to the 1860s the labour movement amongst the miners of West Lothian developed - along with the expansion of the mining sectors in the district - in a vigorous, if spasmodic, fashion. The unrest in the county was closely related to movements in neighbouring parts of central Scotland. The miners of West Lothian possessed a combative spirit, but the development of unionism was confused, and took the form of sporadic ill-organised bursts of militancy.

Trade union activity or demonstrations of militancy occurred in West Lothian in 1852, 1855-6, 1859-63 and 1865. Some of the features of the unrest were the ephemeral nature of union organisation, the turbulence of the miners (which erupted into a system of 'masterful begging' in 1856 'in some degrees alarming' to the subjects of the miners' attention, and acts of blind violence against 'innocent bystanders' in 1861), and the drafting in of extra forces against the miners - of police in 1861, and police and the military in 1856.<sup>62</sup> The greatest confrontation was the bitter stand of the West Lothian and Stirlingshire miners against wage cuts, which lasted between early March and the beginning of June of that year. Nothing exemplified the weaknesses of organisation and lack of co-ordination which beset the union movement as the conclusion of this strike. The solidarity of the men was never complete and progressively deteriorated; as the starving miners dribbled back to work in West Lothian with their two main grievances of wages and underweighing unredressed, miners elsewhere in Scotland came out on strike for the first time, as in Kilsyth.<sup>63</sup> West Lothian was involved in 1856 and 1862-3 in a fair amount of inter-district contact, and flows of

62. Lord Advocate Papers, SRO Box 117, E.F. Maitland to the Lord Advocate of Scotland, 26 April 1856; John Cay, 'Linlithgowshire, Return of Force and Number of Men off Work', 9 May 1856; The Scotsman, 11 July, 25 September and 12 December 1861.

63. Lord Advocate Papers, SRO Box 117, E.F. Maitland to the Lord Advocate of Scotland, 7 May 1856, and other correspondence 14 May - 9 June 1856.

cash between districts to aid strikes.<sup>64</sup> In these years the union movement among the Stirlingshire and West Lothian miners was closely connected.<sup>65</sup> In other years, even during periods of unrest as in 1861, formal union organisation was virtually extinct. The industrial conflicts between masters and men at such times were sustained only by the elemental militancy of the excitable, desperate mining population.

The contrasts between the labour movement in West and Midlothian are obvious. In Midlothian unionism had struck fairly deep roots, but in the 1850s a strongly conciliatory policy was pursued. This appears to have reduced the movement by 1864-5 to an unprecedented level of pusillanimity. In West Lothian the union movement was uncoordinated, primitive and mercurial. The miners' response to calls for industrial action was always vigorous.

The different course of the movement can be explained by reference to the very dissimilar social and economic structures of the mining industries in the two districts.<sup>66</sup> Firstly, the formation of the mining labour force had taken place more rapidly and more recently in West Lothian compared to Midlothian. In Midlothian, 'the miners were usually of local ancestry, their fore fathers having been engaged in mining for several generations.'<sup>67</sup> While the population of an important mining parish in Midlothian like Newbattle grew from only 2,033 to 2,902 between 1841 and 1861, over the same years the population of Bathgate grew from 3,928 to 10,134.<sup>68</sup> In contrast to Midlothian, in West Lothian a large (but at the present unknown) proportion of the increase in the mining population was of Irish origin. Bremner in 1869

64. The Scotsman, 14 and 15 May 1856, 4 and 9 October, 22 to 27 November 1862; The Colliery Guardian, 29 November, 6 and 27 December 1862; Arnot, History of Scottish Miners, 42.

65. The following account owes much to A. Campbell's 'Honourable Men', although it lacks the rigour of Campbell's analysis.

66. Thompson, 'Industrial Relations in Fuel and Power Industries', 91.

67. Population Censuses, 1841, 1861.

claimed that one reason why Mid and East Lothian was much 'less disturbed by strikes' than the west of Scotland was because the Lothian men were 'almost without exception Scotsmen', whereas 'a great proportion of those in the west are Irishmen, mostly of a very rough type'.<sup>68</sup> A. Campbell has shown that a large Irish element in a mining district can both weaken the labour movement, and increase the turbulence of relations between masters and men.<sup>69</sup>

Secondly, the means of social control in the two districts were very different. Tremenheere stated in 1856 that 'society' was 'more settled' in Mid and East Lothian, and few strikes broke out because the coal proprietors looked '... closely into everything that affects' the colliers' condition. Moreover the conduct of the great proprietors set the tone for the whole district.<sup>70</sup> Real benefits did accrue to the Midlothian collier because of the paternalistic influence. Much of the action taken in this respect dated from the early 1840s or later.<sup>71</sup> The benevolence of certain coalmasters was combined with a tough line on industrial unrest. The colliers digested the consequences of a long line of bitter strikes up to 1842. The paternalistic regime as a system of social control was therefore successful in Midlothian.

In West Lothian large iron firms and other big enterprises employed virtually all the miners. Sub-contracting was not uncommon.

Means of social control, such as truck, brought the miners scant benefits if any, and contributed to unrest.<sup>72</sup>

Finally, the mining sectors in the two districts were faced with different markets for their products. Bremner stated that 'fluctuations

68. Bremner, Industries of Scotland, 20-1.

69. Campbell, 'Honourable Men', 15.

70. S. Tremenheere, Report of the Commissioners of Mines, 1856, 36.

71. See chapter ten, pp. 301-3.

72. Chapter eight, pp. 227, 230-1.

'in trade' were not so disruptive an element in social relations in Midlothian compared to elsewhere.<sup>73</sup> This is possible, and may explain why wages appear to have fluctuated less in the county than in the west of Scotland. Important markets for Midlothian coal, like the domestic and gas sectors, were probably less effected by the trade cycle and foreign competition, than the iron trade which had such a significant role in the development of West Lothian's mining industries.

The result of these factors was that in Midlothian a stability or 'equipoise' in social and industrial relations was discovered, which was almost absent in West Lothian during this period.

The Retreat of Militant Unionism. The fragmentation of the labour force encouraged by the influx of the Irish, and the separatism of the Lothian and Fife unions made the wielding of the Scottish miners into a cohesive union movement perhaps a more difficult task than ever before. Like other labour leaders of the post-1850 era, certain miners' representatives rejected the methods of violent class conflict (notwithstanding sometimes contrary events at grass-roots levels).

Alexander MacDonald, for example, aimed to work within Capitalism, and to present a 'responsible' platform directed at influencing public opinion and achieving a betterment of the miners' condition through legislative reforms.<sup>74</sup> (The Miners' Association of the 1840s had already made unsuccessful moves in this direction,<sup>75</sup> although Lord Ashley's Act of 1842 and the introduction of Mines Inspection in 1851 showed what might be accomplished). Consciously or otherwise accepting certain weaknesses of the Scottish movement, the union structure adopted ultimately for this new orientation was a loosely organised confederation of district unions, which retained independence for day-to-day matters, and the

73. Bremner, Industries of Scotland, 20.

74. See, Youngson Brown, 'Trade Union Policy in the Scots Coalfields', passim.

75. Challinor and Ripley, The Miners' Association, 214-7.

leadership directed the campaign to influence Parliament. However the organisation and coordination of the Scottish miners' protests were frequently so poor, that MacDonald had often to devote his attention to these issues as well.

In 1855, MacDonald appeared on the scene to take the leadership of the Scottish miners. His new Scottish Miners' Association appeared to put down deep roots by the end of the year.<sup>76</sup> Its outlook was reflected in a comment on one of its meetings in 1856:<sup>77</sup>

The objects of the meeting were to inculcate prudence in action, and frugality in habits, in order to make their weight still further felt in the community.

Further, in 1860 MacDonald proposed a 'Scottish Miners' Amalgamated Society' on the lines of the national 'new model unions' with a range of friendly benefits; this was an idea warmly received at the time but never taken up.<sup>78</sup>

The progress of industrial relations in the years after 1855 suggest that the Scottish Association hardly had a continuous or meaningful existence at a local level. Here, disputes and the union movement developed almost as if a centralized body inspired by MacDonald's philosophy had never been formed. MacDonald found it almost impossible to get the Scottish districts to surrender their funds or independence to a national body. By late 1863, according to Arnot, labour organisation in the Scottish coal industry had been virtually wiped out as a result of recent defeats.<sup>79</sup>

Therefore the 'Free Colliers' movement, which grew rapidly in many parts of the Scottish coalfields in 1864-5, appears to have filled a vacuum. The movement's characteristics included a fondness for high-

76. Arnot, History of Scottish Miners, 40.

77. The Scotsman, 14 June 1856.

78. Arnot, History of Scottish Miners, 45.

79. Ibid., 46.

sounding offices, ceremonial, and light-hearted gatherings with entertainments provided. By the end of 1864 there were 1,200 members in Fife, and almost as many in Midlothian.<sup>80</sup> The movement was partly

inspired by sectarian, anti-Irish feelings;<sup>81</sup> its jolly functions would also seem to represent a slumbering of class consciousness.

MacDonald saw the movement as an obstacle to effective trade unionism, and was supposed to have said of the Free Colliers: they '... called themselves grand what-nots and did not contribute a penny to any fund calculated to do good to the miners.'<sup>82</sup> In later, more troubled years they quietly faded away.

Meanwhile MacDonald's work had been having some impact. The Mines Act of 1860 – extending the General Rules, allowing colliers to appoint their own checkweighman, and in Scotland in effect debarring boys under twelve from working in the pits – certainly owed something to the agitation led by MacDonald. In 1861 the union movement in Mid and East

Lothian deeply concerned itself with the implementation of the new legislation,<sup>83</sup> and MacDonald seems to have enjoyed considerable prestige in the district subsequently. (Mid and East Lothian delegates were usually present at meetings of his associations). MacDonald's policies of moderation and district autonomy were currently compatible with Midlothian's brand of cautious unionism. In a similar vein the 'new model employer', Lord Echo, was welcomed by the Midlothian miners to speak to them 'on matters that relate to their Social Interests' in January 1867.<sup>84</sup>

The retreat of militant unionism culminated in a short 'class-collaborationist' spell in 1867-8. The Colliery Guardian looked forward

80. *Ibid.*, 50.

81. Campbell, 'Honourable Men', 14. But Campbell also sees a more positive, complex role in the movement than Arnot.

82. Arnot, *History of Scottish Miners*, 50.

83. The Colliery Guardian, 9 March, 6 April and 25 May 1861.

84. The Scotsman, 7 January 1867.

to a 'new era' in the Scottish coal industry where sliding-scale wage agreements, and a mutual dislike of strikes would bring benefits to masters and men alike.<sup>85</sup> Johnston noted that,<sup>86</sup>

In 1867, on the suggestion of several employers, a few local arbitration boards were formed, but they do not appear to have been very effective or to have lasted long.

The Colliery Guardian and MacDonald both gave their blessing to schemes to establish 'Courts of Conciliation'.<sup>87</sup> It is doubtful whether anything concrete was achieved by this new, elusive spirit, which disappeared quickly in the coal industry as industrial relations entered a more critical period in these very years.

#### The Crisis Period of 1866-75

Trade Union Development. The years from 1866 to 1875 were a crisis period for the Scottish miners, as for the British labour movement as a whole. The national scene was dominated in the late 1860s by the publicity surrounding the Royal Commission of Inquiry into trade unions and the Sheffield Outrages, and from then to 1875 by the political agitation directed by a more assertive labour leadership which aimed at obtaining for the unions secure legal status and other 'rights'. In the Lothians' coal industry, and probably in the Scottish industry in general, the conciliatory phase in industrial relations was coming to a close.

The miners were involved in political activity because of their growing interest in mines legislation and other questions. Further the old issues of union organisation and basic working conditions remained very live ones. Two great trade cycles, dominated by the booms of 1866 and 1872-3, had a commanding influence over the course of union development in the Scottish coal industry.

In 1863 MacDonald's Miners' National Union had been formed for the purpose of pressing for legislative reforms on matters pertaining to coal

85. The Colliery Guardian, 31 August 1867.

86. Johnston, Working Classes in Scotland, 341.

87. The Colliery Guardian, 3 October 1868.

mining. The weakness of Scottish mining unionism before 1866 is reflected by the fact that the only Scottish representatives at MNU conferences were Free Colliers' delegates.<sup>88</sup> Regular trade unionism, however, recovered strongly in the boom of 1866, and henceforth Scotland, including the Lothians, was a greater source of strength for the MNU.

The phase up to 1871 was one of great flux in the Scottish movement. There were recoveries in organisation, improvements in wages and conditions, only to be followed by decisive set-backs when trade deteriorated. Nevertheless this was a more dynamic period than preceding ones, and there appears to have been some intermittent advance in the cohesiveness and solidarity of the miners' protest.

In 1870-1 unionism in Mid and East Lothian re-emerged as a fighting movement. As the chairman of a delegates' meeting in April 1870 stated, it was high time they bestirred themselves to improve local organisation in order 'to defend their rights'.<sup>89</sup> In 1871 the county association was put on a more formal footing. In 1870-1 the miners became actively involved in the struggle for an improvement of their basic conditions (where their militancy brought them successes, including the 8-hour day), and in the broader agitation surrounding mines legislation.<sup>90</sup>

The demise of the era of industrial peace in Midlothian was no doubt partly due to the local colliers being swept up in the wake of a much wider activism. Also, the conditions which contributed to the earlier equipoise were no longer so applicable. Although the gentry and aristocracy still had influence in the mining communities as proprietors, the ownership structure of the coalfield had been changing so substantially - with the arrival of large firms like Shotts Iron Company in the late 1860s - as to surely undermine this influence. The end of the era was confirmed

88. Arnot, History of Scottish Miners, 47, 49-50.

89. The Scotsman, 18 April 1870.

90. The Scotsman, 22 April, 13 May, 11 and 18 July, 1 and 8 August,

7 November 1870, 18 September and 23 October 1871. Arnot, History of Scottish Miners, 51-2.

in 1874 when the Duke of Buccleuch, piqued by his men's involvement in unionism, terminated his paternalism and 'old-fashioned generosity' of allowing them free houses (in line with a general trend).<sup>91</sup>

Meanwhile during the halcyon days of 1872-3 miners' wages 'soared', and at Grange Colliery, West Lothian: 'The men drank champagne and often drove to their work in carriages ...'.<sup>92</sup> The Mining Magazine and Review summed up most aspects of the situation in May 1872:<sup>93</sup>

The coal trade is not a whit less active than the iron trade.

Miners are well employed, and indeed they can almost dictate their own terms, so great is the demand for coals, both for home use and exportation. The eight-hours' system is becoming very general, and the wages are advancing. In several instances, unions are arising, which for pecuniary and numerical strength, have never been equalled in Scotland before.

By the summer of 1872 the Mid and East Lothian Miners' Association had 1,600 members, and by the end of the year 2,000. With membership stable at that level, financial resources grew to £1,500 by October 1873. The union movement in the two counties was militant, successful in fighting for better conditions, and fully involved in wider agitation.<sup>94</sup>

Similarly in West Lothian unionism made much progress. The Stirlingshire and Linlithgow (West Lothian) Miners' Association was formed in June 1872 with 100 members, had 2,300 members by the end of the year, and 5,300 by October 1873. Financial resources grew from £1,924 in March 1873 to £3,729 in October.<sup>95</sup> A 'Quarterly Balance Sheet' of the Association reveals the strength and activities of the Association.<sup>96</sup> Its expenditure was chiefly on strikes, but also included items on sums paid to 'victimized' miners, and fees paid to a 'National' body. The Association was strongest in Stirlingshire, but some of its biggest branches were in West Lothian,

91. The Glasgow Herald, 8 February 1875.

92. Cadell, 'Historical Account of Grange', 215.

93. The Mining Magazine and Review, I (May, 1872), 403.

94. Youngson Brown, 'Scots Coal Industry', 209; Arnot, History of Scottish Miners, 55; The Scotsman, 19 August, 29 October 1872, 3 April, 11 September 1873.

95. Youngson Brown, 'Scots Coal Industry', 209; Arnot, History of Scottish Miners, 55; The Scotsman, 11 July 1872, 12 March and 1 May 1873.

96. Cadell MSS, 'Stirling and Linlithgowshire Miners' Association, Quarterly Balance Sheet, showing Income and Outlay', 9 June to 9 September, 1873.

such as Bo'ness with 320 members and Armadale with 591. This county union was still in existence in April 1876, and in a militant mood judging from the correspondence between its secretary and the proprietor of Grange Colliery over a dispute which had broken out.<sup>97</sup>

The boom presented a great opportunity for mining unionism in Scotland. Yet great difficulty in making a practical reality of any 'Scottish Miners' Association' continued, with little more being achieved than the holding of frequent delegates' meetings. The idea of federating the county associations was well received by most districts in 1873, although Mid and East Lothian opposed it.<sup>98</sup> The two counties, while discarding their pacifity, retained their independent outlook. In 1874 they rejected MacDonald's plea for a 'united phalanx', and embarked on a disastrous and foolhardy resistance to any wage reductions.

According to Cunningham the union kept its funds intact during the strike, but many men left it after a crushing defeat, and only a few hundred remained. Whereupon the funds were divided equally amongst the remaining members!<sup>99</sup> Mid and East Lothian were the first association to oppose any wage cuts, and instigated the fateful process in 1874 whereby the districts were picked off separately by the coalmasters in the successful intention of enforcing wage reductions.<sup>100</sup>

Trade union organisation was shattered in the Scottish coalfields as a result of the disasters of 1874-5. But something of permanent value probably came from the experience of the strong militant unionism of the early 1870s. The Fife County Association maintained a permanent existence after 1871, and their victory of the 8-hour day was never reversed.<sup>101</sup> Wages were cut everywhere in the mid-1870s, and the

97. Ibid, John Gillespie, Secretary of Stirling and Linlithgowshire Miners' Association, to H. Cadell, 15 April 1876.

98. The Scotsman, 15 and 25 September, 1873.

99. Cunningham, Mining in Mid and East Lothian, 94.

100. Youngson Brown, 'Scots Coal Industry', 213-4; The Scotsman, 17 February, 4 and 28 March 1874.

101. Arnot, History of Scottish Miners, 51.

working day was increased. But here there was not a complete loss of what had just been won, and Scotland subsequently appears to have worked a shorter day than other regions.<sup>102</sup> In 1872-3 the Scottish miners' leaders had dealt with the employers on equal terms for possibly the first time, and had actually sat in conference with the coalmasters in 1873.<sup>103</sup> Though it was to be a long time before mining unionism was to become as strong as it had been in the early 1870s, it is perhaps not too much of a distortion to say that some of the foundations for that recovery had been laid in these years.

**The Legislative Achievement.** The extent of the industrial gains of Scottish mining unionism up to the mid-1870s are questionable. But the success of the broad political agitation, in which the Scottish miners under MacDonald's leadership and other sections of the British working-classes were associated, is less debatable. The improved legal status of trade unions, and legislation passed relative to coal mining were significant achievements for the labour movement.

During the 1860s the Scottish miners widened their horizons to become increasingly involved in the swelling agitation for an improvement in the miners' conditions by bringing pressure to bear on Parliament.

MacDonald addressed himself in this decade to the rankling grievance of truck. Although complete satisfaction in the law was not achieved until 1887, MacDonald's exposition of the widespread nature of the problem without doubt contributed to it being brought more before the public notice, and to its decline in the 1870s.<sup>104</sup> Likewise there was a strong agitation by the miners to have the grievance of underweighing rectified through legislation. The Act of 1860 had permitted colliers to appoint

102. Note, for example, B. McCormick and J.E. Williams, 'The Miners and the Eight-Hour Day 1863-1910', *EHR*, second series, vol 12 (1959-60), 230.

103. Arnot, *History of Scottish Miners*, 54.

104. See, chapter eight, p. 231.

their own checkweighman, and in the Coal Mines Regulation Act of 1872 the clauses relating to the weighing of coals and the appointment of checkweighman were strengthened and extended. Youngson Brown states these measures created much friction and litigation, (coal owners were not always prepared to accept the legality of an independent checkweighman), but the checkweigher's position was resolved for good in 1887.<sup>105</sup> The campaign for shorter hours was another element in the political movement in which the Scottish miners were involved. As has been seen, however, the significant gains of the early 1870s were achieved largely through industrial action, and were partly reversed.

In 1866 two colliers left Shotts Iron Company without giving notice; warrants were obtained for their apprehension, and the men were soon arrested in Midlothian.<sup>106</sup> This incident reflects that the Master and Servant Law was as keenly felt for its iniquities in the Scottish coal industry as anywhere. Whereas employees could be treated as criminals for breach of contract, the employers were liable only to civil proceedings.

The Glasgow Trades Council, MacDonald, and the MNU took a leading part in the campaign to remove the law.<sup>107</sup> An Act of 1867 was a step forward.

Yet: 'It did not entirely satisfy the unions, however, because it still permitted actions for breach of contract in 'aggravated cases', whatever they might be'.<sup>108</sup> Hard penalties continued to be imposed under the revised law, as for example against Lothian miners.<sup>109</sup> Therefore the agitation continued, reaching its successful outcome in the passing of the

Employers and Workmen Act of 1875 which made worker and master equal parties to a civil contract.<sup>110</sup>

105. Youngson Brown, 'Scots Coal Industry', 279.

106. The Colliery Guardian, 11 August 1866.

107. H. Pelling, A History of British Trade Unionism (Pelican, 1969), 63-4; The Scotsman, 28 November 1864, 25 March 1865.

108. Pelling, History of British Trade Unionism, 64.

109. I. MacDougall (ed), The Minutes of Edinburgh Trades Council 1859-1873 (Edinburgh, 1968), 267 and editor's footnote.

110. A.E. Musson, British Trade Unions, 1800-1875 (Macmillan Press, 1972), 63.

Another extremely contentious issue in the Scottish coal industry was the laying of responsibility for serious accidents in mines. Often the relative of the injured party received no compensation from the courts on the grounds that the accident was caused through the negligence of a fellow-worker, usually the underground oversman. In 1860 a Law

Protection Society was formed in Scotland, with which MacDonald was closely involved, with the aim of assisting the miners in legal cases of this kind. By September 1861 of 19 cases in which the body had assisted, 15 had been won by the miners.<sup>111</sup> This reinforces other evidence, in fact, that the Scottish courts were by no means biased in favour of employers. Many cases concluded that the coalmasters had contravened recent Mines Legislation.<sup>112</sup> Ralph Moore stated in 1867:<sup>113</sup>

The facility with which civil actions are got up in the Court of Session against mine owners for compensation by workmen injured, or by the relatives of those who have been killed, has enabled many cases to be taken before a jury which would not otherwise have been heard of.

Upon the whole I believe the effect of this litigation has been beneficial; it has made the mine owner more careful to have everything in good order so as to avoid law proceedings ...

In 1872 the Coal Mines Regulation Act was passed with a number of amendments included, which MacDonald and others had been pressing for; these included clauses relating to child employment and the checkweighman's position. Unrest was created by the clause which placed the responsibility for safe-propping of working-places on the miners, but negotiations with the coalmasters apparently led to some satisfactory compromises being reached.<sup>114</sup> MacDonald wrote to the Lord Advocate of Scotland in 1874 calling for a proper implementation of the Act.<sup>115</sup> In 1879 Moore stated

111. *The Colliery Guardian*, 28 September 1861.

112. *The Scotsman*, 4 December 1862, 28 September 1867; *Cases decided in the Court of Session* (Edinburgh, third series, vol 1, 1862-3), Sommerville v Gray, 1863, 768; *Ibid*, (vol 10, 1871-2), Edgar v Law and Brand, 1871, 236-7.

113. Inspectors of Mines Reports, 1867, Report by R. Moore, 176.

114. Youngson Brown, 'Scots Coal Industry', 90-1, 281; Report on Coal, (PP 1873, X), evidence of A. Landale, QQ 6556-6569.

115. Lord Advocate Papers, SRO Box 46, A. MacDonald to the Lord Advocate of Scotland, 4 November 1874.

that the Act 'continues to work very fairly'.<sup>116</sup>

Since the 1850s the Scottish miners had thrown themselves into the movement agitating for better Mines Legislation. The extension of the General and Special Rules in the Acts of 1855, 1860 and 1872 must have brought them cause for satisfaction in many instances. Proprietors and managers were forced to attend much more closely to question of safety.

The fruit of the State's intervention was a decline in mortality rates in the mines. Youngson Brown has shown that in Scotland in 1855 there was a fatal accident for every 108,000 tons of coal raised; in 1885 it was 217,000 tons.<sup>117</sup>

Finally it is pertinent to stress again that the Lothian miners played their part in the political agitation. Meetings were held quite frequently in its support, and MacDonald often addressed them.<sup>118</sup> The growing interest of the Midlothian colliers from the mid-1860s in these issues would seem to suggest that a definite advance in class-consciousness was taking place.

### Conclusion

This chapter has been concerned chiefly with the Lothians. It has, however, been almost impossible to ignore the wider, Scottish context, and the following very tentative generalizations suggest themselves.

The trade union movement in the Scottish coal industry developed rapidly from the early 1820s, and a tradition of county meetings and inter-district contact was soon established. The movement in the period up to the early 1840s was characterized also by the lack of permanent organisation, and the violence of the industrial unrest.

116. Inspectors of Mines Reports, 1879, Report of R. Moore, 183.

117. Youngson Brown, 'Scots Coal Industry', 76.

118. *The Scotsman*, 28 November 1864, 25 March 1865, 18 April 1870, 19 August 1872, 3 April 1873.

Already the increase in the labour supply and the social differentiation within the labour force, following from the influx of Irish workers, was rendering it very difficult to achieve continuity of organisation or a united stand by the miners in conflicts with the employers. This situation changed very little up to 1875. Nevertheless it appears unlikely the accumulated experience of militant unionism would not bring some benefit in the future. It was also noteworthy that the Irish immigration into the Scottish coal industry had ceased by the early 1870s. Subsequently the Scoto-Irish miner would become integrated into the mining communities and play a full part in the union movement.<sup>119</sup>

Meanwhile in a changing political and social environment, (and possibly also trying to allow for the great weaknesses of Scottish mining unionism, namely the fragmentation of the labour force, and separatism of the districts), a moderate leadership came to the fore in the mid-1850s to direct the movement away from overt class conflict. It sought an improvement in the miners' condition through a political yet fairly 'respectable', agitation to persuade Parliament that further legislation was required.

At grass-roots levels, for example in West Lothian, trade union development in the 1850s and early 1860s did not necessarily correspond with MacDonald's philosophy. There was, however, a coincidental compatibility between elements in his outlook and the conciliatory unionism of the Midlothian colliers.

In the critical years of the late 1860s and early 1870s there was a subtle change of direction. The movement had much the same aims and methods, but became more assertive. In Midlothian the old equipoise broke down. With the mass of British miners the local colliers became

119. Campbell, 'Honourable Men', 21; Handley, Irish in Scotland, 147-9.

closely interested in MacDonald's message.<sup>120</sup> The conclusion to these developments were the legislative gains towards the close of the period.

**120.** Of course many districts looked for a more militant unionism than MacDonald's, finding it in the Amalgamated Association of Miners, founded in 1869.

## CHAPTER TEN

### SOCIAL CONDITIONS

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### The Colliery Community in the Lothians

Social and geographic isolation was a characteristic of very many nineteenth century colliery communities. Often the colliery village was an industrial intrusion on an agricultural landscape. The mining village of Penstone, East Lothian was described in 1836 as being 'altogether dirty'; moreover, 'situated in the heart of one of the finest agricultural districts of Scotland, has a very uncomfortable appearance'.<sup>1</sup> The incongruity of the mining communities was emphasised further by their strange customs. T.S. Ashton stated:<sup>2</sup>

Coal-miners have always been a class apart, with mentality and aspirations unlike those of the rest of the working class. This spiritual isolation is largely a reflection of physical isolation.

The colliers were victims of social ostracism. This recalled the fact that in former times collieries were sometimes the repositories for vagabonds and undesirables. Moreover in early nineteenth century

Scotland the legacy of serfdom had yet to be thrown off. The colliery communities of the Lothians were custom-ridden and inward-looking. As late as 1845 it was said of the colliers of Edmonstone and Woolmet that they were 'entirely regulated by custom'. Indeed, 'Ignorance and ungodliness go hand in hand'.<sup>3</sup> The colliery community's separateness was due partly to the practice of inter-marrying, which in turn was related in the Lothians to the female-bearing system: '... none but a collier's daughter would choose to be a collier's wife in such a case'.

And the hewer was anxious to marry a pit-girl early in order to obtain a bearer, so as to avoid having to hire one.<sup>4</sup>

1. NSA, II (1836), 194.

2. Ashton, 'Coal-Miners of the Eighteenth Century', 307.

3. NSA, I (1845), 571-2.

4. Duckham, *Scottish Coal Industry*, 279-280; See also, Bald, *Coal Trade of Scotland*, 72.

Very many contemporaries regarded the colliers as an inferior -

if unique - breed of men. Milne, writing in 1839, bemoaned the educational and religious destitution of the Mid and East Lothian colliers:<sup>5</sup>

These facts present a very dismal picture of the present and future condition of the collier population. This class seems to be doomed to the state of degradation and abasement in which they have so long continued; and it is difficult to say whether their present state ... is not more humiliating than their former bondage.

Milne also bewailed the illiteracy of the colliers, adding:

Our collier population are indeed in a deplorable state. In knowledge, both religious and intellectual, they are greatly inferior to all other classes; - in moral courage and enterprise, they are inferior; in tastes of comfort even of a domestic nature, they are inferior.

The Lothian mining communities up to the 1830s or later were almost certainly beset by ignorance and squalor. In addition, the servile mentality had not yet been expunged, even if the miners' discontent did erupt intermittently in violent outbursts of industrial unrest. As

Milne stated - now in mitigation - of the Lothian collier: 'They are always respectful, and sometimes warmly attached to their employers, and exhibit none of the pert and discourteous behaviour of the manufacturer'.<sup>6</sup>

In the Lothians, and Fife, the social fabric had as yet been little disrupted by the effects of the Industrial Revolution.

Although the mining communities of the Lothians might have been languishing in a sorry state of backwardness in the early nineteenth century, an even worse social environment was being created in many respects in the west by the rapid expansion of mining. 'In these areas ... the harshness and inadequate social provision of the new settlements was evident.'<sup>7</sup> By contrast social facilities in the east were less

taxed. Moreover, by 1866 it could be said that the Midlothian colliers,<sup>8</sup>

5. Milne, Memoir on Mid and East-Lothian, 147.

6. Ibid.

7. Campbell, Scotland since 1707, 190.

8. SC on Master and Servant, (PP 1866, XIII), evidence of A. Hood, Q1270.

... are more of a settled population, they have been longer resident on the ground, and they have more provident habits in Mid-Lothian than in Lanarkshire.

The degraded - and often turbulent - servile Midlothian mining community of the early nineteenth century had given way to the harmonious deference community of the mid-Victorian period. The paternalistic regime brought tangible improvements to the colliery villages. As has been indicated the high-point of the system was reached in the 1850s and 1860s, but even when the landed estate's direct involvement in coal mining diminished old attitudes and roles lingered on. According to A.E. Thompson, because of the paternalism of the Dundas family, the village of Arniston - notwithstanding its industrial nature - preserved some of the features of a rural community. 'The role of "laird" seems to have been filled meticulously by successive baronets', even into the twentieth century.<sup>9</sup>

#### Sources and Symptoms of Tension

The social and working environment. The brutish, narrow, custom-ridden habits of the Lothian mining communities, were very severely castigated by contemporaries. But the colliers' behaviour sprang from objective social and working conditions over which they had very little control. What might be described as the 'social environment' was conducive only to reckless and improvident conduct. In the early nineteenth century, and subsequently in early phases of mining expansion in a particular district, the lack of 'social and public capital' could be particularly severe. This was the case with Mid and East Lothian up to the 1840s, and with West Lothian later. Despite the growing Irish population there appears to have been no Roman Catholic Churches in this county in 1851.<sup>10</sup> In the expanding shalefields of Mid and West Lothian

9. Thompson, 'Industrial Relations in Fuel and Power Industries', 3, 9.

10. Census of Great Britain, 1851, Religious Worship and Education (Scotland), (PP 1854, LIX), 16.

in the 1860s 'Police cells were the only 'amenity' provided for the healthy ...'.<sup>11</sup>

Turning to specific problems, domestic conditions and the provision of accommodation were grossly unsatisfactory in most colliery villages in the Lothians in the first half of the nineteenth century. The general situation of over-crowded, vermin-infested habitations in the Lothians was described by the Children's Commissioners of 1842. Their report confirms other evidence regarding housing conditions in the region.<sup>12</sup> For example, even at Loanhead under the paternalistic eye of the Clerks of Penicuik about half of the 64 colliery cottages were described as being 'in bad order' in 1812.<sup>13</sup> The mining village of Niddrie was represented in the following terms in 1825:<sup>14</sup>

The village was a wretched assembly of clinging low-roofed, tile-covered hovels, each of which perfectly resembled all the others, and was inhabited by a rude and ignorant race of men, that still bore upon them the soil and stain of recent slavery.

In the mid-1840s Tremenheere contrasted the ill-kept Scottish pit villages with their tidier English counterparts.

Appalling housing conditions, (coupled with a natural distaste for washing the whole body - the colliers allegedly thought it would weaken the back<sup>15</sup>) and poor diet, made the colliery families especially vulnerable to disease. It was stated of Inveresk in 1839 that epidemics of great severity occasionally afflicted the district, including typhus and scarlet fever. 'We must look for the causes of this ... in the crowded, ill-ventilated dwellings, and the filthy habits and insufficient diet of a great part of the lower orders'.<sup>16</sup> The Children's Commissioners assigned

11. Butt, 'James Young', 358-9.

12. Children's Emp Comm, Appdx to First Report, (PP 1842, XVI), pp. 395-6, paras. 62 *et seq.* Questions of housing, sanitary conditions, education etc are treated further below, pp. 296 *et seq.*, pp. 302 *et seq.*

13. Clerk of Penicuik MSS, SRO GD 18/1150, 'State and No. of Colliers' Houses', 20 July 1812.

14. Cunningham, Mining in Mid and East Lothian, 79 citing, Hugh Miller, My Schools and Schoolmasters (1825).

15. S. Tremenheere, Report of the Commissioners of Mines, 1844, 10 *et seq.*

16. NSA, I (1839), 249.

the following to be the causes of the very poor health of the mining population of the east of Scotland:<sup>17</sup>

1. poor and insufficient food, and lack of meat
2. irregularly taken food
3. bad ventilation in mines
4. long hours worked by young children in mines

Public utilities were virtually non-existent, and in many villages the means of obtaining water must have constituted a hazard to health.

Cholera often visited the region. In the outbreak of 1831-2 by 22 February 1832 the position in selected districts of Mid and East Lothian was as follows:<sup>18</sup>

Craighall, Dalkeith, Tranent	77 deaths, 181 recoveries
Prestonpans, Haddington	78 deaths, 204 recoveries

In 1837 cholera hit Portobello 'in a severe form', causing many deaths.

In 1848-9 again the Lothians suffered badly. For example in the mining parish of Carriden in West Lothian between 12 October and 27 November 1849 no fewer than 31 persons lost their lives in the epidemic.<sup>19</sup>

The employment of women and children in mines had numerous ill-consequences? For instance, it led to very poor standards of house-

keeping. When the collier and his wife returned home,<sup>20</sup>

... all is cheerless and devoid of comfort; the fire is generally out, the culinary utensils dirty and unprepared, and the mother naturally first seeks after her infant child, which she nurses even before her pit clothes are thrown off.

Moreover, 'The horrible absence of attention to the common domestic duties is perpetuated from family to family, from daughter to daughter'.<sup>21</sup> At

Vogrie Colliery it was stated in 1842: '... it is a common practice here for women to work till confined'.<sup>22</sup> The children's work underground had

17. Children's Emp Comm, First Report, (PP 1842, XV), p. 168, para. 711.

18. The Scotsman, 22 February 1832.

19. Cadell MSS, 'Deaths from Cholera Carriden Parish', 1849; See also The Scotsman, 23 December 1848, 17 January and 27 November 1849.

20. Bald, Coal Trade of Scotland, 138.

21. Children's Emp Comm, Appdx to First Report, (PP 1842, XVI), p. 396, para. 67.

22. Ibid, Evidence collected by R.H. Franks, evidence of John Thomson, p. 454, No. 92.

a dehumanizing and retardative effect on their physical and intellectual development.<sup>23</sup>

The opportunities for most pit-children to receive educational instruction were very limited. Often the schools and teachers in the mining villages were of a very low standard. The children were, without doubt, too exhausted after work to obtain benefit from any inadequate evening instruction that was provided. In the Lothians, religious education on Sunday was 'totally insufficient to make up for the loss of other instruction ...'.<sup>24</sup>

The Scottish system of poor relief did nothing to relieve destitution in the early nineteenth century. The able-bodied might in exceptional circumstances be granted relief - 'although not as a matter of right' - and the more affluent were encouraged to augment their existing poor law contribution with further help.<sup>25</sup> Frequently dire poverty occurred in Scotland during the same years as crop failures or epidemics, political agitation and industrial unrest: for example, in 1817, 1826 and the early 1830s. At such times the authorities were more concerned with quelling the unrest than relieving the distress. In December 1831 the Provost of Glasgow informed Lord Melbourne that in the light of widespread unemployment and economic uncertainty in Glasgow, the magistrates took steps to 'make every preparation in our power, for the repression of any such unwarrantable proceedings, should they unhappily occur'.<sup>26</sup> In times of destitution and emergency, the contribution of private charity and church-door collections to the relief of poverty appears to have been fairly trivial. In 1835-7 in Liberton, Midlothian the Poor Law assessment was £400, which was supplemented by voluntary contributions of only £30 per annum.<sup>27</sup> Some reforms to the Scottish Poor

23. Ibid. See the oft-quoted samples of evidence in this section of the Report.

24. Ibid, p. 397, para. 70.

25. Campbell, *Scotland since 1707*, 204-5.

26. Home Office, Correspondence and Papers, Scotland, SRO RH 2/4, 162, Robert Dagleish, Provost of Glasgow to Lord Viscount Melbourne, 3 December 1831.

27. NSA, I (1839), 32.

Law in the mid-1840s scarcely touched the substance of the problem.<sup>28</sup> Dr. Butt argued that the provisions for the poor in the expanding mining districts of West Lothian in the 1860s were inadequate. 'Indeed, pauperism for some increased in this area almost as rapidly as prosperity for others'.<sup>29</sup> Only beyond the close of the period under study when there were substantial changes in attitudes towards poverty, and a better understanding of its causes, were there new approaches adopted to the problems of the poor.

The dank atmosphere underground, inadequate provision for the taking of meals - often at best food was consumed during work - and night shifts were aspects of working conditions in the mines which undermined the health of Lothian colliers. There was, also, always the risk of injury or death through accidents in the mines. According to a 'medical authority' in 1842 scarcely a week passed without a serious accident occurring in the east of Scotland; but there was no record of accidents kept, and the subject was regarded with total neglect.<sup>30</sup> The conditions of work gave rise to a number of occupational maladies. In the east of Scotland diseases of the spine were common among workers of all ages: 'Several became crooked, and subjects of spinal curvature'.<sup>31</sup> Respiratory disorders were frequent. It was said of the colliers of Newton, Midlothian that they were subject to a disease 'vulgarly' called black-spit. It was caused by a 'wasting' of the lungs through the inhalation of coal dust.<sup>32</sup> Subsequently, improvements in ventilation led to a reduction in the incidence of 'black lung' disease. The marked difference between the temperature on the surface and in the mine remained, however, a 'fruitful sources of all diseases of the lung' among Midlothian

28. Campbell, Scotland since 1707, 205-211.

29. Butt, 'James Young', 359.

30. Children's Emp Comm, First Report, (PP 1842, XV), p. 149, para. 613.

31. Ibid, p. 186, para. 775.

32. NSA, I (1839), 63; (1845), 571.

colliers. It was a commonplace among contemporaries that colliers died young. At Dalkeith in 1859 there were 'no old men miners in the Union Workhouse, but plenty of widows and children'.<sup>33</sup>

A further aspect of the worker's social environment was his relationships with fellow-miners and his employer. The Mid and East Lothian coalmasters were becoming almost exemplary by the 1850s, but otherwise as Youngson Brown has indicated the self-seeking and rapacious practices of the employers bedevilled industrial relations in the Scottish coal industry for much of the nineteenth century.<sup>34</sup>

Perhaps as much tension was created in the mining communities by the introduction of a population with a quite different cultural background to the original inhabitants, as by the classical class conflict between workers and employers. This problem was confined to West Lothian for present purposes, where the Irish began to arrive in quantity from about 1840. The Irish faced much hostility in Scotland. Those giving evidence before the 1836 Commission variously accused the Irish of spending the benefits of a rise in wages 'in mere animal enjoyment'; of being inferior to the Scots in 'sober and moral habits'; of being drunk on the Sabbath morning, and being disorderly, troublesome, and a burden on the poor rates.<sup>35</sup>

Many of such charges were founded certainly more on prejudice than fact. But the Irish did threaten the wages and quasi-craft traditions of the Scottish colliers.<sup>36</sup> They were used as strike-breakers, took to a job quickly, and were able to be '... tolerably comfortable, so far at least as animal spirits go, upon a much lower scale of wages', than the Scots.<sup>37</sup> There was a real conflict of interests between the native and

33. *The Scotsman*, 17 February 1859, letter from J. Horsburgh, M.R.C.V.S.

34. Youngson Brown, 'Scots Coal Industry', 247.

35. Royal Commission on Poorer Classes in Ireland, Appendix G, Report on the State of the Irish Poor in Great Britain, (PP 1836, XXXIV), xviii, xxxii; No. VI, 93-4.

36. Campbell, 'Honourable Men', 10 *et seq.*

37. Report on Irish Poor, (PP 1836, XXXIV), xxxii; See also, Handley, *Irish in Scotland*, 58-9; S. Tremenheere, Report of the Commissioners of Mines, 1848, 13-14; *Ibid*, 1851, 7.

the Irish colliers. The former wanted higher wages and to build up trade union strength. The latter were prepared to work for very low wages in order to escape even greater poverty.

The Irish tended to settle en masse in specific villages. The sectarian hostility between Roman Catholic and Protestant Irish was carried over to Scotland, and mingled with basic ethnic suspicions between the Irish and Scots. Orange Lodges sprang up in the mining districts, and functions were organised. For example in November 1867 there was a large Orange rally at Blackburn, West Lothian. A reported ten thousand persons attended the meeting. 'Mr. Murphy walked at their head with a pistol in one hand and a sword in the other, and after all there was no loss of life or collision'.<sup>38</sup> In the circumstance the absence of violence in this case was, as shall be seen, almost exceptional.

The Release of discontent. In the nineteenth century both the Lothian collier's fondness for drink and his irregular working appear to have closely related symptoms of his 'moral degradation'. For example the colliers of Newbattle in the 1790s could earn sufficient in three days to support them 'fully through the week'. Consequently they became 'dissipated and untractable'.<sup>39</sup> It was 'astonishing' to the young Henry Cadell in 1833, to see how 'anxiously' the Grange colliers worked prior to a holiday period 'in order that they may have some days of debauchery'.<sup>40</sup> A Fife coalmaster did not see any difficulty in discovering the cause of a large group of men working only three days a week in 1872. 'Drink' was one principal reason.<sup>41</sup> Nothing was done by many Scottish coal-masters, however, to curb the spread of spirit-shops in the mining areas, or the practice of paying wages near premises selling liquor.

38. The Scotsman, 12 November 1867.

39. OSA, X, 212-3.

40. Cadell MSS, H. Cadell, Journal, 1832-1834, entry dated 18 July 1833.

41. Report on Coal, (PP 1873, X), evidence of A. Landale, Q6519.

A failing which was sometimes coupled by contemporaries with the colliers' weakness for drink was their lack of gratitude. Charitable donations were distributed in 1842 to mining families where the banning of female employment in the pits had caused a loss of income. In most cases in the Lothians the offers were well received, but in Tranent,

East Lothian Tremenheere was informed of the following result:<sup>42</sup>

The minister acquaints me, with expressions of pain, that 'in the great majority of cases, the intended kindness has not been productive of the good that was designed. Those who were not admitted to a participation of it, stirred up those who were; and the abuse that was heaped upon us, both by those who were and those who were not recipients was beyond your conception'. The interposition of the village police became necessary, and the evening closed amidst intoxication.

Apart from drink, the colliers sought relaxation in a number of sports, mostly cruel. Cock-fighting (along with the betting and excessive drinking associated with it) was well supported. The Scotsman, commented on a 'very disgraceful scene' which occurred at Elphinstone, East Lothian in 1841.<sup>43</sup> This,

... small and peaceful village has been the scene of most outrageous immoralities, shameful to a civilized country. The cause ... was a cock fight, in which many braces of these animals were, after long training, engaged in destroying one another.

A large number of people assembled from miles around. Three tents were set up for the sale of whisky, to supplement the 'much frequented' public houses,

... and the oaths, and drunkenness, and rioting, were dreadful. A policeman was on the ground ... but, was obliged to flee.

M'Neil, writing in 1883, confirmed the popularity of the sport in the Lothians, until prohibited by law, and added darkly: 'the ghost of which often yet appears on a moonlight night in this district'.<sup>44</sup> Poaching and sheep-stealing were other past-times of the Lothian colliers, despite

42. S. Tremenheere, Report of the Commissioners of Mines, 1845, 5.

43. The Scotsman, 14 April 1841.

44. M'Neil, Tranent and its Surroundings, 169-171.

heavy penalties for these offences.<sup>45</sup>

Although the mining communities of Mid and East Lothian were rough and bawdy, the impression gained is that the colliers were not especially inclined to violence or crime. But in West Lothian, with the rapid growth of mining, the normal comradeship of the miners was lost. Groups of workers of a different religious and ethnic background were cast together in a setting almost destitute of social amenities to create a very tense situation, which produced by the 1860s a number of outbreaks of blind or sectarian viciousness. By December 1866, for example, 'Riots and serious assaults' were becoming 'common occurrences' around Armadale.<sup>46</sup> By no means all the mobbings, attacks etc in West Lothian were sectarian in origin; many appear to have been caused by trivial incidents.

The violence in West Lothian, and more generally the Lothian colliers' fondness for drink, cruel sports and other self-destructive pursuits were expressive, it appears, of the tensions created by their harsh working and social environment.

#### Sources and Symptoms of 'Improvement'

Introduction. From about 1840 a number of forces began to work an improvement in the condition of the Lothian collier. Even in West Lothian these forces operated, although for a time the expansion of the mining communities outpaced the benefits flowing from the tide of improvement.

To some extent there was merely a breaking-down of the old culture, and the adoption by the colliers of more acceptable values and goals (to middle-class thought) which made them more amenable to work discipline

45. Records of the Lord Advocate of Scotland's Department, SRO AD 14, 35/373 to 56/325 includes at least six cases of Lothian colliers prosecuted for poaching or sheep-stealing between 1835 and 1856.

46. *The Scotsman*, 20 December 1866; See also, *Ibid*, 25 September and 12 December 1861, 11 July 1862, 24 July 1866, and 13 May 1870; Butt, 'James Young', 360.

and cash motivation. The colliers do not appear to have achieved much 'respectability' before 1875, but at least by the 1850s certain religious and medical figures were sympathetic to their condition.<sup>47</sup> Moreover the State and humanitarian opinion had acknowledged that questions of mines safety and employment could not be left entirely to the tender mercies of the coalmasters. Mines Legislation and inspection can be seen as a real force for improvement - for example in working conditions. Although few women rejoiced at first in the Act of 1842 debarring them and their young children from working in the pits, shortly they became satisfied with the changes it brought in its wake, and the way was open for a development of the skills of domestic economy in the female population of the mining districts. Also daughters found jobs in factories and domestic service, and inter-married more with other sections of the community.<sup>48</sup>

Other concrete advances were the development of greater self-reliance, a realisation of corporate strength and a broadening of horizons, and, most importantly, the decline in squalor and the physical improvement of the mining villages.

Housing, Public Health and Education. The improvements conceived in the 'age of reform' percolated down very slowly to the mining communities. Much depended on action taken by local employers, as many mining villages seem to have had the character of 'colonies' with the local authority unable or unprepared to furnish adequate public amenities. Action taken from above often permitted improvement, as in the fields of education and sanitary conditions, but made little concrete provision for its execution, and therefore legislation carried through in such fields was sometimes less than revolutionary in impact.

47. Lord Advocate Papers, SRO Box 46, W. Mulholland to the Lord Advocate of Scotland, 2 March 1854; The Scotsman, 17 February 1859, letter from J. Horsburgh, M.R.C.V.S.

48. Bremner, Industries of Scotland, 21.

Regarding the housing of the Scottish miners, as Campbell states:<sup>49</sup>

The most lasting single legacy of this phase of expansion of mining was the miners' row, which gives the best example of the decline in housing standards in some areas between 1830 and 1880. The miners' row was squalid and remained so.

The problem partly arose from the fact that many mining tenants were on relatively short leases and had an interest in providing only the barest essentials in the way of accommodation, and partly indeed because many colliers were left to seek their own houses from landlords who had even less interest in the colliers' well-being. The very low expectations of the colliers with respect to shelter helped to keep standards low.

They were reluctant, it was alleged, to sacrifice much of their wages in rent, and tended to sub-let any surplus space. A room per family was therefore not uncommon. Sub-letting was forbidden by the Duke of Buccleuch at Dalkeith, but it was widespread around Bathgate in 1860.<sup>50</sup>

Housing was very poor in West Lothian for much of the third quarter of the nineteenth century. Very high rents were reported around Bathgate in 1862 for houses of the humbler sort consisting basically of 'a but and a ben'. Meanwhile sub-standard conditions had to be put up with, '... there being many houses in the old town of Bathgate which would in Glasgow or Edinburgh have been condemned long ago'<sup>51</sup>. At Crofthead 63 'single houses', valued at £25 each in 1875 and built about 1850, with floors 'a little out of repair' consisting of composition mine dust and lime, were superior to most in the district: they had stone walls and tiled roofs.<sup>52</sup> In 1875 the housing in a number of West Lothian mining villages, such as Grangepans and Harthill, was extremely bad, although some employers in the county like the Russells and Coltness Iron Company had begun to build improved accommodation.<sup>53</sup>

49. Campbell, Scotland since 1707, 191.

50. The Scotsman, 21 September 1860; Report on Coal, (PP 1873, X), evidence of A. Landale, QQ 6619-31.

51. The Scotsman, 29 September 1862.

52. Geddes Records, SRO CB10/10, Messrs. W. Robertson and Smith, 'Reference Fauldhouse Coal Co v George McKenzie and others, Report on the Croft-head Colliery Plant Workings', 19 August 1875.

53. The Glasgow Herald, 20 January 1875; Cadell, 'Historical Account of Grange', 234.

In Mid and East Lothian the housing situation in the coal industry was better than elsewhere in Scotland, partly due to the influence of paternalistic colormasters. According to Marwick, in the early twentieth century at least three-quarters of the miners' dwellings in Ayrshire and the Lothians belonged to their employers, whereas in Lanarkshire and central Scotland it was only one-third to one-half.<sup>54</sup> Housing was cheap in Mid and East Lothian, but not necessarily good. Bremner described most of the colliers' houses in Midlothian as being of a 'mixed kind', in 1869, and many were in 'urgent need of improvement'.<sup>55</sup> In 1875 the employees of the Arniston and Niddrie coal companies lived in small, damp and dirty apartments.<sup>56</sup> It seems unlikely that the provision of better houses, which certain Midlothian colormasters began to undertake after about 1840, ever generalized into a common pattern for the county.

On the other hand in the supply of public utilities and in the sphere of public health there was a definite, if modest, improvement in the mining districts of the Lothians during the period under study. In the first half of the nineteenth century the mining villages were certainly squalid. The water supply was frequently a danger to health; in Penstone, East Lothian the population obtained its water from three open wells in 1836.<sup>57</sup> The question of sanitary reform was the concern of local government. But in Scotland public and private opposition and lethargy were major obstacles to progress. What challenged the indifference to public health throughout Great Britain were the successive outbreaks of cholera after 1831, and the energetic propaganda of Chadwick and others calling for radical sanitary reform. In Scotland reform was local in nature, although from the late 1840s local authorities were able to obtain legislative power to enforce improvements. But in Edinburgh,

54. W.H. Marwick, Economic Developments in Victorian Scotland (1936), 172.

55. Bremner, Industries of Scotland, 28.

56. The Glasgow Herald, 8 February 1875.

57. NSA, II (1836), 194.

for example, sanitary reform had to wait until the 1860s.<sup>58</sup> Yet at least one agricultural village in Midlothian was capable of being transformed by action taken under the 'Nuisances Act of 1848'. Formerly Ratho was a miserable place with a dunghill 'before almost every door', which, along with the ditches, were cleared only once a year. As a result of recent action by 1852 the village was thoroughly cleaned and sanitary conditions were greatly improved.<sup>59</sup>

Elsewhere, by the close of the period, sanitary amenities had become satisfactory at a number of mining villages in the Lothians, either through the action of a vigilant local authority as at Crofthead, or that of an improving employer, as at Newtongrange. A number of communities received gas street-lighting as at Bathgate (1834), Bo'ness (1843), and Lasswade (1857). In 1873 the Marquis of Lothian had completed a gas work for the lighting of the colliery, farms and villages of the Newbattle estate, and was undertaking a gas supply for the village of Newtongrange.<sup>60</sup> During the 1860s several large employers were undertaking works to greatly improve the water supply to the mining villages of West Lothian, which was sorely needed. Previously inhabitants over a significant area had had to rely for their water supply on 'the clouds or ... far-away springs'. Similarly by the early 1870s water companies and coalmasters had wrought a substantial improvement in the water supply in parts of Midlothian.<sup>61</sup>

Nevertheless the progress that had been accomplished was quite incomplete. Provisions for waste disposal were very mixed throughout the Lothians, varying from good to appalling. In the superior village of Newtongrange there were no closets whatsoever in 1875. More generally

58. Campbell, Scotland since 1707, 212-4.

59. The Scotsman, 11 August 1852.

60. The Scotsman, 24 January 1873.

61. The Scotsman, 1 and 2 July, 1 October 1862, 21 October 1867, 6 July 1871; The Glasgow Herald, 20 January, 8 and 11 February 1875.

some extremely grim, black spots remained. The mining rows at Kinneil and Harthill were surrounded by filth, and Grange possessed 'neither lighting, drainage, nor an adequate water supply'. It was '... one of the dirtiest villages in Scotland'.<sup>62</sup>

As in England, before legislation passed in the early 1870s, Scottish primary education was left largely to church schools and charitable bodies. Up to about 1840 it would appear that much of the instruction given was almost worthless.<sup>63</sup> In the mining districts the standard of education the children received depended greatly on the willingness of the local employers to accept some responsibility in this area.

Legislation at least made the children available for lessons. The Act of 1842 was a first step. The Mines Act of 1860 laid down that no boys between the ages of ten and twelve years could be employed in a mine except those who could 'obtain a certificate of ability to read and write, or at least school attendance'. Youngson Brown has indicated that this elastic requirement meant effectively in Scotland that children under twelve were kept out of mines, as employers found that obtaining and filing the certificates was more trouble than going without children.<sup>64</sup> Although Alexander MacDonald was frequently far from satisfied with the operation of the Act, Ralph Moore was. Moore claimed that where schools were not established in connection with the colliery

in the east of Scotland, they were convenient to the colliery village.<sup>65</sup>

In the Lothians new schools were set up, and the local coalmasters had a fair record in this matter. By the late 1860s it appears that boys in

62. The Glasgow Herald, 8 and 11 February 1875; Cadell, 'Historical Account of Grange', 234.

63. Handley, Irish in Scotland, 299.

64. Youngson Brown, 'Scots Coal Industry', 278-280.

65. Select Committee on Mines, (PP 1866, XIV), evidence of A. MacDonald, QQ 6780-9; Inspectors of Mines Reports, 1865, Report by R. Moore, 133.

collier families were by the age of twelve fairly proficient in reading, writing and arithmetic, and were encouraged to take up evening classes later.<sup>66</sup> MacDonald, himself, perceived a great improvement in the literacy of the Scottish collier between the late 1830s and 1866: a fair testimony that actual progress in education had been made.<sup>67</sup>

Paternalism. Even while the direct economic involvement of the landed estate in the Mid and East Lothian coal industry declined between the 1840s and 1860s, its positive social significance increased. As entrepreneurs or lessors the gentry and aristocracy constituted a major force for improvement in the district in their role of benevolent paternalists. Paternalistic regimes were also operated in West Lothian by the Cadells of Grange and Bailies of Polkemmet.<sup>68</sup>

The Buccleuchs, Dundases of Arniston, Clerks of Penicuik and others demonstrated their paternalism by such gestures as granting allowances to colliers' widows, allowing old tenants to remain in colliery cottages, giving out small cash gifts on occasions like the Queen's marriage day, by being present at convivial gatherings and functions where the colliers were present, by providing certain amenities such as bowling greens (Arniston in 1861), reading rooms or libraries, and by supporting their employees in certain of their own endeavours like the formation of colliery bands. In 1857,<sup>69</sup>

In celebration of the birth of a son and heir at Arniston, Mr. Dundas entertained the domestic and out-door establishment ... with a supper and dance ... Some days previously, the colliers of the estate upwards of 400, were plentifully regaled with beef, plum-pudding, and ale, and were visited by Mr. and Mrs. Dundas, who addressed them in a kind and affable manner.

66. Bremner, Industries of Scotland, 21.

67. SC on Master and Servant, (PP 1866, XIII), evidence of A. MacDonald, QQ 494-6. In the early nineteenth century colliers usually made their signatures on annual bonds with a cross. In a document of 1859 the number of written signatures exceeded the crosses, Cadell MSS, 'The Petition of Grange Labourers', 1 April 1859.

68. The Cadells' regime was not comprehensive; they supplied appalling accommodation for their colliers.

69. The Scotsman, 26 September 1857.

Substantial advantages accrued to the Lothian colliers on account of the role which the coal proprietors were ready to perform, especially in the spheres of housing and education. At Dalkeith Colliery the colliers' houses, built about 1840, were for long rent-free. They each consisted of one room, one kitchen, one small scullery and a separate water closet. The houses were 53 feet wide and 20 feet deep. Prizes and strict rules were prescribed to encourage the occupants to keep their homes clean and in good order. Even towards the close of the period these houses, which were well lighted and had an excellent water supply, had few equals in the Scottish mining districts.<sup>70</sup> Good houses, dating from the same period, were also provided for most of the colliers of the Marquis of Lothian.<sup>71</sup> After 1850 in East Lothian both the Dowager Lady Ruthven and Lord Elphinstone provided 'model' homes for the colliers who worked on their estates.<sup>72</sup> Elsewhere in the two counties housing standards were inferior to these examples.

The provision of subsidized schooling, on the other hand, was quite widespread. By the 1840s, and even earlier in some cases, the Marquis of Lothian, the Duke of Buccleuch, and families like the Hopes, Hopetouns, and Wauchopes were financing teachers and colliery schools.<sup>73</sup> In 1855 Lady Ruthven was establishing a school for the colliery children of Winton, East Lothian on 'a handsome and liberal scale'. Similar benevolence flowed in the 1860s from Lord Elphinstone at Carberry, and jointly from R.B. Wardlaw-Ramsay and Archibald Hood at Whitehill.<sup>74</sup>

70. Buccleuch MSS, SRO GD 224/582, 'Plan and Elevation of Workmens Houses for Dalkeith Colliery', January 1845; Ibid, Box 649, 'Rules to be observed for Encouraging Cleanliness and Order in the Work-Mens houses at Dalkeith Colliery', 29 April 1841.

71. Bremner, Industries of Scotland, 28.

72. S. Tremenheere, Report of Commissioners of Mines, 1855, 19; The Colliery Guardian, 10 December 1869.

73. S. Tremenheere, Report of Commissioners of Mines, 1844, 14; Ibid, 1847, 8; NSA, I (1839), 74; Ibid, II (1835), 149; Children's Emp Comm, Appdx to First Report, (PP 1842, XVI), Evidence collected by R.H. Franks, evidence of D. Adams, No. 27.

74. SC on Mines (PP 1866, XIV), evidence of A. Hood, QQ 13318-23.

The generosity of the coal proprietors was generally rewarded by submissive respect shown towards them by the colliers. Even when the workers at Grange petitioned for 'a small advance of wages' in 1859, they proclaimed to Henry Cadell: 'We cast ourselves wholly on your sympathy'. In 1861 Cadell's 'trulay servants' made another appeal to him 'most respectfully'; this time to grace a colliers' 'Walking Procession' and dinner with his presence.<sup>75</sup> The Mid and East Lothian coalmasters were troubled little by industrial unrest in the 1850s and 1860s, (and the same was true of Cadell at Grange). Quite apart from any business advantages this brought, it is probable that the landowners of the region found the part of generous and humanitarian despots socially agreeable.

It is the case that paternalistic regimes were established elsewhere in the Scottish coal industry, for example by the Dixons at Govan, and that certain powerful enterprises like the Bairds' and Coltness Iron Company became more aware in the 1850s and 1860s of their responsibilities in areas like colliers' housing.<sup>76</sup> However the strength, concentration and success of the paternalistic system in Mid and East Lothian was probably rather exceptional.

But the changing ownership structure, the development of working-class consciousness, and the onset of business uncertainties in 1874 undermined this regime. Soon Dalkeith Colliery came under corporate control. A collier speaking in 1890 regretted the change:<sup>77</sup>

... wherever the colliery has been worked by the proprietor wages were better as a rule and everything was more forthcoming, such as prop-wood and other material. You were not restricted so much as when it was under a company ... miners were better off where the proprietor worked the colliery than where the company worked it. That has been my experience as a working miner.

75. Cadell MSS, 'The Petition of Grange Labourers', 1 April 1859; 'Appeal of Grange Workmen to Henry Cadell', 26 June 1861.

76. S. Tremenheere, Report of the Commissioners of Mines, 1852-3, 24-30.

77. RC on Mining Royalties, Second Report, (PP 1890-1, XLI), evidence of R. Brown, Q5756.

The Churches and Self-Help. The social and working environment of the mining communities was enhanced not only from such sources of improvement as paternalistic benevolence, Mines legislation and very slowly from the movements for educational and sanitary reform, but also from the efforts of the inhabitants themselves. The religious revival and the triumphant advance of middle-class morality in Victorian society were, without a doubt, powerful external forces which played a significant part in shaping the process of 'moral improvement' in the mining districts. In the Lothians, moreover, paternalistic intervention was sometimes involved in the colliers' projects for self-improvement. But many of the self-help bodies ante-dated the period when paternalistic and middle-class influence has been established as being significant. They originated to a considerable extent, from the colliers' own determination to better their condition.

In the early nineteenth century the colliers appear to have been quite indifferent to the Churches, and the Churches in some cases to them. In Gilmerton there had been no church, which was held to be a cause of the 'melancholy want of religion' among the miners.<sup>78</sup> In many parts of East Lothian in 1841, 'Hundreds of grown-up colliers ... never enter a place of worship, but spend the sabbath in the vilest debauchery and rioting'.<sup>79</sup> Milne noted widespread ungodliness among Mid and East Lothian colliers in the late 1830s.

But the Churches were by then reaching out to the miners, who were moreover a receptive audience. Gilmerton received its church in 1837, and shortly few pit villages in Midlothian were without a religious establishment. There was missionary activity in Elphinstone, East Lothian,<sup>80</sup> and at Arniston where a sharp change took place in the colliers'

78. NSA, I (1839), 13.

79. *The Scotsman*, 14 April 1841.

80. McNeil, *Tranent and its Surroundings*, 199.

behaviour. Recently ignorant of religion, they listened 'with cheerful and much seriousness to the Ministers of the Gospel who come among them', and by 1839 they and their families had become apparently regular church-goers.<sup>81</sup> After 1850 the churches were probably a moderately important element in the life of the colliery communities. In West Lothian institutions of the Established, Methodist and Free Church bodies were founded, especially in the 1860s. For example at Armadale, a Free Church chapel was established which by 1869 had 197 members 'almost exclusively ... miners'.<sup>82</sup> The religious movement continued too in Mid and East Lothian. After 1850 a Primitive Methodist chapel was built at Cockenzie, with stones quarried by miners who attached themselves to this denomination.<sup>83</sup>

The coal owners of the region often lent their weight to the religious revival. They were active members of local churches, and gave generously of financial aid to new projects.<sup>84</sup>

I have not considered it my brief to undertake an 'in-depth study' of the relationship between the Churches in the Lothians and trade unionism or working-class consciousness, but some provisional observations may be possible. It seems probable that the decline in religious indifference was accompanied by acceptance of a morality which contributed to a reduction in drunkenness and absenteeism. In 1847 Tremenheere observed that the temperance movement had met with some success at a significant number of collieries in Mid and East Lothian. Other commentators noted a recent advance in the spiritual and general behaviour of the colliers at certain Lothian works in the early and mid-1840s.<sup>85</sup>

81. Milne, Memoir on Mid and East-Lothian, 147-8; see also, *Ibid.*, Statistical Table at end, regarding attendance at places of worship.

82. Cadell MSS, 'Circular re Armadale Free Church', 1 March 1869.

83. McNeil, Tranent and its Surroundings, 172.

84. The Dundases of Arniston, the Baillies of Polkemmet, the Cadells at Grange and the Gillespies near Bathgate were amongst those active in these respects.

85. S. Tremenheere, Report of the Commissioners of Mines, 1847, 20; NSA, I (1844), 572; II (1843), 135.

It appears likely that religion helped to raise personal standards and was of some utility as a work-discipline among Lothian colliers from about this time.

The colliers were more obviously responsible themselves for developing qualities such as moderation and thrift when they founded and supported their own self-help bodies. In many cases the workers sought managerial and church acceptance. For example in 1850 the miners of Dalkeith Colliery successfully obtained comment and approval for the rules of their newly-established friendly society from the Duke of Buccleuch.

(The manager thought the project 'stable and useful' and 'deserving of encouragement'.)<sup>86</sup> But employers did not always have a controlling influence: in 1837 and 1842 friendly society funds were used in Midlothian for strike purposes. The friendly societies subscribed to by the Lothian colliers were intended chiefly to provide benefits for sickness and funeral expenses, and to some extent for other contingencies such as accidents and widowhood. Such organisations had been in existence since the eighteenth century. In 1820 there was a Union Society of Coal-Hewers in Niddry, providing sickness and funeral benefits, and restricting entry to those aged between sixteen and forty years of 'good character and health'.<sup>87</sup> Between about 1830 and 1850 a number of societies were active, evidently pursuing a useful existence relieving distress and inculcating providential habits at a number of Lothian collieries, including New Craighall, Sheriffhall and Edmonstone. In 1843 there were seven friendly societies in Bathgate in existence, all founded before 1810, with a combined membership of 969, or about one-quarter of the population of the parish.<sup>88</sup> In 1875, perhaps in reaction to the failure of the

86. Buccleuch MSS, SRO GD 224/582, H. Cadell to the Duke of Buccleuch, 3 and 17 June, and 5 August 1850.

87. Report of the Committee of the Highland Society to inquire into the State of Friendly Societies (1820), Transactions of the Highland Society, vol 6 (1824), Appendix, table IV.

88. Children's Emp Comm, Appdx to First Report, (PP 1842, XVI), p. 402, paras. 90 et seq; ibid, Evidence collected by R.H. Franks, evidence of D. Adams, No. 27; NSA, I (1839), 104; II (1843), 166.

trade union in the previous year, the colliers of Mid and East Lothian set up an Accidents, Superannuation, and Widows and Orphans Fund.<sup>89</sup>

Friendly societies remained important and flourishing towards the end of the period also in Tranent, where three were in existence in 1883 including a Miners' Friendly Society.<sup>90</sup>

The Lothian miners also participated after 1850 in another great self-help movement - the co-operative movement. For example, at Whitehill Colliery, Midlothian the colliers ran a co-operative store in the 1860s, of which their employer Archibald Hood was treasurer, although the colliers managed the business.<sup>91</sup> At Tranent a co-operative society was established in 1862. By 1875 it had grown to a considerable size with 600 members (four-fifths being miners), and a capital of £4,663. Another successful co-operative store was established at Crofthead, West Lothian with 100 members, mostly miners, and a weekly turnover of £90 by 1875.<sup>92</sup>

The colliers of the Lothians demonstrated their moral and intellectual improvement by subscribing to Mutual Improvement Societies, Savings Banks and Subscription Libraries. In the early nineteenth century the colliers evidently showed no interest in the Savings Banks dotted about the region. By 1861, however, when a bank was opened at the shale-mining village of Broxburn it 'met with the greatest success'. By June 1862 deposits amounted to 'several hundred pounds, almost entirely from the savings of the labouring community'.<sup>93</sup> Not all the miners dissipated the high earnings of 1872-3 on drink. Some Mid and East Lothian men were said to have accumulated large bank balances, others to have invested in house-building, and some Arniston miners did invest small amounts in the Arniston Coal Company.<sup>94</sup>

89. The Glasgow Herald, 8 February 1875.

90. McNeil, Tranent and its Surroundings, 234.

91. SC on Master and Servant, (PP 1866, XIII), evidence of A. Hood, QQ 1277-80.

92. The Glasgow Herald, 20 January and 8 February, 1875.

93. The Scotsman, 23 June 1862 cited by Butt, 'James Young', 360.

94. The Glasgow Herald, 8 February 1875; Dissolved Companies SRO, BT/2/549, Arniston Coal Company Limited, List of shareholders, 30 September 1875.

Libraries and reading-rooms were increasingly utilized such as those set up at Dalkeith Colliery in 1843, at Kinneil Ironworks by 1851, and at the Bathgate Paraffin Company Works in 1862. In December 1861 the first of a series of lectures was given in the Public School-room to the miners at Armadale; there were readings from authors, including Poe and Tennyson, which were well received apparently.<sup>95</sup>

The rising standards of the Lothian colliers were revealed in the development of domestic pride. In the early 1840s the Midlothian colliers' homes were hovels in most cases. In 1875 in their houses there was said to be an air of cleanliness and almost warmth, floors were sanded, and interiors were decorated with cheap engravings, bird-cages and pot-flowers.<sup>96</sup>

It is true that probably only a minority of the Lothian miners ever became involved actively in the various movements that have been discussed. To take an extreme example the Mutual Improvement Societies at Dalkeith Colliery and in Portobello had only 16 and 21 members

respectively in 1851.<sup>97</sup> But the fact that so many churches and self-help institutions were able to thrive - even if not embracing most of the miners - suggests that the mining communities were rejecting the passive and wholesale acceptance of squalor which had been fairly noticeable in the early nineteenth century. Nor were the miners entirely sacrificing themselves to subtle instruments of social control by supporting the ideals of self-help. The more independent, self-reliant character of the Lothian miner, which made him interested in books and co-operative societies, surely made him interested as well in the re-emergence of militant trade unionism towards the close of the period.

95. *The Scotsman*, 13 December 1861.

96. *The Glasgow Herald*, 8 February 1875.

97. *Religious Worship (Scotland)*, (PP 1854, LIX), 82 *et seq.*

### An Improved Social Environment

Certain broad reform movements, and the efforts of the miners themselves, the coal proprietors, and employers brought a considerable improvement in the working and social environment of the Lothian mining districts by the close of the period under study. Apart from the major developments already discussed the environment was enriched as a result of a piecemeal accumulation of social assets. By the early 1870s colliery bands, bowling greens, public parks and cricket clubs could be found in the mining villages. Annual fairs, and gymnastic and athletic games were becoming very popular with the miners.

Such developments, along with the advance of a more 'acceptable' morality, certainly raised the moral tone of the mining communities.

But it is very difficult to measure the value of these improvements in any rigorous sense. On the other hand in the more concrete areas of wages, conditions of employment, and the physical state of the mining villages it is quite obvious that gains were either small or unevenly distributed.

Nevertheless as Youngson Brown notes, the fact that a much larger proportion of Scottish miners were at work in 1881 between the ages of forty-five and sixty-four as compared to 1851, suggests that on the whole

the working life of the miner was becoming longer.<sup>99</sup> This would be due most likely to an improvement in domestic and working conditions.

Youngson Brown reaches the following conclusion:<sup>100</sup>

There is no doubt that between the 1840s and the 1860s the mining communities in the west largely moved away from the rather wild and unruly type of existence which Tremenheere described and feared and became ... in a word, more civilized. Education - which was Tremenheere's favourite theme - and union - which was MacDonald's - effected the change, together of course with the simple accumulation of experience.

99. Youngson Brown, 'Scots Coal Industry', 74-5.

100. *Ibid*, 215.

It appears quite possible that there was a convergence in the social structures of the mining districts of Scotland during these decades. Other regions were becoming more settled like the Lothians, while the Lothians were becoming much less under the somewhat exceptional influence of the paternalistic coalmasters (and the special market conditions which had tended to apply up to the 1870s). The circumstances were being set for social, economic and labour developments in the Lothian coalfields to follow, henceforth, a somewhat less idiosyncratic path.

## GENERAL CONCLUSION

The results of this study indicate that the use of the *in vitro* technique in the study of the interaction between *Escherichia coli* and *Enterococcus faecalis* is feasible and can be used to predict the outcome of the interaction in vivo. The results also indicate that the *in vitro* technique can be used to study the interaction between *E. coli* and *E. faecalis* under different conditions, such as different temperatures, different pH values, and different concentrations of antibiotics. The results of this study also indicate that the *in vitro* technique can be used to study the interaction between *E. coli* and *E. faecalis* under different conditions, such as different temperatures, different pH values, and different concentrations of antibiotics.

## GENERAL CONCLUSION

In this study two arguments have frequently been pressed, or at least been implicit in the narrative and accompanying analysis: firstly, that changing market conditions exercised a profound effect on the development of the coalfield; and yet secondly, that there was a considerable continuity in the structure of ownership and even more in employer-worker relationships, and that these phenomena in turn had widespread consequences. Many of the trends noted in the economic and social history of the Lothians' coal industry between the early nineteenth century and the 1870s have been explained by reference to the relative weight, or interaction of these two themes.

The stability<sup>1</sup> in employer-worker relationships stemmed from the fact that a handful of landed families for generations were the largest employers in the region. Even when the form of business organisation changed, and new firms ran the mines, the influence of the old families remained very significant in Mid and East Lothian up until the early 1870s. One must be wary of speaking too early about the eclipse of this 'gentry' class with respect to coal mining. As lessors such families were still interested or involved in the business enterprises themselves. As proprietors of the minerals and benevolent paternalists they provided social amenities for the colliery communities, whose very existence in some cases had come from their economic decisions. On the employment side neither a great expansion of the labour force nor huge recruitment from new sources of manpower was required.<sup>2</sup> Between about 1840 and 1880 the working population of Mid and East Lothian coal industry grew by only about 50%, compared with the impressive three-fold expansion in the numbers employed in British mining and quarrying generally.<sup>3</sup>

1. This word seems a fair evaluation in the circumstances.

2. One might add, notwithstanding the advance in output between 1840 and 1880, and perhaps partly in consequence of the improvements in organisation and technique.

3. P. Deane and W. Cole, British Economic Growth 1688-1959 (Cambridge, 1959), 143.

The study of the evolution of the market has revealed that transport developments in the region, although in the earlier part of the nineteenth century lagging behind experience elsewhere, exhibited a periodization that has been encountered in other works. In particular the form which canal-rail rivalry took, as embodied in the contest between the Union Canal and the Edinburgh & Glasgow Railway, followed a pattern very familiar to most transport historians.<sup>4</sup> Similarly the findings have confirmed the strong impact of the Railway on the coal trade, especially in the destruction of local monopolies.

It was only the emergence of dynamic new areas of market growth which saved the Lothian coalfields from further stagnation after 1840.

Continuity in employment relationships and a relatively stable growth of the market favoured the paternalistic regime and enabled an environment of social equipoise to be established without great difficulty in the 1850s and 1860s. In England's West Midlands, by contrast, economic and market conditions had exhibited a 'convulsive' pattern of expansion, leading to role-conflict for landed coalmasters and their withdrawal from active involvement in the coal industry from the 1820s.<sup>5</sup> In the Lothians domestic consumption and later the gas industry were very significant sectors of demand, bringing it would seem, greater stability to market conditions than obtained elsewhere. This probably helps to explain why the landed estate played a positive role in the region's coal industry for so long.

Among the Lothian colliers an evolution from a servile mentality in the early nineteenth century to a deferential one by the 1850s has been traced. This may appear to be a sterile tautological distinction. But

after the legal collapse of serfdom the bondsman of the early nineteenth

4. See below, chapter two, pp. 51-3.

5. Opprobrium was earned by the Stafford family every time they either cut wages or increased coal prices. E. Richards, 'The Industrial Face of a Great Estate: Trentham and Lilleshall 1780-1860', *EHR*, second series, vol 27 (1974), 425-9.

century enjoyed few advantages from his still servile relationship to his employer, and intermittently participated in violent industrial disputes. At least in the community of deference, where industrial unrest was rare, deferential respect was rewarded with some real benefits, such as the provision of social facilities.<sup>6</sup>

With the Mid and East Lothian coal industry's competitive position and hold on traditional markets being progressively undermined during the first half of the nineteenth century, it is not surprising that the coalfield lost its status as a relatively high wage area. Again, with money wages being cut, it was scarcely unnatural for the Lothian colliers to be swept along in the major currents of industrial unrest in the Scottish coal industry. Their struggles were for a time elemental and quite unideological.<sup>7</sup> The strike of 1842 was something of a watershed. It demonstrated to the colliers of Mid and East Lothian that even a well-organised and most desperate resistance would be crushed by their employers with the assistance of the forces of law and order.<sup>8</sup>

During the next generation it was probably the same men, or their brothers and sons, who formed most of the labour force of the Midlothian coal industry, and they were strike-disliking folk. In other coalfields there were ruthless suppressions of unrest, but the element of continuity in the labour force there, with often rapid recruitment, can hardly have been so pronounced in most cases. Conditions of flux made West Lothian, for example, an unsettled area during the third quarter of the nineteenth century.<sup>9</sup> Such factors as these may explain the apparently tortuous - and to some no doubt unsatisfactory - development of class-consciousness among the Mid and East Lothian colliers. By the early 1870s they were becoming more militant, but their industrial action was self-interested and sectional, and they conceived of no desire to overthrow the existing

6. Chapter ten, pp. 301-2.

7. There is no evidence that they related their struggles to the economic and social system, or wished to change it.

8. Chapter nine, pp. 257-61.

9. Chapter nine, pp. 268-71.

economic and social order. The region's labour force had its roots deep in the past, well before the appearance of a radical working-class movement, and, as has been noted, had for long enjoyed special relations with the masters,

Among the sources that have been employed in this study the colliery accounts are notable for their enormous quantity of data. Yet despite considerable processing, little in the way of really clear trends have emerged. Something more rewarding might have been revealed if it had been possible to determine with some accuracy the behaviour of colliers' real earnings. Family muniments and legal records were fruitful sources of information, both being very useful in such diverse areas as capital formation and labour movements. It was not possible in a thesis away from the specialization of historical demography to investigate census enumerators' returns or communion rolls. They certainly do offer scope for the researcher into mining communities.<sup>10</sup> They doubtless would illuminate certain social and demographic problems which remain a little unclarified in this study. The role of religion in the mining communities is but one of a number of themes which deserve much deeper research than it was possible to undertake here. Economic and social problems are of course rarely distinct as such and normally have implications, including religious observances, extending beyond these intra-disciplinary divisions.

In 1800 the Lothians' coal industry was a small part of the total British coal industry. In 1875 its relative importance was even less.

An advantage of examining a small coalfield is presumably that it is possible to increase both the depth and the range of the topics studied.

A disadvantage is that it is sometimes difficult to assess the impact of trends which did not themselves reach full expression in the Lothians, but which nevertheless seem to have had a considerable effect on the region. It does appear that the Lothians were influenced by such major

10. See, Campbell, 'Honourable Men'.

trends as the integration of the economy due to the transport revolution, and the total increase in the labour supply in the Scottish coal industry. If this was the case it would be symptomatic of the decreasing insularity of the region.

Yet for the early and mid-Victorian periods another major finding has been that even the same region could contain mining fields with strikingly different economic and social structures, which accounted for (to take one example) the differing patterns of the labour movement in the separate fields. Even the diversity among the Scottish districts is revealing, and helps to explain the great difficulty encountered by the trade union movement in making much headway during the period.

Some broad movements in the British coal industry were repeated in the Lothians - above all the general advance in output and technique achieved between about 1840 and 1880.<sup>11</sup> By 1840 the accumulated weight of tradition and inhibited entrepreneurship displayed by most of the landed coalmasters contributed to make the Mid and East Lothian coalfield an uncompetitive and relatively backward one. Although the executives of the subsequent progress were primarily representatives of 'private enterprise',<sup>12</sup> the landed estate remained an extremely powerful influence in the development of the coalfield. Bearing in mind these strong elements of continuity, and that in certain ways the landed classes were a conservative force, it is difficult to attribute the modernization of the Lothians' coal industry mainly to developments on the supply side.<sup>13</sup>

Rather the organisational and technical advances were elicited primarily by the favourable evolution of market demand. This seems to be one significant finding which emerges from the study of a small but interesting coalfield.

11. Chapter seven, pp. 191 *et seq.*

12. See pp. 131-2 for what I mean by this term, and chapter five, pp. 152 *et seq.* for the role of private enterprise.

13. Naturally the supply side had to be sufficiently flexible in response to demand changes. As was seen in chapter five, pp. 159-164, there were during the closing years of the period considerable changes in the typical method of business organisation in the region.

## STATISTICAL APPENDIX

## STATISTICAL APPENDIX

Table 1. Coal Shipments from South Forth Ports, 1851-80<sup>1</sup>

Year	Grangemouth (tons)			Bo'ness (tons)			Leith (tons)		
	Coastwise	Foreign	Total	Coastwise	Foreign	Total	Coastwise	Foreign	Total
1851	6,521	16,185	22,706	36,359	65,796	102,155	9,091	13,086	22,177
1852	2,943	18,675	21,618	34,450	53,228	87,678	8,358	18,623	26,981
1853	2,039	24,149	26,188	31,442	70,183	101,675	10,359	22,582	32,941
1854	4,294	10,411	23,705	35,549	63,127	98,676	14,338	23,685	38,023
1855	2,334	58,182	55,416	37,637	109,341	146,978	10,401	29,853	40,254
1856	1,021	44,281	45,302	122,662	127,542	250,144	5,839	34,393	41,232
1857	922	38,819	39,741	119,557	138,024	257,561	4,590	27,955	32,545
1858	952	37,797	38,749	108,092	128,952	237,045	6,769	28,248	35,017
1859	2,704	47,334	50,038	113,329	167,888	281,217	7,433	38,096	45,529
1860	1,749	62,409	64,208	124,354	151,973	276,327	6,696	35,593	42,289
1861	3,389	74,174	77,563	124,152	168,152	292,304	6,269	48,840	55,109
1862	2,199	93,677	95,876	99,006	163,930	262,937	10,575	57,697	68,272
1863	867	94,445	95,312	102,589	163,765	266,354	13,907	59,737	73,639
1864	2,785	84,759	87,544	105,845	164,314	270,159	11,242	67,395	78,637
1865	3,119	118,036	121,155	88,365	162,029	250,394	17,772	81,144	104,916
1866	3,318	110,971	114,289	30,139	177,144	207,293	10,295	71,476	81,771
1867	2,666	119,113	121,779	30,000	185,633	215,033	12,404	80,379	92,783
1868	1,679	133,555	135,234	66,721	260,430	327,151	6,798	87,672	94,470
1869	1,803	103,181	104,984	74,392	197,571	271,963	10,716	85,069	95,785
1870		109,695			219,493				104,657
1871		133,733			211,499				140,874
1872		126,347			254,147				194,117
1873		144,477			233,329				186,838
1874		177,780			257,731				279,612
1875		196,251			321,137				355,976
1876		200,175			359,187				318,905
1877		171,222			233,545				293,518
1878		159,372			239,365				190,672
1879		124,090			266,900				174,230
1880		119,079			287,086				197,148

1. Sources: Report on Coal, Appdx to Report Committee E, (PP 1871, XVIII), 78; Final Report of the Royal Commission on Coal Supplies, Part XI, Appendices, (PP 1905, XVI), 86-7.

**Table 2. Approximate Gas Output at Glasgow and Edinburgh Gas Companies, 1827-90<sup>2</sup>**

Glasgow Gas Light Company		Edinburgh Gas Light Company	
Year	Output (thousand cu ft of gas)	Year	Output (thousand cu ft of gas)
1827	79,000	1840	95,000
1837	163,000	1850	120,000
1847	391,000	1860	220,000
1860	769,000	1870	340,000
1870	1,296,000	1880	510,000
1890	3,059,000	1890	1,200,000

**Table 3. Approximate Coal Consumption at Gas Works in Glasgow and Edinburgh, 1827-84<sup>3</sup>**

Glasgow		Edinburgh	
Year	Consumption (tons)	Year	Consumption (tons)
1827	8,000	1840	10,000
1859	60,000	1866	35,000
1869	148,110		
1882-3	221,057	1884	105,891

**Table 4. Properties of Coals from Analyses undertaken c1850<sup>4</sup>**

Name of coal or colliery	Chemical Analysis (%)	Illuminating power (sperm candles)	Yield per ton of coal (cu ft of gas)
	Volatile matter	Ash in coke	
Torbanite	68.4	31.6	22.8
Old Wemyss	52.5	47.5	15.1
Lesmahagow	49.6	50.4	9.1
Arniston	45.5	54.5	4.2
Grange	40.2	59.8	5.2
Wigan Cannel	37.0	63.0	3.0
Pelaw Main	30.3	69.7	2.6
Rhondda	22.8	77.2	2.7

2. Sources: Glasgow Corporation Gas Department, *A Brief Account of the Inauguration and Development of the City's Gas Supply* (April, 1949); T.R. Cameron, 'A History of Gas Manufacture in Edinburgh', (Edinburgh, 1952).

3. Sources: derived from a number of sources, including those noted in foot-note 2, above, and *Water and Gas Works Statistics*.

4. Sources: various, including *Journal of Gas Lighting*, 10 December 1851, 10 November 1851. Note: Later analyses give considerably higher yields and illuminating powers for Scottish gas-coals, but the above table is one of the most satisfactory for comparative purposes.

**Table 5. Scottish Gas-Coal Shipped to London, 1853-9<sup>5</sup>**  
(tons)

Colliery	1853	1854	1855	1856	1859
Boghead (torbanite)	5,714	10,680	13,212	9,661	6,217
Knightswood	270	1,951	-	230	-
Lesmahagow	1,094	-	220	-	106
Lochgelly	2,944	1,303	254	-	-
Methil	1,250	3,513	2,979	1,868	856
Bathville	-	-	1,138	419	3,185
Others	1,251	1,469	2,035	954	3,099
	<b>12,523</b>	<b>18,916</b>	<b>19,838</b>	<b>13,132</b>	<b>13,463</b>

5. Sources: Journal of Gas Lighting; Hunt, Mineral Statistics.

Table 6. Sheriffhall Colliery Coal Output and Consumption, 1794-1827<sup>6</sup>

Period <sup>7</sup> (ending)		Output			Consumption within Colliery		
		Great Coal (tubs)	Smalls (tubs)	Panwood (bolls)	Great Coal (tubs)	Smalls (tubs)	Panwood (bolls)
9 August 1794 to							
1 November 1794	9,398						
6 February 1796	20,310						
4 February 1797	27,565						
3 February 1798	13,112						
2 February 1799	30,026	3,251	4,504		208	220	4,132
1 February 1800	40,577	3,977	11,004		40	439	11,146
31 January 1801	53,988	4,907	9,874		15	2,141	9,596
30 January 1802	40,658	4,600	15,023	1,239	2,429	14,060	
29 January 1803	47,144	7,917	15,675	2,189	254	15,619	
28 January 1804	34,010	5,047	22,052	225	981	21,756	
26 January 1805	63,639						
25 January 1806	95,966						
24 January 1807	90,651						
23 January 1808	87,020						
14 January 1809	78,349						
13 January 1810 to							
12 January 1811	113,874	3,763	22,494	589	331	17,938	
11 January 1812	141,310	9,093	29,612	486	1,081	19,155	
9 January 1813	148,445	10,239	20,425	743	2,499	19,299	
8 January 1814	161,892	8,140	21,514	1,162	1,068	19,095	
7 January 1815	217,950	2,191	15,587	1,626	540	15,228	
6 January 1816	213,827	11,983	17,761	2,294	500	15,430	
4 January 1817	232,170	11,458	22,828	2,218	382	14,113	
3 January 1818	219,676	5,968	14,930	2,214	241	13,145	
2 January 1819	137,139	6,342	10,227	1,362	197	9,074	
1 January 1820	201,802	6,733	16,172	1,973	73	14,627	
6 January 1821	155,576	1,891	8,831	1,420	1,060	8,899	
12 January 1822	103,119	2,855	5,649	1,189	575	5,623	
11 January 1823	98,563	4,876	15,681	877	10	7,120	
15 November 1823	138,232	4,774	8,597	2,119	77	8,419	
13 November 1824	149,840	1,774	17,354	2,241	24	14,147	
12 November 1825	157,362	3,478	16,671	1,294	387	14,797	
11 November 1826	192,935	4,151	21,550	1,386	601	17,562	
10 November 1827	182,665	8,957	21,162	2,540	2,800	16,757	

6. Sources: for Sheriffhall Colliery (Tables 6-8), Buccleuch MSS, SRO GD 224/986/3, Sheriffhall Colliery Account Book.

7. The periods are mostly of about one year. They cover the period commencing from the immediately preceding date.

**Table 7. Sheriffhall Colliery Colliers' and Oncost Wages Proportion**

Period	Ratio (where Oncost Wages = 1)
9 August 1794 - 2 February 1799	1.006
3 February 1799 - 28 January 1804	0.909
29 January 1804 - 14 January 1809	0.912

**Table 8. Sheriffhall Colliery Average Price of Great Coal, 1794-1827**

Period (ending)	Average Price of Great Coal per tub (£)	Period (ending)	Average Price of Great Coal per tub (£)
9 August 1794 to		18 February 1815 to	
1 November 1794	0.067	6 October 1815	0.108
8 August 1795	0.059	5 January 1816	0.108
7 November 1795	0.065	6 March 1816	0.104
4 February 1796	0.065	6 July 1816	0.106
7 May 1796	0.064	5 October 1816	0.101
1 November 1797	0.054	4 January 1817	0.107
3 February 1798	0.058	5 April 1817	0.101
5 May 1798	0.067	5 July 1817	0.086
4 August 1798	0.058	3 November 1817	0.095
3 November 1798	0.060	3 November 1818	0.087
4 November 1799	0.067	31 December 1818	0.091
1 February 1800	0.075	9 February 1821	0.100
3 May 1800	0.067	7 June 1822	0.092
1 November 1800	0.058	11 October 1822	0.083
30 January 1801	0.064	10 January 1823	0.082
2 May 1801	0.057	11 July 1823	0.083
1 August 1801	0.054	11 October 1823	0.082
30 July 1803	0.075	14 February 1824	0.081
28 October 1803	0.083	22 May 1824	0.076
28 January 1804	0.087	21 August 1824	0.078
28 April 1804	0.087	13 November 1824	0.078
21 February 1805	0.100	12 February 1825	0.081
29 July 1808	0.108	14 May 1825	0.095
14 October 1808	0.117	13 August 1825	0.096
14 January 1809	0.123	12 November 1825	0.103
15 April 1809	0.092	11 March 1826	0.111
15 July 1809	0.108	13 May 1826	0.112
14 October 1809	0.108	27 July 1826	0.097
13 October 1810	0.108	12 August 1826	0.092
11 January 1812	0.108	12 November 1826	0.095
9 January 1813	0.117	3 January 1827	0.095
10 April 1813	0.108	5 May 1827	0.084
2 December 1813	0.108	4 August 1827	0.081
17 February 1815	0.117	10 October 1827	0.081

8. The periods commence from the immediately preceding date.

Table 9. Loanhead Colliery Output, 1813-1815<sup>9</sup>

Period		Greats (tubs)	Smalls (tubs)	Panwood (tubs)
7 August 1813 - 29 January 1814		18,235	2,888	7,925
30 January 1814 - 30 July 1814		11,758	1,600	5,627
31 July 1814 - 18 February 1815		11,830	307	4,155

Table 10. Loanhead Colliery Colliers' and Oncost Wages Proportion, 1813-1815

Period	Ratio (where Oncost Wages = 1)
7 August 1813 - 29 January 1814	1.23
31 July 1814 - 18 February 1815	1.79

Table 11. Loanhead Colliery Colliers' Piece Rates and Prices, 1813-1815

Period	Great Coal Colliers' Piece Rate (per tub)	Great Coal Sale Price (per tub)
7 August 1813 - 28 August 1813	9d	1s 10d
26 September 1813 - 9 October 1813	9d	2s
15 May 1814 - 21 May 1814	1s	2s
21 January 1815 - 28 January 1815	1s	1s 10d

Table 12. Stobhill Colliery Output, 1810-1820<sup>10</sup>

Period (Year to)	Great Coal (tubs)	Smalls	Panwood
August 1810	19,231	5,954	4,006
August 1811	20,265	5,452	1,875
August 1812	41,759	9,510	6,011
August 1813	30,702	6,599	4,936
August 1814	28,799	6,867	7,293
August 1815	22,611	6,048	4,111
August 1816	22,619	5,096	3,523
August 1817	24,524	6,356	4,806
August 1818	23,247	5,597	1,862
August 1819	22,870	4,770	4,083
August 1820	29,861	6,153	4,902

9. Sources: for Loanhead Colliery (Tables 9-11), Clerk of Penicuik MSS, SRO GD 18/1148, Loanhead Colliery Accounts and Statements, 1810-15.

10. Source: Dundas of Arniston MSS, Sales of Coal at Stobhill, 1809-1820.

Table 13. Prestonhall Colliery Output, 1810-1813<sup>11</sup>

Period	Great Coal (loads)	Limewood (bolls)
29 November 1810 - 31 December 1811	15,198	9,990
31 December 1811 - 3 April 1812	5,763	2,994
3 April 1812 - 2 April 1813	15,191	13,571

Table 14. Prestonhall Colliery Profit, 1810-1813

Period	Value of Coals, etc. delivered to Estate (£ s d)	Total Profit (£ s d)	Net Profit (£ s d)
29 November 1810 - 31 December 1811	98 - 11 - 0	178 - 8 - 6	79 - 15 - 6
31 December 1811 - 3 April 1812	42 - 10 - 6	110 - 6 - 6	67 - 16 - 0
3 April 1812 - 2 April 1813	105 - 3 - 0	190 - 1 - 9	84 - 18 - 9

Table 15. Prestonhall Colliery Colliers' Piece Rates and Prices, 1810-1813

Period	Great Coal: Average Colliers' Piece Rates (per load)	Great Coal: Average Prices (per load)
29 November 1810 - 31 December 1811	3½d	9d
31 December 1811 - 3 April 1812	3¾d	9¾d
3 April 1812 - 2 April 1813	3¾d	9½d

Table 16. Easthouses Colliery Output of Great Coal, 1815-1819<sup>12</sup>

Period	(tubs)
7 January 1815 - 7 January 1816	22,110
8 January 1816 - 11 January 1817	30,549
31 January 1818 - 5 February 1819	42,450

Table 17. Easthouses Colliery Colliers Wages, 1815-1819

## Average Collier Hewing Wages per Week

Period <sup>13</sup> (ending)	(£ s d)	Period (ending)	(£ s d)
14 November 1815 to		31 January 1818 to	
1 April 1815	15- 6	1 May 1818	1 - 2 - 0
3 June 1815	16- 6	24 July 1818	1 - 0 - 2
19 August 1815	16-11	5 November 1818	1 - 11 - 8
25 November 1815	18- 1	5 February 1819	1 - 15 - 0
24 February 1816	16- 9	9 April 1819	2 - 0 - 10
25 May 1816	16- 0	11 June 1819	1 - 14 - 11
24 August 1816	14- 1		
16 November 1816	14- 2		
18 January 1817	12-11		

11. Sources: for Prestonhall Colliery (Tables 13-15), J.C. Brodie Collection, SRO GD 247/84/2, Papers relating to Prestonhall Coal, 1810-1813.

12. Sources: for Easthouses Colliery (Tables 16-19), Marquis of Lothian Mines, SRO CB9/26, Easthouses Colliery Pay Bills Account Book, 1815-1819.

13. See note 8.

Table 18. Easthouses Colliery Colliers' Output 1815-19Average Collier Output of Great Coal per Week  
(Selected Pits)

Period (ending)	(tubs)	Period (ending)	(tubs)
14 January 1815 to 1 April 1815	18.5	25 August 1816 to 16 November 1816	21.2
3 June 1815	21.1	18 January 1817	18.4
19 August 1815	20.2	31 January 1818 to 1 May 1818	38.4
25 November 1815	19.6	24 July 1818	31.6
24 February 1816	22.6	5 November 1818	54.3
25 May 1816	20.2		
24 August 1816 (No. 1 Pit)	17.4		
6 November 1818 to 5 February 1819	39.1	6 November 1818 to 5 February 1819	64.1
9 April 1819	36.0	9 April 1819	69.8
11 June 1819	33.6	11 June 1819	55.0

Table 19. Easthouses Colliery Colliers' and Oncost Wages Proportion, 1815-19

Period (ending)	Ratio (where Oncost Wages =1)	Period (ending)	Ratio (where Oncost Wages =1)	Period (ending)	Ratio (where Oncost Wages =1)
15 January 1815 to 1 April 1815	0.68	25 November 1816 to 25 May 1816	0.70	2 May 1818 to 24 July 1818	1.80
3 June 1815	0.51	24 August 1816	0.69	5 November 1818	1.19
19 August 1815	0.52	16 November 1816	1.13	5 February 1819	1.64
25 November 1815	0.79	18 January 1817	0.98	9 April 1819	1.16
24 February 1816	0.65	31 January 1818 to 1 May 1818	1.38	11 June 1819	1.53

Table 20. Shaws Colliery Output, 1804-7, 1819-1822<sup>14</sup>

Period (ending)	Great Coal (tubs)
8 January 1804 to	
12 January 1805	22,795
11 January 1806	26,684
17 January 1807	30,342
12 June 1819 to	
16 June 1820	63,539
15 June 1821	84,306
21 June 1822	74,596

14. Sources: for Shaws Colliery (Tables 20-23), Marquis of Lothian Mines, SRO CB9/7, Shaws Colliery Pay Book (No. 21), 1803-7; CB9/8, Shaws Colliery Pay Book, 1819-1822.

15. See note 8.

Table 21. Shaws Colliery Colliers' Output, 1804-7, 1819-1822

Average Collier Output of Great Coal per Week			
Period (ending)	(tubs)	Period (ending)	(tubs)
12 November 1803 to 7 January 1804	32.9	17 September 1819	48.4
7 April 1804	28.9	24 December 1819	58.7
7 July 1804	31.2	7 April 1820	67.6
6 October 1804	32.4	14 July 1820	49.3
5 January 1805	33.8	20 October 1820	47.8
6 April 1805	43.9	2 February 1821	45.2
6 July 1805	45.5	11 May 1821	48.8
12 October 1805	32.4	17 August 1821	43.7
11 January 1806	34.1	30 November 1821	43.5
5 April 1806	30.3	8 March 1822	38.6
12 July 1806	37.4	14 June 1822	44.3
11 October 1806	36.9	27 September 1822	34.0
7 February 1807	37.1	27 December 1822	34.9

Table 22. Shaws Colliery Colliers' Wages, 1819-1822

Average Collier Hewing Wages per Week			
Period (ending)	(£ s d)	Period (ending)	(£ s d)
12 June 1819 to 17 September 1819	1 - 10 - 2	12 May 1821 to 17 August 1821	1 - 7 - 7
24 December 1819	1 - 12 - 10	30 November 1821	1 - 9 - 10
7 April 1820	1 - 18 - 9	8 March 1822	1 - 5 - 5
14 July 1820	1 - 10 - 5	14 June 1822	1 - 8 - 9
20 October 1820	1 - 10 - 5	27 September 1822	1 - 0 - 2
2 February 1821	1 - 10 - 1	27 December 1822	1 - 3 - 8
11 May 1821	1 - 10 - 2		

Table 23. Shaws Colliery Colliers' Piece Rates and Prices, 1819-1822

Period (week to) <sup>16</sup>	Great Coal: Average Colliers' Piece Rates		Great Coal: Average Prices (per tub)
		(per tub)	
19 June 1819	6d.		1s 4d.
5 November 1819	6.12d.		1s 6d.
2 February 1821	6.31d.		1s 6d.
4 February 1822	7.28d.		1s 6d.
7 June 1822	6.57d.		1s 4d.
5 July 1822	6.7d.		1s 3d.
13 September 1822	6.71d.		1s 4d.
1 November 1822	7d.		1s 4d.

16. The period gives the week in which a significant change, if any, occurred in average prices and piece rates.

**Table 24. Bryans Colliery Output, 1814-1822<sup>17</sup>**

Period	Great Coal (tubs)
5 February 1814 - 7 January 1815	26,007
31 January 1818 - 29 January 1819	8,331
31 May 1822 - 29 November 1822	3,784

**Table 25. Bryans Colliery Colliers' Wages and Output, 1814-1823****Average Colliers' Hewing Wages and Output of Great Coal per Week<sup>18</sup>**

Period <sup>18</sup> (ending)	Hewing Wages (£ s d)	Output (tubs)
5 February 1814 to		
9 April 1814	1 - 7 - 2	36.8
9 July 1814	1 - 10 - 7	38.8
8 October 1814	1 - 13 - 9	39.3
7 January 1815	1 - 10 - 7	38.5
31 January 1818 to		
10 April 1818	1 - 6 - 6	32.1
10 July 1818	1 - 4 - 1	33.2
9 October 1818	17 - 5	24.6
8 January 1819	18 - 3	23.6
9 April 1819	19 - 3	27.7
11 June 1819	1 - 0 - 3	30.0
18 May 1821 to		
24 August 1821	16 - 8	13.8
14 December 1821	16 - 2	10.8
22 February to		
10 May 1822	18 - 9	15.9
1 June 1822 to		
4 October 1822	18 - 5	15.8
7 March 1823	18 - 6	20.2

17. Sources: for Bryans Colliery (Tables 24-26), Marquis of Lothian Mines, SRO CB9/16, Bryans Colliery Summing Book, 1814-15, 1818-19; CB9/18, Bryans Colliery Summing Book, 1821-3.

18. See note 8.

Table 26. Bryans Colliery Colliers' Piece Rates and Prices, 1814-1822

Period <sup>19</sup> (week to)	Great Coal: Average ← Great Coal: Average	
	Colliers' Piece Rates (per tub)	Prices (per tub)
19 February 1814	1s. 6d.	8d.
19 November 1814	1s. 8d.	8d.
7 February 1815	1s. 8d.	8d.
6 February 1818	1s. 3d.	6d.
13 February 1818	1s. 2d.	6d.
13 March 1818	1s.	6d.
4 September 1818	1s. 2d.	6d.
30 October 1818	1s. 2d.	7d.
11 June 1819	1s. 2d.	7d.
25 May 1821	1s. 6d.	9d.
5 July 1821	1s. 3d.	6½d.
21 February 1822	1s. 3d.	7d.
19 December 1822	1s. 4d.	7d.
14 March 1823	1s. 4d.	7d.

Table 27. Bryans Colliery Collier Weekly Work Patterns, 1820<sup>20</sup>

Part 1. Total Output for each working day (tubs of great coal)

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
3,023	2,670	2,640	3,386	2,408	3,052

Part 2. Total noted 'non-attendances'<sup>21</sup> for the period

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
31	22	16	5	18	68

Part 3. Average number of colliers working per day

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
12.1	12.6	12.6	14.2	14.1	10.6

Part 4. Average output per collier per day (tubs of great coal)<sup>22</sup>

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
11.3	9.2	9.5	10.4	7.4	12.6

19. The periods indicated are where a significant change in prices or piece rates occur (or are the end of accounts).

20. Source: Marquis of Lothian Mines, SRO CB9/19, Bryans Colliery Output and Sales Book, 1820. The period covered is 1 April 1820 to 22 September 1820.

21. The term, noted 'non-attendances', includes colliers who are represented in the accounts with no output of great coal, or an output less than two tubs per day.

22. Part 4 of the table gives the average number of colliers per day who are represented in the accounts with an output of three tubs or more of great coal per day.

**Table 28. Dalkeith Colliery Output, 1843-1875<sup>23</sup>**

Period (one year approx. to)	Great Coal (tons)	Period (one year approx. to)	Great Coal (tons)
22 April 1843	15,082	27 March 1860	49,349
20 April 1844	19,732	26 March 1861	43,699
16 April 1845	26,832	25 March 1862	45,047
15 April 1846	34,515	24 March 1863	44,239
13 April 1847	36,930	22 March 1864	48,908
11 April 1848	39,255	21 March 1865	46,569
10 April 1849	38,359	20 March 1866	47,643
9 April 1850	48,401	19 March 1867	43,313
8 April 1851	51,857	17 March 1868	42,517
6 April 1852	40,564	16 March 1869	34,042
5 April 1853	48,557	15 March 1870	35,668
4 April 1854	58,209	14 March 1871	39,043
1 April 1856	51,766	12 March 1872	39,986
31 March 1857	54,308	11 March 1873	38,680
30 March 1858	52,113	10 March 1874	37,450
29 March 1859	42,060	9 March 1875	40,739

23. Source: for Dalkeith Colliery (Tables 28-37), Buccleuch MSS, SRO GD 224/534-549, Dalkeith Colliery Account Vouchers, 1838-1875.

**Table 29. Dalkeith Colliery Colliers' Output, 1839-1853<sup>24</sup>**

Average Collier Output of Great Coal per Fortnight			
Period <sup>25</sup> (ending)	(tons)	Period (ending)	(tons)
21 February 1839 to		28 May 1846 to	
1 May 1839	16.0	2 September 1846	12.4
21 August 1839	12.2	23 December 1846	8.9
16 October 1839	13.1	17 March 1847	9.0
27 November 1839 to		8 June 1847	10.6
4 March 1840	13.8	31 August 1847	12.5
13 January 1841 to		22 November 1847	11.5
24 February 1841	5.7	29 February 1848	9.1
19 May 1841	5.8	11 April 1848 to	
14 August 1841	8.3	18 July 1848	11.4
20 November 1841	7.7	10 October 1848	10.8
12 February 1842	6.1	16 January 1849	10.5
21 May 1842	6.2	10 April 1849	12.0
13 August 1842	7.7	11 April 1849 to	
5 November 1842 to		3 July 1849	21.0
19 November 1842	11.5	25 September 1849	19.5
25 February 1843	8.6	1 January 1850	23.9
6 May 1843	8.7	9 April 1850	19.7
26 August 1843	6.7	16 July 1850	16.1
18 November 1843	6.4	22 October 1850	14.6
24 February 1844	10.8	28 January 1851	21.0
18 May 1844	9.2	22 April 1851	13.9
7 September 1844	8.2	15 July 1851	17.2
14 December 1844	7.6	21 October 1851	14.9
5 March 1845	10.1	13 January 1851	16.6
28 May 1845	12.6	6 April 1852	20.1
20 August 1845	12.6	13 July 1852	16.1
26 January 1845	16.6	5 October 1852	10.5
18 February 1846	16.7	11 January 1853	14.6
27 May 1846	11.3	5 April 1853	15.7

24. The collier productivity figures are derived from 'random' samples of collier groups varying in number from about two to six up to July 1851, and thereafter from groups of about thirteen to twenty-five. The groups are taken from the Cowden Pit, except in the year to April 1849 when they are from Smeeton Pit.

25. See note 8. The periods are mostly of about three months.

Table 30. Dalkeith Colliery Colliers' Wages, 1839-1853<sup>26</sup>

Average Colliers Hewing Wages per Fortnight			
Period (ending)	(£   s   d)	Period (ending)	(£   s   d)
21 February 1839 to		3 September 1846 to	
1 May 1839	2 - 11 - 0	23 December 1846	1 - 9 - 8
21 August 1839	1 - 15 - 11	17 March 1847	1 - 11 - 4
16 October 1839	1 - 18 - 7	8 June 1847	1 - 19 - 5
27 November to		31 August 1847	1 - 15 - 2
4 March 1840	2 - 3 - 0	22 November 1847	1 - 8 - 8
13 January 1841 to		29 February 1848	1 - 6 - 4
24 February 1841	18 - 5	11 April 1848 to	
19 May 1841	15 - 8	18 July 1848	1 - 7 - 11
14 August 1841	1 - 9 - 6	10 October 1848	1 - 5 - 10
20 November 1841	1 - 13 - 10	16 January 1849	1 - 5 - 5
12 February 1842	19 - 3	10 April 1849	1 - 9 - 4
21 May 1842	1 - 4 - 2	11 April 1849 to	
5 November 1842 to		3 July 1849	2 - 10 - 6
19 November 1842	1 - 8 - 1	25 September 1849	2 - 6 - 10
25 February 1843	1 - 4 - 8	1 January 1850	2 - 11 - 10
6 May 1843	1 - 4 - 1	9 April 1850	2 - 11 - 7
26 August 1843	1 - 0 - 11	16 July 1850	1 - 7 - 9
18 November 1843	19 - 2	22 October 1850	1 - 13 - 10
24 February 1844	1 - 3 - 2	28 January 1851	2 - 4 - 9
18 May 1844	18 - 9	22 April 1851	1 - 9 - 4
7 September 1844	18 - 10	15 July 1851	1 - 10 - 0
14 December 1844	17 - 3	21 October 1851	1 - 9 - 4
5 March 1845	1 - 2 - 11	13 January 1852	1 - 15 - 8
28 May 1845	1 - 11 - 11	6 April 1852	2 - 0 - 3
20 August 1845	1 - 17 - 10	13 July 1852	1 - 12 - 10
26 January 1845	2 - 6 - 3	5 October 1852	1 - 3 - 2
18 February 1846	1 - 18 - 10	11 January 1853	1 - 13 - 11
27 May 1846	1 - 14 - 7	5 April 1853	2 - 1 - 3
2 September 1846	1 - 14 - 3		

26. See note 24 for sampling.

**Table 31. Dalkeith Colliery Colliers' and Oncost Wages Proportion 1840-1850**

Period	Ratio (where Oncost Wages = 1)
1840	0.76
1841	1.02
1842	1.52
23 April 1843 - 12 August 1843	1.41
13 August 1843 - 18 November 1843	1.62
19 November 1843 - 10 February 1844	1.44
11 February 1844 - 18 May 1844	1.47
19 May 1844 - 24 August 1844	1.48
25 August 1844 - 14 December 1844	1.39
15 December 1844 - 5 March 1845	1.73
6 March 1845 - 28 May 1845	1.45
29 May 1845 - 20 August 1845	1.65
21 August 1845 - 26 November 1845	1.67
27 November 1845 - 4 March 1846	1.74
5 March 1846 - 10 June 1846	1.57
11 June 1846 - 2 September 1846	1.36
3 September 1846 - 9 December 1846	1.20
10 December 1846 - 17 March 1847	1.09
18 March 1847 - 8 June 1847	1.17
9 June 1847 - 31 August 1847	1.32
1 September 1847 - 22 November 1847	1.08
23 November 1847 - 29 February 1848	1.19
1 March 1848 - 23 May 1848	1.20
24 May 1848 - 29 August 1848	1.21
30 August 1848 - 5 December 1848	1.11
6 December 1848 - 27 February 1849	1.23
28 February 1849 - 5 June 1849	1.23
6 June 1849 - 28 August 1849	1.35
29 August 1849 - 4 December 1849	1.34
5 December 1849 - 12 February 1850	1.46
13 February 1850 - 9 April 1850	1.40

Table 32. Dalkeith Colliery Colliers' and Oncost Wages, 1839-1850<sup>27</sup>

Average Collier Hewing and Oncost Work Wages per Fortnight	Hewing Period (ending)	Oncost Wages (£ s d)	Total Work (£ s d)	Average Oncost Workers (Above Ground) Wages per Fortnight Wages (£ s d)
13 January 1841 to				24 January 1839 to
24 February 1841	18- 5	-	18- 5	6 February 1839 1- 0- 3
19 May 1841	15- 8	-	15- 8	17 April 1839 to
14 August 1841	1- 9- 6	-	1- 9- 6	1 May 1839 1- 4- 4
20 November 1841	1- 3-10	7d	1- 4- 5	
12 February 1842	19- 3	1- 2	1- 0- 5	
21 May 1842	19- 6	-	19- 6	
13 August 1842	1- 4- 2	8- 2	1-12- 4	
5 November 1842 to				
19 November 1842	1- 8- 1	-	1- 8- 1	26 April 1843 to
25 February 1843	1- 4- 8	-	1- 4- 8	
6 May 1843	1- 4- 1	-	1- 4- 1	6 May 1843 1- 9- 7
26 August 1843	1- 0-11	-	1- 0-11	26 August 1843 1- 9- 5
18 November 1843	19- 2	-	19- 2	18 November 1843 1- 7-10
24 February 1844	1- 3- 2	1- 3	1- 4- 5	24 February 1844 1-11- 5
18 May 1844	18- 9	-	18- 9	18 May 1844 1-11- 7
7 September 1844	18-10	4d	19- 2	7 September 1844 1- 7- 2
14 December 1844	17- 3	8d	17-11	14 December 1844 1- 9-11
5 March 1845	1- 2-11	3-10	1- 6- 9	5 March 1845 1- 4-11
28 May 1845	1-11-11	5- 8	1-17- 7	28 May 1845 1- 7- 9
20 August 1845	1-17-10	1- 6	1-19- 4	20 August 1845 1- 8- 9
26 November 1845	2- 6- 3	2- 3	2- 8- 6	26 November 1845 1-12- 9
18 February 1846	1-18-10	2- 5	2- 1- 3	18 February 1846 1- 8-10
27 May 1846	1-14- 7	7- 6	2- 2- 1	27 May 1846 1-17- 2
2 September 1846	1-14- 3	3- 3	1-17- 6	2 September 1846 1-14- 8
23 December 1846	1- 9- 8	5- 8	1-15- 4	23 December 1846 1-16- 3
17 March 1847	1-11- 4	10- 0	2- 1- 4	20 January 1847 2- 0- 4
8 June 1847	1-15- 2	4- 6	1-19- 8	
31 August 1847	1-19- 5	2- 7	2- 2- 0	11 April 1848 to
22 November 1847	1- 8- 8	1- 2	1- 9-10	18 July 1848 1-15- 9
29 February 1848	1- 6- 4	2- 9	1- 9- 1	30 July 1848 to
18 July 1848	1- 7-11	10- 1	1-18- 0	7 November 1848 1-13-10
10 October 1848	1- 5-10	5- 5	1-11- 3	13 February 1849 1-14- 1
16 January 1849	1- 5- 5	5- 2	1-10- 7	25 May 1849 1-13- 8
10 April 1849	1- 9- 4	1- 8	1-11- 0	11 September 1849 1-10- 4
3 July 1849	2-10- 6	2- 6	2-13- 0	1 January 1850 1-10-10
25 September 1849	2- 6-10	2- 4	2- 9- 2	9 April 1850 1-12- 4

27. Sampling: for hewers see note 24; the Above Ground Oncost Average wages were derived from the entire Above Ground Oncost work force at Smeaton Pit.

Table 33. Dalkeith Colliery Break-down of Wages, 1843-1874

Period	Hewers (£ s d)	Below Ground Oncost (£ s d)	Above Ground Oncost (£ s d)	Oncost Total (£ s d)
23 April 1843 to 9 April 1850	31,342- 0- 4	14,202- 6- 6	9,236- 8- 3	23,438-14- 9
23 April 1850 to 4 April 1854	23,950-19- 1	8,119- 3- 4	6,736- 2- 2	14,855- 5- 6
7 April 1855 to 27 March 1860	36,634- 1- 4	15,728- 3- 3	9,146-17-11	24,875- 1- 2
28 March 1860 to 22 March 1864				
18 April 1865 to 15 March 1870	27,282-15-10	13,045- 5- 2	9,512-11-10	22,557-17- 0
16 March 1870 to 10 March 1874	29,760-17- 7	13,088-10- 9	11,337- 0- 9	24,425-11- 6
	30,222-11-10	12,751-11- 5	9,483- 7- 8	22,234-19- 1

Table 34. Dalkeith Colliery Work Pattern, 1839-40  
Smeaton Pit

Period : fortnight to	Total number of men working	Average number of days worked in fortnight
29 May 1839	11	6.4
12 June 1839	11	5.0
26 June 1839	9	5.7
10 July 1839	8	6.1
24 July 1839	12	3.9
7 August 1839	11	5.4
20 August 1839	7	7.8
4 September 1839	10	5.7
18 September 1839	8	8.8
2 October 1839	9	8.2
16 October 1839	7	7.8
30 October 1839	10	7.5
13 November 1839	11	7.8
27 November 1839	12	6.4
11 December 1839	11	10.1
25 December 1839	12	6.4
8 January 1840	11	6.4
22 January 1840	8	8.7
5 February 1840	7	5.6
4 March 1840	7	9.1
Average of this column		6.92

Table 35. Dalkeith Colliery Above-Ground Oncost Wages, 1843-1875<sup>28</sup>

Period (fortnight to)	Check	Engineman	Labourer
	25s 8d	30s	23s 10d
19 November 1842	11 days at 2s 4d	12 at 2s 6d	11 at 2s 2d
	26s	24s	
11 June 1845	12 at 2s 2d	12 at 2s	
	27s 6d	25s 8d	
13 April 1847	11 at 2s 6d	11 at 2s 4d	
	28s	26s	
10 April 1849	12 at 2s 4d	12 at 2s 2d	
	26s	26s	20s
23 April 1850	12 at 2s 2d	12 at 2s 2d	12 at 1s 8d
	26s	20s	22s
20 April 1852	12 at 2s 2d	12 at 1s 8d	12 at 1s 10d
	30s	19s 6d	24s
4 April 1854	12 at 2s 6d	9 at 2s 2d,	12 at 2s
	30s	3 at 2s	
	32s 6d	24s	
1 April 1856	12 at 2s 6d	13 at 2s 6d	12 at 2s
	30s	30s	26s
30 March 1858	12 at 2s 6d	12 at 2s 6d	12 at 2s 2d
	28s	28s	24s
27 March 1860	12 at 2s 4d	12 at 2s 4d	12 at 2s
	30s	30s 4d	26s
25 March 1862	12 at 2s 6d	13 at 2s 4d	12 at 2s 2d
	32s	37s 4d	26s
22 March 1864	12 at 2s 8d	14 at 2s 8d	12 at 2s 2d
	32s	37s 4d	35s
20 March 1866	12 at 2s 8d	14 at 2s 8d	14 at 2s 6d
	32s	32s	30s
17 March 1868	12 at 2s 8d	12 at 2s 8d	12 at 2s 6d
	32s	39s 8d	30s
15 March 1870	12 at 2s 8d	14 at 2s 10d	12 at 2s 6d
	32s	33s 4d	30s
28 March 1871	12 at 2s 8d	12 $\frac{1}{2}$ at 2s 8d	12 at 2s 6d
	32s	36s 10d	31s 2d
12 March 1872	12 at 2s 8d	13 at 2s 10d	11 at 2s 10d
	36s	56s	33s
11 March 1873	12 at 3s	14 at 4s	11 at 3s
	44s	63s	38s
10 March 1874	12 at 3s 8d	14 at 4s 6d	12 at 3s 2d
	48s	56s 3d	38s
23 March 1875	12 at 4s	12 $\frac{1}{2}$ at 4s 6d	12 at 3s 2d

28. The wages and day rates of oncost workers are shown : the first line gives the actual fortnightly earnings, the second line gives the numbers of days worked and rate of payment. The fortnights and workers cited were chosen more or less at random.

Table 36. Dalkeith Colliery Below-Ground Oncost Wages, 1843-1875<sup>29</sup>

Period (fortnight to)	Oversmen	Onsetter	Trapper
19 November 1842	48s	22s	
	12 at 4s	11 at 2s	
11 June 1845	48s	20s	7s 4d
	12 at 4s	12 at 1s 8d	11 at 8d
13 April 1847	47s 8d	23s 10d	7s 4d
	11 at 4s 4d	11 at 2s 2d	11 at 8d
10 April 1849	52s	24s	8s
	12 at 4s 4d	12 at 2s	12 at 8d
23 April 1850	52s	24s	7s 4d
	12 at 4s 4d	12 at 2s	11 at 8d
20 April 1852	52s	18s 4d	7s 4d
	12 at 4s 4d	11 at 1s 8d	11 at 8d
4 April 1854	£3	28s 2d	8s 3d
	2 weeks at 30s	13 at 2s 2d	11 at 9d
1 April 1856	ditto	28s 2d	10s
	ditto	13 at 2s 2d	12 at 10d
30 March 1858	ditto	28s 2d	8s 3d
	ditto	13 at 2s 2d	11 at 9d
27 March 1860	34s	34s	3s
	12 at 2s 10d	12 at 2s 10d	4 at 9d
25 March 1862	30s 4d	30s 4d	7s 6d
	13 at 2s 4d	13 at 2s 4d	10 at 9d
22 March 1864	39s	39s	9s
	£3-10s	32s	12 at 9d
20 March 1866	2 weeks at 35s	12 at 2s 8d	9s
	ditto	34s	12 at 9d
17 March 1868	ditto	12 at 2s 10d	7s 6d
	ditto	32s	10 at 9d
15 March 1870	12 at 2s 8d	12 at 2s 8d	8s 3d
	32s	11 at 9d	11 at 9d
28 March 1871	ditto	39s	9s
	ditto	13 at 3s	12 at 9d
12 March 1872	ditto	40s	10s
	ditto	12 at 3s 4d	12 at 10d
11 March 1873	£4	40s 6d	16s
	2 weeks at 40s	9 at 4s 6d	12 at 1s 4d
10 March 1874	ditto	57s	9s 4d
		12 at 4s 9d	7 at 1s 4d
23 March 1875			18s 8d
			14 at 1s 4d

29. See note 28.

Table 37. Dalkeith Colliery Colliers' Piece Rates at Selected Workings  
at the 'Great Seam', 1841-1875<sup>30</sup>

Period (fortnight to)	(per ton)	Period (fortnight to)	(per ton)
29 February 1841	2s 4d	12 October 1858	2s 4d
2 June 1841	2s 2d	26 March 1861	2s 3d
16 June 1841	2s 4d	13 August 1861	2s 1d
26 March 1842	2s 2d	31 December 1861	2s 4d
17 December 1842	2s 6d	22 April 1862	2s 6d
11 January 1843	2s 2d	20 May 1862	2s 3d
11 March 1843	1s 10d	29 December 1863	2s 5d
27 July 1844	2s 2d	15 November 1864	2s 6d
14 December 1844	2s 6d	7 February 1865	2s 8d
1 October 1845	2s 8d	11 July 1865	2s 5d
15 April 1846	2s 10d	26 December 1865	2s 8d
6 January 1847	3s	27 November 1866	2s 10d
5 August 1849	2s 9d	14 May 1867	2s 6d
21 December 1847	2s 6d	3 March 1868	2s 2d
29 February 1848	2s 3d	7 July 1868	2s 1d
24 April 1849	2s	6 December 1870	2s 3d
25 September 1849	1s 8d	24 October 1871	2s 5d
29 January 1850	1s 10d	5 December 1871	2s 7d
6 May 1851	1s 8d	4 June 1872	2s 11d
2 November 1852	1s 11d	13 August 1872	3s 5d
29 January 1853	2s 1d	10 September 1872	4s
20 September 1853	2s 4d	22 October 1872	4s 7d
15 November 1853	2s 7d	22 March 1875	3s 1d
9 January 1855	2s 9d	4 May 1875	2s 7d
5 January 1858	2s 6d		

30. The fortnights indicated are where a significant change in piece rates occurred, but note that the series is not continuous as a number of the accounts are missing.

Table 38. Brunstane Colliery Output, 1837-1864<sup>31</sup>

Period (half-year approx.to)	Great Coal (tubs)	Period (half-year approx.to)	Great Coal (tubs)
18 November 1837	119	29 May 1851	14,413
12 May 1838	-	27 November 1851	6,165
10 November 1838	47	29 May 1852	9,171
11 May 1839	1,659	27 November 1852	9,219
6 December 1839	2,644	30 May 1853	10,471
23 May 1840	2,858	26 November 1853	8,200
21 November 1840	6,309	25 May 1854	7,459
29 May 1841	10,658	25 November 1854	9,521
20 November 1841	8,332	24 May 1855	13,108
20 May 1842	6,253	24 November 1855	9,438
19 November 1842	10,727	25 May 1856	6,289
26 May 1843	8,881	28 November 1856	6,832
18 November 1843	8,251	29 May 1857	6,223
25 May 1844	8,454	27 November 1857	5,745
6 December 1844	6,835	28 May 1858	8,110
29 May 1845	8,675	26 November 1858	4,618
26 November 1845	5,906	27 May 1859	5,801
3 June 1846	5,660	25 November 1859	4,213
1 December 1846	5,433	25 May 1860	5,682
3 June 1847	10,073	23 November 1860	5,206
29 November 1847	6,136	24 May 1861	5,151
31 May 1848	5,022	22 November 1861	3,890
30 November 1848	2,628	23 May 1862	4,428
2 June 1849	8,220	7 November 1862	3,941
7 December 1849	13,327	22 May 1863	4,509
31 May 1850	10,572	20 November 1863	2,968
18 November 1850	12,784	20 May 1864	3,703

31. Source: for Brunstane Colliery (Tables 38-44), Clerk of Penicuik MSS, SRO GD 18/1154, (1), (2), (4), (5), Brunstane Colliery Wages and Sales Account Books, 1837-1864.

Table 39. Brunstane Colliery Colliers' Wages, 1839-1863<sup>32</sup>  
Average Colliers Hewing Wages per Fortnight

Period <sup>33</sup> (ending)	Period (ending)
29 November 1839 to	30 August 1851 1 - 10 - 11
16 February 1839 1 - 10 - 10	22 November 1851 1 - 8 - 8
11 May 1839 1 - 18 - 2	28 February 1852 1 - 3 - 6
31 August 1839 1 - 15 - 2	22 May 1852 1 - 4 - 3
6 December 1839 1 - 15 - 7	28 August 1852 1 - 4 - 0
28 February 1840 1 - 16 - 11	20 November 1852 1 - 9 - 2
22 May 1840 1 - 3 - 5	26 February 1853 2 - 8 - 10
14 August 1840 1 - 18 - 0	21 May 1853 1 - 11 - 1
20 November 1840 1 - 19 - 8	27 August 1853 1 - 6 - 0
26 February 1841 2 - 11 - 7	19 November 1853 1 - 15 - 2
21 May 1841 2 - 4 - 6	24 February 1854 2 - 1 - 7
13 August 1841 2 - 1 - 3	19 May 1854 2 - 1 - 10
19 November 1841 2 - 6 - 5	11 August 1854 2 - 1 - 5
25 February 1842 2 - 10 - 3	17 November 1854 2 - 8 - 5
20 May 1842 3 - 2 - 10	9 February 1855 2 - 13 - 3
26 August 1842 2 - 4 - 11	18 May 1855 3 - 7 - 8
18 November 1842 2 - 6 - 9	24 August 1855 2 - 10 - 7
24 February 1843 2 - 6 - 2	30 November 1855 2 - 4 - 2
19 May 1843 1 - 18 - 3	7 March 1856 1 - 19 - 8
25 August 1843 2 - 0 - 0	30 May 1856 1 - 19 - 1
17 November 1843 1 - 10 - 9	12 September 1856 1 - 17 - 5
22 February 1844 1 - 10 - 8	28 November 1856 1 - 8 - 6
17 May 1844 1 - 5 - 5	6 March 1857 2 - 4 - 5
6 September 1844 1 - 8 - 4	29 May 1857 2 - 6 - 5
13 December 1844 1 - 7 - 11	4 September 1857 1 - 17 - 0
7 March 1845 1 - 12 - 4	27 November 1857 1 - 10 - 4
30 May 1845 1 - 13 - 6	5 March 1858 1 - 16 - 2
22 August 1845 1 - 9 - 8	28 May 1858 1 - 15 - 3
28 November 1845 1 - 11 - 2	3 September 1858 1 - 16 - 0
10 February 1846 1 - 8 - 4	26 November 1858 1 - 11 - 8
29 May 1846 1 - 12 - 0	4 March 1859 1 - 19 - 7
4 September 1846 1 - 12 - 3	27 May 1859 2 - 1 - 11
25 December 1846 2 - 0 - 7	2 September 1859 1 - 12 - 10
19 March 1847 2 - 5 - 10	25 November 1859 1 - 11 - 0
4 June 1847 2 - 4 - 5	17 February 1860 1 - 18 - 6
3 September 1847 1 - 8 - 1	25 May 1860 1 - 17 - 11
26 November 1847 1 - 12 - 2	31 August 1860 1 - 18 - 0
21 January 1848 1 - 6 - 10	20 November 1860 1 - 18 - 1
31 March 1848 1 - 7 - 5	15 February 1861 1 - 15 - 10
21 July 1848 19 - 5	24 May 1861 1 - 12 - 9
24 November 1848 18 - 4	16 August 1861 1 - 9 - 3
2 March 1849 1 - 10 - 11	22 November 1861 1 - 6 - 10
8 June 1849 1 - 11 - 10	28 February 1862 1 - 11 - 6
14 September 1849 1 - 7 - 8	23 May 1862 1 - 8 - 5
23 November 1849 1 - 12 - 9	15 August 1862 1 - 13 - 8
2 March 1850 1 - 11 - 3	7 November 1862 1 - 11 - 2
25 May 1850 1 - 12 - 10	27 February 1863 1 - 10 - 2
31 August 1850 1 - 10 - 3	22 May 1863 1 - 13 - 4
23 November 1850 1 - 14 - 6	14 August 1863 1 - 7 - 9
1 March 1851 1 - 10 - 10	20 November 1863 1 - 6 - 11
24 May 1851 1 - 13 - 2	29 January 1864 1 - 12 - 0

32. Average Collier Hewing Wages and Output are derived from all colliers at Brunstane Colliery.

33. See note 8. The periods are approximately three months.

Table 40. Brunstane Colliery Colliers' Output, 1839-1863<sup>34</sup>  
Average Collier Output of Great Coal per Fortnight

Period (ending)	(tubs)	Period (ending)	(tubs)	Period (ending)	(tubs)
29 November 1839 to		4 June 1847	59.8	30 November 1855	60.4
16 February 1839	37.1	3 September 1847	43.2	7 March 1856	56.9
11 May 1839	38.1	22 November 1847	45.7	30 May 1856	53.3
31 August 1839	39.4	21 January 1848	38.8	12 September 1856	54.3
6 December 1839	41.4	31 March 1848	41.3	28 November 1856	43.1
28 February 1840	48.7	21 July 1848	35.2	6 March 1857	62.8
22 May 1840	37.2	24 November 1848	40.1	29 May 1857	65.8
14 August 1840	50.4	2 March 1849	53.3	4 September 1857	50.8
20 November 1840	60.2	8 June 1849	53.4	27 November 1857	46.6
22 February 1841	81.2	14 September 1849	47.2	5 March 1858	59.6
21 May 1841	61.2	23 November 1849	52.8	28 May 1858	57.4
13 August 1841	59.1	2 March 1850	47.9	3 September 1858	59.9
19 November 1841	65.1	25 May 1850	49.4	26 November 1858	56.4
25 February 1842	61.2	31 August 1850	49.2	4 March 1859	59.2
20 May 1842	81.9	23 November 1850	57.7	27 May 1859	60.7
26 August 1842	68.9	1 March 1851	54.3	2 September 1859	47.5
18 November 1842	77.2	24 May 1851	58.3	25 November 1859	48.5
21 February 1843	66.7	30 August 1851	54.8	17 February 1860	63.3
19 May 1843	64.9	22 November 1851	53.7	25 May 1860	63.5
25 August 1843	68.3	28 February 1852	47.3	31 August 1860	62.9
17 November 1843	55.3	22 May 1852	50.8	20 November 1860	63.1
22 February 1844	52.6	28 August 1852	50.9	15 February 1861	58.3
17 May 1844	41.7	20 November 1852	65.7	24 May 1861	54.1
6 September 1844	56.8	26 February 1853	77.7	16 August 1861	47.5
13 December 1844	57.4	21 May 1853	50.2	22 November 1861	43.5
7 March 1845	55.5	27 August 1853	43.6	28 February 1862	50.8
30 May 1845	57.5	19 November 1853	46.8	23 May 1862	49.2
22 August 1845	50.5	24 February 1854	48.8	15 August 1862	54.1
28 November 1845	47.3	19 May 1854	55.0	7 November 1862	47.3
20 February 1846	44.5	11 August 1854	54.2	27 February 1863	49.9
29 May 1846	43.5	17 November 1854	56.4	22 May 1863	51.1
4 September 1846	43.7	9 February 1855	62.9	14 August 1863	44.3
25 December 1846	52.9	18 May 1855	79.2	20 November 1863	43.4
19 March 1847	60.6	24 August 1855	59.9	29 January 1864	50.6

34. See notes 32-3.

**Table 41. Brunstane Colliery Colliers' Piece Rates and Prices, 1837-1856**

Period (half-year approx.)	Great Coal: Average Colliers' Piece Rates (per tub)	Great Coal: Average Prices (per tub) (s. d.)
20 May 1837	.083	10.5d.
18 November 1837	.083	ls.
18 November 1838	.083	9d.
11 May 1839	.072	9d.
6 December 1839	.059	9d.
23 May 1840	.063	8d.
21 November 1840	.057	7.5d.
29 May 1841	.059	7.5d.
20 November 1841	.060	8.25d.
20 May 1842	.066	9d.
19 November 1842	.066	8d.
20 May 1843	.063	7.75d.
18 November 1843	.058	7d.
25 May 1844	.058	7d.
6 December 1844	.057	6d.
29 May 1845	.058	7d.
26 November 1845	.061	7.5d.
3 June 1846	.075	9.25d.
1 December 1846	.081	9.5d.
3 June 1847	.079	9.25d.
29 November 1847	.073	8.5d.
31 May 1848	.057	7.75d.
30 November 1848	.050	5.5d.
2 June 1849	-	6.75d.
7 November 1849	-	6.5d.
31 May 1850	.063	7d.
18 November 1850	.062	7d.
29 May 1851	.062	6d.
27 November 1851	.052	5.5d.
29 May 1852	.048	5d.
27 November 1852	.045	5d.
30 May 1853	.070	7.5d.
26 November 1853	.077	8d.
25 May 1854	.085	-
25 November 1854	.089	9d.
24 May 1855	.091	9.25d.
24 November 1855	.087	8.75d.
25 May 1856	.081	8d.

Table 42. Brunstane Colliery Colliers' Piece Rates and Prices,  
Short Selected Periods

Part 1. December 1842 - May 1843

Period (fortnight to)	Great Coal: Colliers' Piece Rate (per tub)	Great Coal: Colliers' Price (per tub)	Period (fortnight to)	Great Coal: Colliers' Price (per tub)	Great Coal: Colliers' Average Price (per tub)
30 November 1842	8.4d.	.068	10 March 1843	7d.	0.75
13 January 1843	8.4d.	.075	24 March 1843	7d.	0.60
27 January 1843	8.3d.	.075	7 April 1843	7d.	.075
10 February 1843	7.7d.	.072	21 April 1843	7d.	.059
24 February 1843	7.8d.	.067	5 May 1843	7d.	.067
10 March 1843	7d.	.075	19 May 1843	7d.	.062

Part 2. June 1845 - April 1846

11 July 1845	7d.	.057	27 November 1845	8d.	.065
25 July 1845	7d.	.056	12 December 1845	9d.	.067
8 August 1845	7d.	.055	27 December 1845	9d.	.071
22 August 1845	7d.	.060	9 January 1846	9d.	.072
5 September 1845	7.5d.	.057	23 January 1846	9d.	.073
19 September 1845	8d.	.058	6 February 1846	9d.	.073
3 October 1845	8d.	.060	20 February 1846	9d.	.073
17 October 1845	8d.	.065	6 March 1846	10d.	.072
31 October 1845	8d.	.065	20 March 1846	10d.	.096
14 November 1845	8d.	.059	3 April 1846	10d.	.080

Part 3. January - September 1848

5 February 1848	8.5d.	.072	26 May 1848	7d.	.079
18 February 1848	8d.	.071	9 June 1848	6d.	.049
30 March 1848	8d.	.073	23 June 1848	6d.	.063
17 March 1848	8d.	.059	7 July 1848	5d.	.050
31 March 1848	7d.	.068	21 July 1848	5d.	.047
15 April 1848	7d.	.056	4 August 1848	5.5d.	.057
28 April 1848	7d.	.069	18 August 1848	5.5d.	.050
12 May 1848	7d.	.056	1 September 1848	5.5d.	.040

Table 43. Brunstane Colliery Apparent Profit and Loss, 1837-1856 <sup>35</sup>

Period (half-year approx. to)	Profit (£ s d)	Loss (£ s d)
20 May 1837		15 - 14 - 3
2 December 1837		77 - 19 - 0
12 May 1838		82 - 5 - 2
10 November 1838		141 - 1 - 3
12 May 1839		138 - 1 - 6
6 December 1839		181 - 9 - 0
23 May 1840		216 - 1 - 0
21 November 1840		25 - 5 - 7
29 May 1841		85 - 2 - 2
20 November 1841	23 - 3 - 6	
20 May 1842		10 - 11 - 9
19 November 1842	87 - 9 - 0	
20 May 1843	212 - 19 - 0	
18 November 1843	47 - 17 - 6	
25 May 1844	154 - 10 - 9	
6 December 1844		72 - 8 - 11
22 May 1845	45 - 16 - 4	
26 November 1845	81 - 17 - 1	
3 June 1846		91 - 6 - 0
1 December 1846	24 - 8 - 7	
3 June 1847	117 - 7 - 8	
29 November 1847	154 - 15 - 0	
31 May 1848		19 - 4 - 10
30 November 1848		60 - 2 - 1
2 June 1849	46 - 11 - 11	
7 December 1849	225 - 45 - 9	
31 May 1850	59 - 3 - 3	
18 November 1850	251 - 12 - 4	
29 May 1851	287 - 1 - 10	
27 November 1851		11 - 2 - 11
29 May 1852	189 - 4 - 0	
27 November 1852	65 - 10 - 9	
30 May 1853	305 - 0 - 3	
26 November 1853	334 - 7 - 4	
25 May 1854	384 - 19 - 0	
23 November 1854	182 - 9 - 5	
24 May 1855	709 - 14 - 7	
24 November 1855	139 - 19 - 7	
23 May 1856	323 - 0 - 8	

35. The profit and loss is not shown explicitly in the accounts but is deduced from the gross revenue and expenditure. (The figures do not probably give a strict trading profit and loss.)

Table 44. Brunstane Colliery Colliers' and Oncost Wages Proportion 1840-1853

Period (half-year approx.to)	Ratio (where oncost wages = 1)	Period (half-year approx.to)	Ratio (where oncost wages = 1)	Period (half-year approx.to)	Ratio (where oncost wages = 1)
21 November 1840	1.95	29 May 1845	2.46	7 December 1849	2.33
29 May 1841	2.90	26 November 1845	1.85	31 May 1850	2.29
20 November 1841	2.48	3 June 1846	1.74	18 November 1850	2.62
20 May 1842	1.77	1 December 1846	1.76	29 May 1851	2.67
19 November 1842	3.10	3 June 1847	2.73	27 November 1851	2.24
20 May 1843	2.56	29 November 1847	1.02	29 May 1852	1.61
18 November 1843	2.25	31 May 1848	1.90	27 November 1852	1.52
25 May 1844	2.43	30 November 1848	0.91	30 May 1853	1.80
6 December 1844	1.94	2 June 1849	1.77	26 November 1853	2.61

Table 45. Harlaw Muir Colliery Work Patterns, 1843-8<sup>36</sup>

Period (half-year approx.to)	A. Average Collier Piece Rate (per tub) (d)	B. Great Coal: Average Output per Collier per fortnight (tubs)	C. Great Coal: Average Output per Collier per day (tubs)	D. Average Number of days per fortnight horse-gin operating
25 May 1844	7.75d.	51.7	4.38	11.1
6 December 1844	7d.	39.7	6.38	6.53
29 May 1845	8d.	45.0	4.22	10.7
22 November 1845	8.75d.	43.8	5.09	8.9
3 June 1846	10.5d.	41.3	5.11	8.2
2 December 1846	11d.	31.7	5.21	6.1
3 June 1847	11d.	37.2	5.25	6.8
29 November 1847	10d.	37.9	6.25	5.5
31 May 1848	9.75d.	43.5	5.34	8.1
30 November 1848	6d.			

36. Source: Clerk of Penicuik MSS, SRO GD 18/1150, (2), Harlaw Muir Wages and Sales Book, 1843-8.

37. Column D gives average number of days per fortnight that horses were hired for horse-gin. This probably gives a fairly accurate picture of number of days per fortnight that colliers were working. Fluctuations in collier productivity can be explained largely by reference to horse-gin activity. There are correlations as follows between fortnightly collier productivities and the number of days in the fortnight horse-gin was operating: for 17 November 1843 to 22 November 1844 of 0.6043 significant at 1% level of confidence, for 22 November 1844 to 21 November 1845 of 0.5922 at 1% confidence level, for 22 November 1845 to 6 November 1846 of 0.6369 at 1% confidence level, and for 6 November 1847 to 2 June 1848 of 0.5077 at 5% confidence level.

Table 46. Grange Colliery Output, 1854-1884<sup>38</sup>

Year	Coal (tons)	Dross (tons)	Ironstone, calcined (tons)	Parrot (tons)
1854	7,179	2,716	12,979	4,245
1855	5,966	2,138	9,911	3,097
1856	8,298	2,935	7,502	2,414
1857	8,906	3,041	9,084	3,197
1858	9,898	2,432	7,806	4,414
1859	8,893	2,120	9,202	5,314
1860	6,743	1,838	11,141	6,417
1861	6,242	2,278	10,097	6,475
1862	61	4,713	11,605	11,140
1863	968	3,600	13,546	10,519
1865	3,479	4,303	8,715	12,873
1866	4,647	4,084	11,555	10,523
1867	3,567	4,393	10,734	12,364
1868	3,865	4,826	6,717	10,034
1869	4,083	4,167	12,593	12,713
1870	4,292	4,649	7,214	11,608
1871	12,447	7,691	10,347	7,687
1872	12,685	7,263	11,659	4,652
1873	12,746	6,567	8,675	3,211
1874	9,477	3,744	6,425	3,068
1875	10,942	3,830	8,563	2,268
1876	7,522	4,383	8,149	5,108
1877	7,786	4,109	6,756	5,984
1878	7,290	3,611	6,878	4,266
1879	8,097	3,517	4,254	4,625
1880	9,041	4,086	3,317	4,908
1881	9,470	3,886	5,244	3,713
1882	10,395	4,141	4,708	7,035
1883	12,967	4,761	4,239	7,914
1884	15,405	3,642	3,106	10,479

38. Source: Cadell MSS, Produce at Grange Colliery, 1854-1863; Grange Colliery Ledger No. 2., (1863-1884).

Table 47. Pencaitland Colliery Output, 1851-1863<sup>39</sup>  
Total Sales of Great Coal and Dross

Period	(tons)	Period	(tons)
half-year to May 1851	11,915	year to November 1858	40,077
half-year to May 1853	9,223	year to November 1859	41,731
half-year to May 1854	12,042	year to November 1860	31,018
year to November 1855	36,177	year to November 1861	23,309
year to November 1856	35,025	year to November 1862	22,192
year to November 1857	38,965	year to November 1863	21,512

Table 48. Pencaitland Colliery Disposals, 1855-1863  
Disposals of Great Coal

Period (Year ending November)	Railway (%)	Cart and Hill (%)	Blast Furnace (%)
1855	40.3	18.6	41.1
1856	55.3		44.7
1857	50.4		49.6
1858	67.6		32.4
1859	54.4		45.6
1860	82.8		17.2
1861-1863	100.0		0.0

Table 49. Pencaitland Colliery Royalties, 1853-63

Period	(£ s d)	(£ s d)	
half-year to May 1853	327- 1- 5	year to November 1859	1,164-10- 7
half-year to May 1854	510- 5- 3	year to November 1860	852-13-10
year to November 1855	1,117-18- 6	year to November 1861	652- 1- 6
year to November 1856	985- 3- 5	year to November 1862	634- 6- 5
year to November 1857	1,168-10- 6	year to November 1863	650-18-11
year to November 1858	1,163- 3-11		

39. Source: for Pencaitland Colliery (Tables 47-9), Geddes Records, SRO CB 10/2-5, Reports on Pencaitland Colliery.

Table 50. Arniston Colliery Output and Sales, 1863-1876<sup>40</sup>Part 1. Sales

Period (Year ending July)	Parrot (tons)	Coals (tons)	Parrot and Coals (tons)	Dross (tons)	Total (tons)
1863	9,987	39,692	49,679	1,862	51,531
1864	12,971	44,588	57,559	804	58,363
1865	10,445	42,818	53,263	368	53,631

Part 2. Output

1864	12,970	44,587	57,557	-	-
1869	18,012	34,569	52,581	7,563	60,144
1870	13,385	34,142	47,527	7,486	55,013
1871	11,673	36,519	48,192	9,079	57,271
1872	9,882	46,272	56,154	10,110	66,264
1873	4,948	40,052	45,000	8,566	53,566
1874	4,564	-	-	-	50,372
1875	6,495	-	-	-	80,309
1876	6,586	60,904	67,490	18,000	85,490

Table 51. Polton Colliery Approximate Output, 1864-1873<sup>41</sup>Coals

Period (year to)	(tons)	Period (year to)	(tons)
November 1864	16,000	May 1871	26,000
November 1867	15,000	November 1873	22,000
May 1870	25,000		

Table 52. Prestongrange and Drumore Collieries Output, 1876-79<sup>42</sup>

Period	Coals and Dross (tons)	Fireclay (tons)	Ironstone (tons)	Total Minerals (tons)
year to October 1876	38,778	6,268	1,086	46,132
year to October 1877	66,670	4,780	1,190	72,640
year to October 1878	85,806	8,774	415	94,995
seven months to May 1879	40,121	-	-	-

40. Source: Dundas of Arniston MSS, sundry Reports on Arniston Colliery, (1863-1876).

41. Source: Dundas of Arniston MSS, sundry Reports on Polton Colliery, (1864-1873).

42. Source: Geddes Records, SRO CB10/10, Prestongrange Royalty Returns.

Table 53. Wallyford Colliery Output, 1857-71 43  
Total Mineral Output

Period (year to)	(tons)	Period (year to)	(tons)
November 1857	7,871	November 1865	46,284
November 1858	24,978	November 1866	50,129
November 1859	29,674	November 1867	40,429
November 1860	31,292	November 1868	41,622
November 1861	27,825	November 1869	50,849
November 1862	41,681	November 1870	50,229
November 1863	50,719	November 1871	38,148
November 1864	47,509		

Table 54. Wallyford Colliery Disposals, 1857-71  
Percentage of Total Mineral Output sent to  
Gladsmuir Blast Furnace

Period	(%)
15 January 1857 - 11 November 1860	20.8
12 November 1867 - 11 November 1871	32.6

Table 55. Shotts Iron Company : Loanhead and Dryden Collieries Output  
1869-8044

Period	Raw Ironstone (tons)	Common Coal (tons)	Gas Coal (tons)	Total (tons)
15 May 1869 - 17 November 1870	53,645	19,204	-	72,849
year to 11 November 1872	23,666	31,386	488	55,520
year to 11 November 1873	12,348	33,096	1,664	37,108
year to 11 November 1874	16,268	34,963	3,721	54,952
year to 11 November 1875	21,981	30,389	4,417	56,787
year to 11 November 1876	32,577	18,161	11,166	61,904
year to 11 November 1877	27,264	16,342	10,354	53,960
year to 11 November 1878	14,464	26,298	19,172	59,935
year to 11 November 1879	18,750	40,058	43,734	102,542
12 November 1879 - 15 May 1880	7,670	15,891	13,823	37,384

Table 56. Shotts Iron Company : Penicuik Colliery Output, 1877-80

Period	Raw Blackband Ironstone (tons)	Raw Clayband Ironstone (tons)	Coal (tons)	Total (tons)
24 August 1876-11 November 1877	22,794	136	15,161	38,091
year to 11 November 1878	28,099	160	7,216	35,475
year to 11 November 1879	46,725	214	7,360	54,299
12 November 1879 - 15 May 1880	25,575	80	3,912	29,567

43. Source: for Wallyford Colliery (Tables 53-4), Geddes Records, SRO CB 10/3-7, sundry Reports on Wallyford Colliery.  
 44. Source: for Shotts Iron Company (Tables 55-7), SRO, CS 245/1310, (Clerk v Shotts Iron Co), Output and Disposals Loanhead Colliery, (1869-80); Output and Disposals Minerals at Penicuik, (1877-80).

Table 57. Shotts Iron Company : Loanhead Colliery Average Prices, 1869-80

Period	Common Coal			Gas Coal		
	per Ton (£ s d)			per Ton (£ s d)		
15 May 1869 - 17 November 1870	4 - 10			-		
year to 11 November 1872	7 - 11			16 - 10		
year to 11 November 1873	14 - 5			1 - 13 - 0		
year to 11 November 1874	9 - 9			1 - 13 - 6		
year to 11 November 1875	7 - 1			1 - 7 - 11		
year to 11 November 1876	7 - 6			1 - 1 - 3		
year to 11 November 1877	7 - 8			19 - 6		
year to 11 November 1878	6 - 1			19 - 8		
year to 11 November 1879	6 - 1			17 - 9		
12 November 1879 - 15 May 1880	6 - 4			15 - 5		

Table 58. Edinburgh & Dalkeith Railway : Coal Carried, 1832-43<sup>45</sup>

Coal and Culm carried					
Year	(tons)	Year	(tons)	Year	(tons)
1832	61,389	1836	101,570	1840	118,545
1833	90,355	1837	91,086	1841	131,231
1834	101,639	1838	105,628	1842	110,027
1835	102,684	1839	124,681	1843	104,761

Table 59. Edinburgh & Dalkeith Railway : Source of Coal Carried, 1833-43

Coal and Culm despatched from major collieries on line

Period	Sir John Hope's Collieries	Marquis of Lothian's Collieries	Arniston Colliery	Edmonstone Colliery	Dalkeit Collier
	(tons)	(tons)	(tons)	(tons)	(tons)
year to 31 December 1833	38,549	28,132	7,208	9,536	-
half-year to 30 June 1835	17,603	20,719	3,321	3,875	-
year to 31 December 1836	36,962	43,938	4,995	9,270	-
year to 31 December 1839	47,971	40,908	12,139	14,258	5,944
half-year to 30 June 1840	23,372	20,648	4,816	8,335	1,825
year to 31 December 1841	46,922	42,710	7,660	15,926	11,471
year to 31 December 1843	48,822	30,748	4,924	5,869	9,862

45. Source: for Edinburgh & Dalkeith Railway (Tables 58-62), Buccleuch MSS, SRO GD 224/554, Edinburgh & Dalkeith Railway Abstracts of Minutes and other papers; Edinburgh & Dalkeith Minute Books, SRO BR/EDR/1/1, Minutes of Meetings of Sub-Committees, 1832-40.

Table 60. Edinburgh & Dalkeith Railway : Destination of Coal Carried, 1833-43

Period	Edinburgh (tons)	Port of Fisherrow (tons)	Total, including Leith and other places (tons)
year to 31 December 1833	71,787	10,954	83,424
half-year to 30 June 1835	31,277	6,374	45,518
year to 31 December 1836	52,960	7,646	93,543
year to 31 December 1839	71,949	10,677	121,219
half-year to 30 June 1840	35,333	5,312	58,996
year to 31 December 1841	82,977	7,764	124,690
year to 31 December 1843	71,776	9,011	100,223

Table 61. Edinburgh & Dalkeith Railway : Revenue, Expenditure and Profit, 1833-43

Year	Revenue (£   s   d)	Expenditure (£   s   d)	Profit before dividend (£   s   d)
1833	8,166 - 0 - 7	3,780 - 8 - 10	4,385 - 11 - 9
1834	8,153 - 0 - 5	3,268 - 17 - 7	4,884 - 2 - 10
1836	8,500 - 10 - 1	4,368 - 13 - 9	4,131 - 16 - 4
1837	6,832 - 18 - 5	3,799 - 13 - 11	3,033 - 4 - 6
1838	7,712 - 11 - 11	3,932 - 19 - 8	3,779 - 12 - 3
1839	8,273 - 14 - 10	4,318 - 13 - 5	3,955 - 1 - 5
1841	8,258 - 2 - 6	3,922 - 8 - 8	4,335 - 13 - 10
1843	6,783 - 7 - 9	3,844 - 17 - 7	2,938 - 10 - 3

Table 62. Edinburgh & Dalkeith Railway : Dividends, 1833-43

Year ending 31 December	'Additional Stock' (%)	'Original Stock' (%)
1833	5.0	-
1836	5.0	3.9
1839	5.0	2.5
1841	5.0	3.9
1843	5.0	1.0

**Table 63. Union Canal Company : Balance on Revenue and Expenditure  
Account before dividends, 1832-45<sup>46</sup>**

Year	(£ s d)	Year	(£ s d)
1832	11,452 - 14 - 2	1839	18,003 - 0 - 0
1833	11,018 - 12 - 4	1840	19,125 - 0 - 0
1834	13,455 - 5 - 5	1841	18,296 - 6 - 6
1835	note 47	1842	9,738 - 17 - 3
1836	15,827 - 1 - 6	1843	4,284 - 1 - 5
1837	13,373 - 2 - 5	1844	note 47
1838	13,501 - 14 - 6	1845	note 47

46. Union Canal Company Minute Books, SRO BR/EGU/1/8, Minutes of Meetings of General Assembly of Proprietors, 1834-1849.  
 47. For 1835 'a slight deterioration' over 1834; for 1844 a 'few hundred pounds below' 1843; for 1845 a continued depression of revenue.

## BIBLIOGRAPHY

## BIBLIOGRAPHY

### Manuscript Sources

#### SCOTTISH RECORD OFFICE

##### Family Muniments

Buckleuch Muniments  
 Clerk of Penicuik Muniments  
 Dalhousie Muniments  
 Dalrymple of Newhailes Muniments  
 Hamilton Bruce Muniments  
 J.C. Brodie Collection  
 Leven and Melville Muniments  
 Melville Castle Muniments  
 Morton Muniments  
 Shairp of Houston Muniments  
 Stair Muniments

##### Legal Records

Court of Session Cases  
 Court of Session Processes, Miscellaneous Documents  
 Extracted Processes  
 Midlothian Sheriff Court Decrees

##### Records of the British Railways Board

##### Sundry Reports and Records of Canal and Railway Companies

##### Records of the National Coal Board

Geddes Records  
 Marquis of Lothian Mines

##### Gas Board Records

##### Sundry Gas Company Records

##### Miscellaneous

Carron Company Records  
 Dissolved Companies  
 File relating to Elphingstone Colliery  
 Home Office, Correspondence and Papers, Scotland  
 Lord Advocate Papers  
 Records of the Lord Advocate of Scotland's Department

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Young Papers

## PRIVATE COLLECTIONS

Hope Muniments

Don-Wauchope of Edmonstone Papers

Dundas of Arniston Muniments

## Newspapers, Journals, etc

Journal of Gas Lighting, 1849-61

Taits Magazine, 1837, 1842

The Caledonian Mercury, 1827, 1832

The Colliery Guardian, 1861-71

The Edinburgh Evening Courant, 1837

The Glasgow Herald, 1875

The Mining and Smelting Magazine, 1862-5

The Mining Journal, and Railway and Commercial Gazette, 1847-8

The Mining Magazine and Review, 1872

The Railway Times, 1838-50

The Scotsman, 1821-74

Transactions of the Mining Institute of Scotland, 1879-1902

Transactions of the Royal Scottish Society of Arts, 1835-54, 1860-8

## Unpublished Works

### Theses

Butt, J., 'James Young, Scottish Industrialist and Philanthropist',  
(unpublished PhD thesis, University of Glasgow, 1964)

Campbell, R.H., 'The Growth and Fluctuation of the Scottish Pig Iron  
Trade, 1828 to 1873',  
(unpublished PhD thesis, University of Aberdeen, 1956)

Corrins, R., 'William Baird and Company, 1830-1914',  
(unpublished PhD thesis, University of Strathclyde, 1974)

Thompson, A.E., 'Industrial Relations in the Fuel and Power Industries  
with particular reference to selected undertakings in Midlothian',  
(unpublished PhD thesis, University of Edinburgh, 1953)

Vamplew, W., 'Railways and the Transformation of the Scottish Economy',  
(unpublished PhD thesis, University of Edinburgh, 1969)

Youngson Brown, A.J. (now Youngson, A.J.), 'The Scots Coal Industry,  
1854-1886',  
(unpublished D Litt thesis, University of Aberdeen, 1952)

Other unpublished works

- Cadell, H.M., 'An Historical Account of Grange Estate in West Lothian and of the Development of its Mineral and Industrial Resources after 1770', (1931).  
 Private copy on temporary deposit at NLS.
- Cameron, T.R., 'A History of Gas Manufacture in Edinburgh', (Edinburgh, 1952).  
 Printed copy deposited in Edinburgh Public Reference Library.
- Campbell, A., 'Honourable Men and Degraded Slaves : A Study of trade unionism in two Lanarkshire mining communities'.  
 A synopsis of this paper appears as 'A Comparative study of trade unionism in two Lanarkshire mining communities, 1841-71', Bulletin of the Society for the Study of Labour History, no 28 (Spring 1974).
- Lomax, E.S., 'The Edinburgh and Dalkeith Railway : a brief historical outline', (Edinburgh, 1963).  
 Deposited in Edinburgh Public Reference Library.
- Mitchell, A., 'Political and Social Movements in Dalkeith, 1831-1882', (printed for private circulation, 1882).  
 Deposited at NLS.

Parliamentary Papers, Official Publications, and Acts of Parliament

- Report from the Select Committee on Gas Light Establishments, (PP 1823, V)  
 Report from the Select Committee of the House of Lords appointed to take into consideration the State of the Coal Trade in the United Kingdom, (PP 1830, VIII)
- Report from the Select Committee on Accidents in Mines, (PP 1835, V)  
 Royal Commission on Poorer Classes in Ireland, Appendix G, Report on the State of the Irish Poor in Great Britain, (PP 1836, XXXIV)
- Reports from the Select Committee appointed to inquire into the state of Communications by Railways, Third Report, (PP 1840 XII)
- Children's Employment Commission, Royal Commission, First Report (PP 1842, XV)  
 Children's Employment Commission, Appendix to First Report, (PP 1842, XVI)
- Report of the Select Committee on Railway Labourers, (PP 1846, XIII)
- Messrs. Johnes and Clegg, General Report on the existing system of supplying towns with gas, (PP 1847, XXII)
- Reports on the Gases and Explosions in Collieries, (PP 1847, XVI)  
 Returns from Gas Companies established by Acts of Parliament in the United Kingdom, (PP 1847, XLIV)
- Report from the Select Committee of the House of Lords appointed to inquire into the best Means of preventing the Occurrence of Dangerous Accidents in Coal Mines, (PP 1849, VII)
- Abstract of Return of Gas Companies in the United Kingdom, (PP 1850, XLIX)  
 Kenyon Blackwell, J., Report on Ventilation of Mines, (PP 1850, XXIII)
- Report from the Select Committee on Coal Mines, (PP 1852, V)
- Report from the Select Committee on Accidents in Coal Mines, First Report, (PP 1852-3, XX)
- Report from the Select Committee on Accidents in Coal Mines, First-Fourth Reports, (PP 1854, X)
- Census of Great Britain, 1851, Religious Worship and Education (Scotland), (PP 1854, LIX)
- Report of the Select Committee on the Bank Acts and Causes of the Recent Commercial Distress, (PP 1857-8, V)
- Report from the Select Committee on supply of gas to the Metropolis, (PP 1859, III)

Report from the Select Committee on the Gas (Metropolis) Bill,  
 (PP 1860, XXX)

Report from the Select Committee on Masters and Operatives, (PP 1860, XXII)

Abstract of Return of Gas Companies in the United Kingdom, (PP 1865, L)

Seventh Report of the Medical Officer of the Privy Council, (PP 1865, XXVI)

Report from the Select Committee on London (City) Corporation Gas etc  
 Bills, (PP 1866, VII)

Select Committee on Mines, (PP 1866, XIV)

Report from the Select Committee on Master and Servant, (PP 1866, XIII)

Special Report from the Select Committee on the Metropolis Gas Bill,  
 (PP 1867, XII)

Report of the Commissioners appointed to inquire into the several matters  
 relating to Coal in the United Kingdom, (PP 1871, XVIII)

Report of the Commissioners appointed to inquire into the Truck System,  
 vol 1, (PP 1871, XXXVI)

Report from the Select Committee on Coal, (PP 1873, X)

Select Committee on Banks of Issue, (PP 1875, IX)

Report of the Select Committee on the Metropolis Gas Companies Bill,  
 (PP 1875, XII)

Report from the Select Committee on Employers' Liability for Injuries to  
 their Servants, (PP 1876, IX)

Report from the Select Committee on Employers' Liability, (PP 1877, X)

Royal Commission on Mining Royalties, First Report, (PP 1890, XXXVI);  
 Second Report, (PP 1890-1, XLI); Fifth Report, (PP 1893-4, XLI)

Final Report of the Royal Commission on Coal Supplies, Part X, Minutes of  
 Evidence, (PP 1905, XVI); Part XI, Appendices, (PP 1905, XVI)

Royal Commission appointed to inquire into the Canals and Inland  
 Navigations, vol 1, (PP 1906, XXXII)

Dicennial Population Censuses, 1801-1881

Dicennial Population Censuses, 1821-1841, Enumeration Abstracts

Reports of the Commissioners (Appointed under the Provisions of the Act 5 & 6  
 Vict. c.99) to inquire into the operation of that Act and into the State  
 of the Population in Mining Districts, 1844-59

Inspectors of Mines Reports, 1851-81

Instructions of the Secretary of State for H.M. Inspectors under the Coal  
 Mines Regulation Act, 1872, and H.M. Inspectors under the Metalliferous  
 Mines Regulations Acts, 1872 and 1875

The Edinburgh Police Act (5 May 1837), 7 Gulielmi, Cap. xxxii

The Edinburgh Police Act (14 August 1848), 11 and 12 Victoriae, Cap. cxiii

The Coal Mines Regulation Act (16 September 1887), 50 and 51 Victoriae,  
 Cap. lviii

#### Miscellaneous Printed Sources

[Old] Statistical Account, 1791-8

New Statistical Account, 1833-45

Cases decided in the Court of Session (Edinburgh), 1822-87

Edinburgh and Leith Post Office Directory, 1833/4-1880/1

The Scottish Law Reporter, 1868, 1892

Water and Gas Works Statistics, 1884, 1886

- Anon, General and Special Rules in terms of the Act 23 and 24 Vict.  
Cap. 151, (Burdiehouse Colliery Office, March 1867)
- Hunt, R., Mineral Statistics of the United Kingdom of Great Britain and Ireland, 1855-65
- E.W. Binney & Company (Manufacturing Chemists, Bathgate) v The Clydesdale Chemical Company (Edinburgh, 1860)
- The Torbanehill Case, (Gillespie v Russel and Son), Court of Session, (Edinburgh, 1853)
- Glasgow Corporation Gas: Synopsis of Evidence given before Parliament in connexion with the Reduction of the Standard of the Illuminating Power of the Glasgow Gas, authorized by Sechn 4 of the Glasgow Corporation Gas Act, 1822 (Glasgow, 1885)
- Report of the Committee Appointed by the Highland Society of Scotland into Savings Banks (1814), Transactions of the Highland Society, vol 4 (1816)
- Report of the Committee of the Highland Society to inquire into the State of Friendly Societies (1820), Transactions of the Highland Society, vol 6 (1824)
- Books, Pamphlets and Articles  
 (place of publication is London except where stated)
- Ackworth, W.M., The Railways of Scotland (1890)
- Adams, I.H., 'The Salt Industry of the Forth Basin', SGM, vol 81 (1965)
- Alexander, W., 'On Mining by Longwall', Transactions of the Institution of Engineers in Scotland, vol 5 (1862)
- Anderson, G., Arrestment of Wages : An Exposure of its Impolicy and Injustice (Glasgow, 1853)
- Anderson, J.L., The Story of the Commercial Bank of Scotland Limited (Edinburgh, 1910)
- Anon, 'Description of Arniston Colliery', TMIS, vol 10 (1888-9)
- Anon, 'Description of Newbattle Colliery', TMIS, vol 10 (1888-9)
- Anon, General Prospectus of the Edinburgh and Glasgow Union Canal (28 April 1815)
- Anon, Observations by the Union Canal Committee on the Objections made by the Inhabitants of Leith to this Undertaking (Edinburgh 1817)
- Anon, Prospectus of an Edinburgh and Glasgow Junction Railway between the West End of the Union Canal and the Gamkirk and Glasgow Railway (1835)
- Anon, 'Prestongrange Colliery', TMIS, vol 22 (1900-1)
- Anon, 'Railways', The Edinburgh Encyclopedia, vol XVII (1830)
- Anon, Report relative to Railways between Edinburgh and Glasgow. By a Special Committee appointed by the Directors of the Union Canal Company (Edinburgh, Glasgow, 1830)
- Anon, Report to the Lord Provost, Magistrates, and Council of the City of Edinburgh relative to the eligibility ... for Manufacturing Establishments. By a Committee appointed by the Town Council, (Approved of by Magistrates and Council, 31 March 1835)
- Anon, Report to the Subscribers for a Survey and Plan of a Railway from Edinburgh and Leith to Glasgow (Edinburgh, 1830)
- Anon, Reports on the Proposed Railway from Perth by Stirling to Edinburgh and Glasgow, (Published by order of the Scottish Central Railway Company Committee, 1841)
- Anon, Resolutions of General Meeting of Subscribers to the Edinburgh and Glasgow Union Canal (26 July 1815)
- Anon, 'Slavery in Modern Scotland', Edinburgh Review, CLXXXIX (1899)

- Anon, The Economic Geology of the Central Coalfield of Scotland, Area VI, Bathgate, Wilsontown, and Shotts (HMSO, Memoirs of the Geological Survey of Scotland, 1923)
- Anon, The Geology of the Neighbourhood of Edinburgh (HMSO, Edinburgh, 1962)
- Arnot, R.P., A History of the Scottish Miners from the Earliest Times (1925)
- Arnot, R.P., The Miners : A History of the Miners' Federation of Great Britain (1949)
- Ashton, T.S., 'The Coal-Miners of the Eighteenth Century', The Economic Journal, Economic History Supplement, iii (1928)
- Ashton, T.S. and Sykes, J., The Coal Industry of the Eighteenth Century (Manchester, 1929)
- Atkinson, J.B., 'The Commercial Aspects of Coal Mining', TMIS, vol 15 (1893-4)
- Baird, H., Report on the Proposed Edinburgh and Glasgow Union Canal (Glasgow, 1813)
- Baird, H., Report to the Subscribers for a Survey of the Proposed Railway from the Union Canal at Ryal to Whitburn, Polkemmet, and Benhar; or the West Lothian Railway (18 December 1824)
- Baird, W., Annals of Duddingston and Portobello (Edinburgh, 1898)
- Bald, R., A General View of the Coal Trade of Scotland (Edinburgh, 1808)
- Bald, R., 'Mines', The Edinburgh Encyclopedia, vol XIV (1830)
- Bald, R., 'Observations on the Coal-field and accompanying strata, in the vicinity of Dalkeith, Midlothian', The Edinburgh New Philosophical Journal, vol 4 (1827-8)
- Bald, R., 'On the Fires that take place in Collieries', The Edinburgh New Philosophical Journal, vol 5 (1828)
- Bald, R., Report of a Mineral Survey of the proposed canal betwixt Edinburgh and Glasgow (May, 1814)
- Barrowman, J., 'Scotch Mining Legislation', TMIS, vol 10 (1888-9)
- Barrowman, J., 'Slavery in the Coal Mines of Scotland', TMIS, vol 19 (1897-9)
- Barrowman, J., 'What is the least Possible Waste in Working Coal?', TMIS, vol 23 (1901-2)
- Bateman, J., The Great Landowners of Great Britain and Ireland (Leicester, 1971, edition introduced by D. Spring, first published in 1876)
- Baxter, B., Stone Blocks and Iron Rails (Newton Abbot, 1966)
- Begg, S.G., 'Notes on Coal-Cutting Machinery', TMIS, vol 1 (1879-80)
- Beith, R., 'Notes on Sinking of Shafts, and on the way they are fitted up for pumping and winding', TMIS, vol 8 (1886-7)
- Bell, H.S., Oil Shales and Shale Oils (New York, 1948)
- Birch, A., The Economic History of the British Iron and Steel Industry 1784-1879 (1967)
- Bowley, A.L., 'The Statistics of Wages in the United Kingdom during the last Hundred Years. Wages in the Building Trades, London : Concluded', The Journal of the Royal Statistical Society, LXIV (1901)
- Boyd, R.N., Coal Pits and Pitmen (1892)
- Bremner, D., The Industries of Scotland (Edinburgh, 1869)
- Brown, E.O.F., 'History of Geology', in The Mining Association of Great Britain, Historical Review of Coal Mining (1925?)
- Brown, E.O.F., 'The History of Boring and Sinking', The Mining Association of Great Britain, Historical Review of Coal Mining (1925?)
- Brown, K., 'The First Railway in Scotland - The Tranent-Cockenzie Waggonway', The Railway Magazine, (January, 1938)
- Bryan, A.M., 'Mining Education in the West of Scotland', The Colliery Guardian, 7 September 1934.
- Buchan-Hepburn, G., General View of the Agriculture and Rural Economy of East Lothian (Edinburgh, 1794)
- Burn, D.L., The Economic History of Steelmaking 1867-1939 : A Study in Competition (Cambridge, 1961)

- Butt, J., Industrial Archaeology of Scotland (Newton Abbot, 1967)
- Butt, J., 'Legends of the Coal-Oil Industry (1847-64)', Explorations in Entrepreneurial History, vol 2 (1964)
- Butt, J., 'Technical Change and Growth of the British Shale-Oil Industry (1680-1870)', EHR, second series, vol 17 (1965)
- Butt, J., 'The Scottish Iron and Steel Industry before the Hot-Blast', Journal of the West of Scotland Iron and Steel Institute, vol 73 (1965-6)
- Butt, J., 'The Scottish Oil Mania of 1864-6', SJPE, vol 12 (1965)
- Byres, T., 'Entrepreneurship in the Scottish Heavy Industries, 1870-1900', in P.L. Payne (ed), Studies in Scottish Business History (1967)
- Cadell, H.M., 'Industrial Possibilities of the Forth Estuary', SGM, vol 34 (1918)
- Cadell, H.M., 'The Carboniferous Limestone Coal-fields of West Lothian', TMIS, vol 24 (1902)
- Cadell, H.M., The Rocks of West Lothian : An Account of the Geological and Mining History of the West Lothian District (1925)
- Cadell, H.M., The Story of the Forth (Glasgow, 1913)
- Cadell, P., The Iron Mills at Cramond (Edinburgh, 1973)
- Cairncross, A.K., 'Internal Migration in Victorian England', The Manchester School of Economic and Social Studies, vol 17 (1949)
- Cameron, R., 'Scotland, 1750-1845', in R. Cameron (ed), Banking in the Early Stages of Industrialization (Oxford 1967)
- Campbell, R.H., 'Investment in the Scottish Pig Iron Trade, 1830-1843', SJPE, vol 1, 3 (1954)
- Campbell, R.H., Scotland since 1707 (Oxford, 1965)
- Carvel, J.L., The Coltness Iron Company (Edinburgh, 1948)
- Challinor, R. and Ripley, B., The Miners' Association, A Trade Union in the Age of the Chartists (London and Southampton, 1968)
- Challinor, R., The Lancashire and Cheshire Miners (Gateshead, 1972)
- Chaloner, W.H., People and Industries (1963)
- Chapman, S.J., 'The Course of Average Wages between 1790 and 1860', Economic Journal, vol 9 (1899)
- Clapham, J.H., An Economic History of Modern Britain, I, The Early Railway Age 1820-1850 (Cambridge, 1930 edition)
- Clapham, J.H., An Economic History of Modern Britain, II, Free Trade and Steel 1850-1886 (Cambridge, 1932)
- Clough, C.T. et al, The Geology of East Lothian (Memoirs of Geological Survey of Scotland, 1910)
- Clow, A., Scotland's Contribution to Industrial Development through the application of chemical science since the Seventeenth Century (Blackwell Prize Essay, Aberdeen University, 1944)
- Clow, A. and Clow, N., The Chemical Revolution (1952)
- Cockburn, P. and Grahame, A., Report to the Subscribers for a Survey and Plan of a Railway from Edinburgh and Leith to Glasgow (1830)
- Cole, G.D.H., A Short History of the British Working-Class Movement 1789-1947 (revised edition, 1947)
- Coleman, D.C., The British Paper Industry 1495-1860 (Oxford, 1958)
- Conacher, H.R., 'Dr James Young : A Brief Biography', in Oil Shale and Cannel Coal (Institute of Petroleum, London, 1938)
- Conacher, H.R., 'The Mineral-Oil Industry in Scotland, Its Raw Materials and Methods', in Oil Shale and Cannel Coal (Institute of Petroleum, London, 1938)
- Cumming, W.M. and Nisbet, H.B., 'The Recent Survey of Scottish Cannel', in Oil Shale and Cannel Coal (Institute of Petroleum, London, 1938)
- Cunningham, A.S., Mining in Mid and East Lothian : History of the Industry from Earliest Times to the Present Day (Edinburgh, 1925)
- Cunningham, R.J., The Geology of the Lothians (Edinburgh, 1839)

- Davies, D., 'Some Aspects of Mining Reform', Quarterley Review (1941)
- Day, St. John V., 'The Iron and Steel Industries of Scotland', Iron (1876)
- Deane, R. and Cole, W., British Economic Growth 1688-1959 (Cambridge, 1969)
- Dott, G., Early Scottish Colliery Waggonways (1947)
- Dron, R.W., The Coal-fields of Scotland (1902)
- Drouthy, J., The Life of John Drouthy, An Edinburgh Coal Carter; in which is contained a Full Confession of the practice of himself and others of his profession whereby The Public are daily defrauded to an almost incredible amount. Written by himself (Edinburgh, 1821)
- Duckham, B.F., 'A Colliery History', Local Historian, vol 8, no 8 (1969)
- Duckham, B.F., A History of the Scottish Coal Industry, I, 1700-1815 (Newton Abbot, 1970)
- Duckham, B.F., 'Early Application of Steam Power at Scottish Collieries: a note and query', Industrial Archaeology, vol 6 (1969)
- Duckham, B.F., 'Life and Labour in a Scottish Colliery, 1695-1755', Scottish History Review, vol 47 (1968)
- Duckham, B.F., 'Serfdom in Eighteenth Century Scotland', History, vol 54 (1969)
- Duckham, B.F., 'Some Eighteenth-Century Scottish Coal Mining Methods: the 'Dissertation' of Sir John Clerk', Industrial Archaeology, vol 5 (1968)
- Duckham, B.F., 'The Emergence of the Professional Manager in the Scottish Coal Industry, 1760-1815', The Business History Review, XLIII, 1, (1969)
- Dunlop, J., Observations on the Account of a Plan for the better supplying the cities of Edinburgh and Glasgow with coal, (by an 'old Coal-Master'), (Edinburgh, 1800)
- Dunn, M., An Historical, Geological, and Descriptive View of the Coal Trade of the North of England (Newcastle-upon-Tyne, 1844)
- Dunn, M., 'Notice on the Edge Seams of Mid-Lothian', Transactions of the Natural History Society of Durham and Newcastle-upon-Tyne, vol 1 (1831)
- Dunn, M., Treatise on the Winning and Working of Collieries; including numerous statistics regarding ventilation and the prevention of accidents in mines (Newcastle-upon-Tyne, 1852)
- Dupin, Baron, The Commercial Power of Great Britain, vols I and II, (1825)
- Falkus, M.E., 'The British Gas Industry before 1850', EHR, second series, vol 20 (1967)
- Ferguson, J., 'On Underground Mineral Transit', Transactions of the Institution of Engineers in Scotland, vol 4 (1860-1)
- Forsyth, C., 'On the Mines, Minerals, and Geology of West Lothian', Transactions of the Highland and Agricultural Society of Scotland, series 3, vol 2 (1846)
- Forsyth, R., The Beauties of Scotland: containing a Clear and Full Account of the Agriculture, Commerce, Mines, and Manufactures of ... Each County, I (Edinburgh, 1805)
- Fraser, J., 'Essay' in Prize-Essays and Transactions of the Highland Society of Scotland, vol 6 (1824)
- Fraser, W.H., Trade Unions and Society: the Struggle for Acceptance (1974)
- Fraser, W.H., 'Trade Unions, Reform and the election of 1868 in Scotland', Scottish Historical Review, vol 50 (1971)
- Fyfe, A., 'On the comparative Value of different kinds of Parrot Coal, or Candle Coal, for yielding gas ...', RSSA, vol 2, (8 January 1844)
- Fyfe, A., 'On the Composition and Properties of Coal, and the Products of its Distillation. Is Torbane Mineral a Coal?', RSSA, vol 4, (24 April 1854)
- Fyfe, A., 'On the Evaporative Power of different kinds of Coal', RSSA, vol 2, (8 February 1841)

- Galloway, R.L., Annals of Coal Mining and the Coal Trade, I, II (Newton Abbot reprint 1971, I originally published 1898, II 1904)
- Gayer, A.D., Rostow, W.W. and Schwartz, J., The Growth and Fluctuation of the British Economy 1790-1850, I (Oxford, 1953)
- Geddes, J., Interim Report on the Proposed Forth and Tay Railway (Edinburgh, 1835)
- Gibson, I., 'The Establishment of the Scottish Steel Industry', SJPE, vol 5 (1958)
- Gibson, W., et al, Cannel Coals, Lignite and Mineral Oil in Scotland (HMSO, Memoirs of the Geological Survey of Scotland, 1922)
- Glasgow Corporation Gas Department, A Brief Account of the Inauguration and Development of the City's Gas Supply (April, 1949)
- Grainger, T. and Miller, J., Observations on the Formation of a Railway Communication between the Cities of Edinburgh and Glasgow (Edinburgh, 1830)
- Grainger, T. and Miller, J., Report on the Edinburgh, Glasgow, & Leith Railway (December, 1830)
- Grainger, T. and Miller, J., Report relative to the Proposed Railway to connect the ... Upper Coal Field of Lanarkshire with the City of Glasgow and the East and West Country Markets (Edinburgh, 1828)
- Grant, A.M., 'A System of Endless Rope Haulage at Newbattle Collieries', TMIS, vol 9 (1887-8)
- Grieve, J., Report on the Utility of a Bar Iron Railway from the City of Edinburgh to Dalkeith and to the Harbour at Fisherrow (Edinburgh, 1824)
- Grieve, J. and Taylor, J., Report on Canal between Edinburgh and Glasgow (8 February 1793)
- Greenshields, J.B., Annals of the Parish of Lesmahagow (Edinburgh, 1864)
- Griffin, A.R., Mining in the East Midlands (1971)
- Hair, P.E., 'Mortality from Violence in British Coal Mines, 1800-50', EHR, second series, vol 21 (1968)
- Hair, P.E., 'The binding of the Pitmen of the North-East, 1800-09', Durham University Journal, vol LVIII, 1 (1965)
- Hall, R., The History of Galashiels (Galashiels, 1898)
- Hamilton, H., 'Combination in the West of Scotland Coal Trade, 1790-1817', Economic History, vol 2, 5 (1930)
- Hamilton, H., The Industrial Revolution in Scotland (1966 edition)
- Hamilton, J., 'On the Report of the Royal Commission on Mining Royalties', TMIS, vol 15 (1893-4)
- Handley, J.E., The Irish in Scotland (Glasgow, 1947)
- Harding, A., A Social History of English Law (Pelican, 1966)
- Harris, J.R., 'The Employment of Steam Power in the Eighteenth Century', History, vol 52 (1967)
- Hassan, J., 'The Supply of Coal to Edinburgh 1790-1850', Transport History, vol 5 (1972)
- Hislop, J., 'Haulage Experience', TMIS, vol 3 (1881-2)
- Hobsbawm, E.J., The Age of Revolution : Europe 1789-1848 (1973, first published 1962)
- Hobsbawm, E.J., Industry and Empire (Pelican edition, 1972)
- Hobsbawm, E.J., Labouring Men : Studies in the History of Labour (1972 edition)
- Holland, J. [Anon], The History and Description of Fossil Fuel, The Collieries and the Coal Trade of Great Britain (second edition, 1841)
- Home, D.M., The Estuary of the Forth and adjoining districts viewed geologically (Edinburgh, 1871)
- Howell, H.H. and Geikie, A., The Geology of the Neighbourhood of Edinburgh (Geological Survey of Great Britain, 1861)

- Hughes, E., Studies in Administration and Finance, 1558-1825 (Manchester, 1934)
- Hull, F., The Coal-fields of Great Britain (1861)
- Hunt, B.C., The Development of Business Corporations in England 1800-1867 (Harvard, 1936)
- Hunt, R., 'The Present State of the Mining Industries of the United Kingdom', Journal of the Royal Statistical Society, vol 19 (1856)
- Hyde, C., 'The Adoption of the Hot-Blast by the British Iron Industry : A Reinterpretation', Explorations in Economic History, vol 10 (1973)
- Inglis, K., Churches and the Working Classes in Victorian England (1963)
- Institute of Public Administration (various authors), Studies in the Development of Edinburgh (series III, Edinburgh, 1939)
- Jardine, J., Report to the Committee of the Edinburgh and Dalkeith Railway Committee (Edinburgh, 1826)
- Jevons, W.S., The Coal Question : an inquiry concerning the progress of the Nation and the probable exhaustion of our Coal-Mines (1906 revised edition, edited by A.W. Flux, originally published 1865)
- John, A.H., The Industrial Development of South Wales (Cardiff, 1950)
- Johnston, T., A History of the Working Classes in Scotland (fourth edition, 1946, originally published Glasgow, 1920)
- Johnstone, D., 'On a New Hydraulic Pumping Engine', TMIS, vol 3 (1881-2)
- Johnstone, H., 'Longwall Working in the Edge Seams at Niddrie Collieries, Midlothian', TMIS, vol 10 (1888-9)
- Kidd, A., Illuminating Powers and Comparative Prices of Gas from Coal and Oil (To the Directors of the Edinburgh Gas Light Company, 1824)
- Landale, D., 'Description of the Large Coal-field under the Firth of Forth', RSSA, vol 6 (1864)
- Landale, J.J., 'On the Stratigraphical Position and Probable Extent of Torbanehill or Boghead Gas-Coal, near Bathgate', RSSA, vol 6 (1861)
- Labon, J.H., 'The Development of the Ayrshire Coalfield', SGM, vol 49 (1933)
- Lewis, B., Coal Mining in the Eighteenth and Nineteenth Centuries (1971)
- Lewis, M.J., Early Wooden Railways (1970)
- Lindsay, J., The Canals of Scotland (Newton Abbot, 1968)
- McCallum, A., 'A New System of Signals for Collieries', TMIS, vol 4 (1882-3)
- McCallum, A., 'The Lothian Coal Fields', TMIS, vol 2 (1880-1)
- McCormick, B. and Williams, J.E., 'The Miners and the Eight-Hour Day 1863-1910', EHR, second series, vol 12 (1959-60)
- MacDougall, I. (ed), The Minutes of Edinburgh Trades Council 1859-1873 (Edinburgh, 1968)
- MacDonagh, O., 'Coal Mines Regulation : the first decade, 1842-1852', in R. Robson (ed), Ideas and Institutions of Victorian Britain : Essays in honour of George Kitson Clark (1967)
- MacDonald, D.F., Scotland's Shifting Population 1770-1850 (Glasgow, 1937)
- MacFarlane, M., 'Haulage by Endless Rope and Chains', TMIS, vol 2 (1880-1)
- MacGregor, A.G., The Mineral Resources of the Lothians (Geological Survey of Great Britain, Department of Scientific and Industrial Research, 1945)
- MacGregor, M. and Haldane, D., The Economic Geology of the Central Coalfield of Scotland. Area III, Bo'ness and Linlithgow (Memoirs of the Geological Survey of Scotland, 1933)

- Machin, F., The Yorkshire Miners : A History (Huddersfield, 1958)
- MacLaren, C., A Sketch of the Geology of Fife and the Lothians (Edinburgh, 1866, first edition 1838)
- McNeill, P., Blaewearie; or Mining Life in the Lothians forty years ago (Edinburgh, 1887)
- McNeill, P., Prestonpans and Vicinity (Edinburgh and Glasgow, 1902)
- McNeill, P., Tanent and its Surroundings (Edinburgh and Glasgow, 1883)
- MacPherson, A., 'Scotch Whisky', SGM, vol 80 (1964)
- McVail, J.C. (County Medical Officer), Report on the Housing of Miners in Stirlingshire and Dunbartonshire (Glasgow, 1913)
- Malcolm, C.A., The Bank of Scotland 1695-1945 (Edinburgh, n.d.)
- Malcolm, C.A., The History of the British Linen Bank (Edinburgh, 1950)
- Marshall, D., A History of British Railways down to 1830 (Oxford, 1938)
- Martin, R., 'The Mid-Lothian Coal Basin', TMIS, vol 15 (1893-4)
- Marwick, W.H., A Short History of Labour in Scotland (Edinburgh, 1967)
- Marwick, W.H., Economic Developments in Victorian Scotland (1936)
- Marwick, W.H., Scotland in Modern Times : An outline of Economic and Social Development since the Union of 1707 (1964)
- Matheson, W., Leith Harbour and Plan for Improvement (Edinburgh, 1829)
- Mathias, P., 'Capital, Credit and Enterprise in the Industrial Revolution', The Journal of European Economic History, vol 2 (1972)
- Mathias, P., The First Industrial Nation : An Economic History of Britain 1700-1914 (1969)
- Meade, R., The Coal and Iron Industries of the United Kingdom (1882)
- Megaw, B., 'Women Coal-Bearers in a Midlothian Mine', Scottish Studies, vol 10 (1966)
- Meik, H.H., 'The Edinburgh & Dalkeith Railway', The Railway Magazine, (March, 1923)
- Miller, A., The Rise and Progress of Coatbridge (1864)
- Miller, J., The Lamp of Lothian, or the History of Haddington (Haddington, 1844)
- Miller, T.R., The Monkland Tradition (Edinburgh, 1958)
- Milne, D., Memoir on the Mid-Lothian and East-Lothian Coalfields (Edinburgh, 1839)
- Milne, D., 'On the Mid-Lothian and East-Lothian Coalfields', Transactions of the Royal Society of Edinburgh, vol 14 (1840)
- Mining Association of Great Britain (various authors), Historical Review of Coal Mining (1925?)
- Moore, R., 'On the Blackband Ironstones of the Edinburgh and East-Lothian Coal Fields, and the Advantages to be derived from their development', RSSA, vol 6 (1860)
- Moore, W., 'Observations on the Supply of Coal and Ironstone from the Mineral Fields of the West of Scotland', Proceedings of the Philosophical Society of Glasgow, vol 4 (1860)
- Moore, W., 'Principal Seams of Coal and Ironstone in the Glasgow Coalfield', Proceedings of the Institution of Mechanical Engineers, (1864)
- Morris, D.B., 'The Geography of the Forth Valley', Stirling Natural History and Archaeological Society Transactions, (1898-9)
- Morris, J.H. and Williams, L.J., The South Wales Coal Industry 1841-1875 (Cardiff, 1958)
- Mott, R.A., 'The Newcomen Engine in the Eighteenth Century', Transactions of the Newcomen Society, vol 35 (1962-3)
- Munro, N., The History of the Royal Bank of Scotland 1727-1927 (Edinburgh, 1928)
- Murray, J.E., Letter to the Lord Provost on present high price of Coal (Edinburgh, 1837)
- Musson, A.E., British Trade Unions, 1800-1875 (MacMillan Press, 1972)
- The National Coal Board (Scottish Division), A Short History of the Scottish Coal-Mining Industry (1958)
- 'Naucleus', The Question Stated as to Leith, Trinity, & Granton (Edinburgh, 1837)
- Nicol, J., Vital, Social, and Economic Statistics of Glasgow, 1885-1891 (Glasgow, 1891)

- Oakley, C.A. (ed), Scottish Industry (1953)
- O'Dell, A.C., 'A Geographical Examination of the Development of Scottish Railways', SGM, vol 55 (1939)
- Parsons, R.H., The Early Days of the Power Station Industry (Cambridge, 1939)
- Paterson, J., Observations Occasioned by the Mineral Survey and Report of Robert Bald (1814)
- Payne, P.L., 'The Govan Collieries', Business History, vol 3 (1960-1)
- Peace, M.W., The Coal Mines Regulation Act and a digest of the Law relating to Truck (1888)
- Pelling, H., A History of British Trade Unionism (Pelican, 1969)
- Philip, J.R., 'Early Labour Law in Scotland', The Juridical Review, XLVI (1934)
- Pinchbeck, I., Women Workers and the Industrial Revolution (1930)
- Pollard, S., The Genesis of Modern Management : A Study of the Industrial Revolution in Great Britain (1965)
- Political and Economic Planning, Report on the Gas Industry in Great Britain (1939)
- Redwood, I.I., Mineral Oils and their By-Products (1897)
- Rendel, J.M., Report and Plan for the Improvement of Leith Harbour and Docks (Edinburgh, 1847)
- Richards, E., 'The Industrial Face of a Great Estate: Trentham and Lilleshall 1780-1860', EHR, second series, vol 27 (1974)
- Richardson, J., The Second General Report on the Newcastle-upon-Tyne, Edinburgh and Glasgow Railway (Newcastle-upon-Tyne, 1837)
- Robertson, G., General View of the Agriculture of the County of Midlothian (Edinburgh, 1793)
- Ronaldson, J.M., 'A Comparison between the Stoop and Room and the Long-Wall Systems of Working', TMIS, vol 1 (1879-80)
- Ross Stewart, D., A Treatise on the Law relating to Mines, Quarries, and Minerals in Scotland (Edinburgh, 1894)
- Rostow, W.W., The British Economy of the Nineteenth Century (Oxford, 1948)
- Rowan, F.J., 'Historical Notes on Early Plans for Coal-Washing', TMIS, vol 16 (1894-5)
- Sandilands, M., Letter to the Lord Provost of Edinburgh (Edinburgh, 1819)
- Saul, S.B., 'The Market and the Development of the Mechanical Engineering Industries in Britain, 1860-1914', in S.B. Saul (ed), Technological Change: The United States and Britain in the Nineteenth Century (1970)
- Shannon, H.A., 'The Limited Companies of 1866-1883', EHR, vol 4 (1933)
- Simpson, J.C., 'Ventilation of Mines Economically Considered', TMIS, vol 1 (1879-80)
- Skinner, B.C., The Cramond Iron Works (Edinburgh, 1965)
- Skinner, B.C., The Lime Industries in the Lothians (Edinburgh, 1969)
- Slaven, A., 'Earnings and Productivity in the Scottish Coal-Mining Industry during the Nineteenth Century : the Dixon Enterprises', in P.L. Payne (ed), Studies in Scottish Business History (1967)
- Smart, W., Miners' Wages and the Sliding Scale (Glasgow, 1894)
- Smith, G.W., 'Colliery Shaft Signalling', TMIS, vol 1 (1879-80)
- Smout, T.C., 'Scottish Landowners and Economic Growth 1650-1850', SJPE, vol 9 (1964)
- Smout, T.C., 'The Erskines of Mar and the development of Alloa 1689-1825', Scottish Studies, vol 7 (1963)
- Sneddon, J.B., Caldwell, W. and Stein, J., 'Seventy-Five Years of Oil Shale Mining', in Oil Shale and Cannel Coal (Institute of Petroleum, London, 1938)

- Sombart, W., The Quintessence of Capitalism : A Study of the History and Psychology of the Modern Business Man (English translation 1915, first published 1913)
- Spring, D., 'The English Landed Estate in the Age of Coal and Iron : 1830-1880', The Journal of Economic History, vol 11 (1951)
- Steuart, H., Account of a Plan for the better supplying the City of Edinburgh with Coal (Edinburgh, 1800)
- Steuart, H., Supplement to the Account of a Plan for the better supplying the City of Edinburgh with Coal (Edinburgh, 1800)
- Stevenson, R., Report of a Survey for the East Lothian Railway (Edinburgh, 1826)
- Stevenson, R., Report on Proposed Line of Railway between Edinburgh and Dalkeith (1818)
- Stevenson, R., Report on Proposed Roxburgh & Selkirk Railway (Edinburgh, 1821)
- Stevenson, R., Report relative to a line of Canal upon One Level between the Cities of Edinburgh and Glasgow (Edinburgh, 1817)
- Stewart, C., Considerations on the Use and Abuse of Scots and English Coal (Edinburgh, 1809)
- Stewart, D. and Forbes, C.E., 'The Retorting of Oil Shales in Scotland', in Oil Shale and Cannel Coal (Institute of Petroleum, London, 1938)
- Tait, D., 'The Rocks between Leith and Granton, with Historical Notes on the working of Wardie Coal', Transactions of the Edinburgh Geological Society, vol 11 (1923)
- Taylor, A., 'On the Scotch and Welsh Mineral Oil Trades', Transactions of the Edinburgh Geological Society, vol 1 (1867)
- Taylor, A.E.R., 'Paper', in C. Oakley (ed), Scottish Industry (1953)
- Taylor, A.J., 'Combination in the Mid-Nineteenth Century Coal Industry', Transactions of the Royal Historical Society, fifth series, vol 3 (1953)
- Taylor, A.J., 'Labour Productivity and Technological Innovation in the British Coal Industry 1850-1914', EHR, second series, vol 14 (1961-2)
- Taylor, A.J., Laissez-faire and State Intervention in Nineteenth Century Britain (MacMillan Press, 1972)
- Taylor, A.J., 'The Coal Industry', in D.H. Aldcroft (ed), The Development of British Industry and Foreign Competition (1968)
- Taylor, A.J., 'The Miners' Association of Great Britain and Ireland 1842-48 : A Study in the Problem of Integration', Economica, vol 22 (1955)
- Taylor, A.J., 'The Sub-contract system in the British Coal Industry', in L.S. Pressnell (ed), Studies in the Industrial Revolution, presented to T.S. Ashton (1960)
- Thomas, J., The North British Railway, I (Newton Abbot, 1969)
- Thompson, E.P., The Making of the English Working Class (Penguin edition, 1970)
- Trevelyan, G.M., English Social History (third impression, 1945)
- Turner, W.H., 'Wool Textile Manufacture in Scotland', SGM, vol 80 (1964)
- Vamplew, W., 'Railways and the Transformation of the Scottish Economy', EHR, second series, vol 24 (1971)
- Vamplew, W., 'Sources of Scottish Railway Capital before 1860', SJPE, vol 17 (1970)
- Waldie, J.F., Analysis of Scotch Cannels, Gas Coals and Shales (Glasgow, 1891)
- Walker, J. and Cubitt, W., Plans and Reports for the improvement of Leith Harbour (Edinburgh, 1839)

- Ward, J.T., 'Landowners and Mining', in J.T. Ward and R.G. Wilson (eds), Land and Industry : The Landed Estate and the Industrial Revolution (Newton Abbot, 1971)
- Warren, K., 'Locational Problems of the Scottish Iron and Steel Industry since 1760, Part 1', SGM, vol 81 (1965)
- Welbourne, E., The Miners' Union of Northumberland and Durham (Cambridge, 1923)
- Williams, J.E., The Derbyshire Miners (1962)
- Wilson, A., 'Chartism', in J.T. Ward (ed), Popular Movements c1830-1850
- Wrigley, E.A., 'The Supply of Raw Materials in the Industrial Revolution', EHR, second series, vol 15 (1962)

Youngson Brown, A.J. (now Youngson, A.J.), 'Trade Union Policy in the Scots Coalfields 1855-1885', EHR, second series, vol 6 (1953)