Price Performance and Egyptian Stock Market Efficiency: An Initial Public Offerings Perspective

By

Zakaria S. G. HEGAZY

A Thesis Submitted to the Department of Accounting and Finance, University of Strathclyde in fulfilment of the requirements for the Degree of Doctor of Philosophy (Ph.D.) in Finance

January, 1998

ACKNOWLEDGEMENTS

All praise and thanks be to Allah, Lord of the Worlds, for His Providence and Divine Direction throughout my life and especially during the course of researching for this thesis. To My supervisor Professor Ronnie MacDonald, for his supervision, recommendations, guidance, suggestions, and encouragement, go my sincere thanks. I owe a great debt of gratitude to my parents for the inexhaustible encouragement and support received over the years. The encouragement of my colleagues DR Salaheldin Ismail and his family, and DR Mohammed Salimullah is acknowledged. I am indebted to my home country, Egypt, for financing my education in the United Kingdom, and to my teachers and officials at both the University of Helwan and the Ministry of Higher Education in Cairo, Egypt, for their support. Finally, the thesis would never have been completed without the assistance, understanding, encouragement, sacrifices and patience of my wife, Umm Heba, and my children, Heba, Reham and Hadeer, to all of them I am very much indebted.

ABSTRACT

The core of this thesis has involved an examination of the efficiency of the Egyptian stock market (ESM) with a specific focus on the price performance of the privatised initial public offerings (PIPOs). Recent structural changes in the Egyptian economy during the 1990s permit testing hypotheses about how these changes have affected the behaviour of ESM, in general, and PIPOs in particular. An analytical review of prior studies is provided in Chapter Two. Two documented anomalies of IPOs price performance, i.e. short-run underpricing and long-run overpricing, are revealed. Some researchers attribute these findings to the trading system of the developed capital markets. Our study refutes this explanation because we also find these anomalies in the ESM, although it is a market without an investment-banker (specialist) system.

Accordingly, five empirical chapters are constructed to investigate the ESM. Before examining the price performance of PIPOs in the ESM, two chapters are assigned to examine the whole market at the domestic and international levels, as a preliminary exploration. From the domestic point of view, Chapter Four deals with questions of normality, volatility, randomness, and the efficiency of the ESM. Several basic tests were employed for testing *normality*. All indicated that none of the indices has a normally distributed return. Then, the Autoregressive Conditional Heteroscedastic model (ARCH) proposed by Robert Engle (1982) and the Generalized ARCH model (GARCH) of Bollerslev (1986) are employed to describe the process of stock returns. The findings show that the variance of returns is time-varying in the GARCH context. Also, the integratedness of the volatility of asset returns is analyzed using the IGARCH model. The results indicate that the volatility of stock returns is integrated.

To test the stationarity of the ESM returns, unit root tests of Dickey and Fuller (1979) and the variance-ratio test of Lo and MacKinlay (1988) were implemented. The results support the notion that there is a relatively significant stationary component in past returns that can be used to predict future returns; therefore, returns do not follow pure random walks. Since the random walk hypothesis is not equivalent to market efficiency, we conduct the test of efficiency by using unit root and cointegration techniques, which are recently developed techniques

in the time series literature. It is found that disaggregate stock price indices of the ESM are cointegrated which is interpreted as a violation of the concept of static efficiency introduced by MacDonald and Power (1993).

Then, Chapter Five is assigned to test the internationalization of the ESM among eighteen emerging international stock markets. The Engle-Granger two-step methodology and the Johansen's multivariate cointegration tests were performed on these prices. The findings show that the eighteen emerging markets are cointegrated, indicating Granger-Causality in levels and these are suggesting of inefficiency. However, for the Middle Eastern and Mediterranean Rim markets groups, the results reveal an absence of any clear evidence of cointegration among them.

Then, to measure the price performance of PIPOs, we use both the market-adjusted and risk-adjusted models. In the risk-adjusted model, both the general CAPM and the Returns Across Time and Securities (RATS) model were employed. Chapter Six illustrates that the Egyptian PIPOs are underpriced with average initial returns of 15.03 % and the observed distribution is heavily skewed and has a median of 13 %.

Chapter Seven shows that insignificant positive excess market returns exist, on average, between the close in the first day of listing and the close in the fourth week of trading. It is suggested that these early positive excess market returns in the aftermarket may result from speculative bubbles which burst in subsequent trading in the aftermarket period giving rise to negative excess market returns. Also, the results indicate that the mean beta declines after-listing and varies around the market beta of unity. The mean beta in the Egyptian PIPOs market thus appear to behave nearly in a similar manner to the risk behaviour in other markets. Finally, Chapter Eight investigates the efficiency of the Egyptian PIPOs in the aftermarket. The results supported both the weak-form and semistrong-form of the Efficient Market Hypothesis of the PIPOs in the ESM.

CONTENTS

CHAPTER ONE
INTRODUCTORY FRAMEWORK

1.0 INTRODUCTION

The behaviour of stock markets has attracted a substantial amount of interest in the world of finance. In this thesis, an examination of such behaviour in a developing stock market, Egypt, is made with a specific focus on the price performance of the privatisation initial public offering (PIPOs). Section 1.1 outlines the objectives and the importance of this study. Then, Section 1.2 presents the research philosophy and plan. In Section 1.3, we provide a brief outline of the research strategy and analytical approach. Finally, an organization of the thesis is provided in Section 1.4.

1.1 OBJECTIVES AND IMPORTANCE OF THE STUDY

Numerous studies have investigated unseasoned new issues in the developed capital market, where issues offered to the public for the first time are generally traded in the over-the-counter market. The parties to these unseasoned issues in the United States, for example, are the issuers, the subscribers to the new issue, and underwriters. However, trading arrangements for unseasoned new issues in Egypt differ from developed capital markets. There is no well-developed over-the-counter market in Egypt, and it is common practice for shares issued to the public for the first time to receive official stock exchange listing at the time of the issue. The parties to this process in Egypt are the brokers, the principal clerks of the stock exchange, and the jobbers who are entitled to transact business. Therefore, the main objective of this thesis is to explore and analyze, for the first time, the price performance of the

Egyptian stock market, in general, and the privatisation initial public offerings (PIPOs) in particular. Our operational objectives are outlined as follows:

The first objective is to examine the stochastic properties as well as the efficiency of a newly constructed time-series for daily returns on the Egyptian stock market index, since its efficiency and stochastic properties have not yet been investigated. The importance of this objective can be clarified in many respects: (1) the issues of efficiency and randomness of this market are important in the context of market integration and globalization, (2) the study of market efficiency and time series properties of the Egyptian stock market will also help us to enhance our understanding of this fast-growing and increasingly important market in the Middle East, (3) the distribution of stock returns is an important issue in finance since asset returns in finance are usually modelled as generated by a stochastic process with certain characteristics, and (4) concepts such as return and risk, which are examined through out this thesis, using a mean-variance analysis and efficient market hypothesis, depend on the assumptions of the distribution of asset returns.

The second objective is to investigate the issue of internationalization of this emerging market, examining the possibility of earning arbitrage profits by trading in more than one national market. By doing so we hope to gain some insight into the situation of the Egyptian stock market within the context of emerging international equity markets.

The third objective is to measure the initial price performance of the PIPOs, offered to the public by Egyptian privatised companies, from the offering date to the date of the first listing on the exchange. This objective is to determine the degree of 'underpricing' or the 'market discount' in Egypt and compare it to underpricing found by other researchers in other markets. This objective is important for many reasons, namely: (1) it is anticipated that the comparison of underpricing noted in this study with other studies will provide signals on the efficiency in setting the offer price of a new issue, and (2) examining the degree of the initial returns, this study will suggest justifications to explain the degree of underpricing found in the Egyptian PIPOs and discuss its implication to the market.

The fourth objective is to measure the aftermarket performance subsequent to listing. This objective is thought to be important for a number of reasons: (1) there is a possibility that adjustments of underpricing in the primary market may extend to the secondary market, and (2) an investigation into the secondary market of PIPOs is important in order to determine the profits attainable from investments in this emerging market. For instance, what buy and hold strategies produce the highest returns in the secondary market?

The fifth objective is to investigate the risk behaviour of PIPOs in the initial and aftermarket periods. This objective is important for several reasons, such as: (1) the evaluation of systematic risk allows investors and investment banks to make deductions about the performance of the PIPOs and to develop techniques to predict their future risk levels, (2) most previous studies on the performance of risk of IPOs have been constructed for the developed capital markets of the world, especially the U.S.. In this study, the behaviour of risk in a developing capital market, Egypt, is examined in order to see if it behaves in a similar manner or differently from the risk behaviour of IPOs in the developed capital markets.

The sixth and final objective is to test the aftermarket efficiency of the Egyptian PIPOs by examining both the weak and semi-strong forms versions of the Efficient Market Hypothesis (EMH).

In achieving the above objectives, we believe that this research provides an extensive study of the initial market for the Egyptian PIPOs and their subsequent performance which should be of value to bankers, investors, privatized companies and academics.

For bankers, a deeper understanding of the market discount and aftermarket performance in the PIPOs is important. Certainly, the experience of the banker can help him/her to improve specific strategies for marketing a new issue. Obviously, these strategies are essential but additional perceptions can be achieved by clarifying such performance from an elaborated study. Moreover, the price performance can be regarded as a significant area in which bankers can play a very important role if the behaviour of the aftermarket performance could be determined.

For investors, the existence of price performance may present opportunities for active trading strategies to generate higher returns. Understanding the nature of this performance is helpful in determining the risk-return relationship of PIPOs as they become seasoned as well as for determining the timing of buy and hold strategies for the speculative investor.

For privatised companies, the cost of external equity capital depends not only upon the transaction costs incurred in going public but also upon the returns that investors receive in the aftermarket. To the extent that low returns are earned in the aftermarket, the cost of external equity capital is lowered for these firms.

For academics, it is believed that this research is amongst the first to examine issues which concern the microstructure of the Egyptian equity market. Thus, the value of this study is based upon the development and testing of specific hypotheses which provide perceptions about the workings of the equity market in Egypt. This is particularly valuable, because the majority of the research conducted in this issue has been concentrated in the UK and U.S.. Developing an understanding of the price performance in emerging capital markets is clearly desirable.

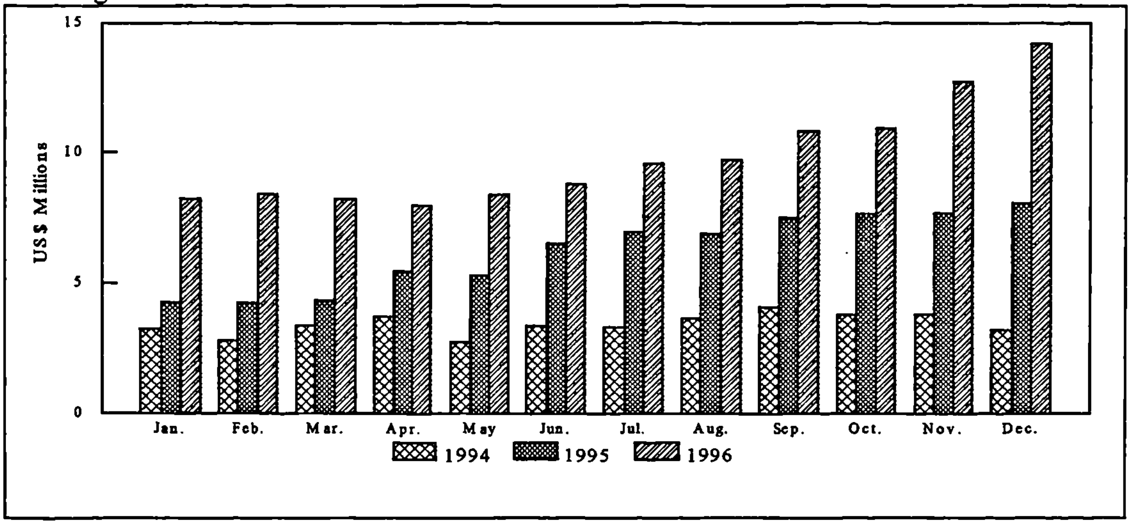
Finally, the literature, in this thesis, clarifies that the evidence of long-run returns for IPO is less extensive (both temporally and internationally) than evidence of underpricing. Similarly, explanation for poor abnormal returns post-listing are relatively less developed than those for initial returns. Thus, further analysis is warranted, especially in terms of the relationship between initial and long run returns. These objectives gain greater acceptance given the rapid rise in the valuation of the Egyptian market during the period of study as it is demonstrated in Table 1-1 and Figure 1-1.

Table 1-1 Total Market Capitalization Levels for Egyptian Equity Market Trading: Jan. 1994 - Dec. 1996.

	Market Capitalization (Millions of US dollars)		
Month	**1994**	**1995**	**1996**
Jan.	3.19	4.23	8.19
Feb.	2.80	4.23	8.37
Mar.	3.37	4.33	8.16
Apr.	3.70	5.46	7.99
May	2.76	5.26	8.37
Jun.	3.34	6.48	8.77
Jul.	3.33	6.98	9.61
Aug.	3.64	6.89	9.74
Sep.	4.07	7.54	10.89
Oct.	3.80	7.65	10.97
Nov.	3.79	7.67	12.75
Dec.	3.19	8.09	14.18

Source: Securities Market In Egypt, Monthly Statistical Reports from January 1994 to December 1996. All figures shown are recorded at the respective month-ends.

Figure 1-1 Histogram of the Market Capitalization Levels for the Egyptian Equity Market Trading Jan. 1994- Dec. 1996.



1.2 RESEARCH PHILOSOPHY AND PLAN

This thesis concerns the price performance in the Egyptian stock market, where the privatisation is set to be one of the basic objectives of the public sector reform program implemented in 1991. The story of privatization started in February 1993 when the government offered 16 public sector assets in tourism for sale. By July 1994, formal program targets were met through the sale of LE 5.1 billion in holding company assets. This was achieved via the sale of shares to employee shareholder associations, which have little power to exercise ownership rights. However, the continuing privatisation effort had limited success because it relied on direct sales through private placements. Because of this, the government then decided to use the stock market for selling public enterprises to the public at large. The use of public share issues in privatisation is usually claimed to have the distributional advantage of avoiding concentrating ownership rights in a few investment institutions. Accordingly, it was able to take advantage of the keen interest shown by Egyptians for investing in shares, particularly after the speculator gains that were made by investors during 1993. Under those circumstances, this market has grown rapidly and been the subject of several changes.

As a consequence, five topics are concerned in this thesis: (1) the efficiency and stochastic properties of the Egyptian stock market, (2) its internationalization within the context of emerging equity markets, (3) the phenomenon of underpricing, (4) the price performance of the PIPOs in the aftermarket, and (5) the aftermarket efficiency of the PIPOs.

The first topic deals with the question of normality, volatility, randomness and efficiency of the Egyptian equity market. There are various justifications for using the assumption of normality in finance. The most substantial one is that the normal distribution is fully described by only two parameters: the mean and the variance. That is, an asset is fully described by its expected rate of return '*mean*' and its expected risk "*variance*' [Levy and Sarnat (1984)]. Based on theory, it is expected that asset returns are normally distributed. In addition, the return on a stock index of the whole Egyptian equity market is a weighted sum of returns on individual stocks including PIPOs. Since the sum of normal variables is normally distributed, stock index returns would be normally distributed if returns on the individual stocks were normal. Because we noted an existence of leptokurtic distribution in the data, we found a justification for testing the volatility of stock returns by using a GARCH model.

Then, the stationarity of such time series returns is examined. Since the results reject the random walk hypothesis in favour of a mean-reversion process, this reflects the existence of autocorrelation in the Egyptian stock returns which brings to light the issue of efficiency. As a consequence, cointegration techniques are employed to test the concept of 'static efficiency' introduced by MacDonald and Power (1993). Following MacDonald and Power (1993), Fama's (1970) definition is operationalized: that a market is efficient if "all prices fully reflect all relevant information". Thus, the joint null hypothesis developed based on such definition is that: the market participants exploit all available information in a rational way; and there is a constancy in the expected equilibrium returns. If this joint null hypothesis is accepted, then it follows that the prices of different shares can not be cointegrated. The reason is that, according to MacDonald and Power (1993), if prices are cointegrated this implies that there must be Granger-causality running in at least one direction between the different price series, enabling a researcher to use one share price to help forecast the others. As a result, the share price either does not correctly manifest all available information or there are important variations in expected returns.

The second topic analyzes the situation of the Egyptian equity market among eighteen emerging stock markets. By including a sufficient number of stock markets, we investigate two hypotheses that explain Egyptian stock market integration. The first is the market segmentation explanation. The lesser degree of market segmentation, such as cross-country stock investing and foreign ownership restriction, tends to integrate one market to others [see, e.g., Ng et al. (1991)]. Hence, we should see a gradual increase in the degree of cointegration over time as we would expect world stock markets to become more integrated over time. Second, strong economic relationships among countries that are in the same region or within the same time zone are expected to exhibit a higher degree of integration. Therefore, the existence of a common feature among stock markets would lead them to be cointegrated.

The third topic, in this study, is to investigate the market performance of privatised new issues of common stocks offered to the public for the first time, at the time of their initial offering on the Cairo Stock Exchange. Numerous studies have been conducted to explain the difference between the initial offer price and early traded stock price levels in the newly listed stocks. Empirical evidence, from the UK and U.S., indicates that initial offering prices in IPOs are typically set at a discount to the early post-listing prices in such stocks [Merritt, Howe and Newbould (1967), and Levis (1993) for the U.K.; Neuberger and Hammond (1974), Ibbotson (1975), Block and Stanley (1980), Ritter (1987), Tinic (1988), Ritter (1991), and Barry and Jennings (1993) for the U.S.]. In addition, studies by Aggarwal, Leal and Hernandez (1993), and Lee ; Taylor; and Walter (1996) have documented the existence of underpricing in, Brazil, Mexico, Chile and Australia, respectively, for IPOs.

As a result, many hypotheses have been introduced in previous studies to explain the underpricing phenomenon. For instance, 'the Inaccurate Pricing Hypothesis' of Merritt, Howe and Newbould (1967) explains that underpricing is a result of inaccurate pricing which must be considered as part of the cost of making an issue along with the more obvious administrative costs. However, the 'Winner's Curse Hypothesis' of Rock's (1986) assumes that uninformed investors may encounter what is called a ‘winner’s curse’ because they have a greater risk of being allocated securities in overpriced or/ less underpriced issues. In reality, the ‘winner’s curse’ hypothesis generates another related hypothesis, i.e. the risk-averse-underwriter hypothesis of Beatty and Ritter (1986) which argues that there is an equilibrium relation between the expected underpricing of an IPO and the ex ante uncertainty about its value. Further, the Baron's (1982) 'Information Asymmetries Hypothesis' focuses on information asymmetries between issuing firms and their investment bankers, thus investment bankers take advantages of their superior knowledge of market conditions to underprice offerings.

Also, Tinic (1988) argues that some researchers have suggested the Monopsony hypothesis which maintains that the underwriters of IPOs intentionally price the securities at a discount from their expected values in the aftermarket because they can capture at least a fraction of the rents indirectly. Another related hypothesis is the 'Certification Hypothesis' of Booth and Smith (1986), Beatty and Ritter (1986), and Chowhry and Nada (1996), suggests that investment bankers can build their reputations by deliberately underpricing and absorbing the underprice loss. The Stablization hypothesis of Ruud (1993) assumes that underwriter price support provides an explanation for the positively skewed distribution of initial IPO returns. However, many of the these explanations for the underpricing phenomenon can be criticised on the grounds of either the extreme assumptions that are made or the unnecessarily convoluted stories involved. One difficulty with a direct application of these models to a privatisation sale is the assumption that a government knows more about asset values than the private sector, which seems implausible. However, Vickers and Yarrow (1988) argue the opposite is likely to be true. Another problem is that the government is initially selling only a fraction of the shares and retaining the reminder for a certain time period [see Table 1.2]. However, this thesis argues that a government with no intention of intervening is more willing to retain a (noncontrolling) stake in the firm for some time period, since it knows that it will sell it at a high price in the future once its credibility has grown. On the contrary, a government which anticipates a change of its current policy chooses a rapid sale, since it predicts reduced profits from the policy change and a lower market value for the firm. Similarly, underpricing may indicate commitment since an uncommitted government cannot expect higher profits from a later sale, and is consequently not willing to underprice the initial sale.

Table 1.2 Law 203 Companies Shares Sold Offered Through Egyptian Stock Market to the Public and Employees: 1994-95.

Enterprise	Year of Privatisation	% of sold Shares	Enterprise	Year of Privatisation	% of sold Shares
Misr Chemical Industries CO	1994	51%	Helwan Cement	1995	29.6%
Paints & Chemical industries	1994	10%	El Nasr Clothing & Textile Co.	1995	8%
Alexandria Portland Cement	1994	20.6%	Egyptian Elector Cables	1995	30%
Torah Portland Cement	1994	35.5%	Extracted Oil Co.	1995	20%
Uniarab Spinning & Weaving	1994	4.24%	North Cairo Flour Mills	1995	20%
Alexandria Spining & Weaving	1994	15.6%	Alexandria for Pharmaceuticals & Chemicals	1995	21%
Ameriya Cement	1995	22.5%	Nile for Pharmaceuticals & Chemicals	1995	20%
Eastern Co. for Tobacco	1995	20%	Heliopolis for Housing and Development	1995	20%

Source: Hassan, A.W., Stock Exchange and Its role in Achieving the Objectives of Transferring Projects of Business Sector to Private Ownership, Cairo: Dar El-Nahda, 1996, pp. 410-12.

The fourth topic, in this study, is to investigate the market performance of the PIPOs during the period following their initial listing on the Cairo Stock Exchange. In the present topic, the initial returns reported in the previous topic are taken as a background on searching for the attainable returns level over the aftermarket period starting from the first day to the end of the first year of trading in such offerings.

More recently, long-run return evidence for IPOs has been documented. Aggarwal and Rivoli (1990), and Ritter (1991) show that US IPOs significantly underperform in the periods subsequent to listing [Levis (1993)]. Also, Aggarwal; Leal and Hernandez (1993) extend the international evidence on initial public offerings and present the first comprehensive analysis examining new issues in the Latin American countries of Brazil, Chile, and Mexico. The three countries use different issues procedures but show behaviour similar to other major international markets like the U.S. and UK. Also, the Australian findings are consistent with the U.S., UK, and Latin American countries patterns of positive initial returns followed by underperformance [Finn and Higham (1988) and Lee, Taylor and Walter (1996)].

The fifth topic, in this study, involves an investigation of the efficiency of the Egyptian PIPOs in the aftermarket. Since no body believes that markets are strongly efficient, we only test two forms of the Efficient Market Hypothesis (EMH), i.e. the weak-form and the semistrong-form. Under the weak-form of market efficiency all information regarding past price movements is reflected in the current stock price. The weak-form market efficiency can be supported by a confirmation of the random walk theory upon which stock price changes are independent over time [see Levy and Sarnat (1984), and Hudson; Dempsey and Keasey (1996)]. Thus, the return from any initial underpricing should also be independent of subsequent returns [see McDonald and Fisher (1972) and Ibbotson (1975) for early evidence of this observation].

Whilst, the weak-form efficiency tests focus only on information about the past stock prices, the semi-strong form efficiency tests are concerned with all publicly available information, including of course the stock prices. If the market is semistrong efficient, all public announcements, e.g., changes in the annual earnings, changes in the declared cash dividend, changes in the management of the firm, etc., are fully reflected in the stock price [Ball and Brown (1968) and Joy, Litzenberger, and McEnally (1977)].

This thesis has found that excessive returns can be provided when the privatized companies initially went public, thus, purchasing their stock was favourable. Our view is based on the hypothesis that the government tends to underprice securities when pricing a PIPO because of the risk it assumes. Thus, if the issue is priced very conservatively, the government will have no trouble in selling the issue out and recovering its investment. Thus, the approach of this thesis in testing the semistrong form of the efficient market hypothesis would be to test the returns of an investor who acquired the PIPO shortly after it was initially offered and then held the security for various periods.

In the developed capital markets the tests of purchasing new issues showed that excessive returns could be earned if purchases were made at the offering price because of underpricing of the issues by underwriters. However, the markets tend to be efficient because this underpricing is compensated for by the market almost immediately after the issue begins trading. The returns from purchasing after the offering appears to compensate the investor only for the additional risks inherent in such new issues. These results generally support the semistrong form of the efficient market hypothesis [see Ibbotson and Jaffe (1975), Block and Stanley (1980), Ibbotson (1975), Logue (1973), McDonald and Fisher (1972), Neuberger and Hammond (1974), and Fischer and Jordan (1991)].

1.3 Research Strategy

This thesis takes a two-pronged approach to the examination of the price performance of the Egyptian stock market. ***First***, a rather straightforward examination of the normality, volatility, randomness and efficiency of the Egyptian equity market is conducted. Thus, we examine the validity of the normality assumption of daily stock returns on the Egyptian stock market (for a period of 751 days, starting from January 1994 to December 1996). The data are the eleven daily closing indices of the Egyptian Capital Market, namely, the daily price indices of eight sectors (agriculture, mining, construction, manufacturing, transportation, trade, finance, and services), the public subscription index, the closed subscription index, and the general index. In order to test the null hypothesis of normality, we employ the coefficients of skewness and kurtosis, the chi-square test, the Studentized range statistics, the Jarque-Bera (1987) test and the Kolmogrov-Smirnov D-statistic. In examining the volatility of stock returns, we employ both the Autoregressive Conditional Heteroscedastic model (ARCH) proposed by Robert Engle (1982) which provides a convenient framework with which to assess the time-varying variance, and the Generalized ARCH model (GARCH) of Bollerslev (1986), which provides a very long memory form of ARCH process. Then, tests of the random walk hypothesis, at a formal level, are conducted based on the Dickey and Fuller (1979) methodology and the variance-ratio test of Lo and MacKinlay (1988). Finally, we conduct a further investigation concerning the prices rather than the returns using unit root and cointegration techniques to test the concept of static efficiency for individual share price indices. To analyze the situation of the Egyptian equity market among the other emerging stock markets, we use unit root and cointegration techniques. We prefer to use these techniques rather than the international extensions of the CAPM (ICAPM) because testing the latter empirically fails to provide fully satisfactory results, [see, e.g., Levy (1997), Roll (1977), Solnik (1977), and Dumas (1977), Ross (1978), Sharpe (1978), and Logue and Rogalski (1979), for pessimistic discussions about the ICAPM].

Second, the price performance of the privatization sales which represent the main securities traded in the market during the period of study are examined. Therefore, in order to measure the price performance of the PIPOs, we select a sample of 32 Egyptian privatised companies of ordinary shares offered to the public and listed on the Stock Exchange for the first time during the period from January 1994 to December 1996. A number of secondary data sources is accessed. Market prices of all sample after listing are compiled from *'Al-Ahram El-Ektisadi'* (i.e., weekly economic magazine) published in Egypt and Monthly Reports published by the CMA. Using daily data for a whole year of trading might have more non-trading problems in the data than if weekly data were used. Therefore, we use the weekly data for measuring the performance for the whole year to see if there would be any trend formed by the excess return in the first year after listing. Monthly data are not used because: firstly, it would not allow us to state with accuracy the time which the new issues took to conform to the EMH after listing. Secondly, in a volatile market like the Egyptian Capital Market, monthly data might not be the best data to portray the behaviour of share performance.

In order to analyse the performance of IPOs in the initial market, the market-adjusted and risk-adjusted methods are employed in this study. In the market adjusted returns model the returns of new issues are adjusted to the market returns over the same time period. The assumption within this model is that ex ante expected returns are equal across securities for a particular time interval, but not necessarily constant overtime. Moreover, this model takes into account market-wide movements which occur at the time of the event being studied. Obviously, the market adjusted returns model lacks the introduction of risk measurement in the analysis. Using the Market and Risk Adjusted Returns method, we examine the sensitivity of the introduction of risk in analysing returns of the IPOs. In the risk-adjusted method, the mean excess returns would be measured using the RATS[1] model which originally developed by Ibbotson (1975), then by Warner (1977), and finally by Clarkson and Thompson (1990) and employed by Keloharju (1993) as a proposed cross-sectional estimation technique for a portfolio of securities separated in time. The RATS model was first formulated by Ibbotson (1975) based on the two-parameter model of CAPM of Sharpe (1964) and Lintner (1965).

To measure the systematic risk of the Egyptian PIPOs, we employ the portfolio approach. However, it is claimed that estimating systematic risk is difficult because the systematic risk of each investment is based on the covariance of two unobservable variables, the expected return from an investment and the expected return from the market portfolio. Therefore, we assume a stable relation over time, the covariance between the expected returns from an IPO and the expected returns

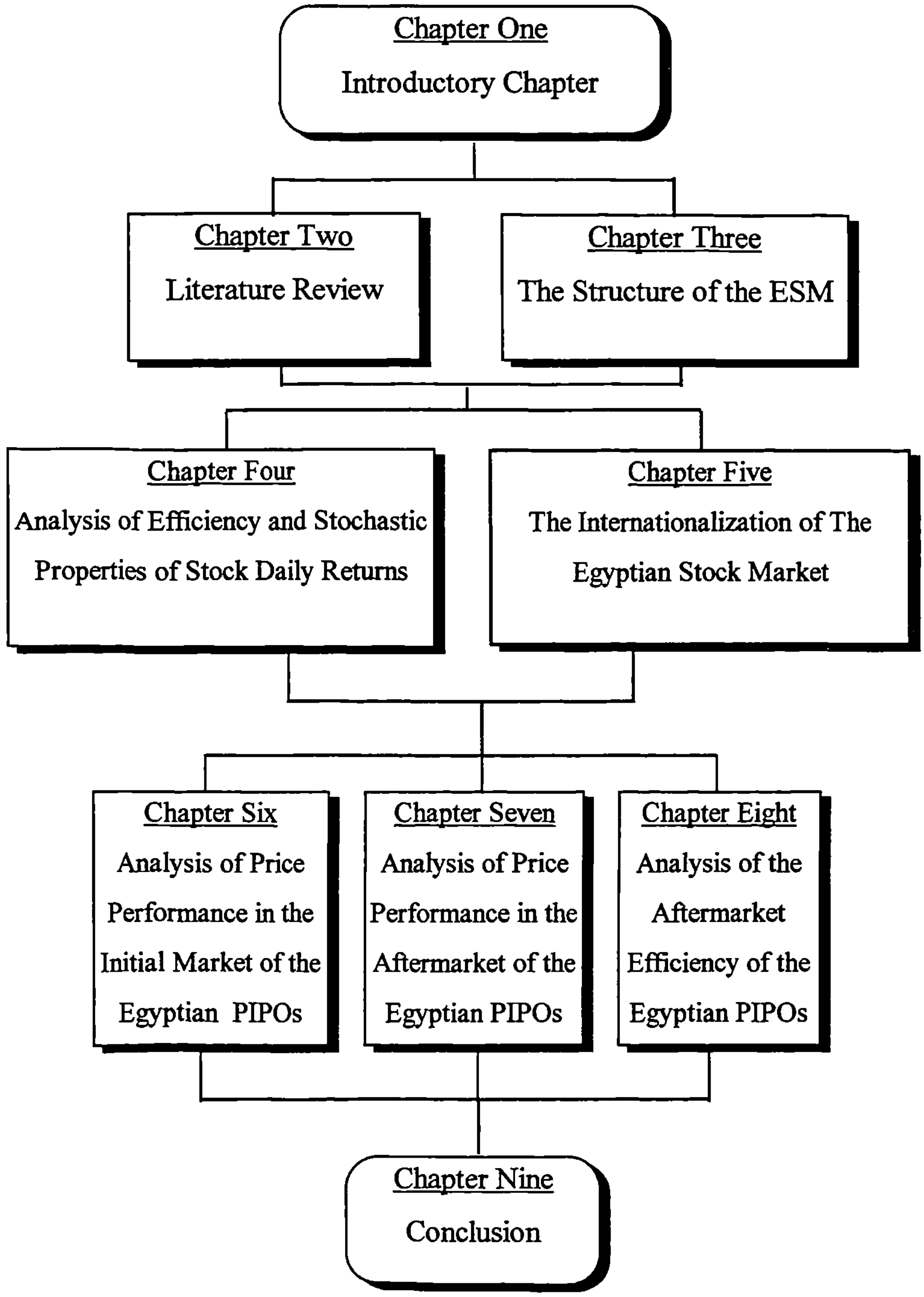
[1] Since Ibbotson combined returns across time and securities, the model is designated as RATS.

from the market portfolio can be estimated using recent actual returns. To do this, the historical returns from the IPO are regressed on the historical returns from the market portfolio. The resulting slope coefficient is the estimate of that firm's beta or systematic risk.

1.4 ORGANIZATION OF THE THESIS

In carrying out the objectives of this thesis, nine chapters of analysis are presented. A framework of this structure is illustrated in figure 1.2. The first chapter clarifies an introduction within which the objectives, importance, research philosophy and plan, research strategy and analytical approach and organization of the thesis are provided. Chapter two then provides the contextual framework for this thesis by investigating the literature relevant to both the underpricing phenomenon and the secondary market performance in the IPOs. In Chapter Three, a detailed review of the Egyptian Capital Market is presented. First, in Section 3.1, a historical sequence of the events and legislative actions which have had a meaningful relation with the activities of the Egyptian capital market are outlined. Based on this background, Section 3.2 examines the microstructure of the Egyptian Stock Exchange (ESE). In the latter we analyze several issues including: the trading system, the trading procedure (i.e., placing orders, types of orders, transmitting orders, execution of orders, price determination, and the participants), Egyptian stock market indices, the mechanism of making a new issue on the ESE, and the price mechanism of the Egyptian PIPOs market. Finally, Section 3.3 provides a summary and conclusion of the findings provided in the other sections. Chapter four analyzes the time series properties of the Egyptian stock market. In Section 4.1, we give some stylised facts about our stock returns data, and compare the empirical distribution with the normal distribution. In Section 4.2, using a GARCH model, we examine the volatility of stock returns. Section 4.3 deals with the assumption of stationarity against the random walk alternative. In Section 4.5, we address the efficiency issue using the recently developed cointegration procedure. In Section 4.4 we summarise our results. Chapter five investigates the internationalization of the Egyptian equity market. Section 5.1 outlines the situation of the Egyptian stock market within the context of the Middle Eastern region. Sections 5.2 and 5.3 provide a brief discussion of data and methodology, respectively. Then Section 5.4 reports the main results. Concluding remarks are stated in Section 5.5. Chapter six examines the underpricing phenomenon in the Egyptian PIPOs market. In carrying out this objective, we present two return series. The first is the series of market adjusted returns. The second series of returns attempts to control for risk of unseasoned new issues using a method similar to the RATS (returns across time and securities). In chapter seven, the initial returns reported in chapter five are taken as a background on searching for the attainable returns level over the secondary market period starting from the first day to the end of the first year of trading in such offerings. Chapter eight examines two forms of the Efficient Market Hypothesis (EMH), i.e. the weak-form and the semistrong-form. In testing the weak-form of the EMH, we employed two broad groups of tests: parametric tests (regression analysis) and non-parametric tests (runs test). For the semistrong-form, we employed two models. The first is the market-adjusted returns model. The second model attempts to control for risk of the IPOs using a method similar to the RATS model. Then chapter nine presents conclusions generated from the empirical chapters. In this chapter, the main findings discussed in our analysis are highlighted. Finally, a summary, recommendations and directions for further research in the area of PIPOs stock prices are considered in chapter eight.

Figure 1-2: Framework for the Structure of the Thesis



CHAPTER TWO

A REVIEW OF THE LITERATURE ON THE PRICE PERFORMANCE OF IPOs

2.0 INTRODUCTION

The objective of this chapter is to survey two empirical regularities for the initial public offerings (IPOs): (1) short-run underpricing, and (2) long-run overpricing. The short-run underpricing refers to the pattern of positive average initial returns. This initial return is defined as the percentage price change from the offering price to the closing price on the first day of trading. While the long-run overpricing refers to the pattern of lower returns on IPOs than for comparable firms for several periods following the offer.

In carrying out the literature survey, two sections of analysis are considered. First, a survey of prior studies examining the degree and determinants of the level of underpricing in initial public offerings is provided in section 2.1. In constructing this section, we investigate the levels of underpricing, measurement methods and time intervals reported in prior studies. Then, explanations of initial performance reported are discussed.

Following this, the literature relevant to the aftermarket performance in IPOs is analysed. In this analysis we conduct a review of prior studies, covering a range of IPOs across markets, time periods and sample sizes. Finally, explanations of the aftermarket performance of IPOs are made.

2.1 A SURVEY OF INITIAL RETURNS

2.1.1 LEVELS, MEASURING AND TIME INTERVALS OF INITIAL RETURNS

2.1.1.1 Levels of Initial Returns Reported in Prior Studies

In this section, a wide range of underpricing levels is reported. For instance, for the U.S., table 2.1 illustrates average initial returns from 3.17 % in Ng and Smith (1996) to levels of 48.4 % are recorded in Ritter (1984). However, table 2.2 shows a better consistency in initial returns levels for the UK. This observation may be due, in part, to the limited number of studies available for analysis in the UK. Later in this chapter, we clarify that the UK evidence sheds light on a number of issues left unresolved by the U.S. studies.

Table 2.3 illustrates limited evidence for Australia; Canada; Finland; France; Germany; Japan; Netherlands; and Switzerland, indicating initial returns from the underpricing of IPOs similar to those reported for securities in the U.S. and UK. In addition, table 2.4 shows evidence of underpricing for unseasoned stock securities for newly industrialised and developing countries (i.e., Hong Kong, Malaysia, Singapore, Thailand, Brazil, Chile, and Mexico). Likewise, in table 2.4 the findings are consistent with U.S. and UK patterns of positive initial returns. Having known the levels of underpricing, it can be noted that IPOs produce meaningful positive returns in early trading for those investors beneficial enough to be allocated shares in such securities. In that case, for the purpose of this thesis, it is important to analyze the measurement methods of this initial returns. Thus, the following section outlines such methods.

Table 2-1 Summary Review of Levels of Returns in the U.S.A Market of IPOs

Author(s)	Year	No. of IPOs	Study Period	Average Initial Return (%)
Reilly and Hatfield	1969	53	1963-65	9.6
Bear and Curley	1970	140	1969	12.9
Stoll and Curley	1970	205	1957-63	42.4
McDonald and Fisher	1972	142	1969	28.5
Logue	1973	250	1965-69	41.7
Reilly	1973	53	1963-65	9.6
Reilly	1973	62	1966	9.9
Neuberger and Hammond	1974	816	1965-69	17.0
Ibbotson	1975	112	1960-69	12.8
Ibbotson and Jaffe	1975	128	1960-70	16.8
Reilly	1977	486	1972-75	10.9
Block and Stanley	1980	102	1974-78	6.0
Neuberger and LacChapelle	1983	118	1975-80	27.7
Ritter (a)	1984	1028	1977-82	26.5
Ritter (b)	1984	325	1980-81	48.4
Beatty and Ritter	1986	545	1981-82	14.1
Chalk and Peavy	1987	649	1975-82	21.7
Miller and Reilly	1987	510	1982-83	9.9
Balvers et al.,	1988	1182	1981-85	7.8
Tinic	1988	134	1966-71	11.1
Johanson and Miller	1988	962	1981-83	10.5
Beatty	1989	2215	1975-84	22.1
Muscarella and Vetsuypens	1989	38	1970-87	7.1
Jenkinson	1990	1322	1985-88	10.4
Aggarwal and Rivoli	1990	1598	1977-87	10.7
Carter and Manaster	1990	501	1979-83	16.18
Ritter	1991	1522	1975-84	14.3
Barry et al.,	1991	723	1983-87	7.38
Drake and Vetsuypens	1993	93	1969-90	9.18
Barry and Jennings	1993	229	1988-90	6.78
Hanley et al.,	1993	1523	1982-87	9.61
Garfinkel	1993	549	1980-83	10.2
Slovin et al.,	1994	175	1973-88	12.1
Clarkson	1994	420	1976-85	13.93
Schultz and Zaman	1994	72	1992	3.9
Alli et al.,	1994	185	1983-87	5.28
Dunbar	1995	480	1980-83	16.8
Ng and Smith	1996	1991	1981-88	3.17*
Ng and Smith	1996	1991	1981-88	0.7*

* 3.17 % with warrant compensation 0.7 without warrant compensation.

Table 2-2 Summary Review of Levels of Returns in the UK Market of IPOs

Author(s)	Year	No. of IPOs	Study Period	Average Initial Return (%)
Merritt, et al.,	1967	149	1959-63	13.7
Davis and Yeomans	1976	275	1965-71	10.6
Buckland et al.,	1981	297	1965-75	9.7
Jenkinson and Mayer	1988	20	1979-87	22.2
Jenkinson	1990	197	1985-88	12.2
Levis	1990	123	1985-88	8.6
Levis	1993	712	1980-88	14.3
Menyah et al.,	1995	40	1981-91	23.6*

* privatisation sales.

Table 2-3 Summary Review of Levels of Returns in Other Developed Markets of IPOs

Market:	Author(s)	Year	No. of IPOs	Study Period	Average Initial Return (%)
Australia	Finn and Higham	1988	93	1966-78	29.2
Australia	Lee et al.,	1996	266	1976-89	11.86
Canada	Jog and Riding	1987	100	1971-83	11.0
Canada	Cheung and Krinsky	1994	N/A	1982-88	6.8
Finland	Keloharju	1993	79	1984-89	8.6
France	McDonald and Jacquillat	1974	31	1968-71	3.0
France	Jacquillat et al.,	1978	60	1966-74	5.2
France	Jenkinson and Mayer	1988	11	1986-87	25.1
France	Husson and Jacquillat	1990	131	1983-86	4.0
Germany	Uhlir	1989	97	1977-87	25.1
Japan	Dawson and Hiraki	1985	106	1979-84	51.9
Japan	Jenkinson	1990	22	1986-88	19.7
Japan	Kunimura and Severn	1990	551	1969-80	1.42
Netherlands	Wessels	1989	46	1982-87	5.1
Switzerland	Kunz and Aggarwal	1993	42	1983-89	35.8

N/A = not available.

Table 2-4 Summary Review of Levels of Returns in Newly industrialised and Developing Countries

Market:	Author(s)	Year	No. of IPOs	Study Period	Average Initial Return (%)
Hong Kong	Dawson and Hiraki	1985	31	1979-84	10.9
Hong Kong	Dawson	1987	21	1978-83	13.8
Korea	Kim and Lee	1990	41	1984-86	37.0
Korea	Krinsky et al.,	1992	275	1985-90	79.0
Malaysia	Dawson	1987	21	1978-83	166.6
Singapore	Wong and Chiang	1986	48	1975-84	56.0
Singapore	Dawson	1987	39	1978-83	38.4
Singapore	Koh and Walter	1989	70	1973-87	27.0
Thailand	Wethyavivorn and Koo-Smith	1991	32	1988-89	68.69
Latin American Countries					
Brazil	Aggarwal et al.,	1993	62	1980-90	78.5
Mexico	Aggarwal et al.,	1993	44	1987-90	2.8
Chile	Aggarwal et al.,	1993	21	1982-90	16.3 **
Chile	Aggarwal et al.,	1993	36	1982-90	7.6**

** 16.3 % (full sample) and 7.6 % (privatisation sample = 21).. [a] 6th month.

2.1.1.2 Measurement Methods of Initial Returns Reported in Prior Studies

Essentially, two methods are found to be employed in the measurement of initial performance of IPOs, namely:

1. Market-Adjusted Returns Model, and
2. Risk-Adjusted Returns Method.

First, a large number of studies, such as Finn and Higham (1988), Ritter (1991), Kelokarju (1993), Levis (1993), Aggarwal; Leal and Hernandez (1993), and Lee; Taylor and Walter (1996), employed the market-adjusted returns measure,

$$AR_{it} = R_{it} - R_{mt}$$

where AR_{it} is the market-adjusted excess return of stock i in period t, R_{it} is the raw return of stock i in period t, and R_{mt} is the market portfolio return in the same time period. That is, the returns are adjusted to the market returns over the same time period. In analysing this model, some features can be clarified as follows:

- It calculates the ex post abnormal return on any security as the difference between its return and that on the market portfolio.
- It assumes that ex ante expected returns are equal across securities for a particular time interval, but not necessarily constant overtime.
- It takes into account market-wide movements that occur at the time of the event being studied.
- It assumes that the systematic risk of each security in the sample is one. That is true only if we believe that systematic risk is rewarded.

The last feature of this model implies the lack of the introduction of risk measurement in the analysis. Alternatively, some studies thus employ the risk-adjusted returns method in measuring the price performance of the IPOs. In the latter, the sensitivity of the introduction of risk in analysing returns of the IPOs is examined.

In the risk-adjusted method, the mean excess returns could be measured using the RATS[1] model. This model was originally developed by Ibbotson (1975), then by Warner (1977), and finally by Clarkson and Thompson (1990) and employed by Keloharju (1993) and others, as a proposed cross-sectional estimation technique for a portfolio of securities separated in time.

The RATS model was first formulated by Ibbotson (1975) based on the two-parameter model of the CAPM of Sharpe (1964) and Lintner (1965). The latter was derived as the equilibrium implications of investors using a mean-variance approach to portfolio construction. The two-parameter model is expressed algebraically in the first equation of the work of Ibbotson (1975) as:

$$E(\tilde{R}_j) = E(\tilde{\gamma}_0) + [E(\tilde{R}_m) - E(\tilde{\gamma}_0)]\beta_j \tag{1}$$

Where,

$E(\tilde{R}_j)$ is the expected return on any asset j;

$E(\tilde{R}_m)$ is the expected return on the market portfolio;

$E(\tilde{\gamma}_0)$ is interpreted as the expected return on any security whose return is uncorrelated with $\tilde{R}_m$; and

$$\beta_j = \frac{Cov(\tilde{R}_j, \tilde{R}_m)}{\sigma^2(\tilde{R}_m)},$$

[1] Since Ibbotson combined returns across time and securities, the model is designated as RATS.

Ibbotson (1975) assumes that a linear relationship exists between asset returns $\tilde{R}_j$, $\tilde{\gamma}_0$ and $\tilde{R}_m$, and he restated eq. (1) as:

$$\tilde{R}_j = \alpha_j + \beta_{j,0}\tilde{\gamma}_0 + \beta_{j,m}\tilde{R}_m + \tilde{e}_j, \tag{2}$$

where

$$\beta_{j,m} = \frac{Cov(\tilde{R}_j, \tilde{R}_m)}{\sigma^2(\tilde{R}_m)} = \beta_j,$$

$$\beta_{j,0} = \frac{Cov(\tilde{\gamma}_0, \tilde{R}_m)}{\sigma^2(\tilde{R}_m)} = 1 - \beta_j, \text{ and}$$

$\tilde{e}_j$ is the stochastic disturbance term for asset j.

Rearranging eq. (2) into excess return form and making use of period-by-period returns by adding the subscript t, Ibbotson obtained

$$(\tilde{R}_{j,t} - \tilde{\gamma}_{0,t}) = \alpha_j + \beta_j(\tilde{R}_{m,t} - \tilde{\gamma}_{0,t}) + \tilde{e}_{j,t}. \tag{3}$$

and he formulated the conditional expectation of eq. (3) as

$$E(\tilde{R}_{j,t} - \gamma_{0,t} \,|\, \tilde{R}_{m,t} - \tilde{\gamma}_{0,t}) = \alpha_j + \beta_j(\tilde{R}_{m,t} - \gamma_{0,t}).$$

According to Ibbotson (1975):-

- The market equilibrium model described by eq. (1) says that $\alpha_j = 0$ for all j.
- Estimates of α_j in eq. (3) provide measures of 'abnormal performance' of new securities.

Hence, the two-factor model was used by Ibbotson to model returns across time and securities (RATS). That is, he formulated the following RATS regression model for general class of one-stock portfolio regressions:

$$(\tilde{R}_{j,n} - \tilde{\gamma}_0) = \alpha_n + \beta_{n,0}(\tilde{R}_m - \tilde{\gamma}_0) + \beta_{n,-1}(\tilde{R}_{m,-1} - \tilde{\gamma}_{0,-1}) + \tilde{E}_{j,n} \tag{4}$$

where

n is the month of seasoning, which is held constant in each regression;

$\tilde{R}_{j,n}$ is the return of security j during the nth month of seasoning;

α_n is the regression constant that is the average return in excess of the returns implied by the equilibrium relationship described in eq.(1) (α_n will serve as a measure of abnormal performance);

$\beta_{n,0}$ is the regression coefficient for the unlagged independent variable;

$\beta_{n,-1}$ is the regression coefficient for the independent variable lagged one month;

$\tilde{R}_m, \tilde{\gamma}_0$ are measured during the same calendar month as $\tilde{R}_{j,n}$ for the unlagged independent variable $((\tilde{R}_m - \tilde{\gamma}_0)$, and measured in the previous calendar month for the lagged independent variable $(\tilde{R}_{m,-1} - \tilde{\gamma}_{0,-1})$;

$\tilde{E}_{j,n}$ is the stochastic disturbance term for asset j during the nth month of seasoning.

In analysing the RATS model defined in eq. 4, some features can be shown as follows:

- It assumes that the addition of the lagged independent variable is useful in reflecting part of a stock's actual return for any month in the next month's measured return[2].
- It assumes that the addition of the lagged independent variable does not affect the statistical properties of the model and may reduce the residual variation.
- It assumes that multicollinearity is difficult to be found since returns from the market portfolio are independent from month to month.

---

[2] Ibbotson examined the lack of timeliness of quotes by running the RATS regression model of eq. (4) including various lag terms in the independent variable. His preliminary results indicated that only the first lag is important.

- The true beta, b_n, is assumed to be approximately equal to the sum of the lagged and unlagged betas, $b_n \cong \beta_{n,0} + \beta_{n,-1}$.
- It has a particular advantage of allowing for the contingency that the systematic risk of new securities may change as the securities become seasoned.
- It is not a direct transformation of the two-parameter model described in eq. (3).
- Unlike the $\tilde{R}_{j,t}$ in eq. (3), the $\tilde{R}_{j,n}$ in eq. (4) are drawn from distributions exhibiting differing systematic and unsystematic risks because a different security *j* is in the portfolio each month. Thus, the true β_n in eq. (4) is not fixed but has a different value, β_j , for each asset *j*.

Despite these benefits of examining time independence securities in the RATS approach, Ibbotson (1975) notes that the significance of initial returns, and the broad findings for aftermarket efficiency, would probably be revealed by less complex risk-adjusted approaches. This view is also apparent in Jacquillat, McDonald and Rolfo (1978), and Finn and Higham (1988), where RATS approaches to the measurement of aftermarket returns in France and Australia respectively are found.

2.1.1.3 Time Intervals Reported in Prior Studies

For the time intervals of calculating excess returns, the survey revealed that a number of different time intervals were used. The calculation was performed over the period between the initial offering day and the close of trading on the first day of listing, such as:

- Levis (1990), Levis (1993), and Menyah et al., (1995) in the analysis of UK offerings;

- Stoll and Curley (1970), McDonald and Fisher (1972), Chalk and Peavy (1987), Miller and Reilly, and Muscarella and Vetsuypens (1989), Drake and Vetsuypens (1993), Garfinkel (1993), Hanley et al., (1993), Alli et al., (1994), Clarkson (1994), Slovin et al., (1994), Schultz and Zaman (1994), Dunbar (1995) and Ng and Smith (1996) for U.S. offerings;
- McDonald and Jacquillat (1974) for France securities; Jog and Riding (1987), and Cheung and Krinsky (1994) for Canadian securities; Finn and Higham (1988), and Lee et al., (1996) for Australian securities;
- Wong and Chiang (1986) and Dawson (1987) for Pacific Basin offerings; and
- Aggarwal et al., (1993) for Latin American offerings.

Also, excess returns was measured over the period between the initial offering day and the close of trading at the end of the first week of listing, [see e.g., Neuberger and LaChapelle (1983) and Tinic (1988) for the U.S., and Cheung and Krinsky (1994) for Canadian securities]. Moreover, excess market returns were measured over the period between the initial offering of shares and the closing trading date one month after listing [see Logue (1973) and Ibbotson and Jaffe (1975) for the U.S.; and Kunimura and Severn (1990) for Japanese offerings].

2.1.2 Explanations of the Short-Run Underpricing Reported in Prior Studies

In addition to positive initial returns found in the previous studies, a number of internal and external factors which increase or decrease the underpricing range are reported. That is, underpricing is found to be:

- inversely related to the size of new issue of security [Louge and Lindvall (1974), Hess and Frost (1982), Ritter (1987), and Hanley (1993)];
- positively related to the issues with higher risk [Beatty and Ritter (1986),Wasserfallen and Wittleder (1994), Barry, Muscarella and Vetsuypens (1991)];
- positively related to legal liabilities arising from any false or inadequate information in the prospectus (for misrepresenting the true value of the firm) [Ibbotson (1975), Tinic (1988), and Keloharju (1993)];
- negatively related to the size of the firm [Tinic (1988), Alexander (1991), Drake and Vetsuypens (1993)];
- negatively related to the firm's age that is positively related to the price [Barry, Muscarella and Vetsuypens (1991)];
- negatively related to the quality of a firm [Welch (1989), Ruud (1993), and Jain (1996)];
- larger in privatisation sales than in initial public offerings of private firms (this is due to greater policy risk and asymmetric information over asset values) [e.g. Perotti and Guney (1993)];

- positively related to the uncertainty of the market demand for the issue [Baron (1982)];
- inversely related to the market share of the investment banker [Smith (1986), Booth and Smith (1986), Beatty and Ritter (1986), Ritter (1987), Carter and Manaster (1990), and Jain (1994)]; and
- inversely related to the use of warrants compensation, because the choice of these non-cash forms of compensation reduces the expected underpricing costs by diminishing the adverse-selection problem faced by uninformed investors [Muscarella and Vetsuypens (1991), Jain (1994), Chua (1995), and Dunbar(1995)].

As a result, many hypotheses have been introduced to explain the underpricing phenomenon. Some of such hypotheses are:

1. The inaccurate pricing hypothesis;
2. The winner's curse hypothesis;
3. The risk-averse-underwriter hypothesis;
4. The baron’s (1982) information asymmetries hypothesis;
5. The investment banker's monopsony power hypothesis;
6. The certification hypothesis;
7. The auditor selection hypothesis;
8. The lawsuit avoidance hypothesis;
9. The costly information acquisition hypothesis;
10. The wealth redistribution hypothesis;
11. The signalling hypothesis;

12. The stablization hypothesis;

13. The cascades hypothesis; and

14. The speculative-bubble hypothesis.

Each of these hypotheses is discussed as follows:

2.1.2.1 The Inaccurate Pricing Hypothesis

This hypothesis is related to the study of Merritt, Howe and Newbould (1967). They investigated the London new issue market for the period 1959-63. It is in this investigation, it is argued that inaccurate pricing, where it can be identified, must be considered as part of the cost of making an issue along with the more obvious administrative costs (i.e., underwriting commission, Stock Exchange quotation fees, capital duties, printing and advertising, administration of allotments, brokerage, brokers' and legal fees, reporting accountants' fees, etc.).

In their analysis, Merritt, Howe and Newbould (1967), found that some part of the cost of inaccurate pricing can be avoided. They argued that if the price of an issue proves to be less than some subsequent market price and that the discount on that market price could be avoided or at least reduced, then the avoidable discount represents a loss to the issuing company (i.e., the existing shareholders). In their view, this loss is considered as a part of the costs of the issue along with the more conventional costs stated above. Merritt, Howe and Newbould (1967) have termed the total discount the 'market discount' and any necessary discount to float the issue the 'introductory discount', although the analysis is largely in terms of total market discount.

In the work of Merritt, Howe and Newbould (1967), the inclusion of market discount in the issue costs was an innovation in studies of the new issue market. From that time, the literature has produced a variety of theories which intend to explain the observed market discount (i.e., underpricing) in initial public offerings. However, a given reason can be more important for some IPOs than for others.

2.1.2.2 The Winner's Curse Hypothesis

An important interpretation for underpricing phenomenon is offered in Rock's (1986) model. In this model, the underpricing is assumed to emerge because of an informational asymmetry between a group of informed investors and a less informed issuing firm. At first, Rock's (1986) model considers a market in which there are two assets available for investment:

1. A safe asset whose return is normalised to 1.
2. An asset whose value per share, $\tilde{v}$, is uncertain.

It is the latter asset that is being issued. In issuing such asset, the issuer selects an offer price, *p*, and offer quantity, *Z* shares, taking in his account that it is not allowed to make any re-adjustment of price or quantity.

In Rock's (1986) model, it is assumed that if oversubscription occurs, it results exclusively from large orders placed by investors who are well informed about the prospects of the offerings. Rock (1986) calls this segment of the market 'informed'. All other investors, in addition to the issuer, are called 'uninformed'. Thus, Rock (1986, p. 190) assumes:

> 'A.1. The informed investors have perfect information about realised value of the new issue...
>
> A.2. Informed investors cannot borrow securities or short-sell. They cannot sell their private information'.

A.3. Informed demand, I, is no greater than the mean value of the shares offered, $\tilde{v}Z$.

A.4. Uninformed investors have homogenous expectations about the distribution of $\tilde{v}$.

A.5. All investors have the same wealth (equal to 1) and the same utility'.

Accordingly, Rock (1986) reports that:

- By A1, the informed investors place orders for the new shares whenever the realised value per share, $\tilde{v}$, exceeds the offer price, p;
- By A2 the informed investors order to the full extent of their wealth (equal to 1);
- By A.3, when the informed investors order, they order a constant amount of money:

$$\begin{array}{l} I \text{ if } p < \tilde{v}, \\ 0 \text{ if } p > \tilde{v}; \end{array}$$

- The uninformed, who are N in number, cannot predicate the size of their order upon the realisation of $\tilde{v}$;
- By A.4 and A.5, each uninformed investor wants to submit the same fraction, T, of his wealth (equal to 1) for the new issue; and
- since short-selling is impossible, each investor submits the positive share $T^* =$ Max $(0,T)$.

Then, Rock (1986) combines the demand of both the informed and uninformed investors as:

$$\begin{array}{l} NT^* + I \ \textit{if} \ p < \tilde{v}, \\ NT^* \ \textit{if} \ p > \tilde{v}. \end{array}$$

Because the demand fluctuates according to whether $\tilde{v}$ is above or below p, the issuer must experience either excess supply or excess demand in one of the two states:

1. In the state $\tilde{v} > p$, the probability that an order is filled be denoted *b; and*
2. If $\tilde{v} < p$, designate the probability b'.

To relate these probabilities (i.e., b and b') to fundamental magnitudes, Rock (1986) devises the following mechanism for allocating rationed shares:

1. The incoming orders are assigned a lottery number upon arrival.
2. These numbers drawn at random, and the corresponding orders are filled in their entirety.
3. The drawings finish when there are either no more orders or no more shares.

Under this scheme, the probability that an order is filled is independent of its size, as implicitly assumed in the definition of b and b'. If rationing occurs, the value of the issue equals the value of the orders filled, plus some excess if the last order chosen cannot be totally accommodated. Upon ignoring the small 'round-off' error, Rock (1986) has

$$\tilde{N}_u T^* + \tilde{N}_i = pZ \quad \text{if} \quad \text{b} < 1$$

where $\tilde{N}_u$ is the number of uninformed orders filled and $\tilde{N}_i$ is the informed orders filled. Taking expressions,

$$bNT^* + bI = pZ \quad if \; b < 1$$

or

$$b = \min\left(\frac{\text{pZ}}{\text{NT}^* + \text{I}}, 1\right),$$

similarly,

$$b' = \min(\frac{pZ}{NT*}, 1),$$

In this model, it is very important to notice that $b < b$`, which says directly that the probability of receiving an allocation of underpriced issue ($\tilde{v} > p$) is less than or equal to the probability of receiving an allocation of an overpriced issue ($\tilde{v} < p$). Assuming that the uninformed investors base the decision of investment upon their prior beliefs regarding b and b`, their valuation of the new shares is revised downward.

As a result, in attracting uninformed investors to the offering, the issuer must price the shares at a discount, which interpreted as compensation for receiving a disproportionate number of overpriced stocks.

In the Rock's (1986) model, in order to emphasise that prior expectations are involved, b and b` are subscripted by '*e*'. Uninformed investors calculate T by maximising their expected utility of terminal wealth.

Table 2-5 presents the investor's terminal wealth as a function of the aftermarket value of the new issue and the probability of receiving an allocation. In Table 2-5, if an investor submits an order that is not transacted because of rationing, the order is transformed into an equal dollar amount of safe asset. From this table, Rock formulates the expected terminal utility for the uninformed investor as follows:

$$b_e p(\tilde{v} > p)\, E[U(1 + T(p^{-1}\tilde{v} - 1)) \mid \tilde{v} > p]$$

$$+\, b_e`p(\tilde{v} \leq p)\, E[U(1 + T(p^{-1}\tilde{v} - 1)) \mid \tilde{v} \leq p]$$

$$+\, [1 - b_e p(\tilde{v} > p) - b_e`p(\tilde{v} \leq p)]\, U(1).$$

Table 2-5 Terminal wealth of investor as a function of the aftermarket value of the new issue and the probability of obtaining an allocation[a]

	Aftermarket value[b]			
	$\tilde{v} > p$, (underpriced)		$\tilde{v} < p$ (overpriced)	
Allocation	yes	no	yes	no
Wealth	$p^{-1}\tilde{v}T + (1-T)$	1	$p^{-1}\tilde{v}T + (1-T)$	1
Probability	$b_e p(\tilde{v} > p)$	$(1 - be)\, p\, (\tilde{v} > p)$	$b_e' p(\tilde{v} < p)$	$(1 - b_e')\, p\, (\tilde{v} < p)$

[a] Source: Rock (1986, p. 193).

[b] Aftermarket value is the price, v, realised on the first trade; the aftermarket price differs from the offering price, p, according to whether the issue is underpriced ($v > p$) or overpriced ($v < p$). The probability of these two events from the viewpoint of the uninformed investors is denoted $p(v > p)$ and $p(v < p)$, respectively. Given the issue is underpriced, the probability of an allocation is b_e; given the issue is overpriced, the probability of an allocation is b_e'. The uninformed investor has unit wealth initially, and chooses a fraction, T, to invest in the new issue.

And he forms the optimal *T that* satisfies the first-order condition as:

$$(b_e / b_e')\, p(\tilde{v} > p)\, E[U'(1 + T(p^{-1}\tilde{v} - 1))\,(p^{-1}\tilde{v} - 1) \mid \tilde{v} > p]$$

$$+ p(\tilde{v} \leq p)\, E[U'(1 + T\,(p^{-1}\tilde{v} - 1))\,(p^{-1}\tilde{v} - 1) \mid \tilde{v} \leq p) = 0.$$

Rock (1986) suggests that as far as the investor is concerned, it is not rationing *per se* that lowers his estimate of the value of the offering when he obtains an allocation. According to Rock, If rationing occurs to the same degree for both underpriced and overpriced issues, uninformed demand is the same as if there is no rationing. Rather, it is the bias in rationing good issues relative to bad issues that is important, the bias being measured by the ratio (b_e / b_e') in the optimality condition.

Thus, the complete equilibrium is represented in equations (4), (5), and (6) in the work of Rock (1986, p.194) as follows:

$$b = \min\left(\frac{pZ}{NT^*(b/b', p + I)}, 1\right), \tag{4}$$

$$b' = \min\left(\frac{pZ}{NT^*(b/b', p)}, 1\right), \tag{5}$$

$$0 = (b_e / b_e') \, p(\tilde{\nu} > p) \, E[U'(1 + T(p^{-1}\tilde{\nu} - 1))(p^{-1}\tilde{\nu} - 1) \mid \tilde{\nu} > p]$$

$$+ \, p(\tilde{\nu} \leq p) \, E[U'(1 + T(p^{-1}\tilde{\nu} - 1))(p^{-1}\tilde{\nu} - 1) \mid \tilde{\nu} \leq p), \qquad (6)$$

$$T^{*}(b_e / b_e', p) = max\,(0, T(b_e / b_e', p)).$$

In this model, investors who become informed only submit a purchase order if $\tilde{\nu} > p$ (i.e., the offering price is less than the true value of the stock). Where the true value is less than offering price, only uninformed investors are assumed to submit purchase orders and to be allocated the whole quantity of the issue.

For underpriced securities ($\tilde{\nu} > p$), both informed and uninformed investors will submit orders to purchase the new issue and shares will be rationed between the two groups. Rationing occurs because the offering price of the issue is fixed through a firm-commitment contract with the investment banker so that any excess demand for the stocks leads to quantity adjustments or rationing.

The investment banker is then accountable for selling any unsold shares in the aftermarket and receives a payment for his services. As a result, it is quite possible for uninformed investors to encounter what is called a 'winner's curse' because they have a greater risk of being allocated securities in overpriced or/ less underpriced issues.

2.1.2.3 The Risk-Averse-Underwriter Hypothesis

Numerous studies, [e.g., Beatty and Ritter (1986) and Koh and Walter (1989)], have attempted to test Rock's winner's curse model, both for the U.S. and other countries. A cross-sectional implication of the model, developed in Beatty and Ritter (1986), is that riskier issues should have greater underpricing, on average. Beatty and Ritter (1986) argue that there is an equilibrium relation between the expected underpricing of an IPO and the ex ante uncertainty about its value. They also argue that this underpricing equilibrium is enforced by the investment banking industry. They present empirical evidence supporting their propositions. Their results are based on the fact that, while many IPOs shoot up in price, many other issues decline in price once they start trading.

As a result, even though on an average IPOs are underpriced, an investor submitting a purchase order cannot be certain about an offering's value. Beatty and Ritter (1986), call this uncertainty about the value per share 'ex ante uncertainty'. They argue that the greater is the level of ex-ante uncertainty about the value of an issue, the greater is the anticipated level of underpricing.

In order to test whether there is a positive relation between initial return and ex ante uncertainty, Beatty and Ritter (1986) regress initial return on two proxies for ex ante uncertainty:

1. the log of 1 plus the number of uses of proceeds, and
2. the reciprocal of the gross proceeds expressed in terms of 1982 purchasing power.

Table 2.6 shows the results of their study, where the positive coefficients on these variables indicate that investors interpret these measures as positively correlated with ex ante uncertainty. The coefficient of 83,578 on the inverse of gross proceeds indicates that smaller offerings, ceteris paribus, have substantially higher average initial returns. Beatty and Ritter (1986) interpret the results in table 2-6 as showing that there is a positive relation between ex ante uncertainty and expected underpricing. In table 2-6, it worth nothing that the R^2 is quite low at 0.07. Beatty and

Ritter (1986) comment that this is as it should be. If the R^2 was high, it would imply that the actual initial return on an offering is predictable.

Table 2-6 Weighted least squares regression results with initial return as the dependent variable .[a]

Constant	Log(1 + number of uses of proceeds)	Reciprocal of gross proceeds	R^2
-0.0268 (0.0360)	0.0691 (0.0209)	83,578 (18,561)	0.07

Source: Beatty and Ritter: (1986, p. 223).
a Standard error in the parentheses. The sample is composed of all 545 underwritten S.E.C.-registered initial public offerings from April 1981 to December 1982. The weighting factor is the log [1000 + sales], where sale is the most recent 12-month revenues for the issuing firm expressed in terms of 1982 purchasing power. The means of the variables are: 13.25 for the weighting factor, 1.74 for the log of one plus the number of uses of proceeds and 0.000000423 for the reciprocal of gross proceeds. Gross proceeds are measured in dollars of 1982 purchasing power. The average initial return is 0.141 per cent.

The results of Beatty and Ritter (1986) lead to a popular explanation for underpricing based on risk aversion of underwriters. That is, investment bankers purposely underprice new common stocks to reduce their risks and costs of underwriting. In other words, underpricing serves as a method of reducing the chances of ending up with an unsuccessful issue and the associated loses.

Although it may have some superficial appeal, this explanation is not very satisfactory for many reasons:

1. It fails to address why issuers do not insist on investment bankers to adjust their underwriting spreads to compensate for the risks of the offering.
2. The investment bankers acquire reasonably good information about the potential demand for an IPO. It is not uncommon for underwriters to receive indications from prospective investors that are much larger than the total amount of the offering.
3. If the principal driving force for underpricing were the investment bankers' desire to reduce their risk exposures, one would expect only IPOs underwritten on a

firm-commitment basis to be underpriced. New issue distributed with a best efforts contract should be more fully priced because investment bankers' risks under the best efforts agreement are minimal.

In contrast, the empirical evidence provided by Ritter (1984) and Chalk and Peavy (1987) indicate that IPOs issued with best efforts contracts tend to be underpriced by a much larger amount than the IPOs underwritten with firm-commitment agreements. Such a result is inconsistent with the risk-averse-underwriter hypothesis.

<u>2.1.2.4 The Baron's (1982) Information Asymmetries Hypothesis</u>

The most famous model in the area of explaining underpricing phenomenon is Baron's (1982) model. This model demonstrates a positive demand for investment banking advising, and distribution services and provides an explanation of the underpricing of new issues. The model of Baron (1982) assumes that the issuer has a demand for capital for investment in a specific project. Thus, the issuer has a demand for investment banking advising and distribution services for new issues.

In Baron's (1982) model, in order to create a demand for the services of investment banker, the investment banker is assumed to have more information about the possible demand for the stocks being issued than the issuing firm. Thus, the investment banker is in a stronger position to affirm a successful flotation of the stock.

Because of this informational asymmetry between the issuing firm and investment banker, the *underpricing* arises. The level of such underpricing can be defined under two possible contracts in Baron's (1982) model. First, under a *pure distribution contract*, the issuing firm sets the offering price of the stock and the investment banker receives a payment for distributing the stocks. This pure distribution contract implies some kind of *uncertainty* over the market demand for the new issues.

Thus, the greater the issuing firm's uncertainty over the market demand for the securities, the lower the offering price set, hence, indicating an underpricing phenomenon in such issues. This problem is further compounded when the distribution effort of the investment banker is unobservable. As a result, the issuing firm is unable to link compensation to the distribution efforts of the banker. This may lead the issuing firm to reduce the offering price in the stocks to minimise the risk of undersubscription.

Second, under a *delegation contract* by which the issuing firm compensates the investment banker in setting the offering price of the stock. Here, the degree of underpricing could be less through such delegation contract. Given the superior information of the investment banker, this contract is recommended. By linking the banker's compensation to the level of offering price of the stock, the gains from the superior information of the investment banker can be shared between the two parties.

However, since the distribution effort of investment banker is unobservable, a problem emerges, giving the banker an incentive to minimise his efforts. One way for the investment banker to do this is to underprice the issue. As a result, the investment banker trades off between the compensation in the contract from not underpricing and the benefits of underpricing in terms of reduced distribution efforts. Therefore, in the Baron's (1982) delegation contract, this trade off leads to the underpricing phenomenon.

In conclusion, the explanation of Baron's (1982) model for underpricing phenomenon focuses on information asymmetries between issuing firms and their investment bankers. The hypothesis of Baron is that investment bankers take advantages of their superior knowledge of market conditions to underprice offerings, which permits them to expend less marketing effort and ingratiate themselves with buy-side clients. While there is undoubtedly some truth to this, especially with less sophisticated issues, Muscarella and Vetsuypens (1989) find that when investment banking firms go public, they underprice themselves by as much as other IPOs of similar size.

2.1.2.5 The Investment Banker's Monopsony Power Hypothesis

Tinic (1988) argues that some researchers have suggested that gross underpricing may be a result of the monopsony power of the investment bankers in underwriting common stocks of small speculative firms. Their conclusions were based on the observation that large, reputable investment banks generally do not accept to underwrite common stocks for small firms. In explaining this view, for example, Ritter (1984:237) stated:

> "Major bracket underwriters generally refuse to underwrite small offerings from start-up firms, possibly for reputation reasons."

According to Ritter, the IPO market is segmented. The IPOs of small firms are underwritten by investment bankers who, for some unexplained reason, can exercise greater bargaining power over the issuers. These investment bankers intentionally underprice the securities and distribute them to their large customers who regularly buy investment services from them.

A similar line of reasoning was used by Chalk and Peavy (1987), who claimed that the underwriters can increase their revenues by using an implicit discriminatory pricing scheme. That is, underpriced issues would be allocated only to the favoured customers of the firm who regularly do business with the investment bank and pay commissions and fees far excess of the competitive rates.

In short, the Monopsony hypothesis maintains that the underwriters of IPOs intentionally price the securities at a discount from their expected values in the after market. That is because they can capture at least a fraction of the rents indirectly.

While there is some evidence on rationing, it is difficult to find any scientific evidence that would support the proposition that grossly underpriced IPOs are rationed to the underwriters' so-called favoured customers. On the contrary, Tinic (1988), for example, presents some evidence that shows that there is no relationship between the amount of brokerage commissions generated from institutional clients of the investment bankers and the allocation of underpriced IPOs to them.

In conclusion, there are some problems with the 'monopsony power' hypothesis, such as:

- It does not explain why reputable investment bankers refuse to underwrite some IPOs.
- It implies that issuers are either ignorant or irrational. Somehow, they do not learn from the experiences of previous issuers and search for investment bankers who price IPOs more fully.

However, it is important to note that not every small start-up firm's IPO is underpriced. Clearly, there must be another explanation for the issuers' apparent inability to search and find investment bankers who can price their IPOs more fully.

2.1.2.6 The Certification Hypothesis

Another explanation of underpricing phenomenon is found in the works of Booth and Smith (1986), Beatty and Ritter (1986), Carter and Manaster (1990), and Chowhry and Nada (1996). The investment banker is introduced to the model of Booth and Smith (1986) as an underwriter or certifier of value. Booth and Smith (1986) suggest that investment bankers, who attempt to establish reputations for correct pricing, can build their reputations by deliberately underpricing and absorbing the underprice loss. This implies that, if the IPOs tend to be handled by smaller and less established investment banker, they would tend to be relatively more underpriced. Furthermore, even investment bankers with established reputations can underprice to protect their reputations.

Moreover, Booth and Smith (1986) advance the 'certification hypothesis' to explain the role of the investment banker in the capital raising process. Due to potential opportunistic behaviour by insiders, investment banker can be employed to certify that issue price is consistent with inside information. The analysis of Booth and Smith indicates that firm value can be increased if bonding investments are made to certify the new issue price. Moreover, they indicate that the net benefit from certification can be greater if issuing firms are able to utilize a specialist (investment banker) who has made the required bonding investment.

Beatty and Ritter (1986) comment that the net present value of future quasi-rents that a reputable investment banker can expect to earn exceeds the short-run gain from opportunistic behaviour. The willingness to not behave opportunistically, Beatty and Ritter comment, is what is meant by having a good reputation. That is the investment banker will find that it is not in its interest to behave opportunistically if it has a stock of reputation built up, on which it is earning a return in the form of, for example, having lower distribution costs, or being able to charge higher underwriting fees. Consequently, if the underpricing equilibrium is enforced by investment bankers with reputation capital at stake, any investment banking firm that cheats must lose customers.

2.1.2.7 The Auditor Selection Hypothesis

Balvers, McDonald and Miller (1988) clarify that the incentive to investment banker in choosing a high reputable auditor is to increase the quality of information supplied to investors so that investors can evaluate the prospects of the issuing firm more accurately. Thus, the investment banker helps to protect its own reputational capital by reducing the possibility of mispricing the issue. Therefore, the risk of frustrating either the uninformed investors or issuing firm can be reduced. This result displays a consistency with the Rock (1986) equilibrium model.

Balvers, McDonald and Miller (1988) assume an environment similar to that of Rock (1986) and Beatty and Ritter (1986). They assume an investment community that consists of informed and uninformed investors. Also, they assume risk neutrality because the investment banker can spread the risk over a syndicate. Accordingly, they specify a profit function where the investment banker's proceeds are a result of three components:

1. the uninformed investors' perception of the investment banker's reputation,
2. a basic fee, which is tied to the actual reputation, minus a penalty which is a result of any deviation from the equilibrium level of underpricing, and
3. a cost of acquiring auditor reputation.

The motivation for this specification is elaborated in the following derivation of their model. In this model, an investment banker is to select the offer value of an issue (offer times the number of shares issued, denoted as p) and auditor reputation as (A) so as to maximize expected profits (Π) given by:

$$\max \Pi(P, A) = \max[bR(A) + R' * \{F - gE[u - (v - p)]^2\} - cA]$$

$R(A)$ = the investment banker's reputation (a function of the auditor's reputation (A) as perceived by uninformed investor),

R' = the actual reputation of the investment banker,

u = the equilibrium level of underpricing as in Beatty and Ritter,

v = market determinant value of the offering with $E(v)=u$,

and b, c, f, and g are constants.

Balvers, McDonald and Miller (1988) assume that the first term in the right-hand side of equation (1) represents the ability of the investment banker to benefit the firm by signalling its reputation through auditor selection. They argue that this assumption works through the effect of reputation on ex ante uncertainty which in turn affects underpricing.

The second term reflects a basic fee, f, tied to the investment banker's actual reputation, R', minus the loss in goodwill, also proportional to R', due to mispricing of the new issue. Balvers, McDonald and Miller (1988) represent the goodwill costs by a quadratic loss function that penalises the investment banker for any deviation from the optimal level of underpricing. Clearly, an investment banker with higher reputation has more goodwill to loss so that the loss in goodwill can be considered proportional to reputation.

An important inference of Balvers, McDonald and Miller (1988) that for u-(v-p) < 0, the investment bankers loss goodwill with potential issuers who know R'. Also, for u-(v-p) > 0, there is a goodwill loss to currently informed investors who also are assumed to know R'. This analysis is consistent with Beatty and Ritter (1986), where the investment bankers who miss the underpricing equilibrium will lose either potential investor if they do not underprice enough, or issuers if underprice too large.

The third term in eq. (1) represents the investment banker cost of assuring himself of high reputation auditor. The explanation of such cost is that the investment banker is assumed to put pressure on the firm to hire a reputable auditor. That is because the reputable auditor can provide better information about earnings which makes it easier for investment banker to price the issue correctly and maintain the reputation capital. As a result, the investment banker has to pay for part of the reputable auditor's incremental cost.

An interesting point in the work of Balvers, McDonald and Miller (1988) is the structuring of the information environment relative to underpricing so that the percentage underpricing is proportional to ex ante uncertainty:

$$u / p = h(\sigma_v^2 + \sigma_m^2)$$

where, h is the increase in the optimal percentage underpricing per unit increase in ex ante uncertainty, and the $(\sigma_v^2 + \sigma_m^2)$ are independent sources of uncertainty. The first source of uncertainty is due to the firm specific factors. The term that reduces such sort of uncertainty is based on the reputation of the auditor chosen. The second source of uncertainty is due to the market environment. A part of this uncertainty is the perceived reputation of investment banker which is shown by uninformed investors. This reputation depends, also, on the selection of auditor.

To sum up, Balvers, McDonald and Miller (1988) clarified that the incentive to investment banker in choosing a high reputable auditor is to increase the quality of information supplied to investors so that investors can evaluate the prospects of the issuing firm more accurately. Thus, the investment banker helps to protect its own reputational capital by reducing the possibility of mispricing the issue and therefore reducing the risk of frustrating either the uninformed investors or issuing firm within the Rock (1986) setting. Consequently, the high reputable auditor reduces the level of underpricing through reducing the level of ex-ante uncertainty surrounding the aftermarket price in newly issued stock. This result displays a consistency with the Rock (1986) equilibrium model.

Moreover, Beatty (1989) tests the relation between auditing firm reputation and the underpricing of IPOs. Employing an indicator variable approach, Beatty formulates the following estimated model:

Initial return =a + b (Age of client$_i$)

+ c (Type of underwriting contract$_i$)

+ d (Percentage of ownership offered$_i$)

+ e (Oil & gas$_i$)

+ f (Underwriter reputation$_i$)

+ r (Auditing firm$_i$)

In this model, Beatty (1989) hypothesises that an inverse relation exists between the reputation of the auditor of an IPO and the initial return earned by an investor. His results indicate that issuing firms which pay a premium for their registration audit exhibit lower initial returns for their investors. Thus, the results provide support for the hypothesised negative relation between the auditor reputation and underpricing. Thus, the issuing firm which hire a reputable auditor is expected to underprice less than the issuing firm which hire a less reputable auditor.

Moreover, the reputable auditor can prevent the investment banker and issuing firms from presenting false or inadequate information in the registration statement, and help them in avoiding civil liabilities on account such mistakes. If it is not the case, to recover damage, a purchaser of an IPO can sue every person who has signed the registration statement, every member of the board of the directors or partner in the issuing firm, every accountant, engineer, appraiser, or other consultant, and every investment banker that is associated with the offering. As a result, we discuss the lawsuit avoidance hypothesis in explaining the underpricing phenomenon, as follows.

2.1.2.8 The Lawsuit Avoidance Hypothesis

A distinct explanation of underpricing is provided in the works of Ibbotson (1975), Tinic (1988), Simon (1989), Alexander (1991, 1993), Hughes and Thakor (1992), and Drake and Vetsupens (1993). For example, Ibbotson (1975) notes that the issuing firm and its underwriter may perceive that underpricing establishes a form of insurance against legal suits. For example, errors in the prospectus may be less likely to result in legal suits when the stock's initial performance is positive.

Tinic (1988) in his paper presents evidence that a certification process works partly through the ability of investors to use the courts to press damage claims against investment bankers for shortcomings of their due diligence reviews and failures to disclose important information held by insiders. Tinic argues that rather than purchasing insurance against such lawsuits, investment bankers will protect themselves, in part, by underpricing as a form of self-insurance.

Tinic (1988) argues that, unlike some of its alternatives, the "implicit-insurance" hypothesis provides an explanation for the issuers' willingness to leave some money on the table. Under the securities regulations, the issuer is jointly and severally liable for civil liabilities that may arise from disclosure of inadequate information. If the issuer were reluctant to buy insurance by underpricing its securities, it would not only face larger expected liabilities but would also have to compensate the investment banking firm for its higher expected liabilities. In other words, the issuer would have to incur much larger underwriter spreads without necessarily reducing its exposure to potential lawsuits.

Empirically, Tinic (1988), examined this principal implication of the insurance hypothesis, that is the IPOs issued after a certain strict provision should exhibit larger initial abnormal returns than the unseasoned new issues that are brought to the market in the pre such periods. Table 2-7 illustrates the statistical results of Tinic empirical investigation of the insurance hypothesis based on samples of IPOs that were brought to the market before and after the Securities Act of 1933. The large difference between the initial excess returns of the IPOs in the pre- and post-SEC samples is consistent with the insurance hypothesis.

Table 2-7 Average Excess Return, Issues Size, and Price Level of IPOs Underwritten by Ranked and Non-ranked Investment Banking Firms

	Pre-SEC	Post-SEC
Sample size	70	134
Average Excess Return [a]	0.05174	0.11065
	(0.0098)	(0.01843)
Percentage of IPOs Underpriced	68.57%	65.67%
Average Issue Size	$7,324,012	$5,043,035
	(1,329,384)	(590,529)
Average Price	$34.00	$15.37
	(1.45)	(0.81)
Sample of IPOs Issued by Ranked Investment Bankers	30	53
Average Excess Return	0.04893	0.06162
	(0.0138)	(0.01777)
Percentage of IPOs Underpriced	76.67%	58.49%
Average Issue Size	$6,501,853	$8,314,687
	(876,772)	(1,295,867)
Average Price	$37.09	$20.99
	(1.83)	(1.41)
Sample of IPOs Issued by Non-Ranked Investment Bankers	40	81
Average Excess Return	0.05385	0.14273
	(0.0139)	(0.02773)
Percentage of IPOs Underpriced	62.50%	70.37%
Average Issue Size	$7,940,632	$2,902,325
	(2,240,593)	(316,325)
Average Price	$31.68	$11.70
	(2.08)	(0.74)

Source: Tinic 1988:805.
[an] Average excess return from the date of offering to after-market price one week later. Standard errors of the reported averages are presented in parentheses.

Unlike Tinic (1988), Drake and Vetsupens (1993) examine 93 IPOs from 1969-1990 that were subsequently involved in lawsuits. They find that these IPOs had average initial returns that are similar to the firms that did not subsequently get sued lawsuit.

The same line of research found in Huges and Thakor (1992) where they develop several models for the pricing of IPOs in which there is a threat of litigation. Under some conditions, underpricing results; under other conditions, no underpricing results.

The evidence presented by Drake and Vetsuypens and by Huges and Thakor suggests that legal liability considerations are, at best, a minor reason for the underpricing of large IPOs.

2.1.2.9 The Costly Information Acquisition Hypothesis

Investment banker may underprice IPOs to induce regular investors to reveal information during the pre-selling period, which then can be used to assist in pricing the new issue. This argument has been developed by Benveniste and Spindt (1989). Furthermore, in order to induce truthful revelation for a given IPO, the investment banker must underprice issues for which favourable information is revealed more than those for which unfavourable information is revealed. This leads to a prediction that those IPOs for which the offer price is revised upwards will be more underpriced than those for which the offer price is revised downwards.

This pattern is presented in the data, as documented by Hanley (1993). She examined the compensation schedule proposed by Benveniste and Spindt. Table 2-8 presents the results of OLS regression using the percentage change in shares offered, which proxies for changes in share allocation, as dependent variable. The percentage change in the offer price, the pre-issue offer size, the percentage change in the NASDAQ (i.e., National Association of Security Dealers Automatic Quotation) index, and the level of institutional holdings are used as independent variables. Positive (negative) information regarding the issue is reflected in final offer prices that are greater (less) than expected. If increased allocations are used to at least partially compensate investors for revealing information, then positive revisions in the number of shares issued should be associated with positive revisions in the offer price. Table 2-8 shows that there is a positive and significant relation between revisions in the offer price and changes in the number of shares offered.

Figure 2-1 presents the average initial return by year according to the relation of the final offer price to the offer range. The results in this figure indicate a positive relation between revisions in the offer price and subsequent initial return. Generally, Hanley (1993) concludes that issues that have good information revealed (final offer prices that exceed the offer range) have subsequently greater initial returns than all other IPOs.

To sum up, the empirical results of Hanley relate the pre-issue information-gathering activities of underwriters to revisions in offering features and subsequent underpricing. Truthful revelation of good information through demand by regular investors is rewarded by an increase in both share allocation and underpricing. In the model, and in practice, the share allocation mechanism is not sufficient to fully compensate investors, since the number of shares to be offered is rationed. Consequently, Benveniste and Spindt (1989) predict, and Hanley confirms, that underpricing is positively related to revisions in the offer price from the filling of the preliminary prospectus to the offer date. In other words, the final offer price only partially adjusts to new information. The result is that issues that have positive revisions in the offer price and good information revealed are significantly more underpriced than other IPOs.

Table 2-8 Cross-sectional OLS regressions with the absolute percent change in the actual offer price from the expected offer price, the percent change in the number of shares offered, and initial returns as dependent variables .[a] The data for the sample of IPOs issued from January 1983 to September 1987 are from Investment Dealers' Digest Corporate Database

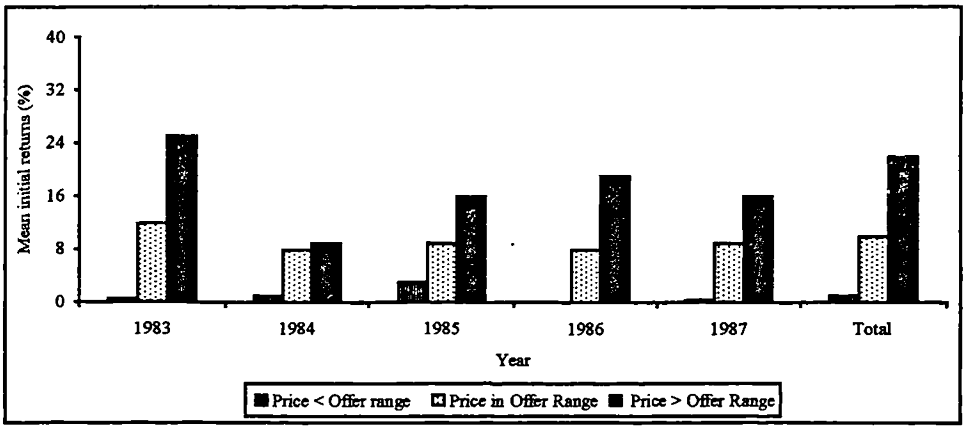
	Dependent Variables		
	Absolute percent change in the actual offer price from the expected offer price quoted in the preliminary prospectus [b]	Percentage change in shares offered [c]	Initial return[d]
Intercept	0.051[g] (5.68)	0.001 (0.14)	0.124[g] (7.38)
Percent change in the actual offer price from the expected offer price quoted in the preliminary prospectus		0.365[g] (7.95)	0.383[g] (11.01)
Percentage width of preliminary of prospectus offer range	0.248[g] (9.24)		
Offer amount [e]	0.001 (1.50)	-0.001[h] (-2.21)	-0.001[g] (-2.98)
Percentage change in the NASDAQ index from file data offer date [f]	0.169[h] (2.46)	0.381[g] (4.53)	0.410[g] (5.65)
Ratio of overallotment option shares available to shares offered	-0.052 (-1.07)		-0.004 (-0.03)
Average market share of the lead underwriters	0.271[g] (3.42)		-0.327[g] (-4.18)
Percentage of shares held by institutions the quarter following the offer	0.020[h] (2.39)	0.45[h] (2.62)	-0.021 (-1.46)
F-value	28.18	65.97	50.51
Adjusted R^2	10.62%	15.46%	17.80%
Number of observations	1373	1373	1373

Source: Har ey (1993:242)

[a] In parentheses are the t-statistics using White (1980) heteroscedastic-consistent standard error.

[b] The absolute change in the offer price is calculated as $|(P_o - P_E)/P_E|$, where P_o is the final offer price, $P_E = (P_H + P_L)/2$ is the expected offer price, P_H is the highest anticipated offer price, and P_L is lower anticipated offer price quoted in the preliminary prospectus. [c] The percentage change in shares offered is defined as $(N_o - N_F)/N_F$, where No is the actual number of shares offered (net of the overallotment option exercised) and N_F is the number of shares quoted in the preliminary prospectus. [d] The initial return is defined as $(P_1 - P_o)/P_o$, where P_1 is the first recorded closing or bid price after the offering. [e] The offer amount is the pre-issue or expected offer amount when used as an independent variable for both the absolute change in the offer price and the percent change in shares offered, and is the post-issue or actual offer amount (excluding the exercise of the overallotment option) when used as an independent variable for the initial return. [f] The change in the NASDAQ index is measured in absolute terms when used as an independent variable for the absolute change in offer price. [g] Significant at the 0.01 level (two-tailed test). [h] Significant at the 0.05 level (two-tailed test).

Figure 2-1 Mean yearly initial returns by relation of the final offer price to the offer range quoted in the preliminary prospectus



Source: Hanley (1993:245).

The offer range is defined as the lowest P_L, and highest, P_H, anticipated values of the offer price as quoted in the preliminary prospectus. Final offer prices that are less than the offer range have values that are lower than P_L. In contrast, final offer prices that are greater than the offer range have values that are higher than P_H. Final offer prices within the offer range lie between P_L and P_H. This initial return is defined as $R_I = (P_I - P_o)/P_o$, where P_o is the final offer price and P_I is the first recorded closing or bid price from Standard and Poor's Daily Stock Price Record: Over-the Counter. The data for the sample of 1,430 IPOs issued from January 1983 to September 1987 are from Investment Dealer's Digest Corporate Database

2.1.2.10 The Wealth Redistribution Hypothesis

Because being allocated shares in underpriced IPOs is valuable, issuers/investment bankers may be able to use these allocations to pursue other goals. In Japan, for example, the Recruit Cosmos IPO led to the resignation of Prime Minister Takshita in April 1989. The Recruit Company sold off a real estate subsidiary, Cosmos, in an IPO that was severely, and intentionally, underpriced. Many of the shares were allocated to politicians. When details came to light, several prominent politicians resigned, for the scheme was only a tiny step away from handing over envelops filled with cash [Ziemba and Schwartz (1992)]. The scandal also led to a change in the Japanese regulations for selling IPOs, with much less underpricing in 1989 than previously.

In some denationalisation, or privatizations, the value of underpriced shares has been recognised by the government. In 1979, when Margaret Thatcher became Prime Minister of Britain, the government owned many firms, including British Airways and British Steel. In order to give British voters a positive experience with capitalism, as government denationalised businesses, issues were both intentionally underpriced and allocated to as many as voter as possible. As a result, the number of shareholders in Britain increased from three million in 1979 to 11 million in 1990.

Perotti and Guney (1993), present evidence concerning several privatisation programs in both developed and developing countries. Tables 2-9 through 2-14 present extensive data on the British, French, Spanish, Nigerian, Turkish and Malaysian programs. The data suggest that partial sales are common. These Tables offer evidence on the remarkable extent of underpricing in these privatisation programs, which in average greater in privatisation sales than in initial public offerings (IPOs) in private firms.

Table 2-9 Privatisation in France

Enterprise	Date of sale	Stake sold (%)	Discount* (%)	Application Multiple	Gross Proceeds (Billion FF)
Elf Aquitaine	September 86	NA	30.5	NA	3.3
St. Gobain	November 86	NA	19.9	14	13.5
Paribas	January 87	42	24.2	NA	17.5
Sogenal	March 87	44	36.0	46	1.5
Banque de Traveaux Publiques	April 87	94	23.1	65	0.4
Banque Industrielle et Mobiliere Privee	April 87	51	21.4	29	0.4
Crdit Commercial de France	April 87	94	16.8	10.7	4.4
Havas	May 87	45	8.0	20	6.4
Compagnie Generale d' Electicite	May 87	29	11.4	NA	8.0
Socite' Generale	July 87	49	6.1	NA	21.5
Television Francaise 1	July 87	50	7.9	NA	3.5

Notes: *Discounts calculated in fully paid basis, NA means not applicable.
Source: Perotti and Guney (1993:89).

Table 2-10 Privatization in Turkey

Enterprise	Date of Sale	Stake Sold (%)	Offer Price	Market Price	Discount (%)	Gross Proceeds (Million Tl)
Teletas (Telecom)	March 88	22.00	5000	6396	27.92	9719.0
Eregli DC (Steel)	April 90	52.00	11750	12243	4.19	13239.2
Cukurova (Power)	April 90	25.41	23750	24000	1.05	96995.4
Kepez E. (Electric)	April 90	43.68	14400	15255	5.93	23457.0
Arcelik (Appliances)	May 90	25.00	21500	23149	7.66	50162.0
Bolu C. (Cement)	May 90	35.33	12750	13911	9.10	20851.8
Celik H. (Cables)	May 90	29.28	13750	15948	15.90	19545.5
Petkim (Refining) Employees	July 90	8.09	2500 2500	2451	-1.96	315477.8 19809.4
Through Bond Cert.			2250			61890.0
Konya C. (Cement)	October 90	39.90	25000	25000	0.00	48619.7
Mardin C. (Cement)	November 90	48.20	50000	50800	1.60	25463.7
Unye C. (Cement)	December 90	12.00	10000	10000	0.00	2570.5
Thy (Turkish Airlines) Employees	December 90	small amount	3000 3000	2750	-8.33	12307.9 1617.3
Adana (Cement) [A]	February 91	23.90	270000	300000	11.11	79128.9
Adana (Cement) [B]	February 91	23.40	30000	33000	10.00	8792.0
Migrons (Chain Stores)	February 91	42.20	8000	8820	10.00	18199.0
Kalkinma (Bank)	March 91	19.88	3000	3000	0.00	596433.0
Afyon C. (Cement)	March 91	48.60	30000	39000	30.00	36448.6
Ditas	May 91	14.77	7000	6300	-10.00	5087.0
Nigde C. (Cement)	May 91	99.80	165000	145000	-12.12	921731.2
Petrol Ofisi (Oil)	May 91	5.00	4000	4000	0.00	72000.0
Tupras (Refining)	May 91	2.50	2000	1820	-10.10	36500.0
Gima (Chain Stores)	June 91	54.68	4000	430	0.00	21871.4
Tofas (Autombile)	July 91	6.25	19000	240	13.15	190000.0
Tofas (Auto. Distr.)	July 91	10.00	15000	16500	10.00	30000.0

Notes: NA means not applicable.
Source: Perotti and Guney (1993:94).

Table 2-11 Privatization in Nigeria

Enterprise	Date of Sale	Government Stack Prior to sale (%)	Stake Sold (%)	Offer Price (Naira)	Market Price (Naira)	Premium Since Sale (%)	Gross Proceeds (Million Naira)
Flour Mills	8/89	51	51	0.80	50.00	6150.0	6.2
African Petroleum	5/89	60	20	1.90	2.95	55.20	32.8
National Oil	12/89	60	20	2.00	2.93	46.5	33.6
Ashaka Cement Ltd.	7/89	72	30	1.20	1.89	57.5	39.0
Nigeria Yeast And Alc.	10/89	51	51	0.70	1.45	107.0	3.2
United Insurance	3/89	42	42	1.20	1.57	30.8	17.6
New Insurance	9/90	47	47	1.20	1.57	30.8	0.9
West African Insurance	8/90	40	40	1.10	1.30	18.2	0.7
Niger Insurance	8/90	100	100	1.30	1.59	16.1	8.8
American Int'l Insurance	12/90	49	49	1.65	2.16	30.9	6.8
Prestige Assurance	12/90	49	49	1.15	1.38	20.0	3.4
Royal Exchange Assurance	12/90	49	49	1.75	1.87	6.8	17.7
Sun Insurance	12/90	49	49	1.25	1.36	8.8	1.5
British American Insurance	7/90	49	49	1.10	1.38	25.4	4.3
Crusader Insurance	7/90	49	49	1.30	1.41	8.4	2.5
Guinea Insurance	8/90	25	25	0.80	1.10	37.5	1.5
Law Union Insurance	7/90	39	39	0.95	1.10	15.7	33.7
Unity Life Insurance	7/90	NA	NA	0.90	NA	NA	0.6
Benue Cement	3/91	NA	NA	0.90	1.20	33.3	42.6
Okumu Palm Oil	3/91	NA	NA	0.90	NA	NA	23.2

Notes: NA means not applicable.
Source: Perotti and Guney(1993:92).

Table 2-12 Privatisation in the UK-Sales on the Stock Market

Enterprise	Date of sale	Stake sold %	Offer price (Pence)	Market price	Discount (%)	Demand Multiple	Gross proceeds (Million Pound)
British Petroleum	June 77	17	300	368	22.6	4.7	564
	November 79	51	363	367	1	1.5	290
	September 83	7	435	441	1*	2.7	565
	October 87	36.8			-13***		
British Aerospace	February 81	50	150	171	14	3.5	149
	May 85	NA	375	420	12	5.4	550
British and Wireless	November 81	49	168	197	17	5 6	224
	December 83	31	275	273	-1*	0.7	272
	December 85	22	587	590	0.5	2	602
Amersham	February 82	100	142	188	32	25.6	63
Assoc. British Ports	February 83	51.5	112	138	23	35	22
	April 84	48.5	270	272	0.7*	1.6	52
Jaguar	August 84	100	165	179	8	8.3	294
British Telecom	December 84	50.2	130	173	33	5	3916
	December 91	23.9	110	125.5	14	2.5	50.35
Enterprise Oil	July 84	100	185	185	0*	0.7	393
Britoil	November 82	51	215	196	-9*	0.3	548
	August 85	49	185	207	12	10	450
Trustee Savings Bank	October 86	100	100	135.5	35.5	8	1360
British Gas	December 86	100	135	147.5	9	4	5603
British Airways	February 87	100	125	169	35	32	900
Rolls Royce	May 87	100	170	232	36	9.4	1360
BAA	July 87	100	245	291	19	8	919
			290	291*	0.3*	6	362
British Steel	December 88	100	60	62.7	4.2	3.3	2500
Anglian Water	December 89	100	100	148.5	48.5	2.2	707
N.W. Water	December 89	100	100	135	35	1.6	853
Northu. Water	December 89	100	100	157	57	9.0	157
Severn Trent	December 89	100	100	131	31	1.8	848
S.W. Water	December 89	100	100	147	47	1.8	293
Southern Water	December 89	100	100	141	41	3.4	392
Thames Water	December 89	100	100	136	36	4.3	922
Welch Water	December 89	100	100	141	41	2.1	345
Wessex Water	December 89	100	100	154	54	4.0	246
Yorkshire Water	December 89	100	100	149	49	2.6	471
East Mid. Electric	December 90	100	100	150.5	50.5	9.5	523
Eastern Electric	December 90	100	100	148	48	9.2	347
London Electric	December 90	100	100	142	42	8.1	523
Manweb	December 90	100	100	166	66	15.4	248
Midlands Electric	December 90	100	100	150.5	50	9.5	502
Manweb	December 90	100	100	152	52	11.7	414
Northern Electric	December 90	100	100	142.5	4.5	13.7	296
Seaboard	December 90	100	100	142	2	13.2	305
S. Wales Electric	December 90	100	100	164	64	15.8	243
S. West Electric	December 90	100	100	150	50	12.2	295
Southern Electric	December 90	100	100	150	50	11.6	647
Yorkshire Electric	December 90	100	100	159	59.5	7.7	497
National Power	March 91	60	100	137.5	37.5	5.4	1338
PowerGen	March 91	60	100	137	37	5.4	820
Scptt. Hydro-El.	June 91	100	100	122	22	3.0	920
Scottish Power	June 91	100	100	115.5	15.5	3.0	1955

Notes:* Tender sale, ** Partial tender sale, ** Issued during the October 1987 stock crash. The price fall of the issue was less than general decline, NA means not applicable, Discounts are calculated, based on prices one day later, on the amount actually paid for purchases, which may include the value of an attached voucher by some utilities.
Source: Perotti and Guney (1993:88).

Table 2-13 Privatization in Malaysia

Enterprise	Date of Sale	Stake Sold (%)	Offer Price	Market Price	Discount (%)	Application Multiple	Gross Proceeds (Million M$)
Cement Ind. of Malaysia	June 84	83.9	1.00	1.91	91.0	34.6	8.8
Malaysian Intl Shiping	February 87	67.0	2.40	5.00	108.3	1.2	203.9
Ports Toto Malaysia	July 87	71.4	2.00	9.55	377.5	87.8	8.5
Tradewinds	March 88	93.2	1.10	1.83	66.3	8.0	16.5
Sistem Tel.	April 88	NIL	2.00	6.05	202.5	63.4	13.2
Cement Manuf. Services	February 89	91.1	1.30	2.17	66.9	20.0	6.5
Malaysian Airline Systems	December 89	47.1	1.80	2.45	36.1	7.0	189.0
Edran Auto National	July 90	36.4	4.30	8.15	89.5	22.0	154.8
Permas Intl Hotels	September 90	89.5	1.30	2.32	78.4	15.1	20.5
Syrikat Telecom	November 90	31.4	5.00	6.10	22.0	1.1	2,352.5
Kedah Cement	January 92	NA	2.00	2.60	30.0	1.5	58.5
Kedah Cement	March 92	NA	5.00	6.60	32.0	6.4	750.0
Perusahaan Otomobil	May 92	NA	4.50	8.75	94.0	3.5	3,213.9

Notes: NA means not applicable.
Source: Perotti and Guney (1993:95).

Table 2-14 Privatization in Spain

Enterprise	Date of sale	Stake sold (%)	Offer price (Ptas)	Market price	Application Multiple	Initial return (%)	Gross Proceeds (Million Pats)
AMPER	May 86	67.7	1720	4500	3.3	161.6	4,377.5
GESA	November 86	38.0	1912	2550	3.6	33.3	8,221.6
ACESA	May 87	57.6	707	1490	3.6	110.7	43,669.4
GASMADRID	December 87	16.0	3375	6750	NA	100.0	5,495.0
ENCE	April 88	39.3	4850	5530	1.4	14.0	17,603.8
ENDESA	June 88	20.4	1400	1980	NA	41.0	74,200.0
REPSOL	May 88	26.6	1700	2040	2.8	20.0	135,575.0

Notes: NA means not applicable.
Source: Perotti and Guney (1993:89).

2.1.2.11 The Signalling Hypothesis

It is argued that underpricing allow the issuing firms to sell future offerings at a higher price than would otherwise be the case. This argument has been formalised in signalling models by Allen and Faulhaber (1989), Welch (1989), and Grinblat and Hwang (1989). In these models, issuing firms have private information about whether they have high or low values. The high-value firms may choose to underprice their IPOs as away of signalling that they are high value. In order for this to be worthwhile, they must benefit sufficiently at the time of the seasoned offering.

For example, the results of Welch (1989), represented in table 2-15, clarify evidence that roughly one-third of the firms going public conduct a seasoned equity issue within the next few years. Also, the mean ratio of seasoned offerings (SO) proceeds over IPO proceeds for reissuing firms over the entire period is in excess of 3. As a result, it could be concluded that IPO firms that reissue do so substantially and IPOs could be used to advertise for seasoned equity issues. Garfinkel (1993), however, finds that the hypothesised relation between initial returns and subsequent seasoned new issue is not present, casting doubt on the empirical relevance of signalling as a reason for underpricing [see Table 2-16].

Table 2-15 Descriptive Statistics for Firms Categorised by IPO Year

Panel A: Initial Public offerings (IPOs)							
Year of IPO	1977-82	1977	1978	1979	1980	1981	1982
Number of IPOs	1028	32	48	77	234	439	198
Issues Proceeds (in millions 1982 dollars	7.1 (10.4) 0.1...7.75	7.4 (10.6) 0.5...55.9	7.4 (8.7) 0.9...38.1	7.2 (7.1) 0.8...42.1	6.7 (10.6) 0.4...110.6	7.6 (10.7) 0.2...128.1	6.5 (10.9) 0.1...73.3
Initial Return	0.26 (0.62) -0.69...7.8	0.21 (0.46) -0.31...2.0	0.26 (0.42) -0.38...1.6	0.24 (0.56) -0.44...2.8	0.51 (0.89) -0.4...7.75	0.17 (0.5) -0.5...4.0	0.21 (0.5) -0.7...3.5
Panel B: Corresponding Seasoned Equity Offerings (SOs)							
Year of IPO	1977-82	1977	1978	1979	1980	1981	1982
Number of IPO Reissuing	288	6	21	32	55	116	58
Total number of SOs	395	9	38	46	84	150	68
Total SO proceeds (in millions 1982 dollars)	25.9 (36.9) 0.2...411.1	43.2 (54.7) 7.1...151.3	44.1 (89.9) 0.5...411.1	19.9 (12.9) 0.2...45.6	25.6 (24.5) 0.5...85.9	25.8 (34.0) 0.4...237.2	21.4 (23.7) 1.6...148.0
Total SO proceeds / IPO proceeds	3.4(4.5) 0.1...40.4	4.7 (5.8) 0.5...13.2	3.4 (3.1) 0.3...13.2	3.6 (5.6) 0.1...26.0	2.9 (2.5) 0.3...13.6	3.0 (3.6) 0.1...21.3	4.3 (6.7) 0.2...40.4

Source: Welch (1989:443).

Panel A lists characteristics for IPOs from 1977 to 1982 reported in *Going Public The IPO Reporter*. Panel B lists characteristics of the seasoned equity offerings (SOs) for these IPO firms as reported in the *Corporate Finance Sourcebook*. Here, each column displays the statistics for subsequent SOs for all firms whose IPO took place in the column's listed period. Total SO proceeds are firms' total proceeds over all their seasoned offerings The total SO proceeds and total SO proceeds/IPO proceeds statistics is only for firms that had reissued by December 31, 1987. For the last two rows in both panels, the first cell entry is the mean, the number following (in parentheses) is the standard deviation of the series, and the line below is the range of the series. All dollar series have been normalised to 1982 CPI dollars.

Table 2-16 Logistic Model Relating Probability of Reissue to Unexplained Underpricing, Partial Adjustment Variables and Proxies for Ex-ante Underpricing

	Constant	Initial Res	Pdiff	Shsadj	Firm Ret	Mkt Ret	DebtD	RankD	LnSize	LnAge	Plant
Coefficient	-5.96	0.94	-0.82	0.63	0.97	-0.64	0.00	0.33	0.49	0.01	-1.09
Asymptotic t-Statistic	-3.26**	1.13	-0.87	1.18	3.48**	-0.77	0.00	0.85	2.34*	0.10	-1.28

Source: Garfinkel (1993).
*significant at the 5 % level. ** significant at the 1 % level. Log-likelihood =-143.5; Pseudo-R^2 =0.143 calculated as 1 -[(-2/n) * log likelihood]. Variables are defined as: *Initial Res* is the underpricing residual from regression Equation (1) in the work of Garfinkel (1993), i.e., it is the underpricing not explained by proxies for ex-ante uncertainty and partial adjustment. Pdiff equals the percentage difference between expected IPO price and final IPO price. Shsadj equals the percentage difference between number of shares expected to be offered and number of shares actually offered. Firm Ret is the cumulative raw return to the stock for the 200 days following the end of the first day of trading on the exchange. Mkt Ret is the cumulative market return calculated over the same window as firm Ret. DebtD is a dummy variable that equals 1 if the firm had bank or public debt in its capital structure prior to the IPO, 0 otherwise. RankD takes on a value 1 if the underwriter of the firm's IPO was a national, 0 otherwise. LnSize is the natural log of the inflation-adjusted dollar amount of equity offered in the IPO, exclusive of overallotment. LnAge is the natural log of the firm's age at the time of the IPO. Plant is the ratio of plant and equipment to total assets at time of IPO.

2.1.2.12 The Stablization Hypothesis

The hypothesis of stablization through underwriter price support provides an explanation for the positively skewed distribution of initial IPO returns. The effect of such price support is to reduce the number of negative initial returns from what would otherwise be observed. If investment bankers are actively supporting prices in the aftermarket, observations that would have occurred in the left tail of the distribution (i.e. negative returns) are propped up to a zero or slightly below the offer price.

Within the framework of this hypothesis, the pricing model of Ruud (1993) is developed. In this model, the mean of the distribution of initial returns can be measured as log (P_0/P_t). If underpricing occurs, the distribution of initial returns should have the same shape (normal, if the forecast errors are normally distributed), but should be shifted by the degree of underpricing. Thus, the mean of the distribution would change, but not the shape.

The model of Ruud (1993) assumes that underpricing simply shifts the mean of the distribution of initial returns without modifying the shape of the distribution, as summarised by the higher moments of variance, skewness, and kurtosis. The actual data yield a distribution that is not normal or symmetric but may plausibly be explained as a result of underwriter price support. Ruud (1993) argues that the practice of 'stablization' by investment banker's results in average initial returns that are substantially overstated. That stablization is the practice of buying large numbers of shares in the immediate aftermarket in an effort to prevent the price from falling.

However, direct evidence does not support Ruud's hypothesis that, after adjusting for the effect of the underwriter support, the average initial return is close to zero. Using a sample of 510 firm commitment IPOs from 1982-83, Miller and Reilly (1987) report that 30% of the sample has non-positive market-adjusted one-day returns. These issues underperform by an average of 3.9% during the next four weeks, whereas the other 70 % of issues outperform the market by 1%. Given that the average initial return for the sample is 9.9 % at worst. (Ruud uses a virtually identical sample of 463 firm commitment IPOs from 1982-83 in her empirical work, without acknowledging Miller and Reilly's evidence. She also uses logarithmic returns, which, given the skewness of initial return distributions, results in a lower mean than when more conventional return computation are used.)

2.1.2.13 The Cascades Hypothesis

In this model, Welch (1992) presents that potential investors pay attention not only to their own information about a new issue, but also whether other investors are purchasing. Thus, issuers may underprice the new issues to induce the first few expected investors to buy, and induce a cascade in which all subsequent investors want to buy irrespective of their private information.

An interesting implication of the Benveniste and Spindt (1989) dynamic information acquisition explanation, in conjunction with the Welch (1992) cascades model, is that positively-sloped demand curves can result. In Benveniste and Spindt, the offering prices are adjusted upwards if regular investors indicate positive information. Other investors, knowing that this will only be a partial adjustment, correctly infer that these offerings will be underpriced. Those other investors will consequently want to purchase additional shares, resulting in positively sloped-demand curve. The inferences of investors, however, will change if a given underwriter opportunistically exploits investors. If this not the case, any underwriter could create a cascade and sell an issue for more than its basic value.

2.1.2.14 The Speculative-Bubble Hypothesis

Under this hypothesis, underpricing of the IPOs are attributed to the speculative desires of investors who could not get allocations of the oversubscribed new issues from the underwriters at the offering prices. That is, the offering prices of the issues were consistent with their economic values. However, the speculation in the after-market pushed their prices well above their intrinsic worth temporarily. The speculative-bubble hypothesis would imply that the initial positive excess returns of the IPOs should be followed by negative excess returns as bubble bursts sometimes later.

However, Ritter (1984b) tested the speculative-bubble hypothesis with a sample of natural-resource issue that were underwritten in the hot-issue period of 1980. He concluded that, even in this sample of highly speculative small issues, there was no evidence that would support the implications of a speculative bubble.

2.2 A SURVEY OF THE AFTERMARKET RETURNS

2.2.1 LEVELS OF THE AFTERMARKET RETURNS REPORTED IN PRIOR STUDIES

In section 2.1, the literature review of the initial performance indicates that IPOs produce meaningful positive returns in early trading for those investors advantageous enough to be allocated shares in such securities. However, the question of how these stocks behave in the aftermarket is not clear. Therefore, the literature relevant to the aftermarket performance in IPOs is reviewed as follows.

In measuring the aftermarket performance, a large number of studies focus on the aftermarket returns of the IPOs over the first year of trading. Within this year period, a number of holding periods for the calculation of aftermarket returns could be used. Table 2-17 illustrates the holding periods put to use by the prior studies as well as the returns across these periods. The returns across the holding periods used in Table 2-17 are mostly expressed in excess market-adjusted and risk-adjusted return's models. The market adjustments over the extended holding periods are necessary to control for the possibility of large shifts in the level of the market.

In section 2.1, we noted that a number of studies have attempted to avoid the potential biases in the excess market return form by adopting a risk-adjusted approach to the measurement of aftermarket returns. For example, Bear and Curley (1975), Ibbotson (1975), Jacquillat et al. (1978) and Finn and Higham (1988) all and others evaluate the level of systematic risk in newly issued stocks by estimating Sharpe's (1963) Market model.

Table 2-17 Summary of Previous Studies on Aftermarket Performance of IPOs

			Aftermarket Returns						
Market	**The study**	**Year**	**A**	**B**	**C**	**D**	**E**	**F**	**G**
UK	Merritt et al.,	1967	13.7	16.3	-	-	1.9	-	-
U.S.A	Reilly and Hatfield	1969	9.6	7.8	-	23.6	-	-	
U.S.A	McDonald and Fisher	1972	28.5	34.6	-	-3.2	-	-	-18.1
U.S.A	Reilly	1973	9.6	8.7	-	20.4	-	-	7.1
U.S.A	Reilly	1973	9.9	9.6	-	17.3	-	-	3.6
U.S.A	Neuberger and Hammond	1974	17.0	19.1	-	-	0.8	-	-
France	McDonald and Jacquillat	1974	3.0	4.6	-	15.6	-	-	-
U.S.A	Bear and Curley	1975	12.9	-	-	-15.4	-	-	-25.0
U.S.A	Ibbotson	1975	-	11.4	4.9	2.4	-	-	-
U.S.A	Reilly	1977	10.9	11.6	-	-3.0	5.1	-	-9.7
France	Jacquillat et al.	1978	5.2	-	7.0	10.7	-	-	-
U.S.A	Block and Stanley	1980	6.0	3.4	-	2.8	-2.3	-	-3.1
U.S.A	Neuberger and LaChapelle	1983	27.7	33.6	73.5	-	8.3	-	-
Hong Kong	Dawson	1984	13.8	-	-	-	-1.0	-1.0	-9.3
Singapore	Dawson	1984	39.4	-	-	-	0.6	1.4	-2.7
Malaysia	Dawson	1984	166.6	-	-	-	6.2	9.4	18.2
U.S.A	Miller and Reilly	1987	9.9	13.0	-	-	-	38.6	-
U.S.A	Chalk and Peavy	1987	21.7	23.6	-	-	2.0	18.0*	-
Singapore	Dawson	1987	38.4	-	-	-	-	1.4	-
Australia	Finn and Higham	1988	-	-	-	-	1.0	-	-6.5
U.S.A	Bhandari	1989	-	-	-	-	-0.1	-	-
Germany	Uhlir	1989	25.1	-	-	-	-	-	-7.4
U.S.A	Aggarwal and Rivoli	1990	1.07	10.8	11.2	-5.5	-	0.5	-13.7
Japan	Kunimura and Severn	1990	1.42	-	-	-	-	-	1.42
U.S.A	Ritter	1991		-	-	-	0.4	-0.7	-29.1
Thailand	Wethyavivorn and Koo-Smith	1991	68.7	-	-	-	-	-3.02	-
UK	Levis	1993	14.3						-30.6
Finland	Keloharju	1993	8.6	-	-	-	-	-	-2.64
Switzerland	Kunz and Aggarwal	1993	35.8	-	-	-	-	-	-6.1
Brazil	Aggarwal et al.,	1993	78.5	90.2	-	39.2	2.3	-	-9.0
Chile	Aggarwal et al.,	1993	16.3	19.1	-	-9.8	5.6	-	1.1
Mexico	Aggarwal et al.,	1993	2.8	33	-	-17.7	21.6	-	-19.6
Australia	Lee et al.,	1996	11.0	-	-	-	-	-	-3.81

* Returns measured between t=1 and the 190^{th} day of trading.
A = Initial return measured between offering price and closing traded price in the first day of trading,
B = Return between the initial offer price and the closing traded price one month after issue,
C = Return between the initial offer price and the closing traded price six months after issue,
D = Return between the initial offer price and the closing traded price one year after issue,
E = Return between the closing traded price of the first day of trading and the closing traded price one month after issue,
F = Return between the closing traded price of the first day of trading and the closing traded price six month after issue,
G =Return between the closing traded price of the first day of trading and the closing traded price one year after issue.

Moreover, measurement of return from the initial offering price may not be that important for the specific investor, due to the difficulty of obtaining shares at the original offering price in the initial period. As a result, many investors will be forced to purchase unseasoned shares on the market in the early listing period. Consequently, returns measured from the first day of trading rather than from offering in Table 2-17 may provide a more significant indication of aftermarket returns for the investor.

2.2.2 A Review of Studies Reported in the U.S. Market

Table 2-17 illustrates that, in 1969, Reilly and Hatfield reported positive returns, in the aftermarket period, for 53 U.S. securities over the period 1963-65. This rise in stock prices has been adjusted. According to Reilly and Hatfield, this adjustment, after initial underpricing, is a further gradual correction for the initial underpricing in unseasoned stock securities. Also, it can be argued that speculative effects may have been responsible where an initial sharp rise in stock prices creates a continued demand for the stocks in the aftermarket.

Then, in 1972, McDonald and Fisher examined 142 U.S. stocks issued in 1969, and reported significant positive initial returns from the offering to the first day of trading, followed by negative excess returns over holding periods D and G in Table 2-17 (i.e., one year from the offering and from the first day of trading, respectively). McDonald and Fisher (1972) justified such negative excess market-adjusted returns in terms of the bear market conditions in the U.S. during 1969. According to McDonald and Fisher (1972), one justification of negative excess market return is that the IPOs suffer from high systematic risk levels, and unadjusted stock returns are therefore expected to decline more than market returns during declining market periods giving rise to negative excess market returns. Further evidence in McDonald and Fisher (1972) is that the initial return of an offering was noted to be uncorrelated with subsequent returns and might be consistent with efficient market hypothesis in its weak-form version.

One year later, Reilly (1973) provided further evidence of a continued positive return adjustment for underpricing where 53 securities sold on the OTC market in the U.S., over the period 1963-65. This issue period coincides with a period of rising market prices, where excess returns for periods from the offering up to through the first year of trading were positive and increasing. Elimination of the initial excess returns from the offering to the end of the first day of trading, however, revealed that excess returns measured between the first day of trading and the year following flotation were positive, but lower than excess returns measured from the initial offering price. Again, an indication of a continued adjustment for underpricing is suggested and the evidence is taken to indicate an efficient market where most of the superior performance of newly issued stocks is eliminated in the early trading [see Table 2-18].

Table 2-18 Results of Reilly (1973) reflecting investment in all new issues at post-offering prices

	Friday after offering to year after offering		Fourth Friday after offering to year after offering	
	Declining Market	Rising Market	Declining Market	Rising Market
Number of new issues showing increases	26	36	25	38
Number of new issues showing decreases	36	17	37	15
new issues:				
Mean percent change	+6.3	+29.8	+49	+31.3
Median percent change	-8.2	23.4	-5.4	19.5
Standard deviation of price change	54.9	53.9	54.8	51.2
Coefficient of variation	8.7	1.8	11.2	1.6
Pearsonian Measure of skewness	0.8	0.4	0.6	0.7
Third moment of distribution	63.6	58.7	66.2	55.9

Source: Reilly (1973:90).

Likewise, in 1974, Neuberger and Hammond found positive excess market returns for 816 securities over the period 1965-69. They suggested a market efficiency with relatively small positive excess market returns being reported over the first month aftermarket. The implication here is that the market adjusts to underpricing in early trading.

Moreover, in 1975, Bear and Curley gave a rather different explanation for the longer term decline in the returns of unseasoned securities. Bear and Curley suggest that underwriters can set offering prices at relatively high levels when favourable market conditions exist. However, if we accept this role for the underwriter, it seriously doubts the presumed equilibrium relationship between the ex-ante uncertainty levels in the IPOs and the associated underpricing levels in such offerings [As discussed in section 2.1].

In the same year, Ibbotson (1975) studied the risk and performance (measured by risk-adjusted returns) on newly issued common stocks which were offered to the public for the first time during the period 1960 through 1969. The results of Ibbotson confirm that the mean initial performance of unseasoned new securities is positive. Ibbotson assumed that an investor in a single random issue has an equal chance for a gain or loss, but he could not reject this hypothesis. The results generally confirm that there are no departures from the market efficiency in the after market. According to Ibbotson, positive initial performance without departures from the efficiency in the aftermarket suggests that new issue offerings are underpriced. However, no adequate explanation of underpricing process is given in this work of Ibbotson (1975).

An extension of the Ibbotson (1975) analysis was provided by Ibbotson and Jaffe (1975) focusing on the aftermarket performance of securities in hot and cold issue markets. Ibbotson and Jaffe (1975) examined U.S. securities over the period January 1960 to October 1970 and, as in Ibbotson (1975), one issue was selected randomly for each month within this period. Excess returns (i.e., residuals) were calculated using excess market returns rather than through the RATS approach. The residuals, for each issue, were then computed between the initial offering date and the first month end post-issue and between the initial offering date and the second month end post-issue. From the first month's residuals, strong serial dependency was indicated between securities using correlation and runs tests [see Tables 2-19 and 2-20].

Table 2-19 Serial correlation coefficient for the average residual with lags 1-122.

Lag	First month value	First month difference value	Second month value
1	0.744	-0.268	0.231
2	0.612	-0.054	-0.087
3	0.509	-0.194	-0.115
4	0.516	0.074	-0.177
5	0.493	-0.116	0.101
6	0.431	0.059	-0.016
7	0.372	-0.063	0.081
8	0.308	-0.014	0.053
9	0.309	0.079	-0.047
10	0.233	0.026	-0.072
11	0.267	0.084	0.031
12	0.074	0.091	-0.103
Standard error	0.088	0.090	0.088

Source: Ibbotson and Jaffe (1975:1031)

This finding suggests that first month end returns were predictable in Ibbotson and Jaffe (1975). However, Ibbotson and Jaffe (1975) suggest that profitable trading rules were unlikely to result from this serial dependency because of large transaction costs. This interpretation may suggest market efficiency in the aftermarket.

Table 2-20 Statistics of runs tests

	Type of test	# of Obs.	Expected # of runs	# of runs	t-value
First month series	Using all observations	128	65	38	-4.79
	Using every odd Obs.	64	33	20	-3.28
	Using every third Obs.	43	22.5	14	-2.62
First month differenced series	Using all observations	124	63	83	+3.61
	Using every odd Obs.	62	32	30	-0.51
	Using every third Obs.	41	21.5	24	+0.79
Second month series	Using all observations	128	65	49	-2.84
	Using every odd Obs.	64	33	33	0.00
	Using every third Obs.	43	225	23	0.15

Source: Ibbotson and Jaffe (1975: 1033).
For an independent Bernoulli series, the expected number of runs, E(U), and the variance of the number of runs observed, V(U), are given by: E(U)= 1/2 M + 1, and V(U) = [(M/2) . ((M/2)-1)]/(M-1), where M is the number of observations in the sample., and U is the number of runs observed in the sample. Should observations be positively depended on preceding observations, the number of runs would be expected to be below that given above.

Furthermore, in 1977, Reilly in his analysis of 486 U.S. IPOs over the period 1972-75 reported negative excess market-adjusted returns. As in McDonald and Fisher (1972), Reilly (1977) explained the negative excess market returns in terms of significant market decline, affecting the aftermarket returns of the bulk of stocks investigated.

Moreover, Block and Stanley (1972) provided further evidence of negative excess market-adjusted returns, in the aftermarket, when excess market returns are measured from a date in early market trading [referred to as E in Table 2.17] to a number of dates in the aftermarket. In these studies, an indication of a continued adjustment for underpricing is suggested and that evidence is taken to indicate an efficient market where most of the overperformance of IPOs is removed in the early trading.

Neuberger and LaChapelle (1983) reported significant positive excess market returns for 118 U.S. securities, over the period 1975-80, in the aftermarket. Similar results are also given in Chalk and Peavy (1987) and Miller and Reilly (1987) where significant positive excess market returns, in the aftermarket, were reported. One interpretation of the positive excess returns recorded between early market trading and subsequent listing dates, is a gradual decline in the level of perceived risk levels of the issued stocks as they mature on the market, causing stock prices to gradually rise as progress is made through the aftermarket.

Further evidence was provided in the work of Aggarwal and Rivoli (1990), where an analysis of 1598 U.S IPOs over the period 1977-87 was made and negative excess market returns were reported in the aftermarket. They suggested that the early positive excess market returns in the aftermarket may result from speculative bubbles which burst in subsequent trading in the aftermarket period giving rise to negative excess market returns. Aggarwal and Rivoli (1990) offer two-bubble building mechanisms. First, they claim that underwriters to an issue may attempt to place shares in strong hands rather than weak hands. The former group retains the stock for a significant period of time and, in so doing, artificially represses the supply of stocks in the aftermarket forcing market prices upwards. The second explanation is based upon underwriters artificially stimulating demand for newly listed stocks by selling shares to small, risk-oriented and generally uninformed investors in the aftermarket period.

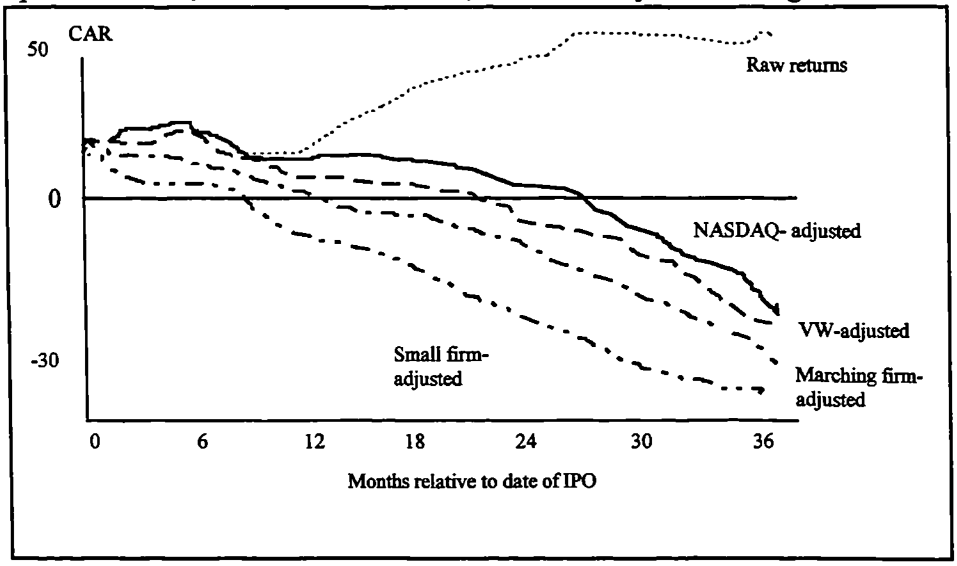
Finally, for the U.S. studies, in 1991, Ritter examined a sample of 1522 U.S. IPOs over the period 1975-84, and noted a similar pattern of aftermarket return performance. However, Ritter (1991) suggests that the negative trend in aftermarket returns in his study is consistent with an IPO market in which investors are periodically overoptimistic about the earnings potential of young growth companies and that firms take advantage of these, as Ritter says: 'windows of opportunity'. Ultimately, a correction of this pricing performance produces a decline in stock prices. This view of Ritter and the speculative bubbles hypothesis of Aggarwal and Rivoli (1990), clearly doubts the market efficiency view stated in other studies.

Table 2-21 Abnormal Returns for initial public offerings in 1975-84

Month of seasoning	Number of firms trading	AR_t %	t-stat.	$CAR_{1,t}$ %	t-stat
1	1512	0.38	.036	0.38	0.70
2	1514	1.49	2.81	1.88	2.02
3	1517	-0.12	-0.24	1.75	1.46
4	1518	-1.07	-2.21	0.69	0.48
5	1519	-0.81	-1.63	-0.12	-0.08
6	1519	-0.55	-1.06	-0.67	-.0.38
7	1518	-1.59	-3.13	-2.27	-1.18
8	1516	-1.10	-2.21	-3.37	-1.63
9	1514	-1.73	-3.38	-5.10	-2.31
10	1513	-1.63	-3.32	-6.72	-2.88
11	1508	-1.59	-3.08	-8.32	-3.39
12	1501	-1.91	-3.66	-10.23	-3.97
13	1496	-0.32	-0.56	-10.55	-3.92
14	1492	-0.82	-1.60	-11.37	-4.06
15	1486	-1.19	-2.30	-12.56	-4.32
16	1478	-1.26	-1.92	-13.82	-4.59
17	1469	-0.47	-0.85	-14.29	-4.58
18	1463	-0.49	-0.88	-14.78	-4.59
19	1449	0.37	0.61	-14.42	-4.43
20	1440	0.30	0.55	-14.11	-4.12
21	1429	-0.94	-1.66	-15.05	-4.27
22	1416	-0.20	-0.33	-15.25	-4.21
23	1403	0.56	-0.92	-15.80	-4.24
24	1397	-1.09	-1.97	-16.89	-4.43
25	1388	0.30	0.50	-16.59	-4.25
26	1372	-0.26	-0.44	-16.85	-.4.20
27	1354	-1.66	-2.87	-18.51	-4.50
28	1347	-1.02	-1.72	-19.54	-4.65
29	1339	-0.97	-1.84	-20.51	-4.78
30	1324	-1.51	-2.74	-22.01	-5.01
31	1309	-1.02	-1.57	-23.03	-5.13
32	1296	-0.63	-1.00	-23.66	-5.16
33	1283	-1.31	-2.16	-24.96	-5.33
34	1270	-1.39	-2.39	-26.35	-5.52
35	1260	-1.10	-1.89	-27.45	-5.64
36	1254	-1.67	-2.80	-29.13	-5.89

Source: Ritter (1991:10).AR_t is the average matching firm-adjusted returns, and CAR_t is the cumulative average returns in percent.

Figure 2-2 Cumulative average adjusted returns for an equally-weight portfolio of 1,526 IPOs in 1975-84, with monthly rebalancing.



Source: Ritter (1991:11)
Five CAR series are plotted for 36 months after the IPO date: (1) no adjustment (raw returns), (2) CRSP value-weighted NASDAQ index adjustment (NASDAQ-adjusted),(3) CRSP value-weighted AMEX-NYSE index adjustment (VW-adjusted), (4) marching firm adjustment (matching firm-adjusted), and (5) matching firm adjustment (small firm-adjusted). Month 0 is the initial return interval.

2.2.3 A Review of Studies Reported in the U.K Market

The UK findings are consistent with U.S. patterns of positive initial returns followed by underperformance. For example, Merritt et al., (1967) provided one of the earliest significant analysis of aftermarket returns, for 149 U.K offerings over the period 1959-1963. An insignificant positive return was reported between the initial market price in the unseasoned offerings and the close of trading one month later. This was taken by Merritt et al. to suggest an efficient market where the market adjusts for initial underpricing in early trading and offers relatively small holding returns subsequently.

Another study for examining the long-run performance of the IPOs in the U.K, is the study of Levis (1993). He examined 712 UK stocks over the period 1980-88, and reported significant positive initial return from the offering to the end of the first day of trading, followed by negative excess return at the end of the first year of offering [see Table 2-22 and Figure 2-3].

In this study, the UK evidence sheds light on a number of issues left unresolved by the U.S. studies. First, it demonstrates that the long-run underperformance of IPOs is not a phenomenon unique to U.S. new issues. Poor aftermarket performance emerges as a persistent feature of IPOs.

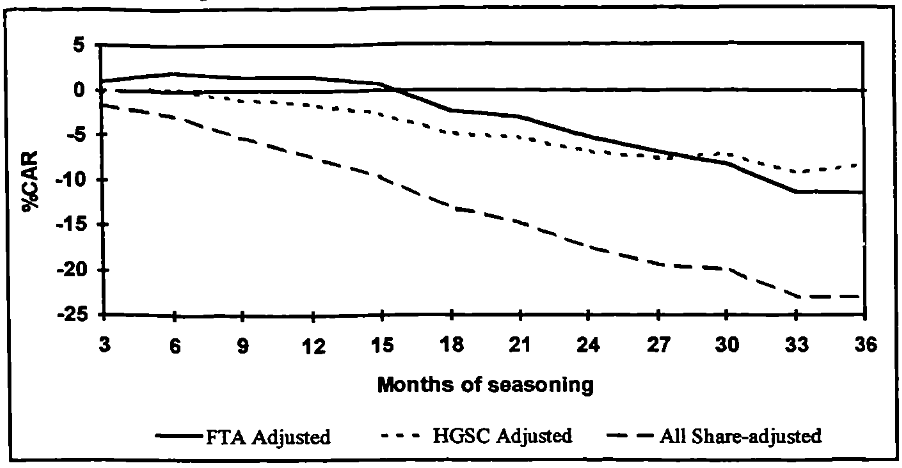
Second, the results of Levies' s study for IPOs in 1980-1985 suggest that the long-run underperformance extends beyond 36 months. Third, the apparent tendency for the firms with the highest initial returns to have the worst aftermarket performance, together with the marginal long-run outperformance of firms with moderate first day returns, casts further doubt on the conventional belief that positive initial returns are entirely due to deliberate underpricing.

Table 2-22 Cumulative Average adjusted returns for IPOs, 1980-1988, excluding initial returns

		FTA Adjusted		HGSC Adjusted		All Share-adjusted	
Month of seasoning	Number of observations	CAR %	t-statistic	CAR %	t-statistic	CAR %	t-statistic
3	712	0.98	1.10	-0.16	-0.15	-1.65	-1.49
6	710	2.08	1.62	0.20	-0.15	-2.67	-1.91
9	709	1.48	0.94	-1.00	-0.63	-5.19	-3.26
12	705	1.57	0.85	-1.55	-0.86	-7.20	-4.01
15	697	0.69	0.33	-2.63	-1.32	-9.65	-4.85
18	688	-2.35	-1.03	-4.87	-2.23	-13.10	-6.01
21	676	-3.02	-1.21	-5.31	-2.24	-14.73	-6.17
24	656	-5.20	1.92	-6.80	-2.69	-17.33	-6.87
27	611	-6.90	-2.32	-7.61	-2.75	-19.34	-6.99
30	579	-8.14	-2.52	-7.11	-2.37	-19.80	-6.61
33	518	-11.35	-3.18	-9.23	-2.80	-22.85	-6.93
36	483	-11.38	-2.95	-8.31	-2.35	-22.96	-6.49

Source: Levis (1993: 36).

Figure 2-3 Cumulative average adjusted returns for 712 IPOs, 1980-88ncing.



Source: Levis (1993: 36).

2.2.4 A Review of Studies Reported in Other Markets

Unlike most of the U.S. or U.K studies, McDonald and Jacquillat (1974) examined 31 IPOs, in France, over the period 1968-1979. Excess returns of 15% at the end of the first year of offering were noted, compared with the initial excess market returns (i.e., underpricing) of only 3 %. This suggests that an efficient markets interpretation, where new favourable information, affecting investor expectations during this period.

Moreover, in the analysis of Dawson (1987) of 21 Hong Kong offerings and 39 Singaporean offerings, over the period 1978-83, an efficient markets view of aftermarket performance was suggested. Although negative stock returns were recorded at the end of the first year after trading [see Table 2.17] in the Hong Kong and Singaporean offerings, these negative returns were found to be insignificantly different from zero. Dawson (1987) took this evidence to indicate a fast adjustment for underpricing in the aftermarket. However, the Latin American findings are consistent with U.S. and UK patterns of positive initial returns followed by underperformance. Aggarwal; Leal and Hernandez (1993) extend the international evidence on initial public offerings and present the first comprehensive analysis examining new issues in the Latin American countries of Brazil, Chile, and Mexico. The Brazilian sample includes 64 IPOs between 1980 and 1990. The first day market-adjusted returns relative to the offer price averaged 78.5%. The long-run mean excess market-adjusted return was -47% in Brazil.

Table 2-23 The Aftermarket Performance of Brazilian IPOs, 1980-1990

Panel B: Market-adjusted Returns from offering						
Time	N^b	Mean	Median	Standard Dev.	T-statistic	Wealth relative
Day 1	62	78.5	36.5	90.5	6.83*	1.79
Month 1	56	90.2	44.9	28.6	5.25*	1.90
Month 2	54	92.9	28.0	64.9	4.14*	1.85
Month 3	56	92.9	38.8	60.4	4.33*	1.81
Year 1	57	39.2	-22.2	162.6	1.82*	1.09
Year 2	48	0.4	-45.5	107.8	-0.03	0.92
Year 3	48	-25.6	-70.4	155.4	-1.14	0.60
Panel B: Market-adjusted Returns from day 1						
Month 1	56	2.3	-3.4	35.3	0.48	1.02
Month 2	54	4.9	-6.0	54.6	0.67	1.06
Month 3	56	6.1	-9.7	66.7	0.69	1.08
Year 1	57	-9.0	-51.1	155.0	-0.44	1.00
Year 2	48	-34.9	-60.2	67.6	-3.58*	0.85
Year 3	48	-47.0	-76.6	143.4	-2.27*	0.67

Source: Aggarwal, Leal and Hernadez (1993:48).

The pattern is similar in Chile. There were 36 IPOs in the sample, including 21 privatizations, for the 1982-1990 period. The first day adjusted market return from the offer price was 16.3%. However, the three-year mean excess return was -23% for Chile. For privatization sample, there was a 7.6% first day market-adjusted return from the offer price, but -13.7% after three years [see, Table 2-24].

The three countries use different issue's procedures but show behaviour similar to other major international markets like the U.S. and UK. In the case of Chile, the privatisation issues behaved in the same way as other issues. In all three countries, IPOs are usually oversubscribed and concentrated in some "hot issues" years. This suggested that investors who that buy IPOs in the aftermarket may be overoptimistic.

Table 2-24 The Aftermarket Performance of Chilean IPOs, 1982-1990

Panel A: Market-adjusted Returns from offering (Full sample)						
Time	N^b	Mean	Median	Standard Dev.	T-statistic	Wealth relative
Day 1	19	16.3	0.5	44.7	1.58	1.16
Month 1	14	19.1	13.2	38.2	1.87	1.19
Month 2	11	12.3	-9.7	42.9	0.95	1.11
Month 3	13	2.9	-4.8	37.3	0.27	1.03
Year 1	15	-9.8	-23.0	48.2	-0.78	0.87
Year 2	15	33.9	-12.2	99.3	1.32	1.51
Year 3	8	0.8	-19.0	80.3	0.02	0.93
Panel B: Market-adjusted Returns from day 1 (Full sample)						
Month 1	21	5.6	-4.8	25.5	1.00	1.05
Month 2	20	11.5	3.9	28.7	1.79	10.10
Month 3	24	2.4	4.8	29.3	0.39	0.99
Year 1	28	1.1	-18.8	32.0	0.11	1.03
Year 2	26	-2.0	-13.4	64.0	-0.16	1.10
Year 3	18	-23.7	-31.8	54.5	-1.41	0.83
Panel C: Market-adjusted Returns from offering (privatisation sample)						
Time	N^b	Mean	Median	Standard Dev.	T-statistic	Wealth relative
Day 1	9	7.6	-11.7	37.4	0.64	1.08
Month 1	7	2.1	-14.9	35.3	0.17	1.01
Month 2	7	5.4	-9.7	38.5	0.40	1.04
Month 3	8	-5.1	-13.3	23.2	-0.66	0.95
Year 1	9	-29.9	-32.4	17.8	-5.04	0.64
Panel C: Market-adjusted Returns from day 1(privatisation sample)						
Month 1	11	16.3	-5.5	49.3	1.15	1.14
Month 2	12	11.4	4.5	26.3	1.56	1.10
Month 3	16	8.5	4.8	30.8	1.14	1.09
Year 1	18	-5.5	-20.1	44.6	-0.53	0.93
Year 2	17	-5.4	-6.8	42.4	-0.54	0.96
Year 3	13	-13.7	-25.0	58.2	-0.88	0.91

Source: Aggarwal, Leal and Hernadez (1993:49)

Table 2-25 The Aftermarket Performance of Mexican IPOs, 1987-1990

Panel A: Market-adjusted Returns from offering						
Time	N^b	Mean	Median	Standard Dev.	T-statistic	Wealth relative
Day 1	44	2.8	0.7	14.3	1.29	1.03
Month 1	37	33.0	5.0	46.2	1.37	1.34
Month 2	35	29.4	4.1	38.8	1.25	1.36
Month 3	30	15.4	0.2	46.5	1.82	1.19
Year 1	38	-17.7	-35.3	71.7	-1.52	0.83
Panel B: Market-adjusted Returns from day 1						
Month 1	37	21.6	1.1	88.5	1.49	1.22
Month 2	35	18.4	2.3	84.7	1.28	1.20
Month 3	30	10.0	-2.1	44.1	1.24	1.05
Year 1	38	-19.6	-38.9	72.5	-1.67	0.81

Source: Aggarwal, Leal and Hernadez (1993:50).

Based on the international evidence, it appears that theses patterns are not country-specific and not particular of a specific issuing procedure. Moreover, the Australian findings are consistent with U.S., UK, and Latin American countries patterns of positive initial returns followed by underperformance. Finn and Higham (1988) adopt methods similar to Ibbotson's (1975) returns across time and securities or (RATS) model. Using monthly data and the 60 calendar month portfolio returns, they have 60 observations for each month of the first 12 months of seasoning for the sample as a whole. Finn and Higham (1988) indicate large and widespread initial returns to the new issue-cum-listing process, where the average initial market-adjusted return is 29.2%. However, the one-year market-adjusted return from the closing price on day one results insignificant mean returns of -6.52%, [see Finn and Higham (1988, p. 342)].

Finn and Higham (1988) suggest that joint process of initial issue-cum-listing in Australia, the listing requirements of the Australian Associated Stock Exchange and the vesting of allocation rights to the issue in the brokers, together with barriers to entry to stockbroking in Australia, provided the market structure which facilitated underpricing of the new securities.

In (1996), Lee, Taylor and Walter examined both initial underpricing and post-listing returns for 266 Australian IPOs over the period 1976-89, and reported significant positive initial return from the offering to the end of the first day of trading, followed by negative excess return at the end of the first year of offering. Their results also show that Australian IPOs significantly underperform market movements in the three-year period subsequent to listing [see Table 2-26].

Table 2-26 Abnormal Returns for initial public offerings in 1975-84

Month of seasoning	Number of firms trading	Average return (percent)	T-statistic on the average return [b]	Cumulative average return (percent)
1	266	-1.129	-1.135	-1.129
2	266	-2.952	-3.104***	-4.021
3	266	-1.457	-1.683**	-5.420
4	266	-2.609	-2.891***	-7 887
5	266	2.085	0.898	-5.967
6	266	3.559	1.359*	-2.621
7	266	-1.135	-1.227	-3.725
8	266	-1.743	-2.027***	-0.404
9	266	-4.113	-3.995***	-9.294
10	266	-0.679	-0.620	-9.910
11	265	-3.489	-3.512***	-13.054
12	263	-0.515	-0.572	-13.502
13	260	-3.434	-3..343***	-16.472
14	260	-3.335	-3.751***	-19.258
15	259	-0.245	-0.207	-19.456
16	258	-3.025	-3.183***	-21.892
17	251	0.164	0.138	-21.763
18	250	2.346	2.232**	-19.928
19	250	-3.578	-3.437***	-22.793
20	248	-2.940	-3.033***	-25.063
21	247	-1.617	-1.757**	-26.275
22	245	-1.818	-1.688**	-27.615
23	244	-3.368	-3.368***	-30.053
24	240	-1.396	-1.317*	-31.029
25	237	-5.204	-5.486***	-34.619
26	233	-2.260	-2.563***	-36.096
27	230	-2.564	-2.797***	-37.735
28	227	-4.108	-4.212***	-40.293
29	224	-3.863	-4.127***	-42.599
30	220	-0.733	-0.775	-43.020
31	218	-4.922	-4.702***	-45.824
32	217	-2.586	-2.805***	-47.225
33	213	-0.439	-0.422	-47.457
34	199	-2.053	-1.717**	-48.536
35	185	-1.540	-1.306*	-49.329
36	169	-3.809	-4.164***	-51.259

Source: Lee et al. (1996:1203)

Combining the findings of Australian studies with similar results of studies in other countries (i.e., Thailand, Finland, Germany, Japan, and Switzerland), we can declare that, the long-run underperformance of IPOs is not a phenomenon unique to U.S. or UK new issues. In these studies, poor performance in the aftermarket emerges as a persistent feature of IPOs.

In conclusion, it is obvious that the essential measurement models exist for computing aftermarket returns are the market-adjusted and risk-adjusted returns models. Using these measurement models, a large number of the studies indicate negative returns between the first day of trading in the IPOs and the end of trading one year after listing. In these studies, an indication of a continued adjustment for underpricing is suggested and that evidence is taken to indicate an efficient market where most of the superior performance of newly issued stocks is eliminated in the early trading. However, the speculative bubbles hypothesis, clearly doubts this view of market efficiency.

On the other hand, a small number of studies reported significant positive excess market returns in the aftermarket, indicating a gradual decline in the level of noticed risk levels of the issued stocks as they mature on the market, causing stock prices to gradually rise as progress is made through the aftermarket. However, hypothetical clarifications are necessary in order to explain the price performance of the IPOs in the aftermarket. Therefore, the following section deals with hypotheses and theories reported in prior studies for explaining the point under study.

2.2.5 Explanations of the Long-Run Price Performance of IPOs

In this section, a conceptual background relevant to the price performance of the IPOs in the long-run is provided. The survey revealed some hypotheses suggested in explaining the aftermarket performance of the IPOs; namely:

1. The divergence of opinion hypothesis;
2. The insiders-dumping hypothesis;
3. The efficient market hypothesis;
4. The impresario hypothesis;
5. The windows opportunities hypothesis;
6. The speculative bubble hypothesis; and
7. The seasoning effect hypothesis.

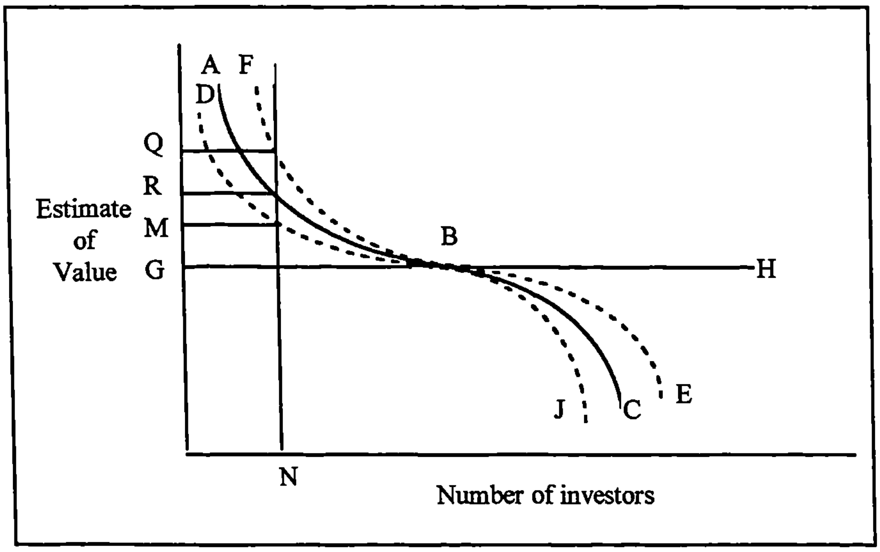
Briefly, each of these hypotheses is reviewed as follows:

2.2.5.1 The Divergence of Opinion Hypothesis

The present hypothesis predicts that if there is a great deal of uncertainty about the value of an IPO the evaluations of optimistic investors may be much higher than those of pessimistic investors. As time goes on and more information becomes available, the divergence of opinion between optimistic and pessimistic investors will narrow, and consequently, the market price will drop.

For this reason, Miller (1977) argues that investors who are most opportunistic about IPO will be the buyers and he predicts that IPOs will underperform in the long-run. Miller (1977), explained his prediction by curve *ABC* plotted in Figure 2-2 below. This figure shows the cumulative distribution of the number of investors with estimates above a certain value for the amount received at liquidation of the investment. It can also be interpreted as the number of shares investors are willing to hold at each price.

Figure 2-4 The cumulative distribution of the number of investors with estimate above a certain value for the amount received at liquidation of investment.



Source: Miller (1977:1152).

Miller (1977) assumes that:

- Any single investor is able to purchase only one share and there are N shares available.
- The shares will end up being owned by the N investors with the highest evaluation of the return.

From curve *ABC* it can be seen that:

* There are N investors who estimate the final value to be R or above.
* The selling price of the stock will be R.
* If it was lower,

  - there would be more than N investors who wished to hold the stock, and
  - bidding against each other they would soon bid the stock up to R.

* If it was above,

  - some of those holding the security would feel it over valued, and

  - would attempt to sell their share, driving the price back down to *R*.

* The curve *ABC* in Figure 2-4 is a demand curve for the security. The supply curve is a vertical line at the number of shares available.

* The price is determined by the interaction of the demand and the supply curves.

Several results follow from this simple model. As long as the entire supply of the security can be absorbed by a minority of the potential purchasers the market price will be above the mean evaluation of the potential investors. Also as long as a minority of potential investors can absorb the issue, an increase in the divergence of opinion will increase the market clearing up. This can be seen by noting that:

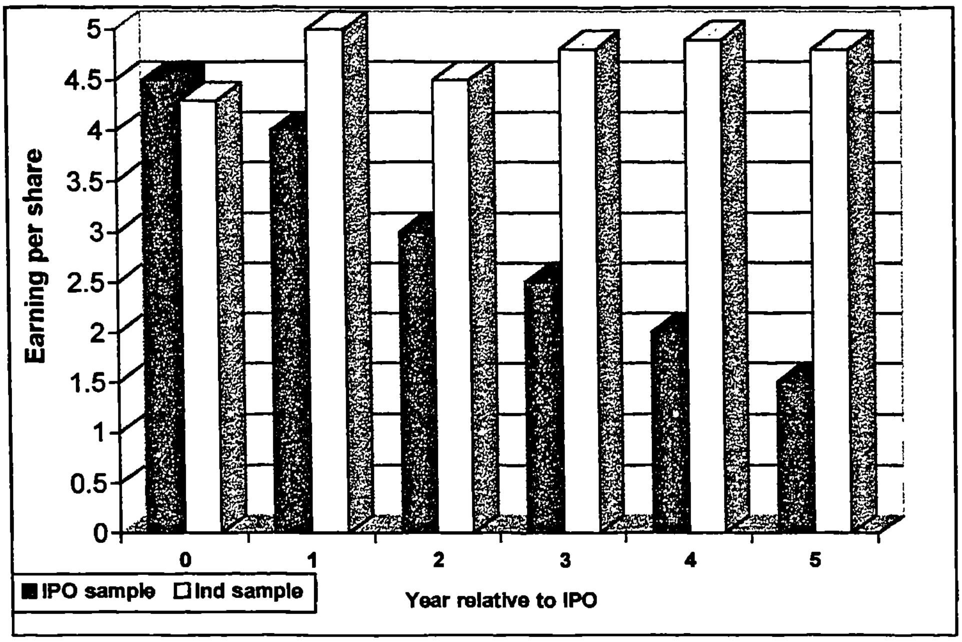
* If curve *ABC* is replaced with curve *FBJ*, representing a greater divergence of opinions about the security. The market clearing price rises from *R* to *Q*.

* On the other hand, if the divergence of opinion decreases, causing curve *ABC* to be replaced with curve *GBE*, the market clearing price falls from *R* to *M*.

* In the limit, where there is no disagreement about the return from the security, curve *ABC* becomes the straight line *GBH*, and the market price falls to *G*. Only in this case is the market price determined by the average evaluation of the potential investors (Miller 1977:1152-53).

Direct evidence does support Miller's prediction that many investors are periodically overoptimistic about companies. For example, Shiller (1990) provides evidence via a survey of investors of IPOs, that only 26 % of the respondents in his sample did some fundamental analysis of the relation between the offer period and the firm's underlying value. Moreover, Jain and Kini (1994) provide evidence that the earnings per share of companies going public actually declined in the first few years after the IPO [see Figure 2-5].

Figure 2-5 Market Expectations and Earnings Performance



Source: Jain and Kini (1994: 1724)

2.2.5.2 The Insiders-Dumping Hypothesis

A further explanation considers the possibility that after an initial price increase for underpricing, stock prices might fall in the aftermarket due to the effects of insiders-dumping on listings. The present hypothesis implies that a downward sloping demand curve for a firm's stock exists so that an increase in the supply of stock leads to a stock price decline [see Myers and Majluf (1984) and Greenwald, Stiglitz and Weiss (1984)].

Direct evidence does not support the hypothesis that insiders may dump their stock on listing, causing a large increase in the supply of stocks on the market. The empirical results of McConnel and Sanger (1987) do not confirm such explanation.

Table 2-27 illustrates the results of investigating the insider-dumping explanation of negative post-listing returns in the work of McConnel and Sanger (1987).

Table 2-27 Average monthly raw returns and average monthly market-adjusted returns following listing for 305 common stocks that listed on the NYSE over the period 1973-1978 categorised according to volume of insider trading

	Sample in which insider sales exceeded insider purchases (sample size = 48)		Sample in which insider purchases exceeded insider sales (sample size = 66)		Sample in which no insider trade were reported (sample size =191)	
Time interval following listing	Average raw return (percent)	Average market adjusted return[a] (percent)	Average raw return (percent)	Average market adjusted return[a] (percent	Average raw return (percent)	Average market adjusted return[a] (percent
First month	194	0.62 (0.33)	0.64	-1.33 (-0.79)	-1.34	-2.04 (-2.46)*
Second month	1.68	1.47 (1.00)	-1.22	-2.75 (-2.11)*	1.42	0.41 (0.57)
Third through twelfth months	0.29	-0.63 (-1.22)	1.32	0.29 (0.56)	0.87	0.02 (0.77)

Source: McConnel and Sanger (1987).
a t-statistic to test the null hypothesis that the average market-adjusted return equal to zero is contained in parentheses.
* Significance at the 0.05 level.

In this table, of the 305 firms examined, only 48 were classified as having net insider sales, while 66 were classified as having net insider purchases. Almost two thirds (191) of the companies experienced no insider trading activity. Contrary to the insider-dumping explanation of negative post-offering returns, for the 'net insider-sales' group, the first- and second -month average raw and market-adjusted returns are positive although not statistically significant. For the 'net-insider-purchases' group, the first-month average raw return is negative and both the first- and second-month market-adjusted returns are negative. Only the second month market-adjusted return is statistically significantly different from zero. Finally, only the 'no-insider-trading group exhibits negative average raw return in the first month following listing, and only for this sample is the market-adjusted return statistically significantly different from zero.

The results of the analysis led no support to the insider-dumping explanation of negative post-listing stock returns. To the contrary, of the firms examined, in the work of McConnel and Sanger (1987), those that experienced net insider selling earned higher average returns following listing than those firms with either net insider purchases or no insider activity. As a result, it may be suggested that insider selling can not explain negative post-listing stock-returns.

2.2.5.3 The Efficient Market Hypothesis

In its weak-form version, the Efficient Market Hypothesis (EMH) predicts that all information regarding past price movements are reflected in the current stock price. This form of the EMH can be supported by a confirmation of the random walk theory upon which stock price changes are independent over time [see Levy and Sarnat (1984), and Hudson ; Dempsey and Keasey (1996)]. Thus, the return from any initial underpricing should also be independent of subsequent returns [see McDonald and Fisher (1972) and Ibbotson (1975)]. Moreover, the weak-form of the EMH suggests that it is not possible to establish profitable trading rules based on the prior performance of a share.

For example, if a new issue performs well initially, there is no reason to believe that its subsequent performance will be superior or inferior. If such predictions were possible, profitable trading rules could be established thus invalidating the EMH [see Ibbotson and Jaffe (1975), Block and Stanley (1980), Ibbotson (1975), Logue (1973), McDonald and Fisher (1972), Neuberger and Hammond (1974), and Fischer and Jordan (1991)].

In brief, the EMH suggests that underpricing in the IPOs is associated with initial mispricing and that stock prices adjust to their true level in early trading to remove this underpricing. As a consequence, high returns would not be attainable, on a continuous basis, over the longer term. Eventually, this hypothesis is supported in the present thesis.

2.2.5.4 The Impresario Hypothesis

Shiller (1990) presents an 'impresario' hypothesis in which he argues that the market for IPOs is subject to fads and that IPOs are underpriced by investment bankers (the impresarios) to create the appearance of excess demand. Sheller's hypothesis predicts that companies with highest initial return, should have the lowest subsequent returns. There is some evidence of this relation in Ritter (1991), [see Section 2.2.2].

2.2.5.5 The Windows Opportunities Hypothesis

Ritter (1991) and Laughran and Ritter (1995) argue that the low long-run returns on IPOs are consistent with issues taking advantage of 'windows of opportunity' in which the market is willing to overpay for their equity. This framework can be viewed as a dynamic version of Myer's (1984) financing hierarchy, or pecking order framework. In the static financing hierarchy model, external equity is always the last choice for financing. In the dynamic financing hierarchy, or windows of opportunity, model, external equity is sometimes the first choice for financing, because sometimes a firm can issue overvalued equity. The windows opportunity framework predicts that this will be low long-run returns on firms conducting IPOs and on firms conducting seasoned equity offerings.

2.2.5.6 The Speculative Bubble Hypothesis

This hypothesis suggests that there is a possibility of emerging 'speculative bubbles' in the aftermarket because the market exaggerates the increase of prices in order to compensate for the perceived level of initial underpricing in the IPOs. An optimism may also emerge in response to an issue being oversubscribed prior to trading so that investors unable to purchase the stock, at that time of issue, may increase demand for the stock in aftermarket trading and add to the increase in the stock price. At length, however, because the market efficiency causes investors' expectations to be revised, so that stock prices adjust downwards to their 'true' level, then, this 'speculative bubble' will burst.

Direct evidence supports the existence of such phenomenon in the U.S.. Aggarwal and Rivoli (1990) note that such bubbles burst between five and twelve months following the initial offering. More importantly, investors buying stocks after the reaction to the initial underpricing are likely to experience negative returns as investors revise the stock price downwards as progress is made through the aftermarket in the IPOs.

2.2.5.7 Seasoning Effect Hypothesis

The final explanation in our survey suggests that adjustment for initial underpricing might be gradual and continues in the aftermarket leading to an increase in stock prices over time. Reilly and Hatfield (1969) noted that the long-run increase in stock price as being a gradual and continued adjustment for underpricing. Reilly and Hatfield argued that this continuing price rise may also be consistent with a gradual reduction in the shares' perceived level of risk as they become seasoned.

However, a somewhat different interpretation might be that a gradual and continued increase in stock price is related to an emerging of favourable information over the aftermarket period in the stock.

2.3 SUMMARY

In this chapter, a substantial body of facts and information has been recorded within the literature review concerning the price performance of the IPOs. These facts and information were analysed in two sections. The first section focused on the levels, measurement methods, time intervals and explanations reported in prior studies for initial returns of IPOs. Then, the second section dealt with examining the performance of IPOs over the long-run periods of trading.

In conclusion, one can point out that:

- The poor-performance of IPOs in the long-run makes the new issues underpricing phenomenon even more of a puzzle.
- The questions of whether or not IPOs underperform in the long-run as well as why issuers set their IPO price at a level that is lower on average than the market price at the end of the first day have generated a large literature.
- There is no specific model can provide a definitive explanation of the these anomalies (i.e., short-run underpricing and long-run overpricing].
- The evidence of long-run returns for IPO is less extensive (both temporally and internationally) than evidence of underpricing.
- Explanations for poor-abnormal returns in the aftermarket are relatively less developed than those for initial returns.

◊ The evidence of underpricing and long-run performance of the IPOs have been well documented in the developed stock markets, however, it is not the case for developing capital markets.

◊ The majority of the literature focuses on the private IPOs, whereas the privatisation sales in the emerging markets get only a small consideration.

Therefore, due to the limited international evidence of long-run performance by IPO, further analysis is warranted, especially in terms of the relationship between initial and long run returns. Thus, the main objective of the following chapters is to examine the price performance and capital market efficiency in the Egyptian stock market with specific concentration on the privatisation sales over the period 1994-96.

CHAPTER THREE
THE STRUCTURE OF THE EGYPTIAN SECURITIES MARKET

3.0 INTRODUCTION

From the preceding chapter, a general background of the underpricing and aftermarket performance of initial public offerings can be constructed. Such a background should be interpreted within the institutional framework of the Egyptian capital market. Combining the information of this chapter with the literature review chapter, the remaining chapters can be developed and examined in detail.

Having considered the importance of the institutional environment of the Egyptian capital market, this chapter is organized as follows. First, in section 3.1, a historical sequence of the events and legislative actions which have had a meaningful relation with the activities of the Egyptian capital market are outlined. Based on this background, section 3.2 examines the microstructure of the Egyptian Stock Exchange (ESE). In the latter we analyze several issues including: the trading system, the trading procedure (i.e., placing orders, types of orders, transmitting orders, execution of orders, price determination, and the participants), Egyptian stock market indices, the mechanism of making a new issue on the ESE, and the price mechanism of the Egyptian PIPOs market. Finally, section 3.3 provides a summary and conclusion of the findings provided in the other sections.

3.1 Brief History of The Egyptian Stock Market

3.1.1 The Period Preceding the Economic Reform

The Egyptian stock market is one of three stock markets in North Africa (i.e. Egypt, Tunisia and Morocco). It was originally established in 1910, and in the early days of the First World War (1914-1918) was abrogated. Then, it was again restored in 1931 at the request of the Government Commissioner. On December 31, 1933, a Royal Decree was issued promulgating the General Regulations of the stock exchanges, but was later amended in virtue of the Royal Decree issued on April 24, 1940, according to which the government approved the General Regulations mentioned above. On July 2, 1955, Law 326 of 1953 was issued granting brokers alone the privilege of dealing in securities whether listed on the stock exchange quotations list or not.

In consideration of the great developments in economic conditions from 1940 to 1957 the need arose for the amendment of the General Regulations of the stock exchanges. Accordingly the amended General Regulations were issued in virtue of Law 161 of 1957 which conferred on the Egyptian stock exchanges (i.e. Cairo and Alexandria) the status of general legal entities with power to administer their funds and to litigate. However, this law subjected the stock exchanges to the government control represented in the government commissioner who was given the right to exercise veto against all resolutions or decisions of the General Meeting, the stock exchange Commission and the Subsidiary Committees if issued in violation of the laws or regulations governing the stock exchange or if they were against public interest.

With the introduction of the Open-Door policy by Sadat in 1974, in order to encourage the investment of Arab and foreign capital in economic development projects of the country, and subsequent incorporation of joint companies under Law 43 of 1974 as amended by Law 32 of 1977, the shares of these companies were accepted for listing and negotiation on the Egyptian stock exchanges. Consequently, Law 121 of 1981 was issued amending certain provisions of Law 161 of 1957 pertaining to the General Regulations of stock exchanges in order to conform the new economic legislative measures taken succeeding the adoption of the economic Open-Door policy in Egypt.

Table 3.1 shows the market value of trading during the period 1956-1982 as measured by the trading levels on the Cairo stock exchange. Such figures show what happened to market activity following the nationalization of the private sector in the early 1960s. The exchanges had continued to exist but with virtually no securities, trading almost disappeared completely. In fact, most of the trading activity since that time has been either in government bonds or in shares of public sector controlled companies.

Although the stock exchange trading figures do not adequately portray the size of the Egyptian capital market, during that period, they are a measurement of the liquidity within that market. Since there was not a well developed over-the-counter market in Egypt, trades executed on the stock exchanges were believed to be the best measure of the existing secondary market.

Table 3-1 Cairo Stock Exchange Historical Market Value of Bond and Share Trading (1956-1982)

Year	LE Millions	Year	LE Millions
1956	57.3	1970	.3.8
1957	32.7	1971	3.6
1958	66.7	1972	3.9
1959	43.9	1973	4.3
1960	38.4	1974	4.1
1961	23.4	1975	7.4
1962	12.2	1976	7.6
1963	5.1	1977	5.9
1964	4.3	1978	4.9
1965	2.8	1979	6.4
1966	4.0	1980	9.8
1967	6.5	1981	9.1
1968	2.8	1982	7.8
1969	6.3	-	-

Source: Cairo Stock Exchange, 1982.

Table 3-2 Market value of shares Trade (1978-1982)

Year	Cairo	Alexandria	Total
1978	2,397	676	3,073
1979	2,438	529	2,967
1980	8,029	486	8,515
1981	5,417	395	5,812
1982	6,804	858	7,662

Source: Cairo Stock Exchange, 1982.

Moreover, Table 3.2 illustrates the market value of the shares traded during 1978-1982 for both the Egyptian stock exchanges (i.e., Cairo and Alexandria). It should be pointed out that trading statistics did not indicate the proportion of trades resulting from private transfers, as for example from one family member to another. If all of these private transactions could be eliminated, it was probable that normal share trading in 1982, for example, did not even reach LE 5 million.

In summary, during the period prior to the 1991 economic reform, the private sector was in the early stages of development. However, it was expected that together with an educational process headed by the Capital Market Authority, the stock exchanges and, the establishment of securities companies, market forces on their own, should create a viable operating securities market, so essential in the stage of the Open Door Policy. However, as a matter of fact, during that period the role of the stock exchange remained minimal.

3.1.2 THE NEW ERA OF THE EGYPTIAN STOCK MARKET

Only after the government undertook the implementations of the new reforms in 1991, which are accompanied by the Capital Market Law 95 of 1992, Cairo and Alexandria stock exchanges regain their importance as crucial financial vehicles for the upcoming period. Specifically, the Egyptian stock market has witnessed major progresses during the period from January 1994 to December 1996. Thus, a general overview of the market during this period is outlined below.

3.1.2.1 An Overview Of The Market During 1994-96

During 1994, the General Price Index rose from 136.34 to 238.37: an 74.8 % increase. The prices perhaps rose both as a result of companies' enhanced performance, reflected in increased profits, and a P/E multiple expansion. This suggestion may be justified by average market P/E which rose to reach over 13 during September-October 1994. It is argued that the reasons behind P/E expansion, could be: the drop in interest rates on deposits, the fact that dividend income became tax exempt, and/or the realisation by investors that the asset value of some companies greatly exceeded their market value.

Moreover, during 1994, four companies were privatised, namely: EIPICO, Paints and Chemicals Company (PACIN), Ameriyah Cement and Alexandria Cement. At the end of this period, three mutual funds were incorporated by banks: The National Bank of Egypt, Bank of Alexandria and the Egyptian American Bank. At this point, due to the fear of dramatically increasing prices, the authorities suspended licenses for any further funds. At the same time, the government accelerated the rate of the privatisation program, increasing the supply of shares in the market while the inflow of funds to the market was restricted. As a result, during 1995, the General Index dropped by 26% and several privatised companies were trading at prices below their public offering price.

However, the second half of 1996 has been characterised by a steep increase in prices and a fundamental shift by the government in its willingness to sell the privatized companies via the stock exchange. This began in May 1996 when the new Ganzouri's government decided, for the first time, to issue a majority of public sector companies' shares on the stock exchange. Also, during 1996, the number of domestic mutual funds increased, and now are investing in Egypt (Table 3.3). Such a background, to be worthwhile, should be explained within the market capitalization outlined in the following section.

Table 3-3 The Egyptian Domestic Mutual Funds

Mutual Fund	**Asset Managed (L.E mn)**
Bank Misr I	200
Bank Misr II	300
Egypt Trust (Lazard Freres)	254
Egyptian American Bank	300
Bank of Alexandria	200
National Bank of Egypt I	200
National Bank of Egypt II	300
HSBC (EIC I, EIC II)	136
Allied Investors	100
Banque Du Caire	100
Egypt Fund	170
Delta Bank	50
SAIB	100
Export Development Bank (NMF)	100
Suez Central Bank	100
Total	**2,610**

Source: EFG-Hermes (March 1997:56)

3.1.2.2 Market Capitalization During the New Era (1994-1996)

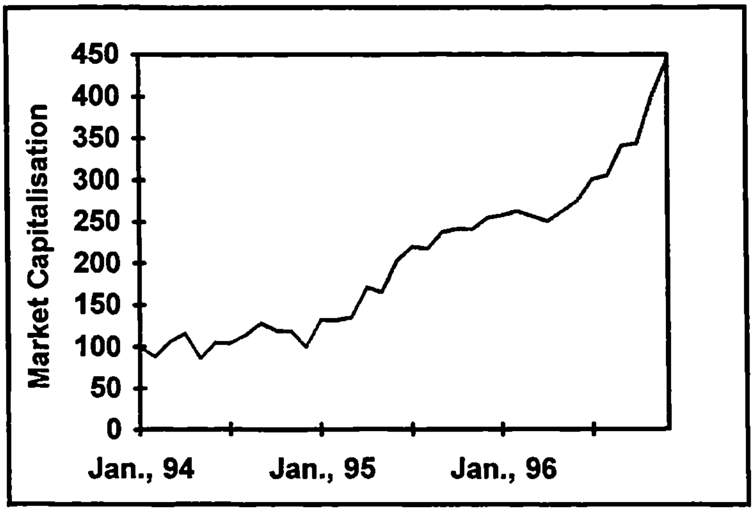
It is noticeable, from Table 3-4, that the market capitalisation in 1996 is approximately 3 times that of the year of 1994. However, at the present time, the capital market in Egypt is small in relation to the size of the overall economy. Figure 3.1 below shows the evolution of market capitalization over the period of study.

Table 3-4 Total Market Capitalisation Levels for Egyptian Equity Market Trading: Jan. 1994- Dec. 1996

	Market Capitalisation (Jan. 1994=100)		
Month	**1994**	**1995**	**1996**
Jan.	100.00	132.45	256.54
Feb.	87.73	132.45	262.19
Mar.	105.69	135.68	255.80
Apr.	115.98	170.98	250.22
May	86.37	164.80	262.18
Jun.	104.66	203.01	274.90
Jul.	104.30	218.68	301.12
Aug.	114.16	215.91	305.33
Sep.	127.66	236.09	341.16
Oct.	119.13	239.73	343.83
Nov.	118.72	240.25	399.44
Dec.	99.89	253.43	444.44

Exchange rate ($/LE.): $1 approximately = LE 3.39 as of October 1996).
Source: Securities Market In Egypt, Monthly Statistical Reports from January 1994 to December 1996.

Figure 3-1 Total Market Capitalisation Levels for Egyptian Equity Market Trading: Jan. 1994- Dec. 1996.



As capitalization has increased, Capital Market Authority has intensified its efforts to delist companies, listed for tax reasons, which do not trade. Of the 646 companies with a total market capitilization of L.E. 56.64 billion (about US$ 16.6 billion), only 50-60 trade actively. These active companies however makeup the bulk of market capitalization.

However, it is suggested that the stated figures of market capitalization may understate the true market capitalization due to many factors, such as:

1) most of the public sector companies' stocks -not yet privatised- are not listed on the stock exchange, and
2) the non-traded listed stocks on the stock exchange are listed at their incorporation par value. Accordingly, once these stocks start to trade at market value, the whole market capitalization of the Egyptian equity market will expand by the difference between stocks' market value and par value. This, to some extent, may explain the 1995 increase in market capitalization despite the fall in stock prices during the year.

To sum up, in studying the current situation of the Egyptian stock market, it could be observed that:

- total market capitalization is, to some extent, an unclear figure when we consider the actual free float,
- most companies have much less than 100% of their shares available for active trading,
- local institutions are not major participants in free float holdings as they lack the internal expertise needed to make investment decisions, and

- the concept of a longer-term horizon geared towards holding stocks to realise profits through capital appreciation still needs time to take hold.

Unlike the period prior to the economic reform program of 1991, the most important conclusion which might be drawn concerning the new era is the revival of the Egyptian capital market, which is regarded as vital to the development of the Egyptian economy. The Egyptian stock market has achieved a high level of success, reflected in the flow of privatization shares and the resulting increase in the volume of traded shares, the increase in the efficiency of securities companies working in the capital market, and increasing overall stock market efficiency. Finding solutions to obstacles to trading activity has contributed greatly to this success. We notice that after the issuance of Law No. 95 of 1992, a law that was designed to modernize the capital market, the total volume of traded shares increased dramatically during the period of study (1994-1996).

This increase in activity can be explained by the acceleration of the privatization program in the first half of 1996, when many public company shares were offered for sale and were oversubscribed. The intention of the Egyptian government is to offer as much as 70% of companies for sale in order to anchor investors or a group of investors by direct sale methods [see Table 3.5]. This will also enhance demand for such companies, thereby raising their share prices.

Table 3-5 Law 203 Companies Shares Sold Offered Through Egyptian Stock Market to the Public and Employees: 1993-97

Enterprise	Year of Privatisation	% of sold Shares	Size of Transactions
Commercial International Bank	1993	**37.50**	390,000,000
Misr Chemical Industries CO	1993	51.00	53,920,000
EPICO (Pharmaceuticals)	1994	17.20	39,732,000
Paints & Chemical industries	1994	10.00	25,000,000
Alexandria Portland Cement	1994	20.60	52,800,000
Torah Portland Cement	1994	35.50	93,000,000
Uniarab Spinning & Weaving	1994	4.24	N/A
Alexandria Spining & Weaving	1994	15.60	N/A
Ameriya Cement	1995	22.50	54,000,000
Helwan Cement	1995	29.6	170,000,000
El Nasr Clothing & Textile Co.	1995	8.16	25,000,000
Egyptian Elector Cables	1995	30%	27,000,000
Extracted Oil Co.	1995	20%	24,104,000
North Cairo Flour Mills	1995	20%	50,400,000
Alexandria for Pharmaceuticals & Chemicals	1995	21%	26,460,000
Nile for Pharmaceuticals & Chemicals	1995	20%	17,010,000
Heliopolis for Housing and Development	1995	20%	25,959,990
Middle Egypt Mills	1996	23.53	39,600,000
Nasr City Housing & De.	1996	70.00	182,000,000
Egyptian Fin. & Ind. Co.	1996	70.80	69,000,000
Southern Cairo Mills	1996	39.92	31,137,600
Egy. Starch & Glucose	1996	30.00	48,300,000
Ameriya Cement	1996	12.50	115,000,000
Kafr El Zaiat for Insecticides & Chemicals	1996	69.69	24,252,120
El Naser Deyhydrated	1996	58.96	17,922,700
Nile Match Co.	1996	54.58	29,470,770
Misr Oil and Soap	1996	52.93	98,442,980
Middle and West Delta Flours	1996	61.02	183,048,000
Development and Popular Housing	1996	62.60	63,543,495
Telemisr	1996	66.27	26,508,000
Upper Egypt Flour Mills	1996	61.00	170,800,000
MI Bank	1996	10.00	116,250,000
East Delta Flour Mills	1996	61.00	113,460,000
Arab Cotton Ginning	1996	62.65	37,923,255
Mamphis Pharmaceuticals	1996	40.00	50,005,700
General Co. for Silos and Storage	1996	51.03	115,440,000
Cairo Pharmaceuticals	1996	30.00	48,852,000
Al-Ahram Beverages	1996	15.00	40,500,000
Helwan Cement	1996	31.00	465,000,000
Al-Ahram Beverages	1997	75.00	231,187,500
Ameriyha Cement	1997	17.00	241,400,000
Nile Cotton Ginning	1997	20.00	50,400,00
PACIN	1997	13.13	170,625,000
Uniarab	1997	10.00	42,780,000
Egypt Free Shops	1997	30.00	42,000,000

Source: Hassan, A.W., Stock Exchange and Its role in Achieving the Objectives of Transferring Projects of Business Sector to Private Ownership, Cairo: Dar El-Nahda, 1996, pp. 410-12, and EFG-Hermes 1997, pp. 37.(N/A= not available).

3.2 MICROSTRUCTURE OF THE EGYPTIAN STOCK MARKET

The market microstructure literature can be divided into two related approaches. The first approach focuses on the details of the trading process. The major elements of this process include the generation and dissemination of information, the arrival of orders, and the rules, institutions, and other design features of a market that determine how orders are transformed into trades, [see, e.g., Schwartz (1988, 1991), Lee et al. (1991), and Brown et al. (1992)].

The second approach was basically developed to explain volume-volatility interrelationships for stock markets. One group of this approach may be labelled *the mixture of distribution hypothesis*, [see, e.g., Clark (1973), and Epps and Epps (1976)]. Models for testing this hypothesis are based on the assumption that the variance per transaction is monotonically related to the volume of that transaction and, further, it is assumed that a mixing variable is the cause of the joint volatility-volume relationship.

Another group of the second approach is the sequential arrival of information view, developed and extended by Copland (1976, 1977) and Jennings and Barry (1983). In this model Copland focused on the volume of asset trading and he assumes that information is disseminated sequentially from one group of traders to another and the individuals demand curve shifts sequentially as new information is revealed to them. This sequential arrival of information creates numerous intermediate equilibria prior to the final complete equilibrium. The change from one equilibrium level to another creates price changes at the same time as it generates volume.

Other models focus on the interrelatedness of bid-ask spreads, volume and volatility and, in particular, in explaining the U-shaped curves generated for both volume and volatility against the spread, [see, e.g., Admati and Pfleiderer (1988) and Brock and Kleidon (1992)]. Moreover, the heterogeneous models of trader behaviour represent an important category in explaining the interrelationships of the key market indicators. Amongst this class of model the noise trader paradigm of De Long et al. (1990) is the most representative. According to the noise trader model, trade is based on noise traders having a dispersion of explanations concerning the future value of the asset price. This, in turn, can generate considerable trading volume and price volatility as prices are driven far from their equilibrium values.

Nevertheless, due to the lack of data about the volume in the Egyptian securities market, we adopt the first approach for analyzing the microstructure of the Egyptian Stock Exchange (ESE). It is intended to enhance an understanding of this market by presenting its profile and current status. Thus, this section is divided under several headings including:

1. The trading system.
2. The trading procedure (i.e. Placing Orders; Types of Orders; Transmitting Orders; Execution of Orders; Price Determination; and The Participants).
3. Egyptian Stock Market Indices.
4. The Mechanism of Making a New Issue on the ESE.
5. The Price Mechanism of the Egyptian PIPOs Market.

3.2.1 The Trading System

According to Cohen et al. (1986), there are a number of different exchange trading systems which can be divided into two broad categories; batch or continuous. In a batch system, orders are collected and then crossed as a single transaction. However, in a continuous system trades occur whenever two orders cross. Continuous systems are further sub-classified into two distinct systems: auction or order-driven system (where brokers act as agents for the ultimate customers) versus dealer or quote-driven system (where an intermediary makes the market by satisfying the ultimate customer's order from the intermediary's own account).

Auction or order-driven markets emphasize an accurate assessment of supply and demand by requiring all orders to interact. Trading is done by brokers who simply accept buy and sell orders from investors and let the price of a security be determined by demand for and supply of that security in the marketplace. In contrast, dealer or quote-driven markets emphasize market liquidity by increasing market continuity and price stabilisation. Market continuity is achieved by minimising the time it takes for investors to trade, while price stabilisation is obtained by minimising the deviations of the market price from the intrinsic value. Market continuity and price stabilisation represent major functions of market makers. Most markets are neither complete auction systems nor pure dealer system, as they allow customers to compete with official market makers by entering limit orders.

The Egyptian stock exchange can be described as an auction or order-driven market system. It is described as an auction market because (a) the matching of orders is centralized; (b) the determination of prices is based on competitive auction rules;

and (c) until now the market has no market-maker. The market concentration principle requires that all orders in listed stocks must be submitted to the Stock Exchange. In addition to the market concentration principle, the auction rules are based on the two other essential principles of price priority and time precedence. The price priority principle is that market orders, which do not specify execution price, take precedence over limit orders, which specify execution price; and that, for limit orders, sell orders with the lowest price are first matched with buy orders with highest price. The time precedence principle means that, for two or more orders with the same price, the earlier order takes precedence over the others.

Several reasons may explain the adoption of this pattern in Egypt. First, the role of individual investors is aimed to be significant in the Egyptian securities market. In contrast, the typical dealer or quote-driven markets are dominated by institutional investors. Second, the relatively low trading cost may be another consideration which dictated the securities market in Egypt to adopt the order-driven market system. Third, regulatory considerations are less complicated. For the effective performance of the dealer system, regulators must pay attention to the risk exposure and capital adequacy of market makers who normally deal with large institutional investors and counterbalance the market trend.

However, as the trading volume increases and the role of institutional investors becomes more prominent in the Egyptian securities market, the need for market makers may arise. Additionally, the question of the capital adequacy of exchange member firms becomes more serious as they tend to take positions in other markets for bond and derivative securities as well as international securities markets, even if domestic equity market remains order-driven without intermediaries.

Although there is a long debate about the adoption of the order-driven system in the Egyptian stock market, we suggest that there is no pressing need for adopting a dealer system. Our justification is that, first, it is too early to indicate that the new order-driven system has failed or not. Second, the cost of implementing a dealer system proved to be considerable. Third, a dealer system might result in the monopoly of market making by a few, large international securities companies with large capital. Finally, the protection of existing brokers' profit margin is needed. In the following section, the trading procedure on the Egyptian stock exchange is described in details.

3.2.2 THE TRADING PROCEDURE

- ***Placing Orders***:

In placing orders, a client who wishes to buy or sell securities gives his instructions (order) to his agent, or he may use the services of a bank, or a banker. The Egyptian stock exchange requires some essential information to be given in placing orders, such as: the nature of the transaction, i.e. buying or selling, the number of securities which the transaction is to involve; the price at which the order is to be executed; the length of time for which the order is valid; the name of security; and the type of coupon (if applicable).

- ***Types of Orders***:

Two major types of orders are executed by stockbrokers on the Egyptian stock exchange. First, the market order, i.e. "at best" , which occurs when it is left to the broker to execute the order at the best price available in the market. Second, the "limit order" which occurs when the person placing the order fixes the price at which he/she wants the transaction to be executed. He/she gives a maximum price in the case of a purchase and a minimum price in the case of a sale.

- ***Cover***

Although at present forward trading does not take place in the Egyptian securities market, it is specified that, if and when it does, a deposit may be required by the other party.

- ***Transmitting Orders:***

If an investor deals directly with his broker, then he gives him the order directly. If an investor deals through his bank, he gives the order to his bank, which forwards it to their broker. Telephone orders should be confirmed in writing, but, in practice, if the bank or brokers know their clients well, written confirmation may be a mere formality completed some time after the bargain has actually been conducted. Banks may have standard forms for written orders and for confirmation of telephone orders. Then, a client's order is transmitted to his broker's (or his bank's) representative on the floor on the Stock Exchange.

- ***Execution of Orders:***

Prior to Law 95 of 1992, in the Egyptian Stock Exchange the jobbers stood at a post on the trading floor (or sometimes operated by a telephone) and chalked on boards the securities handled by them and their mid spread prices (i.e. prices in the middle of their bids and offers). Floor brokers holding customers orders walked around the competing jobbers and got bid-offer quotations, but without quantity offers from each jobber, without disclosing whether they wish to buy or sell or were 'just looking'. The broker then had to select the best counterpart jobber quotation for his customer. The jobber so selected would normally then take the full amount of the broker's order at the quoted price. If the broker had a relatively large order, he would ask the jobber to specify the amount he will deal on either side of his quotation.

However, the situation is different after the implementation of Law 95 of 1992, where the Egyptian stock exchange introduced the stock market automated trading system in a limited operational base to replace the traditional manual handling of orders. The new automated trading system receives and classifies orders by issue input through system terminals installed in securities companies located across the country. It then generates a table of orders per issue on the screen of the system monitor installed at the post.

All securities transactions are conducted on the trading floor posts. Each post is equipped with computer terminals for entering trading and market information. Stock exchange employees, stationed at each post, simply serve as auctioneers, and play no role in market making. Member firms of the Egyptian stock exchange simply pass their client's orders to the exchange employees at each trading post. In addition to the usual principles of auction on the basis of prices, time, and customer priority, the Stock Exchange imposes a size priority on its action process. Hence, a large order takes precedence over a small order given simultaneous bids and offers at the same price. A single opening price is determined for each trading session. The following section explains the price determination in the Egyptian stock exchange.

- ***Price Determination***:

The daily regular trading session is conducted from 10.30 a.m. to 15.30 p.m. The Egyptian auction's method establishes prices at the beginning of a trading session, after an interruption in trading, or at the end of a session. For each stock, all orders received during a specified period are placed according to the price priority principle only, and sets the opening price so as to clear the market. Once the opening price is established, stock prices are set on an on-going basis till the end of the session, when the closing price is set.

In order to explain the pricing mechanism in the Egyptian stock exchange we assume the following example. Suppose, that during a specified period preceding the opening of a trading session, sell and buy orders for a given stock have been received as indicated in Table 3-6. This represents a trading record of the stock exchange transactions. The record lists the numbers of orders by type, price, and the firm (indicated by A through C in our example). For instance, the table indicates that company A has a market order to sell 6,000 shares, a market order to buy 5,000 shares, a limit order to sell 3,000 shares at LE 40 per share, a limit order to buy 2,000 shares at LE 40, and so forth.

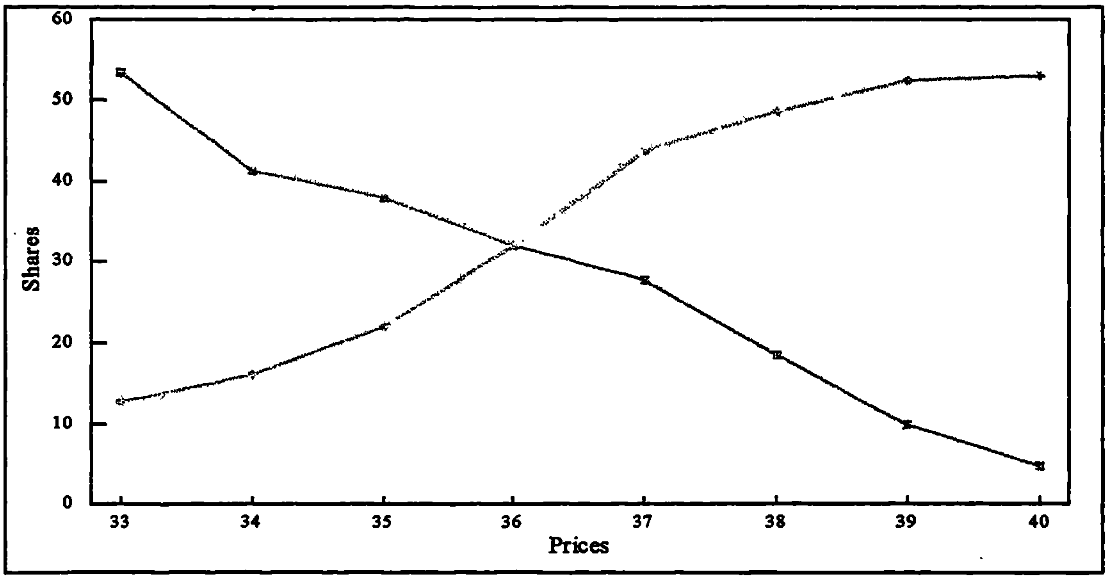
This particular configuration of sell and buy orders can be translated into a set of demand and supply schedules of the type depicted in Figure 3-2, where quantity is drawn along the vertical axis and price along the horizontal axis. Market orders, which do not specify a price, would simply shift up the demand and supply schedules vertically. Then the simply shift clears when the price LE 36 per share and 32,000 shares are exchanged.

Table 3-6 An example of the order execution in the Egyptian Securities Market (in thousands of shares)

Total	Selling	Price (LE)	Buying	Total
13	3 6 4 B A C	Market orders	5 3 2 A B C	12
3	3 A	40	2 1 A B	3
6	2 3 1 A B C	39	1 2 2 C A B	5
9	4 5 B C	38	4 1 C A	5
13	5 9 A C	37	9 A	9
5	5 B	36	3 5 1 B C A	9
4	3 1 C A	35	5 C	5
1	1 B	34	3 2 A B	5

A, B, C refer to the respective member securities companies of the exchange.

Figure 3-2. Opening Price Determination in Egyptian Stock Exchange (in Egyptian pounds, in thousands of shares)



After the initial price has been established and market orders, limit sell orders of LE 36 or less, and limit buy orders of LE 36 or more have all been executed, the trading record would looks like the one depicted in Table 3-7. For the execution of the remaining orders, the order of execution moves from high to low (that is 35, 34, and so on) for buy orders, and from low to high (37, 38, 39, and so on) for sell orders.

Table 3-7 Beginning of a Trading Session (in thousands of shares)

Total	Selling	Price (LE)	Buying	Total
		Market orders		
3	3	40		
	A			
6	2 3 1	39		
	A B C			
9	4 5	38		
	B C			
13	5 9	37		
	A C			
		36		
		35	5	5
			C	
		34	3 2	5
			A B	

Figure 3-3 is a graphical representation of Table 3-7. With the aid of Figure 3-3, we may consider two possible movements of stock prices in the Egyptian stock exchange. First, suppose that a large (relative to existing limit orders) market order comes to the exchange. If it is an order to buy 25,000 shares, it would be matched with (a) the limit sell orders of 13,000 shares at LE 37, (b) the limit sell orders of 9,000 shares at LE 38, and (c) the limit sell orders of up to 3,000 shares at LE 39. Thus the transaction price moves from low to high, namely from LE 37 to LE 38, then to LE 39. On the other hand, if the market order is an order to sell 7,000 shares, it would be matched with (a) the limit buy orders of 5,000 shares at LE 35, and (b) the limit buy orders of up to 2,000 shares at LE 34. Thus, the transaction price moves from high to low, namely from LE 35 to LE 34, then to LE 34.

Second, suppose that small (relative to existing orders) market sell and market buy orders randomly come to the exchange. The market sell order would be matched with existing limit buy order at LE 35 per share, and the market buy order with existing limit sell orders at LE 37 per share. This means that, as long as there are limit buy orders at LE 35 and limit sell orders at LE 37, the transaction price moves back and forth between LE 35 and LE 37.

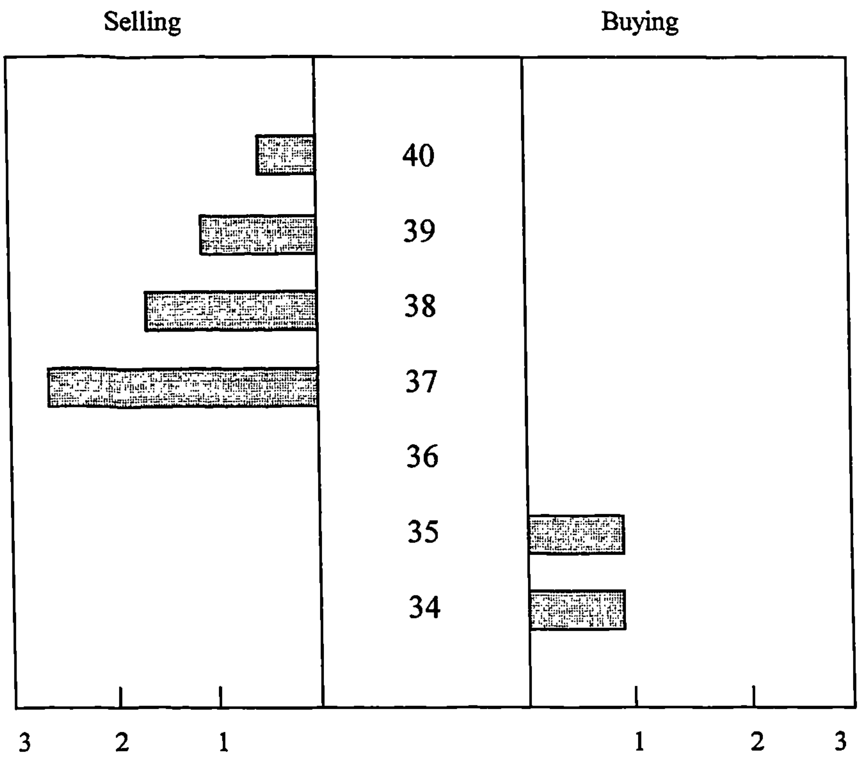


Figure 3-3 Price Determination in the Egyptian Securities Market

- ***The Participants:***

In the Egyptian securities market the participants can be classified into three groups: issuers, investors, and intermediaries. Issuers in the Egyptian stock markets include the government, state enterprises and banks, and private banks and corporations. Investors are institutions and individuals. Financial institutions (including commercial banks, finance companies, securities companies, and insurance companies), are significant purchasers of securities. Foreign investors are permitted to purchase stocks without restriction. There are also no restrictions regarding the repatriation of income generated from such instruments.

The main underwriters and dealers are commercial banks, investment banks, securities companies and finance companies. Commercial banks operating in Egypt are involved in traditional banking areas such as deposit-taking, lending and foreign exchange dealing. They are increasingly active in custody and investment advisory, and are major participants in securities underwriting. Investment banks are involved in primary and secondary dealing of debt and equity securities, as well as corporate finance, investment advisory and securities custody. Currently, there are 32 investment banks operating in Egypt. Recently, finance companies play a reasonably specialised role in Egypt, centred primarily on secondary market trading of equity securities. They have also established themselves in the securities settlement and custody business. Finally, securities companies in Egypt, act primarily as brokers of equity securities; to a lesser degree are also involved in advisory and investment management work.

In Egypt, the broker has a fundamental obligation to act for his client and not for himself. Otherwise their relationship would not retain the important elements of good faith and trust. If, for example, a broker who has been instructed sell buys the shares for himself, he is acting as an agent for his client, but also as a principal for himself. This is a transaction which the law will not enforce - for the broker who is instructed to deal in the market cannot make a short circuit for his obligation by taking the transaction out of that market. Moreover, if a broker is employed by his client to sell shares and sends his client a contract note which omits the name of a jobber or other purchaser, the broker does not become a principle and liable to the client for the purchase price of the shares. However, the broker may act as principle with his client's consent. A client is, of course, free to conduct his business affairs in his own way. He might be agreeable to his broker dealing with him as a principle. Then, if he claims to rescind the contract the broker can say by way of defence (a) that he made full disclosure that he was acting on his own behalf, and (b) that his client consented to that situation.

The scales of a broker's commission are regulated by the Rules and Regulations of the Stock Exchange. Therefore, if a broker tries to extract a profit over and above his commission as broker he becomes, to that extent, a principle in the matter and, to that extent, he is in breach of his duty to act as an agent. Thus, a broker who makes a profit over and above his commission must account for it to his client.

3.2.3 EGYPTIAN STOCK MARKET INDICES

Generally, the purpose of an index is the same as that of an average. In its simplest form an index is an average stated with reference to a base value which is generally set at 100 at some prior point in history. Although averaging may be used in the calculation of the index, weighting schemes are more generally encountered in the Egyptian stock market. This different method of calculation is chosen to eliminate some of the shortcomings inherent in simple averaging.

There are several indices in the Egyptian stock market, and none of them can be considered wholly authoritative. The ones which come to being considered the official index are those calculated by the Capital Market Authority, namely: the daily General Index of the Egyptian stock exchange, the daily Public Subscription Index, the daily Closed Subscription Index and eight daily semi-composite indices on the sectoral level: (a) all agriculture, (b) all mining, (c) all construction, (d) all manufacturing, (e) all transportation, (f) all trade, (g) all finance, and (h) all services. Table 3-8 summarizes background information concerning stock market indices computed by the Capital Market Authority in Egypt for eleven indices.

Table 3-8 Egyptian Stock Market Indices on January 2, 1992 (the base date)

Index Name	Composition
General Index	all listed firms
Public Subscription	148
Closed Subscription	444
Agriculture	35
Mining	8
Construction	88
Manufacturing	233
Transportation	27
Trade	51
Finance	130
Services	86

In addition, there are some other indices such as: Egyptian Financial Group (EFG) index, Hermes index, and International Finance Corporation (IFC) index. The EFG index is a capitalization weighted index of the 40 most actively traded stocks. The index was initiated on January 2, 1993, at a value of 1000.

In the following, we outline each of these indices. The Hermes index is similar to the EFG index; this is because the two competed before EFG and Hermes Financial emerged. The Hermes index is a capital-weighted index and covers the shares which trade actively on the exchange. However, the Hermes index is somewhat wider in scope because of its extra constituents and because it includes different classes of companies' shares. Finally, the IFC index is also a capitalisation weighted index of 49 established companies. When the IFC included Egypt in its emerging markets Global Composite Index, Egypt took a weight of 0.1 percent. As of the beginning of February, 1996, Egypt's weight in the IFC index was around 0.7 percent, reflecting the market's increased capitalisation through new issues and high stock prices. All the indices are calculated using the market-value-weighted formula by:

$$\text{Current Index} = \frac{\text{Current Aggregate Market Value}}{\text{Base Aggregate Market Value}} \times 100$$

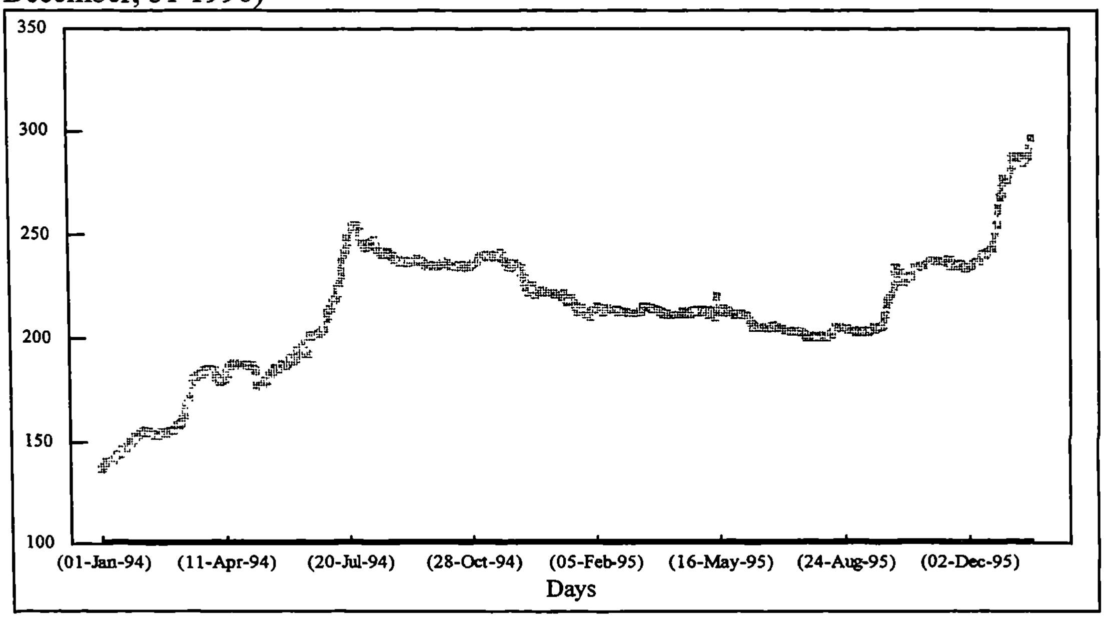
where the base index value is 100 recorded on January 2, 1992. Virtually, the above calculation of these indices accomplishes two things. First it makes the index responsive to the total value of the issues involved. Second, it eliminates the sensitivity of the index to stock splits since the product of stock price times number of shares outstanding remains constant. For the purpose of the continuity of the reported index numbers, the base market value must be adjusted for: (a) a new listings; (b) delistings; (c) rights offerings; (d) public offerings (e) private placements;

(f) mergers; (g) exercises of warrants; and (h) conversions of convertible securities into common stock. In contrast, a corporate decision which does not change the market value of the shares requires no adjustment of the base market value. Therefore, stock splits, capitalisation issues (bonus issues), and stock dividends entail no adjustment, because the new shares multiplied by the increased (or decreased) number of shares remains the same as the old share price multiplied by the old number of shares. Thus, the formula for adjustment is given as follows:

$$New\ Base\ Market\ Value = Old\ Base\ Market\ Value \times \frac{New\ Market\ Value}{Old\ Market\ Value}$$

The major composite index in Egypt is the General Index. This index is not the subject of a great deal of controversy. All listed firms and industry groups are represented. Figure 3-4 illustrates the daily price movements of the General Index from January 1994 to the end of December 1996.

Figure 3-4 Daily Price Movement of the General Index (January 1, 1994 to December, 31 1996)



3.2.4 THE MECHANISM OF MAKING A NEW ISSUE ON THE EGYPTIAN STOCK EXCHANGE

Firms coming to the market need to time the operation carefully. In order to raise cash at acceptable cost, the business must be able to present itself to the investing public as an attractive investment. In Egypt, a company seeking a listing must be represented by a broking member firm. Thus, the company, or its advisor, will approach one or more stockbroking firms and appoint them as the sponsoring broker(s) to the new issue. The company will produce drafts of the prospectus and other documents through the sponsoring broker for checking by the Quotations Department. The latter will advise on what further information is necessary for disclosure to the public before listing can be granted. At the same time, the sponsoring brokers will be advising on the price at which the issue is likely to be acceptable to investors. The determination of the issue price is the responsibility of the company and its advisors and is not discussed with the Quotations Department.

The timing of an issue is controlled by the Capital Market Authority to which the sponsoring broker applies for "an impact date". On this date the issue is announced and the underwriters are approached. The responsibility of the Capital Market Authority in this respect is to ensure that the announcements of large issues do not coincide, that the total of underwriters liabilities at any one time is not excessive and that, for offers for sale, the closing dates and first days of dealing in the new stock are reasonably spread. The Capital Market Authority does not judge the quality of the issue or regulate whether the money is to be invested, for example, in manufacturing industry or financial services; this is solely determined by the competition between the users of capital and their ability to meet the requirements of investor as reflected in the market.

Immediately before the announcement of a new issue the principal underwriting is agreed. When the underwriting of an issue is complete, and prior to the subscription for the shares, the sponsoring broker will apply formally to the Quotations Committee for a listing. When the listing has been granted, the Stock Exchange's role, which until that time has been to ensure that all information is available to potential subscribers, changes to one of continuing supervision so that existing shareholders and potential new shareholders are kept aware of all changes in the company's situation as soon as they occur. The discipline of full disclosure can be fairly onerous for a specific company but does ensure that all shareholders are kept equally well informed and that there is no false market.

3.2.5 THE PRICE MECHANISM OF THE EGYPTIAN PIPOS MARKET

A unique aspect of the Egyptian PIPO market is that the governmental influence on the decision of the offer price has been very substantial. The government established the rule for security analysis for the calculation of the offer price and has applied this rule to all privatised issuing firms.

According to this rule, the three main figures of firm value per share must be taken into account in deciding the offer price. Those three figures are the earning value which is the sum of future dividends per share discounted at the official interest rate, the asset value which is the net asset value per share plus the proceeds from the offering per share, and the relative price which is the firm value per share estimated from the market price of a comparable firm already gone public. In applying three figures the earning value can be used as the offer price only when it does not exceed the asset value, and the weighted average of those two figures is used if the asset value is greater than the earning value. The relative price can be taken as the offer price only if it does not exceed the earning value. If it does, then the arithmetic average of those two numbers is used.

The goal of government policy is that the estimation of the corporate value to be used as the offer price should be as conservative as possible. Understandably, the government approach can lead to the underpricing of IPO firms, and in some cases to the underpricing of an unbearable extent. Recently, the Egyptian government authorities realized that their formula is inappropriate and detrimental to the development of securities industry. Thus, they undertook a policy under which underwriter sets the offer price in negotiation with the issuer so that pricing in PIPO shares has become much more flexible. Nonetheless, the pricing process is still under the supervision of government authorities. Virtually, a more liberalized pricing system is required with which the mandatory application of the rule for security analysis should be eliminated from the offer price decision.

3.3 SUMMARY

This chapter has presented a general review of the structure of the Egyptian capital market. Two meaningful observations can be highlighted from this review. First, the structure of the Egyptian stock market seems to be different in comparison with the developed capital markets. In the previous chapter, we found some unique performance in IPOs prices in such developed capital markets. In particular, we clarified the role of the investment bankers in these markets. This is of interest because some studies tend to use the trading system per se to explain the price performance of the IPOs in the developed capital markets. For example, a greater volatility in the initial period is thought to be caused by investment bankers who want to underprice the IPOs in such markets.

On the Egyptian stock exchange, trading is performed through the floor-traders whose duty is essentially clerical. Nowadays, they receive market orders and record them in the computer. The quantities are negotiated on a bilateral basis. Unlike in developed capital markets, where investment bankers buy and sell for their own accounts and have an obligation to stabilise prices and supply liquidity to the market, the floor-traders do not take a position in the stock transactions. They do not buy or sell stocks in order to ensure price stability nor do they have the duty to do so.

The second observation in this chapter is the increase in the market activity. With this increase, it has become necessary to confront the elements that pose obstacles to such activity. Lack of transparency and non-availability of information are often cited as obstacles to the market. However, companies are now becoming more accessible, using the Capital Market Authority information system, an up-to-date system that guarantees reliable low-cost information and data on companies listed on the market.

CHAPTER FOUR

EFFICIENCY AND STOCHASTIC PROPERTIES OF STOCK DAILY RETURNS IN EGYPT(1994-1996)

4.0 INTRODUCTION

Before examining the price performance of initial public offerings in the Egyptian stock market, we should understand and examine the whole market at the domestic and international levels as a preliminary step. Hence, in the present chapter we analyse the time series properties of this market, using eleven domestic available indices. Then, in Chapter five, we investigate the issue of its internationalization among eighteen emerging stock markets.

Even though this market has grown rapidly since its reformation and has been the subject of several changes. Its efficiency and stochastic properties have not yet been investigated. The issues of its efficiency and randomness are important in the context of market integration and globalization. It will also help us to enhance our understanding of this fast-growing and increasingly important market in the Middle East. The distribution of stock returns is an important issue in finance. Asset returns in finance are being usually modelled as generated by a stochastic process with certain characteristics. Concepts such as return and risk in the mean-variance analysis and efficient market hypothesis depend on the assumptions of the distribution of asset returns.

This chapter is organised as follows. Section 4.1 gives some stylised facts about our stock returns data, and compare the empirical distribution with the normal distribution. Section 4.2 demonstrates that the variance of Egyptian stock returns is time-varying in the GARCH context. It also investigates the integratedness of the volatility of such returns. In section 4.3, we test the assumption of stationarity against the random walk alternative. In section 4.4, we address the efficiency issue using the recently developed cointegration procedure. Finally, we provide a summary and conclusion of the findings provided in other sections.

4.1 EXAMINING THE ASSUMPTION OF NORMALITY

4.1.1 INTRODUCTION

There are many reasons for using the assumption of normality in finance. The most important one is that the normal distribution is fully described by only two parameters, the mean and the variance. That is, an asset is fully described by its expected rate of return (mean) and its expected risk (variance). In such a case, investors either minimise the expected variance for a given level of expected return or maximize expected return for a given level of expected variance [Levy and Sarnat (1984)].

As an important extension of the mean-variance analysis, the two-fund separation theorem is based on the same assumption. This theorem says that all efficient portfolios can be constructed as linear combinations of the market portfolio and a riskless asset. Thus, the only role for the individual investor is to choose the appropriate combination of the market portfolio and the risk-free asset, which makes his degree of risk aversion [Ross (1992:31-39)].

Furthermore, in the practical implementation of the mean variance analysis, the two-fund separation theorem and the CAPM, it is assumed that asset return distributions as well as the covariance structure among individual assets are stable over time, with the implication that unconditional historical estimates of the distribution parameters (i.e., mean and variance) as well as of the covariance structure among individual securities, can be used in portfolio optimisation (Frennberg (1994:12)].

Based on theory, we expect that asset returns in general, and daily stock index returns in specific, to be normally distributed. It is given that the return on a stock index is a weighted sum of returns on individual stocks. Since the sum of normal variables is normally distributed, stock index returns would be normally distributed if returns on the individual stocks were normal. This argument comes from the assumption that the return over a specific period interval (for example one day) can be seen as the sum of independent and identically distributed returns over small trading intervals (say 15 minutes or so).

Normality can be proven by applying the central limit theorem, which says that (if and only if) the variance of the random variables is finite then, in the limit, the sums of identically distributed random variables approach a random distribution (Kendall and Buckland (1967:38)]. However, if short interval returns do not have a finite variance and/or do not have a stable distribution over time, then the central limit argument can not be applied. Thus, the assumption of normality is not only very often used, it is also based on a very sensitive theoretical reasoning. We will examine its empirical support in the following section.

4.1.2 DATA AND METHODOLOGY

In this section we examine the validity of the normality assumption of daily stock returns on the Egyptian stock market. The data are the eleven daily closing indices of the Egyptian Capital Market, namely, the daily price indices of eight sectors (agriculture, mining, construction, manufacturing, transportation, trade, finance, and services), the public subscription index, the closed subscription index, and the general index. This study covers a period of 751 days, starting from January 1994 to December 1996. These indices are quoted from *the Monthly Statistical Reports of Securities Market in Egypt*. A complication we faced is that these indices are not adjusted for dividends. This is not ideal from a theoretical point of view, but they are the best available indices for the period under consideration.

However, since the objective of this section is to model non-linear dependencies in stock returns, we would expect that dividend adjustment would not affect our results. This point has already been discussed in French et al. (1987) and Corhay and Rad (1994). They mention that the dividend adjustment has little or no effect on the estimates of their models. For example, French et al. (1987) use S & P returns which do not include dividends. They argue that since the ex-dividend days are different for different stocks in the S&P composite portfolio, there are not large changes in the daily index due to dividend payments. They compared the estimates of monthly volatility computed from daily data for the CRSP value-weighted portfolio of NYSE and American Stock Exchange stocks with the estimates for the S&P composite portfolio from July 1962 through December1984 and they were very similar. The daily returns of the market indices in our sample are calculated as the difference in the natural logarithm of the closing index value for two consecutive trading days,

$$R_t = \log(P_t) - \log(P_{t-1}) \tag{4.1}$$

The standard test statistics for the assumption of normality are the coefficients of skewness and kurtosis, which are the expected value of the third- and fourth-order moment, respectively. It is given that in a symmetrical population, mean, median and mode coincide. Taking distance from mean to mode or mean to median, the skewness of the distribution can be measured. Stuart and Ord (1994) mention that Pearson (1895) proposed the measure of skewness as: (mean- mode)/σ, which is subject to the inconvenience of determining the mode. For a wide class of distributions, this measure is expressed in terms of the first four moments. Stuart and Ord (1994) and Doonik and Hansen (1994) define measures of relative skewness and kurtosis, as $\beta_1 = \mu_3^2 / \mu_2^3$ and $\beta_2 = \mu_4 / \mu_2^2$, respectively, where, μ_3^2 is the third moment about the mean, squared, μ_2^3 is the second moment about the mean, cubed, β_2 is the ratio of the fourth moment about the mean divided by the variance squared. However, those authors provide more convenient quantities than β_1 and β_2, namely:

$$\gamma_1 = \sqrt{\beta_1} = \frac{\mu_3}{\mu_2^{3/2}} = \frac{k_3}{k_2^{3/2}} \tag{4.2}$$

$$\gamma_2 = \beta_2 - 3 = \frac{\mu_4}{\mu_2^2} - 3 = \frac{k_4}{k_2^2} \tag{4.3}$$

If the distribution is standardised , γ_1 and γ_2 are its third and fourth cumulants. The coefficient of skewness is zero for any symmetric distribution as the normal distribution (i.e. β_1 disappears with μ_3). In general, the ratio of μ_3 to $\mu_2^{3/2}$ (i.e. γ_1) will give some indication of the extent of departure from symmetry. The γ_1 also takes the sign of μ_3, and therefore, gives the sign to the skewness: negative γ_1 indicates a distribution that is skewed to the left of its mean (i.e. the lower tail is heavier and mode > median > mean), and a positive γ_1 indicates a distribution skewed to the right of its mean (i.e. the upper tail of the distribution is the heavier, and that mean > median > mode). The coefficient of kurtosis measures the degree of peakedness of the distribution. For a normal distribution the expected value of the coefficient of kurtosis $\beta_2 = 3$ and γ_2 is zero and known as mesokurtic. Distributions for which $\gamma_2 < 0$ are called platokurtic (flatter or shorter than normal), and values of γ_2 above zero are called leptokurtic (slim or long-tailed). Taken together the skewness and the kurtosis coefficients are fairly sensitive to detect any departure from normality. In testing skewness and kurtosis, we first calculated the sample moments: $M_r = \sum_{i=1}^{n} x_i^r$, where n is the number of observations, r is the natural logarithm of returns. Then we calculate the first four sample cumulants (Fisher's K-statistics), see Kanji (1993:42):

$$K_1 = \frac{M_1}{n},\ K_2 = \frac{nM_2 - M_1^2}{n(n-1)},\ k_3 = \frac{n^2 M_3 - 3nM_2M_1 + 2M_1^3}{n(n-1)(n-2)}, \text{ and}$$

$$K_4 = \frac{(n^3 - n^2)M_4 - 4(n^2+n)M_3M_1 - 3(n^2-n)M_2^2 + 12M_2M_1^2 - 6M_1^4}{n(n-1)(n-2)(n-3)} \tag{4.4}$$

In order to test for skewness, the test statistic is:

$$u_1 = \frac{K_3}{(K_2)^{3/2}} * \left(\frac{n}{6}\right)^{1/2} \tag{4.5}$$

Also, to test for kurtosis the test statistic is

$$u_2 = \frac{K_4}{(K_2)^2} * \left(\frac{n}{24}\right)^{1/2} \tag{4.6}$$

A combined test can be obtained using the test statistic:

$$\chi^2 = \left(\frac{K_3}{(K_2)^{3/2}} * \left(\frac{n}{6}\right)^{1/2} + \frac{K_4}{(K_2)^2} * \left(\frac{n}{24}\right)^{1/2}\right)^2 \tag{4.7}$$

which will approximately follows a χ^2 distribution with two degrees of freedom. Moreover, we use the X^2-test in order to test the departure of an empirical distribution from theoretical one. Another method for testing the normality assumption is the Studentized range statistics which has particularly good properties against symmetric short- or long tailed distributions, but it is completely insensitive to asymmetry [Frennberg (1994:15)]. In addition, in testing the normality assumption we use the Jarque-Bera (1987) test which is an asymptotic, or large-sample, test. It is also based on the OLS residuals. Using the results of skewness and Kurtosis measures, the JB test statistic can be defined as: $JB = n[(\gamma_1^2 / 6) + (\gamma_2^2 / 24)]$, where, γ_1 and γ_2 are the measures of skewness and Kurtosis, respectively, defined as in equations 4.2 and 4.3. Under the null hypothesis that the residuals are normally distributed, Jarque and Bera showed that asymptotically (i.e., in large samples) the JB statistic follows the chi-square distributions with 2 df. As a last method for testing the normality assumption we use the Kolmogrov-Smirnov D-statistic in order to test the null hypothesis of normality. This method has at least two advantages over chi-square test [Lillifors(1967)]: "(1) It can be used with small sample size, where the validity of the chi-square would be questionable. (2) Often it appears to be a more powerful test than the chi-square test for any sample size."

Using the Kolmogrov-Smirnov D-statistic, we determine:

$$D = \max\left|F^*(X) - S_n(X)\right|, \tag{4. 8}$$

D = the maximum difference between $F^*(X)$ and $S_n(X)$, $S_n(X)$ = the sample cumulative distribution function calculated as: $Sn(x_i) = \frac{cu(x_i)}{n}$, $F^*(X)$ = the cumulative normal distribution function with $\mu = \overline{X}$, the sample mean, and $\sigma^2 = s^2$, the sample variance, defined with denominator n-1, and calculated as $f(x) = \frac{e^{-\mu}\mu^x}{x!}$, where x is the order of the sample observations. If the value of D exceeds the critical value, one rejects the hypothesis that observations are from a normal population [see, Kanji (1993:67)].

4.1.3 EMPIRICAL RESULTS OF NORMALITY TESTS

Several basic statistics, listed in Table 4-1, shed some light on the Egyptian market. First, with the exception of the mining sector, all indices have positive mean stock returns. In particular, the finance sector, and public subscription stocks have the two highest mean stock returns. In the case of standard deviation of stock returns, the indices of closed subscription, and the sectors of manufacturing, finance, and transportation manifest themselves in greater fluctuations. The χ^2-test shows that it is extremely unlikely that the returns were generated for a normal distribution. Also, the results of the Studentized range reject the normality of the Egyptian stock prices series distributions. Finally, Jarque-Bera statistic indicate that none of the indices has a normally distributed return. These results confirm the well known fact that daily stock returns are not normally distributed. However, the results of the Kolmogrov-Smirnov test do not confirm this conclusion, where non of the calculated values of *D* not lower than the critical value, hence, we could not reject the hypothesis that observations are from a normal population. Finally, it can be observed that all distributions are positively skewed, except for the mining index, indicating that they are non-symmetric. Furthermore, they all exhibit high levels of kurtosis, indicating the existence of leptokurtic distribution of the data which provides a justification for our use of a GARCH model in the following section.

Table 4-1 Sample Statistics on Daily Returns Series

Index*	1	2	3	4	5	6	7	8	9	10	11
$\mu\ (\times 10^3)$	0.7000	-0.0600	1.0700	1.1600	0.2100	0.3800	1.6300	0.8400	1.4100	0.7400	1.0400
$t(\mu=0)$	2.1450	-1.0000	1.5170	2.9220	0.4000	1.3200	3.0210	2.7870	4.1400	0.9200	4.769
σ	0.0090	0.0020	0.0190	0.0110	0.0140	0.0080	0.0150	0.0080	0.0090	0.0220	0.0060
$M1$	0.5240	-0.0430	0.8040	0.8690	0.1550	0.2860	1.2180	0.6300	1.0580	0.5560	0.7780
$M2$	0.0600	0.0020	0.2810	0.0890	0.1510	0.0470	0.1640	0.0510	0.0670	0.3650	0.0270
$M3$	0.0020	-0.0001	0.1290	0.0090	0.0280	0.0060	0.0090	0.0006	0.0020	0.0010	0.0002
$M4$	0.0004	0.0000	0.0630	0.0020	0.0136	0.0010	0.0030	0.0001	0.0001	0.0580	0.0000
$K1(\times 10^4)$	7.0000	-0.600	20.000	10.000	2.0000	4.0000	20.000	8.0000	10.000	7.0000	10.000
$K2(\times 10^5)$	8.0000	0.2000	40.000	10.000	20.000	6.0000	20.000	6.0000	9.0000	50.000	0.4000
$K3\ (\times 10^5)$	0.2800	-0.010	20.000	1.0000	4.0000	0.8000	1.0000	0.0700	0.2000	0.0600	0.0200
$K4\ (\times 10^5)$	0.0480	0.0005	8.0000	0.3000	2.5000	0.1000	0.4000	0.0090	0.0200	8.0000	0.0020
γ_1	3.9600	-27.40	23.740	9.6100	13.040	16.170	3.6200	1.2300	2.3700	0.0550	0.9400
Test for γ_1	44.250	-306.6	265.53	107.55	145.89	180.91	40.510	13.730	26.530	0.6100	10.540
γ_2	75.940	748.97	594.25	187.31	449.26	331.68	88.430	19.450	24.670	324.93	12.190
Test for γ_2	424.79	4189.7	3324.2	1047.8	2513.1	1855.4	494.70	108.90	137.97	1817.7	68.000
X^2-test	1649.7	40945	228.88	4278.9	1441.5	66705.	3248.9	1171.8	545.55	23390	739.09
SR	23.87	27.40	27.03	25.14	37.62	29.15	24.10	15.27	17.60	37.40	14.24
JB	182418	17647220	11120664	1109429	6337023	3475174	246337	12027	19747	3303759	4760
D -test**	0.0007	-0.001	0.0011	0.0012	0.0002	0.0004	0.0016	0.0008	0.0014	0.0002	0.0010

Notes: Indices are: 1=Agriculture, 2=Mining, 3=Construction, 4=Manufacturing, 5=Transportation, 6=Trade, 7=Finance, 8=Services, 9=Public Subscription, 10=Closed Subscription, 11=General index. Underlined values indicates a rejection of *H0*, Normal distribution at the 95% level. SR = the Studentized range is computed as: (maximum-minimum)/standard deviation. JB= Jarque-Bera X^2 statistic for testing normality with df=2. The critical value of D for the Kolmogrov-Smirnov one sample test for 750 observations is calculated as: $1.63/\sqrt{750}=0.0595$ for the 1% level of significance (α), $1.36/\sqrt{750} = 0.0499$ for $\alpha = 5\%$, $1.22/\sqrt{750} = 0.044$ for $\alpha = 10\%$, $1.14/\sqrt{750} = 0.042$ for $\alpha = 15\%$, and $1.07/\sqrt{750} = 0.039$ for $\alpha = 20\%$ [see Kanji (1994:188)]. Underlined values indicates a rejection of *H0*, Normal distribution at the 95% level.

4.2 EXAMINING THE VOLATILITY OF EGYPTIAN STOCK RETURNS : GARCH MODELS

4.2.1 INTRODUCTION

In examining the assumption of normality in the Egyptian Capital we noted that the existence of leptokurtic distribution provides justification for our use of a GARCH model. The reason is that the efficient markets model depends upon not only the expected returns but also the whole stochastic process of such returns. The recent finance literature has been investigating the generating process of the pricing assets. For example, in time series analysis, much statistical evidence clarifies that the volatility of asset returns is time-varying with a tendency for shocks to decay through time. Thus, a variety of models are employed to evaluate the time-varying variance. One of these models is the Autoregressive Conditional Heteroscedastic model (ARCH) proposed by Robert Engle (1982) which provides a convenient framework with which to assess the time-varying variance. The ARCH model applies a time series autoregressive scheme of past squared innovation terms to the conditional variance equation. Bollerslev (1986) generalized the model to the Generalized ARCH model (GARCH) which provides a very long memory form of ARCH process.

Here, we summarize the statistical evidence and demonstrate that the variance of Egyptian stock returns is time-varying in the GARCH context. Furthermore, we also investigate the integratedness of the volatility of asset returns, i.e. test for unit roots of the conditional variance equation. The empirical results indicate that the volatility of Egyptian stock returns is integrated.

4.2.2 METHODOLOGY

Empirical evidence from daily stock return studies has provided some insight into the statistical properties of high frequency time series data. Several authors have noted time varying volatility in stock returns data, and rejected a homoskedastic error structure for conditional distributions [see, e.g., Akgiray (1989)].

Sterge (1989) has observed that financial returns data exhibits volatility. That is, large changes of either sign cluster together, with intervening periods of relative stability. This clustering could represent the arrival of information in clusters, or delays in the market adjustment process as traders try to measure its content. This is not an automatic refusal of market efficiency. As Engle et al. (1990) point out, if information arrives in clusters, then the asset returns or prices may exhibit ARCH behaviour even if the market perfectly and instantaneously adjusts to the news. In the alternative, even if the market takes time to resolve expectational differences, it is still informationally efficient in the sense of being unbiased.

One statistical property of stock return data on the Egyptian Stock Exchange is the divergence of the distribution from normal. The distribution of stock returns has fatter tails than the normal distribution. This leptokurtosis has been explained by some researchers by suggesting that the data is generated from a fat tail distribution that is stationary over time. Members of this distribution include the Paretian and Student-t. Others have suggested that the data comes from distributions that change over time.

A modelling technique that particularly fits the distributional properties noted above is the Autoregressive Conditional heteroscedastic (ARCH) and Generalized Autoregressive Conditional heteroskedastic (GARCH) formulations. These models allow the variance of returns to change overtime. The variance in one period can depend upon variables and disturbances from previous periods. Also as Bollerslev et al (1990) observe, the conditional normality assumption in ARCH generates some degree of excess kurtosis. These models have been used frequently to model stock return changes by a number of researchers (for example, Akgiray (1989) and Najand and Yung (1994) among others).

Engle's ARCH regression model is obtained by assuming that the mean of y_t (random variable) is given by X_t (independent variable) which is a linear combination of lagged endogenous and exogenous variables included in the information set Φ_{t-1} with β a vector of unknown parameters and h_t the variance of the errors.

$$\begin{aligned} y_t|\Phi_{t-1} &\sim N(X_t\beta, h_t) \\ h_t &= \alpha_0 + \sum \alpha_i \varepsilon_{t-1}^2 \\ \varepsilon_t &= y_t - X_t\beta \end{aligned} \tag{4.9}$$

Bollerslev (1986) extends the ARCH process to GARCH, which allows for a more flexible lag structure. The GARCH(q,p) regression model of Bollerslev is obtained by

$$\begin{aligned} \varepsilon_t &= y_t - X_t\beta \\ y_t|\phi_{t-1} &\sim N(0, h_t) \\ h_t &= \alpha_0 + \sum_{i=1}^{q} \alpha_i \varepsilon_{t-1}^2 + \sum_{j=1}^{p} h_{t-j} \end{aligned} \tag{4.10}$$

Bollerslev shows that the resulting GARCH(q,p) model is essentially a stationary ARCH(q) process. To simplify the GARCH(p,q) model, we consider a GARCH(1,1) case. The equation (4.10) can then be expressed as:

$$h_t = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \alpha_2 h_{t-1} \tag{4.11}$$

$$= \alpha_0 + \gamma \varepsilon_{t-1}^2 + \alpha_2 (h_{t-1} - \varepsilon_{t-1}^2) \tag{4.12}$$

where $\gamma = \alpha_1 + \alpha_2$; α_1, α_0, α_2 and γ are the parameters to be estimated; $\alpha_0 > 0$ and $\gamma \geq \alpha_2 \geq 0$ to ensure h_t to be positive. According to Engle and Bollerslev (1986), if the sum of $\alpha_1 + \alpha_2$ is close to one in the GARCH(1,1) process, then the model is known as integrated GARCH(IGARCH), which implies persistence of the conditional variance over all future horizons. That is to say that when $\gamma = 1$, the model turns to be an IGARCH(1,1) model and the parameter γ is for measuring the integratedness of h_t.

That is, the IGARCH formulation is introduced by Engle and Bollerslev (1986) to allow unit root(s) to enter the conditional variance equation. Unlike the ordinary time series analysis of a unit root in the mean equation, if a unit root appears in the variance equation in the IGARCH(1,1) sense, shocks to the system are not permanent but decay through time. Since the IGARCH has a very dispersed distribution, the conventional sample autocorrelation structure of the squared innovation terms and the Dickey-Fuller test statistic for the testing of the unit root in the mean may not be valid for the analogous unit root testing in the variance. However, the Wald statistic is proved to have an asymptotic Chi-square distribution under the null of a unit root in the variance as long as the statistic is based upon maximum likelihood estimation. Therefore, maximum likelihood estimation which embodies a heteroskedasticity correction turns out to be very important for the test of the unit root in the conditional variance equation.

Thus, if the IGARCH model is the data generating process, the parameter γ in equation (4.12) turns to be very convenient for testing the hypothesis that $\gamma = 1$. The simplest way to do the test is to take a Wald-t statistic which equals $(\hat{\gamma} - 1)$ and divide by the standard deviation of $\hat{\gamma}$ via the Maximum Likelihood Estimation (MLE) on equation (4.12). The Wald-t statistic has an asymptotic normal distribution under the null hypothesis (γ =1).

4.2.3 DATA

We mentioned above that the initial justification for using a GARCH model is the existence of leptokurtic distribution in our time series. Additional justification for the use of a GARCH model is provided in Table 4.2. We perform Engle's test (1982) on the residuals to look for ARCH effect. Engle's test is a Lagrange Multiplier test used to test for the presence of ARCH effect against the null hypothesis of constant conditional variance.

Table 4.2 The Lagrange Multiplier Test Statistics for the Presence of ARCH Effect

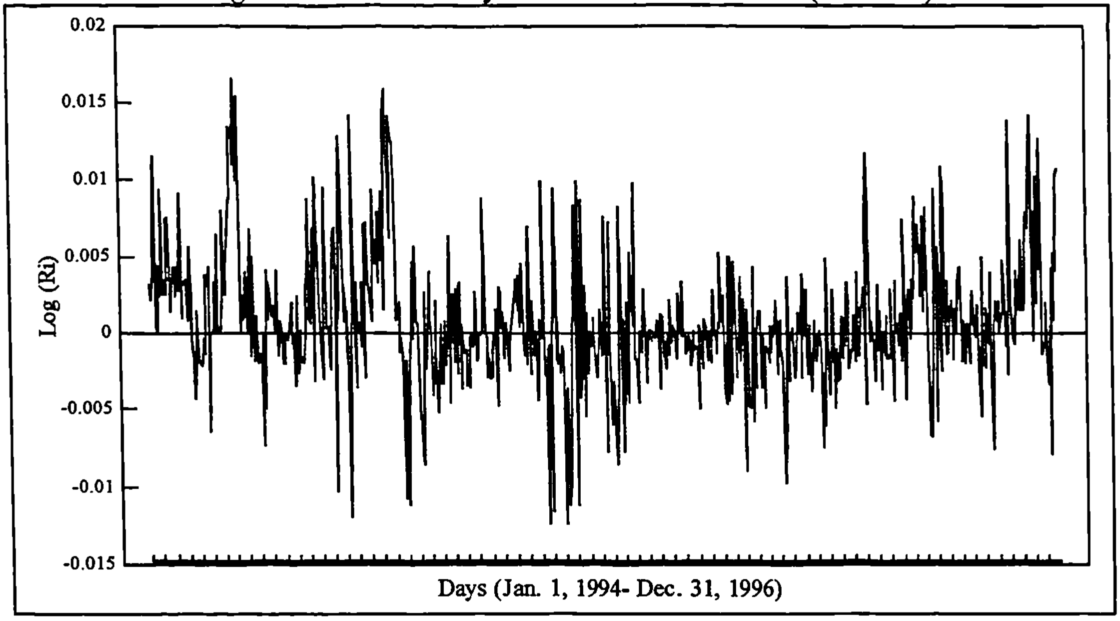
	LR1	**LR2**	**LR3**	**LR4**	**LR5**	**LR6**	**LR7**	**LR8**	**LR9**	**LR10**	**LR11**
TR^2	0.006	0.001	0.002	0.283	0.004	0.007	0.026	0.762	1.880	0.682	<u>50.19</u>

Notes: R1=Agriculture, R2=Mining, R3=Construction, R4=Manufacturing, R5=Transportation, R6=Trade, R7=Finance, R8=Services, R9=Public Subscription, R10=Closed Subscription, R11=General index, (L= the log of the index level).
Underlined values indicate significance level = 1 %.

The Lagrange Multiplier test statistic is computed as TR^2, where T denotes the sample size and R^2 is the coefficient of determination from the regression of squared residuals on past squared residuals. Results of this test show that the null hypothesis is only rejected for LR11 (i.e. the General Index of stock returns on the Egyptian Stock Exchange) at the five percent significance level with 10 lags. Results of other lags are similar, and are therefore not reported. Hence, the General Index of stock returns seems to be the most representative index in testing market volatility using a GARCH model. Thus, 751 daily observations starting from January 1994 to December 1996 are constructed. The reason for constructing this higher frequency data base, is that the higher frequency data is more likely to reflect the presence of GARCH effects.

Moreover, to specify the time series behaviour, we employed some standard time series tests; in particular the autocorrelation function and the partial autocorrelation function. The time series plot of the stock returns data of the General Index is given in Figure 4.1.

Figure 4.1 Stock Daily Returns: General Index (1994-96)



The first ten autocorrelations, ρ_k, and partial correlations, ρ_{kk}, for the returns series are given in Table 4.3. The first ten ρ_k's and first three ρ_{kk}'s lie outside of the $\pm 2/\sqrt{751} = (0.072)$ bound. Since the autocorrelations and partial correlations in Table 4.3 are significantly different from zero, they reflect the positive correlation of the daily stock returns.

Table 4.3 Correlation structure for Stock Daily Returns: General Index

lag	1	2	3	4	5	6	7	8	9	10
ρ_k	0.254	0.279	0.237	0.165	0.150	0.138	0.130	0.129	0.094	0.083
ρ_{kk}	0.254	0.229	0.140	0.040	0.035	0.040	0.041	0.042	0.002	-0.001

Obs. =751.

The AR(1) process is thus specified in the mean equation in order to get rid of the serial correlation of the stock returns in the mean equation. After fitting the AR(1) model, the residual correlations are presented in Tables 4.4 and 4.5, where most of the ρ_k's and ρ_{kk}'s lies within ± 0.072 and are fairly small.

Table 4.4 Residual Correlation Structure for AR(1) model fitted to the Egyptian Stock Daily Returns: General Index

lag	1	2	3	4	5	6	7	8	9	10
ρ_k	-0.059	0.183	0.149	0.083	0.091	0.080	0.072	0.087	0.048	0.033
ρ_{kk}	-0.059	0.181	0.175	0.075	0.048	0.041	0.036	0.052	0.015	-0.014

Table 4.5 Squared Residual Correlation structure for AR(1) model fitted to the Egyptian Stock Daily Returns: General Index

lag	1	2	3	4	5	6	7	8	9	10
ρ_k	0.259	0.022	0.022	-0.010	0.061	0.024	0.014	-0.007	-0.014	0.010
ρ_{kk}	0.259	-0.048	0.031	-0.024	0.075	-0.014	0.015	-0.019	-0.004	0.011

However, Table 4.6 shows that the modified Box-Pierce Q-statistics are unable to accept the null hypothesis of the residuals being white noise at any level of significance. This clarifies that the variances of stock returns are serially correlated and suggests fitting the data to a GARCH(1,1) model (or an IGARCH (1,1) model). These models, as we explained above, allow the variance of returns to change over time. The variance in one period can depend upon variables and disturbances from previous periods. At the same time, these models provide an explanation for the leptokurtosis often observed in financial data. The following section will present the empirical results of the investigation of the volatility in the Egyptian stock market.

Table 4.6 The modified Box-Pierce Q-statistics

lag	1	2	3	4	5	6	7	8	9	10
$Q^r(k)$	50.47	50.85	51.22	51.29	54.09	54.52	54.66	54.70	54.84	54.92
$Q^2(k)$	48.66	107.18	149.63	170.32	187.33	201.79	214.59	227.18	233.90	239.12

Notes: Q^r indicates the Q-statistics of the residuals, and Q^2 indicates the Q-statistics of the squared residuals.

4.2.4 THE EMPIRICAL RESULTS

Tables 4.7 and 4.8 report full information Maximum Likelihood estimates using the Berndt, Hall, Hall, and Hausman (1974) (BHHH) algorithm. The results show that the data in the Egyptian capital market are fitted to the GARCH (1,1) model. In Table 4.7 the GARCH coefficient α_2 is highly significant and implies that a significant part of the current volatility of the Egyptian General index returns can be explained by past volatility. Moreover, the past volatility tends to persist over time since the sum of $\alpha_1 + \alpha_2$ is 1.019. This persistence capture the propensity of returns of like magnitude to cluster in time.

Also, if the parameters in the conditional variance are positive, then the shocks to volatility persist over time. The degree of persistence is determined by the magnitude of these parameters. As can be seen from Table 4.7, the degree of persistence is positive and high. This finding is consistent with other research on the financial markets [e.g., Baillie and Bollerslev (1990), Bollerslev and Domowitz (1993) and Dionysios and MacDonald (1996)].

Table 4.7 The regression results with GARCH(1,1) specification

$$R_t = \beta_0 + \beta_1 R_{t-1} + \varepsilon_t$$

$$\varepsilon_t | \Phi_{t-1} \sim N(0, h_t)$$

$$h_t = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \alpha_2 h_{t-1}$$

Where R_t is the market return on the General Index

	β_0	β_1	α_0	α_1	α_2
Coefficient	0.035	0.320	0.033	0.419	0.600
Std. error	0.014	0.037	0.003	0.041	0.027
T-statistic	<u>2.585</u>	<u>8.730</u>	<u>9.812</u>	<u>10.283</u>	<u>22.321</u>
P-value	0.010	0.000	0.000	0.000	0.000

Log Likelihood = 136.637, $(\alpha_1 + \alpha_2)$ = **1.019**

Underlined values denote significance at 1 % level.

Table 4.8 The regression results with IGARCH(1,1) specification

$$R_t = \beta_0 + \beta_1 R_{t-1} + \varepsilon_t$$

$$\varepsilon_t | \Phi_{t-1} \sim N(0, h_t)$$

$$h_t = \alpha_0 + \gamma \varepsilon_{t-1}^2 + \alpha_2 (h_{t-1} - \varepsilon_{t-1}^2)$$

Where R_t is the market return on the General Index

	β_0	β_1	α_0	γ	α_2
Coefficient	0.035	0.320	0.033	**1.019**	0.600
Std. error	0.014	0.037	0.003	0.020	0.027
T-statistic	2.585	8.730	9.812	50.680	22.322
P-value	0.010	0.000	0.000	0.000	0.000

Wald-t = -0.95, Log Likelihood = 136.637, γ = **1.019** = ($\alpha_1 + \alpha_2$)

*Data are daily, 751 observations from 1/1/1994 to 31/12/1996.

*The Weld-t statistic of the hypothesis that the conditional variance equation has a unit root (γ =1). Wald-t has a asymptotically normal distribution of X^2_1 under the null.

Significantly, according to Engle and Bollerslev (1986), if the sum of $\alpha_1 + \alpha_2$ is close to one in the GARCH(1,1) process, then the model is known as integrated GARCH(IGARCH), which implies persistence of the conditional variance over all future horizons. Thus, Table 4.8 reports the regression results with IGARCH(1,1) specification.

Under the assumption of conditional normal distribution of ε_t, the estimated coefficients $\hat{\gamma}$ *and* $\hat{\alpha}_2$, are asymptotically normally distributed, [see Engle (1982) and Bollerslev (1986) for proofs]. According to Table 4.8, the estimated parameters $\hat{\gamma}$ *and* $\hat{\alpha}_2$ are very significantly different from zero in the General Index of the Egyptian stock market. This is related to the well-known fact that the volatility is not constant and is correlated across time in most high frequency financial time series data.

In the IGARCH(1,1) model, γ is the parameter to test for integratedness. Table 4.8 reveals that the estimated γ is 1.019. The hypothesis of the IGARCH(1,1) model is then tested. The Wald-t could not reject the null of γ = 1 (i.e. it fails to accept the hypothesis of $\gamma < 1$). Obviously, the IGARCH(1,1) process renders an efficient description of the stochastic process of our time series.

If the models presented in Tables 4.7 and 4.5 are correctly specified, the standardized residuals, $\varepsilon_t h_t^{-1/2}$ *or* $\varepsilon_t^2 h_t^{-1}$, should be normally distributed, [See Bollerslev (1986)]. That is, the IGARCH is essentially based on the assumption of a conditional normal distribution of the innovation term ε_t. Table 4.9 summarises the results of the normality test of the $\varepsilon_t h_t^{-1/2}$ term.

Table 4.9 Statistical Properties for $\varepsilon_t h_t^{-1/2}$ with IGARCH(1,1) model

Sample Mean	0.035
Variance	1.018
Standard Error	1.009
SE of Sample Mean	0.037
t-Statistic	0.960
Signif. Level (Mean=0)	0.337
Skewness	-0.06
Signif Level (Skewness=0)	0.48
Kurtosis	11.68
Signif Level (Kurtosis=0)	0.000

Obviously, the normality test fails to accept the hypothesis that the $\varepsilon_t h_t^{-1/2}$ term is normally distributed. The failure occurs primarily because the standardized residuals follow a distribution which has much slimmer tails than the normal distribution. This finding is consistent with other research on the stock exchange market. For instance, Bollerslev (1987) concluded that the monthly returns to the Standard and Poor's 500 (SP500) Composite Index were better fitted with a GARCH model under the assumption of Student-t distributed errors. Hong (1988) rejected conditional normality claiming abnormally high kurtosis in the daily New York Stock Exchange stock returns.

To sum up, following the above results of generating the GARCH models, some conclusions are revealed. First, because the GARCH model stands for the changeability in the volatility over time, fitting a GARCH(1,1) model to our data may describe the process of assets returns efficiently. Second, in the IGARCH (1,1) model, γ is the parameter which measure the integratedness of volatility. The fact that $\gamma = 1$ in the IGARCH(1,1) context does not imply that shocks to the system will never die out, but the impacts of such shocks tend to decay over time. According to our results in the Egyptian stock market, the Wald-t statistic fails to accept the hypothesis of $\gamma < 1$. Obviously, the IGARCH(1,1) process provides an efficient description of the stochastic process of Egyptian stock prices.

Finally, a GARCH model proposes a simple and convenient method to assess time-varying variance. Particularly, by using the IGARCH model, not only can the time varying variance be evaluated, but also the integratedness of the variance can be measured. Nevertheless, it does not necessarily remain that the IGARCH model is the most adequate model in all situations associated with time-varying variance. The IGARCH model merely presents a manifest way to understand the stochastic process of our time series returns. Additionally, further attempt is required to examine the possibility of the mean-reversion process of our time series within the framework of testing its stationarity. Thus, in the following section, we conduct tests of random walks based on the Dickey and Fuller (1979) methodology and the variance-ratio test of Lo and MacKinlay (1988).

4.3 STATIONARITY AND RANDOM WALK TESTS

4.3.1 INTRODUCTION

In the present section, we examine the possibility of the mean-reversion process of this time series within the framework of testing its stationarity. Generally, many econometric problems can be raised if a time series is non-stationary. A spurious relationship among the levels of the variables could be the result of such non-stationarity. If the series are non-stationary, standard regressions that try to explain the variable behaviour will be meaningless; the standard errors of the parameters would be incorrect, and the variance of forecasts into the future would be infinite; that is, the system will not be anchored (see, Dickey; Jansen and Thornton 1994:9-10).

Therefore, economic variables such as stock prices and/or returns, should be modified before being used in regression analysis. A common modification of a time series variable involves first differencing. However, the level of a variable and first differencing will be very different in terms of mean and variation. Differencing would be preferred, if the first differences of a set of variables were stationary, with the variables themselves being non-stationary. Then, one can expect that the variables may be cointegrated. The cointegration of such variables is stationary, thus they cannot move too far from each other. On the contrary, a failure of cointegration suggests that these variables have no long run relationship. Nevertheless, stable linear relationships among variables are, nowadays, the focus of cointegration tests. As a result, the absence of cointegration among variables does not necessarily mean that there is no stable long-run relationships among variables. It solely suggests that there is no stable long-run linear relationship among them. Accordingly, the stationarity of the utilised time series in this section are investigated. Tests of random walks, at the formal level, are conducted based on the Dickey and Fuller (1979) methodology and the variance-ratio test of Lo and Mackinlay (1988).

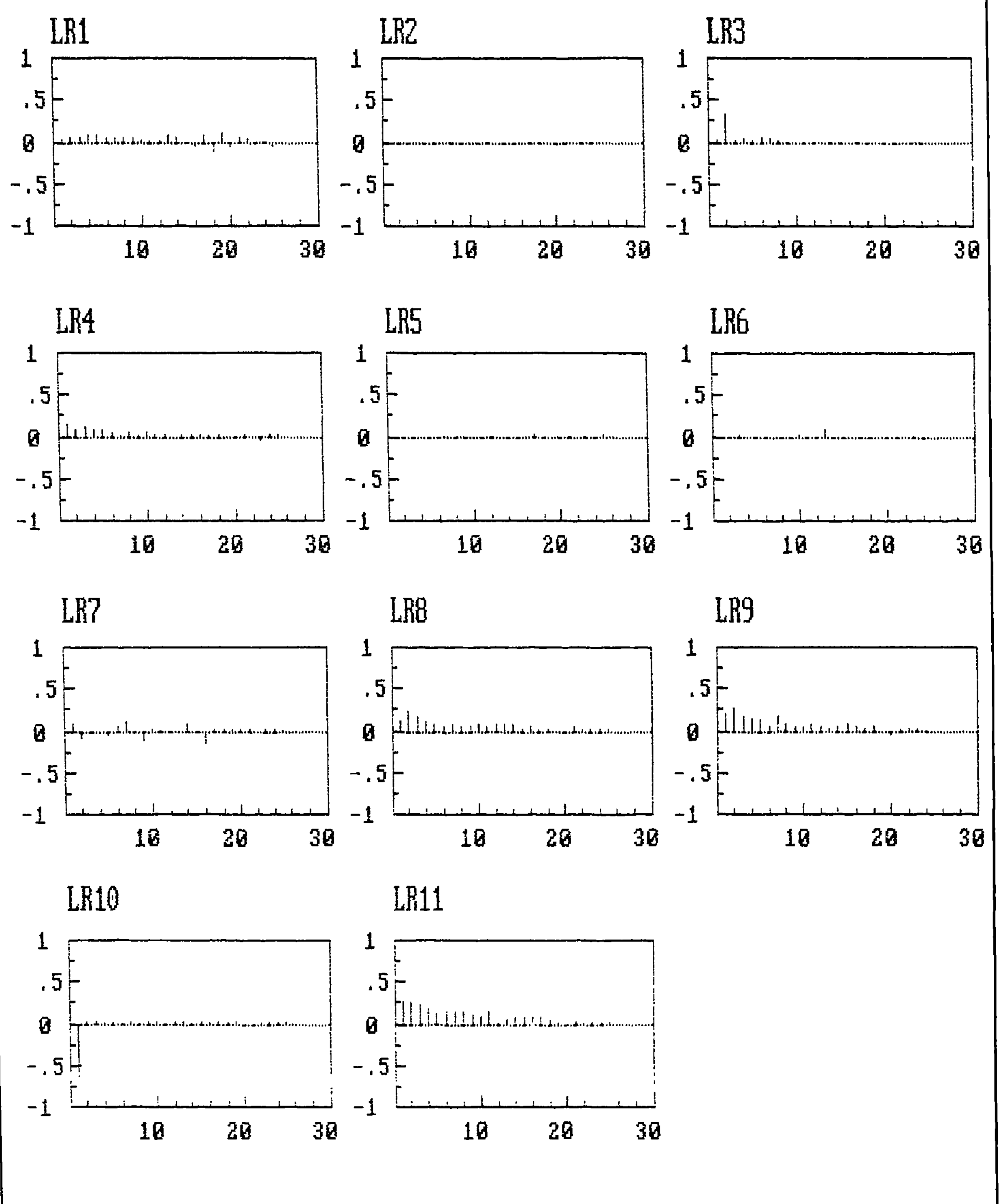
4.3.2 TEST OF STATIONARITY BASED ON CORRELOGRAM

At the informal level, weak stationarity can be tested using the correlogram of a time series, which is a graph of autocorrelation at various lags. For a stationary time series, the correlogram tapers off quickly, whereas for non-stationary time series it dies of gradually [see Gujarati (1995) and Stewart (1991)]. To establish the correlogram of our variables, we start by using the Autocorrelation Function, which is frequently defined as: $\hat{\rho}_k = \hat{\gamma}_k / \hat{\gamma}_0$, the ratio of the sample covariance to sample variance. Hence, we have obtained Figure 4-2, displaying the sample correlogram of the levels and their first differences of the eleven Egyptian stock indices. The correlogram is shown up to 25 lags. The evidence from these correlogram figures shows that the estimated autocorrelations die down quickly for the levels as well as the first differences of the variables, and then appear to fluctuate in a non-systematic way around and close to zero. We reach the tentative conclusion that the various stock indices could be weakly stationary.Moreover, we judge the statistical significance of any $\hat{\rho}$ by its standard error[1]. Table 4-10 illustrates that most of the $\hat{\rho}$ coefficients of the levels, for LR1, LR2, LR3, LR5, LR6, LR7, and LR10 are individually statistically insignificant.

---

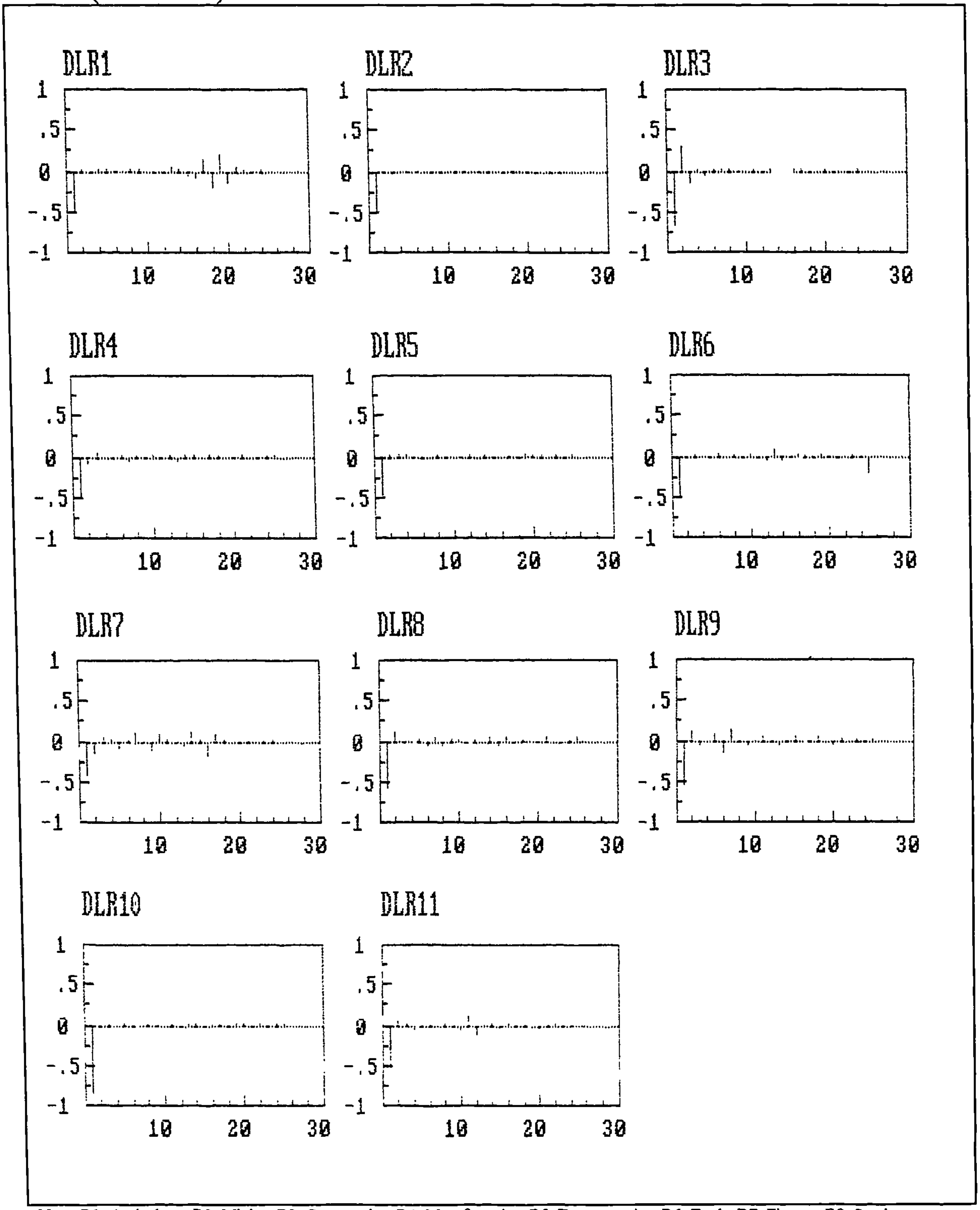
[1]For example, our data size is n =751, implying a variance of 1/751 or standard error of $1/\sqrt{751}$ = 27.40. Then, following the properties of the standard normal distribution, the 95% confidence interval for any ρ_k should be $\pm$ 1.96 (27.40.) = 0.072 on either side of zero. Thus, if $\hat{\rho}_k$ falls inside the interval (-0.072, 0.072), we do not reject the hypothesis that the true ρ_k is zero. But if it lies outside this confidence interval, then we can reject the hypothesis that the true ρ_k is zero.

Figure 4-2 The Correlogram of the Levels of the Eleven Egyptian Daily Return Indices (1994-1996)



Notes:R1=Agriculture, R2=Mining, R3=Construction, R4=Manufacturing, R5=Transportation, R6=Trade, R7=Finance, R8=Services, R9=Public Subscription, R10=Closed Subscription, R11=General index, (L= the log of the index level)

Figure 4-3 The correlogram of the First Differences of the Eleven Egyptian Daily Return Indices (1994- 1996).



Notes:R1=Agriculture, R2=Mining, R3=Construction, R4=Manufacturing, R5=Transportation, R6=Trade, R7=Finance, R8=Services, R9=Public Subscription, R10=Closed Subscription, R11=General index, (D = the first difference).

Table 4-10 Test for Autocorrelation Coefficient of the Levels

Autocorrelation coefficient $\hat{\rho}$											
Lags	LR1	LR2	LR3	LR4	LR5	LR6	LR7	LR8	LR9	LR10	LR11
1	0.02	-0.00	0.01	0.15	0.00	-0.00	0.07	0.10	0.20	0.05	0.26
2	0.05	-0.00	0.31	0.08	0.00	-0.00	-0.08	0.22	0.26	0.03	0.28
3	0.06	-0.00	0.03	0.12	0.00	0.01	-0.00	0.16	0.17	0.03	0.24
4	0.08	-0.00	0.04	0.09	0.00	-0.00	-0.01	0.11	0.15	0.01	0.17
5	0.08	-0.00	0.01	0.06	0.00	-0.00	-0.06	0.09	0.15	0.02	0.15
6	0.04	-0.00	0.04	0.05	0.00	-0.00	0.04	0.05	0.05	0.02	0.14
7	0.04	-0.00	0.03	0.02	0.00	-0.00	0.10	0.09	0.17	0.03	0.13
8	0.06	-0.00	0.02	0.04	0.00	-0.00	-0.01	0.04	0.08	0.04	0.13
9	0.04	-0.00	-0.00	0.01	0.00	-0.00	-0.09	0.05	0.04	0.02	0.10
10	0.00	-0.00	-0.00	0.03	0.00	0.00	0.03	0.06	0.04	0.01	0.08
11	0.00	-0.00	-0.00	0.02	0.00	-0.00	0.03	0.04	0.07	0.02	0.13
12	0.02	-0.00	-0.00	0.02	0.00	-0.00	-0.01	0.07	0.05	0.02	0.02
13	0.08	-0.00	-0.00	-0.02	0.00	0.08	-0.01	0.07	0.02	0.03	0.06
14	0.05	-0.00	-0.00	0.02	0.00	-0.00	0.08	0.07	0.05	0.03	0.08
15	-0.02	-0.00	-0.01	0.02	0.00	-0.01	-0.01	0.01	0.08	0.01	0.08
16	-0.03	-0.00	-0.00	0.01	0.00	-0.00	-0.15	0.04	0.04	0.02	0.08
17	0.08	-0.00	-0.00	0.02	0.03	-0.00	0.01	0.00	0.03	0.02	0.06
18	-0.11	-0.00	-0.00	0.00	0.00	-0.00	0.02	0.02	0.04	0.02	0.04
19	0.10	-0.00	-0.00	-0.02	0.00	-0.00	0.01	-0.01	-0.00	0.01	0.01
20	-0.06	-0.00	-0.00	-0.01	0.00	-0.00	0.00	-0.02	-0.03	0.00	-0.02
21	0.03	-0.00	-0.00	0.00	0.00	-0.00	0.01	0.03	0.02	-0.01	0.02
22	0.04	-0.00	-0.00	-0.02	-0.02	-0.00	-0.00	0.01	0.02	-0.01	0.03
23	-0.01	-0.00	-0.00	-0.03	0.00	0.02	0.01	0.01	0.01	0.01	0.02
24	-0.01	-0.00	-0.00	0.00	0.00	-0.00	0.02	0.03	-0.02	0.02	0.01
25	-0.05	-0.00	-0.00	0.00	0.00	-0.00	0.02	0.02	-0.01	0.02	0.01

Notes: Notes:R1=Agriculture, R2=Mining, R3=Construction, R4=Manufacturing, R5=Transportation, R6=Trade, R7=Finance, R8=Services, R9=Public Subscription, R10=Closed Subscription, R11=General index, and the letter L refers to the log of a variable. The 95% confidence interval for ρ_k is (-0.072, 0.072).

Thus, we could not reject the hypothesis that the true $\hat{\rho}$ is zero, but it may be rejected for LR4, LR8, LR9, and LR11. Therefore, some of these time series seems to behave as white noise, see, Table 4-10. In order to test the joint hypothesis that all the ρ_k autocorrelation coefficients are simultaneously equal to zero, we use the Q statistic developed by Box and Pierce (1970), which is defined as

$$Q = n\sum_{k=1}^{m} \hat{\rho}_k^2 \qquad (4.13)$$

where n is the sample size and m is the lag length. For our data, the Q statistic based on 25 lags is illustrated in Table 4-11. Only, the Q statistic for the levels of LR2, LR5 and LR6 does not exceeds the critical value from the chi-square table at any reported level of significance. However, For the other variables, all being highly significant; the *p* values of obtaining such chi-square values are practically zero. Therefore, we may not reject the null hypothesis that all ρ_k are all zero, for three time series (i.e. LR2, LR5, and LR6). However, we could simply reject the null hypothesis that all ρ_k are all zero. A variant of the Box-Pierce Q statistic is the Ljung-Box (1978) statistic, which is defined as:

$$\mathrm{LB} = \mathrm{n(n+2)}\sum_{\mathrm{k=1}}^{\mathrm{m}} \left(\frac{\hat{\rho}_{\mathrm{k}}^2}{\mathrm{n-k}}\right) \sim X_m^2 \qquad (4.14)$$

Although in large samples both Q and LB statistic follow the chi-square distribution with m df, the LB statistic has been found to be more powerful than Q statistic in small samples. Calculating LB statistic, we could not reject the null hypothesis that all ρ_k are zero, for each of our time series. Thus, based on the LB statistic, the overall conclusion is that the stock returns time series may represent stationarity.

Table 4-11 Test for Autocorrelation Based on Box-Pierce and Ljung-Box Statistics

	LR1	LR2	LR3	LR4	LR5	LR6	LR7	LR8	LR9	LR10	LR11
Q	<u>55.37</u>	0.030	<u>78.070</u>	<u>47.580</u>	0.960	5.660	<u>51.490</u>	<u>105.790</u>	<u>183.18</u>	<u>296.120</u>	<u>275.010</u>
LB	0.350	0.000	7.300	0.600	0.001	0.030	0.630	2.460	6.780	115.140	12.430

Notes: The joint null hypothesis is that all the ρ_k autocorrelation coefficients are simultaneously equal to zero. The other letters are defined in Table 4-1.

Nevertheless, the use of graphical and correlogram evidence is unreliable in making inference about the stationarity and unit roots, and we now turn to the formal testing strategies, examining each of these series for the presence of unit roots.

4.3.3 THE AUGMENTED DICKEY-FULLER METHODOLOGY

At the formal level, the first, stationarity of a time series is checked by employing the Augmented Dickey-Fuller (ADF) statistic, developed by Dickey and Fuller (1979). Therefore, we denote R_t as the share return index, and follow the strategy outlined in Holden and Perman (1994) of constructing a number of statistics based upon the following three regression equations:

$$R_t = \rho R_{t-1} + e_t \qquad t = 1, 2, ... \qquad (4.15.1)$$

$$R_t = \rho R_{t-1} + \alpha + e_t \qquad t = 1, 2, ... \qquad (4.15.2)$$

$$R_t = \rho R_{t-1} + \alpha + \beta t + e_t \qquad t = 1, 2, ... \qquad (4.15.3)$$

In these equations, it is assumed that the disturbance term, e_t, is *IID* process. Dickey and Fuller (1981) clarifies that the limiting distributions and critical values that they obtain under the assumption that e_t is an *IID* process are also valid when e_t is autoregressive if augmented Dickey-Fuller (*ADF*) regression is run. Therefore, In assuming the data are generated according to (4.15.1) with $\rho = 1$ and that e_t is a stationary autoregressive of order *p*

$$e_t = \theta_1 e_{t-1} + \theta_2 e_{t-2} + ... + \theta_p e_{t-p} + \varepsilon_t \qquad (4.16)$$

where defines an IID process, and consider the reparameterisation version of

$$R_t = \rho R_{t-1} + \alpha + \beta t + e_t \qquad t = 1, 2, ...$$

which is

$$\Delta R_t = \alpha + \beta t + \phi R_{t-1} + e_t \qquad (4.17)$$

Given the equation for e_t in (4.16) we rewrite (4.17) as

$$\Delta R_t = \alpha + \beta t + \phi R_{t-1} + \theta_1 e_{t-1} + \theta_2 e_{t-2} + ... + \theta_p e_{t-p} + \varepsilon_t$$

which can be written, since ($R_t = \rho R_{t-1} + e_t$) with $\rho = 1$ gives $e_t = R_t - R_{t-1}$, as

$$\Delta R_t = \alpha + \beta t + \phi R_{t-1} + \theta_1(R_{t-1} - R_{t-2}) + \theta_2(R_{t-2} - R_{t-3}) + + \ldots + \theta_p(R_{t-p} - R_{t-p-1}) + \varepsilon_t$$

that is ΔR_t is regressed on R_{t-1}, ΔR_{t-1}, ΔR_{t-2}, $\Delta R_{t-2}, \ldots$, ΔR_{t-p} as well as an intercept and time trend is required. In such a case, we want to test

$$H_0: \phi = 0 \text{ against } H_A: \phi < 0.$$

Figure 4.4 presents a decision tree summary of the test procedure employed in this section. The estimated Augmented Dickey-Fuller statistics are reported in Table 4-12 for the levels of the variables. All indices appear to reject the null hypothesis that ϕ = 0, at the 5 percent level. That is, the stock returns series does not exhibit a unit root, which is another way of saying that the eleven indices of Egyptian stock returns are stationary and not obeying the theory of a random walk.

However, Liu and He (1991) have indicated that the variance-ratio test of Lo and MacKinlay (1988) is more powerful than the Dickey-Fuller or Box-Pierce tests under alternative hypothesis involving AR(1), ARIMA(1,1,0) or ARIMA(1,1,1). For example, there are some important departures from the random walk that the Dickey-Fuller unit root test cannot detect. More importantly, when the attribute of interest is uncorrelatedness of increments, the variance-ratio test is more appreciate than the unit root test [Lo and MacKinlay (1988)]. Therefore, the variance-ratio test is outlined and employed in the following section.

Figure 4-4 A Decision Tree of Unit Root Testing

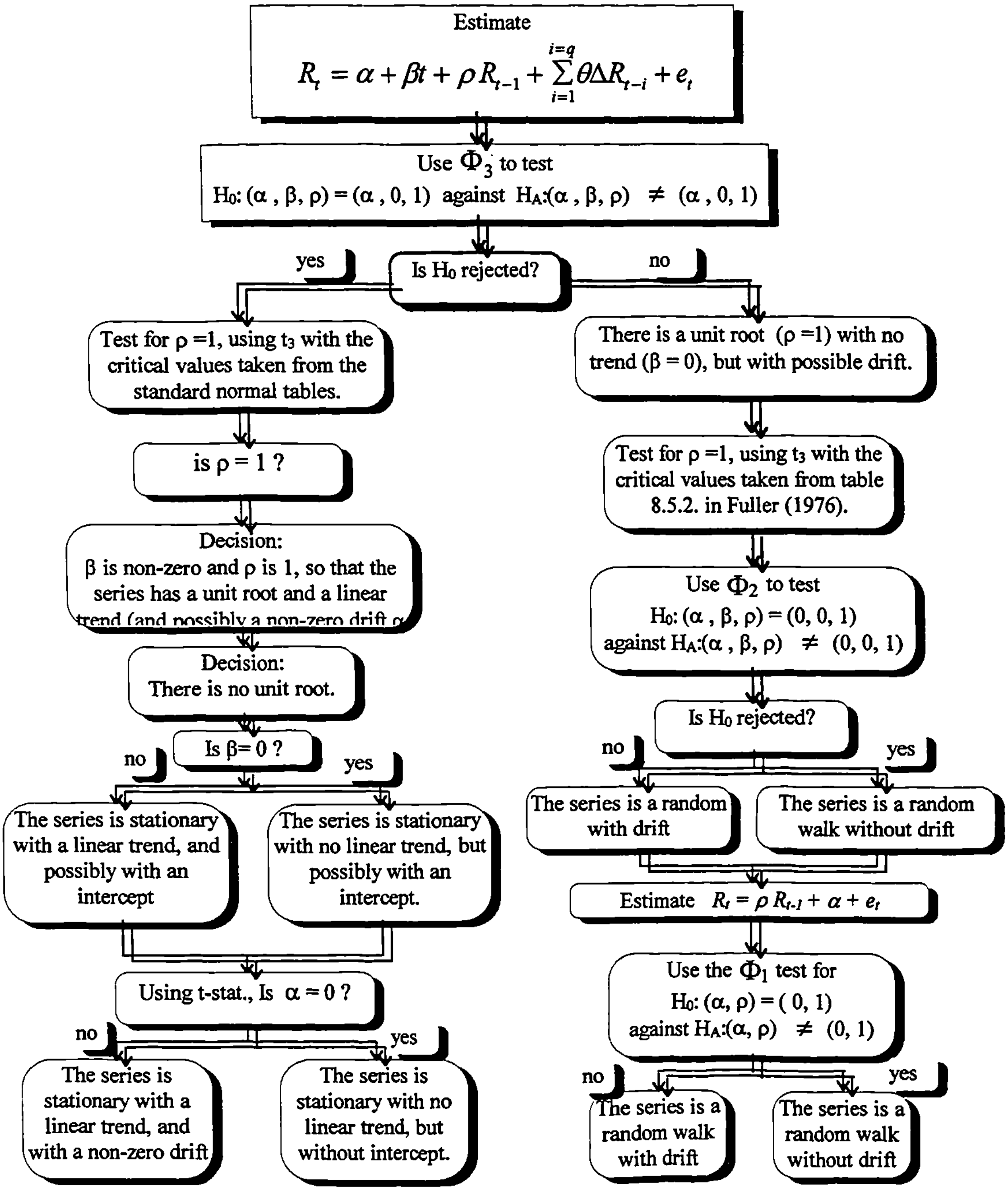


Table 4-12 Dickey-Fuller tests of random walk for the Eleven Daily Indices of the Egyptian Capital Market of 750 days (January, 1st 1994 to December 31 1996)

	α_0	ϕ_0	α_1	α_2	α_3	α_4
R1	0.001	-0.744	-0.248	-0.210	-0.162	-0.076
S.E	0.000	0.079	0.074	0.067	0.058	0.042
t-statistics	1.621	-9.427	-3.361	-3.126	-2.777	-1.818
R2	-0.000	-1.007	0.005	0.004	0.003	0.001
S.E	0.000	0.082	0.074	0.064	0.052	0.037
t-statistics	-1.000	-12.207	0.073	0.064	0.052	0.037
R3	-0.000	-1.007	0.005	0.004	0.003	0.001
S.E	0.000	0.082	0.074	0.064	0.052	0.037
t-statistics	-1.000	-12.207	0.073	0.064	0.052	0.037
R4	0.001	-0.711	-0.289	0.044	0.075	0.011
S.E	0.001	0.065	0.061	0.057	0.052	0.037
t-statistics	1.128	-10.864	-4.736	0.772	1.442	0.302
R4	0.001	-0.659	-0.219	-0.181	-0.085	-0.032
S.E	0.000	0.067	0.063	0.057	0.049	0.037
t-statistics	1.858	-9.863	-3.477	-3.148	-1.742	-0.884
R5	0.000	-1.001	0.001	0.001	0.000	0.000
S.E	0.001	0.082	0.074	0.064	0.052	0.037
t-statistics	0.399	-12.165	0.012	0.010	0.008	0.006
R6	0.000	-0.996	-0.005	-0.006	0.006	0.003
S.E	0.000	0.082	0.073	0.064	0.052	0.037
t-statistics	1.316	-12.134	-0.071	-0.091	0.107	0.084
R7	0.002	-1.072	0.153	0.064	0.070	0.059
S.E	0.001	0.082	0.073	0.063	0.050	0.037
t-statistics	3.120	-13.089	2.105	1.013	1.386	1.584
R8	0.000	-0.584	-0.372	-0.183	-0.062	-0.019
S.E	0.000	0.062	0.060	0.057	0.050	0.036
t-statistics	1.451	-9.419	-6.170	-3.209	-1.230	-0.538
R9	0.001	-0.487	-0.391	-0.191	-0.115	-0.069
S.E	0.000	0.058	0.058	0.055	0.049	0.037
t-statistics	2.027	-8.340	-6.773	-3.470	-2.329	-1.869
R10	0.001	-0.755	-0.129	-0.075	-0.008	-0.004
S.E	0.000	0.061	0.054	0.044	0.026	0.012
t-statistics	2.649	-12.469	-2.402	-1.714	-0.324	-0.336
R11	0.000	-0.453	-0.390	-0.200	-0.071	-0.035
S.E	0.000	0.054	0.055	0.054	0.048	0.037
t-statistics	2.200	-8.323	-7.081	-3.731	-1.464	-0.963

Notes: Indices:R1=Agriculture, R2=Mining, R3=Construction, R4=Manufacturing, R5=Transportation, R6=Trade, R7=Finance, R8=Services, R9=Public Subscription, R10=Closed Subscription, R11=General index. The null hypothesis is $\phi = 0$ (returns follow a random walk). The t-statistics at the 5% level is -2.87 [from Dickey and Fuller (1979)]. An underline indicates the individual coefficient is different from zero at the 5 % level of significance. Standard errors(S.E) and t-statistics are reported under each coefficient.

4.3.4 THE VARIANCE RATIO APPROACH

The variance-ratio test which was proposed by Lo and MacKinlay (1988) enables us to measure how much a given deviation from an equilibrium relationship is determined by a random walk component and how much of it is due to the stationary deviation. The test is based on the premise that the variance of random walk increments in a finite sample is linear in the sampling interval [Ayadi and Pyun (1994:648)]. This test is sensitive to correlated price changes but robust with respect to many forms of heteroscedasticity and non-normality of the stochastic disturbance term. Thus, the test can be employed to identify the presence of negative serial correlation in stock prices indices. If stock price movements partly reflect negative serial correlation, the stock return variance should grow less than proportionately with time[see, Cochran and DeFina (1995:847)]. The variance-ratio test can be mathematically expressed as follows:

$$V(k) = \frac{1}{k}\frac{\text{var}(y_t - y_{t-k})}{\text{var}(y_t - y_{t-1})} = \frac{\sigma_k^2}{\sigma_1^2} \tag{4.18}$$

which is the variance of the k-difference of y_t divided by k over the variance of the first difference of y_t, σ_k^2 is the unbiased estimator of *k*th of the variance of $\ln P_t - \ln P_{pt-k}$ and σ_1^2 is the unbiased estimator of the variance of $\ln P_t - \ln P_{pt-1}$.

These estimators can be conventionally calculated as follows:

$$\sigma_k^2 = \frac{1}{k(T-k+1)(1-\frac{k}{T})}\sum_{t=k}^{T}(Y_t - Y_{t-k} - k\hat{\mu})^2 \tag{4.19}$$

$$\sigma_1^2 = \frac{1}{(T-1)}\sum_{t=1}^{T}(Y_t - Y_{t-1} - \hat{\mu})^2 \tag{4.20}$$

where T is the sample size and $\hat{\mu} = \frac{1}{T}(y_r - y_0)$. With the assumption of homoscedasticity the asymptotic variance of the V_k statistic is shown to be:

$$\Phi(k) = \frac{2(2k-1)(k-1)}{3kT} \tag{4.21}$$

the $V(k)$ statistic [Lo and MacKinlay (1988)] asymptotically approaches normality or

$$Z(k) = \frac{V(k)-1}{[\phi(k)]^{1/2}} \approx N(0,1) \tag{4.22}$$

We use this test as a test for the homoscedasticity. Lo and MacKinlay also derive the heteroscedasticity-consistent variance estimator $\Phi^*(k)$:

$$\Phi^*(k) = \sum_{j=1}^{k-1} \left[\frac{2(k-j)}{k}\right] \hat{\delta}(j) \tag{4.23}$$

in which

$$\delta(j) = \frac{\sum_{T=j+1}^{T} (s_t - s_{t-1} - \hat{\mu})^2 (s_{t-j} - s_{t-j-1} - \hat{\mu})^2}{\left[\sum_{t=1}^{T} (s_t - s_{t-1} - \hat{\mu})^2\right]^2} \tag{4.24}$$

Thus, the variance ratio test statistic can be standardised asymptotically to a standard normal variable or:

$$Z^*(k) = \frac{V(k)-1}{[\phi^*(k)]^{1/2}} \approx N(0,1) \tag{4.25}$$

Generally, if y_t follows a random walk, then $V(k)$ = 1 [see Ayadi and Ryun (1994:648-9)]. Thus, a test of random walk is equivalent to testing the null hypothesis: $V(k)$ =1 against an alternative hypothesis that $V(k)$ is not equal to one.

Hence, the variance ratio test allows the importance of the random walk component to be characterised on a continuous scale rather than restricting the decision to a dichotomous choice in the presence or the absence of random walk as in the case of the unit root test. In other words, the purpose of the variance ratio approach of Lo and MacKinlay (1988) is to detect the short-term fluctuations dominate the stochastic trend components, while the ADF is formulated to examine only the existence of stochastic trend components [see Huang (1995:253)].

Consequently, we apply variance ratio statistics with homoscedasticity and heteroscedastic error term, denoted by Z(k) and $Z^*(k)$, respectively, to the eleven Egyptian stock price indices. Hence, we calculated the V(K), Z(k), and $Z^*(K)$ for each of the cases K=2, 3, 4, 5, 6, 8, 10, 12, 16, 20, 24, 36, and 50. Under the random walk hypothesis, the ratio of (1/k) times the variance of the K-differences over the variance of the first differences is expected to be unity. The results of full sample period are shown in Table 4-13.

Figure 4-5 shows the continuous variance ratios for the log of the Egyptian Daily Returns. We notice that the variance ratios are below one up to K=50. The results in Table 4-13 indicate that under the assumption of homoscedasticity, the variance ratio test rejects the null hypothesis for every level of K. When the Z-statistic values are compared with the conventional critical value of 1.96 for the five percent level, the variance ratios, $V(k)$ are statistically different from unity. Therefore, the results under homoscedasticity suggest that the behaviour of the Egyptian Stock returns can not be described as obeying the random walk theory. These results are consistent with those of Bark (1991), and Ayadi and Pyun (1994).

The rejection of random walk obtained from Z(k) under homoscedasticity could be due to the presence of heteroscedasticity and/or serial correlation. Thus, we applied the heteroscedasticity-consistent variance-ratio test $Z^*(k)$. Table 4-13 illustrates that the results for all values of K, indicate that the null hypothesis of random walk can be rejected at the five percent level of significance. These results, here, confirm the results of the homoscedasticity test.

The rejection of the random walk hypothesis is heteroscedasticity robust and suggests that the variance ratios are different from unity. Since, the variance ratios are declining as K increases, they exhibit negative autocorrelation which indicates the presence of a mean-reversion process. The finding of mean-reversion agrees with Fama and French (1988), and French and Roll (1986), who reported negative serial correlation for American stocks, and with Poterba and Summers (1988), who rejected the random walk hypothesis and found mean-reversion for a sample of the European and Asian national stock index, and with Lee et al. (1996), who reported negative serial correlation for secondary market prices of syndicated loans for LDCs.

Moreover, our rejection of random walk for the Egyptian Stock index agrees with Lo and Mackinlay (1988), who rejected the null of random walk for NYSE-AMEX stock prices, and finally with Huang (1975) for the Asian stock markets. On the other hand, our rejection of random walk differs from Claessen et al. (1993), who do not reject the null of random walk for a sample of 20 emerging markets. These apparently contradictory results should not be surprising. In effect, Solnik (1974) in his investigation of the market structure of stock prices for several European markets concludes that prices are strongly affected by the specific characteristics of the individual markets.

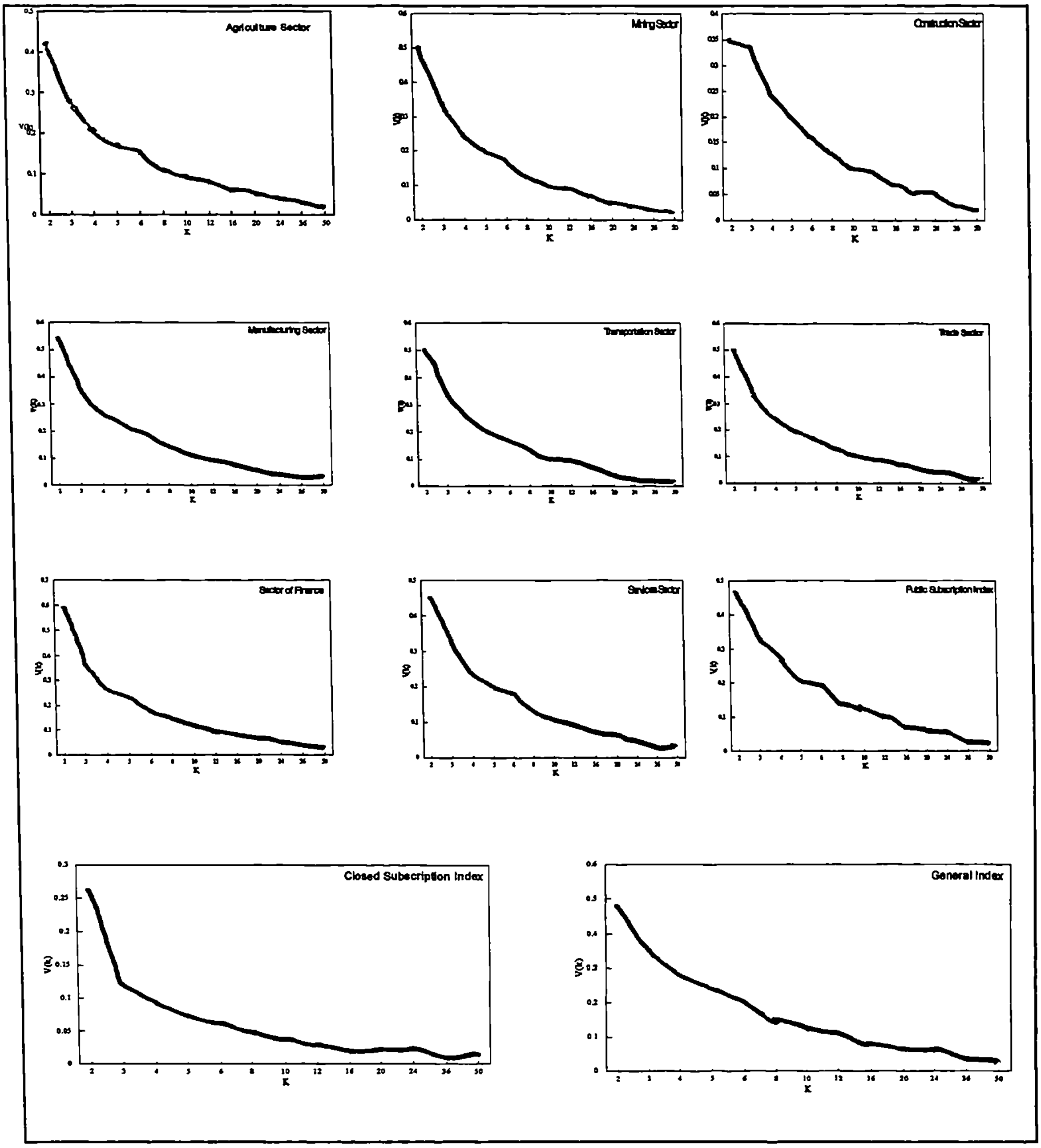
To sum up, for the time period January 1, 1994 to December 31, 1996 the Augmented Dickey-Fuller test rejects the random walk hypothesis for the Egyptian stock prices. Likewise, the more powerful variance-ratio tests have rejected the random walk in favour of a mean-reversion process. However, the existence of autocorrelation in the Egyptian stock prices indices does not necessarily imply inefficiency [see, Lucas (1978), Levitch (1979), Lee et al. (1996)]. Essentially, spurious autocorrelation may also be due to infrequent or non-synchronous trading [Poterba and Summer (1988); Scholes and Williams (1977); and Lee et al. (1996)]. As a result, in the following section we propose to address the efficiency issue employing the recently developed cointegration procedure.

Table 4-13 Estimates of Variance Ratio Tests and their Test Statistics for the Eleven Daily Indices of the Egyptian Capital Market of 750 days (January, 1st 1994 to December 31 1996)

		Lags												
S*		**2**	**3**	**4**	**5**	**6**	**8**	**10**	**12**	**16**	**20**	**24**	**36**	**50**
1	v(k)	0.42	0.28	0.21	0.17	0.15	0.11	0.09	0.08	0.06	0.05	0.04	0.03	0.02
	Z(k)	-15.78	-13.15	-11.52	-10.40	-9.43	-8.21	-7.32	-6.73	-5.79	-5.20	-4.70	-3.89	-3.25
	Z*(k)	-93.92	-116.70	-114.18	-120.71	-118.14	-120.13	-120.56	-121.27	-121.40	-121.56	-121.96	-122.18	-121.66
2	v(k)	0.50	0.34	0.25	0.20	0.17	0.13	0.10	0.09	0.07	0.05	0.04	0.03	0.02
	Z(k)	-13.65	-12.21	-10.94	-9.97	-9.18	-8.05	-7.24	-6.66	-5.76	-5.19	-4.68	-3.88	-3.24
	Z*(k)	-27.30	-36.39	-36.62	-39.06	-38.99	-40.03	-40.61	-40.97	-41.41	-41.65	-41.81	-42.07	-42.21
3	v(k)	0.35	0.33	0.24	0.20	0.16	0.13	0.10	0.09	0.07	0.05	0.05	0.03	0.02
	Z(k)	-17.81	-12.34	-11.07	-9.95	-9.23	-8.05	-7.22	-6.65	-5.76	-5.19	-4.68	-3.88	-3.24
	Z*(k)	-37.30	-38.53	-38.09	-40.12	-39.95	-40.64	-41.04	-41.35	-41.71	-41.92	-42.05	-42.26	-42.37
4	v(k)	0.54	0.35	0.27	0.22	0.19	0.14	0.11	0.09	0.07	0.06	0.05	0.03	0.03
	Z(k)	-12.67	-11.96	-10.73	-9.77	-8.98	-7.95	-7.14	-6.59	-5.72	-5.15	-4.66	-3.87	-3.23
	Z*(k)	-44.75	-62.95	-63.35	-67.57	-67.23	-69.73	-70.62	-71.44	-72.32	-72.70	-73.16	-73.73	-74.01
5	v(k)	0.50	0.34	0.25	0.20	0.17	0.13	0.10	0.09	0.07	0.05	0.04	0.03	0.02
	Z(k)	-13.65	-12.21	-10.94	-9.97	-9.18	-8.05	-7.24	-6.66	-5.76	-5.19	-4.68	-3.88	-3.24
	Z*(k)	-35.08	-46.77	-47.06	-50.20	-50.11	-51.45	-52.19	-52.66	-53.22	-53.53	-53.74	-54.07	-54.24
6	v(k)	0.50	0.33	0.25	0.20	0.17	0.13	0.10	0.09	0.07	0.05	0.04	0.03	0.02
	Z(k)	-13.68	-12.35	-10.94	-9.97	-9.18	-8.05	-7.24	-6.66	-5.76	-5.19	-4.68	-3.88	-3.24
	Z*(k)	-41.28	-55.57	-55.26	-58.95	-58.84	-60.42	-61.30	-61.81	-62.46	-62.84	-63.07	-63.45	-63.64
7	v(k)	0.59	0.36	0.27	0.23	0.17	0.14	0.11	0.09	0.08	0.06	0.05	0.03	0.02
	Z(k)	-11.27	-11.77	-10.73	-9.65	-9.12	-7.96	-7.21	-6.62	-5.67	-5.18	-4.67	-3.88	-3.24
	Z*(k)	-58.17	-90.52	-90.92	-95.80	-97.17	-98.80	-100.41	-100.66	-99.81	-101.04	-100.95	-100.49	-99.88
8	v(k)	0.45	0.32	0.24	0.20	0.18	0.13	0.11	0.09	0.07	0.06	0.05	0.03	0.03
	Z(k)	-15.02	-12.54	-11.05	-9.95	-9.07	-7.98	-7.21	-6.64	-5.74	-5.16	-4.67	-3.87	-3.23
	Z*(k)	-104.26	-129.78	-126.55	-133.39	-130.96	-134.34	-136.32	-137.30	-137.83	-137.68	-138.14	-138.11	-137.79
9	v(k)	0.46	0.34	0.27	0.21	0.19	0.14	0.12	0.10	0.07	0.06	0.05	0.03	0.02
	Z(k)	-14.67	-12.16	-10.74	-9.93	-8.96	-7.95	-7.13	-6.58	-5.72	-5.13	-4.65	-3.87	-3.24
	Z*(k)	-111.29	-137.59	-134.18	-145.25	-140.86	-145.72	-146.75	-147.89	-149.13	-148.61	-149.07	-149.54	-149.30
10	v(k)	0.26	0.12	0.09	0.07	0.06	0.05	0.04	0.03	0.02	0.02	0.02	0.01	0.01
	Z(k)	-20.15	-16.09	-13.26	-11.56	-10.36	-8.79	-7.76	-7.05	-6.02	-5.37	-4.82	-3.96	-3.29
	Z*(k)	-53.35	-63.52	-58.75	-59.97	-58.23	-57.88	-57.61	-57.46	-57.22	-57.07	-56.97	-56.80	-56.69
11	v(k)	0.48	0.35	0.28	0.24	0.20	0.15	0.12	0.11	0.08	0.07	0.06	0.04	0.03
	Z(k)	-14.15	-11.95	-10.54	-9.52	-8.89	-7.86	-7.07	-6.47	-5.67	-5.09	-4.61	-3.85	-3.23
	Z*(k)	-115.86	-145.93	-141.94	-150.13	-150.62	-155.08	-156.29	-156.15	-158.42	-157.76	-158.49	-159.32	-159.14

An underline indicates the individual coefficient is different from zero at the 5 % level of significance.
*The numbers in the first column refer to the sectors ordered as in Table 4-1

Figure 4-5 Continuous V(k) Plot for the Eleven Daily Indices Returns of the Egyptian Capital Market of 750 days (January, 1st 1994 to December 31 1996)



4.4 Cointegration and Egyptian Stock Market Efficiency

4.4.1 Introduction

In the previous section, we find a rejection of the random walk hypothesis in favour of a mean-reversion process. The existence of autocorrelation in the Egyptian stock returns brings to light the issue of efficiency. As a consequence, here, we use cointegration techniques to test the concept of 'static efficiency' introduced by MacDonald and Power (1993). Following MacDonald and Power (1993), we operationalize Fama's (1970) definition that a market is efficient if "all prices fully reflect all relevant information". Given that, the joint null hypothesis developed based on such definition is that:

- the market participants exploit all available information in a rational way; and
- there is a constancy in the expected equilibrium returns.

If this joint null hypothesis is verified, then it succeeds that the prices of different shares can not be cointegrated. The reason is that, according to MacDonald and Power (1993), if time series prices are cointegrated, this implies that there must be Granger-causality running in at least one direction between the different price series, enabling a researcher to use one share price to help forecast the others. As a result, the share price either does not correctly manifest all available information or there are important variations in expected returns. The usefulness of this methodology for testing the efficiency of asset markets has been demonstrated by MacDonald and Power (1993). In the following section we describe the cointegration methodology adopted and clarify the implication of such a methodology for stock prices.

4.4.2 COINTEGRATION METHODOLOGY

Generally, if $S_1, S_2, S_3, \ldots, S_k$ is a set of price indices, which we are interested in, and each of these indices is $I(1)$, it must be first-differenced to induce stationarity. If there exists a linear combinations of two or more $I(1)$ series, then the series are cointegrated. For N $I(1)$ series it is possible for there to be up to N-1 stationary linear combination or cointegrating vectors. If there is a cointegrating relationship among a vector of variables then this immediately implies that there must exist an error correction representation which is defined by MacDonald and Power (1993), as:

$$(1-L)\Delta X_t = -\rho Z_{t-1} + u_t \qquad (4.26)$$

where X is an $N \times 1$ vector of $I(1)$ variables, Z represents the error correction term, L denotes the lag operator and u denotes a vector of residuals. For a speculative market with constant expected equilibrium returns, equation (4.26) represents a clear violation of market efficiency since information in past prices could have been used to improve the forecasts of the current prices. Therefore, a finding that cointegration exists among stock prices is strong evidence of static inefficiency [see MacDonald and Power (1993)].

In order to test for cointegration, we employ two techniques. The first is the two-step regression based technique proposed by Engle and Granger (1987). Using this technique, we employ OLS to estimate a cointegrating regression for the potentially cointegrating set. Then, the stationarity of the residuals from this cointegrating regression is examined using Durbin Watson, Dickey Fuller and Augmented Dickey Fuller statistics (since the distributions of these statistics are non-standard, we utilize statistics tabulated by Engle and Granger).

In spite of its inherent simplicity and the potentially powerful results it offers, it has been argued that the Engle-Granger two-step procedure suffers from a number of deficiencies. MacDonald and Power (1993), for example, clarify that, the use of OLS to estimate a cointegration relationship for an N dimensioned vector does not clarify whether one is dealing with a unique cointegrating vector or simply a complex linear combination of all the distinct cointegrating vectors which exist within the system. Furthermore, they mention that the technique fails to capture the underlying time series properties of the data and its test procedures do not have well defined limiting distribution.

An alternative cointegrating technique which deals with all of the deficiencies of the Engle-Granger two-step procedure, is the Johansen multivariate technique. In particular, the latter provides estimates of all the cointegrating vectors that exist within a vector of variables, fully captures the underlying time series properties of the data, and offers a test statistic for the number of cointegrating vectors with an exact limiting distribution. This test may, therefore, be viewed as more discerning in its ability to reject a false null hypothesis.

We now present a brief discussion, provided by MacDonald and Power (1993), of the Johansen technique. In their explanation, they consider an $N \times 1$ vector of $I(1)$ variables = X ={s^1, s^2, s^3,...,s^n}, where the s's denote share prices of the n indexes, that follow autoregressive process with Gaussian errors:

$$\begin{gathered} X_t = \pi_1 X_{t-1} + \pi_2 X_{t-2} + ... + \pi_k X_{t-k} + c + e_t \\ t = 1,2,...,T \end{gathered} \tag{4.27}$$

where e_t, is an $N \times 1$ vector with zero mean and variance matrix A and c is a constant. The cointegrating vectors for the process in equation (4.27) may be stated as:

$$I - \pi_1 - \pi_2 - \ldots - \pi_k = \pi \tag{4.28}$$

where π is an $N \times N$ matrix whose rank determines the number of distinct cointegrating vectors between the variables in X. If X is $I(1)$ then the rank of the π must be $\leq N$-1. Define two $N \times r$ matrices, α and β, such that:

$$\pi = \alpha\beta'. \tag{4.29}$$

the rows of β' form the r distinct cointegrating vectors such that, if β_i' the ith row of β':

$$\beta_i' X_t \sim I(0). \tag{4.30}$$

MacDonald and Power represent the Johansen's likelihood ratio, or Trace, test statistic LR_1 for the hypothesis that there are at most r cointegrating vectors as:

$$LR_1 = -T \sum_{i=r+1}^{N} \ln(1-\lambda_i) \tag{4.31}$$

where $\lambda_{r+1},\ldots, \lambda_n$ are the N-r smallest squared canonical correlations between the residuals of X_{t-k} and ΔX_t, corrected for the effect of the lagged differences of the X process [for details of how to extract the λ's see Johansen (1988)]. Additionally, the likelihood ratio statistic for testing at most r cointegrating vectors against the alternative of $r + 1$ cointegrating vectors, the λ-Max tests, is given by (4.31'):

$$LR_2 = -T \ln(1 - \lambda_{r+1}) \tag{4.31'}$$

Since equations (4.31) and (4.31') will have a non-standard distribution under the null hypothesis, Johansen provides approximate critical values for the statistic, generated by Monte Carlo methods, for VAR systems with up to five variables. The major attraction of this methodology is that it allows calculation of all N eigenvalues and eigen-vectors simultaneously and one can also infer the number of significant cointegration relations by testing how many of the λ's are zero [see Johansen (1988) and Johansen and Juselius (1989) for further details].

4.4.3 COINTEGRATION RESULTS

Following the cointegration methodology defined above, we start with reducing the numbers of stochastic trends among our share price indices through checking the orders of integration of our individual share price indices rather than return indices. Accordingly, we follow the strategy outlined in Figure 4.4 of constructing a number of statistics for each share price time series of our sample, thus we estimate

$$S_t = \alpha + \beta t + \rho S_{t-1} + \sum_{i=1}^{i=q} \theta \Delta S_{t-i} + e_t$$

To eliminate the serial correlation in the residuals, three lags in the first difference of S_t, were required. Line (ii) for each index in Table 4.14 reports, therefore, the results of the *ADF* (4.15.3) regression. A variable deletion test (imposing zero coefficients on S_{t-1} and the time trend) gives a computed value for Φ_3. Table VI in Dickey and Fuller (1981) shows the critical value for more than 500 observations (we actually use 751) to be 6.25. The overwhelming impression to emerge from this table is that the vast majority of our stock price indices contains a unit root. There is only one instance out of a potential 11 indices where the hypothesis of a stochastic unit root may be rejected; the Φ_3 statistic for S_7 at 14.25 is much higher than the five percent critical value.

Due to this decision, we move to analyze the calculated *t*-statistic of the coefficient of Z_{t-1}. The reported results reinforce our inference that the series contains a unit root, the critical value of -3.41 (obtained from Fuller, Table 8.5.2) is higher than each reported value results except for S_7, where the reported t_3 is 5.39.

In order to ascertain whether a drift component is present, the value of the Φ_2 statistic is obtained. As the computed F statistics are below the tabulated value of 4.68 (obtained from Table V in Dickey and Fuller,1981), it is not possible to reject the null, which implies the absence of a drift in this process. The information that $\beta = 0$ (from the Φ_3 test) is exploited, thus, we estimate [4.15.2] and calculate the Φ_1, see Table 4.14. The values of Φ_1 are below the critical value of 4.59 (obtained from Table IV in Dickey and Fuller,1981) leading to a decision to not reject the null.

Our conclusion from this sequence of tests is that the vast majority of our time series contains a unit root, but not a deterministic trend nor a drift term. Having ascertained that the series is not $I(0)$, we confirm that the series needs to be differenced only once to achieve stationarity (i.e. is an $I(1)$ variable) This requires further differencing. Thus, we begin with the regression:

$$\Delta\Delta S_t = \phi\Delta S_{t-1} + \alpha + \beta t + \gamma\Delta\Delta S_{t-1} + e_t.$$

The statistics of the *ADF* for the first differences are reported in the last two columns in Table 4.14. The results confirm the conclusion that the vast majority of our share price time series is $I(1)$. For the finance sector, (S_7), where we reject the joint null that $(\alpha, \beta, \rho) = (\alpha, 0, 1)$, since the Φ_3 statistic at 14.25 is much higher than the five percent critical value of 6.25. In such a case, we know that either [$\beta \neq 0$ and $\rho = 1$], [$\beta = 0$ and $\rho \neq 1$], or [$\beta \neq 0$ and $\rho \neq 1$]. Therefore, we test for $\rho = 1$, using the t-statistic of 4.42 obtained from estimating [4.15.3], with the critical value of 1.96 taken from the standard normal tables. Thus, we reject the null that $\rho = 1$, then we have two possibilities: either [$\beta = 0$ and $\rho \neq 1$], or [$\beta \neq 0$ and $\rho \neq 1$]. In either case ρ is not 1, there is no unit root, and conventional test procedures can be used. Thus, we carry out a t-test for the null that $\beta = 0$, but we could not reject this hypothesis since the t-statistic of -1.72 is less than the critical value of 1.96 taken from the standard normal tables. Here, we may decide that the series is stationary with no linear trend, but possibly with an intercept.

Using a conventional t-test in order to test whether the intercept is zero, we find t-statistic of -4.60 rejecting the null and implying a drift in S_7. Our conclusion, therefore, is that the share price time series of finance sector (S_7) is stationary with no linear trend, but with a non-zero drift. Nevertheless, based on the results of the vast majority of our time series, we are encouraged to proceed to our cointegration analysis.

For completeness, as well as for comparative purposes, we use the Engle-Granger two-step methodology in addition to the multivariate Johansen estimates. Table 4.15 presents some simple bivariate cointegration results between our 10 indices of stock prices and the General Index. The findings in this table suggest that the share prices of only one of the indices in the sample may be cointegrated with the General Index of the Egyptian Stock Market; S_9 has statistically significant Dickey-Fuller based statistics using the daily price data. Therefore, the stock market does appear to be efficient for the vast majority of the sample since no predictability seems to exist between the General market index and the prices of these price indices.

Table 4-14 Unit Root Tests for the Daily Prices Data

		Intercept	Trend	Z_{t-1}	ΔZ_{t-1}	ΔZ_{t-2}	ΔZ_{t-3}	Φ_3	Φ_2	Φ_1	t(*ADF*) for the first difference	
											with trend	without trend
i.	$Z = S_1$	0.02	0.0004	-0.001	0.004	0.01	0.03	1.898	2.54		-19**	-19**
ii.	*t-stat.*	(0.05)	(1.48)	(-0.22)	(0.11)	(0.37)	(0.89)					
iii	$Z = S_1$	-0.31		0.00	0.00	0.01	0.03			2.72		
iv.	*t-stat.*	(-0.98)		(1.27)	(0.08)	(0.33)	(0.85)					
i.	$Z = S_2$	0.96	-0.00	-0.01	0.00	0.00	0.00	1.46	1.92		-19.3**	- 20**
ii.	*t-stat.*	(1.80)	(-1.43)	(-1.82)	(0.10)	(0.10)	(0.10)					
iii	$Z = S_2$	0.30		-0.00	0.00	0.00	0.00			1.17		
iv.	*t-stat.*	(1.14)		(-1.16)	(0.00)	(0.00)	(0.00)					
i.	Z = *S3*	0.68	0.00	-0.01	0.00	0.41	0.04	1.49	2.03		-12.5**	-12.4**
ii.	*t-stat.*	(2.00)	(1.28)	(-1.80)	(0.04)	(12.10)	(1.06)					
iii	Z = P3	0.48		-0.00	0.00	0.40	0.04			1.42		
iv.	*t-stat.*	(1.59)		(-1.34)	(0.01)	(12.04)	(0.97)					
i.	Z = P4	1.95	0.00	-0.01	0.14	0.05	0.10	2.77	2.93		-16.7**	-16.7**
ii.	*t-stat.*	(2.36)	(1.25)	(-2.13)	(3.78)	(1.27)	(2.73)					
iii	Z = P4	1.46		-0.00	0.14	0.05	0.10			3.36		
iv.	*t-stat.*	(2.00)		(-1.74)	(3.75)	(1.23)	(2.68)					
i.	Z = P5	0.93	0.00	-0.01	0.00	0.00	0.00	1.46	2.00		-19.3**	-19.3**
ii.	*t-stat.*	(1.90)	(1.42)	(-1.99)	(0.12)	(0.12)	(0.12)					
iii	Z = P5	0.70		-0.01	0.00	0.00	0.00			1.19		
iv.	*t-stat.*	(1.52)		(-1.48)	(0.10)	(0.10)	(0.10)					
i.	Z = P6	0.61	0.00	-0.01	0.00	0.00	0.01	1.82	1.49		-19.3**	-19.3**
ii.	*t-stat.*	(1.68)	(1.90)	(-1.72)	(0.03)	(0.05)	(0.29)					
iii	Z = P6	0.12		-0.00	0.00	0.00	0.01			0.92		
iv.	*t-stat.*	(0.47)		(-0.29)	(0.00)	(0.01)	(0.26)					
i.	$Z = S_7$	-2.39	-0.00	0.02	0.09	-0.09	-0.00	14.25**	10.76**		-18.7**	-18.2**
ii.	*t-stat.*	(-4.60)	(-1.72)	(4.42)**	(2.47)	(-2.37)	(-0.13)					
iii	Z = P7	-1.90		0.01	0.10	-0.08	0.00			19.85		
iv.	*t-stat.*	(-4.39)		(5.39)**	(2.71)	(-2.18)	(0.08)					
i.	Z = P8	0.10	0.00	-0.00	0.09	0.22	0.12	1.49	0.13		-14**	-13.9**
ii.	*t-stat.*	(0.31)	(1.31)	(-0.410)	(2.55)	(6.22)	(3.41)					
iii	Z = P8	-0.02		0.00	0.09	0.22	0.12			1.38		
iv.	*t-stat.*	(-0.07)		(0.31)	(2.56)	(6.22)	(3.39)					
i.	Z = P9	0.92	0.00	-0.00	0.16	0.23	0.10	2.08	1.17		-12.5**	-12.5**
ii.	*t-stat.*	(1.48)	(0.89)	(-1.26)	(4.16)	(6.19)	(2.62)					
iii	Z = P9	0.77		-0.00	0.16	0.23	0.10			2.73		
iv.	*t-stat.*	(1.29)		(-0.93)	(4.16)	(6.17)	(2.60)					
i.	Z = P10	-0.54	0.00	0.00	0.15	0.02	0.01	5.41	1.05		-35.4**	-35.3**
ii.	*t-stat.*	(-1.44)	(0.25)	(1.39)	(4.10)	(1.12)	(1.20)					
iii	Z = P10	-0.61		0.01	0.15	0.02	0.01			2.56		
iv.	*t-stat.*	(-2.25)		(2.62)	(4.10)	(1.12)	(1.195)			8.10		
i.	Z = P11	0.39	0.00	-0.00	0.18	0.21	0.14	2.12	0.76		-12.5**	-12.5**
ii.	*t-stat.*	(1.11)	(0.88)	(-0.94)	(5.00)	(5.88)	(3.90)					
iii	Z = P11	0.27		-0.00	0.18	0.21	0.14			2.79		
iv.	*t-stat.*	(0.83)		(-0.52)	(5.00)	(5.87)	(3.88)					

For each regression equation the dependent variable is ΔZ. Z is defined in the second column. The estimation period is 1994 Jan., 1st to 1996 Dec. 31st. ** indicates a rejection of the null at the 95 % level. Lines (I) and (iii) report the estimates of equations 4.26.3 and 4.26.2, respectively.

Table 4-15 Two Step Cointegration Test: Sector Share Prices and the General Index (S_{11})

Price Indices	*DW*	*DF*	*ADF(L)*
S_1	0.007	-0.448	-0.600(4)
S_2	0.006	-1.115	-1.194(6)
S_3	0.003	-0.693	-1.194(2)
S_4	0.034	-2.640	-2.521(7)
S_5	0.016	-2.640	-2.521(7)
S_6	0.004	-0.791	-0.929(5)
S_7	0.005	2.372	1.944(1)
S_8	0.013	-1.482	-2.123(2)
S_9	0.069	-3.772*	-3.127(1)
S_{10}	0.114	-0.202	-0.219(2)

Note: The statistics reported are all from bivariate regressions consisting of Dependent Variable (sector share prices) and the General Index. *DW, DF,* and *ADF* denote, respectively, Durbin Watson, Dickey Fuller and Augmented Dickey Fuller statistics on the residuals generated from the cointegrating equation. The five percent critical values for these statistics are as follows: *DW* =0.386; *DF* = 3.37; and *ADF* =3.17; see Engle and Granger (1987), Table II. The numbers in parenthesis after the *ADF* denotes the lag length (*L*). An * denotes significant at the five percent level.

Looking at the cointegrating regression: $S_9 = -77.942 + 1.8324S_{11}$, we see the long-run coefficient is about 1.83, which suggests that there is practically two-to-one relationship between S_{11} and S_9 and that S_9 adjusts to its long-run growth path fairly quickly following a disturbance. A similar pattern emerges from the results of the reverse regression. Our Engle-Granger two-step multivariate estimates, normalized on the General Index, are reported in Table 4-16.

Table 4-16 Two Step Multiple Cointegration: General Index as the Dependent Variable[1]

No. of Indices	DW	DF	ADF(L)
10	0.637	-15.104**	-10.074**(1)

Note: The statistic reported are for the multiple regression with the General Index as the dependent variable. The five percent critical values are: DF = -4.48; ADF= -4.43. The values are from Engle and Yoo (1987) and are for a system with five variables.

Using the critical value for a five variable system, we note that the reported values are significant at the five percent level (critical values for systems of more than five variables are not available for the two-step procedure). As a result, due to such problems inherent in the two-step methodology, the results presented in Tables 4-15 and 4-16 are only suggestive of the long-run relationships. Using the Johansen multivariate approach, we examine such relationships below. The multivariate

Johansen estimates were calculated: (1) using all 11 price series, and (2) using only 10 price series and omitting the one potentially I(0) variable S_7.

Tables 4-17 and 4-18 present our estimation of equations (4.31) and (4.31') for the different indices. Table 4-17 shows that, on the bases of LR_1, the trace test, we can reject the null hypothesis that there is a zero cointegrating vector when we use all price series. Support of this evidence of cointegration may also be adduced from the LR_2 statistic, where there would appear to be up to two cointegrating vectors. Omitting the S_7, table 4-18 illustrates that LR_1, the trace test, demonstrates up to nine cointegrating vectors. This evidence of cointegration may also be supported from the LR_2 statistic, where there would appear to be up to three cointegrating vectors.

Thus, the above results may be summarised as indicating a strong rejection of the null hypothesis of static efficiency. In explaining this conclusion, we refer to MacDonald and Power (1993) who have used the term static efficiency to denote the null of constant expected real returns and rational information processing. On the basis of simple bivariate cointegration tests it was demonstrated that the vast majority of our share price indices did not cointegrate with the General Index in the Egyptian Stock Market. This would seem to be a strong finding, given the efficiency definition of MacDonald and Power (1993). Thus, it appears to indicate both rational information processing and the absence of important time-varying elements in equilibrium returns. However, this finding conflicts with our multivariate estimates from both the Engle-Granger two step tests and Johansen cointegration tests where a substantiate amount of inefficiency was documented. This conclusion agrees with MacDonald and Power (1993) who reported a strong amount of inefficiency for a sample of 40 companies over the period January 1969 to December 1991. In order to interpret this evidence of cointegration, MacDonald and Power (1993) provide an ambitious proposal for the agenda of future research into the behaviour of stock prices. They mentioned that it may either reflect the consequences of noise trading or variable equilibrium expected returns. They suggest that a constructed survey data base on agents' stock price expectations may resolve which of the two effects dominates.

Table 4-17 Multivariate Cointegration Tests: Johansen Maximum Likelihood Procedure (All Variables)

λ-MAX LR_2				*Trace Test* LR_1			
H_0	*statistic*	*90 % CV*	*m*	*H0*	*statistic*	*90% CV*	*m*
r ≤ 0	$\underline{63.87}$	43.48	11	r ≤ 0	$\underline{286.37}$	272.03	11
r ≤ 1	$\underline{47.43}$	42.72	10	r ≤ 1	222.49	228.55	10
r ≤ 2	$\underline{42.7}$	35.84	9	r ≤ 2	175.06	185.83	9
r ≤ 3	31.6	32.26	8	r ≤ 3	132.36	149.99	8
r ≤ 4	30.19	28.36	7	r ≤ 4	100.76	117.73	7
r ≤ 5	22.18	24.63	6	r ≤ 5	70.57	89.37	6
r ≤ 6	17.93	20.9	5	r ≤ 6	48.39	64.74	5
r ≤ 7	11.84	17.15	4	r ≤ 7	30.46	43.84	4
r ≤ 8	9.39	13.39	3	r ≤ 8	18.62	26.7	3
r ≤ 9	8.81	10.6	2	r ≤ 9	9.23	13.31	2
r ≤ 10	0.42	2.71	1	r ≤ 10	0.42	2.71	1

Note: the minimum number of cointegrating vectors is denoted by *r*. The vector autoregression (in levels) contained 11 lags and constant. The variable m = p -r, where p denotes the number of variables. Underlines denote significance at the ten percent level (using *CATS in RATS* package, we could not specify the five present level. However, we could get 5% level by *Microfit* which does not give use the possibility to test beyond 5 lags contained in the vector autoregression).

Table 4-18 Multivariate Cointegration Tests: Johansen Maximum Likelihood Procedure (Excluding S_7)

λ-MAX LR_2				*Trace Test* LR_1			
H_0	*statistic*	*90 % CV*	*m*	*H0*	*statistic*	*90% CV*	*m*
r ≤ 0	$\underline{48.42}$	42.72	10	r ≤ 0	$\underline{228.55}$	218.06	10
r ≤ 1	$\underline{38.23}$	35.84	9	r ≤ 1	$\underline{185.83}$	169.64	9
r ≤ 2	$\underline{32.98}$	32.26	8	r ≤ 2	$\underline{149.99}$	131.41	8
r ≤ 3	$\underline{29.93}$	28.36	7	r ≤ 3	$\underline{117.73}$	98.42	7
r ≤ 4	22.13	24.63	6	r ≤ 4	$\underline{89.37}$	68.49	6
r ≤ 5	17.96	20.9	5	r ≤ 5	$\underline{64.74}$	46.37	5
r ≤ 6	13.75	17.15	4	r ≤ 6	$\underline{43.84}$	28.41	4
r ≤ 7	8.79	13.39	3	r ≤ 7	$\underline{26.7}$	14.66	3
r ≤ 8	5.82	10.6	2	r ≤ 8	$\underline{13.31}$	5.87	2
r ≤ 9	0.05	2.71	1	r ≤ 9	$\underline{2.71}$	0.05	1

Note: The vector autoregression (in differences) contained 11 lags and constant.

4.5 CONCLUSION

In this chapter we have empirically examined some time series properties and standard assumptions of stock returns using 3 years of daily data on the eleven Egyptian stock returns. Several basic tests, i.e. X^2, the Studentized range, Jarque-Bera statistic, all indicate that none of the indices has a normally distributed return. Although this result justifies the fact that daily stock returns are not normally distributed, the results of the more powerful test, i.e. Kolmogrov-Smirnov test, do not confirm this conclusion.

Due to the existence of leptokurtic distribution in our time series, we use a GARCH model in order to describe the process of stock returns in the Egyptian financial market. The findings demonstrate that the variance of Egyptian stock returns is time-varying in the GARCH context. We also investigate the integratedness of the volatility of asset returns. The empirical results indicate that the volatility of Egyptian stock returns is integrated.

To test the stationarity of the Egyptian stock returns, first, unit root tests developed by Dickey and Fuller (1979) are applied to these series. Then, we conduct the variance-ratio test of Lo and MacKinlay. The results provide support that there is a relatively significant stationary component, which suggests the presence of successful smoothing for these series. It is suggested that smoothing may reduce volatility of financial series but exhibit significant serial correlation. The latter was found to be negative, suggesting that the stock returns follow a mean reverting process. The important conclusion of this evidence is that there are components in past prices that can be used to predict future prices; therefore, prices do not follow random walks. Furthermore, the random walk hypothesis, while being a special case of a martingale, is not equivalent to market efficiency.

The test of efficiency is conducted using recently developed techniques for the time series literature. In particular, unit root and cointegration techniques are used to test the concept of static efficiency introduced by MacDonald and Power (1993) for individual share price indices. Amongst the results reported in this Chapter is the finding that disaggregate stock price indices of the Egyptian Stock Market are cointegrated which is interpreted as a violation of static efficiency. It is suggested that such cointegration may either reflect the consequences of noise trading or variable equilibrium expected returns.

In this chapter, we examined the efficiency of the Egyptian stock market from the domestic point of view. In the following chapter, we look at the issue of its internationalization among eighteen emerging stock markets.

CHAPTER FIVE
THE INTERNATIONALIZATION OF THE EGYPTIAN STOCK MARKET

5.0 INTRODUCTION

In Chapter four, we examined the possibility of arbitrage profits within the Egyptian stock market, using the relationships that can be found among eleven domestic available indices. In this Chapter, we investigate the issue of internationalization of this emerging market, examining the possibility of earning arbitrage profits by trading in more than one national market. By doing so we may gain some insight into the situation of the Egyptian stock market within the context of emerging international equity markets.

Both investors and academic scholars have examined the implications of investing in international equity markets. Most studies have examined interrelationships among the world stock markets either using 1980s data [e.g. Schollhammer and Sand (1985); Eun and Shim (1989); Chan et al. (1992); and Arshanaplli and Doukas (1993)] or Using 1960s to 1970s data[1] [e.g. Grubel and Fander (1971); Agmon (1972); Panton et al. (1976); and Maldonado and Saunders (1981)]. Most studies examined a limited number of countries. Few provide a comprehensive study that examines long-run relationships among national stock markets by involving a large number of nations. [e.g. Levy and Sarnat (1970); and Chan et al. (1997)].

---

[1] Levy and Sarnat (1970) and Maldondo and Saunders (1981), in which they include 1950s data.

For the emerging markets, the empirical evidence is scarce, in general, and not found for the Egyptian stock market, in particular. Cheung and Ho (1991) and Cheung (1993) examine intertemporal patterns of the correlation coefficients among the developed markets and the Asian emerging markets. They find that the correlation coefficients are unstable overtime, but confirm the benefit of diversification of investing in the Asian region. Cheung and Mak (1992) examine the causal relationship between the developed markets and Asian emerging markets and find that the US market is a 'global factor' which leads most of the Asian emerging markets. Chan et al. (1992) use unit root and pairwise cointegration tests to examine the relationship among the Asian-Pacific markets and conclude that these Asian emerging markets are not cointegrated. The results are interesting but their study suffers several drawbacks.

First, the study of Chan et al. (1992) ignores currency risk because the equity prices are measured in local currencies. Second a pairwise cointegration test is incapable of determining the interdependence among the investigated markets because more than two markets can be cointegrated. Such a possibility cannot be clarified by the pairwise test. Third, when the daily indices are used, the problem of nonsynchronous trading becomes serious because the investigated indices may be influenced by some thinly traded stocks. This leads to an erroneous representation of the true relationships among these markets. However, this bias could be reduced if a weekly interval of indices is used.

The main objective of this chapter is to use recently developed techniques (i.e., unit root and cointegration) to analyze the behaviour of the Egyptian equity market in relation to eighteen emerging stock markets[2]. We prefer to use these techniques rather than the international extensions of the CAPM (ICAPM) because testing the latter empirically fails to provide fully satisfactory results, [see, e.g., Levy (1997)]. Roll (1977), for example, indicated that there is little possibility of ever being able to generate a correct empirical test of the CAPM [see also Ross (1978), and Sharpe (1978), for discussions of the improbability of successfully testing the CAPM; Logue and Rogalski (1979), for specific empirical criticisms along this line; and Solnik (1977), and Dumas (1977), for a similarly pessimistic discussion about the ICAPM].

For instance, Roll's basic facts are that: (1) the CAPM is not testable unless the exact composition of the true market portfolio is known and used empirically, and (2) it cannot be proved or disapproved empirically because of the tautological nature of the linear relationship between average security returns and the betas. If it is correct that the CAPM cannot be tested empirically, then it is unlikely that the ICAPM will shed much light on the extent of international capital market integration.

Our study in this Chapter is significant for the following related, but distinct reasons. First, we include the exchange fluctuations in our analysis, which is more relevant to the international investors, by focusing on the US dollar measures for all indices. Second, we use the weekly indices to minimize the problem of nonsynchronous trading. Third, we include all available indices of emerging markets in our analysis to provide a comprehensive representation of the relationships between the Egyptian stock market and other emerging markets. Fourth, we examine the weak-form efficient market hypothesis for each of the eighteen emerging stock

[2] Those are in Egypt, Argentina, Brazil, Mexico, Venezuela, India, Indonesia, Korea, Malaysia, Pakistan, Philippines, Taiwan & China, Thailand, Greece, Jordan, Nigeria, Turkey, and Zimbabwe.

markets by unit root tests. Finally, we employ the Johansen test, along with the Engle-Granger two-step methodology, which is not restricted to only pairwise comparison and is capable of examining the interdependence among several stock markets. The latter has important implications for diversification through international investing.

As explained in Chan et al. (1992) and Arshanaplli and Doukas (1993), diversifying into international stock markets cannot be effective if those markets have comovements, i.e. they are cointegrated. For example, assume an investor plans to diversify into two cointegrated stock markets, say Egypt and Greece. If stock prices in Egypt declined steadily over a long period of time, and stock prices in Greece followed the decline closely since the two market are cointegrated, the diversification would not be effective because the systematic (country) risk cannot be diversified away. Thus, it is not in the best interest of investors who want diversified portfolios to invest in cointegrated markets.

Moreover, by including a sufficient number of stock markets, we investigate two hypotheses that explain Egyptian stock market integration. The first is the market segmentation explanation. The lesser degree of market segmentation, such as cross-country stock investing and foreign ownership restriction, tends to integrate one market to others [see, e.g., Ng et al. (1991)]. Hence, we should see a gradual increase in the degree of cointegration over time as we would expect world stock markets to become more integrated over time. Second, strong economic relationships among countries that are in the same continent or within the same time zone are expected to exhibit a higher degree of integration. Therefore, the existence of a common feature among stock markets would lead them to be cointegrated. For example, Corhay et al.

(1995) attempt to observe whether there is a common long-term trend among the stock prices of the 5 Pacific-Basin markets. Using cointegration theory, their study finds that while there exists a rather integrated Pacific-Basin financial area, the regional aspects (Asian versus Pacific) play important roles. Likewise, Chung and Liu (1994) examine the common stochastic trends among national stock prices of the US and 5 East Asian countries, including Japan, Hong Kong, Taiwan, Singapore, and South Korea. Their result suggests that the US and Taiwan markets may not belong to a common stock region containing the remaining 4 countries.

The structure of this chapter is as follows. Section 5.1 outlines the situation of the Egyptian stock market within the context of the Middle Eastern region. Sections 5.2 and 5.3 provide a brief discussion of data and methodology, respectively. Then Section 5.4 reports the main results. Concluding remarks are stated in Section 5.5.

5.1 EGYPT WITHIN THE CONTEXT OF MIDDLE EASTERN EMERGING MARKETS

It is mentioned above that strong economic relationships among countries that are in the same region or within the same time zone are expected to exhibit a higher degree of integration. Thus, it is useful to consider the status and features of emerging markets in the Middle East region.[3] The analysis below, using quantitative indicators, compares the stock markets in these emerging markets.

In Middle Eastern countries the financial sector is dominated by commercial banks. The securities markets in these countries are relatively small despite the fact that the region contains some of the developing world's largest institutional investors

[3] Particularly those are in Iran, Jordan, Morocco,Tunisia, and Turkey. Other active regional equity markets include Bahrain, Israel, Kuwait, and Oman. Although there are no formal stock markets in Saudi Arabia and the United Arab Emirates, equity transactions take place through the banking system. The establishment of equity markets is under consideration in Lebanon, Sudan, and Syria.

in international markets. Foreign participation, even in the government securities market, is limited in most countries. Similarly, there have been few direct placements of Middle Eastern equities on foreign markets. Moreover, the use of market-based risk management instruments by countries in the region has been extremely narrow despite the relatively limited degree of export diversification.

While there are considerable differences across countries in the importance of equity markets, the supply of corporate securities remains generally limited both in absolute terms and relative to the size of the economies. This reflects several factors that have constrained the demand for and the supply of stocks, including the closed, family-owned nature of many companies in the region. Moreover, in several countries public sector enterprises have continued to play a dominant role in a wide range of economic activities. The number of effectively quoted companies thus has been relatively small and the markets have remained thin.

Due to the relatively underdeveloped nature of the equity market, the Middle Eastern region has attracted a disproportionately small share of recent international flows to developing countries. Thus, according to Bates (1994), the Arab countries received only about US$ 0.2 billion out of the total some US$ 52 billion that flowed into developing country equity markets in 1993. The region's share of inflows associated with new issues was also negligible. More broadly, International Financial Corporation data indicate that Arab countries accounted for only 2 percent of total flows of foreign portfolio and direct investment in developing countries in 1989-92, with the bulk of the Arab country share reflecting foreign direct investment [Hovaguimian (1994)].

While equity markets in countries other than Jordan and Turkey are small, the provision of risk finance and the tradition of market trading are hardly new. In Egypt, the Alexandria and Cairo stock exchanges are over a century old, and the Cairo stock market was one of the most active in the world in the 1940s (see Chapter Three). Other Arab countries have also had stock exchanges for several years: an exchange was set up in Iran in 1966, and in Tunisia in 1969.

In order to explain the status of the Egyptian stock market among others, it is worth considering a number of indicators of market activity and performance, and comparing them with other countries. Table 5-1 provides data on market capitalization of equities for two benchmark years (1983 and 1993). In 1983, the equity market in Egypt was larger than that in Turkey, as well as several other emerging markets, when judged by capitalization (in US dollar terms) and in relation to GDP. However, by end-1993, while the Egyptian market had increased almost fourthfold, other emerging markets, including Turkey, had increased by a factor of 25 or more.

It is also noticeable that, at end-1993, the ratio of Jordan's market capitalization to GDP exceeded that in most emerging markets, and was similar to that in some major industrial countries. The picture looks different when looking at listed companies and value traded. As Table 5-2 illustrates, the number of listed companies in Egypt increased from 154 to 674, compared with a much smaller increase or even a decline in several other countries.

Table 5-1 Market Capitalization of Traded Equities

	1983		1993	
	Millions of US dollars	**Percent of GDP**	**Millions of US dollars**	**Percent of GDP**
Egypt	1,106	3.0	3,800	9.2
Iran	...	...	1,297	2.6
Jordan	2,713	56.7	4,891	94.2
Morocco	254	2.1	2,662	9.8
Tunisia	...	...	955	6.4
Turkey	968	2.0	37,496	30.2
Argentina	1,386	1.3	43,967	17.2
Chile	2,599	13.2	44,622	102.1
Colombia	857	0.9	9,237	17.4
Greece	964	2.8	12,319	13.6
India	7,178	7.2	97,976	44.8
Kenya	...	...	1,421	26.3
Nigeria	2,970	3.7	1,029	2.9
Philippines	1,389	1.4	40,327	75.0
Thailand	1,488	1.5	130,510	105.5
Japan	565,164	47.6	2,999,756	71.2
United Kingdom	225,800	48.9	1,151,646	121.7
United States	1,898,063	55.7	5,223,768	82.4

Sources: International Finance Corporation, Emerging Markets Factbook; and IMF, International Financial Statistics.

Table 5-2 Listed Companies and value Traded

	1983			1993		
	(1)	(2)	(3)	(1)	(2)	(3)
Egypt	154	32	0.21	674	75	0.11
Iran	...	...	...	124	311	2.51
Jordan	95	329	3.50	101	1,377	13.63
Morocco	76	17	0.22	65	498	7.66
Tunisia	...	...	...	19	46	2.42
Turkey	373	7	0.02	152	23,242	152.90
Argentina	238	389	1.63	180	10,339	57.43
Chile	214	65	0.30	263	2,797	10.63
Colombia	196	65	0.33	89	732	8.22
Greece	113	17	0.15	143	2,713	18.97
India	3,118	2,377	0.76	6,800	21,879	3.22
Kenya	...	...	...	56	14	0.25
Nigeria	93	18	0.19	174	10	0.06
Philippines	208	483	2.32	180	6,785	37.69
Thailand	88	381	4.33	347	86,934	250.53
Japan	1,789	230,906	129.10	2,155	954,341	442.85
United Kingdom	2,217	42,544	19.20	1,646	423,526	257.30
United States	7,722	797,123	103.20	7,607	3,507,223	461.10

Sources: International Finance Corporation, Emerging Markets Factbook; and IMF, International Financial Statistics.
(1) Number of Listed Companies, (2) Value traded (Millions of US dollars, and (3) Average Value traded (Millions of US dollars)

However, if we consider activity on the market as measured by the value traded, Egypt's increase was limited when compared with other markets. Consequently, value traded remained small relative to the number of companies quoted. In the case of Morocco and Tunisia, the average value traded increased, however remaining relatively low especially in the case of Tunisia. Trading volume in the Amman Stock Exchange increased sharply from US$ 19 million in 1978 to US$ 640 million in 1989 and further to US$ 1.4 billion in 1993 (the largest in the Arab countries). During the same period, listed companies rose from under 70 to almost 115 [Toukan (1994)].

The interpretation of some of these raw data needs to be qualified with a number of observations. In Egypt, the 674 shares listed in 1993 include over 400 that are closed companies, with the rest seldom trading. many companies, including those that are fully owned by state entities, only list to benefit from tax advantages. It is estimated that the shares of only about 80 companies actually trade-albeit an increase from 40 1983 [Fag El-Nour (1994)]. Market capitalization data, which show the nominal value of all listed shares, should also be interpreted with caution. Excluding listed shares that are not available for trading sharply reduces the total. It has thus been estimated that Egyptian market capitalization of the stocks that trade was probably around US$ 0.5 billion at end-1992. However, at the end of February 1996 it was around US$ 8.2 billion with an annual turnover of US$ 1.1 billions and 741 listed companies.

To sum up the process of development of stock market and its integration to international capital markets is less advanced in Egypt, particularly when compared with Latin American and Asia rather than Middle Eastern markets. Yet this market is believed to provide an important channel for mobilizing resources - from domestic, regional, and international sources-and allocating them to productive investments. It is also consistent with the increased emphasis the private sector as the main engine for investment and growth. There is increased recognition in Egypt of the need to significantly broaden its domestic financial market and improve the internationalization of this market. This comes at a time of pressures on aid flows, increased international competition for private capital, and an uncertain environment for the country's terms of trade. The historical experiences of other countries in the Middle East region and other developing countries suggest that there is a clear and strong potential for market development and internationalization. Thus, in the following sections, we construct our empirical investigation to analyze the situation of the Egyptian equity market among seventeen emerging stock markets.

5.2 DATA AND SUMMARY STATISTICS

Our sample of national equity markets includes weekly data for 17 emerging market returns based on the International Finance Corporation (IFC) indices of the world Bank[4] and the Egyptian capital market returns based on the General Index defined in Chapter three. The IFC provides value-weighted indices of a representative sample of equities in each country covering at least 60 percent of the market's capitalization.

The summary statistics are presented in Table 5-3 for the total variable data for each country. The time period covered from January 1994 to December 1997. The

[4] The data base was generously provided by Donna McDonall from *Datastream International*, Department of Accounting and Finance, University of Strathclyde.

weekly interval was chosen (as opposed to daily or monthly) as a compromise between the problems of measurement errors inherent in daily data and sampling inefficiencies associated with longer intervals [see Pogue and Solnik (1972)].

Table 5-3 Summary Analysis of International Equity Returns

Name	Mean	Std. Dev.	Autocorrelation						
			ρ_1	ρ_2	ρ_3	ρ_4	ρ_6	ρ_8	ρ_{10}
Egypt	6.63	29.35	0.23	0.20	0.13	0.05	0.01	-0.05	0.01
Argentina	6.24	23.14	0.02	0.06	-0.04	-0.08	0.06	0.04	-0.10
Brazil	24.44	31.72	-0.02	0.02	0.06	0.06	-0.00	-0.10	-0.02
Mexico	-3.64	25.94	0.21	0.23	0.01	0.12	-0.04	0.09	0.04
Venezuela	20.80	35.03	-0.01	-0.00	-0.14	0.07	0.08	-0.04	-0.14
India	-8.84	17.49	0.12	0.00	0.01	0.02	0.02	0.12	0.10
Indonesia	-26.00	27.88	-0.12	0.15	0.14	-0.06	-0.11	0.05	0.10
Korea	-35.36	25.60	0.01	0.25	0.07	0.14	0.19	0.00	0.01
Malaysia	-28.08	21.73	0.09	-0.12	0.10	0.23	-0.08	0.18	-0.01
Pakistan	-10.40	18.12	0.17	0.07	0.06	-0.07	-0.03	-0.04	-0.08
Philippines	-19.76	20.45	-0.03	0.10	0.02	-0.04	-0.12	0.18	0.10
Taiwan,China	5.20	18.45	0.00	0.04	0.14	-0.03	-0.00	0.09	-0.07
Thailand	-47.84	27.24	0.01	-0.01	-0.01	0.02	0.18	0.01	0.09
Greece	11.44	17.42	0.02	0.05	-0.11	0.01	0.01	-0.06	-0.01
Jordan	2.08	9.02	-0.04	-0.05	0.09	-0.02	0.00	-0.01	0.03
Nigeria	48.36	43.50	0.02	0.02	0.01	0.02	0.03	-0.01	-0.02
Turkey	21.32	43.73	-0.05	0.03	-0.12	0.08	0.04	0.07	-0.13
Zimbabwe	5.72	22.52	0.33	0.17	0.20	0.03	-0.07	-0.04	0.04
Latin America	5.72	19.58	0.07	0.15	0.02	0.09	0.04	-0.05	-0.04
Asia Regional	-16.64	11.22	0.18	0.11	0.11	0.23	0.08	0.20	0.00
Composite	-8.32	10.46	0.13	0.29	0.08	0.15	0.14	0.02	-0.08

Means, standard deviations, and autocorrelations coefficients of 17 emerging market returns based on the IFC indices and the Egyptian capital market returns based on the General Index defined in Chapter three. Both means and standard deviations are in annualized percentage terms. All returns are calculated in US dollar measures. The sample ends in December 1997.

It should be noted that any comparison of national markets must take account of the fact that stocks on different national securities are quoted in different national currencies so that any relationship between the movement in the two securities is likely to be obscured by fluctuations in the exchange rate. Hence, to abstract from this problem, the US dollar measure was employed as the common currency unit. Moreover, it is believed that the US dollar helps in attaining a more integrated emerging stock markets, by facilitating greater arbitrage because of the absence of uncertainty about exchange rate volatility. In addition, using the US dollar returns, we can eliminate the location inflation in our time series.

The statistics include the average (annualized) arithmetic return, standard deviation, and autocorrelations. The range of average returns is relatively high for the sample. The mean US dollar returns for these emerging markets vary from 48 percent (Nigeria) to 2 percent (Jordan). This sharply contrasts with the range of average returns in the developed markets [see, for example, Bekaert and Harvey (1995)]. In their sample, based on Morgan Stanley Capital International, one country (Hong Kong) out of 21 developed markets has an average return that exceeds 20 percent. In our sample, four countries (Venezuela, Turkey, Brazil, and Nigeria) have average returns above 30 percent. Emerging market returns are characterized by high volatility. Standard deviations range from 9 percent (Jordan) to 44 percent (Turkey and Nigeria). There are twelve emerging markets with volatility higher than 20 percent. Moreover, these markets reveal high autocorrelations. This suggests that the returns in many of these countries may be predictable (to some extent) based on past returns alone.

For the purpose of this Chapter, we conduct Johansen cointegration tests in two stages: (1) using all 18 price series, then (2) using different groups of countries. These groups are:

1. Egypt and four Latin American indices (i.e., Argentina, Brazil, Mexico, and Venezuela).
2. Egypt and eight Asian indices (i.e., India, Indonesia, Korea, Malaysia, Pakistan, Philippines, Taiwan & China , and Thailand).

3. Egypt and three Mediterranean rim countries indices (i.e., Greece, Jordan and Turkey).
4. Egypt and two Middle Eastern indices (i.e., Jordan and Turkey).
5. Egypt and two African indices (i.e., Nigeria and Zimbabwe).

5.3 METHODOLOGY

In Chapter four, we explained that two time series x and y, each being an $I(1)$ process, are said to be cointegrated if they form a linear combination, ψ_t, which is $I(0)$ i.e. $\psi_t = x_t - \Phi.y_t$ where the constant Φ is sometimes termed the 'the cointegrating vector'. In other words, if *some simple linear relation* can be found between two financial time series, using historical data, this implies a market inefficiency because one would expect this information to be impounded into the relative prices. If this possibility for earning profits, using information contained in the cointegrating vector, remains, then this implies a form of market inefficiency [see, e.g., MacDonald and Power (1993); and Chelley-Steeley and Pentecost (1994) who use the cointegration methodology for testing the efficiency of the UK share prices].

In terms of cross-border equity market efficiency, cointegration implies that national stock market indices have a long-run relationship. This may limit the benefit of international diversification. Recalling equation 4.27 from Chapter four, our analysis is based on a vector autoregressive model with Gaussian errors:

$$X_t = \pi_1 X_{t-1} + \pi_2 X_{t-2} + \ldots + \pi_k X_{t-k} + c + e_t \quad t = 1,2,\ldots,T \qquad (5.1)$$

where e_t is an $N\times1$ vector with zero mean and variance matrix A and c is a constant; K is the maximum number of lag length processing the white noise; and X_t = (Egy, Arg, Bra, Mex, Ven, Ind, Ind, Kor, Mal, Pak, Phi, *T&C*, Tha, Gre, Jor, Nig, Tur, Zim)[5] is a 18 × 1 vector of stochastic variables [see Chapter four for a detailed discussion of testing the hypothesis of cointegration].

5.4 EMPIRICAL RESULTS

Following the cointegration methodology defined in Chapter four, we start by checking the orders of integration of each of the indices used in the cointegration analysis.

$$\Delta P_t = \alpha + \beta t + \rho P_{t-1} + \sum_{i=1}^{i=q} \theta \Delta P_{t-i} + e_t \tag{5.2}$$

where Δ is the first difference operator. A significant negative value of ρ will reject the null hypothesis that a unit root exists, i.e., $I(1)$ and in favor of the alternative hypothesis of stationarity, $I(0)$. To eliminate any serial correlation in the residuals, three lags of the first difference of P_t, were required. The first line for each country index in Table 5-4 reports, therefore, the results of the *ADF* (5.2) regression. A variable deletion test (imposing zero coefficients on P_{t-1} and the time trend) gives a computed value for Φ_3. Table VI in Dickey and Fuller (1981) shows the critical value for more than 250 observations (we actually use 207) to be 6.34. The first impression to emerge from this table is that all our stock price indices contain a unit root.

Therefore, we move to analyze the calculated *t*-statistic of the coefficient of Z_{t-1}. The reported results strengthen our deduction that the series contains a unit root, the critical value of -3.43 (obtained from Fuller, Table 5.5.2) is higher, in absolute terms, than each reported value. Having determined that the series is not $I(0)$, we

---

[5] Egy, Arg, Bra, Mex, Ven, Ind, Ind, Kor, Mal, Pak, Phi, *T&C*, Tha, Gre, Jor, Nig, Tur, and Zim denote Egypt, Argentina, Brazil, Mexico, Venezuela, India, Indonesia, Korea, Malaysia, Pakistan, Philippines, *Taiwan and China*, Thailand, Greece, Jordan, Nigeria, Turkey, And Zimbabwe, respectively.

justify that the series needs to be differenced only once to achieve stationarity (i.e. is an $I(1)$ variable). This requires further differencing. Thus, we begin with the regression:

$$\Delta\Delta P_t = \phi\Delta P_{t-1} + \alpha + \beta t + \gamma\Delta\Delta P_{t-1} + e_t \tag{5.3}$$

The statistics of the *ADF* for the first differences are reported in the last two columns in Table 5-4. The results confirm the conclusion that our share price time series is $I(1)$, indicating that all the weekly stock prices follow a random walk.

Before implementing the Johansen method, we construct the Engle-Granger two-step method as a preliminary test. Table 5-5 presents some simple bivariate cointegration results between 17 indices of stock prices and the Egyptian stock Index. The findings in this table suggest that the share prices of 12 indices (i.e., Argentina, Brazil, India, Indonesia, Korea, Pakistan, Philippines, Taiwan & China, Thailand, Greece, and Zimbabwe) in the sample may be cointegrated with the Index of the Egyptian Stock Market; they have statistically significant Dickey-Fuller based statistics using the weekly price data. Moreover, the Engle-Granger two-step multivariate estimates[6], normalized on the Egyptian Index, are reported in Table 5-6.

Using the critical value for a five variable system, we note that the reported values are significant at the five percent level (critical values for systems of more than five variables are not available for the two-step procedure).

---

[6] The tests are computed by performing two regressions. The first, called the cointegrating regression, fits the static bivariate model: $y_t = \hat{\varphi} + \chi_t\hat{\pi} + z_t$, where z_t is the residual term which interpreted as the cointegrating linear relation. The Durbin-Watson test simply examines the DW of this regression to see if it is significantly greater than zero, which would be its probability limit if z_t contains a unit root as required by the null hypothesis. At the second stage, the DF and ADF tests are obtained respectively as the t-statistics of $\hat{\rho}$ in regressions 4.15.1, 4.15.2, and 4.15.3, [see Engle and Yoo (1987)].

As a result, due to such problems inherent in the two-step methodology, the results presented in Tables 5-5 and 5-6 are only suggestive of the long-run relationships. Therefore, we use the Johansen multivariate approach in examining such relationships. First, the multivariate Johansen estimates were calculated using all 18 price series. Table 5-7 illustrates that LR_1, the trace test, demonstrates up to eleven cointegrating vectors. This evidence of cointegration may also be supported from the LR_2 statistic, where there would appear to be up to seven cointegrating vectors. These results would mean Granger-Causality in levels and hence would be suggestive of inefficiency.

Second, the Johansen cointegration tests are applied to the five groups of countries as suggested earlier. Table 5-8 shows that, on the bases of LR_1, the trace test, we cannot reject the null hypothesis that there is a zero cointegrating vector for the first group (i.e., Egypt, Argentina, Brazil, Mexico, and Venezuela). However, on the basis of the LR_2 statistic, there would appear to be one cointegrating vector for this group. For the third group (Egypt, Greece, Jordan, and Turkey) as well as fourth group (i.e., Egypt, Jordan and Turkey), the results indicate that there is little evidence of long-term relationships among the equity markets of these groups.

For the second group (i.e., Egypt, India, Indonesia, Korea, Malaysia, Pakistan, Philippines, Taiwan & China , and Thailand), the findings suggest that there exist at least two common trends, based on the trace test, and four trends on the basis of the LR_2 statistic among the markets of this group. For the fifth group (i.e., Egypt, Nigeria and Zimbabwe), λ-MAX and trace statistics for $r = 2$ are significant at the ten percent level of significant. Thus, cointegration exists in the fifth group.

Therefore, the stock market does not appear to be efficient for the majority of the sample since the predictability seems to exist between the Egyptian stock market index and the prices of other emerging markets. In other words, the presence of cointegrating vector suggests that significant opportunities for pure arbitrage gain between Egypt and other emerging markets may exist during the period of study. Large gains from international arbitrage appear to persist sufficiently long, allowing a clear cointegrating vector to be determined.

The most striking feature of Tables 5-5 and 5-8 is the total absence of any clear cointegrating vector among the Middle Eastern markets (i.e., Egypt, Jordan, and Turkey) and among Mediterranean rim countries (i.e., Egypt, Greece, Jordan and Turkey), suggesting no gains from regional arbitrage appear to persist long to allow any clear cointegration to be determined. This result provide several implications on the hypotheses offered to explain cointegration relationships. First, countries with common geographic ties (e.g., Middle Eastern countries and Mediterranean Rim countries) may not cointegrate with each other. That is, the common economic and geographic ties do not necessarily lead national stock markets to follow the same stochastic trend. The lack of significant cointegration in these two groups seems not to support this hypothesis. Thus, it is in the best interest of investors who want diversified portfolios to invest in these markets because they are not cointegrated. Such a diversification would be effective because the country risk can be diversified away. Second, under the market segmentation argument of integration, the number of significant cointegrating vectors among all emerging stock markets should increase over time because of less market segmentation (e.g. fewer restrictions on cross-country investing, foreign ownership and foreign exchange control) during this decade. Thus, the evidence seems supportive of the hypothesis that less market segmentation leads to cointegration relationships among emerging stock markets as a whole. However, the results from Middle Eastern and Mediterranean Rim countries do not support this hypothesis.

Table 5-4 Unit Root Tests for the Weekly Prices Data

	Intercept	Trend	Z_{t-1}	ΔZ_{t-1}	ΔZ_{t-2}	ΔZ_{t-3}	Φ_3	t(*ADF*) for the first difference with trend	t(*ADF*) for the first difference without trend
			Egypt						
Z = P	-16.736	0.442	-0.150	0.051	0.122	0.067	5.142	-9.6263	-9.6504
t-stat.	-0.804	2.214	-3.035	0.724	1.720	0.938			
			Argentina						
Z = P	117.060	0.177	-0.098	0.041	0.078	0.026	6.1562	-11.125	-11.142
t-stat.	2.673	1.126	-3.166	0.571	1.086	0.483			
			Brazil						
Z = P	20.991	0.394	-0.159	0.089	0.099	0.084	4.8882	-9.7623	-9.7874
t-stat.	1.294	2.490	-3.206	1.262	1.394	1.193			
			Mexico						
Z = P	97.959	-0.442	-0.045	0.096	0.085	0.073	3.1179	-12.417	-12.45
t-stat.	2.024	-1.889	-2.455	1.381	1.213	2.244			
			Venezuela						
Z = P	16.004	-0.058	-0.043	-0.001	-0.025	-0.034	1.8246	-12.309	-12.343
t-stat.	1.662	-1.423	-1.849	-0.017	-0.352	-0.669			
			India						
Z = P	30.910	-0.082	-0.068	-0.029	0.032	-0.004	3.0253	-12.303	-12.332
t-stat.	2.312	-2.112	-2.405	-0.404	0.448	-0.091			
			Indonesia						
Z = P	2.762	0.027	-0.039	-0.035	0.012	0.048	1.6354	-10.875	-10.894
t-stat.	0.946	0.890	-1.766	-0.482	0.166	0.722			
			Korea						
Z = P	29.527	-0.101	-0.041	0.108	0.054	-0.017	4.0457	-12.228	-12.149
t-stat.	2.613	-2.819	-2.516	1.531	0.765	-0.564			
			Malaysia						
Z = P	-21.119	0.700	-0.062	0.010	0.044	0.006	3.1681	-9.9571	-9.9792
t-stat.	-0.539	1.714	-2.499	0.142	0.617	0.089			
			Pakistan						
Z = P	9.466	0.760	-0.145	0.082	0.097	0.069	3.9821	-9.688	-9.7126
t-stat.	0.203	1.770	-3.083	1.152	1.371	0.968			

Table 5-4 (continued)

	Intercept	Trend	Z_{t-1}	ΔZ_{t-1}	ΔZ_{t-2}	ΔZ_{t-3}	Φ_3	t(*ADF*) for the first difference: with trend	t(*ADF*) for the first difference: without trend
			Philippines						
Z = P	129.910	-0.677	-0.026	-0.012	0.011	0.019	1.7867	-12.699	-12.655
t-stat.	1.596	-1.828	-1.551	-0.175	0.148	0.419			
			Taiwan and China						
Z = P	42.781	-0.104	-0.044	0.014	0.066	0.054	2.6697	-13.588	-13.591
t-stat.	2.184	-1.851	-2.193	0.199	0.939	1.431			
			Thailand						
Z = P	26.910	-0.155	-0.019	-0.061	0.054	-0.069	2.0086	-13.304	
t-stat.	1.479	-1.989	-1.405	-0.867	0.762	-2.268			-13.261
			Greece						
Z = P	9.398	-0.045	-0.022	-0.053	-0.059	0.016	1.179	-13.364	
t-stat.	1.220	-1.490	-1.265	-0.737	-0.831	0.351			-13.371
			Jordan						
Z = P	-1.396	0.096	-0.031	0.069	-0.000	-0.036	2.0094	-10.124	-10.048
t-stat.	-0.295	1.943	-1.583	0.942	-0.003	-0.505			
			Nigeria						
Z = P	-6.100	0.145	-0.024	0.019	0.021	0.019	1.4305	-9.7777	-9.7836
t-stat.	-0.688	1.516	-1.655	0.264	0.294	0.262			
			Turkey						
Z = P	1.893	0.348	-0.087	0.054	0.055	-0.057	5.8431	-10.215	-10.205
t-stat.	0.196	3.032	-3.274	0.775	0.791	-0.902			
			Zimbabwe						
Z = P	21.966	-0.082	-0.024	-0.052	-0.007	-0.009	2.1419	-11.053	-10.884
t-stat.	1.690	-1.644	-1.231	-0.725	-0.103	-0.163			
			Latin America						
Z = P	49.257	-0.114	-0.066	0.019	0.096	0.083	3.7337	-13.016	-13.047
t-stat.	2.578	-2.223	-2.685	0.275	1.362	2.316			
			Asia Regional						
Z = P	21.907	-0.094	-0.038	0.033	0.009	-0.017	2.2975	-12.043	-12.027
t-stat.	1.931	-2.033	-1.909	0.463	0.128	-0.366			
			Composite						
Z = P	-6.730	0.352	-0.035	0.031	0.028	-0.024	2.0868	-9.976	-9.9354
t-stat.	-0.381	1.875	-1.799	0.432	0.389	-0.341	-0.341		

For each regression equation the dependent variable is ΔZ. Z is defined in the first column. The estimation period is 1994 Jan., 1st to 1997 Dec. 17th. Underlines indicate a rejection of the null at the 95 % level.

Table 5-5 Two Step Cointegration Test for Individual Indices Across National Boundaries

Country	*DW*	*DF*	*ADF* (*L*)
Argentina	0.097	-4.992	-1.304 (8)
Brazil	0.108	-4.422	-3.641 (7)
Mexico	0.055	-3.133	-1.861 (8)
Venezuela	0.091	-3.276	-2.229 (6)
India	0.044	-5.118	-1.347 (4)
Indonesia	0.211	-3.730	-2.582 (8)
Korea	0.128	-4.845	-1.863 (8)
Malaysia	0.158	-2.888	-2.138 (8)
Pakistan	0.146	-3.388	-1.934 (7)
Philippines	0.101	-3.632	-1.427 (8)
Taiwan,China	0.089	-5.813	-1.696 (8)
Thailand	0.130	-3.994	-1.595 (8)
Greece	0.108	-4.140	-1.546 (8)
Jordan	0.096	-1.821	-0.409 (8)
Nigeria	0.132	-2.556	-1.728 (8)
Turkey	0.113	-3.109	-1.418 (8)
Zimbabwe	0.071	-3.392	-1.304 (8)

Note: The statistics reported are all from bivariate regressions consisting of Dependent Variable (Country share prices) and the Egyptian Index. *DW*, *DF*, and *ADF* denote, respectively, Durbin Watson, Dickey Fuller and Augmented Dickey Fuller statistics on the residuals generated from the cointegrating equation. The five percent critical values for these statistics are as follows: *DW* =0.386; *DF* = 3.37; and *ADF* =3.17; see Engle and Granger (1987), Table II. The numbers in parenthesis after the *ADF* denotes the lag length (*L*). An underline denotes significant at the five percent level.

Table 5-6 Two Step Multiple Cointegration: Egyptian Index as the Dependent Variable[1]

No. of Indices	DW	DF	ADF(L)
17	0.780	-7.050**	-7.981**(1)

Note: The statistic reported are for the multiple regression with the Egyptian Index as the dependent variable. The five percent critical values are: DW = 0.08; DF = -4.48; ADF = -4.43. The values are from Engle and Yoo (1987) and are for a system with five variables.

Table 5-7 Multivariate Cointegration Tests: Johansen Maximum Likelihood Procedure for 18 Emerging Markets (in US Dollar Measure, weekly Data: January 1994-December 1997)

λ-MAX LR_2			*Trace Test* LR_1		
H0	*statistic*	*m*	*H0*	*statistic*	*m*
$r \le 0$	921.12	18	$r \le 0$	134.17	18
$r \le 1$	786.95	17	$r \le 1$	109.29	17
$r \le 2$	677.66	16	$r \le 2$	104.35	16
$r \le 3$	573.31	15	$r \le 3$	88.12	15
$r \le 4$	485.19	14	$r \le 4$	77.78	14
$r \le 5$	407.42	13	$r \le 5$	67.27	13
$r \le 6$	340.14	12	$r \le 6$	62.44	12
$r \le 7$	277.71	11	$r \le 7$	52.56	11
$r \le 8$	225.15	10	$r \le 8$	49.15	10
$r \le 9$	176	9	$r \le 9$	39.36	9
$r \le 10$	136.64	8	$r \le 10$	36.62	8
$r \le 11$	100.02	7	$r \le 11$	29.26	7
$r \le 12$	70.76	6	$r \le 12$	20.65	6
$r \le 13$	50.11	5	$r \le 13$	17.52	5
$r \le 14$	32.59	4	$r \le 14$	14.36	4
$r \le 15$	18.23	3	$r \le 15$	9.29	3
$r \le 16$	8.94	2	$r \le 16$	8.44	2
$r \le 17$	0.5	1	$r \le 17$	0.5	1

Note: the minimum number of cointegrating vectors is denoted by *r*. The variable m = p -r, where p denotes the number of variables. Underlines denote significance at the 10 percent level (using *CATS in RATS* package)

Table 5-8 Multivariate Cointegration Tests: Johansen Maximum Likelihood Procedure for Constructed Groups of Emerging Markets (in US Dollar Measure) Weekly Data: January 1994-December 1997

λ-MAX LR_2				*Trace Test* LR_1			
H0	*statistic*	*90% CV*	*m*	*H0*	*statistic*	*90% CV*	*m*
Group (1)							
$r \le 0$	**25.85**	20.9	5	$r \le 0$	64.64	64.74	5
$r \le 1$	**20.36**	17.15	4	$r \le 1$	38.79	43.84	4
$r \le 2$	10.51	13.39	3	$r \le 2$	18.43	26.7	3
$r \le 3$	7.23	10.6	2	$r \le 3$	7.92	13.31	2
$r \le 4$	0.69	2.71	1	$r \le 4$	0.69	2.71	1
Group (2)							
$r \le 0$	**54.63**	35.84	9	$r \le 0$	**225.75**	185.83	9
$r \le 1$	**52.03**	32.26	8	$r \le 1$	**171.13**	149.99	8
$r \le 2$	**37.35**	28.36	7	$r \le 2$	**119.1**	117.73	7
$r \le 3$	**29.88**	24.63	6	$r \le 3$	81.76	89.37	6
$r \le 4$	**23.68**	20.9	5	$r \le 4$	51.88	64.74	5
$r \le 5$	11.65	17.15	4	$r \le 5$	28.2	43.84	4
$r \le 6$	8.76	13.39	3	$r \le 6$	16.55	26.7	3
$r \le 7$	6.6	10.6	2	$r \le 7$	7.79	13.31	2
$r \le 8$	1.19	2.71	1	$r \le 8$	1.19	2.71	1
Group (3)							
$r \le 0$	**49.11**	17.15	4	$r \le 0$	**70.1**	43.84	4
$r \le 1$	12.36	13.39	3	$r \le 1$	20.99	26.7	3
$r \le 2$	7.75	10.6	2	$r \le 2$	8.63	13.31	2
$r \le 3$	0.88	2.71	1	$r \le 3$	0.88	2.71	1
Group (4)							
$r \le 0$	**41.11**	13.39	3	$r \le 0$	**50.62**	26.7	3
$r \le 1$	8.83	10.6	2	$r \le 1$	9.51	13.31	2
$r \le 2$	0.68	2.71	1	$r \le 2$	0.68	2.71	1
Group (5)							
$r \le 0$	**16.94**	13.39	3	$r \le 0$	**31.44**	26.7	3
$r \le 1$	**11.12**	10.6	2	$r \le 1$	**14.5**	13.31	2
$r \le 2$	**3.38**	2.71	1	$r \le 2$	**3.38**	2.71	1

Notes::
Group (1): Egypt, Argentina, Brazil, Mexico, and Venezuela.
Group (2): Egypt, India, Indonesia, Korea, Malaysia, Pakistan, Philippines, *Taiwan and China*, and Thailand.
Group (3): Egypt, Greece, Jordan and Turkey.
Group (4): Egypt, Jordan and Turkey.
Group (5): Egypt, Nigeria and Zimbabwe.

5.5 CONCLUSION

This Chapter analyzed the situation of the Egyptian equity market among seventeen emerging stock markets during the period from January 1994 to December 1997. Considering the opening up of the Egyptian equity market during the 1990s, it is expected that there is increasing interest in investing in this market. The weekly stock indices of the eighteen emerging equity markets examined in this Chapter all have a unit root, indicating that all the weekly stock prices follow a random walk.

The Engle-Granger two-step methodology and the multivariate Johansen's cointegration tests were performed on these prices. The findings show that the eighteen emerging markets are cointegrated, indicating Granger-Causality in levels and suggesting of inefficiency.

Nevertheless, the results demonstrate an absence of any clear evidence of cointegration among the Middle Eastern markets and also among Mediterranean Rim markets. This finding implies that: (1) the international diversification among these markets would be effective because the country risk can be diversified away, (2) investors who want diversified portfolios may be encouraged to invest in these markets, and (3) there is an evidence of efficiency due to the absence of Granger-Causality in levels. However, the test of efficiency requires an explicit modeling of the trade-offs between risk and returns, so an economic measure can be measured. Therefore, we have assigned the rest of this thesis to investigate the efficiency of the Egyptian stock market with specific focus on the privatized initial public offerings.

CHAPTER SIX

PRICE PERFORMANCE IN THE PRIMARY MARKET OF THE EGYPTIAN PIPOs

6.0 INTRODUCTION

In the literature review chapter, it is argued that the underpricing phenomenon may be attributed to the trading system of the developed capital markets where the investment banker plays an important role in these markets. Until conducting the present study, the Egyptian Capital Market (ECM) has differed from the developed capital markets in not having an investment-banker system. The ECM, therefore, provides an opportunity to test if underpricing is due to the role of investment banker in the developed capital markets. If the underpricing is enforced by the investment banker per se, then it should not be found in the ECM.

Thus, the main objective of this chapter is to examine the underpricing phenomenon in the Egyptian PIPOs market. In carrying out this objective, two sections of analysis are conducted. First, an examination of the initial price performance of the Egyptian PIPOs is provided in section 6.1. In constructing this section, we present two return series. The first is the series of market adjusted returns. The second series of returns attempts to control for risk of unseasoned new issues using a method similar to the RATS (returns across time and securities) procedure of Ibbotson (1975). In section 6.2, factors to which the underpricing has proved to be attributed are examined. Finally, summary and conclusion are provided in section 6.3.

6.1 Examining the Initial Performance of the Egyptian PIPOs

6.1.1 Introduction

The main objective of this section is to measure the initial price performance of the PIPOs, offered to the public by Egyptian privatised companies, from the offering date to the date of the first listing on the exchange. This objective is to determine the degree of 'underpricing' in Egypt and compare it to underpricing found by other researchers in other markets. It is assumed that the comparison of underpricing noted in this study with other studies will provide signals on the efficiency in setting the offer price of a new PIPO. Moreover, examining the degree of the initial returns, this study may suggest justifications to explain the degree of underpricing found in the Egyptian PIPOs and discuss its implication to the market.

In order to measure the price performance of the PIPOs, we have to determine the approach of analysis and the model(s) through which the performance is measured. Generally, empirical studies in finance involve the use of two broad research methodologies; time-series analysis and cross-sectional analysis. A time-series analysis refers to analysis through time, whereas a cross-sectional refers to analysis across firms. According to Christie (1987, p.231):

> "Given observations of N firms for T time periods, a cross-sectional study conducts T cross-sectional analysis and examines the distribution of the T sets of coefficients. In contrast, a time-series study conducts N time-series analysis and examines the cross-sectional distribution of N sets of coefficients."

The methodology of the present investigation is classified to be cross-sectional in measuring the price performance in the primary market. Empirically, the price performance of an issue can only be considered abnormal, relative to a particular benchmark. Therefore, in this study we apply two general models employed by previous researchers in measuring such abnormal returns in the IPOs studies. The two models are the market-adjusted returns and risk-adjusted returns. These models along with the data to be employed in this study are outlined as follows.

6.1.2 DATA AND METHODOLOGY

The initial public offerings to be used for achieving the objective of this chapter focus on Egyptian privatised companies of ordinary shares offered to the public and listed on the Stock Exchange for the first time during the period from January 1994 to December 1996 [See Appendix D-1 and D-2]. Table 3-3 and figure 3-1 illustrate a noticeable increase in the market capitalisation of Egyptian equity market trading for the period of interest. Thus, this time period allows a relatively large sample of PIPOs to be examined. In total, 32 privatised companies are available for analysis from this period. Concerning the business activities of issuing companies, the sample includes only the industrial based firms, which have been privatised during the period of study, where the required published information and the records from CMA are only available for such firms. For the 32 offerings, four companies were privatised during 1994, nine during 1995, and nineteen during 1996.

In order to analyse the performance of IPOs in the initial market, the market-adjusted and risk-adjusted methods are employed in this study. In the market adjusted returns model the returns of new issues are adjusted to the market returns over the same time period. The assumption within this model is that ex ante expected returns are equal across securities for a particular time interval, but not necessarily constant overtime. Moreover, this model takes into account market-wide movements which occur at the time of the event being studied. The ex post abnormal return on any security is given by the difference between its return and that on the market portfolio.

In applying this model, we first calculate a raw stock's return for each of our 32 firms as:

$$R_{it} = (P_{it} / P_{i,t-1}) - 1 \tag{6. 1}$$

where R_{it} is the return of stock i in period t, $P_{i,t}$ is the price of stock i at time t, and $P_{i,t-1}$ is the price of stock i at time $t-1$ (i.e. the first day return is computed as the closing price to the offering price while other returns are computed as the daily closing price to the first day closing price). Appendix D-3 shows the results of eq. 6.1 for the full sample of study. Then, the return on the General market index of the Egyptian stock exchange during the same time period is calculated as follows:

$$R_{mt} = (P_{mt} / P_{m,t-1}) - 1 \tag{6. 2}$$

where R_{mt} is the market return in time period t, P_{mt} is the market index value at time t, $P_{m,t-1}$ is the market index value on the time $t-1$. [See Appendix D-4]. Accordingly, the market-adjusted abnormal return for each IPO on time t is computed as:

$$AR_{it} = R_{it} - R_{mt} \tag{6. 3}$$

The market-adjusted returns model defined in eq. (6.3) is consistent with the asset pricing model if all securities have a systematic risk of unity. Thus, an assumption for using this price performance measure is that the systematic risk of each security in the sample is one. In such a case, the expected value of the difference between R_{it} and R_{mt} should be equal to zero.

However, as indicated in Chapter Two, the existence of underpricing for initial public offerings is well documented in the literature and seems to be a frequent phenomenon across major capital markets. Accordingly, it is hypothesised that the PIPOs in Egypt provide a significantly high rate of returns in such period, indicating that these issues have been underpriced. In order to test this hypothesis, the mean excess returns for all the sample stocks are calculated as follows:

$$\overline{AR_t} = \frac{1}{n}\sum_{i=1}^{n} AR_{it} \tag{6. 4}$$

Where n is the number of stocks in the sample and $\overline{AR_t}$ is the average excess return at time t. Thus, the null hypothesis is represented as: $\overline{AR_t} = 0$. A standard cross-sectional t-statistic was used to test the statistical significance of the $\overline{AR_t}$'s, (i.e. to test the null hypothesis that $\overline{AR_t} = 0$, assuming that AR_{it}'s are normally distributed and that $\overline{AR_t}$ is normal). And these average excess returns were cumulated from time 1 through time τ to form the cumulative average excess return,

$$C\overline{AR_t} = \sum_{t=1}^{\tau} \overline{AR} \tag{6. 5}$$

The cumulative abnormal returns (residuals) technique focus on the average market model residuals of the securities in the sample around the event period. While the cumulative abnormal return method is by far the most popular method used in security price study, there are some problems attached to it. For example, it does not allow for changes in beta over time. In some cases there are reasons to suggest that systematic risk can be expected to change during a specific period.

Moreover, wealth relative (the performance of the PIPOs firms in relation to the market) are also calculated using the procedure employed by Ritter (1990), Levies (1993), and Aggarwal, Leal and Hernandez (1993). As seen in Equations 6.6, 6.7 and 6.8, WR is the wealth relative; R_{it} is the return of the stock i on day t from the offer day; R_{mt} is the market return during the same time period. The total number of the PIPOs in the sample is presented by N. A wealth relative above one implies that PIPOs outperformed the market in that period. A wealth relative below one indicates underperformance. Therefore, we calculated the average of raw returns as:

$$\overline{R_{it}} = \frac{1}{N}\sum_{i=1}^{N}(P_{it} - P_{i,t-1}) \tag{6. 6}$$

then, calculated the average of market returns as

$$\overline{R_{mt}} = \frac{1}{N}\sum_{i=1}^{N}(P_{mt} - P_{m,t-1}) \tag{6. 7}$$

and computed the wealth relative as:

$$WR_{it} = \frac{1+\overline{R_{it}}}{1+\overline{R_{mt}}} \tag{6. 8}$$

Obviously, the market adjusted returns model lacks the introduction of risk measurement in the analysis. Using the Market and Risk Adjusted Returns method, we examine the sensitivity of the introduction of risk in analysing returns of the PIPOs. In the risk-adjusted method, the mean excess returns would be measured using the RATS[1] model which originally developed by Ibbotson (1975)

In spite of the incredible advantages of Ibbotson's (1975) procedure, we find that it should be modified in order to employ its idea to be used in the present study. First, Ibbotson's (1975) procedure is based on the equilibrium theory of Sharpe (1964) and Lintner (1965). This theory of equilibrium is criticised by Blume (1971)

[1]See section 2.1.12., for more details.

who argues that it is based upon numerous assumptions which obviously do not hold in the real world. The justification of Blume's critique is that a theoretical model should not be judged by the accuracy of its assumptions but rather by the accuracy of its predictions.

The empirical work of Friend and Blume (1970) suggests that the predictions of this model are seriously biased and that this bias is primarily attributable to the inaccuracy of one key assumption, namely that the borrowing and lending rates are equal and the same for all investors. Consequently, although Sharpe's and Lintner's theory of equilibrium can be used as a justification for β_i as a measure of risk, it is a weaker and considerably less robust justification than provided by the portfolio approach. Alternatively, the portfolio approach can be suggested in estimating the systematic risk in the present study. However, it is claimed that estimating systematic risk is difficult because the systematic risk of each investment is based on the covariance of two unobservable variables, the expected return from an investment and the expected return from the market portfolio.

Combining portfolio approach and the idea of returns across time and securities, the RATS model specification, adapted from Clarkson and Thompson (1990) and Keloharju (1993), is as follows:

$$R_{it} = \alpha + \beta R_{mt} + \varepsilon_i \qquad (6.9)$$

where, R_{it} = the raw return of stock i in period t [calculated as in eq.(6-1)], α = regression constant that serves as a measure of market-adjusted initial performance, β = the regression coefficient for the independent variable, R_{mt} = the market return in time period t [calculated as in eq.(6-2)], and ε_i = residual for the $_i$th observation.

Having applied the above mentioned procedures, the empirical results of the Egyptian PIPOs initial performance are reported as follows.

6.1.3 Empirical Results of the Initial Performance

6.1.3.1 Results of the Market-Adjusted Performance

Table 6-1 presents summary statistics on the initial price performance for 32 Egyptian PIPOs. This table reports Market-Adjusted returns measured from the offer price to the price at the end of the first trading day. The mean initial return on day 1 for the full sample is 15.033 %. This number is significantly different from zero at the 5 % level (t-statistic = 4.138). Twenty-seven out of 32 firms (or 84.4 percent of the total) have positive initial returns. The median initial return is 12.797 percent. Our results are consistent with other studies, [see Tables 6-1 and 6-2], a large positive average excess return accrued to the holders of PIPOs on the first day of trading.

According to the results in Table 6-3, there appears to be some minor revision of the initial performance immediately after listing. However, the $\overline{AR_t}$ for day 2 is insignificantly negative at conventional significant levels and amounts to (- 0.011) percent. Consistent with previous empirical evidence, the mean daily returns are not significantly different from zero in any systematic manner for the majority of the first ten days, except the initial return. Moreover, as we expected, wealth relative results show outperformance in the first day of trading and stability after the second day of trading.

Furthermore, a binomial test is used to test the null hypothesis that the data are from a binomial distribution with a specified probability of falling into the first of two categories. The binomial test rejects at the 0.05 level the hypothesis that the fraction of positive returns is equal to 50 percent. Consequently, the null hypothesis that the mean excess return on the first day of trading equals zero is rejected, indicating that the Egyptian IPOs are underpriced.

Table 6-1 Summary Statistics on the Price Performance of IPOs in the Period 1994-96

	N	Mean	t-statistic	positive No.(%)	Zero No.(%)	Negative No (%)	Median
Market-adjusted returns from offer price to closing price at the end of the first trading day							
Our study	32	15.03 %	4.14[a]	27 (84.4%)	0	5 (15.6%)	12.8 %
Muscarella and Vetsuypens (1989)	38	7.12 %	3.69[a]	28 (73.7%)	0	10 (16.3%)	2.73%

[a] Significant at the 0.05 level.

Table 6-2 Price Performance of Some Previous Studies in the first Day of Trading

The study	Return
U.S.A	
McDonald and Fisher (1972)	0.285
Reilly (1973)	0.096
Bear and Curley (1975)	0.129
Reilly (1977)	*0.109*
Block and Stanley (1980)	0.060
Aggarwal and Rivoli (1990)	0.011
Australia: Finn and Higham (1988)	0.292
Egypt: This study	**0.150**

*0 = the offering date & 1 = the first day of trading .

Table 6-3 Average and Cumulative Average Market-Adjusted Daily Returns and Wealth Relative

Return from	$\overline{AR_t}$	t($\overline{AR_t}$)	$C\overline{AR_t}$	Wealth Relative
Offering to 1	0.150	4.138*	0.150	1.15
Day 1 to day 2	-0.011	-0.560	0.139	0.98
Day 1 to day 3	0.007	0.355	0.146	1.00
Day 1 to day 4	0.027	1.452	0.173	1.02
Day 1 to day 5	0.001	0.035	0.174	1.00
Day 1 to day 6	0.005	0.232	0.179	1.00
Day 1 to day 7	0.043	1.824	0.222	1.04
Day 1 to day 8	0.016	0.466	0.238	1.01
Day 1 to day 9	0.019	0.842	0.257	1.01
Day 1 to day 10	0.025	1.069	0.272	1.02

$\overline{AR_t}$ and $C\overline{AR_t}$ are calculated using equations (4 and 5).

6.1.3.2 Results of the Risk-Adjusted Performance

Table 6-4 shows the estimated value of α for each of the first ten days of listing. The initial performance in day 1 was 16.8 percent, compared to 15 percent for the market adjusted daily returns. Thus, the introduction of risk made only a little difference in the initial returns of new issues in Egypt. In addition, there appears to be some negative performance in the aftermarket, however, consistent with previous empirical evidence the mean daily returns are not significantly different from zero in any systematic manner for the first ten days, except for the initial return.

Therefore, the null hypothesis that the mean excess returns on the first day of trading equal zero is rejected, however this is not the case for the subsequent nine days. The main indication of the risk-adjusted returns model is that the Egyptian PIPOs have been underpriced.

Table 6-4 Risk-adjusted Initial Performance of IPOs in the Period 1994-96*

Return from	**Mean excess return** (α)	t(α)	**Mean Beta** ($\bar{\beta}_i$)	t($\bar{\beta}_i$)
Offering to 1	0.168	4.452[a]	0.126	0.289
Day 1 to day 2	-0.022	-1.639	0.014	0.061
Day 1 to day 3	-0.004	-0.287	0.063	0.281
Day 1 to day 4	0.017	1.182	0.178	0.766
Day 1 to day 5	-0.009	-0.560	0.131	0.490
Day 1 to day 6	-0.005	-0.310	0.091	0.353
Day 1 to day 7	0.030	1.567	0.113	0.370
Day 1 to day 8	0.007	0.407	0.186	0.626
Day 1 to day 9	0.008	0.449	0.119	0.392
Day 1 to day 10	0.016	0.772	0.221	0.648

*Risk and returns from offer price to closing price at the end of the first trading day.
[a] Significant at the 0.05 level.

Moreover, it is assumed that the mean systematic risk of the PIPOs is higher than the market risk. Thus, the null hypothesis is that the mean systematic risk of the PIPOs is equal to the market Beta ($\bar{\beta}_i = 1$). The results of this test are summarised in

Table 6-4, which shows that the mean systematic risk of the PIPOs in the primary market is not statistically significant for the following nine days. The mean beta of PIPOs measured from the offering to the end of trading on the first day of listing is 0.13. The calculated t-statistic is 0.289. The critical value of the t-distribution at the 0.05 level for 30 degrees of freedom is 1.70. Consequently, the null hypothesis that the mean Beta of the PIPOs is equal to the market beta cannot be rejected. It should be noted that this is the estimate of the average risk for the sample as a whole. Betas of individual issues would vary around this.

6.2 EXPLANATIONS OF THE REPORTED UNDERPRICING

6.2.1 INTRODUCTION

The above results show large and widespread initial returns to new issues in Egypt. Whilst, the literature demonstrates that a large part of underpricing phenomenon is attributed to the investment banker system in the developed capital markets, the Egyptian Capital Market (ECM) differs from the developed capital markets in not experiencing an investment-banker system. We argue that if the underpricing is enforced by the investment banker per se, then it should not be existed in the ECM. Although, the investment banker-related explanation may be disproved in this market, we turn now to examining factors with which the underpricing has proved to have relationships in private IPOs market and to exploring their possibility in explaining the privatisation-sales underpricing. These factors are:

1. Ex ante uncertainty.
2. The informed demand.
3. The issue size.

For the first factor, in private IPOs as well as privatisation sales, issuers are clearly uncertain about the true market value of an IPO. If they were not, they would not face any risk placing all shares and consequently would not need investment bankers or underwriters. In developed capital markets, despite the greater expertise of investment banks some uncertainty about the true price of an IPO in the aftermarket still remains. As a consequence, investment bankers intentionally underprice IPOs in relation to the degree of that type of uncertainty. Similarly, we assume that the Egyptian government deliberately underprice the privatisation sales in relation to this risk. As it is reported in the literature review chapter, the most convenient hypothesis is that of Beatty and Ritter (1986, p.216) which states:

> 'the greater is the ex ante uncertainty about the value of an issue, the greater is the expected underpricing'.

Ritter (1984) and Beatty and Ritter (1986) proposed a variation of Rock's model in which they tested several proxies for the ex ante uncertainty of an unseasoned new issue. Ritter (1984) found a 'monotinic' increase in initial return in portfolios formed on the basis of aftermarket standard deviation. In this situation, a higher standard deviation would imply greater underpricing or higher initial performance.

Obviously, the ex ante uncertainty is difficult to measure because of the lack of any trading data prior to the issue. In case of the expected underpricing the observed initial return is taken as a proxy. In order to measure the ex ante uncertainty of the true after market value the early secondary market variability of returns may serve as a proxy. The basic idea of using aftermarket return variability is as Uhlir (1989, p.381) assumes:

'the greater the uncertainty about the true aftermarket value the longer it will take participants in the market to establish the 'correct' price in the secondary market.'

This should effect trading since the early prices are subject to major correction activities in either direction which in turn leads to greater return variability. Following Ritter (1984), Beatty and Ritter (1986) and Uhlir (1989), we use the standard deviation of the rates of return in the aftermarket as a proxy for this variability or (ex ante uncertainty). Immediately after the first trading day the following 10 days are taken to calculate the standard deviation of daily returns (See Appendix D-6).

For the second factor, as discussed in the literature review, Rock's (1986) model hypothesises a relationship between the informed demand and underpricing of new issues. Rock (1986) used the length of selling time of new issues as a proxy of informed demand. Thus, the hypothesis of this relationship is that the longer the length of selling time of new issue, the higher is the underpricing (See Appendix D-7).

Finally, studies by Finn and Higham (1988) and Reinganum (1981) and others have shown a negative relation between the firm size and the risk-adjusted rate of return. Logue (1973) found a negative relation between initial performance and total dollar value of the issue and argued that the larger the size of the issue, the more relative bargaining power the issuer has and hence the less the initial underpricing by the underwriter. Likewise, we investigate the relationship between the value of the initial issue and underpricing (see Appendix D-8).

Having considered the factors to which the observed underpricing may be attributed, data and methodology employed to test such relationships are outlined as follows.

6.2.2 DATA AND METHODOLOGY

In order to test the relation between underpricing and ex ante uncertainty we estimate the following model:

$$AR_{it} = \alpha_i + \beta_i \sigma_i + \varepsilon_i \tag{6. 10}$$

where AR_{it} is the market-adjusted returns calculated as in eq. 6-3 as the dependent variable (i.e., underpricing) and σ_i is the standard deviation of early secondary market returns as the explanatory variable. Likewise, to test the relation between the informed demand and underpricing, the following model is applied:

$$AR_{it} = \alpha_i + \beta_i \ln L_i + \varepsilon_i \tag{6.11}$$

where L_i is the length of selling time of new issue; and ln stands for natural log. The time for a new issue to be filled is not publicly available in Egypt. We use the length of time from offering date until the first day of trading and the median time was 16 days. Finally, in testing the relation between the issue size, S_i and underpricing, the following model regresses the day 1 performance on the log of the size variable:

$$AR_{it} = \alpha_i + \beta_i \ln S_i + \varepsilon_i \tag{6. 12}$$

Since the firms under investigation are different in sizes, we suppose that it would be difficult to maintain the assumption of homoscedasticity because of the diversity of firms' sizes. If we drop the assumption of homoscedasticity, allowing for the disturbance variance to be different from observation to observation, some consequences are stated by Econometricans [see Gujarati (1992) and (1995)], such as: OLS estimators are still linear and unbiased, but they no longer have minimum variance. That is, they are no longer efficient. As a result, the usual confidence interval and hypothesis tests on *t* and *F* distributions are unreliable. Therefore, every possibility exists of drawing wrong conclusions if conventional hypothesis-testing procedures are employed. Thus, in the presence of heteroscedasticity, the usual hypothesis-testing routine is not reliable, raising the possibility of drawing misleading conclusions. In general, in cross-sectional data involving heterogeneous units, heteroscedasticity may be the rule rather than the exception.

In order to detect the presence of heteroscedasticity, we use White's general heteroscedasticity test. First, we reestimate models (6.10, 6.11, and 6.12) and obtain the residuals ε_i. Second, we run the following (auxiliary) regression:

$$\hat{\varepsilon}_i^2 = \alpha_1 + \alpha_2 X_i + \alpha_3 X_i^2 + v_i \qquad (6.13)$$

That is, the squared residuals from the original regression are regressed on the original independent variable and its squared values. The null hypothesis H_0 can be tested by the usual F test or, alternatively, by computing nR^2, where R^2 is the coefficient of determination from the auxiliary regression. It can be shown that $nR^2 \sim \mathrm{X}_p^2$ (i.e., nR^2 follows the chi-square distribution with df equal to the number of autoregressive *terms in the* auxiliary regression). Finally, if the chi-square value obtained in the above equation exceeds the critical chi-square value at the chosen level of significance, the conclusion is that there is heteroscedeasticiy. If it does not exceed the critical chi-square value, there is no heteroscedasticity, which is to say that in the auxiliary regression all the coefficients equal zero, except α_i. Therefore, the error variance is the homoscedastic constant equal to α_i.

As an alternative means of addressing the issue of heteroscedasticity, we use the Autoregressive Conditional Heteroscedasticity (ARCH) model. The key idea of

ARCH is that the variance of the regression disturbances (u) at time t ($=\sigma_t^2$) depends on the size of the squared error term at time (t-1), that is on u_{t-1}^2. To be more specific, we again reestimate the three regression models (6.10, 6.11, and 6.12). And conditional on the information available at time (t-1), the disturbance term is distributed as:

$$\varepsilon_t \sim N[0,(\alpha_0+\alpha_1\varepsilon_{t-1}^2)]$$

That is, ε_t is normally distributed with mean zero and variance of ($\alpha_0+\alpha_1\varepsilon_{t-1}^2$). It is clear that the variance of ε at time t is dependent on the squared disturbance at time (t-1), thus giving the appearance of serial correlation. Since the variance of ε_t depends on the squared disturbance term in the previous time period, it is called an ARCH (1) process. Thus, an ARCH (p) process can be written as:

$$\text{var}(\varepsilon_t)=\sigma_t^2=\alpha_0+\alpha_1\varepsilon_{t-1}^2+\alpha_2\varepsilon_{t-2}^2+...+\alpha_p\varepsilon_{p-1}^2 \tag{6.14}$$

If there is no autocorrelation in the error variance, we have $H_0\!:\alpha_1=\alpha_2=....=\alpha_p=0$ in which case $\text{var}(\varepsilon_t)=\alpha_0$, and we have the case of homoscedastic error variance. As Engle (1982) has shown, a test of the proceeding null hypothesis can be easily made by running the following auxiliary regression:

$$\hat{\varepsilon}_t^2=\hat{\alpha}_0+\hat{\alpha}_1\hat{\varepsilon}_{t-1}^2+\hat{\alpha}_2\hat{\varepsilon}_{t-2}^2+...+\hat{\alpha}_p\hat{\varepsilon}_{t-p}^2 \tag{6.15}$$

where $\hat{\varepsilon}_t$, as usual, denotes the OLS residuals estimated from the original regression model. The null hypothesis can be tested using the same procedures of White's general heteroscedasticity test.

6.2.3 EMPIRICAL RESULTS

Table 6.5 shows that there is no relation between initial performance and risk of the issue, as proxied by the standard deviation of daily returns in the aftermarket for the Egyptian IPO market. Following Beatty and Ritter (1986,p.223), R^2 has to be very low. They argue that there should be only a positive relation between ex ante uncertainty and expected underpricing. That means, it must remain difficult for investors to predict the actual initial return of a single individual PIPO even though the average initial return of a large sample can be predicted with reasonable accuracy. Although our regression does not exhibit any relationship between the underlying variables, the correlation coefficient says that there is a positive relation between them. Also, our very low R^2 is consistent with the argument of Beatty and Ritter (1986). Moreover, Table 6-5 shows that the initial performance of privatisation sales is not systematically related to the length of the issue, as measured by the variable used here. It is obvious that the *t*-statistic of the slope coefficient is insignificant and R^2 is close to zero. Likewise, the size of issue variable has a positive sign in the cross-sectional regression. Also, the t-statistic is only 0.123 and the R^2 is 0.001. That is, the initial size of the firm does not appear to be related to the day 1 performance.

Table 6-5 Regression Statistics for Day 1 Market-Adjusted Return as Dependent Variable and Standard Deviation, the log of issue length and the Value of Initial Issue as Independent Variables

Independent variable	α	$t(\alpha)$	β	$t(\beta)$	R^2	DW
Standard deviation	10.4	1.696	1.25	0.928	0.028	1.99
Ln (length of issue)	7.49	0.926	2.83	1.044	0.035	1.95
Ln (size of issue)	12.1	0.494	0.21	0.123	0.001	1.94

* R is the correlation coefficient

In examining the autocorrelation residuals in the three regressions: 6.10, 6.11, and 6.12, Table 6-5 shows that DW = 1.99, 1.95 and 1.94, respectively. Following the decision rules of Durbin-Watson *d* test, we conclude there is no serial correlation in our models (see Appendix D-9).

In detecting the presence of heteroscedasticity using White's general heteroscedasticity test, first, we reestimate models 6.10, 6.11, and 6.12 and obtain the residuals ε_I. Second, we run the auxiliary regression defined in eq. 6.13 (i.e., the squared residuals from the original regressions are regressed on the original independent variable and its squared values).

Table 6.6 shows that for all practical purposes, one can conclude, on the basis of White test, that there is no evidence of heteroscedasticity. Although the sample size of *32 is relatively small, whilst the test is based on large sample* theory, the conclusion reached is very definite, suggesting that sample size is not a problem in this case [see Stewart (1991, p.160)].

Table 6-6 White's test of the heteroscedasticity in the models defined in Equations (6.10, 6.11, and 6.12)

Variables	Model (13)	R^2	$n \times R^2$
Standard deviation	$\varepsilon_i^2 = 257.1 + 40.958 \ln L_i + 3.24 \ln L_i^2$	0.0172	0.55
Ln (length of issue)	$\varepsilon_i^2 = -3329.2 + 564.83 \ln S_i - 20.76 \ln S_i^2$	0.0095	0.31
Ln (size of issue)	$\varepsilon_i^2 = 287.93 + 100.15\sigma_i - 12.42\sigma_i^2$	0.0278	0.89

A chi-square distribution with 2 degrees of freedom. The 5% critical chi-square value for 2 df is 5.99.

In order to corroborate these results, the heteroscedastic-consistent standard errors (HCSEs) relative to the usual standard errors for each regression are reported in Table 6-7. HCSEs reflect any heteroscedasticity in the residuals which is related to the regressors. Large differences between OLS standard errors and HCSEs values are indicative of the presence of heteroscedasticity [see Doornik and Hendry (1994)].

Table 6-7 shows that the HCSEs are close to the OLS standard errors. However, there is little evidence of distortion of inference from untreated heteroscedasticity in the regression defined in Equations 6.10, 6.11, and 6.12.

Table 6-7 The Difference Between SE and HCSE from Models 6.10, 6.11, and 6.12.

Independent variable	α	Std.Error (α)	HCSE (α)	β	Std.Error(β)	HCSE (β)
Standard deviation	10.4	6.15	5.75	1.25	1.35	1.07
Ln (length of issue)	7.49	8.09	8.06	2.83	2.71	2.93
Ln (length of issue)	12.07	24.44	17.55	0.21	1.71	1.24

Thus, as an alternative means of addressing the issue of heteroscedasticity, we use the ARCH model. Using the residuals obtained from regression (6-10), we estimate ARCH (1), ARCH (2), ARCH (3), ARCH (4), and ARCH (5) models. But, none of these models proved to be significant. For example, the results of the ARCH (1) model are reported in Table 6-8. These results indicate that there is no heteroscedasticity in the models defined in Equations 6.10, 6.11, and 6.12.

Table 6-8 The results of ARCH model

Variables	Model (6.15)	R^2	$n \times R^2$
Standard deviation	$\varepsilon_i^2 = 386.0 + 0.024\varepsilon^2_{t-1}$	0.0006	0.0186
Ln (length of issue)	$\varepsilon_I^2 = 395.4 + 0.014\varepsilon^2_{t-1}$	0.0002	0.0062
Ln (size of issue)	$\varepsilon_I^2 = 399.8 - 0.0134\varepsilon^2_{t-1}$	0.00018	0.0062

The 5% critical chi-square value for 1 degree of freedom is 3.84.

6.3 Summary and Conclusions

Initial returns in the primary market of Egyptian PIPOs are found to be approximately 15 % across time and securities. The observed distribution is heavily skewed and has a median of 13 %. The level of underpricing seems to be too high and the privatised companies may have lost money on the table. As a result, we investigated three hypotheses which were proved, in the literature, to explain the positive initial returns to private IPOs. However, they were unsuccessful in explaining even a small part of the initial returns to the Egyptian privatisation sales.

In conclusion, we can point out that:

- since the results document *the existence of underpricing phenomenon in the* ECM, we may refute the investment banker-related explanation, at least in the ECM;
- the institutional feature of the Egyptian Capital Market, the listing requirements of the Egyptian Stock Exchange and Capital Market Authority, together with barriers to entry to stockbroking, provided the market structure which facilitated underpricing. Thus we expect underpricing to be eliminated or reduced, at least when membership restrictions of the ESM lapse;
- early sales of the privatised IPOs may be deliberately underpriced in order to convince the market to absorb larger sales and reduce the risk borne by the government;
- the underpricing of the Egyptian PIPOs is consistent with a signalling argument, since the privatised firms are exposed to greater policy risk, and tend to be large and well-known relative to private IPOs. That is, underpricing may signal commitment because an uncommitted government cannot expect higher proceeds from a subsequent sale, and is therefore not willing to underprice the initial sale; and
- finally, the underpricing of unseasoned issues in general and of privatisation sales in particular, can be thought of as a way of attracting investors away from existing stockholdings.

CHAPTER SEVEN
THE AFTERMARKET PERFORMANCE OF THE EGYPTIAN PIPOs

7.0 INTRODUCTION

The main objective of the present chapter is to describe and analyse the pattern of returns and risks of the Egyptian PIPOs in the aftermarket during the mentioned period. In Chapter six, we have recorded mean initial excess market-adjusted returns of 15.03 % across the sample of 32 Egyptian PIPOs. In the present chapter, these initial returns are taken as a background on searching for the attainable returns level over the aftermarket period starting from the first day to the end of the first year of trading in such offerings.

This chapter is believed to be important for a number of reasons. First, there is a possibility that adjustments of underpricing in the primary market may extend to the aftermarket. While, this did no appear from our study of the first ten days of listing recorded in Chapter six, where we found insignificant excess market-adjusted returns of 2.5% at the end of the first ten days after listing [see Table 6-3], a longer time horizon of investigation is required to clarify such a possibility.

Second, an investigation into the aftermarket performance of the Egyptian PIPOs is important in order to determine the benefits achievable from investments in this market. For instance, what buy and hold strategies produce the highest returns in the aftermarket? This question may find an answer in the present study since speculative movements emerge in the prices of the Egyptian PIPOs in their aftermarket. This finding is found to be consistent with Aggarwal and Rivoli (1990) who note a general increase in the prices of unseasoned stocks and relate this to speculative support of underwriters for the stocks in the early aftermarket period. Moreover, the estimation for systematic risk may allow investors and bankers to make inferences about the performance of the PIPOs and to develop techniques to predict their future risk levels. Finally, most of the previous studies on the performance of risk of IPOs were carried out mainly in the developed capital markets of the world, especially in the U.S.. In this chapter, the behaviour of risk in a developing capital market is examined in order to see if it behaves in a similar manner or differently from the risk behaviour of IPOs in the developed capital markets.

Therefore, this chapter is organised in the following way. In section 7.1, an examination of return performance of the Egyptian PIPOs is made. Section 7.2 investigates the systematic risk in the aftermarket. Then, an analysis of documented results is conducted in section 7.3. Finally, summary and conclusion are provided in *section* 7.4.

7.1 RETURNS IN THE AFTERMARKET

7.1.1 INTRODUCTION

The essential point of our analysis is that there are essential differences between the pricing process in the initial market and the pricing in the aftermarket. As we have seen in chapter six, initial returns are a result of prefixed offering price and quantity set by the issuing firm and the market's initial valuation of the shares. In contrast, in the aftermarket there are no price rigidities. The market is free to set its own value for the shares. Actually, there are many reasons to justify such a distinction.

In the literature review chapter, some explanations relevant to the price performance of the IPOs in the aftermarket are provided. For example, the theory under the Efficient Market Hypothesis (EMH) says that underpricing in IPOs is associated with initial mispricing and that stock prices would adjust to their true level in early trading to remove this underpricing so that significant returns would not be attainable, on a persistent basis, over the longer term. Moreover, the theoretical concept of a speculative-bubble concerns an over-reaction to initial underpricing, or the presence of excess demand in the PIPOs, which is likely to emerge in the aftermarket. A further reason emerges from the insider-dumping hypothesis which considers the possibility that stock prices might fall in the aftermarket due to that insiders may dump their stock on listing, causing a large increase in the supply of stocks on the market. [see Chapter Two for more details].

7.1.2 DATA AND METHODOLOGY

To investigate the return performance in the aftermarket, the market-adjusted excess return model described in Chapter six is employed. In applying this model, we use weekly data for the whole year of trading. Using daily data for a whole year of trading may have more non-trading problems in the data than if weekly data were used. Therefore, we use the weekly data to see if there would be any trend formed by the excess return in the first year after listing.

Monthly data are not used because: firstly, it would not allow us to state with accuracy the time which the new issues took to conform to the EMH after listing. Secondly, in a volatile market like the Egyptian Capital Market, monthly data might not be the best data to portray the behaviour of share performance. This is because the basic objective of this study is to examine the performance of PIPOs over a short period of up to one year after listing. Examinations over a long-run would need more time and data and we intend to do that after the completion of this thesis. Furthermore, if a study on a long-run performance of PIPOs are to be carried out now, it would reduce the number of companies in the sample study.

Since the emphasis is on the price performance of PIPOs over a short period after the offering, returns in the form of capital gains have been used in the analysis. In the short-term, the major part of returns on a new issue investment comes from capital gains since dividends, if declared, will take nearly a year before the shareholder receives the payment. Furthermore, dividend yields of the Egyptian privatized companies are very low compared to the capital changes. Also, when the capital gain is realised, it is free from tax whereas dividends received are income taxable.

Then, the general index of stock prices in the Egyptian Capital Market is chosen since it has been regarded as the most representative index in measuring market movement on the Egyptian Stock Exchange, although several other indexes are available to measure market movement. Finally, following McGinness (1992), the returns measures are defined from the offering price in the stocks to periods ending at the close in the first day of listing, the close in the first four weeks of trading, the close in the first 26 weeks of trading, and the close in the first 52 weeks of trading. Returns for the same closing dates are also measured from the first closing traded price in the PIPOs. In performing this procedure, three connected examinations were singled out: namely, measuring the performance in general, then by year of issuance and finally by excluding the outlying stocks.

7.1.3 EMPIRICAL RESULTS OF RETURNS PERFORMANCE IN THE AFTERMARKET

7.1.3.1 A General Outlook

In this section, we give an overview on the level of returns achievable in the aftermarket of PIPOs under investigation. Descriptive statistics for all the return measures described in equations (5-1) and (5-4), are reported in Table 7-1 where raw returns are shown in Table 7-1 (*Panel A*) and market-adjusted returns are in Table 7-1 (*Panel B*). Examining returns from the original offering date, in Table 7-1 (*Panel A*), indicates that significant positive average returns of 29.5% emerge over the period between the offering date in the stocks and the close in the 52nd week of listing. However, the return of 17.1 % for the holding period between the offering date and closing of trading on the first day of listing, indicates that much of the aftermarket returns of 29.5 % over the period from offering to the 52nd week of listing are attained by the close in the first day of trading. Further analysis in Table 7-1 (*Panel A*) confirms this observation given average returns of only 11.7 % between the first closing traded price of PIPOs and the 52nd week of listing in the stocks.

Table 7-1 The Return Performance in the Aftermarket of the Sample of Egyptian PIPOs for Selected Holding Periods

	Panel A: Raw Returns			***Panel B: Market-Adjusted Returns***		
Return from:	$\overline{R_t}$	$t(\overline{R_t})$	Std D	$\overline{AR_t}$	$t(\overline{AR_t})$	Std D
Offering to day 1	0.171**	4.758	0.203	0.166**	4.925	0.191
Offering to week 4	0.198**	4.771	0.235	0.191**	4.934	0.219
Offering to week 26	0.371**	4.217	0.498	0.355**	4.217	0.439
Offering to week 52	0.295**	2.972	0.561	0.268**	3.436	0.441
Day 1 to week 4	0.024	1.344	0.101	0.023	1.264	0.101
Day 1 to week 26	0.177**	2.490	0.402	0.171**	2.571	0.377
Day 1 to week 52	0.117	1.417	0.468	-0.019	-1.025	0.102

$\overline{R_t}$ and $\overline{AR_t}$ are means of raw returns and market-adjusted returns, respectively, and calculated using equations (1 and 4 in Chapter 5). ** Indicates returns significantly different from zero at 5% level for a two-tailed t-test (Critical t-statistic =1.96).
* Indicates returns significantly different from zero at 10% level for a two-tailed t-test (Critical t-statistic =1.65).

At the same time, further analysis of return performance in the aftermarket of PIPOs is also made in Table 7-1 (*Panel B*) where aftermarket returns are compared to corresponding returns on the Egyptian Stock Index using market-adjusted returns model. From these market-adjusted returns, a rather unfavourable picture of aftermarket performance in the Egyptian PIPOs is indicated. While positive excess market-adjusted returns emerge when the returns measured from the initial offering price in the stocks to the close of trading on the 4th, 26th and 52nd weeks of trading, an average return of -1.9 % is noted for the period between the first closing traded price in the stocks and the 52nd week of trading.

According to the results in Table 7-1 (*Panel B*), it is difficult to advise an investor who purchases PIPO stocks in early aftermarket trading of the selected sample in Egypt to follow a 'buy and hold' strategy to the stocks for the whole of the 52 weeks after listing. However, he might be advised to hold on to the stocks for the first 26 weeks of listing, given positive excess market-adjusted returns averaging 17.1% between the close in trading on the first day of listing and the close trading on the 26th week of listing.

After that, the results in Table 7-1 (*Panel B*) suggest negative average excess market-adjusted returns. These findings indicate an initial period of reasonable and acceptable returns in the PIPOs followed by a longer term period of displeasing returns. Consequently, it is clearly profitable to obtain shares at the original offering price. Moreover, the measurement of aftermarket returns in early aftermarket trading may provide a more substantial measure of performance for the same investor than measures defined from the original offering price. Due to this, a more detailed analysis of aftermarket returns measured from the first closing traded price in the stocks is made. To perform such analysis, we first split the 52 day aftermarket period up into sub-periods of equal duration (i.e. two weeks each). Returns are then constructed from the close in the first day of listing to the closing date in each of these sub-periods. This procedure allows 25 returns to be determined. Descriptive statistics for these returns, across the selected sample of the 32 PIPOs, are reported in Table 7-2.

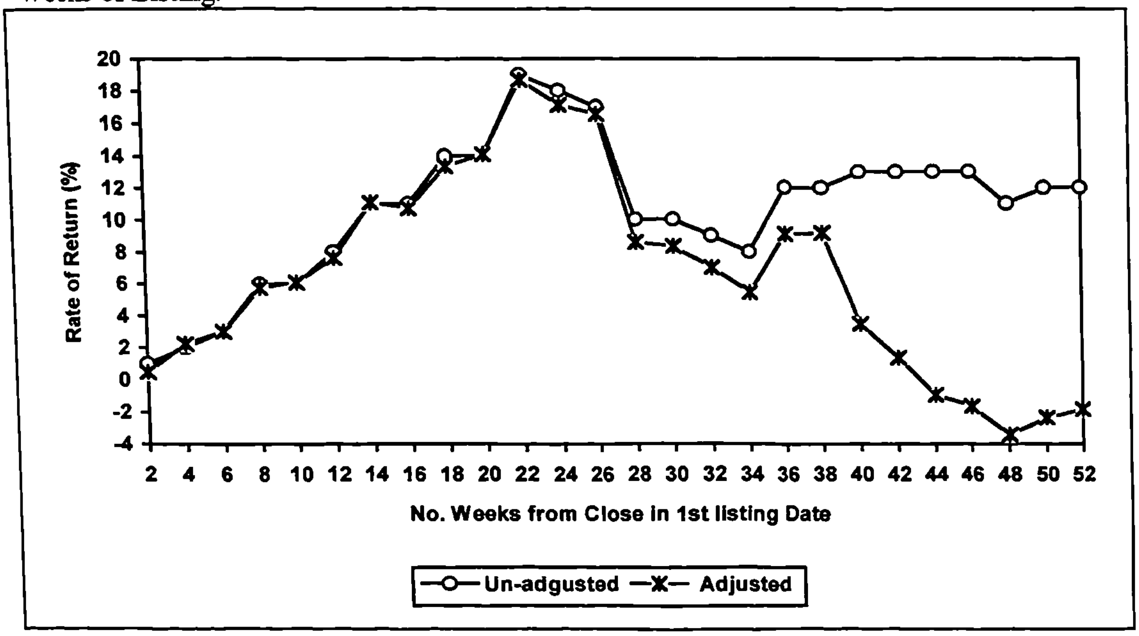
Table 7-2 The Return Performance in the Aftermarket of the Sample of Egyptian PIPOs from the Close of the First Listing to Periods Ending between 2 and 52 Weeks Aftermarket

	Panel A: Raw Returns			*Panel B: Market-Adjusted Returns*		
Return from Day 1 to week:	$\overline{R_t}$	$t(\overline{R_t})$	Std D	$\overline{AR_t}$	$t(\overline{AR_t})$	Std D
2	0.7	0.540	7.2	0.500	0.375	7.6
4	2.4	1.344	10.1	2.259	1.264	10.1
6	3.0	1.176	14.7	3.028	1.210	14.2
8	5.6*	1.877	16.8	5.792**	1.987	16.5
10	5.6	1.547	20.6	6.084*	1.748	19.7
12	7.5*	1.761	24.2	7.633**	2.051	21.1
14	10.9*	1.922	32.2	11.055**	2.141	29.2
16	11.4**	2.009	32.0	10.690**	2.160	28.0
18	14.2**	2.359	34.1	13.359**	2.459	30.8
20	14.4**	2.194	37.2	14.059**	2.306	34.5
22	19.1**	2.702	40.1	18.685**	2.778	38.1
24	17.7**	2.490	40.2	17.117**	2.571	37.7
26	17.1**	2.424	39.9	16.569**	2.511	37.3
28	10.3	1.299	44.6	8.598	1.212	40.1
30	9.7	1.295	42.6	8.299	1.185	39.6
32	9.4	1.185	44.8	6.965	0.951	41.4
34	7.6	1.023	42.0	5.447	0.775	39.7
36	12.0	1.589	42.6	9.096	1.306	39.4
38	11.9	1.603	41.9	9.182	1.313	39.6
40	13.0*	1.723	42.8	3.500	1.427	13.9
42	12.9*	1.703	43.0	1.350	1.288	5.9
44	12.8	1.648	43.9	-0.930	-1.220	4.3
46	12.9	1.633	0.44.7	-1.649	-1.220	7.7
48	11.4	1.417	0.45.5	-3.450	-1.019	19.2
50	12.4	1.532	0.46.0	-2.369	-1.161	11.5
52	11.7	1.417	0.46.8	-1.850	-1.025	10.2

** Indicates returns significantly different from zero at 5% level for a two-tailed t-test (Critical t-statistic =1.96).
* Indicates returns significantly different from zero at 10% level for a two-tailed t-test (Critical t-statistic =1.65).

The returns reported in Table 7-2 are shown in two forms: (1) a form of raw return which is unadjusted for market changes (*Panel A*) and (2) an excess market-adjusted return form (*Panel B*). These returns are shown graphically in Figure 7-1 and, in general, confirm the results noted in Table 7-1 earlier. However, the more detailed presentation in Table 7-2 (*Panel B*) indicates that returns measured from the first day of trading to the period of 42 weeks aftermarket are, on average, positive. In contrast, returns measured for the periods closing between 44 and 52 weeks aftermarket yield negative excess market returns in average. The patterns of returns described over the first 52 weeks of listing suggests that the average excess returns experienced a rising trend in the immediate aftermarket return period with declining trend in returns appearing afterwards.

Figure 7-1 The Average Excess Market-adjusted Returns in Egyptian PIPOs over the First 52 Weeks of Listing.



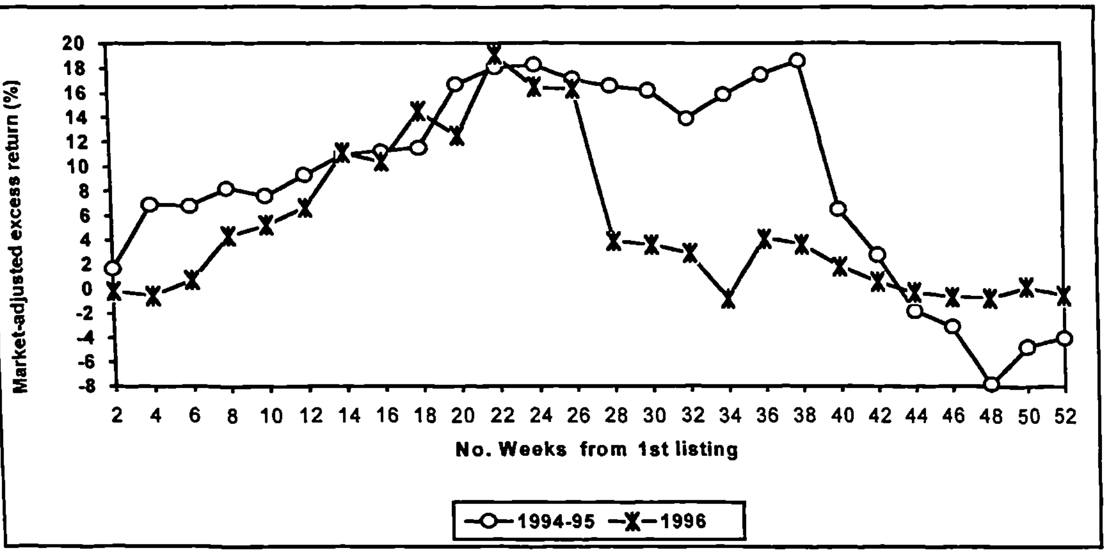
7.1.3.2 The Aftermarket Performance by Year of Issuance

In explaining the trends in the aftermarket returns described above, it is clear that large standard deviations are reported on most of the 25 excess market-adjusted returns measures included in Table 7-2. Hence, it is argued that the size of these standard deviations makes some of these excess returns measures insignificantly different from zero at conventional significant levels. This observation reveals a possibility that the structure of returns described may be distorted or biased by specific stocks or time of issuing.

For example, it is clarified in chapter three that during 1994, the General Index rose from 136.34 to 238.37, an 74.8 % increase. Also, during 1994, four companies were privatised. At the end of this year, three mutual funds were incorporated by banks. At the same time, the government accelerated the rate of the privatisation program, increasing the supply of shares in the market while the inflow of funds to the market was restricted. As a result, during 1995, the General Index dropped by 26% and several privatised companies were trading at prices below their public offering price. However, the second half of 1996 has been characterised by a fundamental shift by the government in its willingness to sell the privatized companies via Stock Exchange. Also, during 1996, the number of domestic mutual funds increased, and now are investing in Egypt.

Therefore, further analysis of aftermarket returns in the PIPOs stocks is made by first splitting the period of interest, 1994-96, into two sub-periods (i.e. 1994-95 and 1996). The number of issues made in these sub-periods was 12 and 20 respectively). The average excess market-adjusted returns produced from the issues in each of the sub-periods are detailed in Table 7-3 and shown graphically in Figure 7-2. Accordingly, a variation in the aftermarket performance is noted across the two sub-periods. In particular, issues made in 1994-95 show higher aftermarket returns on average, than issues made in the period 1996.

Figure 7-2 The Average of Excess Market-Adjusted Returns in The Egyptian PIPOs over the First 52 Weeks of Trading in the Period (1) 1994-95 And (2)1996.



For the issues in 1994-95, a general rise in excess market-adjusted returns is reported over the first 38 weeks of trading which is then followed by a remarkable downturn in returns. While the positive returns for the first 38 weeks in this sub-period are relatively high, and can be taken to indicate inefficiency in the initial pricing of the issues, the sharp downward trend in returns after this period is difficult to explain within the market efficiency view. For the issues in the 1996 sub-period, a rising trend in stock prices, followed by failing trend, is also noted. However, this period of raising prices is, on average, shorter than for the issues made during 1994-95.

Table 7-3 Market-Adjusted excess returns for Holding Periods Defined from the Close in the First Day of Trading to Periods Ending between 2 and 52 Weeks Aftermarket for PIPOs over the Periods: (1) 1994-95 and (2) 1996

	Panel A: 1994-95 Number of Issues: 12			***Panel B: PIPOs: 1996*** Number of Issues: 20		
Return from Day 1 to week	$\overline{AR}_t$	t($\overline{AR}_t$)	Std D	$\overline{AR}_t$	t($\overline{AR}_t$)	Std D
2	1.60	0.762	7.36	-0.17	-0.099	7.77
4	6.93	0.068	11.86	-0.54	-0.305	7.97
6	6.83	1.400	16.91	0.74	0.274	12.12
8	8.24*	1.684	16.95	4.32	1.173	16.47
10	7.60	1.262	20.87	5.17	1.190	19.44
12	9.29	1.540	20.89	6.64	1.372	21.63
14	10.96	1.160	32.73	11.11*	1.789	27.78
16	11.24	1.209	32.21	10.36*	1.780	26.02
18	11.53	1.071	37.31	14.46**	2.389	27.06
20	16.67	1.324	43.61	12.50*	1.936	28.87
22	18.09	1.378	45.49	19.04**	2.496	34.12
24	18.25	1.385	45.67	16.44**	2.211	33.25
26	17.07	1.391	42.51	16.27**	2.078	35.02
28	16.58	1.337	42.96	3.81	0.441	38.66
30	16.18	1.308	42.83	3.57	0.664	37.91
32	13.91	1.104	43.63	2.80	0.308	40.62
34	15.89	1.239	44.43	-0.82	-0.100	36.39
36	17.47	1.399	43.27	4.07	0.490	37.13
38	18.58	1.459	44.11	3.54	0.433	36.57
40	6.39	1.374	16.10	1.77	0.634	12.47
42	2.69	1.381	6.75	0.55	0.452	5.40
44	-1.86	-1.324	4.87	-0.37	-0.418	3.97
46	-3.18	-1.264	8.72	-0.73	-0.466	7.00
48	-7.84	-1.285	21.13	-0.82	-0.204	17.91
50	-4.77	-1.272	12.99	0.10	0.926	0.48
52	-4.01	-1.210	11.48	-0.55	-0.262	9.43

** Indicates returns significantly different from zero at 5% level for a two-tailed t-test (Critical t-statistic =1.96).
* Indicates returns significantly different from zero at 10% level for a two-tailed t-test (Critical t-statistic =1.65).

7.1.3.3 The Aftermarket Performance when excluding Outliers

Despite the disparity in the return movements in Figure 7-2 and Table 7-3 across the issues in the 1994-95 and 1996 sub-periods, the general results are consistent with the earlier observations made in tables 7-1 and 7-2, where an initial period of favourable returns in the offerings is indicated with relatively unfavourable returns emerging after that. Nevertheless, it is still possible that individual stocks may be influencing the general pattern of results produced in each of the sub-periods. Therefore, excess market-adjusted returns in each of the 32 offerings are examined.

In order to help in this respect, reference can be made to Appendix D-10 where excess market-adjusted returns in each of the offerings are reported for periods between the close in the first day of trading and the 20th, 40th and 52nd weeks of trading, respectively. Accordingly, it is clear that the stock issues of Paints & Chem. industries and Nasr City Housing & De. produced aftermarket returns that were considerably higher than the recorded returns achievable in the remaining 30 offerings under investigation.

This is reflected by the change in average excess market-adjusted returns across the sample of offerings when these two firms are removed from the sample. For instance, average market-adjusted excess returns between the close in the first day of listing and the 20th, 40th and 52nd weeks of trading are 14.06 %, 3.5 % and -1.85 %, respectively, when the outlying stocks are included in the sample, and 7.37%, 0.86% and 0.01% respectively, when the outlying stocks are excluded.

Moreover, the standard deviation levels around the average return levels are reduced. Therefore, it is obvious that the overall results reported in Table 7-2 are positively biased by the incorporation of aftermarket returns calculated on the Paints & Chem. industries and Nasr City Housing & De. stocks during the first 20 and 40 weeks of trading. More significantly, both issues occurred during the sub-period 1994-95 and the pattern of return performance indicated over this period must have been significantly affected by the extreme return performance on these stocks. This is partially revealed in Figure 7-2 where average excess market returns for all offerings in the period 1994-95 are shown to be higher than the returns in the 1996 sub-period.

Accordingly, a more important picture of the pattern of aftermarket returns in the Egyptian PIPOs is provided in Table 7-4 where descriptive statistics are reported for excess market returns in all offerings except the Paints & Chem. industries and Nasr City Housing & De. stocks. As in Table 7-3, the first 52 weeks of trading in the stocks are broken up into sub-periods of equal duration (4 weeks each), and returns are then constructed from the close in the first day of listing in the stocks to the closing date in each of these sub-periods.

To evaluate the changes in calculated excess market returns after the removal of the Paints & Chem. industries and Nasr City Housing & De. stocks from the sample of offerings, descriptive statistics for market-adjusted excess returns, based upon all 32 stocks, are shown in Table 7-4 (*Panel A*) with descriptive statistics for market-adjusted excess returns for the sample of stocks excluding the Paints & Chem. industries and Nasr City Housing & De. shown in Table 7-4 (*Panel B*). The mean excess market-adjusted returns levels in Table 7-4 (*Panels A and B*) are also shown in Figure 7-3.

From the results shown in Table 7-4 and Figure 7-3, it is clear that the removal of the Paints & Chem. industries and Nasr City Housing & De. stocks makes an appreciable difference to the 25 market-adjusted excess return measures analysed. Particularly, market-adjusted excess returns levels, after the removal of the radical stocks, are considerably lower than when all 32 stocks are considered. More importantly, significant positive returns emerge for excess market-adjusted returns ending between 8th and 26th weeks of listing for the sample of stocks including the Paints & Chem. industries and Nasr City Housing & De., while there is a decrease in the significance levels of the average excess market-adjusted returns across the same period when the radical stocks are removed from the sample.

However, it is important to note that the general picture of aftermarket performance across the two samples is essentially the same. Specifically, a period of rising returns is indicated with a period of declining returns emerging afterwards. This observation supports the earlier findings recognised in tables 7-1 to 7-3. However, removing the Paints & Chem. industries and Nasr City Housing & De. stocks from the sample enables this pattern of aftermarket performance to be more clearly recognised.

Figure 7-3 The Average Excess Market-adjusted Returns in the Egyptian IPO over the First 52 Weeks of Listing when (I) analysing all stocks Returns and (ii) excluding outlying stock returns

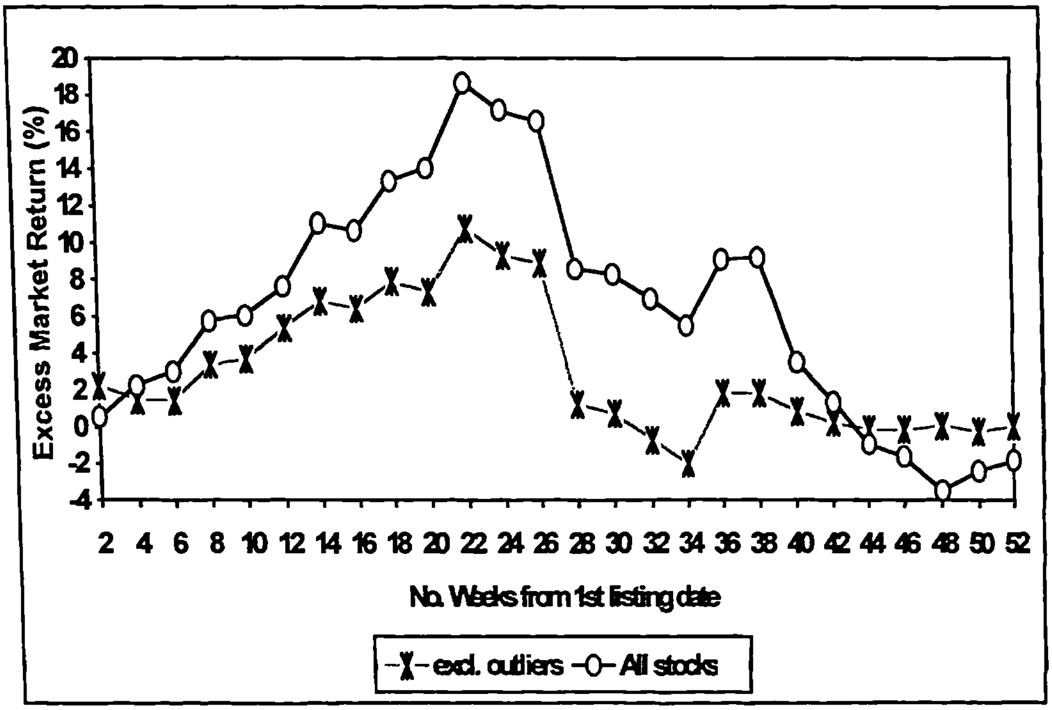


Table 7-4 Market-Adjusted excess Returns for Holding Periods Defined from the Close in the First Day of Listing in the PIPOs to periods Ending between 2 and 52 Weeks after listing

	Panel A: Market-adjusted excess returns using all available stocks			*Panel B: Market-adjusted excess returns where* **Paints & Chem. industries and Nasr City Housing & De.** *stocks are excluded*		
Return from Day 1 to week	$\overline{AR_t}$	t($\overline{AR_t}$)	Std D	$\overline{AR_t}$	t($\overline{AR_t}$)	Std D
2	0.500	0.375	7.6	0.44	0.317	7.60
4	2.259	1.264	10.1	1.44	0.805	9.82
6	3.028	1.210	14.2	1.47	0.617	13.05
8	5.792**	1.987	16.5	3.35	1.338	13.73
10	6.084*	1.748	19.7	3.67	1.130	17.77
12	7.633**	2.051	21.1	5.38	1.493	19.72
14	11.055**	2.141	29.2	6.84	1.547	24.22
16	10.690**	2.160	28.0	6.45	1.546	22.84
18	13.359**	2.459	30.8	7.88*	1.923	22.43
20	14.059**	2.306	34.5	7.37*	1.791	22.55
22	18.685**	2.778	38.1	10.81**	2.595	22.82
24	17.117**	2.571	37.7	9.31**	2.263	22.54
26	16.569**	2.511	37.3	8.89**	2.164	22.49
28	8.598	1.212	40.1	1.25	1.254	1.25
30	8.299	1.185	39.6	0.73	0.149	27.04
32	6.965	0.951	41.4	-0.69	-0.690	29.40
34	5.447	0.775	39.7	-2.05	-0.408	27.44
36	9.096	1.306	39.4	1.83	0.358	27.98
38	9.182	1.313	39.6	1.80	0.357	0.36
40	3.500	1.427	13.9	0.86	0.503	9.37
42	1.350	1.288	5.9	0.21	0.293	3.98
44	-0.930	-1.220	4.3	-0.11	-0.199	2.90
46	-1.649	-1.220	7.7	-0.19	-0.198	5.13
48	-3.450	-1.019	19.2	0.09	0.037	13.44
50	-2.369	-1.161	11.5	-0.26	-0.171	8.20
52	-1.850	-1.025	10.2	0.01	0.011	7.25

** Indicates returns significantly different from zero at 5% level for a two-tailed t-test (Critical t-statistic =1.96).
* Indicates returns significantly different from zero at 10% level for a two-tailed t-test (Critical t-statistic =1.65).

7.2 Systematic Risk in the Aftermarket

7.2.1 Introduction

A partial interpretation for the trend in return performance may be provided by the changes in the risk levels in the PIPOs. Thus, this section examines the behaviour of one measure of risk which has had wide acceptance in the academic community: namely the coefficient of non-diversifiable risk or more simply the beta coefficient in the market model (i.e., systematic risk). The models of stock valuation such as CAPM and the Sharpe's (1963) market model determine that the returns of a security should be commensurate with its systematic risk. In terms of IPOs, due to the absence of share prices prior to the offer, it is thus difficult to compute the systematic risk or beta of the issuing company. Nevertheless, it has been argued that because of the uncertainty of their future performance, the new issues are expected to be more risky than the market in average.

Several studies [e.g., Finn and Higham (1988), Jacquillat et al (1978) and Bear and Curley (1975)] have documented that the systematic risk of new issues in the immediate period after the offering is higher than the systematic risk of a market portfolio. This risk however declines as the issue becomes seasoned. Therefore, the mean systematic risks of PIPOs in the aftermarket are expected to decline with seasoning and vary around the market average of unity. This is because once the trading price is set by the market, investors' uncertainty about the issue is also expected to decrease.

Two hypotheses about the risk behaviour of PIPOs in the Egyptian Capital Market are tested. The first hypothesis states that during the primary market of trading, the mean systematic risk of the PIPOs is higher than the market risk. The results of this test were summarised in Chapter six and showed that the mean systematic risk of the PIPOs in the primary market is not statistically significant, thus, the null hypothesis that the mean beta of PIPOs is equal to the market beta cannot be rejected. This finding leads the investigation to the second hypothesis of the Egyptian PIPOs risk behaviour in the aftermarket. It is hypothesised that the mean systematic risk of such issues in the aftermarket declines as they become seasoned. In testing this hypothesis, two null hypotheses are examined. The first null hypothesis is that *the* mean beta of the PIPOs in the aftermarket equals one. The second is that the mean beta of the PIPOs in the aftermarket equals the mean beta in the primary market. In the following sections we test these hypotheses to evaluate the risk performance in the aftermarket of the Egyptian PIPOs.

7.2.2 DATA AND METHODOLOGY

To investigate the risk performance in the aftermarket, we use the RATS model described in chapters two and six. The RATS model has the advantage of allowing the contingency that the systematic risk of PIPOs may change as the issues become seasoned. The mean beta in the aftermarket periods have been calculated in the following ways:

1. To get the mean beta in the period from the second through the 30th day of trading, an OLS regression based on pooled daily data from each firm in the sample has been used.

2. To get the mean beta in the period from the first through the 52nd week of trading, an OLS regression based on pooled weekly data from each firm in the sample has been used.
3. To get the mean beta during the period from day 2 to day 30 after-listing, the same OLS regression was used on all the daily data from each company in the sample.
4. To get the mean beta during the period from week 1 to week 52 after-listing, the same OLS regression was used on all the weekly data from each company in the sample.

A t-test is then used to test the significance of the above hypothesis. This t-statistic was calculated in two different ways: first, to test the null hypothesis which says that the mean beta of the PIPOs in the aftermarket equals unity, the t-statistic was calculated as

$$t = (\overline{\beta}_{i}s - 1)/s.e \qquad (7.1)$$

where $\overline{\beta}_{i}s$ is the mean beta in the aftermarket, and s.e is the standard error. Second, to test the null which says that the mean beta of the PIPOs in the aftermarket equals the mean beta in the primary market, the t-statistic was calculated as

$$t = \frac{\overline{\beta_s} - \overline{\beta_p}}{\sqrt{\sigma_s^2 + \sigma_p^2}} \qquad (7.2)$$

where.

$\overline{\beta_s}$ is the mean beta in the secondary market,
$\overline{\beta_p}$ is the mean beta in the primary market,
σ_s^2 is the variance of $\overline{\beta_s}$, *and*
σ_p^2 is the variance of $\overline{\beta_p}$.

This method was used also by Gheysens (1979), Lanjong (1981) and Hassan (1991) in studying beta coefficient stationarity in the European capital markets, and Malaysia, respectively.

7.2.3 EMPIRICAL RESULTS OF SYSTEMATIC RISK IN THE AFTERMARKET

7.2.3.1 The average beta in the aftermarket periods using pooled data

Table 7-5 shows that the mean beta from day 2 through to day 30 after listing was found to be -1.72. In testing the hypothesis of $\overline{\beta_s} = 1$ and $\overline{\beta_s} = \overline{\beta_p}$, the t-statistics are -1.64 and -0.197 respectively. The aftermarket mean beta calculated based on the first 29 days after-listing is thus not statistically significantly different from market beta of 1 or from the mean beta in the initial period at the 5 % level. Similarly, over a longer term, and in this case when beta is measured from the first week through to week 52 after-listing, the mean beta is found to be 0.20. In testing the hypothesis of $\overline{\beta_s} = 1$, the t-statistic is -0.70 indicating the null hypothesis that the mean beta in the aftermarket is equal to the mean market beta of 1 could thus not be rejected at the 5 % level.

In testing the hypothesis $\overline{\beta_s} = \overline{\beta_p}$, the t-statistics 0.074 indicating that the mean beta in the aftermarket is not statistically significantly different from the mean beta in the initial period. The null hypothesis is thus not rejected. The results appear to be failed in supporting the hypothesis that the mean beta declines in the aftermarket periods and that the mean beta in the aftermarket is lower than the mean beta in the initial period.

Table 7-5 The average beta in the aftermarket periods using pooled data[1]

Return from:	Mean Beta $\overline{\beta_s}$	t-statistic $\overline{\beta_s} = 1$	t-statistic $\overline{\beta_s} = \overline{\beta_p}$
day 2 to day 30	-1.72	-1.64	-0.197
week 1 to 52	0.2	-0.7	0.074

7.2.3.2 The behaviour of the mean daily and the mean weekly betas

Table 7-6 and 7-7 show the behaviour of the mean daily and mean weekly betas measured using the RATS model. The average of the mean beta value from day 2 through to day 30 is calculated to be 1.27, with a standard deviation of 1.362 and a t-statistic of 5.029. The average of the mean weekly beta from week 1 to week 52 is calculated to be 0.0194 with a standard deviation of 1.60 and a t-statistic of 0.080. Therefore, the average of the mean beta in the short-term is statistically significantly different from 1. However, in the long-term, the mean weekly beta is not statistically significantly different from one. Thus, the results in the long-term support the hypothesis that the mean beta in the aftermarket periods declines and varies around the market beta of 1.

To put the above findings into context, the following section determines whether the pattern of aftermarket returns and risks noted for the Egyptian PIPOs is unique to the local market or whether it emerges in other markets.

---

[1] Note: $\overline{\beta_p}$ = 0.126 and calculated from the offering to the end of the first day of trading (see Chapter six). The standard error of $\overline{\beta_s}$ = 1.175, and obtained when we regressed the mean betas on the constant to get the average of beta. The variance of $\overline{\beta_p}$ $(20\ 66)^2$, the variance of β_s $(9\ 37)^2$ for the returns from day 2 to day 30, and the variance of $\overline{\beta_s}$ = $(.977)^2$ for the returns from week 1 to week 52.

Table 7-6 The mean daily beta obtained by RATS model

Day	Mean Beta ($\bar{\beta}_i$)	$t(\bar{\beta}_i)$	Day	Mean Beta ($\bar{\beta}_i$)	$t(\bar{\beta}_i)$	Day	Mean Beta ($\bar{\beta}_i$)	$t(\bar{\beta}_i)$
2	0.01	0.06	12	2.70	2.39	22	1.84	1.82
3	6.01	1.58	13	1.56	1.46	23	1.80	1.78
4	0.64	0.39	14	1.30	1.21	24	1.81	1.82
5	-0.75	-0.43	15	1.58	1.37	25	1.85	1.87
6	-0.71	-0.32	16	1.72	1.31	26	1.83	1.91
7	-0.23	-0.29	17	2.08	3.59	27	1.83	1.91
8	0.09	0.19	18	1.30	1.19	28	1.71	1.71
9	-0.87	-0.32	19	1.55	1.42	29	1.72	1.73
10	-0.77	-0.30	20	1.41	1.60	30	1.76	1.78
11	0.24	0.72	21	1.88	1.83	Avg.	1.27	σ = 1.362

Table 7-7 The mean weekly beta obtained by RATS model

Week	Mean Beta ($\bar{\beta}_i$)	$t(\bar{\beta}_i)$	Week	Mean Beta ($\bar{\beta}_i$)	$t(\bar{\beta}_i)$	Week	Mean Beta ($\bar{\beta}_i$)	$t(\bar{\beta}_i)$
1	0.04	0.08	**19**	-1.10	-0.77	**37**	1.31	0.44
2	1.17	0.77	**20**	0.48	0.49	**38**	1.74	1.17
3	-3.98	-1.90	**21**	-3.42	-0.97	**39**	-0.07	-0.82
4	0.13	0.08	**22**	-1.52	-0.52	**40**	-0.05	-0.97
5	-0.10	-0.15	**23**	0.29	0.12	**41**	-0.03	-0.49
6	-1.40	-0.67	**24**	-2.80	-3.53	**42**	0.04	0.41
7	-1.03	-0.51	**25**	0.54	0.43	**43**	-0.05	-0.23
8	-2.14	-1.71	**26**	2.35	1.93	**44**	0.20	0.78
9	-0.30	-0.24	**27**	-2.44	-1.43	**45**	0.16	0.97
10	-0.73	-0.42	**28**	-0.28	-1.29	**46**	0.22	1.30
11	0.26	0.45	**29**	1.39	2.19	**47**	0.14	1.44
12	0.67	1.32	**30**	-0.50	-0.50	**48**	0.40	2.22
13	-0.80	-0.84	**31**	0.62	0.83	**49**	0.55	1.62
14	-2.96	-0.99	**32**	0.51	0.65	**50**	-0.18	-1.09
15	-0.53	-0.93	**33**	0.39	0.39	**51**	1.89	2.51
16	0.48	0.67	**34**	0.37	0.24	**52**	-0.12	-0.26
17	0.25	0.24	**35**	5.30	2.77			
18	4.11	1.56	**36**	1.54	0.68	Avg.	0.0194	σ =1.60

7.3 Analysis of Results

In order to understand the significance of the return performance reported in the PIPOs under investigation, a review of Chapter two is made for the aftermarket market returns documented for PIPOs in other markets and time periods. Such a review reveals that a large number of studies report negative after listing returns, on average, between the first date of listing and the traded prices in stocks in one year after listing. However, there is some evidence of significantly positive returns during the first year of listing. For example, in 1967, Merritt et al offer one of the earliest significant analysis of aftermarket returns, for 149 UK offerings over the period 1959-1963. From the limited evidence in this study, an insignificant positive return of 1.9 % is recorded between the initial market price in the newly listed shares and the close of trading one month later. Such a result was taken by Merritt et al to suggest an efficient market where the market adjusts for initial underpricing in early trading and offers relatively small holding returns thereafter. Similar evidence, for U.S. securities, is found in Neuberger and Hammond (1974) where an excess market return of 8.3 % for 816 securities over the period 1965-69 was reported over the period between the initial market price in the first day of trading and the close of trading twenty days later.

Likewise, in our study, as in Merritt et al (1967) and Neuberger and Hammond (1974), we may suggest market efficiency with relatively small positive excess market returns of 2.3% being reported in tables 7-1 and 7-2 over the period between the initial market price in the first day of trading and the close of trading four weeks later. In other words, the Egyptian PIPOs market seems to adjust to underpricing in early trading in the aftermarket. Another picture can be seen in Reilly and Hatfield (1969), where larger positive returns, in the aftermarket period, are reported for US securities over the period 1963-65. In this study, a slight decline in stock returns of -1.8 occurs over the early aftermarket period (4 weeks). More important is the reported stock return of 11 % over the period of one year of trading.

This rise in stock prices, after initial underpricing has been adjusted for is, according to Reilly and Hatfield, a further gradual correction for the initial underpricing in unseasoned stock securities. Given this interpretation of Reilly and Hatfield, we may generalise their results for the purpose of our study where a similar observed price behaviour up to 26 weeks of trading in the Egyptian PIPOs can also be offered. In other words, large premiums, may have emerged in response to the relatively high risk levels in the Egyptian PIPOs stocks during the first half of the first year of trading.

On the other hand, a large number of studies record negative returns in the aftermarket, on average, between the first day of trading and the traded prices in stocks in one year later. Most of these negative returns findings in other markets suggest that the average excess market-adjusted return of -1.85% in the first 52 weeks of listing in the Egyptian PIPOs market are not unusual. In other words, *the* longer-term decline in aftermarket returns, observed in the Egyptian PIPOs aftermarket, receives strong support in comparable studies in other markets. For the risk behaviour, we found that the highest of the weekly mean beta value is 4.11 which is in week 18. The lowest is in week 41 with an absolute beta value of 0.03. When the performance in week 18 and week 41 is analysed further, it is found that in week 18, the average return of the 32 PIPOs has gone up by about 1109 % (because it has moved up from 0.211 % in week 17 to 2.55 % in week 18). Whereas the average market return has moved down by about 92.55 % from the previous level (because it has dropped from 0.19 % in week 17 to -0.02 %). Therefore, the large change of returns of the firms in the sample, compared to the large market change in the opposite direction, could have resulted in the mean beta of the PIPOs in week 18 having the highest mean beta in the period. The large share price movements in the PIPOs in week 18 could be due to new and unexpected information being disseminated into the market at that time. In the case of week 41, where the mean beta was the lowest in the series, it is found that in week 41, the average return of the 32 PIPOs has gone up by about 435.3 % (because it has moved up from 0.067 % in week 40 to 0.36 % in week 41). Whereas the average market return has moved up by about 1007.4 % from the previous level (because it has moved up from -3.264 % in week 40 to 1.92 % in week 41). The large differences in the performance of the PIPOs with the larger movement of the market, could have been the main reason for the low mean beta value in that week. Consequently, attention is now turned to the possible conclusions of the return and risk performance in the aftermarket of such PIPOs.

7.4 CONCLUSION

The increase in PIPOs prices over the first few weeks of listing in the Egyptian Capital Market may be consistent with some adjustment processes for the initial underpricing suggesting, to some extent, efficiency in such market. However, from the results in Table 7-2 (*Panel B*) and 7-3 (*Panel B*) there is some evidence that insignificant positive excess market returns exist, on average, between the close in the first day of listing and the close in the 4th week of listing. These insignificant positive returns may be caused by a number of initial subscribers selling stocks for profit-taking purposes so that the PIPOs stocks are subjected to downward price pressure. Due to this conclusion, the favourable return revealed over the first 30 weeks of listings [Table 7-4] may reflect adjustments for both the initial underpricing in the offerings and the relatively weak early aftermarket performance in the stocks. However, it is difficult to explain why this adjustment is offset in the reminder of the 52 week aftermarket period, where the downward trend in stock returns takes place between, on average, 26 and 52 weeks of trading [see Table 7-4]. If such price behaviour can be attributed to a speculative factor, an explanation for this speculation must be found. We can suggest that, first, it is claimed that Egyptian government may attempt to place shares in strong hands rather than weak hands. The former group retains the stock for a significant period of time and artificially decreases the supply of stocks in the aftermarket forcing market prices upwards. Second, Egyptian government artificially stimulating demand for the stocks of the privatised companies by selling shares to small, risk-oriented and generally uninformed investors in the aftermarket period. Finally, the results in the long-term seem to support the hypotheses regarding the behaviour of the mean systematic risk after-listing. Thus, the mean beta declines after-listing and varies around the market beta of 1. Also, the mean beta in the initial period is higher than the mean beta in the after-market as hypothesised. The mean beta in the Egyptian PIPOs market thus appear to behave nearly in a similar manner to the risk behaviour in other markets.

To sum up, although, in Egypt, shares are not allocated to the investment bankers to the offerings, it seems that the market for the PIPOs is subject to considerable speculative activity. This does not, however, imply that the Egyptian stock market is seriously deficient relative to other markets. However, it is important for our research to extend this analysis in the following chapter to place the documented findings of this chapter into explicitly testing the aftermarket efficiency of the Egyptian PIPOs.

CHAPTER EIGHT
THE AFTERMARKET EFFICIENCY
OF THE EGYPTIAN PIPOs

8.0 INTRODUCTION

The main objective of this chapter is to investigate the efficiency of the Egyptian PIPOs in the aftermarket. Since no body believes that markets are strongly efficient, we only test two forms of the Efficient Market Hypothesis (EMH), i.e. the weak-form and the semistrong-form. In testing the weak-form of the EMH, we employed two broad groups of tests: parametric tests (regression analysis) and non-parametric tests (runs test). For the semistrong-form, we employed two models. The first is the market-adjusted returns model. The second model attempts to control for risk of the PIPOs using a method similar to the RATS (returns across time and securities) procedure of Ibbotson (1975). Our results support both the weak-form and semistrong-form of EMH of the PIPOs in the Egyptian Capital Market.

This chapter is organized in the following way. In section 7.1, the relationship between price performance and market efficiency is discussed. The methodology used in this chapter is explained in section 7.2. Then, the findings and results are presented in section 7.3. Finally, section 7.4 provides a summary and conclusion of findings provided in other sections.

8.1 PRICE PERFORMANCE AND MARKET EFFICIENCY

8.1.1 INTRODUCTION

Primarily, there are three broad theories concerning stock prices movements. The first is the fundamental theory in which the security analyst or investor is basically interested in analysing factors such as economic influences, industry factors, and company information such as product demand, earnings, dividends, and management. Accordingly, the fundamentalist can estimate the intrinsic value of the security and then determine what investment action to take. This action can be reached by comparing this value with the current market price of the security.

The second is the technical or chartist school which maintains that fundamental analysis is unnecessary; all that has to be done is to study historical price patterns and then decide how current price behaviour fits into these. Since the technician believes that history repeats itself, he/she can then predict future movements in price based on the study of historical patterns.

The third is the random walk theory which poses a question that: can a series of historical stock prices or rates of return be an aid in predicting future stock prices or rates of return? As Fama (1970) and Fischer and Jordan (1991, p.618) mention that the empirical evidence in the random-walk literature existed before the theory was established. That is to say, empirical results were discovered first and then an attempt was made to develop a theory which could explain the results. This has led to a diversity of theories, which are called the theory of random walk. This theory has demonstrated, through its empirical tests, that successive price changes over short periods, such as a day, a week, or a month, are independent. To the extent that this independence exists, the random-walk theory directly contradicts technical analysis. And, also, to the extent that the stock markets are efficient in the dissemination of information and that they have informed market participants and the proper institutional setting, the random-walk school poses an important challenge to the fundamentalists camp as well. Accordingly, if the markets are truly efficient, then the fundamentalists will be successful only when (1) they have inside information, or (2) they have superior ability to analyze publicly available information and gain insight into the future of the firm, and (3) they use (1) and/or (2) to reach long-term buy-and hold investment decisions.

For the purpose of this chapter, it is meaningful to clarify that the empirical evidence in support of the random-walk hypothesis rests primarily on statistical tests, such as runs tests and correlation analysis. The results have almost all been in support of the random-walk hypothesis, the weak-form of the efficient market hypothesis. The results of semi-strong-form tests have been mixed. Under this form of market efficiency all information regarding past price movements is reflected in the current stock price. The weak-form market efficiency can be supported by a confirmation of the random walk theory upon which stock price changes are independent over time [see Levy and Sarnat (1984, p. 667.78), and Hudson ; Dempsey and Keasey (1996)].

Thus, the return from any initial underpricing should also be independent of subsequent returns [see McDonald and Fisher (1972) and Ibbotson (1975) for early evidence of this observation]. In other words, the weak-form hypothesis asserts that the subsequent market price behaviour of PIPOs should be independent of the initial price change after the offering. Moreover, the weak form of the EMH suggests that it is not possible to establish profitable trading rules based on the prior performance of a share. For example, if a new issue performs well initially, there is no reason to believe that its subsequent performance will be superior or inferior. If such predictions were possible, profitable trading rules could be established thus invalidating the EMH.

Whilst the weak-form efficiency tests focus only on information about the past stock prices, the semi-strong form efficiency tests are concerned with all publicly available information, including of course the stock prices. If the market is semi-strong efficient, all public announcements, e.g., changes in the annual earnings, changes in the declared cash dividend, changes in the management of the firm, etc., are fully reflected in the stock price. However, publicly available information is so large and heterogeneous that it is impossible to test for market efficiency relative to all the sources of information.

A major contribution of the study of the semistrong-form hypothesis was made by Fisher, Jensen, and Roll in 1969. They tested the speed of the market's reaction to a firm's announcement of a stock split and a change in dividend policy. They concluded that the market was efficient with respect to reacting to the informational content of stock splits and changes in dividend policy. Also, Ball and Brown (1968) conducted another test in this area by analysing the stock market's ability to absorb the informational content of reported annual earnings per share information. The interesting result was that about 85 percent of the informational content of the annual earnings announcement was reflected in stock price movements prior to release of the actual annual earnings figure.

Joy, Litzenberger, and McEnally (1977) conducted another stock price-earnings report test in this area. In their study the authors tested the impact of quarterly earnings announcements on the stock price adjustment mechanism. Some of their results somewhat contradicted the semistrong form of the efficient market hypothesis. They found that favourable information contained in published quarterly earnings reports was not instantaneously reflected in stock prices.

In chapter six we found that excessive returns can be provided when the firms initially go public, thus, purchasing their stock is favourable. This view is based on the hypothesis that the privatised companies tend to underprice securities when pricing a PIPO because of the policy risk they assume. Thus, if the issue is priced very conservatively, they will have no trouble in selling the issue out and recovering their investment. This has led us to test whether the excessive returns could be earned by purchasing a new issue at the offering price (see Chapter six). An alternative approach is conducted in Chapter seven to explore the Egyptian PIPOs market efficiency. This was to test the returns of an investor who acquired the PIPO shortly after it was initially offered and then held the security for various periods.

In the developed capital markets the tests of purchasing new issues showed that excessive returns could be earned if purchases were made at the offering price because of underpricing of the issues by underwriters. However, the markets tend to be efficient because this underpricing is compensated for by the market almost immediately after the issue begins trading. The returns from purchasing after the offering appears to compensate the investor only for the additional risks inherent in such new issues. These results generally support the semistrong form of the efficient market hypothesis [see Ibbotson and Jaffe (1975), Block and Stanley (1980), Ibbotson (1975), Logue (1973), McDonald and Fisher (1972), Neuberger and Hammond (1974), and Fischer and Jordan (1991)]. As an extension to this line of research, in this study we investigate the possibility of existence of both the weak-form and semistrong-form of the EMH in a developing capital market i.e., the Egyptian PIPOs market.

8.2 Data and Methodology

8.2.1 Tests of the weak-form of the EMH in the Egyptian PIPOs Market

The above conceptual framework shows that the weak-form efficiency tests examine whether the time series of past prices can be used to predict the stock future price. So, if such prediction is possible, we can expect that an abnormal profit can be made by simply looking at past stock prices. Thus, it is meaningful to find some empirical tests which indicate that no "excess profit" can be made by looking at past series of stock prices. For example, the random walk hypothesis is tested by looking for association between stock prices changes on consecutive days.

As a consequence, we test this hypothesis by investigating the association between the immediate performance of a PIPO in the primary market and its subsequent performance in the aftermarket to provide any further confirmation or refutation of the EMH. The tests of random-walk hypothesis fall into two broad groups: parametric tests (regression analysis) and non-parametric tests (runs test). Both of these groups are employed in this study as follows.

8.2.1.1 Regression analysis

To test the random walk theory we calculate the stock price change in the initial period and various subsequent periods, as follows

$$R^{subsequent} = \alpha + \beta R^{initial} + e_t \qquad \textbf{(8.1)}$$

The intercept term α measures the expected return (price change), unrelated to previous price changes. Since most securities give a positive return, α should be positive. This is the "positive drift" of the random walk process. Levy and Sarnat (1984, p. 669) found that:

> "... the random walk hypothesis does not contradict the theory which asserts that risky assets must yield a positive mean return. We say in such a case that stock price changes can be characterised by a random walk process with a "positive drift".

And e_t is a random number and incorporates the variability of the current price changes not related to previous price change. Eq. (8.1) is clearly a linear equation. In any test, β could be no different from zero, suggesting no relationship between the previous price change (initial return = $R^{initial}$) and next price change (subsequent return = $R^{subsequent}$).

In the process of estimating eq. (8.1) we intend to obtain a correlation coefficient. The square of the correlation is the fraction of the variation of subsequent's return explained by the underpricing (initial return) shown on the right-hand side of the equation. For example, Table 8-1 shows a correlation coefficient for the whole sample of -0.06 which means that $(-0.06)^2 = 0.0036$ of the variation of the subsequent return (the term on the left-hand side of the equation) is explained by the initial return (the term on the right-hand side). To estimate eq. (8.1), it is hypothesised that there is no relationship between the immediate returns provided by PIPOs purchased at the offerings, and their subsequent returns. For the empirical investigation, we reformulate this hypothesis in terms of its null which states that: the correlation coefficients between the initial and the subsequent returns is zero. If we cannot reject the null, then the weak-form efficient market hypothesis is validated in the Egyptian PIPOs market.

However, we expect that some investors or security analysts may argue that issue which perform well or poorly in the initial period, will continue to behave in the same manner in the future. Or, there may be some reasons to believe that subsequent performance of exceptional issues will compensate for good or bad initial performance i.e., an issue that performed well in the immediate after-market may fall off later, or vice-versa. To avoid such confusion, we extend the above hypothesis by isolating issues which perform exceptionally well in the initial period of trading. This is examined by dividing the sample into groups based on their initial performance and by calculating the correlation coefficients between the initial and subsequent performance of the sub-groups. To test the hypothesis which measures the relationship between the immediate and subsequent price movements of the Egyptian initial public offerings, first, in the short-term, we estimate the following regression

$$R_{1\text{-}week4} = \alpha + \beta R_{o\text{-}1} + e_t \tag{8.1}$$

upon which the correlation coefficients between the initial returns (measured from the offering to the end of the first day of trading) and subsequent returns (measured from the end of the first day to end of the fourth week of listing) are calculated. Each correlation coefficient, which we denote by r is calculated as:

$$r = \frac{\sum_{t=1}^{T}(R_t^{initial} - \overline{R_t^{initial}})(R_t^{subsequent} - \overline{R_t^{subsequent}})}{\sqrt{\sum_{t=1}^{T}(R_t^{initial} - \overline{R_t^{initial}})^2 \sum_{t=1}^{T}(R_t^{subsequent} - \overline{R_t^{subsequent}})^2}} \tag{8. 2}$$

eq. (8.2) represents the ratio of the covariance of initial and subsequent returns to the product of their standard deviations. Secondly, in the long-term, we estimate the following regression

$$R_{week1\text{-}week52} = \alpha + \beta R_{o\text{-}week1} + e_t \tag{8.3}$$

from which the correlation coefficients between the initial returns (measured from the offering to the end of the first week of trading) and the subsequent returns measured from the end of the first week to the end of the 52nd week of trading are calculated. The correlation coefficients between the initial and subsequent returns for all the sub-groups are also analysed to see if there are any significant correlation between the initial and subsequent returns of sub-sample based on the degree of the initial returns. T-statistic is used to test the significance of the relationship between the variables under investigation. The equation of calculating t-statistic was as follows:

$$t_r = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}} \tag{8. 4}$$

where n is the number of observations, r is the correlation coefficient [see Emory (1985)]. Accordingly, the above hypothesis can not be rejected if the correlation coefficient between the initial and subsequent returns for the sample is not significantly different from zero. Thus, a t-statistic which is not significantly different from zero would support the hypothesis of the weak-form efficiency in the market. That is the subsequent performance of the new issues in the Egyptian Stock Exchange is independent of its initial performance.

However, if there is heteroscedasticity in the data since the data are cross-sectional involving a heterogeneity of PIPOs, hypothesis tests on t distribution will be unreliable, raising the possibility of drawing misleading conclusions. Thus, we detect such problem using the heteroscedastic-consistent standard errors (HCSEs) relative to the usual standard errors. HCSEs reflect any heteroscedasticity in the residuals which is related to the regressors. Large differences between OLS standard errors and HCSEs values are indicative of the presence of heteroscedasticity [see Doornik and Hendry (1994)].

So far, we present regression techniques to test the random walk hypothesis. However, the correlation coefficient may be heavily influenced by a pair of extreme observations (i.e., outliers). In order to correct for this possible bias, we use the non-parametric *runs test* which takes into account only the signs of changes and not their magnitude. Moreover, since *runs test* is commonly used to test the weak-form of Efficient Market Hypothesis, the following section deals with such tests.

8.2.1.2 Runs Test

To further reassert or refute the weak-form efficiency of the PIPOs in the Egyptian Capital Market, *runs tests are* performed on the same data used to test the earlier hypothesis in this study. The *runs test* is one of the most common method of testing the random-walk hypothesis, besides the serial correlation coefficient test, sometimes also known as the *Geary test*, a non-parametric test[1] [see Geary (1970)]. *Runs test* is concerned with the direction of price changes (positive, negative, or zero) in a time series. Thus, a run is defined as an uninterrupted sequence of one symbol or attribute, such as "+" or "-". The length of a run is defined as the number of elements in it. By examining how runs in a strictly random sequence of observations one can derive a test of randomness of runs. If stock prices are positively associated, we

[1] In non-parametric test we make no assumption about the distribution from which the observations were drawn.

expect to have long runs of "+" sign (consecutive price increases) and long runs of "-" sign (consecutive price declines). Thus, in this case, any series of observations is expected to break into few long runs. If stock price changes are negatively associated, we expect to find a typical behaviour of the form - + - + -, i.e., a price drop followed by a rise and vice versa. Thus, we will have many short runs. If stock price changes are independent, neither of the previous extreme cases is observed. If the market conforms to the weak-form EMH, the actual number of runs in a price series would equal to the expected number of runs.

In this study runs test is carried out using daily price changes from day 1 to day 30 of listing, and the weekly price changes from week 1 to week 52 after listing. Since the test is in the sign of the change and not in its value, these would be no difference in the result if either the price changes or the log price changes are used. In this study the price changes will be used. Using the *runs test*, we let: n = total number of observations = $n_1 + n_2$, n_1 = number of (+) symbols (i.e., + returns), n_2 = number of (-) symbols (i.e., - returns), and k = number of runs. Then under the null hypothesis that successive outcomes (i.e., returns) are independent, the number of runs is distributed (asymptotically) normally with

$$\text{mean: } E(k) = \frac{2n_1n_2}{n_1+n_2}+1$$

$$\text{Variance: } \sigma_k^2 = \frac{2n_1n_2(2n_1n_2-n_1-n_2)}{(n_1+n_2)^2\,(n_1+n_2-1)} \qquad (8.5)$$

The computation of $E(k)$ is based on two assumptions: that the sample proportion of positive, negative and zero price changes are good estimates of the population propositions; and successive price changes are independent.

For the daily price changes from day 1 to day 30 of the listing, where most of the signs are less than 20 plus (n_1) and minus (n_2) [see Table 8-2], special runs test tables are available in order to determine whether or not k is significantly different from the expected number in a random sample. However, we calculate the limits of confidence upon which we build the decision of asserting or rejecting the hypothesis of randomness. That is, if the hypothesis of randomness is sustainable, we should expect (k), the number of runs obtained to lie between [$E(k) \pm 1.96\ \sigma_k$] with 95% confidence. In other words, we do not reject the null hypothesis of randomness with 95% confidence if [$E(k) - 1.96\ \sigma_k \leq k \leq E(k) + 1.96\ \sigma_k$]; but we reject the null hypothesis if the estimated (k) lies outside these limits.

However, for the weekly price changes from week 1 to week 52 after listing, where most of the signs are more than 20 plus or minus ($n_1 > 20$ or $n_2 > 20$ in Table 8-3), standardised normalised variable Z is calculated to test the statistical significance of the difference between the actual and the expected number of runs, as follows:

$$Z_k = \frac{k - E(k)}{\sigma_k} \qquad (8.6)$$

where k is the actual number of runs in the sample, is assumed to be a standard normal variate with zero mean and unit standard deviation. This fact can be used to check whether the number of runs k in the sample is significantly different from the expected number of runs $E(k)$ for a random sample.

Accordingly, to test the independence of successive price changes in the Egyptian PIPOs, we hypothesize that the sequential changes of stock prices of this market are independent indicating that such market is efficient in the weak-form sense. In order to test this hypothesis, we first calculated the returns (i.e. P_t - P_{t-1}, where P_t is the stock price at time t and P_{t-1} is the stock price at time t-1) for the first 30 days as well as the first 52 weeks of listing for the whole sample. Then, we used the SPSS software package to calculate the number of runs (k) , "+ "sings (n_1) and "- " signs (n_2). Thereafter, using eq. (8.5), we calculated the expected number of runs $E(k)$ and their standard deviations. Then, using eq. (8.6), we calculated Z values to be compared with the critical value of 1.96 at the 5% level of significance to support or refuse the hypothesis of random walk. Moreover, we calculated the 95% confidence interval to see if the actual runs k fall in this interval (i.e. it is random) or outside of this range to reject the randomness hypothesis. It should be noticed that the decision taken by the critical Z is the same by the confidence interval. Also, the results of our calculation of these intervals are similar to the intervals found at the end of econometrics books concerning the critical values of runs test.

8.2.2 TESTS OF THE SEMISTRONG-FORM OF THE EMH IN THE EGYPTIAN PIPOS MARKET

In order to test the semi-strong form EMH in the Egyptian PIPOs market we hypothesize that excess returns are unattainable by trading in PIPOs indicating that the aftermarket of such securities is efficient in the semi-strong form sense. Therefore, the null hypothesis states that the mean excess return in the aftermarket of PIPOs is equal to zero.

In the developed capital markets, we have mentioned above that results generally support the semistrong form of the efficient market hypothesis. Hence, we extend this sort of testing for the Egyptian Capital Market as an emerging market. In Egypt, new issues are allowed to be sold to the public and get listed on the stock exchange only if, prior to the issue, the company has satisfied all the strict requirements set by regulatory bodies and organisations responsible in the new issue process (See Appendix A). With many regulatory bodies involved in the process, it is evident that the government itself takes an interest and it is indeed concerned about the development of new issues market in Egypt. However, it has also been argued that the involvement of too many regulatory bodies could make the issue process more inefficient, as it would take longer before an issue is finally sold to the public.

The government's role in the market, could help to make information available to the public. The Capital Market Authority (CMA), in Egypt, could ensure that information relevant to an issue was published in the prospectus. Information about a privatised company has always been given wider coverage by mass media. Information about existing companies are not given much coverage by the mass media. That information dissemination about PIPOs is more efficient than that of the existing issues.

Having considered the above situation, it is hypothesised that the new issues market in Egypt is efficient in the semi-strong form sense and that prices in the aftermarket would adjust immediately to the under/overpricing. In the case of underpricing stages and the less knowledgeable investors are expected to dispose of their share of new issues as early as possible in order to obtain the capital gains they are earned.

To examine the semi-strong form EMH of the Egyptian PIPOs in the aftermarket period (from the first day to the end of the first year of trading), we use the same sample of the 32 Egyptian privatised companies of ordinary shares offered to the public and listed on the Stock Exchange for the first time during the period from January 1994 to December 1996. Then, we analyse the aftermarket performance over the four periods: (1) daily excess return from day 2 to day 30 after listing, (2) the mean excess return on buy and hold strategy from the end of the first day to day 30 after-listing, (3) the weekly excess returns from week 1 to week 52 after listing, and (4) the mean excess returns on a buy and hold strategy from the end of the first week to end of week 52 after-listing.

Essentially, the market model of Sharpe (1963) and the CAPM developed independently by Sharpe (1964), Lintner (1965) and Mossin (1966), have been the main models used in studies of the semi-strong form of the Efficient Market Hypothesis (EMH). In this study, the market-adjusted and risk-adjusted methods have been employed. Using the market-adjusted approach, described in Chapter six, all returns in all the four periods (1-4) are adjusted to the movements of the Egyptian General Stock Exchange Index. Applying the market adjusted returns model, we calculate the market-adjusted abnormal return (AR_{it}) for each PIPO of our 32 firms. Then, the mean excess returns ($\overline{AR_t}$) for all the sample stocks. And these average excess returns were cumulated from time 1 through time τ to form the cumulative average excess return,

$$C\overline{AR_t} = \sum_{t=1}^{\tau} \overline{AR} \tag{8.7}$$

In testing semistrong form of the EMH based on the daily excess return from day 2 to day 30 after listing, the t-statistic for the cumulative average market-adjusted return in day *t*, is computed as

$$t_t = \overline{CAR_t} \times \frac{\sqrt{n_t}}{csd_t} \tag{8.8}$$

where n_t is the number of firms trading in each day, and csd_t is computed as

$$csd_t = \sqrt{[t \times \mathrm{var} + 2(t-1) \times \mathrm{cov}]} \tag{8.9}$$

where t is the event day, var is the average (over 30 days) cross-sectional variance, and *cov* is the first-order autocovariance of the $\overline{AR_t}$ series which is -3.444. Var has a value of 1.28 [see Table 8-4].

Likewise, in testing semistrong form of the EMH based on the weekly excess return from week 1 to week 52 after listing, the t-statistic for the cumulative average market-adjusted return in day t, is computed using eq. (8.9), where n_t, here, is the number of firms trading in each week. And csd_t is computed using eq. (8.10), where t *is the event* week, var is the average (over 52 weeks) cross-sectional variance, and cov is the first-order autocovariance of the $\overline{AR_t}$ series which represents 0.076. Var *has a value of 3.46*, [This procedure is used by Finn and Higham (1988, p. 341-42), Ritter (1991,p.10), Levis (1993, p.32), Keloharju (1993,p.267), and Lee et al. (1996, p. 1203)]. Finally, in the risk-adjusted approach the excess returns in the aftermarket periods have been measured using a method similar to the RATS procedure of Ibbotson (1975) as described in Chapters two and six.

8.3 Empirical Results

8.3.1 Results of Testing the Weak-Form of the EMH

8.3.1.1 The Results of Regression

Table 8-1 displays the results of regression defined in eq. (8.1). In panel (a) of this, we report the relation between the initial returns (from the offering to the end of the first day of trading) and the subsequent returns (buy at the end of the first day of trading and hold until 4 weeks). These results show that for the sample as a whole, the correlation coefficient was -0.06 with a t-statistic of -.031, indicating that the correlation coefficient is not statistically significantly different from zero at the 5% level. Likewise, for the sub-groups, none of the coefficients were statistically significantly different from zero.

Before reporting the decision based on the above results, we attempted to detect evidence of heteroscedasticity. We found that the heteroscedastic-consistent standard errors are relatively close to the usual standard errors, indicating the absence of heteroscedasticity in the regression defined in eq. 8.1. Therefore, the hypothesis that there is no relationship between the initial and subsequent returns, within one month after-listing, cannot be rejected. In panel (b) of Table 8-1, we report the relation between the initial returns (from the offering to the end of the first week of trading) and the subsequent returns (buy at the end of the first week of trading and hold until 52 weeks). We found that the whole sample has a correlation coefficient of -0.73 with a t-statistic of -1.50, indicating that the correlation coefficient is not statistically significantly different from zero at the 5% level.

A similar conclusion is obtained for the sub-groups, where none of the coefficients were statistically significantly different from zero. Also, we repeated a test of heteroscedasticity, and found that the heteroscedastic-consistent standard errors are very close to the usual standard errors, indicating the absence of heteroscedasticity in the model defined in eq. 8.1. Therefore, the hypothesis that there is no relationship between the initial and subsequent returns, within one year after-listing, cannot be rejected. Since, the non-dependence between the immediate and subsequent returns is to be expected in a weak-form efficient market, the results support the weak-form of EMH of the PIPOs in the Egyptian Capital Market.

Table 8-1 Correlation Coefficients Between the Initial and Subsequent Returns

Sample	Obs.	Corr. Coef	t-statistic	SE	HCSE
(a) The relation between the initial returns (from the offering to the end of the first day of trading and the subsequent returns (buy at the end of the first day of trading and hold until 4 weeks)					
ALL Sample	32	-0.06	-0.31	0.09	0.12
Sub-groups with initial returns of:					
Equal and Greater than 40 %	4	-0.63	-1.14	0.53	0.50
20 % to less than 40 %	8	-0.57	-1.68	1.23	1.07
0% to less than 20 %	15	0.19	0.70	0.32	0.37
less than zero	5	-0.50	-1.01	1.01	0.99
(b) The relation between the initial returns (from the offering to the end of the first week of trading) and the subsequent returns (buy at the end of the first week of trading and hold until 52 weeks)					
ALL Sample	32	-0.07	-0.41	0.44	0.30
Sub-groups with initial returns of:					
Equal and Greater than 40 %	4	-0.73	-1.50	1.12	1.08
20 % to less than 40 %	8	0.53	1.54	6.35	5.29
0% to less than 20 %	15	-0.18	-0.66	1.00	0.91
less than zero	5	0.18	0.32	3.52	3.07

8.3.1.2 Results of Runs Test

The runs test is implemented on each of the PIPOs in the sample. Results in tables (8.2) and (8.3) appear to show that prices of the PIPOs change at random as expected in a weak-form efficient market. Using the conventional two standard errors as a bench-mark, the value of (*Z*) is significantly different from zero (and the number of actual runs K falls outside the relevant intervals) in only 6 of the 32 cases in the daily analysis (i.e. firms 1, 12, 13, 14, 23 and 27) and the same number of cases in the weakly analysis (i.e., firms 8, 10, 18, 25, 29, 32). The mean absolute value of *Z* is - 0.62 for the daily and 0.51 for the weakly data. These values are lower than the *Z* value found in other researchers [e.g. Fama (1969) and Hassan (1991)]. As a result, we conclude that there is no reason to reject weak-form efficiency in the Egyptian privatised initial public offerings market.

Table 8-2 Runs Test on the Daily Prices

Code	n_1	n_2	K	$E(k)$	σ_k	Z_k	The 95% confidence interval	
							$E(k)$ - 1.96 σ_k	$E(k)$ + 1.96 σ_k
1	16.00	13.00	7.00	15.34	2.61	-3.00	10.22	20.47
2	19.00	10.00	10.00	14.10	2.38	-1.51	9.44	18.77
3	20.00	9.00	12.00	13.41	2.25	-0.41	9.00	17.82
4	17.00	12.00	17.00	15.07	2.56	0.95	10.05	20.09
5	18.00	11.00	14.00	14.66	2.48	-0.06	9.79	19.52
6	22.00	7.00	12.00	11.62	1.91	0.46	7.88	15.36
7	15.00	14.00	17.00	15.48	2.64	0.76	10.31	20.66
8	12.00	17.00	11.00	15.07	2.56	-1.39	10.05	20.09
9	14.00	15.00	15.00	15.48	2.64	0.01	10.31	20.66
10	18.00	11.00	18.00	14.66	2.48	1.55	9.79	19.52
11	16.00	13.00	13.00	15.34	2.61	-0.71	10.22	20.47
12	17.00	12.00	9.00	15.07	2.56	-2.17	10.05	20.09
13	17.00	12.00	8.00	15.07	2.56	-2.56	10.05	20.09
14	19.00	10.00	7.00	14.10	2.38	-2.77	9.44	18.77
15	17.00	12.00	16.00	15.07	2.56	0.56	10.05	20.09
16	18.00	11.00	10.00	14.66	2.48	-1.67	9.79	19.52
17	13.00	16.00	17.00	15.34	2.61	0.82	10.22	20.47
18	17.00	12.00	20.00	15.07	2.56	2.12	10.05	20.09
19	15.00	14.00	16.00	15.48	2.64	0.39	10.31	20.66
20	22.00	7.00	9.00	11.62	1.91	-1.11	7.88	15.36
21	15.00	14.00	16.00	15.48	2.64	0.39	10.31	20.66
22	15.00	14.00	19.00	15.48	2.64	1.52	10.31	20.66
23	16.00	13.00	9.00	15.34	2.61	-2.24	10.22	20.47
24	17.00	12.00	16.00	15.07	2.56	0.56	10.05	20.09
25	24.00	5.00	6.00	9.28	1.47	-1.89	6.40	12.15
26	19.00	10.00	15.00	14.10	2.38	0.59	9.44	18.77
27	17.00	12.00	9.00	15.07	2.56	-2.17	10.05	20.09
28	18.00	11.00	15.00	14.66	2.48	0.34	9.79	19.52
29	26.00	3.00	6.00	6.38	0.92	0.13	4.58	8.18
30	17.00	12.00	15.00	15.07	2.56	0.17	10.05	20.09
31	16.00	13.00	13.00	15.34	2.61	-0.71	10.22	20.47
32	13.00	16.00	15.00	15.34	2.61	0.06	10.22	20.47
Average	**17.34**	**11.66**	**12.88**	**14.94**	**2.54**	**-0.62**	**9.97**	**19.92**

Note: n_1 = number of (+) symbols (i.e., + returns), n_2 = number of (-) symbols (i.e., - returns), k = the observed number of runs, $E(k)$ = the expected number of runs, is the standard deviation of the expected number of runs, and Z_k is the standardised normalised variable to test the statistical significance of the difference between the actual and the expected number of runs.

Table 8-3 Runs Test on the Weekly Prices

Code	n_1	n_2	K	$E(k)$	σ_k	Z_k	The 95% confidence interval	
							$E(k)$ - 1.96 σ_k	$E(k)$ + 1.96 σ_k
1	28.00	24.00	23.00	26.85	3.55	-1.08	19.89	33.80
2	33.00	19.00	26.00	25.12	3.31	0.27	18.64	31.60
3	28.00	24.00	30.00	26.85	3.55	0.89	19.89	33.80
4	44.00	8.00	13.00	14.54	1.82	-0.84	10.96	18.11
5	31.00	21.00	21.00	26.04	3.44	-1.47	19.31	32.77
6	27.00	25.00	25.00	26.96	3.56	-0.55	19.97	33.95
7	27.00	24.00	25.00	26.41	3.52	-0.40	19.51	33.32
8	31.00	21.00	35.00	26.04	3.44	2.61	19.31	32.77
9	28.00	24.00	27.00	26.85	3.55	0.04	19.89	33.80
10	30.00	22.00	40.00	26.38	3.48	3.91	19.56	33.21
11	34.00	18.00	29.00	24.54	3.23	1.38	18.22	30.86
12	33.00	19.00	26.00	25.12	3.31	0.27	18.64	31.60
13	39.00	13.00	21.00	20.50	2.66	0.19	15.29	25.71
14	35.00	17.00	24.00	23.88	3.13	0.04	17.74	30.03
15	31.00	21.00	28.00	26.04	3.44	0.57	19.31	32.77
16	37.00	15.00	23.00	22.35	2.92	0.22	16.63	28.07
17	27.00	25.00	31.00	26.96	3.56	1.13	19.97	33.95
18	33.00	19.00	32.00	25.12	3.31	2.08	18.64	31.60
19	24.00	28.00	33.00	26.85	3.55	1.73	19.89	33.80
20	37.00	15.00	23.00	22.35	2.92	0.22	16.63	28.07
21	18.00	34.00	21.00	24.54	3.23	-1.10	18.22	30.86
22	28.00	24.00	30.00	26.85	3.55	0.89	19.89	33.80
23	27.00	25.00	30.00	26.96	3.56	0.85	19.97	33.95
24	33.00	19.00	29.00	25.12	3.31	1.17	18.64	31.60
25	30.00	22.00	35.00	26.38	3.48	2.47	19.56	33.21
26	30.00	22.00	28.00	26.38	3.48	0.46	19.56	33.21
27	37.00	15.00	25.00	22.35	2.92	0.91	16.63	28.07
28	34.00	18.00	27.00	24.54	3.23	0.76	18.22	30.86
29	27.00	25.00	36.00	26.96	3.56	2.54	19.97	33.95
30	28.00	24.00	32.00	26.85	3.55	1.45	19.89	33.80
31	26.00	26.00	29.00	27.00	3.57	0.56	20.00	34.00
32	31.00	21.00	34.00	26.04	3.44	2.32	19.31	32.77
Average	**30.81**	**21.16**	**27.84**	**26.09**	**3.44**	**0.51**	**19.34**	**32.84**

8.3.2 Results of Testing the Semistrong-Form of the EMH

8.3.2.1 Results of the Market-Adjusted Performance (Daily analysis)

Table 8-4 reports market-adjusted average excess returns and the average cumulative market-adjusted returns for the sample of 32 Egyptian initial public offerings for the period January 1, 1994 to December 31, 1996, excluding the initial return. According to the results in Table 8-4, there appears to be significantly positive $\overline{AR_t}$ for five days (i.e., 4, 7, 12, 15, and 16) during the first sixteen days after-listing and amount to (2.15%, 3.88%, 0.56%, 0.52%, and 0.51% respectively). However, the $\overline{AR_t}$ for days 5 and 8, are significantly negative at conventional significant levels and amount to (-2.58 % and -2.36 %) respectively. Remarkably, the mean daily returns are not significantly different from zero in any systematic manner for the majority of the first thirty days after-listing.

Table 8-4 Average and Cumulative Average Market-Adjusted Daily Returns

Day	$\overline{AR_t}$	$t(\overline{AR_t})$	$\overline{CAR_t}$	$t(\overline{CAR_t})$	Day	$\overline{AR_t}$	$t(\overline{AR_t})$	$\overline{CAR_t}$	$t(\overline{CAR_t})$
2	-1.09	-0.56	-1.09	-2.00	17	0.14	0.78	6.28	3.09
3	2.02	1.84	0.93	1.25	18	0.43	0.04	6.71	3.21
4	2.15	2.38	3.08	3.43	19	0.42	1.81	7.13	3.31
5	-2.58	-3.61	0.49	0.48	20	0.42	1.78	7.54	3.41
6	0.55	0.57	1.04	0.91	21	0.39	1.85	7.93	3.50
7	3.88	2.75	4.92	3.93	22	0.39	1.89	8.32	3.58
8	-2.36	-2.89	2.56	1.89	23	0.38	1.80	8.70	3.66
9	0.37	0.41	2.93	2.03	24	0.37	1.77	9.07	3.73
10	0.63	0.88	3.56	2.33	25	0.39	1.87	9.47	3.81
11	0.39	1.51	3.95	2.45	26	0.38	1.78	9.84	3.89
12	0.56	2.63	4.51	2.67	27	0.36	1.71	10.20	3.95
13	0.40	1.88	4.91	2.79	28	0.40	1.88	10.60	4.03
14	0.20	0.98	5.11	2.79	29	0.39	1.85	10.99	4 10
15	0.52	2.28	5.63	2.96	30	0.39	1.84	11.38	4.17
16	0.51	2.04	6.14	3.12					

Consequently, the daily analysis of aftermarket performance reveals that the null hypothesis that the mean excess returns in the aftermarket of PIPOs equals zero could not be rejected, indicating that the aftermarket of Egyptian PIPOs may be efficient in the semi-strong form sense.

8.3.2.2 Results of the risk-adjusted performance (Daily analysis)

Table 8-5 shows α_t for each of the first thirty days of listing. Compared to the returns reported above for the market-adjusted daily portfolios, the risk-adjusted returns seem to be similar [see Table 8-6]. That is, there appears to be significantly positive $\overline{AR_t}$ for five days (i.e., 4, 7, 12, 15, and 16) during the first sixteen days after-listing and amount to (2.02 %, 3.55 %, 0.50 %, 0.52 %, and 0.50 % respectively). However, the $\overline{AR_t}$ for days 5 and 8, are significantly negative at conventional significant levels and amount to (-2.41 % and -2.14 %) respectively. Thus, the introduction of a specific risk variable accounted for only 0.87 % as a total difference in the *aftermarket daily performance* of new issues under study.

Table 8-5 Risk-Adjusted Daily Returns Using RATS Model

Day	Mean excess return (α)	$t(\alpha)$	Day	Mean excess return (α)	$t(\alpha)$
2	-2.19	-1.64	17	0.11	0.66
3	2.02	1.86	18	0.40	1.75
4	2.12	2.29	19	0.40	1.73
5	-2.41	-3.26	20	0.38	1.82
6	0.66	0.68	21	0.38	1.85
7	3.55	2.56	22	0.36	1.76
8	-2.14	-2.70	23	0.36	1.74
9	0.11	0.11	24	0.38	1.82
10	0.69	0.95	25	0.36	1.75
11	0.28	1.25	26	0.35	1.71
12	0.56	2.68	27	0.35	1.71
13	0.38	1.80	28	0.38	1.79
14	0.18	0.90	29	0.37	1.79
15	0.50	2.23	30	0.37	1.78
16	0.50	2.01			

Table 8-6 A Comparison Between Market-Adjusted and Risk-Adjusted Daily Aftermarket Performance of the Egyptian PIPOs*

Days	4	5	7	8	12	15	16
(1) Market-adjusted returns	2.15	-2.58	3.88	-2.36	0.56	0.52	0.51
(2) Risk-adjusted returns	2.02	-2.41	3.55	-2.14	0.55	0.52	0.50
(3) The difference = (1)-(2)	0.13	0.17	0.33	0.22	0.01	0.00	0.01

*The values in the table are cited from Tables 8-4 and 8-5 and represent the returns which are significantly different from zero.

In general, consistent with the market-adjusted evidence found above, the risk-adjusted daily returns are not significantly different from zero in any systematic manner for the first thirty days, except for what we mentioned above. Consequently, the daily analysis of short-term aftermarket performance confirms that the null hypothesis that the mean excess returns in the aftermarket of PIPOs equals zero could not be rejected, indicating that the aftermarket of Egyptian PIPOs is efficient in the semi-strong form sense.

8.3.2.3 Results of the Market-Adjusted Performance (Weekly analysis)

Table 8-7 reports the weekly market-adjusted average excess returns and the average cumulative market-adjusted returns for the same sample investigated above. Table 8-7 shows that there appears to be a significantly positive $\overline{AR_t}$ for only four events (i.e., weeks: 7, 35, 39, and 40) during the first 52 weeks after-listing and amount to (1.72 %, 3.54 %, 4.21 %, and 4.49 %, respectively). However, the $\overline{AR_t}$ for days 27, 34, 42 are significantly negative at conventional significance levels and amount to (-6.66 %, -2.28 %, and -1.93 %) respectively. However, the mean weekly returns for the majority of the first 52 weeks after-listing are not significantly different from zero. Consequently, the weekly analysis of long-term aftermarket performance clarifies that the null hypothesis that the mean excess returns in the aftermarket of

PIPOs equals zero could not be rejected, confirming that the aftermarket of Egyptian PIPOs is efficient in the semi-strong form sense.

Table 8-7 Average and Cumulative Average Market-Adjusted Weekly Returns

Week	$\overline{AR_t}$	$t(\overline{AR_t})$	$C\overline{AR_t}$	$t(C\overline{AR_t})$	Week	$\overline{AR_t}$	$t(\overline{AR_t})$	$C\overline{AR_t}$	$t(C\overline{AR_t})$
1	-1.07	-1.20	-1.07	-3.24	27	-6.66	-2.55	11.22	6.43
2	1.59	1.57	0.52	1.10	28	-0.29	-0.49	10.93	6.15
3	-0.29	-0.17	0.23	0.40	29	-1.07	-1.13	9.86	5.45
4	3.12	1.25	3.35	5.01	30	1.51	1.29	11.37	6.18
5	-0.92	-0.88	2.43	3.25	31	0.50	0.51	11.87	6.35
6	1.70	1.23	4.14	5.04	32	-1.96	-1.65	9.91	5.22
7	1.72	2.35	5.85	6.60	33	1.50	1.75	11.41	5.92
8	0.90	1.09	6.75	7.12	34	-2.28	-2.08	9.13	4.66
9	1.57	1.46	8.32	8.27	35	3.54	3.33	12.67	6.38
10	-1.37	-1.17	6.95	6.56	36	1.20	0.73	13.86	6.88
11	0.16	0.17	7.11	6.39	37	-0.74	-0.73	13.12	6.42
12	1.44	1.59	8.55	7.35	38	1.09	1.07	14.21	6.86
13	0.16	0.17	8.71	7.20	39	4.21	2.36	18.42	8.78
14	2.19	1.73	10.90	8.68	40	4.49	2.09	22.91	10.78
15	0.99	1.00	11.88	9.14	41	-1.22	-1.17	21.69	10.09
16	-0.81	-0.75	11.07	8.25	42	-1.93	-2.07	19.76	9.08
17	0.02	0.04	11.09	8.02	43	0.01	0.01	19.77	8.97
18	2.56	1.42	13.65	9.59	44	-1.82	-1.88	17.94	8.05
19	-0.09	-0.07	13.56	9.27	45	-1.00	-1.45	16.95	7.52
20	0.61	1.03	14.17	9.44	46	-0.48	-0.74	16.46	7.23
21	1.94	1.16	16.11	10.47	47	-1.06	-1.17	15.41	6.69
22	2.73	1.26	18.84	11.97	48	-0.96	-0.91	14.44	6.21
23	-1.30	-0.80	17.54	10.90	49	0.59	0.53	15.03	6.39
24	0.58	0.78	18.13	11.02	50	0.46	0.52	15.49	6.52
25	0.61	0.78	18.74	11.16	51	-0.64	-1.12	14.85	6.19
26	-0.86	-1.24	17.88	10.44	52	-0.23	-0.63	14.62	6.04

8.3.2.4 Results of the risk-adjusted performance (Weekly analysis)

Table 8-8 shows α_t for each of the first 52 weeks of listing. Compared to the returns reported above for the market-adjusted weekly portfolios, the risk-adjusted returns seem to be similar [see Table 8-9]. That is, there appears to be significantly positive mean excess returns (α_t) for two events only (i.e., weeks 7 and 35) during the first 52 weeks after-listing and amount to (1.59 % and 2.64 % respectively). On the other side, the mean excess returns (α_t) for, also, two weeks only (27 and 34) are significantly negative at conventional significant levels and amount to (-5.58 % and -2.27 %) respectively.

Thus, the introduction of a specific risk variable accounted for only 0.06 % as a total difference in the aftermarket weekly performance of new issues under study. In general, consistent with the above empirical evidence the risk-adjusted weekly returns are not significantly *different* from zero for the first year of trading. Consequently, the weekly analysis of long-term aftermarket performance confirms that the null hypothesis that the mean excess returns in the aftermarket of PIPOs equals zero could not be rejected, indicating that the aftermarket of Egyptian PIPOs is efficient in the semi-strong form sense.

Moreover, we also computed the mean compound return equivalent to a buy and hold strategy of buying new issues at closing price of the first day/ week and holding through to the end of day 30/week 52. This strategy showed mean returns of 3.62 and 5.49 percents with t-statistics of 1.50 and 1.91, respectively [see Table 8-10]. On balance, although the returns suggest some positive performance in the aftermarket, we cannot reject the hypothesis that the mean excess returns in the aftermarket of PIPOs equals zero. Therefore, we can point out that the aftermarket of Egyptian PIPOs is efficient in the semi-strong form sense.

Table 8-8 Risk-Adjusted Weekly Performance Using RATS Model

week	Mean excess return (α)	t(α)	week	Mean excess return (α)	t(α)
1	-0.72	-0.84	27	-5.68	-2.19
2	1.61	1.53	28	0.43	0.99
3	-1.06	-0.65	29	-1.19	-1.20
4	3.18	1.25	30	1.26	1.10
5	-0.89	-0.88	31	0.65	0.62
6	1.18	0.82	32	-1.74	-1.38
7	1.59	2.15	33	1.47	1.70
8	0.42	0.54	34	-2.27	-2.03
9	1.32	1.21	35	2.64	2.43
10	-1.59	-1.34	36	1.13	0.66
11	0.21	0.23	37	-0.78	-0.71
12	1.40	1.54	38	1.13	1.10
13	0.00	0.00	39	0.70	1.00
14	2.14	1.71	40	-0.11	-0.21
15	1.18	1.29	41	0.42	1.00
16	-0.60	-0.53	42	-0.67	-1.16
17	0.16	0.23	43	0.88	1.11
18	2.63	1.48	44	-1.26	-1.40
19	-0.55	-0.41	45	-0.49	-0.91
20	0.51	0.82	46	-0.08	-0.15
21	2.44	1.42	47	-0.86	-1.71
22	2.84	1.30	48	-0.97	-1.06
23	-1.33	-0.81	49	0.57	0.50
24	0.89	1.52	50	0.27	0.50
25	0.55	0.68	51	-0.46	-0.80
26	-0.97	-1.39	52	-0.46	-1.28

Table 8-9 A Comparison Between Market-Adjusted And Risk-Adjusted Weekly Aftermarket Performance of the Egyptian PIPOs*

Weeks	7	27	34	35
(1) Market-adjusted returns	1.72	-6.66	-2.28	3.54
(2) Risk-adjusted returns	1.59	-5.58	-2.27	2.64
(3) The difference = (1)-(2)	0.13	-1.08	-0.01	0.90

*The values in the table are cited from Tables 8-7 and 8-8 and represent the returns which are significantly different from zero.

Table 8-10 Risk-Adjusted Performance on a Buy and Hold Strategy

	Mean Excess Returns			
	Market-adjusted	**t-statistic**	**Risk- adjusted**	**t-statistic**
day 1 to day 30	7.7222	1.305	3.62	1.50
week 1 to 52	4.2125	1.699	5.49	1.91

8.4 CONCLUSION

The results in this study support both the weak-form and semistrong-form of the Efficient Market Hypothesis of the PIPOs in the Egyptian Capital Market. The basis of our conclusion are common tests performed on a constructed set of daily and weekly Egyptian market-adjusted and risk-adjusted returns data for the period 1994-1996. Our results are *in line with recent research on* developed stock markets. Testing the weak-form of the EMH, first, the results of regression techniques in both short-term and long-term show that the correlation coefficients are not statistically significantly different from zero at the 5% level, whether for the sample as a whole or for the sub-groups. For this regression, we detected the problem of heteroscedasticity, and found that the heteroscedastic-consistent standard errors are close to the usual standard errors, indicating the absence of heteroscedasticity in the employed regression. As a consequence, we could not reject the hypothesis that there is no relationship between the initial and subsequent returns. Thus, the results of regression tests support the weak-form of EMH of the PIPOs in the Egyptian Capital Market. Second, the results of the non-parametric test (runs test) show that prices of the PIPOs change at random. Our result is based on the standardised normalised variable (Z), which is calculated to test the statistical significance of the difference between the actual and the expected number of runs, and which is not significantly different from zero in both the daily and weekly data. As a result, based on the parametric and non-parametric tests used in this study, we conclude that the weak-form efficiency in the Egyptian initial public offerings market is not rejected.

In testing the semistrong-form of the EMH, however, first, based on the market-adjusted returns daily analysis of short-term aftermarket performance we could not reject the null hypothesis that the mean excess returns in the aftermarket of PIPOs equals zero. Consistent with the market-adjusted results, the risk-adjusted daily returns are not significantly different from zero for the first thirty days. Second, in the long-term after-listing, the weekly analysis of price performance clarified that the null hypothesis that the mean excess returns in the aftermarket of PIPOs equals zero could not be rejected. Also, the risk-adjusted weekly returns are not significantly different from zero for the first year of trading.

Finally, we tested a buy and hold strategy of buying new issues at closing price of the first day/ week and holding through to the end of day 30/week 52. Based on this strategy, although we noticed a positive performance in the aftermarket, we could not reject the hypothesis that the mean excess returns in the aftermarket of PIPOs equals zero. Therefore, the main conclusion of our analysis, based on daily analysis or weekly analysis; or based on market-adjusted or risk-adjusted excess returns models; supports that the aftermarket of the Egyptian PIPOs is efficient in both the weak-form and semi-strong versions of the EMH.

CHAPTER NINE
CONCLUSIONS

8.1 SUMMARY OF FINDINGS

The core of this thesis has involved an examination of the Egyptian stock market efficiency with a specific focus on the price performance of the privatised initial public offerings. Recent structural changes of the Egyptian economy in 1991 permit testing hypotheses about how these changes have affected the behaviour of Egyptian stock market in general and privatisation initial public offerings in particular. A variety of theoretical and empirical conclusions resulted from discussions and empirical analysis presented in the preceding chapters of this thesis are enumerated below:

An analytical review of prior studies is provided in Chapter Two. The first section of this chapter dealt with the underpricing phenomenon connected with the IPOs. Numerous studies suggest that the initial return premium from underpricing could be established by the close in the first day of trading. Many hypotheses were introduced to explain the underpricing phenomenon. However, most of these explanations can be criticised on the grounds of either the extreme assumptions that are made or the unnecessarily complicated stories involved.

In the second section of Chapter Two, the performance of aftermarket returns in the IPOs was scrutinised. A large number of studies surveyed indicated negative returns between the first closing traded price and the close of trading twelve months after issue. Whilst some evidence of IPOs prices rising in the aftermarket was also apparent, this appeared to be less common than the declining performance of returns.

Some clarifications were presented in order to explain these reported positive and/or negative returns. However, the poor performance of IPOs in the long-run makes the new issues underpricing phenomenon even more of a puzzle.

Some conclusions were generated from the literature review. First, evidence of long-run returns for IPOs was noticed to be less extensive than evidence of short-run underpricing. Second, explanations for poor abnormal aftermarket returns were relatively less developed than those for initial returns. Third, evidence of underpricing and long-run performance of the IPOs were observed to be well documented in the developed stock markets, however, it is not the case for developing capital markets. Finally, the majority of the literature focused on the private IPOs, whereas the privatisation sales in the emerging markets got only a small consideration.

Then, a structural and institutional background to the Egyptian securities market is presented in Chapter Three. During the period prior to the 1991 economic reform, it was noticed that the private sector was in the early stages of development, and the role of the stock exchange remained minimal. However, in studying the current situation of the Egyptian stock market, it was observed that this market achieved a high level of success. This success was reflected in: (1) the flow of privatization, (2) the increasing volume of traded shares, (3) increasing the efficiency of securities companies working in the capital market, and (4) increasing overall stock market efficiency.

In analyzing the market microstructure, we noted that the structure of the Egyptian stock market seems to be different in comparison with the developed capital markets. This is of interest because some studies tend to use the trading system per se to explain the price performance of the IPOs in the developed capital markets. For example, a greater volatility in the initial period is thought to be caused by investment bankers who want to underprice the IPOs in such markets. On the Egyptian stock exchange, trading is performed through the floor-traders whose duty is essentially clerical. Nowadays, they receive market orders and record them in the computer. The quantities are negotiated on a bilateral basis. Unlike in developed capital markets, where investment bankers buy and sell for their own accounts and have an obligation to stabilise prices and supply liquidity to the market, the floor-traders do not take a position in the stock transactions. They do not buy or sell stocks in order to ensure price stability nor do they have the duty to do so.

Before examining the price performance of initial public offerings in the Egyptian stock market, we intended to examine the whole market on the domestic and international levels as a preliminary exploration, in Chapters four and five, respectively. In Chapter Four, attempts were made to examine some time series properties and standard assumptions of stock returns and prices using three years of daily data on the eleven Egyptian stock indices. First, several basic tests were employed for testing normality. All indicated that none of the indices has a normally distributed return. This result justifies the fact that daily stock returns are not normally distributed. In such a case, our results are well in line with what has been reported in studies on other markets [e.g. Frennberg [1994)].

Due to the existence of leptokurtic distribution in our time series, we employed a GARCH model in order to describe the process of stock returns in the Egyptian financial market. The findings show that the variance of Egyptian stock returns is time-varying in the GARCH context. We also analyzed the integratedness of the volatility of asset returns. The empirical results indicate that the volatility of Egyptian stock returns is integrated.

Then, in order to test the stationarity of the Egyptian stock returns, unit root tests developed by Dickey and Fuller (1979) were initially applied. Second, we conducted the variance-ratio test of Lo and MacKinlay (1988). The results provided support that there is a relatively significant stationary component. Such stationarity suggests the presence of successful smoothing for these series. It is suggested that smoothing may reduce volatility of financial series but exhibit significant serial correlation. The latter was found to be negative, suggesting that the stock returns follow a mean-reverting process. The important conclusion of this evidence is that there are components in past returns that can be used to predict future returns; therefore, returns do not follow random walks.

Since the random walk hypothesis is not equivalent to market efficiency, we conducted the test of efficiency using recently developed techniques from the time series literature. In particular, unit root *and cointegration* techniques were used to test the concept of static efficiency introduced by MacDonald and Power (1993) for individual share price indices. Amongst the results reported in this Chapter is the finding that disaggregate stock price indices of the Egyptian Stock Market are cointegrated which is interpreted as a violation of static efficiency. It is suggested that such cointegration may either reflect the consequences of noise trading or variable equilibrium expected returns.

Since Chapter four was constructed to examine the efficiency of the Egyptian stock market from the domestic point of view, we assigned Chapter five to look at the issue of its internationalization among eighteen emerging stock markets during the period from January 1994 to December 1997. Considering the opening up of the Egyptian equity market during the 1990s, it is expected that there is increasing interest in investing in this market. The weekly stock indices of the eighteen emerging equity markets examined in this Chapter all have a unit root, indicating that all the weekly stock prices follow a random walk.

The Engle-Granger two-step methodology and the multivariate Johansen's cointegration tests were performed on these prices. The findings show that the eighteen emerging markets are cointegrated, indicating Granger-Causality in levels and suggesting of inefficiency. However, the results reveal an absence of any clear evidence of cointegration among the Middle Eastern markets and also among Mediterranean Rim markets. This finding implies that: (1) the international diversification among these markets would be effective because the country risk can be diversified away, (2) investors who want diversified portfolios may be encouraged to invest in these markets, and (3) there is an evidence of efficiency due to the absence of Granger-Causality in levels. However, because the test of efficiency requires an explicit modelling of the trade-offs between risk and returns, we have assigned the remaining three chapters to investigate the efficiency of the Egyptian stock market by concentrating on the privatized initial public offerings.

Chapter six examined the initial returns in the primary market of Egyptian PIPOs. Such initial returns were found to be approximately 15 % across time and securities. The observed distribution was heavily skewed and had a median of 13 %. The level of underpricing seemed to be high and privatised companies might have lost money on the table. As a result, we investigated three hypothesis which were proved, in the literature, to explain the positive initial returns to private IPOs. However, they were unsuccessful in explaining even a small part of the initial returns to the Egyptian privatisation sales.

Moreover, in Egypt, it is difficult to apply the explanation of Tinic (1988) that the underpricing is a protection against legal liability. That is, the implications of legal liability are quite different in Egypt relative to the U.S. For example, the claims for compensation due to lack of due diligence are much more difficult to carry out. Explanations other than the risk of legal liabilities might be more appropriate to explain underpricing in Egypt.

Thus, we may suggest that the institutional feature of the Egyptian Capital Market -the listing requirements of the Egyptian Stock Exchange and Capital Market Authority, together with barriers to entry to stockbroking- provided the market structure which facilitated underpricing. Thus we expect underpricing to be eliminated or reduced, at least when membership restrictions of the Egyptian stock market lapse.

Furthermore, it can be suggested that early sales of the privatised IPOs may be deliberately underpriced in order to convince the market to absorb larger sales and reduce the risk borne by the government. That is, it can be argued that the underpricing is consistent with a signalling argument, since the privatised firms are exposed to greater policy risk, and tend to be large and well known relative to private IPOs. In other words, underpricing may signal commitment because an uncommitted government cannot expect higher proceeds from a subsequent sale, and is therefore not willing to underprice the initial sale.

Having considered the underpricing phenomenon, Chapter seven dealt with describing and analysing the pattern of returns and risks of the Egyptian PIPOs during the first year of trading. The increase in PIPOs prices over the first few weeks of listing in the Egyptian Capital Market may be consistent with some adjustment processes for the initial underpricing suggesting efficiency in such market. However, from the results in Tables 7-2 (*Panel B*) and 7-3 (*Panel B*) there is some evidence that insignificant positive excess market returns exist, on average, between the close in the first day of listing and the close in the 4th week of listing. These insignificant positive returns may be caused by a number of initial subscribers selling stocks for profit-taking purposes so that the PIPOs stocks are subjected to downward price pressure.

In addition, it can be suggested that such price behaviour is attributed to a speculative factor. That is, the early positive excess market returns in the aftermarket may result from speculative bubbles which burst in subsequent trading in the post listing period giving rise to negative excess market returns. Two explanations could be provided for the existence of speculative 'bubbles' or 'fads'. First, the Egyptian government may attempt to place shares in strong hands rather than weak hands. The former group retains the stock for a significant period of time and artificially decreases the supply of stocks in the aftermarket forcing market prices upwards. The second explanation might based upon government artificially stimulating demand for newly listed stocks by selling shares to small, risk-oriented and generally uninformed investors in the aftermarket period.

Finally, the results in the long-term seem to support the hypotheses regarding the behaviour of the mean systematic risk after-listing. Thus, the mean beta declines after-listing and varies around the market beta of 1. Moreover, the mean beta in the initial period is higher than the mean beta in the after-market as hypothesised. The mean beta in the Egyptian PIPOs market thus appear to behave nearly in a similar manner to the risk behaviour in other markets.

In conclusion, although, in Egypt shares are not allocated to the investment bankers to the offerings, it seems that the market for privatisation initial public offerings is subject to considerable speculative activity. However, this does not indicate that the Egyptian PIPOs market is seriously deficient relative to other markets. This argument is given because a substantial body of work indicating that the form of aftermarket returns and risks observed in the Egyptian market also occurs in other equity markets.

Chapter eight, which is the final empirical chapter, examined the aftermarket efficiency of the Egyptian PIPOs. The results in this chapter supported both the weak-form and semistrong-form of the Efficient Market Hypothesis of the PIPOs in the Egyptian Capital Market. Testing the weak-form of the EMH, first, the results of regression techniques for both short-term and long-term returns showed that the correlation coefficients were not statistically significantly different from zero at the 5 % level whether for the sample as a whole or for the sub-groups.

Second, the results of the non-parametric test (runs test) showed that prices of the PIPOs change at random. Our result was based on the standardised normalised variable (Z), which was calculated to test the statistical significance of the difference between the actual and the expected number of runs, and which was not significantly different from zero in both the daily and weekly data. As a result, based on the parametric and non-parametric tests used in this study, we conclude that the weak-form efficiency in the Egyptian initial public offerings market could not be rejected.

Similarly, in testing the semistrong-form of the EMH, the main conclusion of our analysis, based on daily analysis or weekly analysis; or based on market-adjusted or risk-adjusted excess returns models; supports that the aftermarket of Egyptian PIPOs is efficient in the semi-strong form sense.

Although these findings for Egypt are similar to the developed capital market patterns, these findings must be interpreted cautiously because of the small sample size and the fact that the most IPOs are concentrated during a fewer years. These phenomenon exist in nearly all markets except the UK and the U.S.

8.2. Recommendations and Suggestions for Further Research

An examination of the efficiency of the Egyptian stock market, in general, and the privatised initial public offerings, in particular, has been conducted in this thesis. It is believed that such study provides a number of benefits to government, investors, and academics interested in emerging equity markets. For instance, the following recommendations can be considered by Egyptian policy and decision makers, investors and academics.

- **For the Government:**

1. Government is recommended to use underpricing of early sales to encourage individuals to participate in later sales.

2. Government is recommended to justify to its political opponents and supporters any decision to sell and to underprice.
3. Government is recommended to enhance the marketability of public companies by solving their basic problems.
4. Government is recommended to attract anchor investors to those companies which are most in need of foreign capital and expertise. There are several obvious advantages to selling to anchor investors.
    - First, they have a greater concern for protecting their interest in the company as their investments are more long-term in nature as opposed to merely owning stocks.
    - Second, in times of difficulty, as opposed to small-scale capital market investors, most anchor investors have little choice but to work towards a long-term solution even if this means providing companies with more capital.
    - Third, they bring managerial skills, technology, access to markets, and greater capability to operationally restructure privatised companies.
5. Government is recommended to rearrange its priorities and reallocate its limited resources so that pragmatic solutions can be found to the fundamental problems of selling the less attractive companies.
6. Government is recommended to address the fundamental logic behind the process of privatization itself.
7. Government is recommended to use the tax incentives to stimulate foreign investment.

- **For Investors**

8. Investors who want diversified portfolios are recommended to invest in the Egyptian equity market as well as other Middle Eastern markets, because these markets are not cointegrated. Such a diversification would be effective because the country risk can be diversified away.

- **For Academics**

9. Since amongst the results reported in this thesis is the finding that disaggregate stock price indices of the Egyptian stock market are cointegrated which is interpreted as a violation of static efficiency. It was suggested that such cointegration may either reflect the consequences of noise trading or variable equilibrium expected returns. One way to resolve which of the two effects dominates would be to construct a survey data base on agents' stock price expectations, in spirit of work done for foreign exchange markets (see, for example, MacDonald and Torrance, 1990).

10. Since the Egyptian PIPOs market was exceptionally active in the sample period, it would be argued that the results reflect a temporary overoptimism by investors that may be turned into disappointment when they learned more about the IPO firm's prospects. Additional evidence from other countries is needed before the results can be interpreted more conclusively.

11. Investment banker reputation may play a critical role in assuring investors that aftermarket price support would be provided. This suggests that a fruitful area for future research may be to investigate the relation between measures of investment banker reputation and extent of price stablization provided. Particularly interesting

in this area is the issue of market penalties for investment bankers that violate implicit stablization guarantees. Such an investment banker may lose market share; there may also be an increase in the underpricing of offerings done by the investment banker, reflecting the drop in investor confidence.

12. I have analysed the stock market returns in the first year after going public. My suspicious, however, is that the underperformance does not extend much beyond a longer period, based upon Ibbotson (1975) and Rao's (1991) findings. Ibbotson finds no underperformance in the fifth yea after going public, the last year that he analyzes. Furthermore, Roa finds negative earnings announcement effects in the first 3 years after going public, but not in years 4 through 6.
13. Only by extending the sample period beyond the 3 years of this thesis can additional evidence be gained regarding some of the patterns that have been documented. This extension may resolve the issue of the generality of my findings.
14. Another issue that is unresolved in this thesis is the relation of the long-run underperformance to the short-run underpricing. It is something of a mystery why PIPOs are priced in a manner that results in such large positive average initial returns. If the Egyptian government sets the offering price in a manner that reflects the firm's underlying fundamental value, it is even more of a mystery why some offerings have extremely high initial returns.
15. I would recommend an extension of this study using transaction-to transaction price changes, instead of the daily or weekly price changes that this study employed. The advantages of the transaction price changes are the following:

- Theoretically, investment bankers effects on transaction price changes are much more significant.
- It will take into account the effect of volume on the distribution of stock price changes.
- Transaction-to-transaction price changes can serve as a direct measure of the impact of the investment banker on price variability.

16. Researchers are recommended to investigate the difference of stock price reactions to announcements of new security sales between rights and underwritten offers.
17. Researchers are recommended to investigate the differences in underpricing between private IPO and privatisation sales in the developing capital markets.
18. Researchers are recommended to study the possibility of underpricing phenomenon of convertible bonds and convertible preferred stock, particularly in a case of privatisation sales.
19. I and other researchers are recommended to conduct a comprehensive survey to explore and analyze the relationship between price performance of Egyptian PIPOs and the size of new issue of security, the issues with higher risk, legal liabilities arising from any false or inadequate information in the prospectus (for misrepresenting the true value of the firm), the size of the firm, the firm's age, the quality of a firm, the market conditions (such as: the level of presales in the premarket, the level of interest in the premarket, and the size of minimum-sales constraints), the uncertainty of the market demand for the issue, the market share

of the investment banker, the use of warrants compensation, the syndication process, and 'favouritism'.

While a number of further research obviously emerge from the suggestions above, it is believed that findings in this study provide a valuable contribution to existing capital market research. This contribution is emphasised by the significance of the research issues analysed in this study and by the importance of the Egyptian equity market. It is anticipated that some of the suggestions in this study can be adapted in further studies of the pricing of initial public offerings in other developing capital markets. This would encourage to extend existing empirical findings and set the documented conclusions in this study into a wider international evidence.

BIBLIOGRAPHY

Admati, A and Pfleiderer, P., "A Theory of Intraday Patterns: Volume and Price Volatility," *Review of Financial Studies* (1988), 3-40.

Aggarwal, R. and Rivoli, P., "Fads in the Initial Public Offering Market?" *Financial Management* (Winter, 1990), 45-57.

----------; Leal, R. and Hernandez, L., "The Aftermarket Performance of Initial Public Offerings in Latin America," *Financial Management* 22 (1993), 42-53.

Agmon, T., "The Relationships Among Equity Markets: A Study of Share price Comovements in the US, UK, Germany and Japan," *Journal of Finance* 27(1972), 839-56.

Akgiray, V. "Conditional Heteroscedasticity in Time Series of Stock Returns: Evidence and Forecasts," *Journal of Business* 62(1989), 203-214.

Alexander, J. C.,"The Lawsuit Avoidance Theory of Why Initial Public Offerings are Underpriced," *UCLA Law Review* 41 (1993), 17-71.

--------------, "Do the Merits Matter? A Study of Settlements in Securities Classifications," *Stanford Law Review* 43 (1991), 497-597.

Allen, D. E. and MacDonald, G., "The Long-run Gains from International Equity Diversification: Australian Evidence from Cointegration Tests," *Applied Financial Economics* 5(Feb. 1995), 33-42.

Allen, F. and Faulhaber, G., "Signalling by Underpricing in the IPO Market," *Journal of Financial Economics* 23 (1989), 203-23.

Alli, K.; Yau, J. and Yung, K., "The Underpricing of IPOs of Financial Institutions," *Journal of Business Finance and Accounting* 21, 7 (1994), 1013-1030.

Arshanaplli, B. and Doukas, J., "International Stock Market Linkages: Evidence from Pre- and Post-October 1987 Period," *Journal of Banking and Finance* 17(1993), 193-208.

Ayadi, O. F. and Pyun, C. S., "An Application of Variance Ratio Test to the Korean Securities Market," *Journal of Banking and Finance* 18 (1994), 643-58.

Baillie, R. and Bollerslev, T. " Multivariate General ARCH Approach to Modelling Risk Premia in Forward Foreign Markets," *Journal of International Money and Finance* (1990), 309-325.

Ball, R. and Brown, P., "An Empirical Evaluation of Accounting Income Numbers," *Journal of Accounting Research* 6 (Autumn, 1968), 159-178.

---------, "What Do We Know about Stock Market "Efficiency"?" in: R. Guimaraes; B. Kingsman and S. Taylor, (eds.), *A Reappraisal of the Efficiency of Financial Markets* (Berlin: Springer-Verlag, 1989), 25-55.

Balvers, R. J.; McDonald, W. and Miller, R. E., "Underpricing of New Issues and the Choice of New Auditor as a Signal of Investment Banker Reputation," *The Accounting Review* (1988), 605-622.

Bark, H. k., "Risk and Return, and Equilibrium in the Emerging Markets: Evidence from the Korean Stock Market," *Journal of Economics and Business* 43 (1991), 353-362.

Baron, D. P., "A Model of the Demand for Investment Banking Advising and Distribution Services for New Issues," *Journal of Finance* 37 (1982), 955-76.

Barry, C. B. and Jennings, R. H., "The Opening Price Performance of Initial Public Offerings of Common Stock," *Financial Management* 22 (1993), 54-63.

------------; Muscarella, C. J. and Vetsuypens M. R., "Underwriter Warrants, Underwriter Compensation, and the Costs of Going Public," *Journal of Financial Economics* 29 (1991), 113-135.

Bates, S. "Investment: A European View," Paper presented at the London Conference on "Financial Markets in the Middle East," April 28-29, 1994, organized by the United Kingdom under the auspices of the Regional Economic Development Working Group of the Multilateral Track of the Middle East Peace Process.

Bear, R. M. and Curley, A. J., "Unseasoned Equity Financing," *Journal of Financial and Quantitative Analysis* 10 (1975), 311-325.

Beatty, R. P. and Ritter, J. R., "Investment Banking, Reputation, and the Underpricing of Initial Public Offerings," *Journal of Financial Economics* 15 (1986), 213-32.

-----------, "Auditor Reputation and the Pricing of Initial Public Offerings," *The Accounting Review* (1989), 693-709.

Beaver, W. H. , "Econometric Properties of Alternative Security Return Methods," *Journal* of *Accounting Research 19, 1* (1981), 163-84.

----------- "Market Efficiency," *The Accounting Review* 56 (1981), 23-37.

Beaver, W. H., "The Information Content of Annual Earnings Announcements," Empirical Research in Accounting: Selected Studies, Supplement to *Journal* of *Accounting Research 6* (1968), 67-92.

Bekaert, G. and Harvey, C. R., "Time-Varying World Market Integration," *Journal of Finance* 2(June 1995), 403-444.

Benveniste, L. M. and Spindt, P. A., "How Investment Bankers Determine the Offer Price and Allocation of New Issues," *Journal of Financial Economics* 24 (1989), 343-361.

Bhandari, A.; Grammatikos, T.; Makhija, A. and Papaioannou, G., "Risk and Return on Newly Listed Stocks: The Post-Listing Experience," *Journal of Financial Research* (Summer, 1989), 93-102.

Block, S. and Stanley, M., "The Financial Characteristics and Price Movement Patterns of Companies Approaching the Unseasoned Securities Market in the Late 1970s," *Financial Management* 9, 4 (Winter, 1980), 30-36.

Blume, M. E., "On the Assessment of Risk," *Journal of finance* 26 (1971), 1-10.

Bollerslev, T. "A Conditional Heteroskedastic Time Series Model for Speculative Prices and Rates of Return," *Review of Economics and Statistics* 69(1987), 542-547.

--------------, "Generalized Autoregressive Conditional Heteroscedasticity," *Journal of Econometrics* 31(1986), 307-327.

-------------- and Domowitz " Trading Patterns and Prices in the Interbank Foreign Exchange Market," *Journal of Finance* (1993), 1421-43.

Booth, J. R and Chua, L., "Ownership Dispersion, Costly Information, and IPO Underpricing," Unpublished Working Paper (1995), Arizona State.

-------------- and Smith, R L," Capital Raising, Underwriting and the Certification Hypothesis," *Journal of Financial Economics* 15 (1986), 261-281.

Box, G. and Pierce, D., "Distribution of Residual Autocorrelations in Autoregressive-Integrated Moving Average Time Series Models," *Journal of the American Statistical Association* 65 (1970), 1509-1526.

Brennan, M. and Franks, J., "Underpricing, Ownership and Control in Initial Public Offerings of Equity Securities in the U.K.," Unpublished Working Paper (1995), London Business School.

Brock , W. and Kleidon, A., " Periodic Market Cloure and Trading Volume: a Model of Intraday Bids and Asks," *Journal of Economics and dynamics and Control* (1992), 451-490.

Brown, S. J. and Warner, J. B., "Measuring Security Price Performance," *Journal of Financial Economics* 8 (1980), 205-258.

Brown, P.; Clinch, G. and Foster, G., *Market Microstructure and Capital Market Information Content Research* (American Accounting Association, U.S.A., 1992).

Buckland, R.; Herbert, P. J. and Yeomans, K. A., "Price Discount on New Equity Issues in the U.K. and their Relationship to Investor Subscription," *Journal of Business Finance and Accounting* (1981), 79-95.

Capital Market Autority, Securities Market in Egypt, *Monthly Statistical Reports*, 1994-1996.

Carter, R. and Manaster, S., "Initial Public Offerings and Underwriter Reputation," *Journal of Finance* 45 (1990), 1045-67.

Chalk, A. J. and Peavy, J. W., "Initial Public Offerings: Daily Returns, Offering Types and Price Effect," *Financial Analysts Journal* (Sep./Oct., 1987), 65-69.

Chan, K. C.; Gup, B. E. and Pan, M., "An Empirical Analysis of Stock Prices in Major Asian Markets and the United States," *The Financial Review* 27(May 1992), 289-307.

---------------, "International Stock Market Efficiency and Integration: A study of Eighteen Nations," *Journal of Business Finance & Accounting* 24(Jul. 1997), 803-813.

Chatrath, A.; Ramchander, S. and Song, F., "Benefits from Portfolio Diversification into the Indian Equity Market," *American Business Review* 14(Jan 1996),1-10.

Chelley-Steeley, P. L. and Pentecost, E. J., "Stock Market Efficiency, The Small Firm Effect and Cointegration," *Applied Financial Economics* 4(Dec. 1994), 405-411.

Cheung, C. S. and Krinsky, I., "Information Asymmetry and the Underpricing of Initial Public Offerings: Further Empirical Evidence," *Journal of Business Finance & Accounting* 21, 5 (1994), 739-747.

Cheung, Y. and Ho, Y. K., "The intertemporal Stability of the Relationships Between The Asian-Pacific Equity Markets and the Developed Equity markets," *Journal of Business Finance & Accounting* 18(January 1991), 235-54.

------------- and Mak, C., "A Study of International Transmission of Stock Market Fluctuations Between the developed markets and the Asian-Pacific Markets," *Applied Financial Economics* 2(1992), 1-5.

Chorhay, A. and Rad, A. T. "Statistical Properties of Daily Returns: Evidence from European Stock Markets," *Journal of Business Finance and Accounting* , 21, 2 (1991), 271-282.

------------, "Interdependence of Stock Markets: Evidence from Europe during the 1920s and 1930s," *Applied Financial Economics* 6(Jun. 1996), 243-249.

Chowdhry, B. and Nanda, V., "Stabilization, Syndication, and Pricing of IPOs," *Journal of Financial & Quantitative Analysis* 31, 1 (1996), 25-42.

Christie, A., "On Cross-Sectional Analysis in Accounting Research," *Journal of Accounting and Economics* 9 (1987), 231-258.

Chu, L., *The Aftermarket Performance of Initial Public Offerings*, (USA: Harvard University: PhD, 1991).

Chua, L., "A Re-examination of the Costs of Firm Commitment and Best Efforts IPOs," *Financial Review* 30 (1995), 337-365.

Chung, P. and Liu, D., "Common stochastic trends in Pacific Rim stock markets," *Quarterly Review of Economics & Finance* 34(Fall 1994), 241-259.

Claessen, S.; Dasgupta, S. And Glen, J., "Stock Price Behavour in Emerging Stock Markets", *World Bank*, Working Paper.

Clark, P. K., " A Subordinated Stochastic Process with Finite Variance for Speculative Prices," *Econometrica* (1973), 135-55.

Clarkson, P. M. and Merkley, J., "Ex Ante Uncertainty and the Underpricing of Initial Public Offerings: Further Canadian Evidence," *Canadian Journal of Administrative Sciences* 11, 1 (1994) 54-67.

-------------- and Thompson, R. "Empirical Estimates of Beta When Investors Face Estimation Risk," *Journal of Finance* 45 (1990), 432-453.

--------------, "The Underpricing of Initial Public Offerings, Ex Ante Uncertainty, and Proxy Selection," *Accounting and Finance* 34, 2 (1994), 67-78.

Cohen, K. J.; Maier, S. F. ; Schwartz,, R. A. and Whitcomb, D. K., *The Microstructure of Securities Markets* (Prentice-Hall: Englewood Cliffs, N.J., 1986).

Copland, T., "A model of Asset Trading under the Assumption of Sequential Information Arrival," *Journal of Finance* (1976), 1149-68.

----------- (1977), "A probability Model of Asset Trading," *Journal of Financial and Quantitative Analysis* (1977), 563-78.

Corhay, A.; Rad, A. T. and Urbain, J., "Long run Behavior of Pacific-Basin stock prices," *Applied Financial Economics* 5(Feb. 1995), 11-18.

Davis, W. and Yeomans, K. A., "Market Discount on New Issues: the Influence of

Firm Size, Method of Issue and Market Volatility," *Journal of Banking and Finance* (1976), 27-42.

Dawson, S. M. and Hiraki, T., "Selling Unseasoned New Issues in Hong Kong and Japan; A Test of Primary Market Efficiency and Underpricing," *Hong Kong Journal of Business Management* (1985).

---------------- "Secondary Stock Market Performance of Initial Public Offers, Hong Kong, Singapore and Malaysia: 1978-1984," *Journal of Business Finance and Accounting* 14, 1 (1987), 65-76.

De Long, J.; Bradfor, J.; Shleifer, A.; Summers, L. H., and Waldmann, R. J., "Noise Trader Risk in Financial Markets," *Journal of Political Economy* 98(1990), 703-38.

DeAngelo, L., "Auditor Independence , Low Balling , and Disclosure Regulation," *Journal of Accounting and Economics* 3 (1981),113-127.

Dickey, D. A. and Fuller, W. A., "Distribution Estimates for Autoregressive Time Series with Unit Root," *Journal of the American Statistical Association* 74 (1979), 427-431.

--------------; Jansen, D.; and Thornton, D., "A Primer on Cointegration with an Application to Money and Income," in: B. Bhaskara Roa (ed.) *Cointegration For the Applied Economist* (London: St. Martin's Press, 1994), 9-45.

Dionysios, C. and MacDonald, R. "Some Tests of Market Microstructure Hypotheses in Foreign Exchange Market," *ICMM Discussion Paper Series in Financial Economics* (1996).

Doornik, J. A. and Hendry, D. F., *PcGive 8.0: An Interactive Econometric Modelling System* (London: International Thomson Publishing, 1994).

Drake, P. D. and Vetsupens, M. R., "IPO Underpricing and Insurance Against Legal Liability," *Financial Management* 22, 1 (Spring, 1993), 64-73.

Dumas, B., "Discussion," *Journal of Finance* (May 1977).

Dunbar, C. G., "The Use of Warrants as Underwriter Compensation in Initial Public Offerings," *Journal of Financial Economics* 38 (1995), 59-78.

Easterbrook, F., "Two-Agency Cost Explanations of Dividends ," *American Economic Review* 74 (1984),650-60.

EFG-Herms, *Country and Capital Market*, March (1997).

El-Erian, M. A. and Kumar, M., "Emerging Equity Markets in Middle Eastern Countries," IMF Working Paper 94/103 (Washington: International Monetary Fund, June 1994), 26-50.

Emory, C. *Business Research Methods* (U.S.A.: Irwin, 1985).

Engle, R. F. and Yoo, B.S. "Forecasting and Testing in Co-integrated Systems," *Journal of Econometrics*, 35 (March 187),147-159.

-------------- and Bollerslev, T. "Modelling the Persistence of Conditional Variances," *Econometric Reviews* 5(1986), 1-50.

-------------- and Granger, C., "Cointegrations and Error Corrections: Representation estimation and Testing," *Econometrica*, 55 (March 1987), 251-276.

--------------, "Autoregressive Conditional Heteroscedasticity with Estimates of the Variance of UK Inflation," *Econometrica* 50(1982), 987-1008.

-------------; Ito, T. and Lin, E. L. "Metro Showers or Heat Waves? Heteroskedastic Intra-Daily Volatility in the Foreign Exchange Markets," *Econometrica* 58(1990), 431-450.

Epps, T. and Epps, M., "The Stochastic Dependence of Security Price Changes and Transaction Volumes: Implications for the Mixture-of-Distribution Hypothesis," *Econometrica* (1976), 305-32.

Eun, C. S. and Shim, S., "International Transmission of Stock Market Movements," *Journal of Financial and Quantitative analysis* 24(1989), 241-56.

Fag El-Nour, M. H., "Egypt's Stock Market: Unfulfilled Potential," paper presented at the London conference on "Financial Markets in the Middle East," April 28-29, 1994, organized by the United Kingdom under the auspices of the Regional Economic Development Working Group of the Multilateral Track of the Middle East Peace Process.

Fama, E. F. and French, K., " Permanent and Temporary Components of Stock Prices, " *Journal of Political Economy* 96 (1988), 246-273.

-----------, "A Note on the Market Model and the Two-Parameter Model," *Journal of Finance* 28 (1973), 1181-1187.

-----------, "Efficient Capital Markets: A Review of Theory and Empirical Work," *Journal of Finance* 25 (1970), 383-417.

-----------; Fisher., L.; Jensen, M. C. and Roll, R., "The Adjustment of Stock Prices to New Information," *International Economic Review* 10 (1969),1-21.

Feldman, R. A. and Kumar, M.S., "Emerging Equity Markets: Growth, Benefits, and Policy Concerns," *World Bank Research Observer* 10, 2 (1995), 181-200.

Finn, F. J. and Higham, R., "The Price Performance of Unseasoned New Equity Issues-Cum-Stock Exchange Listings in Australia," *Journal of Banking and Finance* 12 (1988), 333-351.

Fischer, D. E. and Jordan, R. J., *Security Analysis and Portfolio Management*, 5th ed. (London: Prentice Hall, 1991).

Foster, G., *Financial Statement Analysis*, (London: Prentice-Hall Publications, 1986).

French , K. and Roll, R., "Stock return variances: The Arrival of Information and Reaction of Traders," *Journal of Financial Economics* 17 (1986), 5-26.

--------------; Shwert, G.W. and Stambaugh, R.F. , "Expected Stock Returns and Volatility," *Journal of Financial Economics* 19(1987), 3-29.

Frennberg, P. , *Essays on Stock Price Behaviour in Sweden*, (Sweden: University of Lund, Department of Economics, 1994).

Friend, I. and Blume, M., "Measurement of Portfolio Performance Under Uncertainty," *American Economic Review* (1970), 561-75.

Fuller, W.A. *Introduction to Statistical Time Series* (New York: John Wiley, 1979).

Garfinkel, J. A., "IPO Underpricing, Insider Selling and Subsequent Equity Offerings: Is Underpricing a Signal of Quality?" *Financial Management* 22, 1 (Spring, 1993), 74-83.

Geary, R. C., "Relative Efficiency of Count of Sign Changes for Assessing Residuals Autoregression in Least Squares Regression," *Biometrika*, 57 (1970), 123-127.

Gencay, R., "Non-linear Prediction of Security Returns with Moving Average Rules," Journal of Forecasting 15, 3 (Apr. 1996),165-174.

Granger, C. W. and Newbold, P. "Some Recent Developments in a Concept of Causality," *Journal of Econometrics* 39 (1988), 199-211.

Greenwald, B,; Stiglitz, J. and Weiss, A., "Information Imperfections in the Capital Market and Macroeconomic Fluctuations," *American Economic Review*, 74 (1984), 194-199.

Griffin, P.A., "The Usefulness to Investors and Creditors of Information Provided by Financial Reporting: A Review of Empirical Accounting Research," *FASB Research Report* (1982).

Grinblatt, M. and Hwang, C. Y., "Signalling and the Pricing of New Issues," *Journal of Finance* 44 (1989), 394-420.

Grubel, H. G. and Fander, K., "The Interdependence of International Equity Markets," *Journal of Finance* 26(1971), 89-94.

Gugarati, D. M. , *Basic Econometrics*, 3rd ed., (London: McGraw-Hill, 1995).

Guimaraes, R. M. C.; Kingsman, B. G. and Taylor, S. J., *A Reappraisal of the Efficiency of Financial Markets* (Berlin: Springer-Verlag, 1989), 1-24.

Handy, H. and Bisat, A., "Egypt's Home-Grown Reforms", *IMF Survey*, Vol. 26, 8 (April 1997), 116-119.

Hanley, K. W., "The Underpricing of Initial Public Offerings and the Partial Adjustment Phenomenon," *Journal of Financial Economics* 34 (1993), 231-250.

---------------; Kumar, A. and Seguin, P. J., "Price Stablization in the Market for New Issues," *Journal of Financial Economics* 34 (1993), 177-197.

Hassan, A. W., *Stock Exchange and Its Role in Achieving the Objectives of Transferring Projects of Business Sector to Private Ownership* (Cairo: Dar El-Nahda, 1996).

Hassan, R. "An Examination of Price Performance and Aftermarket Efficiency of the Unseasoned New Equity Issues in Malaysia," (U.K: Cardiff, PhD Thesis, 1991).

Hegazy, Z. S. G. and MacDonald, R., "Underpricing and Long-Term Performance of Egyptian Privatization Initial Public Offerings," in: *Arab Management in Tomorrow's World*, Arab Management Unit Conference, Bradford, Uk, 1997, 239-254.

Hensler, D.," A Litigation Costs and the Underpricing of Initial Public Offerings," *Managerial and Decision Economics* 16 (1995), 111-128.

Hess, A. C. and Frost, P. A., "Tests for Price Effects of New Issues of Seasoned Securities," *The Journal of Finance* XXXVI, 1 (1982), 11-25.

Holden, D. and Perman, R., "Unit Roots and Cointegration for the Economist," in: B. Bhaskara Roa (ed.) *Cointegration For the Applied Economist* (London: St. Martin's Press, 1994), 47-112.

Hovaguimian, A., "The Role of Financial Institutions in Facilitating investment and capital Flows," in *Financial Policies and Capital Markets in Arab Countries*, ed. by Said El-Naggar (Washington: International Monetary Fund, 1994), 29-53.

How, J. C.; Izan, H. Y. and Monroe, G. S., "Differential Information and the Underpricing of Initial Public Offerings: Australian Evidence," *Accounting and*

Finance 35 (1995), 87-105.

Huang, B., "Do Asian Stock Market Prices Follow Random Walks? Evidence from the Variance Ratio Test," *Applied Financial Economics* 5 (1995), 251-256.

Hudson, R.; Dempsey, M. and Keasey, K., "A Note on the Weak Form Efficiency of Capital Markets: the Application of Simple Technical Trading Rules to UK Stock Prices - 1935 to 1994," *Journal of Banking and Finance* 20, 6 (Jul. 1996), 1121-1132.

Huges, P. J. and , Thakor, A. V., "Litigation Risk, Intermediation, and the Underpricing of Initial Public Offerings," *Review of Financial Studies* 5 (1992), 709-742.

Hung, B. W. and Cheung, Y., "Interdependence of Asian emerging equity markets," *Journal of Business Finance & Accounting* 22(Mar 1995), 281-288.

Husson, B. and Jacquillat, B. "French new Issues, Underpricing and Alternative Methods of Distribution" in: R. Guimaraes; B Kingsman and S Taylor, (eds.), *A Reappraisal of the Efficiency of Financial Markets* (Berlin: Springer-Verlag, 1989), 349-68.

Ibbotson, R. and Jaffe, J. , "Hot Issues Markets," *Journal of Finance* 30, 4 (September, 1975), 1027-1042.

----------, "Price Performance of Common Stock New Issues," *Journal of Financial Economics* 2 (1975), 235-272.

International Financial Corporation, Emerging Markets Factbook (Washington: IFC, June 1993).

Jacquillat, J. C.; McDonald, J. G. and Rolfo, J., "French Auctions of Common Stock: New Issues, 1966-1974" *Journal of Banking and Finance* 2 (1978), 305-22.

Jain, B. A. and Kini, O., "The Post-Issue Operating Performance of IPO Firms," *Journal of Finance* 49 (1994), 1699-1726.

-----------,"The Underpricing of 'unit' Initial Public Offerings," *Quarterly Review of Economics and Finance* 34, 3 (1994), 309-325.

-----------, "Is Underpricing A Signal of Firm Quality?," *American Business Review* 14 (1996), 38-45.

----------, "The Relationship Between Pricing of Dealership Services and the Underpricing of Initial Public Offerings," *American Business Review* 13, 1 (1995), 22-29.

Jarque, C. M. and Bera, A. K. , "A Test For Normality of Observations and Regression Residuals," *International Statistical Review* 55 (1987), 163-172.

Jenkinson, T. J. and Mayer, C. P., "The Privatisation Process in France and the UK," *Economic Review* 32 (1988), 482-490.

----------------, "Initial Public Offerings in the United Kingdom, the United States, and Japan," *Journal of the Japanese and International Economics* 4 (1990), 428-449.

Jennings, R. and Barry, C., " Information Dissemination and Portfolio Choice," *Journal of Financial and Quantitative Ananlysis* (1983), 1-19.

Jensen M. C., " Some Anomalous Evidence Regarding Market Efficiency," *Journal of Financial Economics* 6 (1978), 95-101.

Jog, V. M. and Ridding, A. L., "Underpricing in Canadian IPOs, ", *Financial Analyst Journal*, (Nov./Dec., 1987), 48-55.

Johansen, S. and Juselius, K. "Maximum Likelihood Estimation of Inference on Cointegration, with Application to the Demand for Money," *Oxford Bulletin of Economics and Statistics* 52 (May, 1989), 169-210.

--------------, "statistical analysis of Cointegration Vectors," *Journal of Economics Dynamics and Control*, 12 (1988), 231-254.

Johnson, J. M. and Miller, R. E., "Investment Banking Prestige and the Underpricing of Initial Public Offerings" *Financial Management* (1988), 19-29.

Joy; D.; Litzenberger, R. and McEnally, R., "The adjustment of stock prices to announcements of unanticipated changes in quarterly earnings," *Journal of Accounting Research* 15 (Autumn, 1977), 207-225.

Kanji, K., *100 Statistical Tests*, (London: SAGE, 1993).

Keasey, K.; McGuinness, P., "Underpricing in New Equity Listings: A Conceptual Re-Appraisal," *Small Business Economics* 7, 1 (1995), 41-54.

Kelokarju, M., "The Winner's Curse, Legal Liability, and the Long-Run Price Performance of Initial Public Offerings in Finland," *Journal of Financial Economics* 34 (1993), 251-277.

Kendall, M. and Buckland, W., *A Dictionary of Statistical Terms*, 2nd ed., (London: International Statistical Institute, 1967).

Kim, E. H. and Lee, Y. K., "Issuing Stocks in Korea," in: Rhea, S. G. and Chang, R. P. (eds.) *Pacific-Basin Capital markets Research* 11 (1990), North-Holland Amsterdam, 243-253.

Klein, B. and K. Leffler, "The Role of Market Forces in Assuring Contractual Performance," *Journal of Political Economy* 89 (1981), 615-41.

Koh, F. and Walter, T., "A Direct Test of Rock's Model of the Pricing of Unseasoned Issues," *Journal of Financial Economic* 23 (1989), 251-272.

Kunimura, M. and Severn, A., "The Post-Issue Performance of New Issues of Japanese Stocks," in: Rhea, S. G. and Chang, R. P. (eds.) *Pacific-Basin Capital markets Research* 11 (1990), North-Holland: Amsterdam, 255-263.

Kunz, R. M. and Aggarwal, R., "Why Initial Public Offerings Are Underpriced: Evidence From Switzerland," *Journal of Banking and Finance* 18, 4 (1994), 705-723.

Kwan, A. C.; Sim, A. and Cotsomitis, J. A., "The causal relationships between equity indices on world exchanges," *Applied Economics* 27(Jan 1995), 33-37.

Latane, K. and Jones, C., "Standardised unexpected earnings: 1971-1977," *Journal of Finance*, (1979), 717-724.

Le Roy, S., "Efficient Capital Markets: A Comment," *Journal of Finance* 31 (1976), 139-141.

Lee, C. M. C.; Mucklow, B. and Ready, M. J., "Spreads, Depths and the Impact of Earnings Information: An Intraday Ananlysis," (Working Paper, University of Michigan, 1991).

Lee, P. J.; Taylor, S. L.; and Walter, T. S., " Australian IPO Pricing in the Short and Long Run," *Journal of Banking and Finance* 20 (1996), 1189-1210.

Lee, S. H.; Sung, H. M.; and Urrutia, J. L., "The Behaviour of Secondary Market Prices of LDC Syndicated Loans," *Journal of Banking and Finance* 20 (1996), 537-554.

Levis, M., "The Long-Run Performance of Initial Public Offerings: The UK Experience 1980-1988," *Financial Management* 22 (1993), 28-41.

Levis, M., "The Winner's Curse Problem, Interest Costs and the Underpricing of Initial Public Offerings," *The Economic Journal* 100 (1990), 76-89.

Levitch, R., "On Efficiency of Markets for Foreign Exchange," in : R. Dornbusch and J. Frenkel, eds., *International Economic Policy* (Johns Hopkins: Baltimore, MD, 1979).

Levy, H. and Sarnat M. *Portfolio and Investment Selection: Theory and Practice* (London: Prentice Hall, 1984).

---------- and Sarnat, M., "International diversification of Investment Portfolios," *American Economic Review* 60(1970), 668-75.

Lin, T. H., "The Certification Role of Large Block Shareholders in Initial Public Offerings: The Case of Venture Capitalists," *Quarterly Journal of Business and Economics* 35, 2 (1996), 55-65.

Lintner, J., "The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets," *Review of Economics and Statistics* (1965), 13-27.

Liu, C. Y. and He, J., "A Variance Ratio Test of Random Walks in Foreign Exchange Rates," *Journal of Finance* 46 (1991), 773-785.

Ljung, G. M. and Box, G. P. E., "On a Measure of Lack of Fit in Time Series Models," *Biometrika* 66 (1978), 66-72.

Lo, A. and MacKinlay, C., "Stock Market Prices Do not Follow Random Walks: Evidence from a Simple Specification Test," *Review of Financial Studies* 1 (1988), 41-66.

Logue, D. E. and Lindvall, J. R., "The Behaviour of Investment Bankers: An Econometric Investigation," *Journal of Finance* (1974), 203-215.

---------------, "On the Pricing of Unseasoned New Issues, 1965-1969," *Journal of Financial and Quantitative Analysis* 8, 1 (January, 1973), 91-103.

--------------- and Rogalski, R. J., "Offshore Alphas: Should Diversification Begin at Home?" *Journal of Portfolio Management* (Winter 1979).

Loughran, T. and Ritter, J. R. , "The New Issues Puzzle," *Journal of Finance* 50 (1995), 23-51.

Lucas, R., "Asset Prices in Exchange Economy," *Econometrics* 66 (1978), 1929-45.

Lung, G. M. and Box, G.P.E., "On a Measure of Lack Fit in Time Series Models," *Biometrika*, 66 (1978), 66-72.

MacDonald, R. and Power, D. "Stock Prices, Efficiency and Cointegration: The Case of the UK," *International Review of Economics and Finance* 2, 3(1993), 251-265.

---------------- and Torrance, T.S., "Expectations Formation and Risk in Four Foreign Exchange Markets," *Oxford Economic Papers* 42 (July, 1990), 544-332.

Maldonado, R. and Saunders, A., "International Portfolio Diversification and the Inter-Temporal Stability of International Stock Market relationships, 1957-1978," *Financial Management* 10(1981), 54-63.

Mandelker, G. and Raviv, A., "Investment Banking : An Economic Analysis of Optimal Underwriting Contracts," *Journal of Finance* 32 (1977), 683-94.

Markowitz, H. M., "Portfolio Selection," *Journal of Finance* 7 (1952), 77-91.

Mauer, D. and Senbet, L., "The Effect of the Secondary Market on the Pricing of Initial Public Offerings: Theory and Evidence," *Journal of Financial Quantitative Analysis 27* (1992), 55-79.

McConnell, J. and Sanger G., "The Puzzle in Post-Listing Common Stock Returns," *Journal of Finance* 27 (1987), 119-140.

McDonald, H. M. and Jacquillat, B. C., "Pricing of Initial Equity Issues: the French Sealed Bid Auction," *Journal of Business* (1974), 37-47.

McDonald, J. G. and Fisher, A. K., " New-Issue Stock Price Behaviour," *Journal of Finance* 27, 1 (March 1972), 91-102.

McGuinness, P. B., "An investigation of Unseasoned New Issues of Common Stock: An investigation into the Initial Pricing and Post-Listing Performance of Unseasoned Offerings of Common Stock in Hong Kong," (UK: The University of Leeds, PhD Thesis, 1992).

Menyah, K.; Paudyal, K. and Inyangete, C. G., "Subscriber Return, Underpricing, and long-term Performance of UK Privatisation Initial Public Offers," *Journal of Economics and Business* 47 (1995), 473-495.

Merritt, A. J.; Howe, M. and Newbould, G. D., *Equity Issues and London Capital Market* (London: Longmans, 1967).

Miller, E., "Risk, Uncertainty, and Divergence of Opinion," *Journal of Finance* 32 (1977), 1151-1168.

Miller, R. E. and Reilly, F. K., "An Examination of Mispricing, Returns, Uncertainty for Initial Public Offerings," *Financial Management* (1987), 33-38.

Mossin, J., "Equilibrium in a Capital Asset Market," *Econometrica* 34, 4 (October, 1966), 768-83.

Muscarella, C. J. and Vetsuypens, M. R., "A Simple Test of Baron's Model of IPO Underpricing," *Journal of Financial Economics* 24 (1989), 125-135.

Myers, S. C. and Majluf, N. C., "Corporate Financing and Investment Decisions

When Firms Have Information that Investors Do Not Have," *Journal of Financial Economics* 13 (1984), 187-221.

--------------,"The Capital Structure Puzzle," *Journal of Finance* 39 (1984) 575-592.

Najand, M and Yung, K "Conditional Heteroskedasticity and the Weekend Effect in S & P 500 Future Index," *Journal of Business Finance and Accounting* 4(1994), 603-612.

Neuberger, B. M. and Hammond C. T., "A Study of Underwriters' Experience with Unseasoned New Issues," *Journal of Financial and Quantitative Analysis* 9, 2 (March, 1974), 165-177.

---------------- and LaChaplle, C. A., "Unseasoned New Issue Price Performance on Three Tiers: 1975-80," *Financial Management* (Autumn, 1983), 23-28.

Ng, C. K. and Smith, R. L., "Determinants of Contract Choice: The Use of Warrants To Compensate Underwriters of Seasoned Equity Issues," *Journal of Finance* 51, 1 (1996), 363-380.

Ng, V.; Chang, R. P. and Chou, R. Y., "An Examination of the Behavior of the Pacific-Basin Stock market Volatility," *Pacific-Basin capital Markets Research* 2(1991), 245-60.

Panton, D.; Lessing, P. and Joy, O., "Co-movement of International Equity Markets: A Taxonomic Approach," *Journal of Financial Quantitative Analysis* 11(1976), 415-32.

Perotti, E. C. and Guney, S. E., "The Structure of Privatisation Plans," *Financial Management* (Spring, 1993), 84-98.

Poterba, J. and Summers, L., "Mean-reversion in Stock Prices: Evidence and Implications, " *Journal of Financial Economics* 22 (1988), 27-59.

Pouge, G.A. and Solnik, B.T., "The Market model to European Common Stock: Some Empirical Results," *Journal of Financial and Quantitative Analysis* (September, 1972).

Raines, J. P. and Leathers, C. G., "Veblenian Stock Markets and the Efficient Markets Hypothesis," *Journal of Post Keynesian Economics* 19, 1 (Fall, 1996), 137-151.

Rao, G., "The Relation Between Stock Returns and Earnings: A Study of Newly-Public Firms," Unpublished Working Paper, University of Illinois (1989).

Reilly, F. K. and Hatfield, K., "Investor Experience with New Stock Issues," *Financial Analyst Journal* 25 (1969), 73-80.

-------------, "Further Evidence on Short Term Results for New Issue Investors," *Journal of Financial and Quantitative Analysis* (January, 1973), 73-80.

-------------, "New Issues Re-visited," *Financial Management*, (Winter, 1977), 28-42.

Reinganum, M. R., "Misspecification of Capital Asset Pricing: Empirical Anomalies Based on Earnings' Yields and Market Values," *Journal of Financial Economics* 9 (1981), 19-46.

Reside, M. A.; Robinson, R. M.; Prakash, A. J. and Dandapani, K., "A Tax-Based Motive for the Underpricing of Initial Public Offerings," *Managerial & Decision Economics* 15, 6 (1994), 553-561.

Ritter, J. R., "The Cost of Going Public," *Journal of Financial Economics* 19 (1987), 269-81.

-------------, "Signalling and Valuation of Unseasoned New Issues: Comment," *Journal of Finance* 39 (September 1984a), 1231-37.

-------------, "The Hot Issue Market of 1980," *Journal of Business* 57 (1984b), 215-240.

-------------, "The Long-Run Performance of Initial Public Offerings," *Journal of Finance* 46 (1991), 3-27.

Rock, K., "Why New Issues are Underpriced," *Journal of Financial Economics*, 15 (1986), 1051-1069.

Roll, R., "A Critique of the Asset Pricing Theory's Test," *Journal of Financial Economics* (March 1977).

Ross, S. A., "The Current Status of the Capital Asset Pricing Model (CAPM)," *Journal of Finance* (September 1978).

--------------, *The New Palgrave Dictionary of Money and Finance* (London: The Macmillan Press, 1992).

Ruud, J. S. "Underwriter Price Support and the IPO Underpricing Puzzle," *Journal of Financial Economics*, 34 (1993), 135-151.

Ryan, B.; Scapens, R. and Theobald, M., *Research Method and Methodology in Finance and Accounting* (London: Academic Press, 1992).

Scholes, M. and Williams, J. "Estimating Betas from Nonsynchronous Data," *Journal of Financial Economics*, 5 (1977), 309-327.

Schollhammer, H. and Sand, O., " The interdependence Among the stock markets of major European Countries and the United States: An Empirical Investigation Among National Stock Price Movements," *Management International Review* 25(1985), 17-26.

Schultz, P. H. and Zaman, M. A., "Aftermarket Support and Underpricing of Initial Public Offerings," *Journal of Financial Economics* 35, 2 (1994), 199-219.

Schwartz, R. A., *Equity Markets: Styructure, Trading, and performance* (Harper & Row: New York, 1988).

---------------, *Reshaping the Equity Markets: A Guide for the 1990s* (Harper Business: New York, 1988).

Shanken, J. and Smith, C. W., "Implications of Capital Markets Research for Corporate Finance," *Financial Management* 25, 1 (Spring, 1996), 98-104.

Sharpe, W. F., "Capital asset prices: A Theory of Market Equilibrium Under Conditions of Risk," *Journal of Finance* (1964), 425-42.

---------------, "Comment," *Journal of Finance* (June 1978).

Shiller, R. J., "Speculative Prices and Popular Models," *Journal of Economic Perspectives* 4 (1990)

Simon, C., "The Effect of the 1933 Securities Act on Investor Information and the Performance of New Issues," *American Economic Review* 79 (1989), 295-318.

Slovin, M. B.; Sushka, M. E. and Bendeck, Y. M., "Seasoned Common Stock Issuance Following an IPO," *Journal of Banking & Finance* 18, 1 (1994), 207-226.

Smith, C. W., "Investment Banking and the Capital Acquisition Process," *Journal of Financial Economics* 15 (1986), 3-29.

Solnik, B. H., "Testing International Asset Pricing: Some Pessimistic Views," *Journal of Finance* (May 1977).

-------------, "The International Pricing of Risk: An Empirical Investigation of the World Capital Market Structure," *Journal of Finance* 29 (1974), 365-378.

Spiess, D. K. and Affleck-Graves, J., "Underperformance in Long-Run Stock Returns Following Seasoned Equity Offerings," *Journal of Financial Economics* 38 (1995), 243-267.

Sterge, J. A. "On the Distribution of Financial Futures Price Changes," *Financial Analyst Journal* (May/June 1989), 75-78.

Stewart, J., *Econometrics* (London, Philip Allan, 1991).

Stoll, H. R. and Curley, A. J., "Small Business and the New Issues Market for Equities," *Journal of Financial and Quantitative Analysis*, (September, 1970), 309-22.

Stuart, A. and Ord, J., *Kendall's Advanced Theory of Statistics: Distribution Theory*, Vol. 1 and 2, (London: Edward Arnold, 1994).

Timewell, S., "Cairo Turns up the Heat," *The Banker* (July 1996), 48-53.

Tinic, S. M., "Anatomy of Initial Public Offerings of Common Stock," *Journal of Finance* 43 (1988), 789-822.

Tufano, P., "Financial Innovation and First-Mover Advantages," *Journal of Financial Economics* 25 (1989), 213-40.

Tukan, U. S., "Amman Stock Market: Can the Boom Continue?" paper presented at the London conference on "Financial Markets in the Middle East," April 28-29, 1994, organized by the United Kingdom under the auspices of the Regional Economic Development Working Group of the Multilateral Track of the Middle East Peace Process.

Uhlir, H., "Going Public in the F.R.G.," in: R. Guimaraes; B. Kingsman and S. Taylor, (eds.), *A Reappraisal of the Efficiency of Financial Markets* (Berlin: Springer-Verlag, 1989).

Vickers, J. S. and Yarrow, G., *Privatization: An Economic Analysis* (Cambridge: MIT Press, 1988).

Warner, J. B., "Bankruptcy, Absolute Priority, and the Pricing of Risky Debt Claims," *Journal of Financial Economics* 4 (1977), 239-276.

Wasserfallen, W. and Wittleder, C. "Pricing Initial Public Offerings: Evidence from Germany," *European Economic Review* 38, 7 (1994), 1505-1517.

Welch, I., "Seasoned Offerings, Imitation Costs, and the Underpricing of Initial Public Offerings," *Journal of Finance* 44 (1989), 421-229.

————, "Sequential Sales, Learning, and Cascades," *Journal of Finance* XLVII, 2 1992), 695-732.

Wessels, R., "The Market for IPOs of the Amsterdam Stock Exchange," in: R. Guimaraes; B. Kingsman and S. Taylor, (eds.), A *Reappraisal of the Efficiency of Financial Markets* (Berlin: Springer-Verlag, 1989).

Wethyavivorn, K. and Koo-Smith, Y., "Initial Public Offerings in Thailand, 1988-89"

Price and Patterns," in: Rhea, S. G. and Chang, R. P. (eds.) *Pacific-Basin Capital markets Research*, 11 (1990), North-Holland, Amsterdam.

Wheatly, S., "Some Tests of International Equity Integration,' *Journal of Financial Economics*, 21(1988), 177-212.

Wong, K. A. and Chiang, H. L. "Pricing New Equity Issues in Singapore," *Asia Pacific journal of Management* 4, 1 (1986), 1-10.

World Development, Washington, DC, May (1989).

Zimba, W. T. and Schwartz, S. L., *Power Japan* (Chicago, IL: Probus, 1992).

Appendix A

Capital Market Law no.95 of the year 1992[1]

Part-One: Issue of Securities

Article-1: The capital market of a joint stock company and the share of dormant partners in COMMANDITE companies limited by shares should be divided into nominal shares of equal value. However, the company may issue bearer shares within the limited and according to the terms and conditions, as well as the procedures to be prescribed in the executive regulations. Bearers of these shares should not have the right to vote in the general assembles.

The company's articles of association should determine the value of the nominal share so that should not be less than five pounds and should not exceed one thousands pounds. This provision should not apply to companies existing at the time the present law comes into force. A share should be indivisible. New shares may be issued, on increasing the capital, with a different value from that previous issues. New shares should have the same rights and obligations of the shares of the previous issues.

The executive regulations indicate the data comprised in the share certifications, the method of replacing lost or damaged certificates, and the procedures to be followed with respect to these certificates, on modifying the company's articles of association. The executive regulations also indicate the provisions on floating the shares for public subscription.

Article-2: Every company that is desirous of issuing securities should notify the authority accordingly. If the authority does not object thereto within three weeks from its notification date, the company shall then be free to go ahead with the issuing procedures, subject to any other provision in the present law. The executive regulations should determine the notification data and documents to be attached thereto.

Article-3: For issuing shares against a real share, or in the occasion of merger, the value of these shares should conform to the value of the real share or the merged rights, as determined by the concerned evaluation committee, without prejudice to the right of concerned parties to submit their complaints, to the complaints committee prescribed in Part-5 of the present law, from the value as determined by the evaluation committee, in accordance with the terms and procedures as prescribed in the executive regulations. However, the party submitting the real share may be the difference in cash, and may also withdraw. In all cases, these shares shall be issued except after the lapse of the time prescribed for submitting the complaint, or after passing a final decision in it.

Article-4: No stocks/securities of any company, including the public business sector companies, and public sector companies, shall be floated for public subscription, except by virtue of a subscription prospectus, approved by the authority, to the published in two mass distribution morning dailies, providing one at least should be in Arabic. The subscription prospectus should be drawn up according to the forms to be provided by the authority.

[1] (official journal-no. 25-Bis, 22 June, 1992)

__Article-5:__ The subscription prospectus, for subscribing to company's shares, on its foundation, should indicate the following data:

(A) Purpose and duration of the company

(B) The company's issued and paid up capital

(C) Description, privileges, and conditions of floating the shares.

(D) Names of founders, and the amount of contribution by each, as well as a statement of the real shares if any.

(E) The company's plan of using funds collected from subscription to the floated shares, and its expectations for the results to be realised through using the amounts.

(F) Places of obtaining the subscription prospectus approved by the authority,

(G) Any data to be determined in the executive regulations.

The other subscription prospectuses should comprise, in addition to the data specified in the previous clause, the following data:

(A) The companies previous activities

(B) Names of the board members, and the directions in charge, as well as experience,

(C) Names of nominal shares who posses more than 5% of the company's shares, each, and the percentage each of them possesses.

(D) A summary of financial statements and data, as approved by the auditors for the three previous years, or for the period from the date of founding the company, whichever is less, and which were drawn up and prepared according to the rules on declaration of data, as specified in the executive regulations and forms set therefor by authority.

__Article-6:__ All company floating stocks/securities thereof for public subscription shall submit , on its own responsibility, semi-annual reports on its activities and results of its works, to the authority, providing these reports should comprise the data announcing its genuine financial standing. The balance sheet and other financial returns and other statements of the company should be prepared according to the accounting criteria and auditing rules to be determined or referred to in the executive regulations. The company should notify the authority with the balance sheet statement, the financial statements, the reports of the board of directors, and the auditor's report thereon, one month before the date scheduled for convening the general assembly. The authority should examine the documents referred to in the previous clauses, or assign a specified quarter to carry out the examination. The authority should then notify its remarks to the company and require it to reconsider these documents so they should conform to the results of examination. If the company does not respond to that, it shall then pay the costs to be incurred in the authority's publishing of its remarks and modifications required thereby. Publishing these remarks and modifications should take place according to the following clause. The company shall publish an adequate summary of the semi-annual reports and annual financial statements, in two mass-distribution morning dailies, of which one at least shall be in Arabic. All companies facing unforeseen substantial circumstances affecting its activities or financial standing shall announce them forthwith and publish an adequate summary thereof in two mass-distribution morning dailies, one of which should at least be in Arabic.

__Article-7:__ The company and its auditors shall provide the authority with all data and documents to be required thereby, to ensure the validity of the data set forth in the subscription prospectuses, periodical reports, and the financial data and statements of the company.

Article-8: All shareholders who wish to conclude an operation resulting in his possession of more than 10% of the nominal shares in the capital of a company which floated its shares for public subscription, should notify the company at least weeks before concluding the operation. The company, within one week from the date of its notification, should advise this notification to each shareholder owning at least 1% of the company's capital. Contravening the provisions of the firs clues should result in cancelling the operation without prejudice to the right of calling to question the organiser of this violation. The provisions of the previous clauses shall apply in case of concluding all operation resulting in a Board member or a worker of the company possessing nominal shares exceeding 5% of the company's capital. The procedures referred to in this article should be taken before concluding all operation that results in exceeding the two percentages prescribed in clues 1 and 5 above. The executive regulations should prescribe the provisions on concluding operations and the procedures of notifying and advising about them.

Article-9: A shareholder shall not represent, at a convention of the general assembly of the company, a number of votes by proxy, exceeding the limits specified in the executive regulations.

Article-10: The Board of directors of the authority, based on serious reasons declared by a number of shareholders owning at least 5% of the company's shares, may, after ensuring the validity of these reasons, halt the resolutions of the general assembly of the company, which are issued in favour of a certain category of shareholders, or issued to prejudice them, or to or to reap any special benefit for the board members or others. The parties concerned shall submit their request to nullify the resolutions of the general assembly, to the arbitration board prescribed in Part 5 of the present law, within fifteen days from issuing the resolution. If this period lapses without this procedure being taken, halting the resolution should be considered as null and inexistent.

Article-11: Subject to tax exemptions as prescribed for shares of companies registered with the stock exchange at the date present law comes into force, the shares listed and inscribed in the schedules specified in Item-A Article-16 of the present law, shall be exempted from the proportional stamp duties. Divisible and distributed profits on these shares shall also be exempted from the general income tax. In case the shares are sold for a value exceeding the buying price, the increase shall be subject to a tax of 2% of the amount of increase, payable by the seller, and this tax shall be collected according to the rules to be issued by a decree of the Minister of finance in agreement with the minister collected according to the rules to be issued by a decree of the Minister of Finance in agreement with the minister.

Article-12: Issuing debenture, finance bonds, and other securities, whether nominal or bearer, shall take place with approval of the general assembly of the company, in accordance with the rules and procedures to prescribed in the executive regulations. The approval of the general assembly shall comprise the yield of the bond debenture, or security, and the basis of its calculation without being restricted by limits prescribed in any other law.
An authorisation shall be obtained from the authority in case debentures, finance bonds and other securities are floated for public subscription.

Article-13: Holders of debentures finance bonds and other securities same issue, in the company, may form a group whose purpose shall be to protect the common interests of members. The group shall have a legal representative selected among its members and whose election and removal shall be decided in accordance with the terms and conditions defined in the executive regulations. The legal representative of the group shall have no direct or indirect relation at all with the company, and no interest contradicting with the interests of the group members. The legal representative shall assume all necessary procedures toward protecting the common interests of the group, whether vis-à-vis the company, or the third parties, or before the court, and within the limits of decisions to be taken by the group convened in a valid meeting. The formation of the group , the name of its legal representative, and copies of its resolutions shall be notified and provided to the authority. The executive regulations shall determine the terms and procedures of calling a meeting of the group and all parties having the right to attend, the method of holding the meeting, its venue, the voting system, and the relation of the group with the company and the authority.

Article-14: Subject to such fiscal exemptions as are prescribed for debentures and finance bonds issued by companies which are registered with the securities market, and exist at the time the present law comes into force, debentures, finance bonds, and other similar securities, whichever the quarter issuing them, and which are recorded in the tables prescribed in Item (A), Article (16) of this law, shall be exempted from the proportional stamp duty on issuing them, and also from the annual proportional stamp duty. The yield of these securities shall similarly be exempted from the movable capital revenue tax, and from the general income tax.
In case any such securities are sold for a value exceeding the buying price, the increase in the selling value shall be subject to tax of 2% of the amount of such increase, payable by the seller. This tax shall be collected according to the rules to be issued by a decree of the minister of finance, jointly with the minister.

Part-Two: Stock Exchanges

Article-15 Securities shall be recorded and circulated in a market called the 'stock exchange'. No security shall be recorded in more than one stock exchange. In exception thereto, a security shall be recorded in both stock exchanges of Cairo and Alexandria existing at the date the present law comes into force, against one registration fee to be shared between both stock exchanges.

Article-16: Recording the securities in the tables of the stock exchange shall be done upon the request of issuing quarter. Recording and deleting the security shall be done by virtue of a decision from the stock exchange management and in accordance with the rules to be set by the board of the authority.
Recording the securities shall take place in two kinds of tables:
(A) Official tables in which the following securities shall be recorded:
1. Public subscription companies' shares fulfilling the two following requirements:
    a. Nominal shares launched for public subscription shall not be less than 30 % of the total shares of the company.
    b. The number of subscribers to the launched shares shall not be less than 150, even though they are non-Egyptians.

If as a result of the circulation of the company's shares the number of shareholders becomes less than 100, for a period more than 3 continuous or interrupted months during the financial years of the companies, the shares shall be considered as deleted and struck off, from the tables, by force of the law, and shall be transferred to the non-official tables.

2. Debentures, finance bonds, and other securities as floated by joint stock companies, and commandite partnerships limited by shares for public subscription, providing they shall fulfil the requirements prescribed in item (a) and (b) of the previous paragraph.

3. Securities as issued by the State and floated for public subscription.
4. Shares and other securities of public sectors companies and public sector companies.

(B) unofficial Tables in which the following shall be recorded:

1. Shares and other securities which do not fulfil the requirements of recording in the official tables.
2. Foreign securities.

<u>Article-17:</u> Securities which are recorded in any stock exchange shall not be circulated outside it, otherwise the circulation of such securities shall be null and invalid. Transactions concerning the circulation of non-recorded securities shall be announce d in the stock exchange, according the rules to be regulated by a decision of the authority's board of directors. The stock exchange shall provide the authorities with the data and periodical reports to be determined in the executive regulations.

<u>Article-18:</u> Dealing in securities which are recorded in the stock exchange shall be through one of the companies authorised to carry out such transactions, otherwise, a transaction not carried out thereby shall be considered null and invalid. The company shall guarantee the validity of the transaction carried out by it the executive regulations shall determine and indicate the works the company is prohibited to carry out.

<u>Article 19:</u> Each stock exchange shall keep a register wherein shall be recorded the company's authorised to operate in the field of securities wherein they exercise their activities. Recording the companies in the stock exchange shall take place against registration fees of ten thousand Egyptian pounds and an annual subscription of on 1% of the company's capital, with a ceiling of five thousand Egyptian pounds.

<u>Article-20:</u> The executive regulations shall indicate the provisions re-organising the circulation, clearing, and settlement transactions in securities operations, and the publication of information on securities circulation.

<u>Article-21:</u> Circulation supply and demand transactions involving securities which are aimed at price manipulations, may be suspended by decision of the Chairman of the stock exchange. The Chairman of the stock exchange shall have the power to cancel the transactions concluded in violation of the provisions of laws, regulations, and decrees issued for their implementation, or those concluded at unjustifiable prices.
He may also suspend dealing in a certain security if continuing such dealing is liable to harm the market or prejudice those dealing within it the Chairman on the authority may in due time take any of the aforementioned procedures.

<u>Article-22:</u> In case of occurring serious circumstances, the chairman of the authority may decide to determine a ceiling and a minimum limit for prices of securities, at the closing prices of the day preceding the decision. These prices shall be in on contracting parties in all stock exchanges. The decision shall be notified to the minister, upon taking it. The minister may stop its enforcement, and indicate the way of determining the prices and monitoring work and operations in the stock exchanges. The minister-may of his own accord- issue a decree determining the procedures to be taken in circumstances referred to hereinbefore.

Article-23 A special fund shall be established, with an artificial person status, to ensure the dealing parties against non-trading risks resulting from the activities of companies dealing in the field of securities. The fund shall be established by a decree of the Prim Minister upon the proposal of the Minister, and the recommendation of the authority's board of directors. The decree concerning the establishment of the fund shall comprise the system of its management, and its relation with companies referred to hereinbefore, the percentage of contributing of its resources by each of these companies, the rule governing spending from and investing these resources, the risks covered by the fund and the bases of indemnifying for these risks.

Article-24: The minister, upon the proposal of the authority's board of directors shall issue a decree re-organising broker's commissions, the ceiling to charges collected for services connected with the transactions taken the place within the SE.
The minister shall also determine the fees for recording the securities in the stock exchange, providing the fees for the registrations in the tables prescribed in item (A) of article 16 of the present law shall not exceed five thousand Egyptian pounds per annum for each issue, and three thousand pounds per annum in respect of each issue for recording in the tables specified in item (b) of the same article the fees referred to hereinbefore shall not be due on the securities to be issued by the State.

Article-25: The stock exchanges of Cairo and Alexandria shall continue to exercise their activities with the same artificial person status prescribed for them at the date the present law comes into force. A Republican decree shall be issued concerned the provisions reorganising their administration and their financial affairs. Pending issue of this decree the financial and administrative regulations which were enforced at the date prescribed in the previous clause shall apply to both stock exchanges.

Article-26: By virtue of an authorisation from the minister, upon the proposal of the authority's board of directors, stock exchanges may be established, with a special juridical person status where registration and circulation shall be restricted to one kind or more of the securities. The executive regulation shall determine the provision concerning the reorganisation of these stock exchange and the circulation of securities within them.

Part-Three: Companies operating in the field of securities

Chapter One: General rules

Article-27: The provisions of this part three shall apply to all companies operating in the field of securities. These are meant to be the companies exercising one or more of the following activities;
a) Merchandising and covering subscription to securities.
b) Participating in the foundation companies issuing securities, or in increasing their capitals.
c) Risk-taker capital.
d) Clearing and settlement in securities bearing the formation and management of securities in portfolios, and of investment funds.
e) Bill Brokerage.
The minister may add further other activities in the field of securities.

Requests for incorporation of these companies shall be submitted to the authority, and the executive regulations shall specified the procedures and terms of funding these companies and the provisions reorganising their activities and words forming part of such activities.

Article-28: Activities as prescribed in the previous article shall not be exercised except for approval thereof from the authority and after recording them in the register provided with the authority for that purpose. The authority shall issue its final decision concerning the licence request, within at most 60 days from the date the application documents are submitted duly fulfilled, the authority. In case the application for licence is refused the decision shall be motivated and the complaint against such refusal shall be raised before the complaints committee prescribed in part 5 of the present law. The executive regulations shall determine the rules, procedures and dues for granting the licence providing such dues shall not exceed 10 thousand Egyptian pounds. The board of the authority shall draw up the for of the licence, and set the data of register. The chairmen of the authority shall stop all activities that is subject to the provisions of the present law, if such activity is exercised without obtaining a licence therefor. The decision suspending the activity shall result in closing down the location where its exercised, via administrative channels.

Article-29 Granting the licence prescribed in the previous article shall require fulfilling the following:

a) the licence applicant shall be a joint stock company, or a commandite partnership by shares.

B) The purpose of the company shall be restricted to exercising one or more of the activities prescribed in article 27 of the present law.

C) The issued capital of the company and the amount paid up thereof, of founding it, shall not be less than the minimum limit to be determined by the executive regulations, according to the type and purpose of the company.

D) The company's executives in charge of its administration shall fulfil the necessary experience and efficiency requirement as needed for its activity, and as shall be determined by a decision to be issued by the board of the authority.

E) paying a deposit for which a decision of the authority's board of directors shall be issued determining its amount, the rules and procedures governing deduction therefrom and its completion, managing its proceeds and refunding its amount.

F) No criminal or misdemeanour penalty shall have been ruled against any of the company's founders , directors, or members of its board of directors during the five years preceding submission of the licence request, in an offence against owner and honesty, or in any of the crimes prescribed in laws of companies, or trade, nor a ruling shall have been passed declaring in bankrupt, unless he has been rehabilitated.

Article-30: The company's activities may be suspended if it violates the provisions of the present law, its executive regulations or the decisions of the authority's board of directors as issued for its implementation, or if it fails to keep fulfilling any of the licence requirements, and after being warned, it fails to remove the violation or completes the licence requirements within the period and according to the conditions to be determined by the chairman of the authority. A motivated decision concerning the suspension of activities shall be issued of the authority, for a period not exceeding 30 days.

The decision shall determine the procedures to be taken during the period of suspension. The decision shall be handed to the company, or notified to it by register letter with acknowledgement of

receipt. The decision for suspension shall be published in two mass distribution morning dailies, at the expense of the company.
If this period lapses without the company carrying out steps removing the causes for which the suspension has taken place, the subject shall be brought before the board of the authority to issue a decision abolishing the licence.

Article-31: In case a danger emerges or threaten the stability of the capital market or those dealing therewith, the board of the authority shall have the power to take any of the following arrangements as considered pertained thereby.
A) Address a warning to the company.
B) Prevent the company from exercising or some of the activities it licensed to exercise.
C) Ask the company's board chairman to call a meeting of the board in order to look into the validations attributed to the company, and take steps as necessary toward removing such violations. The board meeting shall in this case be attended by one representative or more of the authority.
D) Appoint an observer-member in the company's board of directors, for a period to be determined by the board of the authority. Such observer member shall have the right to participate on the board's debates and record his view in respect of the decision taken by the board.
E) Dissolve the board of directors and appoint amendatory to direct the company into rarely ending appointment of a new board of directors to be assigned the legal management prescribed therefor.

Article-32: Complaints against the decisions issued according to the preceding articles shall be raised before the complaints committee prescribed in part 5 of the present law, within 15 days from the date the concerned party is notified of the decision, for the date it warned of it. Cases brought to revoke these decisions shall not be acceptable before complaining against them according to the previous clause.

Article-33: No company shall suspended its activities or liquidate its operations except which the approval of the authority's board of directors, after ascertaining that the company has cleared itself of all its obligations according to the conditions and terms to be set by the board of the authority.

Article-34: Whoever is exercising, at the time the present law comes into force, any of the activities prescribed in article (27) thereof, shall modify his positions in accordance with the provisions of this law and the decrees issued for its implementation within 6 months from the date the executive regulations of the present law comes into force. This six month period may be extended for another 6 months by virtue of a decision of the authority's board of directors.

Chapter-Two: Investment Funds

Articles-35: Investment funds may be established whose purpose shale be to invest savings, in securities, within the limits and according to the terms and conditions defined in the executive regulations. The board of the authority shall have the power to authorise the fund to deal in other movable financial values, or in other fields of investments, according to the terms and conditions to be defined in the executive regulations. The investment fund shall assume the form of a joint stock company with a monetary capital, and the majority of its board members shall not be among its shareholders those dealing with it, or linked therewith by some relation or interest. The funds shall assign the management of its activities to one of the quarters specialised in such line, according to the terms defined in the executive regulations.

<u>Article-36:</u> The articles of association of the investment fund shall determine the ratio of the fund's paid-up capital to the investors' funds, which ratio shall not exceed the one determined by the executive regulations. In exchange for these funds, the investment fund shall issue securities in the form of investment documents whose holders shall have a share in the results of the fund's investments. Subscribing to these documents shall take place through one of the banks authorised therefor by the minister. The board of authority shall determine the procedures of issuing these documents and of recovering their value, the data to be comprised therein, as well as the rules of recording and circulating them in the stock exchange.

<u>Article-37:</u> Bulletins issued for subscription to investment documents as floated by investment funds for public subscription, shall comprise the following extra data:
1. Investment polices;
2-method of distribution and allocation of profits and type of treating capital profits and coins.
3- name of quarter assuming the management of the fund's activities, an adequate summary of its previous works;
4- method of periodical evaluation of the fund's assets, and procedures of recovering the value of investment documents.

<u>Article-38:</u> Securities in which the investment funds invests its money shall by kept one of the banks subject to control by the central bank of Egypt, providing such bank is an owner of or a shareholder in the company which owns the fund, or the company assuming the management of its activities, and providing the fund shall submit to the authority a statement of these securities, duly approved by the bank, on the form to be provided for the purpose the board of the authority.

<u>Article-39:</u> The board chairman of the authority shall be notified of the decisions issued to appoint the board members and the directors in charge of the general management of the fun's activities, as well as the data connected therewith, within thirty days from the date of issuing the aforementioned decisions. The notification shall be made on the form to be provided for the purpose by the authority.
In order to maintain the safety of investors' funds in the investment fund, the board of the authority shall have the power to issue a motivated decision removing any of the board members or the directors referred to hereabove.
A concerned party may complain against the decision issued for removing him, by submitting his complaint before the complaints committee prescribed in part-5 of the present law, within sixty days from the date he is notified of the decision.

<u>Article-40:</u> Verifying the fund's accounts shall be assumed by two auditors to be selected among those recorded in a register to be provided for that purpose, in consultation between the authority and the central audit agency. An auditor shall not audit the accounts of more than two funds at the same time. The provisions of article 6 of the present law shall apply to the fund if it does not launch securities for the general subscription.

Article-42: Banks and insurance companies, with the authority's licence, following approval control authority, according to each case, may exercise, by itself, the activity of investment funds. The executive regulations shall reorganise the procedures for granting the licence, the rules and controls on exercising activity, as well as the authority's supervision thereon.

Part-Four: Money Market Authority

Article-42: The money market authority is a public authority attached to the Minister of Economy and Foreign trade based in the city of Cairo. Branches and offices of the authority may be established inland and abroad by virtue of a decree of the minister after getting the approval of the authority' board of directors.

Article-43: In addition to the jurisdiction prescribed for it in any other legislation, the authority shall assume the application of the provisions of the present law and decrees issued for its implementation. It may also conclude acts, disposals and the procedures as necessary toward achieving the purpose of the authority, most especially the following:

1. Reorganising and developing the capital market. The authority's view shall be consulted in draft laws and decrees connected with the capital market.
2. Organising and supervising training curses for workers in the capital market, or those willing to work in it.
3. Supervising the provisions and publication of information and data as adequate on the capital market, and insuring their validity and clarity, in addition to revealing the facts as expressive thereof.

4. Controlling the capital market to insure the dealing are taking place in valid securities, are not tainted with fraud, swindling, deceit, selfish exploitation, or dummy speculations.

5. Taking procedures as necessary to follow up on implementing the provisions of the present law and the decree issue of its enforcement.

Article-44: The board of the authority is the authority and with managing its matter. It shall have the power to take final decisions as considered necessary thereby to exercise the powers of the authority and achieve its purposes, most especially the following:

1. Laying down the policy to be followed in exercising its powers, and the plans and programmes connected therewith.
2. Setting the rules of inspection and control on companies which are subject to the provisions of the present law.
3. Determining the charges for services rendered by the authority. Setting the rules for hiring the services of experts and asking for consultations that should assist the authority in performing its functions
4. Approving the annual draft budget of the authority. The board with to the authority, shall have the powers prescribed in law no. 73 of the year 1976.

The board may assigned one or more of its members, the task of fulfilling a specified mission.

Article-45: The board of the authority shall be made up of:

1. The chairman of the authority.
2. The deputy chairman of the authority.
3. The deputy governor of the central bank of Egypt.
4. Four members of experience to be appointed and whose remuneration shall be defined, for a period of two renewable years, by a decree of the prime minister upon the proposal of the minister.

5. The chairman of the authority and the deputy chairman shall be appointed, and their financial treatment shall be determined by a republican decree for a period of three renewable years.

Article-46: The chairman of the authority shall assume its administration and the management of its affairs, and shall represent it before the court as well as vis-à-vis third parties.
He may delegate some of his powers to one or more of the incumbents of key positions.

Article-47: The resources of the authority shall be formed of the following:
1. Allocations to be appropriated thereby by the State.
2. Duties and fees as collected by the authority according to the provisions of the present law.
3. Charges collected for services rendered thereby.
4. Fines to be ruled in application of the provisions of the present law local and foreign laws and grants as approved by the board of the authority, following their sanction by the authority legally concerned.

Article-48: The authority shall have a separate budget. Its financial year shall begin and end with the beginning and of the fiscal year of the State. The authority shall have a special account wherein shall be deposited its resources of the proceeds of fines and fees, as well as charges for services and other revenues from its activities. The balance of that account shall be carried forward from one year to another. The financial regulations of the authority shall regulate the uses and disbursements of that account, providing the amounts to be used from the proceeds of this account, its revenues and expenditures shall reflect in the authority's budget and its closing account.

Article-49: The workers of the authority whose names or positions shall be determined by a decree of the minister of justice in agreement with the minister, shall have the power and quality of legal officers in providing evidence of the crimes taking and occurring in violations of the provisions of the present law, its executive regulations and the decrees to be issued for its implementations. Toward that purpose, they shall have the power of access to the registers, books, documents, and data in the company' head office and quarters, or in the stock exchange centre or the quarter and location they are to be found. Officers in charges at the aforementioned quarters shall submit to the foregoing functionaries, the data, and extracts and copies of documents to be required thereby for the purpose.

Part-Five: Settlement of Litigation

Article-50: A decree of the minister shall be issued forming the complaints committee, headed by one of the deputy heads of the State council, with the membership of two counsellors of the State council to be selected by it, and one incumbent of a higher administration level key [position in the authority, to be elected by the authority' chairman, and also a member of experience to be selected by the minister.

Article-51: The committee prescribed in the previous article shall be concerned with considering the complaints to be submitted by concerned parties , against the administrative decisions issued by the minister or the authority, in accordance with the provisions of the prints law, its executive regulations, and decrees issued for its implementation.
Where no special provision is prescribed in the present law, the type for complaining from the decision shall be thirty days from the date of notification or learning thereof. The executive

regulations shall determine the procedures for considering, examining and issuing final decision in the complaints. The committee' s decisions in the complaint shall be final and enforceable. No case brought court revoke these decisions shall be acceptable before lodging a complain against them.

Article-52: Settling the disputes and litigation resulting from applying the provisions of the present laws between parties dealing in the field of securities shall be exclusively through arbitration. The arbitration body shall be formed by virtue of , a decree of the Minster of justice. Under a deputy president of the courts of appeal, with the membership of one arbiter for each of the two parties to the litigation. In case there are several parties to the litigation, one arbiter shall be selected for them.

Traversing the rulings issued by the arbitration body shall be brought before the court of appeal of jurisdiction. In all cases, the rulings of the arbitration bodies shall be final, unless the contestation court decides to stay their enforcement.

Article-53: The president of the arbitration body shall, within ten days from the litigants select their arbiters, determine a date for the session in which the litigation shall be examined, and also its venue. The arbitration office shall announce to all the litigants the date and venue of the session determining all examination of the litigation, at least a week ahead of the session date.

Article-54: Serving all papers connected with arbitration, and the notices addressed by the arbitration office shall be forwarded by table or by register, express mail with acknowledgement of receipt.

Article-55: The arbitration body shall examine the litigation summarily without being restricted by the rule of civil and commercial procedure law, with the exception of those connected with guarantees and principles in prosecution. The arbitration body shall its ruling within a period not exceeding one month.

Article-56: If a litigant fails to attend after being served a notice of the session date, the arbitration body shall have the power of passing its judgement in his absence.

Article-57: The request for arbitration shall indicate of litigants and their legal representatives, the name of the arbiter, the subject of the litigation and the request of claimant. with the request shall be attached all documents supporting it, and an evidence of having settled the arbitration fees.

Article-58: An arbitration office shall be established with the authority to receive and record the arbitration request. the office shall within one week from receiving the request, notify the other party
with the copy of the request in order to select an arbiter therefor, within two weeks of notification. If this period lapses without notifying the office, of the arbitrators' name as selected thereby, and of his quality and address the minister of justice shall then select a councillor from of the judiciary bodies, to act as arbiter for that party.

Article-59: Rules as prescribed in the law in judiciary fees in civil cases shall apply to the arbitration fees with a ceiling of one hundred thousand pounds.

Article-60: The judgement of the arbitration body shall be passed with the majority of view. The arbitration judgement shall be passed in writhing. It shall comprise a brief summary of the litigants' statement, their documents, the recitals and text of the judgement as pronounced, and the place and date of issuing it. The judgement shall be signed by each of the head of arbitration body and secretary, and shall be deposited with the arbitration office. The arbitration office shall then notify the litigants of the deposited judgement. The arbitration office shall deliver to the party in whose favour the judgement is passed, a copy of the judgement body appended of its execution, at the foot of the text of judgement.

Article-61: All disputes connected with the execution of the judgement shall be raised to the arbitration body issuing it.

Article-62: The executive regulations shall determine the rules concerning the reorganisation of the remuneration and expenses of the articles and the complaints committee.

Part-Six: Penalties

Article-61: Subject to any stricter penalty as prescribed in other law, the following shall be liable to a penalty of imprisonment for a period not exceeding five years, and a fine of not less than fifty thousand pounds and not exceeding one hundred thousand pounds or either penalty:

1. Whoever exercises any of the activities subject to the provisions of the present law therefor.
2. Whoever float securities for subscription, or receives on them funds of any form, in violation of the provision of the present law.
3. Whoever intently records in the subscription bulletins the incorporation papers, the licence or documents or announcements connected to the company in correct data or data violating the provisions of the present law, or introduces changes to these data after their approval by or submission too the authority.
4. Whoever intently issues incorrect data of securities, regarding securities to which the subscription by a quarter and authorised to receive such subscription.
5. Whoever forges the company's registers or submit false data to the general assembly of the company
6. Whoever works to inscribe or a simulated transaction, or tries by deception to influence market prices.
7. Whoever registers in the stock exchange securities in violation of the present law and its executive regulations.

Article-64: Subject to any stricter penalty prescribed in any other law, shall be liable to a penalty of imprisonment for a period of not less than two years and a fine of not less than twenty thousand Egyptian pounds and not exceeding fifty thousand pounds, or either penalty, whoever divulges a secret connected therewith in virtue of his work, in implementation of the provisions of the present law, or if he, his wife or children realise a benefit therefrom, or if he records in his reports untrue facts or omits from this reports certain facts affecting their results.

Article-65: Subject to any stricter penalty prescribed in any other law, shall be liable to imprisonment and a fine of not less than twenty thousand Egyptian pounds and not exceeding fifty thousand pounds or either penalty whoever violate the provisions of articles 6,7, 17, 33, and 39, and clause-2 of article (49) of the present law.

Article-66: Shall be liable to a fine of not less than five thousand pounds and not exceeding ten thousand pounds, whoever disposes of securities contrary to the rules prescribed in the present law. The company's directors who violates the provisions of clause (2) of article (8) of the present law shall be liable to the same penalty as prescribed in the previous clause.

Article-67: Subject to any stricter penalty prescribed in any other law, whoever violates any of the provisions in the executive regulations of the present law shall be liable to a fine of not less than two thousand pounds and not exceeding ten thousand pounds.

Article-68: The executive in charge of actual management in the company shall be liable to the penalties prescribe for deed and acts as committed in violations of the provisions of the present law. The company's funds and properties shall in all cases guarantee the payment of financial fines as sentenced.

Article-69: In addition to the penalties prescribed for crime set forth in the previous articles, a court ruling may be passed to prevent and deprive from the exercise of the provision or prohibit exercising the activity in connection with the crime is taken place, which ban or deprivation shall last for a period not exceeding three years. The court ruling shall be mandatory in case of recurrence.

Part-Seven: Reviwal and Fees

Article-70: Whoever is interested may request access and review with the authority, the documents, registers, minutes, and reports connected with the company and obtain information and data therefrom or copies thereof, duly authenticated against fees of one hundred pounds for each document or datum in case of access and review or two hundred pounds for each copy.

Article-71: A request for access and review or for obtaining copies of data or documents shall be submitted to the authority together with evidence of having paid the amount prescribed therefor, providing the request shall mention the applicant's capacity, the datum or document he wishes to review or obtain a copy thereof, and the purpose it is required to used for. The authority may refuse the request if defusing the data or the copies required is likely to case harm to the company or infringe in the public interest and the interest of investors.

Article-72: A company which is funded in accordance with the provisions of the present law shall pay to the authority incorporation fees at the rate of 0.1 % of the value of its issued capital, with the minimum of five thousand Egyptian pounds and a ceiling of fifteen thousand Egyptian pounds, and annul charges for services as rendered by the authority at the rate of 2 % of the value of the company's issued capital, with a minimum of one thousand pounds, and a ceiling of five thousand Egyptian pounds.

Article-73: Companies issuing securities shall pay to the authority a duty at the rate of 0.1% of the value of each issue, with a ceiling of ten thousand Egyptian pounds.

Part-Eight: Unions of Workers in Joint Stock Companies and Commandite Partnerships Limited by Shares

Article-74: Workers in any joint stock company or commandite partnership limited by shares, may establish a union called, "Union of shareholder workers", having a juridical person status, and owning in their favour, some of a company's shares with approval of the group of founders of the company or extra ordinary general assemblies, or according to each case without prejudice the union rights to buy the registered shares or those circulated in the stock exchange.
The executive regulations shall in particular indicate the following:

1. The condition to be fulfilled by companies whose workers have the right to establish the union.
2. Types of shares which the union members may possess, and procedures of evaluating them, the provisions and terms of circulating them, assigning the shares, and workers' right with respect thereto during their service period, and on termination of their service.
3. Conditions to be fulfilled by the workers' union, its powers, the quarter connected with the managing it, and the methods of such managing.
4. The self-financial resources of the union.

The union may obtain loans, grants, or allowances towards the purpose its established for.

Article-75: The union shall be established by virtue of a decision from the money market authority. Its registration and deletion with authority shall take place according to the rules, provisions and terms to be prescribed in the executive regulations. The form of the articles of association of the union shall be issued by a decision of the board of the money market authority.

Appendix B

The Dickey-Fuller Procedure for Unit Root Testing

- In order to work with the decision tree exhibited in Figure 4-4, it is assumed that an ADF approach is used so that sufficient lags of ΔR_t are included to yield approximately white noise residuals. The three potential estimating equations are given in [4.15.1] to [4.15.3]. Accordingly,

1. we estimate

$$R_t = \rho R_{t-1} + \alpha + \beta t + e_t \qquad t = 1, 2, ...,$$

but include sufficient lags of ΔR_t to eliminate serial correlation in the regression residuals, taking the following form

$$R_t = \alpha + \beta t + \rho R_{t-1} + \sum_{i=1}^{i=q} \theta \Delta R_{t-i} + e_t$$

2. we use Φ_3 to test

$$H_0: (\alpha, \beta, \rho) = (\alpha, 0, 1) \text{ against } H_A: (\alpha, \beta, \rho) \neq (\alpha, 0, 1);$$

   * the critical value can be obtained from Table VI in Dickey and Fuller (1981).
   * if the null cannot be rejected, we go to step 5.
   * If the null is rejected, we go to step 3.

3. If the null is rejected we know that:

either

$[\beta \neq 0 \text{ and } \rho = 1]$,

[β =0 and $\rho \neq 1$], or
[$\beta \neq 0$ and $\rho \neq 1$], therefore,

* we test for ρ =1, using the t-statistic obtained from step 1, with the critical values taken from the standard normal tables. We should note that:
    * Critical values from the standard normal are appreciate, in testing the null of ρ =1, when β is non-zero.
* If β is zero the critical values are non-standard, but will be smaller than those obtained from the standard normal, so that an acceptance of ρ =1 using standard normal critical values necessarily implies acceptance of ρ = 1 using non-standard critical values.
* Thus, if ρ = 1 is accepted when tested using standard normal critical values we conclude that β is non-zero and ρ is 1, so that the series has a unit root and a linear trend (and possibly a non-zero drift α). This result is highly unusual for an economic time series.
* If we reject the null that ρ = 1, then we have the following possibilities:

[β =0 and $\rho \neq 1$], or
[$\beta \neq 0$ and $\rho \neq 1$], therefore,

4. In either case ρ is not 1, there is no unit root, and conventional test procedures can be used. Thus we may carry out a t-test for the null that β= 0:
    * If we can not reject the null the series is stationary with no linear trend, but possibly with an intercept.
    * If we wish to test whether the intercept is zero, we use a conventional t-test.
    * If we reject this null (β=0), the series is stationary with a linear trend, and possibly with an intercept. Again a conventional t-test can be used to establish whether or not the intercept is zero.
5. Given non-rejection of the null (α, β, ρ) = (α , 0, 1), then the series has a unit root (ρ =1) with no trend (β = 0), but with possible drift.
    * To support the conclusion that (ρ =1) we may test this, given β is assumed to be zero. The required t-statistic is the same as that used in step 3 but now we need the non standard critical values.
    * These are obtained from table 8.5.2. in Fuller (1976), and are invariant with respect to the value of α.
6. If we wish to establish whether the series has non-zero drift, further tests will be required. Here, we use Φ_2 to test

$$H_0: (\alpha , \beta, \rho) = (0, 0, 1) \text{ against } H_A:(\alpha , \beta, \rho) \neq (0, 0, 1);$$

    * The critical value can be obtained from Table V in Dickey and Fuller (1981).
    * If we cannot reject the null, the series is a random walk without drift.
    * If we reject the null, the series is a random with drift.
7. We may wish to support these findings on the basis of estimating

$$R_t = \rho R_{t-1} + \alpha + e_t \qquad t = 1, 2, ...$$

which is obtained from

$$R_t = \rho R_{t-1} + \alpha + \beta t + e_t \qquad t = 1, 2, ...$$

by setting β at zero as suggested by the various tests.

If β is actually zero then tests on α and /or ρ should have greater power once this restriction is imposed.

8. A sensible way of proceeding might be to use the Φ_1 test for

$$H_0:(\alpha,\rho)=(0,1) \quad against \quad H_A:(\alpha,\rho) \neq (0,1)$$

   * The calculation of this statistic is straightforward since it is an F test but the limiting distribution is non-standard.

Critical values are obtained from Table IV in Dickey and Fuller (1981).

- In General, it is commonly accepted that a time series is stationary if its means, variance and autocovariances are independent of time. First, we suppose, s_t is a time series of specific share price index (or stochastic process) of that is defined for t = 1, 2, ... and for t = 0, -1, -2,... . Formally, s_t is said to be covariance (weakly stationary) if the following conditions are satisfied; see Harvey (1981, p. 22):

$$E(s_t)=\mu \tag{1}$$

$$E[(s_t-\mu)^2]=\text{var}(s_t)=x(0) \tag{2}$$

$$E[(s_t-\mu)(s_{t-\tau}-\mu)]=\text{cov}(s_t,s_{t-\tau})=x(\tau),\quad \tau=1,2,\ldots \tag{3}$$

Equations [1] and [2] require the process to have a constant mean and variance, while, [3] requires that the covariance between any two values from the series (an autocovariance) depends only on the time interval between those two values (τ) and not on the point in time (t). The mean, variance and autocovariances are required to be independent of time. In order to apply the conditions for stationarity in [1], [2], and [3], we define the first order autoregressive process AR(1)

$$s_t=\rho s_{t-1}+e_t,\qquad t=\ldots,-1,0,1,\ldots \tag{4}$$

where e_t is assumed to define a sequence of independently and identically distributed (*IID*) random variables with expected value zero and variance σ^2. The process in [4] is stationary when ρ is less than one in absolute value, i.e. $-1 < \rho < 1$. To understand this, we prefer to introduce the lag operator, L, where $Ls_t = s_{t-1}$ and $L^2s_t = L(Ls_t) = Ls_{t-1} = s_{t-2}$. Then, the AR(1) in [4] can be written as

$$s_t - \rho s_{t-1} = s_t - \rho Ls_t = s_t(1-\rho L) = e_t \tag{5}$$

so that

$$s_t=\frac{e_t}{(1-\rho L)}=(1-\rho L)^{-1}e_t \tag{6}$$

since for the sake of stationarity we assume that ρ is less than 1 in absolute value, we can use the binomial theorem[1] and write,

$$(1-\rho L)^{-1}=1+\rho L+\rho^2L^2+\rho^3L^3+\ldots=\sum_{s=0}^{\infty}\rho^s L^s$$

which we can use in [6] to obtain

$$s_t=(1-\rho L)^{-1}e_t=(1+\rho L+\rho^2 L^2+\rho^3 L^3+\ldots)e_t$$

or

$$s_t=e_t+\rho e_{t-1}+\rho^2 e_{t-2}+\rho^3 e_{t-3}+\ldots$$

The implication of such treatment is that the AR(1) process we are considering can be represented as moving average process of unlimited order, in which s_t depends on the moving average of current and past error terms. Given this, and the assumptions that are made about e_t in [4], it is straight forward to deduce the following results

$$E(s_t)=0 \tag{7}$$

Using the fact that $e_t, e_{t-1},\ldots$ are independent, the variance of s_t, as a sum of geometric progression[1], is seem to be

$$\mathrm{var}(s_t)=\frac{\sigma^2}{1-\rho^2} \tag{8}$$

Equation [8] is true only if the stationarity condition $|\rho| < 1$ holds, because that condition is necessary for the infinite series $(1 + \rho^2 + \rho^4 + \rho^6 + \ldots)$ to converge. Hence, the covariance of s_t and s_{t-1} may be expressed as

$$\mathrm{cov}(s_t, s_{t-\tau})=\frac{\rho^\tau \sigma^2}{1-\rho^2}, \qquad \tau=1,2,\ldots \tag{9}$$

Thus, the covariance matrix of s is

$$\Omega=\frac{\sigma^2}{1-\rho^2}\begin{vmatrix} 1 & \rho & \rho^2 & \ldots & \rho^{n-1} \\ \rho & 1 & \rho & \ldots & \rho^{n-2} \\ \ldots & \ldots & \ldots & \ldots & \ldots \\ \rho^{n-1} & \rho^{n-2} & \rho^{n-3} & \ldots & 1 \end{vmatrix} \tag{10}$$

the matrix in brackets being the correlation matrix of s. It is evident from [10] that every element of s is correlated with every other element of s, but except when $|\rho|$ is very close to 1, this correlation will tend to die out quickly as the time periods become further apart. Once again, we refer to ρ being less than one in absolute value as the stationarity condition. This condition can be expressed in a different way if we return to equation [5] and write it in the form

$f(L)s_t = e_t$

where $f(L)$, $= 1- \rho L$, is a linear function of L, the lag operator. The root of this function (i.e. the solution to $f(L)=0$) is given by $L= (1/\rho)$, so that the requirement that ρ has absolute value less than one equals to requiring that the root of $f(L)$ is greater than one in absolute value. Furthermore, $f(L)$ has a unit root if and only if ρ is one. In this case the stationarity condition is not satisfied.

To explore the implications of this, we contrast the unit root ($\rho = 1$) case with the stationary case (ρ is less than one in absolute value). However, the validity of assuming that the process starts in the infinite past is unclear when we do not assume stationarity. We now assume the process starts at t = 0 and therefore we replace [4] with

$$s_t = \rho s_{t-1} + e_t, \qquad t=1,2,\ldots \tag{11}$$

where s_0 is assumed to be a fixed initial value for the process. We retain the previous assumptions as far as the e_t are concerned. The process in [2.21], with ($\rho =1$) , has been termed "difference stationary" since the first difference of s_t is stationary; see Nelson and Plosser (1982). This follows since, assuming $\rho = 1$,

$$s_t - s_{t-1} = \Delta s_t = e_t$$

and e_t defines a stationary process[1]. An alternative terminology refers to a series which is itself non-stationary, but which is stationary after first differencing, as being integrated of order one, denoted I(1). A series that is stationary, so that differencing is not required, is said to be integrated of order zero, denoted I(0).

Appendix C

Daily Price Index for the Egyptian Capital Market (January 1994)

Appendix C.1 Daily Price Index for the Egyptian Capital Market (January 1994)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
2 Jan.'94	101.66	100.00	101.32	152.72	97.15	103.62	132.28	115.38	159.46	117.56	136.34
3 Jan.'94	101.57	100.00	101.32	152.24	97.15	103.28	133.38	118.65	160.24	177.75	136.78
4 Jan.'94	101.99	100.00	101.32	152.84	97.15	103.28	133.45	118.48	161.02	117.72	137.09
5 Jan.'94	102.83	100.00	101.32	153.54	97.15	103.28	134.00	118.48	162.23	117.72	137.61
6 Jan.'94	102.92	100.00	101.32	154.67	97.15	103.28	134.27	119.07	163.67	117.86	138.30
9 Jan.'94	102.67	100.00	101.32	157.09	97.15	103.28	134.29	123.08	167.44	117.86	139.90
10 Jan.'94	103.16	100.00	101.32	157.09	97.15	103.28	134.41	123.21	167.59	117.86	139.97
11 Jan.'94	103.44	100.00	101.32	156.94	97.15	103.28	134.66	123.21	167.57	117.87	139.97
12 Jan.'94	103.27	100.00	101.32	157.84	97.15	103.28	135.43	122.92	169.09	117.81	140.59
13 Jan.'94	102.65	100.00	101.32	158.24	97.15	103.28	136.19	122.59	169.96	117.79	140.94
16 Jan.'94	102.65	100.00	101.32	158.94	97.15	103.28	136.67	122.79	171.34	117.63	141.43
17 Jan.'94	101.58	100.00	101.32	161.95	97.15	103.28	136.24	122.79	174.46	117.64	142.76
18 Jan.'94	101.18	100.00	100.32	162.87	97.15	103.28	136.02	122.79	175.33	117.64	143.13
19 Jan.'94	101.18	100.00	101.32	162.85	97.15	103.28	136.17	122.79	176.57	117.63	143.65
20 Jan.'94	101.32	100.00	101.32	164.50	97.15	103.28	136.23	122.20	177.39	117.66	144.02
23 Jan.'94	102.18	100.00	101.32	166.60	97.15	103.28	136.33	122.20	179.93	117.66	145.10
24 Jan.'94	102.33	100.00	101.32	168.77	97.15	103.28	136.40	123.13	182.48	117.68	146.20
25 Jan.'94	102.32	100.00	101.32	169.20	97.15	103.28	136.68	123.29	183.17	117.71	146.51
26 Jan.'94	102.77	100.00	101.32	169.33	97.15	103.28	137.14	123.45	183.65	117.74	146.73
27 Jan.'94	102.88	100.00	101.32	169.61	97.15	103.28	137.97	123.69	184.52	117.77	147.12
30 Jan.'94	102.88	100.00	101.32	170.75	97.15	103.28	138.19	123.89	185.98	117.81	147.76
31 Jan.'94	102.44	100.00	101.32	172.06	97.15	103.28	138.24	123.89	187.51	117.80	148.41

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.2 Daily Price Index for the Egyptian Capital Market (February 1994)

Datd	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
1 Feb.'94	102.35	100.00	101.32	172.76	97.15	103.28	138.40	123.91	188.41	117.80	148.78
2 Feb.'94	102.32	100.00	101.32	173.59	97.15	103.28	138.82	123.91	189.36	118.00	149.31
3 Feb.'94	102.13	100.00	101.32	174.42	97.15	103.28	140.00	123.69	191.05	117.98	150.01
6 Feb.'94	102.89	100.00	101.32	175.07	97.15	103.21	140.28	123.69	192.04	117.98	150.43
7 Feb.'94	102.48	100.00	101.32	177.82	97.15	103.21	140.39	123.69	195.26	117.98	151.80
8 Feb.'94	102.42	100.00	101.32	178.41	97.15	103.21	139.96	123.69	195.63	117.98	151.96
9 Feb.'94	102.40	100.00	101.32	179.36	97.15	103.21	140.03	123.69	196.29	118.33	152.45
10 Feb.'94	102.40	100.00	101.32	180.44	97.15	103.21	139.94	123.69	197.47	118.34	152.95
13 Feb.'94	102.05	100.00	103.21	180.50	97.15	103.21	141.87	123.69	198.74	118.34	153.50
14 Feb.'94	102.05	100.00	103.74	180.14	97.15	103.21	143.03	123.69	199.05	118.36	153.64
15 Feb.'94	101.92	100.00	103.74	180.25	97.15	103.21	143.90	123.69	199.82	118.30	153.94
16 Feb.'94	102.81	100.00	103.74	180.82	97.15	103.21	145.99	123.69	201.82	118.35	154.82
17 Feb.'94	102.17	100.00	103.74	180.83	97.15	103.21	147.23	123.98	201.62	118.43	155.20
20 Feb.'94	102.76	100.00	103.74	180.95	97.15	103.21	146.89	123.98	202.38	118.52	155.15
21 Feb.'94	102.65	100.00	103.74	180.72	97.15	103.21	146.46	123.98	201.84	118.53	154.92
22 Feb.'94	102.90	100.00	103.74	181.79	97.15	103.21	142.11	123.98	200.27	118.53	154.26
23 Feb.'94	102.95	100.00	103.74	182.08	97.15	103.21	141.33	123.98	200.10	118.53	154.19
24 Feb.'94	103.17	100.00	103.74	181.76	97.15	103.21	143.26	122.52	200.63	118.53	154.42
27 Feb.'94	103.13	100.00	103.74	181.21	97.15	103.21	143.28	122.52	199.99	118.54	154.15
28 Feb.'94	103.24	100.00	103.74	180.48	97.15	103.21	143.57	122.54	199.29	118.58	153.87

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.3. Daily Price Index for the Egyptian Capital Market (March 1994)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
1 Mar.94	102.98	100.00	103.74	180.21	97.15	103.21	143.32	122.45	198.60	118.58	153.58
2 Mar.94	102.97	100.00	103.74	179.62	97.15	103.21	142.90	122.54	197.86	118.58	153.26
3 Mar.94	103.11	100.00	103.74	179.52	97.15	103.21	142.91	122.54	197.89	118.48	153.22
6 Mar.94	103.11	100.00	101.32	179.61	97.15	103.21	142.32	123.69	197.55	118.40	153.02
7 Mar.94	103.09	100.00	101.32	180.97	97.15	103.21	142.01	121.78	198.91	118.40	153.60
8 Mar.94	103.11	100.00	101.32	181.96	97.15	103.21	142.03	121.78	200.13	118.35	154.09
9 Mar.94	103.11	100.00	101.32	182.50	97.15	103.21	142.57	119.77	200.06	118.53	154.77
10 Mar.94	103.33	100.00	101.32	181.45	97.15	103.21	142.57	119.75	199.17	118.53	153.79
13 Mar.94	103.33	100.00	103.21	181.45	97.15	103.21	142.57	119.75	199.17	118.53	153.79
14 Mar.94	103.33	100.00	103.74	181.45	97.15	103.21	142.65	119.75	199.17	118.53	153.79
15 Mar.94	103.74	100.00	103.74	181.50	97.15	103.21	143.08	118.87	199.27	118.54	153.84
16 Mar.94	103.74	100.00	103.74	182.49	97.15	103.21	143.18	119.12	200.44	118.56	154.35
17 Mar.94	103.74	100.00	103.74	182.43	97.15	103.21	147.22	123.98	200.42	118.61	154.37
20 Mar.94	103.33	100.00	103.74	183.41	97.15	103.21	145.07	119.12	202.78	118.61	155.37
21 Mar.94	103.33	100.00	103.74	183.36	97.15	103.21	145.04	119.52	202.76	118.63	155.38
22 Mar.94	103.29	100.00	103.74	184.38	97.15	103.21	143.43	119.52	202.88	118.64	155.43
23 Mar.94	103.46	100.00	103.74	184.84	97.15	103.21	143.12	118.16	202.91	118.64	155.44
24 Mar.94	103.46	100.00	103.74	185.34	97.15	103.21	143.71	118.43	203.93	118.64	155.88
27 Mar.94	103.43	100.00	103.74	187.47	97.15	103.21	144.47	118.43	206.56	118.86	157.13
28 Mar.94	103.31	100.00	103.74	188.23	97.15	103.21	144.80	118.43	207.38	119.05	157.59
29 Mar.94	103.20	100.00	103.74	189.20	97.15	103.21	144.54	118.43	208.33	119.05	157.99
30 Mar.94	103.35	100.00	103.74	190.78	97.15	103.21	144.19	118.43	210.13	118.91	158.67
31 Mar.94	103.43	100.00	103.74	192.57	97.15	103.21	143.27	118.67	212.45	118.91	159.66

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.4. Daily Price Index for the Egyptian Capital Market (April 1994)

Dat	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
3 Apr.'94	103.35	100.00	103.74	195.19	97.15	103.21	144.84	118.67	215.38	119.13	161.04
4 Apr.'94	103.35	100.00	103.74	197.15	97.15	103.21	145.38	119.18	218.65	119.21	162.47
5 Apr.'94	103.35	100.00	103.74	201.98	97.15	103.21	145.69	119.35	223.69	119.31	164.67
6 Apr.'94	103.35	100.00	103.74	204.32	97.15	103.21	148.97	119.93	227.53	120.12	166.78
7 Apr.'94	103.31	100.00	103.74	208.90	97.15	103.21	149.05	119.93	232.86	120.12	169.05
10 Apr.'94	103.31	100.00	103.74	211.82	97.15	103.21	150.68	119.93	237.28	120.12	170.92
11 Apr.'94	103.43	100.00	103.74	217.02	97.15	103.21	151.77	119.18	238.35	120.15	173.76
12 Apr.'94	103.29	100.00	103.74	218.68	97.15	103.21	153.89	119.35	247.93	120.20	175.50
13 Apr.'94	103.33	100.00	103.74	223.46	97.15	103.21	154.49	120.12	254.00	120.20	178.08
14 Apr.'94	103.35	100.00	103.74	229.33	97.15	103.21	153.80	124.47	261.29	120.21	180.84
17 Apr.'94	103.47	100.00	103.74	230.52	97.15	103.21	153.80	124.54	262.97	120.21	180.88
18 Apr.'94	103.67	100.00	103.74	231.36	97.15	103.21	151.89	124.54	263.67	120.21	181.32
19 Apr.'94	103.87	100.00	103.74	231.36	97.15	103.21	151.35	124.20	263.99	120.20	181.48
20 Apr.'94	104.01	100.00	103.74	232.25	97.15	103.21	151.80	124.20	262.69	120.15	181.71
21 Apr.'94	104.88	100.00	103.74	232.84	97.15	103.21	153.34	124.14	264.32	120.15	182.44
24 Apr.'94	104.88	100.00	103.74	232.84	97.15	103.21	153.34	124.14	264.32	120.15	182.44
25 Apr.'94	104.88	100.00	103.74	232.84	97.15	103.21	153.34	124.14	264.32	120.15	182.44
26 Apr.'94	105.91	100.00	103.74	235.31	97.15	103.21	154.16	124.20	267.45	120.40	183.18
27 Apr.'94	105.91	100.00	103.74	236.09	97.15	103.21	154.16	124.20	268.64	120.40	184.42
28 Apr.'94	108.64	100.00	103.74	235.82	97.15	103.21	153.88	124.14	267.87	120.40	184.17

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.5 Daily Price Index for the Egyptian Capital Market (May 1994)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
3 May.'94	109.55	100.00	103.74	236.52	97.15	103.21	153.86	124.14	270.21	120.40	185.09
4 May.'94	110.55	100.00	103.74	237.54	97.15	103.21	153.83	124.47	269.46	120.40	184.77
5 May.'94	110.46	100.00	103.74	236.59	97.15	103.21	153.99	124.82	269.29	120.40	184.70
8 May.'94	110.51	100.00	103.74	236.84	97.15	103.21	154.29	124.92	269.73	120.38	184.91
9 May.'94	110.29	100.00	103.74	235.79	97.15	103.21	154.53	126.01	268.63	120.66	184.57
10 May.'94	109.97	100.00	103.74	235.79	97.15	103.21	154.56	125.94	267.88	120.66	184.26
11 May.'94	109.91	100.00	103.74	234.74	97.15	103.21	154.48	125.89	267.34	120.68	184.03
12 May.'94	110.24	100.00	103.74	227.62	97.15	103.21	154.58	125.89	259.17	120.70	180.57
15 May.'94	109.70	100.00	103.74	224.95	97.15	103.21	154.51	125.94	255.99	120.76	179.25
16 May.'94	109.41	100.00	103.74	223.38	97.15	103.21	154.15	125.94	259.12	120.70	179.23
17 May.'94	108.38	100.00	103.74	224.29	97.15	103.21	154.16	125.94	253.95	120.70	178.35
18 May.'94	107.84	100.00	103.74	225.29	97.15	103.21	154.18	125.94	255.59	120.76	179.08
19 May.'94	107.55	100.00	103.74	225.28	97.15	103.21	154.19	125.59	255.99	120.76	179.25
23 May.'94	108.53	100.00	103.74	226.51	97.15	103.21	154.27	125.59	257.12	120.97	179.86
24 May.'94	108.85	100.00	103.74	229.37	97.15	103.21	154.29	125.59	258.21	120.97	180.28
25 May.'94	108.98	100.00	103.74	231.45	97.15	103.21	154.26	125.59	261.20	121.83	182.29
26 May.'94	109.69	100.00	103.74	231.81	97.15	103.21	154.32	125.59	262.16	121.85	182.52
29 May.'94	110.14	100.00	103.74	232.40	97.15	103.21	156.00	125.53	269.21	122.26	185.75
30 May.'94	110.42	100.00	103.74	238.77	97.15	103.21	156.21	125.26	270.76	122.26	185.78
31 May.'94	110.25	100.00	103.74	239.18	97.15	103.21	155.92	125.26	271.00	122.28	186.54

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.6. Daily Price Index for the Egyptian Capital Market (June 1994)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
1 Jun.'94	110.22	100.00	103.74	240.94	97.15	103.21	155.58	125.26	272.59	122.46	187.31
2 Jun.'94	110.62	100.00	103.74	240.67	97.15	103.21	155.06	125.26	272.03	122.48	187.05
5 Jun.'94	110.13	100.00	103.74	240.67	97.15	103.21	155.11	125.26	272.10	122.48	187.06
6 Jun.'94	110.13	100.00	103.74	241.21	97.15	103.21	154.78	125.26	272.25	122.81	187.22
7 Jun.'94	109.19	100.00	103.74	241.17	97.15	103.21	155.03	125.26	272.56	122.81	187.24
8 Jun.'94	109.22	100.00	103.74	240.73	97.15	103.21	154.58	125.27	271.14	122.82	186.90
9 Jun.'94	109.28	100.00	103.74	240.11	97.15	103.21	154.34	125.26	270.84	122.41	186.53
12 Jun.'94	109.28	100.00	103.74	240.12	97.15	103.21	154.27	125.26	270.86	122.41	186.54
13 Jun.'94	109.48	100.00	103.74	240.15	97.15	103.21	154.23	125.26	270.83	122.41	186.53
14 Jun.'94	109.73	100.00	103.74	240.24	97.15	103.21	154.13	124.37	270.79	122.26	186.46
15 Jun.'94	109.79	100.00	103.74	240.39	97.15	103.21	153.59	124.44	270.73	122.26	186.40
16 Jun.'94	109.90	100.00	103.74	240.31	97.15	103.21	154.34	124.27	271.11	122.26	186.56
19 Jun.'94	110.04	100.00	103.74	241.20	97.15	103.21	154.34	124.44	272.02	122.25	186.94
20 Jun.'94	110.15	100.00	103.74	240.95	97.15	103.21	154.07	124.37	271.67	122.24	186.82
21 Jun.'94	110.31	100.00	103.74	240.56	97.15	103.21	154.03	124.37	271.66	122.27	186.78
22 Jun.'94	110.31	100.00	103.74	240.11	97.15	103.21	153.51	124.67	270.12	122.27	186.14
23 Jun.'94	109.84	100.00	103.74	240.76	97.15	103.21	153.45	124.89	269.44	123.52	186.59
26 Jun.'94	109.90	100.00	103.74	237.38	97.15	103.21	153.45	124.99	268.44	123.21	184.89
27 Jun.'94	108.69	100.00	103.74	236.35	97.15	103.21	153.51	124.99	264.63	123.23	184.42
28 Jun.'94	108.38	100.00	103.74	236.35	97.15	103.21	153.65	124.99	264.79	123.33	184.46
29 Jun.'94	108.38	100.00	103.74	222.16	97.15	103.21	152.61	124.41	247.61	123.25	177.14
30 Jun.'94	108.12	100.00	103.74	221.51	97.15	103.21	152.61	124.41	246.91	123.25	176.82

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.7 Daily Price Index for the Egyptian Capital Market (July 1994)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
3 Jul.'94	108.12	100.00	103.74	221.93	97.15	103.21	152.75	124.18	247.29	123.30	176.50
4 Jul.'94	107.93	100.00	103.74	220.76	97.15	103.21	153.00	124.18	247.79	123.30	176.52
5 Jul.'94	107.83	100.00	103.74	221.99	97.15	103.21	152.65	123.96	248.35	123.24	177.04
6 Jul.'94	107.83	100.00	103.74	225.30	97.15	103.21	152.65	123.96	251.18	123.20	177.79
7 Jul.'94	107.42	100.00	103.74	225.35	97.15	103.21	152.30	123.96	252.74	123.28	179.36
10 Jul.'94	107.42	100.00	103.74	227.05	97.15	103.21	152.58	123.96	252.97	123.31	179.55
11 Jul.'94	107.69	100.00	103.74	227.70	97.15	103.21	153.01	123.96	253.33	123.31	179.68
12 Jul.'94	107.97	100.00	103.74	229.47	97.15	103.21	152.67	123.96	253.87	123.31	180.72
13 Jul.'94	107.98	100.00	103.74	229.89	97.15	103.21	152.89	124.20	257.47	123.32	181.97
14 Jul.'94	108.84	100.00	103.74	230.66	97.15	103.21	154.35	124.46	258.41	123.30	181.42
17 Jul.'94	108.40	100.00	103.74	233.44	97.15	103.21	154.77	124.46	261.94	123.33	183.28
18 Jul.'94	108.50	100.00	103.74	235.51	97.15	103.21	154.78	124.40	264.34	123.34	184.31
19 Jul.'94	108.73	100.00	103.74	237.08	97.15	103.21	155.15	124.40	266.51	123.34	185.22
20 Jul.'94	108.54	100.00	103.74	237.38	97.15	103.21	155.58	124.40	267.15	123.31	185.49
21 Jul.'94	108.57	100.00	103.74	236.27	97.15	103.21	156.61	125.27	266.06	123.72	185.27
24 Jul.'94	108.43	100.00	103.74	234.96	97.15	103.21	156.85	125.72	264.45	123.74	184.72
25 Jul.'94	108.43	100.00	103.74	235.50	97.15	103.21	157.01	125.72	265.47	123.75	185.03
26 Jul.'94	108.47	100.00	103.74	239.38	97.15	103.21	156.96	125.72	264.93	127.38	186.81
27 Jul.'94	108.34	100.00	103.74	239.83	97.15	103.21	156.96	125.72	265.45	127.37	187.13
28 Jul.'94	108.35	100.00	103.74	239.39	97.15	103.21	156.92	128.40	265.82	127.20	187.19
31 Jul.'94	108.30	100.00	103.74	239.62	97.15	103.21	156.58	129.12	265.96	127.25	187.28

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.8. Daily Price Index for the Egyptian Capital Market (August 1994)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
1 Aug.'94	108.30	100.00	103.74	239.05	97.15	103.21	156.04	129.12	264.92	127.27	186.85
2 Aug.'94	108.13	100.00	103.74	239.58	97.15	103.21	156.08	130.48	265.89	127.27	187.26
3 Aug.'94	108.08	100.00	103.74	240.89	97.15	103.21	156.15	130.48	267.44	127.27	187.92
4 Aug.'94	108.59	100.00	103.74	241.96	97.15	103.21	158.40	131.23	269.65	128.24	189.15
7 Aug.'94	108.59	100.00	103.74	243.89	97.15	103.21	158.89	131.44	270.34	129.74	190.46
8 Aug.'94	107.78	100.00	103.74	241.34	97.15	103.21	158.15	131.55	267.47	130.27	188.52
9 Aug.'94	108.12	100.00	103.74	241.42	97.15	103.21	159.58	131.98	267.80	130.65	188.66
10 Aug.'94	107.28	100.00	103.74	241.29	97.15	103.21	158.05	134.30	268.48	128.37	189.01
11 Aug.'94	107.28	100.00	103.74	242.79	97.15	103.21	157.93	134.30	269.20	129.05	189.71
14 Aug.'94	107.00	100.00	103.74	247.84	97.15	103.21	157.93	134.30	270.26	128.67	192.17
15 Aug.'94	107.00	100.00	103.74	246.03	97.15	103.21	157.32	134.30	273.30	128.79	193.89
16 Aug.'94	107.23	100.00	103.74	247.51	97.15	103.21	157.35	134.30	273.98	129.56	194.04
17 Aug.'94	107.49	100.00	103.74	252.47	97.15	103.21	157.21	138.24	279.79	129.84	194.67
18 Aug.'94	107.55	100.00	103.74	253.31	97.15	103.21	158.65	138.24	280.20	130.14	197.21
21 Aug.'94	107.74	100.00	103.74	250.93	97.15	103.21	158.57	137.05	278.48	129.84	194.12
22 Aug.'94	107.69	100.00	103.74	250.76	97.15	103.21	158.59	137.05	278.73	130.18	194.40
23 Aug.'94	107.51	100.00	103.74	250.76	97.15	103.21	158.78	137.05	273.28	130.18	192.10
24 Aug.'94	107.51	100.00	103.74	246.53	97.15	103.21	158.95	137.05	273.31	130.19	192.12
25 Aug.'94	107.51	100.00	103.74	247.10	97.15	103.21	159.02	137.05	273.98	130.19	192.41
28 Aug.'94	107.37	100.00	103.74	249.24	97.15	103.21	186.38	138.42	294.42	130.22	201.11
29 Aug.'94	107.23	100.00	103.74	249.24	97.15	103.21	187.21	138.42	294.94	130.23	201.34
30 Aug.'94	107.14	100.00	103.74	247.60	97.15	103.21	187.18	139.54	293.21	130.30	200.64
31 Aug.'94	107.52	100.00	103.74	248.84	97.15	103.21	187.26	139.91	294.58	130.46	201.32

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.9 Daily Price Index for the Egyptian Capital Market (September 1994)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
1 Sep.'94	107.39	100.00	103.74	248.94	97.08	103.50	187.21	140.05	294.66	130.74	201.36
4 Sep.'94	107.42	100.00	103.74	249.04	97.08	103.50	187.54	140.05	294.97	130.49	201.51
5 Sep.'94	107.45	100.00	103.74	248.27	97.08	103.50	187.60	141.92	294.57	130.51	201.34
6 Sep.'94	107.56	100.00	103.74	249.58	97.08	103.50	187.69	141.92	296.17	130.48	202.01
7 Sep.'94	107.60	100.00	103.74	249.21	97.08	103.50	187.89	144.64	296.55	130.48	202.17
8 Sep.'94	107.66	100.00	103.74	259.60	97.08	103.50	167.09	145.08	291.24	133.37	201.60
11 Sep.'94	107.39	100.00	103.74	262.09	97.08	103.50	167.14	147.27	294.35	133.90	203.05
12 Sep.'94	107.45	100.00	103.74	264.56	97.08	103.50	167.65	148.42	297.73	133.65	204.52
13 Sep.'94	107.62	100.00	103.64	256.86	97.08	103.50	167.99	148.66	299.10	133.81	205.20
14 Sep.'94	107.62	100.00	103.64	256.68	97.08	103.50	167.99	148.66	300.00	133.81	205.70
15 Sep.'94	107.50	100.00	103.64	266.82	97.08	103.50	187.33	148.66	309.51	133.87	210.02
18 Sep.'94	107.52	100.00	103.64	266.63	97.08	103.50	183.64	150.64	309.87	133.86	210.18
19 Sep.'94	107.90	100.00	103.64	257.22	97.08	103.50	157.14	151.52	315.13	133.89	212.02
20 Sep.'94	107.87	100.00	103.64	259.12	97.08	103.50	157.09	151.87	318.24	134.01	214.00
21 Sep.'94	108.62	100.00	103.64	260.81	97.08	103.50	157.14	152.12	320.76	135.04	214.98
22 Sep.'94	109.18	100.00	103.64	262.90	97.08	103.50	157.27	153.43	323.72	135.05	216.29
25 Sep.'94	109.90	100.00	103.64	263.96	97.08	103.50	157.50	154.15	325.18	135.21	217.02
26 Sep.'94	110.78	100.00	103.64	266.59	97.08	103.50	157.91	155.56	329.01	135.24	218.73
27 Sep.'94	111.68	100.00	103.64	268.17	97.08	103.50	158.03	157.09	331.30	135.33	219.79
28 Sep.'94	112.27	100.00	103.64	270.80	97.08	103.50	159.84	157.60	335.85	135.37	221.83
29 Sep.'94	113.32	100.00	103.64	272.09	97.08	103.50	161.56	161.72	339.34	135.53	223.46

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.10 Daily Price Index for the Egyptian Capital Market (October 1994)

Dat	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
2 Oct.'94	115.33	100.00	103.64	277.04	97.08	103.50	163.70	164.60	347.53	135.60	227.11
3 Oct.'94	117.32	100.00	103.64	282.41	97.08	103.50	164.57	165.05	354.62	135.85	230.38
4 Oct.'94	119.32	100.00	103.64	287.50	97.08	103.50	166.18	169.12	362.75	136.01	234.06
5 Oct.'94	121.04	100.00	103.64	291.74	97.08	103.50	167.52	169.23	368.36	136.52	236.82
9 Oct.'9	123.00	100.00	103.64	298.56	97.08	103.50	169.14	171.23	378.18	136.68	241.25
10 Oct.'9	125.41	100.00	103.64	300.62	97.08	103.50	170.80	171.40	381.55	136.37	242.76
11 Oct.'9	126.83	100.00	103.64	305.27	97.08	103.50	171.05	178.03	389.29	136.77	246.21
12 Oct.'9	125.92	100.00	103.64	309.36	97.08	103.50	173.47	178.03	396.37	136.87	249.39
13 Oct.'9	125.69	100.00	103.64	314.77	97.08	103.50	174.90	178.03	403.11	137.07	252.47
16 Oct.'9	125.77	100.00	103.64	316.95	97.08	103.50	176.16	178.03	406.41	137.26	254.04
17 Oct.'9	125.18	100.00	103.64	316.84	97.08	103.50	176.65	179.72	406.78	137.38	254.27
18 Oct.'9	125.18	100.00	103.64	317.26	97.08	103.50	176.81	179.72	407.33	137.45	254.54
19 Oct.'9	125.18	100.00	103.64	317.71	97.08	103.50	177.27	181.08	408.07	137.77	255.05
20 Oct.'9	124.89	100.00	103.64	316.95	97.08	103.50	177.73	180.74	407.27	137.85	254.74
23 Oct.'9	124.87	100.00	103.64	316.86	97.08	103.50	177.73	180.39	406.99	137.92	254.65
24 Oct.'9	124.79	100.00	103.64	316.44	97.08	103.50	176.87	180.70	405.86	137.95	254.17
25 Oct.'9	122.91	100.00	103.64	312.98	97.08	103.50	175.53	176.54	399.69	138.01	251.47
26 Oct.'9	122.91	100.00	103.64	310.18	97.08	103.50	174.15	175.63	395.04	138.09	249.46
27 Oct.'9	122.63	100.00	103.64	309.60	97.08	103.50	173.80	175.63	393.96	138.16	249.03
30 Oct.'9	121.39	100.00	103.64	304.95	97.08	103.50	173.08	175.63	387.69	138.17	246.26
31 Oct.'9	121.14	100.00	103.64	301.54	97.08	103.50	171.68	175.63	382.46	138.25	243.99

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.11 Daily Price Index for the Egyptian Capital Market (November 1994)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
1 Nov.'94	121.14	100.00	103.64	301.76	97.08	103.50	170.27	175.63	381.60	138.39	243.68
2 Nov.'94	121.14	100.00	103.64	302.27	97.08	103.50	169.29	175.63	381.54	138.41	243.67
3' Nov.'94	121.14	100.00	103.64	304.63	97.08	103.52	168.80	175.63	383.98	138.52	244.81
6 Nov.'94	120.21	100.00	103.64	304.16	97.08	103.52	169.51	175.63	383.75	138.58	244.74
7 Nov.'94	119.46	100.00	103.64	306.04	97.08	103.52	170.84	175.63	386.85	138.62	246.13
8 Nov.'94	118.62	100.00	103.64	307.31	97.08	103.52	171.38	175.63	388.66	138.68	246.96
9 Nov.'94	117.60	100.00	103.64	307.99	97.08	103.52	172.24	171.74	389.04	138.78	247.18
10 Nov.'94	116.65	100.00	103.64	308.10	97.08	103.52	172.62	171.74	389.41	138.75	247.33
13 Nov.'94	115.93	100.00	103.64	306.20	97.08	103.52	172.67	167.98	386.22	138.78	245.94
14 Nov.'94	115.93	100.00	103.64	303.73	97.08	103.52	172.77	167.98	383.28	138.76	244.62
15. Nov.'94	115.47	100.00	103.64	301.34	97.08	103.52	171.90	167.98	379.96	138.79	243.06
16. Nov.'94	115.47	100.00	103.64	298.69	97.08	103.52	170.91	164.41	375.01	138.78	240.99
17. Nov.'94	114.94	100.00	103.64	300.28	97.08	103.52	171.36	161.02	376.47	138.81	241.64
20 Nov.'94	114.74	100.00	103.64	299.93	97.08	103.52	171.40	157.79	375.40	138.78	241.16
21 Nov.'94	114.55	100.00	103.64	299.00	97.08	103.52	171.25	157.44	374.09	138.82	240.60
22 Nov.'94	113.72	100.00	103.64	299.35	97.08	103.56	170.97	157.88	374.41	138.73	240.69
23 Nov.'94	112.94	100.00	104.10	301.08	97.08	103.56	170.96	158.20	376.53	138.78	241.66
24 Nov.'94	112.65	100.00	104.10	301.37	97.08	103.56	170.98	158.17	376.83	138.82	241.81
27 Nov.'94	111.91	100.00	104.10	301.52	97.08	103.56	171.11	157.90	377.01	138.81	241.89
28 Nov.'94	111.93	100.00	104.20	299.56	97.08	103.57	171.32	158.02	374.73	138.85	240.90
29 Nov.'94	111.26	100.00	104.20	298.15	97.08	103.57	171.31	158.00	373.28	138.57	240.11
30 Nov.'94	110.63	100.00	104.20	296.95	97.08	103.57	170.88	158.06	371.44	138.62	239.32

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.12. Daily Price Index for the Egyptian Capital Market (December 1994)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
1 Dec'94	110.17	100.00	104.31	298.14	97.08	103.57	170.46	158.06	372.39	138.79	239.83
4 Dec.'94	110.68	100.00	104.31	297.07	97.08	103.57	170.77	158.08	371.32	138.80	239.36
5 Dec.'94	111.26	100.00	104.31	295.47	97.08	103.57	169.94	156.68	368.63	138.71	238.13
6 Dec.'94	111.89	100.00	104.31	295.23	97.08	103.57	169.38	156.00	367.85	138.71	237.78
7 Dec.'94	112.88	100.00	104.31	295.40	97.08	103.57	169.43	155.93	368.12	138.72	237.91
8 Dec.'94	113.41	100.00	104.31	295.53	97.08	103.57	168.77	154.64	366.32	138.77	237.14
11 Dec.'94	112.86	100.00	104.31	293.57	97.08	103.57	167.97	154.64	364.70	138.66	236.36
12 Dec.'94	112.56	100.00	104.31	293.55	97.08	103.57	167.97	156.95	365.18	138.64	236.56
13 Dec.'94	111.97	100.00	104.31	293.55	97.08	103.57	167.78	158.04	365.34	138.56	236.59
14 Dec.'94	111.83	100.00	104.31	292.79	97.08	103.57	167.54	158.03	364.26	138.54	236.10
15 Dec.'94	111.77	100.00	104.31	292.83	97.08	103.57	167.65	158.04	364.26	138.64	236.16
18. Dec.'94	111.89	100.00	104.31	295.42	97.08	103.57	168.11	157.52	367.54	138.73	237.65
19	111.85	100.00	104.31	293.24	97.08	103.57	168.30	158.05	365.53	138.37	236.57
20	111.34	100.00	104.31	292.64	97.08	103.57	169.07	158.01	365.08	138.54	236.46
21	111.36	100.00	104.31	293.64	97.08	103.57	169.22	158.11	366.40	138.56	237.06
22	111.30	100.00	104.31	293.50	97.08	103.57	169.93	159.41	366.71	138.78	237.32
25	110.73	100.00	104.31	292.10	97.08	103.57	171.09	158.05	365.65	138.48	236.88
26	111.44	100.00	104.31	293.00	97.08	103.57	172.15	158.05	365.06	140.61	237.58
27	111.44	100.00	104.31	291.69	97.08	103.57	172.46	157.98	363.59	140.66	236.96
28	111.41	100.00	104.31	292.50	97.08	103.57	173.09	157.98	365.05	140.63	237.58
29	111.39	100.00	104.31	293.99	97.08	103.57	173.02	157.98	366.76	140.68	238.37

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.13 Daily Price Index for the Egyptian Capital Market (January 1995)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
1 Jan.95	111.37	100.00	104.31	292.44	97.08	103.57	173.02	157.57	364.87	140.67	237.52
2	110.83	100.00	104.31	292.80	97.08	103.57	172.95	157.57	364.85	140.91	237.65
3	111.57	100.00	104.31	292.79	97.08	103.57	172.38	157.57	364.51	140.91	237.49
4	111.06	100.00	104.31	292.22	97.08	103.57	172.39	157.57	364.32	140.48	237.18
5	111.72	100.00	104.31	291.80	97.08	103.57	172.28	157.60	363.75	140.48	236.93
8	111.54	100.00	104.31	290.36	97.08	103.57	172.23	157.60	361.05	141.21	236.13
9	111.33	100.00	104.31	289.39	97.08	103.57	171.57	157.59	359.37	141.24	235.40
10	111.72	100.00	104.31	287.86	97.08	103.57	171.56	157.69	357.49	141.25	234.58
11	111.27	100.00	104.31	288.10	97.08	103.57	170.89	157.69	357.24	141.33	234.51
12	111.16	100.00	104.31	288.56	97.08	103.57	169.97	157.69	357.21	141.30	234.48
15	110.99	100.00	104.33	288.26	97.08	103.57	169.89	157.69	356.71	141.35	234.29
16	111.43	100.00	104.33	288.22	97.08	103.57	170.21	157.69	356.92	141.34	234.38
17	111.44	100.00	104.33	289.63	97.08	103.57	169.75	157.69	358.08	141.56	235.01
18	111.42	100.00	104.33	288.77	97.08	103.79	169.95	157.69	356.73	141.90	234.59
19	111.13	100.00	104.33	288.40	97.08	103.90	169.48	157.69	355.92	141.92	234.25
22	110.99	100.00	104.33	288.37	97.08	103.90	169.47	157.69	355.91	141.88	234.23
23	110.96	100.00	104.33	288.61	97.08	103.90	169.02	157.69	356.23	141.61	234.22
24	110.93	100.00	104.33	288.81	97.08	103.90	168.75	157.69	356.43	141.51	234.25
25	110.90	100.00	104.33	289.48	97.08	103.90	170.13	157.62	356.92	142.53	235.02
26	110.91	100.00	171.91	288.35	97.08	103.90	170.17	157.62	355.79	147.28	237.10
29	110.90	100.00	171.91	288.69	97.08	103.90	169.69	157.62	355.87	147.28	237.13
30	110.92	100.00	203.97	286.52	97.08	103.90	169.12	157.62	352.86	149.59	237.05
31	110.70	100.00	207.54	285.32	97.08	103.90	168.54	157.62	350.47	150.27	236.37

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.14 Daily Price Index for the Egyptian Capital Market (February 1995)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
1	110.61	100.00	211.18	284.42	97.08	103.90	168.46	157.62	349.33	150.52	235.99
2	110.22	100.00	211.18	284.28	97.08	103.90	168.13	157.62	347.38	150.76	235.29
5	110.12	100.00	215.10	282.22	97.08	103.90	167.45	157.62	345.67	151.01	234.64
6	110.08	100.00	219.23	281.66	97.08	103.90	167.00	157.62	344.64	151.34	234.37
7	110.00	100.00	222.29	281.88	97.08	103.90	166.19	157.62	344.42	151.51	234.36
8	109.97	100.00	222.29	282.29	97.08	103.90	166.15	154.58	343.96	151.74	234.28
9	109.64	100.00	222.29	283.13	97.08	103.90	165.19	154.58	344.69	151.84	234.66
12	109.58	100.00	222.29	281.83	97.08	103.90	165.52	151.70	342.17	151.86	233.56
13	109.48	100.00	222.29	282.88	97.08	103.90	166.96	151.70	343.57	152.01	234.26
14	109.51	100.00	222.29	284.01	97.08	103.90	165.94	151.70	344.18	152.65	234.87
15	109.44	100.00	222.29	284.24	97.08	103.90	166.04	150.66	343.73	153.10	234.95
16	109.36	100.00	222.29	284.96	97.08	103.90	166.03	150.29	344.30	153.29	235.27
19	109.36	100.00	222.29	284.83	97.08	103.90	165.70	147.91	343.14	153.51	234.88
20	109.31	100.00	222.29	284.49	97.08	103.90	165.71	147.06	343.09	153.09	234.61
21	109.23	100.00	222.29	284.85	97.08	103.95	165.58	147.06	342.86	153.53	234.77
22	109.19	100.00	222.29	284.67	97.08	103.95	165.39	146.55	342.42	153.52	234.57
23	109.25	100.00	222.29	283.66	97.08	103.95	165.56	154.87	341.89	152.91	234.00
26	109.02	100.00	222.29	283.56	97.08	103.95	165.40	144.51	341.42	152.85	233.77
27	108.74	100.00	222.29	283.64	97.08	103.95	165.66	144.51	341.48	153.01	233.88
28	108.74	100.00	222.29	284.25	97.08	103.95	165.70	144.51	342.26	153.01	234.22

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.14. Daily Price Index for the Egyptian Capital Market (March 1995)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
1	108.84	100.00	222.29	284.59	97.09	103.95	166.42	144.51	343.15	153.03	234.62
5	109.18	100.00	222.29	285.51	97.09	103.95	166.34	144.51	343.69	153.49	235.11
6	109.60	100.00	222.29	286.71	97.09	103.95	166.98	144.51	345.57	153.52	235.96
7	109.49	100.00	222.29	287.10	97.09	103.95	167.48	144.54	346.30	153.60	236.33
8	109.57	100.00	222.29	288.42	97.09	103.95	167.65	145.90	348.85	153.16	237.22
9	109.57	100.00	222.29	288.27	97.09	103.95	168.28	145.90	349.17	153.10	237.32
12	109.86	100.00	222.29	289.69	97.09	103.95	169.20	146.35	351.25	153.43	238.42
13	110.18	100.00	222.29	291.05	97.09	103.95	169.95	147.71	353.81	153.37	239.52
14	110.25	100.00	222.29	290.30	97.09	103.95	170.74	148.11	353.49	153.38	239.39
15	110.22	100.00	222.29	290.09	97.09	103.95	169.96	148.28	352.66	153.45	239.05
16	110.22	100.00	222.29	290.09	97.09	103.95	169.96	148.28	352.66	153.45	239.06
19	110.19	100.00	222.29	288.21	97.09	103.95	173.06	145.05	351.84	153.28	238.60
20	110.14	100.00	222.29	291.49	97.09	103.95	172.73	145.05	355.12	153.71	240.28
21	110.22	100.00	222.29	290.74	97.09	103.95	171.93	145.05	353.20	154.10	239.65
22	110.22	100.00	222.29	290.61	97.09	103.86	172.07	145.05	353.71	153.63	239.61
23	110.22	100.00	222.29	291.52	97.09	103.86	172.07	145.05	354.18	154.16	240.11
26	110.22	100.00	222.29	291.53	97.09	103.86	171.55	145.05	354.10	153.89	239.93
27	110.22	100.00	222.29	290.88	97.09	103.95	170.65	147.59	353.35	153.84	239.58
28	110.22	100.00	222.29	291.11	97.09	103.95	170.12	148.28	353.40	153.87	239.62
29	110.22	100.00	222.29	289.44	97.09	103.95	169.65	148.28	351.63	153.40	238.58
30	110.22	100.00	222.29	289.62	97.09	103.95	168.67	148.28	351.32	153.31	238.39

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.16. Daily Price Index for the Egyptian Capital Market (April 1995)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
2	110.22	95.80	222.29	289.71	97.09	103.95	169.22	148.28	351.76	153.34	238.60
3	110.22	95.80	222.29	287.78	97.09	103.95	169.22	147.81	350.01	153.03	238.53
4	110.22	95.80	222.29	290.00	97.09	103.95	169.63	148.28	352.76	153.00	238.60
5	109.94	95.80	222.29	294.27	97.09	104.03	167.46	148.28	352.08	156.11	240.98
6	109.85	95.80	222.29	293.17	97.09	104.11	167.48	148.28	350.58	155.92	240.34
9	109.85	95.80	222.29	292.12	97.09	104.32	167.05	148.54	348.34	155.94	239.65
10	109.85	95.80	222.29	287.89	97.09	104.41	166.89	147.96	347.06	152.87	236.69
11	109.85	95.80	222.29	287.42	97.09	104.50	166.97	147.96	346.78	152.67	236.44
12	110.23	95.80	222.29	287.28	97.09	104.56	166.38	147.96	345.45	152.97	236.27
13	110.10	95.80	222.29	283.21	97.09	104.56	166.59	147.96	344.45	150.07	233.54
16	110.10	95.80	222.29	283.21	97.09	104.56	166.59	147.96	344.45	150.07	233.54
17	110.75	95.80	222.29	283.63	97.09	104.65	166.72	147.98	345.37	150.07	233.83
18	110.75	95.80	222.29	284.25	97.09	104.75	174.66	147.98	346.75	152.22	236.05
19	110.75	95.80	222.29	283.67	97.09	104.85	174.41	147.98	345.41	152.23	235.64
20	109.81	95.80	222.29	286.95	97.09	104.96	174.78	147.98	346.28	152.20	235.89
26	109.81	95.80	222.29	283.24	97.09	105.08	174.58	147.98	344.84	152.19	235.43
27	109.81	95.80	222.29	282.89	97.09	105.08	174.64	145.96	343.74	152.22	235.10
30	109.60	95.80	222.30	281.85	97.09	105.08	174.66	145.96	341.84	152.21	234.50

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.17 Daily Price Index for the Egyptian Capital Market (May 1995)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
2	109.60	95.80	222.30	281.49	97.09	105.08	174.66	145.96	341.17	152.21	234.29
3	109.60	95.80	222.30	281.01	97.09	105.08	174.62	145.96	340.25	152.22	234.00
4	109.38	95.80	222.30	276.72	97.09	105.08	174.65	145.96	338.73	149.34	231.13
9	109.71	95.80	222.30	274.90	97.09	105.08	173.97	145.96	335.08	149.27	229.92
14	109.71	95.80	222.30	273.49	97.09	105.20	173.93	145.96	332.98	149.07	229.10
15	109.71	95.80	222.30	270.76	97.09	105.33	173.77	145.30	333.75	146.34	227.06
16	109.71	95.80	222.30	267.03	97.09	105.46	173.78	145.30	332.63	143.74	224.54
17	109.81	95.80	222.30	263.93	97.09	105.60	173.75	145.30	332.38	141.27	222.40
18	109.92	95.80	222.30	264.27	97.09	105.74	173.63	144.65	333.17	141.12	222.53
21	109.73	95.80	222.30	264.75	97.09	105.74	173.33	145.30	333.62	141.28	222.80
22	109.73	95.80	222.30	265.47	97.09	105.74	173.25	145.30	332.01	142.58	223.38
23	110.58	95.80	222.30	267.66	97.09	105.77	174.27	145.30	330.84	145.26	225.25
24	110.58	95.80	222.30	263.81	97.09	105.78	174.87	145.30	329.42	142.87	222.81
25	110.58	95.80	222.30	259.88	97.09	105.94	175.48	145.30	327.82	140.52	220.34
28	110.58	95.80	222.30	262.93	97.09	105.94	175.90	145.30	327.71	143.18	222.52
29	110.58	95.80	222.30	261.65	97.09	105.94	175.95	145.14	328.26	141.87	221.60
31	110.56	95.80	222.30	260.66	97.09	105.94	176.32	145.14	328.72	140.94	220.98

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.18 Daily Price Index for the Egyptian Capital Market (June 1995)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
1	110.04	95.80	222.30	263.11	97.09	105.94	177.19	145.14	328.44	143.36	222.90
4	109.75	95.80	222.30	262.35	97.09	105.94	177.39	145.14	330.62	141.78	222.27
5	109.36	95.80	222.30	263.04	97.09	105.98	178.36	145.14	331.06	142.54	222.97
6	108.98	95.80	222.30	261.41	97.09	105.98	177.68	145.14	329.13	141.23	221.76
7	108.98	95.80	222.30	262.04	97.09	105.98	177.43	145.14	329.76	141.85	222.06
8	108.19	95.80	222.30	261.22	97.09	105.98	177.29	144.32	328.06	141.81	221.49
11	108.19	95.80	222.30	261.22	97.09	105.98	177.29	144.32	328.01	141.81	221.49
12	107.98	95.80	222.30	261.02	97.09	105.98	177.91	144.32	327.91	141.90	221.52
13	107.90	95.80	222.30	260.43	97.09	105.98	178.60	144.32	326.88	142.07	221.34
14	107.90	95.80	222.30	260.43	97.09	105.98	178.60	144.32	326.86	142.07	221.33
15	107.65	95.80	222.30	260.52	97.09	105.98	179.29	144.32	326.70	142.39	221.55
19	107.58	95.80	222.30	259.86	97.09	105.98	179.34	144.32	325.95	142.24	221.19
20	107.58	95.80	222.30	258.86	97.09	105.98	179.12	144.32	323.46	142.43	220.56
21	107.44	95.80	222.30	258.68	97.09	105.83	187.75	144.75	322.91	142.44	220.40
22	107.44	95.80	222.30	258.64	97.09	105.83	187.30	144.75	322.76	142.33	220.27
25	111.08	95.80	222.30	258.81	97.09	105.83	187.83	144.79	323.32	142.54	220.61
26	110.48	95.80	222.30	258.88	97.09	105.83	187.68	144.79	323.33	142.52	220.60
27	110.25	95.80	222.42	258.38	97.09	105.83	187.57	144.93	322.78	142.35	220.29
28	110.11	95.80	222.43	257.88	97.09	105.83	187.76	144.98	322.37	142.19	220.03
29	109.99	95.80	222.43	257.27	98.25	105.83	187.76	144.98	322.31	141.79	221.69

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.19 Daily Price Index for the Egyptian Capital Market (July 1995)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
2	109.80	95.80	222.43	254.41	98.25	105.83	178.65	144.98	321.65	141.79	217.79
3	109.80	95.80	222.43	254.27	98.25	105.83	178.85	144.98	321.53	141.79	217.75
4	109.69	95.80	222.43	253.99	98.25	105.83	178.57	144.98	320.77	139.77	217.52
5	109.69	95.80	222.43	254.26	98.25	105.83	184.50	144.98	325.84	139.76	219.11
6	109.72	95.80	222.43	253.98	98.25	105.83	184.26	144.98	325.12	139.77	218.89
9	109.67	95.80	222.43	252.10	98.25	105.71	183.91	144.98	324.12	138.57	217.58
10	109.77	95.80	222.43	251.34	98.25	105.71	183.83	142.73	323.80	137.83	216.88
11	109.77	95.80	222.43	250.04	98.25	105.71	183.72	142.73	323.02	136.81	215.78
12	109.77	95.80	222.43	246.62	98.25	105.71	183.90	142.73	320.22	136.81	214.51
13	109.77	95.80	222.43	245.21	98.25	105.71	182.62	142.73	314.98	136.11	212.69
16	109.77	95.80	222.43	244.40	98.25	105.55	182.76	139.65	312.97	136.12	212.07
17	109.66	95.80	222.43	244.10	98.25	105.41	182.67	139.65	312.35	136.12	211.87
18	109.57	95.80	222.55	246.68	98.25	105.60	182.65	139.80	312.34	138.25	213.63
19	109.61	95.80	222.68	246.59	98.25	105.60	182.49	139.96	312.06	138.26	213.55
20	109.61	95.80	222.68	244.00	98.25	105.60	182.93	139.92	312.63	136.05	211.90
24	109.61	95.80	222.68	244.04	98.25	105.60	182.01	142.28	313.32	136.02	212.09
25	109.61	95.80	222.68	242.75	98.25	105.60	182.29	142.28	313.20	134.75	211.11
26	109.71	95.80	222.68	242.33	98.25	105.60	181.94	142.28	312.22	134.73	210.69
27	109.73	95.80	222.68	242.64	98.25	105.60	182.29	142.28	310.53	135.88	211.11
30	109.80	95.80	222.68	241.75	98.25	105.60	180.83	142.28	309.39	135.15	210.15
31	109.85	95.80	222.68	243.22	98.25	105.60	180.80	142.28	307.92	137.05	211.25

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.20 Daily Price Index for the Egyptian Capital Market (August 1995)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
1	109.93	95.80	222.68	244.82	80.25	105.60	181.12	142.28	310.18	137.44	212.28
2	109.95	95.80	222.68	245.75	80.25	105.60	180.82	142.28	311.63	137.44	212.73
3	109.96	95.80	222.68	245.76	80.25	105.60	181.20	142.28	311.85	137.44	212.84
6	109.80	95.80	222.68	249.06	80.25	105.60	181.00	142.28	313.10	139.55	214.94
7	109.80	95.80	222.68	248.41	80.25	105.60	181.03	142.28	311.91	139.57	214.58
8	109.80	95.80	222.68	247.73	80.25	105.60	181.04	142.28	310.62	139.59	214.20
10	109.80	95.80	222.68	246.49	80.25	105.46	180.69	142.28	311.11	138.23	213.23
13	110.02	95.80	222.68	245.67	80.25	105.46	180.89	142.28	309.58	138.34	212.83
14	109.97	95.80	222.68	245.87	80.25	105.46	180.56	142.28	310.06	138.19	212.87
15	109.97	95.80	222.68	245.46	80.25	105.46	180.48	142.28	308.91	138.33	212.62
16	110.03	95.80	222.68	246.52	80.25	105.46	180.50	142.28	310.53	138.45	213.23
17	110.04	95.80	222.68	246.55	80.25	105.46	180.48	142.28	310.52	138.46	213.57
20	110.04	95.80	222.68	246.89	80.25	105.46	180.45	142.34	311.14	138.46	213.76
21	110.04	95.80	222.68	245.88	80.25	105.46	180.58	142.42	311.53	137.51	213.09
22	109.99	95.80	222.68	245.26	80.25	105.46	180.65	142.42	311.30	137.12	212.70
23	109.99	95.80	222.68	245.24	80.25	105.46	180.75	142.42	311.40	137.10	212.72
24	109.82	95.80	222.68	245.24	80.25	105.46	180.88	141.59	311.09	137.28	212.77
27	109.89	95.80	222.86	245.14	80.25	105.46	180.89	141.59	310.69	137.31	212.67
28	109.64	95.80	222.99	245.21	80.25	105.46	180.90	141.59	310.87	137.29	212.71
29	109.64	95.80	223.14	245.23	80.25	105.46	180.74	141.59	310.76	137.30	212.68
30	109.61	95.80	223.14	245.30	80.25	105.46	180.57	141.59	310.75	137.30	212.68
31	109.47	95.80	223.14	245.16	80.25	105.46	180.61	141.59	310.35	137.36	212.61

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.21 Daily Price Index for the Egyptian Capital Market (September 1995)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
3	109.47	95.80	223.14	245.44	80.25	105.46	180.71	141.59	310.96	137.35	212.79
4	109.32	95.80	223.14	245.20	80.25	105.46	180.73	141.59	310.79	137.25	212.65
5	109.06	95.80	223.14	244.08	80.25	105.46	180.97	141.59	311.95	135.88	211.88
6	108.90	95.80	223.14	244.61	80.25	105.46	180.82	141.59	312.81	135.88	212.15
7	108.79	95.80	223.14	244.96	80.25	105.46	180.94	141.59	314.34	135.57	212.37
10	108.77	95.80	223.17	244.72	80.25	105.46	180.82	139.29	313.42	135.53	212.05
11	108.77	95.80	223.17	244.48	80.25	105.46	180.88	139.62	313.39	135.42	211.95
12	108.91	95.80	223.17	243.61	80.25	105.46	180.89	139.62	312.43	135.20	211.47
13	110.19	95.80	223.17	243.36	80.25	105.46	181.21	139.62	312.39	135.19	211.45
14	110.19	95.80	223.17	243.18	80.25	105.46	181.00	137.63	311.55	135.16	211.16
17	110.27	95.80	223.17	243.65	80.25	105.46	181.40	137.63	311.88	135.58	211.61
18	110.27	95.80	223.17	243.35	80.25	105.46	181.47	137.81	311.67	135.45	211.47
19	110.27	95.80	223.17	243.46	80.25	105.46	181.64	137.99	312.35	135.36	211.58
20	110.16	95.80	223.17	243.87	80.25	105.46	180.92	137.99	311.88	135.64	211.66
21	110.58	95.80	223.17	243.86	80.25	105.46	181.07	137.99	312.10	135.60	211.70
24	110.58	95.80	223.17	243.53	80.25	105.46	180.41	137.99	311.24	135.51	211.35
25	110.70	95.80	223.17	243.79	80.25	105.46	180.06	137.99	311.45	135.51	211.42
26	112.08	95.80	223.17	244.34	80.25	105.46	180.62	137.99	311.80	136.04	211.96
27	113.36	95.80	223.17	244.56	80.25	105.46	180.66	136.35	313.08	135.57	211.98
28	114.80	95.80	223.17	244.30	80.25	105.46	180.69	136.35	312.31	135.80	211.93

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.22. Daily Price Index for the Egyptian Capital Market (October 1995)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
1	117.63	95.80	223.33	301.64	80.30	105.46	181.57	136.35	313.06	135.33	214.79
2	117.72	95.80	223.48	301.60	80.30	105.46	181.50	136.35	312.94	135.34	214.76
3	117.89	95.80	223.48	301.42	80.30	105.46	181.72	136.35	312.96	135.28	214.77
4	118.55	95.80	223.65	301.48	80.30	105.46	180.57	136.46	312.64	135.13	214.50
5	118.55	95.80	223.65	300.77	80.30	105.60	181.33	136.46	312.12	135.04	214.26
8	121.82	95.80	223.65	300.70	80.30	105.60	181.84	136.46	312.84	135.03	214.22
9	121.73	95.80	223.65	300.63	80.30	105.60	181.32	136.46	312.34	135.02	214.08
10	121.73	95.80	223.65	299.69	80.30	105.60	181.37	136.73	310.50	135.10	213.63
11	122.01	95.80	223.83	299.01	80.30	105.79	181.55	136.73	309.69	135.00	213.34
12	122.01	95.80	223.83	298.96	80.30	105.97	181.76	137.46	310.41	134.80	213.38
15	120.44	95.80	223.83	298.88	80.30	105.97	181.37	137.16	310.44	134.47	213.16
16	120.31	95.80	223.83	298.55	80.30	105.97	181.23	137.16	309.11	134.75	212.99
17	120.28	95.80	223.83	298.19	80.30	105.97	181.07	137.16	308.40	134.73	212.78
18	120.35	95.80	223.83	296.41	80.30	105.90	180.95	137.79	308.44	133.25	211.72
19	120.35	95.80	223.83	296.69	80.30	105.92	180.96	136.80	308.32	133.41	211.81
22	120.33	95.80	223.83	296.76	80.30	105.92	180.78	136.80	308.38	133.38	211.81
23	120.33	95.80	223.83	295.87	80.30	105.92	180.55	136.80	306.85	133.29	211.32
24	120.36	95.80	223.83	295.13	80.30	105.92	180.85	136.80	305.52	133.37	211.01
25	120.36	95.80	223.83	295.49	80.30	105.97	180.91	136.80	306.42	133.30	211.21
26	120.36	95.80	223.83	295.75	80.30	105.98	180.49	137.37	306.47	133.38	211.28
29	120.29	95.80	223.83	295.36	80.30	105.98	180.08	135.91	305.18	133.36	210.91
30	120.60	95.80	223.83	295.36	80.30	105.98	179.98	135.91	305.24	133.32	210.90
31	120.60	95.80	223.83	295.48	80.30	105.98	179.83	135.71	305.28	133.33	210.92

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.23 Daily Price Index for the Egyptian Capital Market (November 1995)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
1	109.77	95.80	223.55	294.37	80.30	99.79	219.39	133.43	321.41	143.82	210.53
2	109.77	95.80	223.55	294.17	80.30	99.79	219.76	132.78	321.47	143.74	210.20
5	109.77	95.80	223.55	294.17	80.30	99.79	219.76	132.78	321.47	143.74	210.78
6	109.40	95.80	223.55	293.58	80.30	99.79	219.62	132.98	320.26	143.80	210.80
7	109.27	95.80	223.74	294.07	80.30	99.79	218.92	132.98	320.55	143.78	210.68
8	108.36	95.80	223.74	294.18	80.30	99.79	218.83	139.30	321.92	143.70	210.41
9	107.66	95.80	223.74	293.88	80.30	99.79	218.59	139.30	321.38	143.63	210.56
10	107.66	95.80	223.74	293.92	80.30	99.79	218.59	139.30	321.45	143.63	210.63
13	106.99	95.80	223.74	294.49	80.30	99.79	218.12	139.30	321.99	143.90	211.74
14	106.84	95.80	223.94	294.99	80.30	99.79	219.68	139.30	323.67	143.73	212.02
15	106.84	95.80	223.94	294.94	80.30	99.79	219.22	139.30	323.32	143.70	212.11
16	106.84	95.80	224.14	295.64	80.30	99.79	219.23	139.30	323.43	144.16	212.63
19	106.96	95.80	224.14	298.21	80.30	99.79	219.05	139.30	323.47	145.63	211.83
20	107.12	95.80	224.14	298.75	80.30	99.79	218.81	139.30	321.10	146.67	210.85
21	107.12	95.80	224.14	297.90	80.30	99.79	218.64	139.30	320.77	146.20	211.90
22	107.36	95.80	224.36	297.47	80.30	99.84	218.73	139.35	320.94	145.93	210.97
23	107.34	95.80	224.36	298.00	80.30	99.88	218.80	139.32	320.92	146.26	212.03
26	107.34	95.80	224.36	298.48	80.30	99.88	218.97	139.35	321.52	146.38	212.85
27	107.29	95.80	224.36	298.24	80.31	99.88	218.97	139.37	320.92	146.43	212.00
28	107.29	95.80	224.36	300.21	80.31	99.88	218.95	139.37	323.12	146.87	212.99
29	107.12	95.80	224.36	300.83	80.31	99.88	218.77	139.37	323.09	147.20	213.26
30	106.99	95.80	224.36	298.58	80.31	99.88	218.66	139.37	322.48	147.23	212.66

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.24 Daily Price Index for the Egyptian Capital Market (December 1995)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
3	107.12	95.80	224.36	289.44	80.31	99.88	218.63	139.37	322.19	147.23	212.59
4	106.99	95.80	224.36	289.30	80.31	99.88	218.32	137.17	321.12	147.25	212.33
5	105.84	95.80	224.36	291.10	80.31	99.88	218.55	135.11	324.50	147.16	213.12
6	105.98	95.80	224.36	290.80	80.31	99.88	218.01	133.16	323.17	147.14	212.76
7	106.01	95.80	224.36	290.69	81.42	99.88	218.09	133.16	323.20	147.09	212.72
10	106.45	95.80	224.36	291.54	81.42	99.88	218.28	133.16	324.17	147.25	213.19
11	105.61	95.80	224.36	288.28	81.42	99.88	218.07	133.16	322.14	145.76	211.29
12	105.61	95.80	224.36	287.06	81.42	99.88	218.18	135.00	322.13	144.98	210.60
13	105.60	95.80	224.36	290.20	81.42	99.88	221.44	135.00	324.38	147.12	213.05
14	104.97	95.80	224.36	289.85	81.42	99.88	221.51	133.18	323.21	147.08	212.71
17	104.84	95.80	224.36	289.79	81.42	99.88	221.69	133.18	323.25	147.07	212.70
18	104.97	95.80	224.36	287.72	81.42	99.88	221.89	133.18	322.20	146.19	211.68
19	104.97	95.80	224.36	284.55	81.42	99.88	222.06	133.18	318.94	145.40	210.15
20	104.84	95.80	224.36	283.51	81.42	99.88	221.81	133.02	317.91	144.97	219.52
21	104.84	95.80	224.36	284.42	81.42	99.88	221.95	133.02	320.91	146.55	212.91
24	104.21	95.80	224.36	283.93	81.42	99.88	222.13	138.39	320.75	146.68	212.98
25	103.46	95.80	224.36	282.16	81.42	99.88	223.02	136.63	316.61	147.03	212.23
26	103.46	95.80	224.36	282.07	81.42	99.88	223.26	136.63	315.79	147.28	212.24
27	103.46	95.80	224.36	281.83	81.42	99.88	225.42	136.63	315.00	147.88	212.56
28	103.96	95.80	224.36	283.96	81.42	111.01	225.64	136.67	317.59	148.73	213.95
31	103.83	95.80	224.36	282.80	81.42	111.01	225.38	136.51	317.25	147.98	213.21

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.25 Daily Price Index for the Egyptian Capital Market (January 1996)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
1	102.99	95.80	224.36	282.53	113.31	111.01	224.87	136.51	316.33	147.98	212.98
2	102.99	95.80	224.36	281.59	113.31	111.67	224.37	136.51	313.91	148.65	212.94
3	102.81	95.80	224.36	279.84	113.31	111.67	224.23	136.51	313.60	147.35	211.90
4	102.81	95.80	224.36	279.46	113.31	111.67	224.15	136.99	312.88	147.54	211.73
8	102.34	95.80	224.36	279.43	113.31	111.67	223.32	137.15	312.47	147.45	211.54
9	102.34	95.80	224.36	278.77	113.31	111.67	223.92	136.51	311.32	147.49	211.29
10	102.34	95.80	224.36	277.95	113.31	111.67	224.04	136.51	311.18	147.09	210.90
11	102.19	95.80	224.36	278.27	113.31	111.67	223.63	137.16	311.21	147.20	211.01
14	102.19	95.80	224.36	277.69	113.31	111.67	223.55	137.16	309.62	147.37	210.75
15	102.04	95.80	224.36	277.18	113.31	111.67	223.16	137.16	308.43	147.33	210.86
16	102.04	95.80	224.36	276.72	113.31	111.67	222.21	137.47	306.97	147.30	210.81
17	102.83	95.80	224.36	276.61	113.31	113.30	222.51	137.47	306.69	147.46	210.88
18	103.00	95.80	224.36	277.58	113.31	113.30	222.31	137.47	308.32	147.51	211.34
21	103.66	95.80	224.36	277.05	113.31	113.30	220.74	137.47	306.99	147.26	210.78
22	103.82	95.80	224.36	276.59	113.31	113.30	220.59	137.15	308.67	146.96	210.94
23	103.71	95.80	224.36	276.17	113.31	113.30	220.18	137.15	307.89	146.48	210.65
24	103.70	95.80	224.36	276.51	113.31	113.30	220.31	137.15	308.30	146.95	210.84
25	103.70	95.80	224.36	271.20	113.31	113.30	219.89	137.15	307.60	146.88	210.61
28	103.60	95.80	224.36	275.79	113.31	113.30	218.82	137.47	306.25	146.81	210.20
29	103.65	95.80	224.36	272.39	113.31	113.30	216.95	137.47	305.68	144.61	208.16
30	103.67	95.80	224.36	268.99	113.31	113.30	216.56	137.47	305.06	142.77	206.40
31	103.70	95.80	224.36	266.13	113.31	113.30	216.14	137.47	302.94	141.67	204.91

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.26 Daily Price Index for the Egyptian Capital Market (February 1996)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
1	103.80	95.80	224.36	267.45	113.13	113.30	216.68	137.47	303.04	142.52	205.67
4	103.90	95.80	224.36	266.19	113.13	113.30	216.54	137.47	300.39	142.55	205.03
5	103.90	95.80	224.36	265.79	113.13	134.30	217.13	137.47	301.20	142.22	204.95
6	103.90	95.80	224.36	265.76	113.13	134.30	216.94	137.47	300.62	142.33	204.89
7	103.94	95.80	224.36	265.74	113.13	134.30	217.31	137.47	300.42	142.47	204.97
8	103.94	95.80	224.36	265.48	113.13	134.30	218.09	137.47	301.53	142.18	204.99
11	104.22	95.80	224.36	265.97	113.13	134.30	218.87	137.47	302.31	142.42	204.40
12	104.37	95.80	224.36	262.94	113.13	134.30	218.67	137.47	302.18	140.37	203.95
13	104.53	95.80	224.36	263.87	113.13	134.30	219.50	137.47	303.48	140.62	204.14
14	104.53	95.80	224.36	264.28	113.13	134.30	219.93	137.15	304.11	140.75	204.41
15	104.55	95.80	224.36	264.29	113.13	134.30	219.33	136.19	304.20	140.74	204.43
18	104.55	95.80	224.36	265.27	113.13	134.30	219.27	135.87	304.02	141.22	204.79
19	104.55	95.80	224.36	264.19	113.13	134.30	219.04	135.23	302.58	140.97	204.21
22	104.55	95.80	224.36	265.93	113.13	134.30	218.82	135.23	303.92	141.52	205.02
25	104.55	95.80	224.36	265.94	113.13	134.30	217.60	134.91	303.61	141.58	205.00
26	104.55	95.80	224.36	267.61	113.13	134.30	216.29	135.23	301.08	142.41	205.59
27	104.42	95.80	224.36	267.72	113.13	134.30	214.33	135.23	301.53	142.66	205.41
28	104.42	95.80	224.36	267.33	113.13	134.30	214.32	136.03	300.48	142.33	204.86
29	104.42	95.80	224.36	267.52	113.13	134.30	218.82	136.03	300.30	142.51	204.97

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.27 Daily Price Index for the Egyptian Capital Market (March 1996)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
3	104.42	95.80	224.36	267.47	113.13	134.30	213.52	136.35	299.88	142.51	204.86
4	104.65	95.80	224.36	266.78	113.13	134.30	211.68	136.35	299.32	141.80	204.10
5	104.65	95.80	224.36	266.09	113.13	134.46	211.25	136.52	297.60	141.83	203.69
6	104.65	95.80	224.36	266.42	113.13	134.46	211.30	136.55	297.48	142.08	203.88
7	104.54	95.80	224.36	266.64	113.13	134.46	211.23	136.55	297.46	142.19	203.97
10	104.71	95.80	224.36	266.55	113.13	134.46	211.30	136.55	297.21	142.32	203.61
11	104.70	95.80	224.36	266.74	113.13	134.46	209.99	136.52	295.52	142.61	203.40
12	106.59	95.80	224.36	267.26	113.13	134.46	208.50	136.64	295.75	142.49	203.36
13	106.47	95.80	224.36	267.36	113.13	134.46	208.56	136.78	296.08	142.47	203.42
14	106.48	95.80	224.36	267.54	113.13	134.46	206.97	136.78	295.62	142.34	203.20
17	106.35	95.80	224.36	265.33	113.13	134.46	205.38	136.78	292.83	141.43	201.70
18	106.26	95.80	224.36	265.00	113.13	134.46	203.61	139.93	291.26	141.30	201.18
19	107.50	95.80	224.36	262.64	113.13	134.46	204.21	136.93	291.12	139.97	199.99
20	107.39	95.80	224.36	262.81	113.13	134.55	206.17	137.06	292.55	140.11	200.48
21	107.39	95.80	224.36	267.14	113.13	134.55	209.63	136.93	294.86	142.91	203.49
24	107.80	95.80	224.36	267.03	113.13	134.55	209.76	136.83	294.64	142.99	203.46
25	107.86	95.80	224.36	265.75	113.13	134.55	209.26	136.83	293.61	142.31	202.66
26	109.02	95.80	224.36	265.48	113.13	134.55	208.88	136.35	292.85	142.30	202.45
27	108.70	95.80	224.36	265.82	113.13	134.55	208.78	136.34	293.72	142.21	202.47
28	118.85	95.80	224.36	266.18	113.13	134.55	209.17	136.43	295.15	142.47	203.06
31	118.72	95.80	224.36	265.20	113.13	134.55	208.32	136.82	293.23	142.30	202.43

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.28 Daily Price Index for the Egyptian Capital Market (April 1996)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
1	118.71	95.80	224.36	263.92	113.13	134.55	207.10	136.73	291.82	141.60	201.46
2	118.66	95.80	224.43	263.55	113.13	134.55	207.02	136.64	291.03	141.59	201.26
3	117.01	95.80	224.43	262.78	113.13	134.55	206.15	136.64	288.60	141.60	200.64
4	119.49	95.80	224.43	261.47	113.13	134.55	205.89	136.64	286.43	141.55	200.07
8	119.35	95.80	224.43	261.47	113.13	134.55	205.89	136.64	287.31	140.94	199.78
9	119.48	95.80	224.43	261.58	113.13	134.55	205.58	136.64	288.56	140.82	200.00
10	119.35	95.80	224.43	261.05	113.13	134.55	204.26	136.64	289.27	140.26	199.69
11	121.11	95.80	224.43	261.82	113.13	134.55	204.18	136.87	288.48	140.73	199.90
16	121.04	95.80	224.43	261.53	113.13	134.55	204.30	136.87	288.50	140.57	199.76
17	121.04	95.80	224.43	263.39	113.13	134.55	203.00	136.87	288.27	141.39	200.42
18	120.94	95.80	224.43	263.61	113.13	134.55	204.51	136.87	288.94	141.66	200.82
21	123.34	95.80	224.43	262.72	113.13	134.55	204.12	136.86	287.90	141.45	200.37
22	123.36	95.80	224.43	264.40	113.13	134.55	203.63	136.86	287.23	141.33	200.10
23	124.66	95.80	224.43	262.07	113.13	134.55	203.20	137.29	286.68	141.27	199.91
24	124.10	95.80	224.43	262.19	113.13	134.55	202.44	137.29	286.01	141.33	199.79
30	124.81	95.80	224.43	262.77	113.13	134.55	202.29	137.29	286.75	141.39	200.03

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.29 Daily Price Index for the Egyptian Capital Market (May 1996)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
2	123.83	95.80	224.43	261.79	113.31	134.55	202.92	137.29	285.71	141.28	199.68
5	133.30	95.80	224.43	261.87	113.31	134.55	205.34	136.50	288.67	141.34	200.48
6	133.29	95.80	224.43	261.84	113.31	134.55	205.22	136.50	288.45	141.36	200.44
7	133.18	95.80	224.43	261.22	113.31	134.55	205.52	136.31	287.21	141.41	200.16
8	137.60	95.80	224.43	261.22	113.31	134.55	205.50	136.31	288.46	141.20	200.30
9	141.82	95.80	224.43	261.27	113.31	134.55	206.34	136.47	288.05	141.71	200.64
12	141.57	95.80	224.43	263.05	113.31	134.55	204.11	136.47	298.06	141.97	201.03
13	139.01	95.80	224.43	263.99	113.31	134.55	205.34	136.27	290.47	142.25	201.63
14	138.96	95.80	224.43	265.81	113.31	134.55	206.15	136.49	294.55	142.32	200.70
15	138.88	95.80	224.43	265.41	113.31	134.55	205.27	136.49	293.99	141.96	202.33
16	138.86	95.80	224.43	266.42	113.31	134.55	205.41	137.19	293.77	142.71	204.72
20	137.32	95.80	224.43	266.55	113.31	134.67	205.25	136.55	292.31	143.08	204.83
21	141.12	95.80	224.43	266.30	113.31	134.67	204.73	136.55	290.94	143.38	204.72
22	140.97	95.80	224.43	266.43	113.31	134.67	205.47	136.59	291.10	143.52	204.88
23	140.97	95.80	224.43	266.22	113.31	134.67	205.44	137.23	292.26	143.15	204.85
26	140.97	95.80	224.43	264.98	113.31	134.67	205.27	137.26	290.29	142.99	204.21
27	140.97	95.80	224.43	263.75	113.31	134.67	205.48	137.23	289.27	142.64	203.65
28	140.95	95.80	224.43	263.28	113.31	134.67	205.53	137.26	288.93	142.49	203.60
29	145.75	95.80	224.43	264.37	113.31	134.67	205.42	137.58	291.29	142.59	204.26
30	143.14	95.80	224.43	264.13	113.31	134.67	205.79	137.65	290.20	142.73	204.03

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.30 Daily Price Index for the Egyptian Capital Market (June 1996)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
2	143.14	95.80	224.88	264.51	113.31	134.67	205.79	137.01	290.29	142.89	204.33
3	141.49	95.80	224.88	263.20	113.13	134.67	205.94	137.01	289.84	142.16	203.58
4	141.22	95.80	224.88	262.47	113.31	134.67	206.24	137.02	288.96	142.06	203.27
5	141.22	95.80	224.88	262.35	113.31	134.67	206.16	137.02	288.91	141.98	203.29
6	141.22	95.80	224.88	262.46	113.31	134.67	205.32	137.02	288.42	141.91	203.00
9	142.74	95.80	224.88	262.80	113.31	134.67	205.32	137.02	289.17	141.94	203.23
10	142.67	95.80	224.88	262.11	113.31	134.67	205.81	137.32	289.80	141.39	202.89
11	142.37	95.80	224.88	261.47	113.31	134.67	205.89	137.50	290.07	140.94	202.55
12	142.75	95.80	224.88	260.27	113.31	134.67	206.35	137.50	289.93	140.61	202.28
13	142.75	95.80	224.88	261.33	113.31	134.67	207.79	137.69	290.67	141.06	202.86
16	144.37	95.80	224.88	261.27	113.31	134.67	207.81	137.72	290.58	141.12	202.90
17	144.37	95.80	224.88	259.49	113.31	134.67	207.79	137.72	290.38	140.15	202.00
18	144.37	95.80	224.88	260.70	113.31	134.67	208.40	137.79	289.70	141.18	202.71
19	144.43	95.80	224.88	260.86	113.31	134.67	207.92	137.84	289.34	141.38	202.73
20	144.43	95.80	224.88	260.59	113.31	134.67	209.35	137.26	289.29	141.46	202.87
23	144.45	95.80	224.88	260.79	113.31	134.67	207.98	137.14	288.40	141.47	202.72
24	144.43	95.80	224.88	261.34	113.31	134.67	206.87	136.02	288.25	141.55	202.80
25	144.43	95.80	224.88	262.08	113.31	134.67	205.53	137.78	289.80	141.31	203.07
26	144.43	95.80	224.88	261.94	113.31	134.67	204.16	137.84	289.32	141.06	202.71
27	144.43	95.80	224.88	262.41	113.31	134.67	205.97	137.90	288.89	141.88	203.03
30	144.37	95.80	224.88	264.41	113.31	134.67	205.69	137.90	289.42	142.93	204.55

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.31. Daily Price Index for the Egyptian Capital Market (July 1996)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
2	144.35	95.80	224.88	263.50	113.31	134.67	203.83	137.86	288.51	142.19	203.68
3	144.30	95.80	224.88	263.33	113.31	134.67	203.14	137.86	287.52	142.17	203.50
4	144.24	95.80	224.88	264.18	113.31	134.67	202.48	137.88	287.06	142.64	203.79
7	144.24	95.80	224.88	264.18	113.31	134.67	202.48	137.88	289.20	143.95	204.39
8	144.22	95.80	224.88	263.82	113.31	134.67	204.65	137.88	284.47	143.94	204.33
9	144.22	95.80	224.88	264.44	113.31	134.67	204.70	136.31	283.32	144.42	204.49
10	144.22	95.80	226.12	265.22	113.31	141.66	204.68	135.96	283.69	144.98	205.22
11	144.22	95.80	226.12	265.95	113.31	141.66	204.93	135.96	283.61	145.18	205.70
14	144.22	95.80	226.12	267.84	113.31	141.66	207.73	136.34	288.53	145.81	207.54
15	144.69	95.80	226.12	270.41	113.31	141.66	212.71	136.39	283.63	146.97	210.18
16	144.24	95.80	226.12	271.25	113.46	141.66	235.77	136.40	312.56	147.44	215.58
17	145.08	95.80	226.12	273.80	113.46	141.66	236.96	136.02	314.74	148.66	217.11
18	145.33	95.80	226.12	277.54	113.39	141.66	232.27	136.02	312.42	150.63	218.19
21	147.83	95.80	226.12	279.91	113.39	141.66	229.25	136.02	311.94	151.51	218.72
22	142.67	95.80	226.12	282.16	113.39	141.66	228.97	136.02	313.36	152.16	219.98
24	142.59	95.80	226.12	287.28	113.39	141.66	230.12	136.02	317.14	154.42	223.20
25	147.77	95.80	226.12	290.17	113.39	141.66	228.79	138.73	318.55	155.72	224.91
29	147.79	95.80	226.12	302.54	113.39	141.66	229.34	141.29	329.19	160.16	231.49
30	147.81	95.80	226.12	306.00	113.39	141.66	229.82	144.47	331.20	161.95	233.39
31	147.58	95.80	226.12	302.45	113.39	141.66	235.51	145.11	328.84	161.94	232.95

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.32 Daily Price Index for the Egyptian Capital Market (August 1996)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
1	147.81	95.80	224.88	301.02	113.39	141.66	236.01	145.75	326.06	162.25	232.57
4	147.81	95.80	224.88	298.10	113.31	141.66	235.99	145.76	324.60	161.02	231.04
5	147.81	95.80	224.88	292.15	113.46	141.66	235.39	145.76	320.66	158.65	227.93
6	147.81	95.80	224.88	289.81	113.46	141.66	234.21	146.56	317.96	157.79	226.41
7	147.96	95.80	224.88	288.89	113.46	141.66	233.41	146.56	316.04	157.80	225.96
8	147.83	95.80	224.88	293.33	113.46	141.66	233.11	147.36	318.94	159.45	228.10
11	147.24	95.80	226.12	295.44	113.46	141.66	233.65	147.43	321.40	159.98	229.13
12	146.60	95.80	226.12	292.96	113.46	141.66	233.44	147.43	319.59	158.93	227.82
13	144.12	95.80	226.12	295.16	113.46	141.66	234.15	148.38	323.98	159.08	229.12
14	144.12	95.80	226.12	296.48	113.46	141.66	234.60	148.38	324.50	159.73	229.77
15	144.12	95.80	226.12	296.48	113.46	141.66	234.60	148.38	324.48	159.73	229.76
18	144.05	95.80	226.12	295.02	113.46	141.66	234.86	148.37	326.07	158.45	229.22
19	144.12	95.80	226.12	297.13	113.46	141.66	241.97	148.24	330.04	160.08	231.72
20	144.64	95.80	226.12	300.76	113.46	141.66	242.15	148.49	337.35	160.08	233.55
21	144.64	95.80	226.12	299.85	113.46	141.66	245.07	148.49	334.98	160.97	233.78
22	144.64	95.80	226.12	298.46	113.46	141.66	246.83	149.06	335.17	160.49	233.48
25	142.09	95.80	226.12	299.70	113.46	141.66	247.57	149.06	335.91	161.13	234.29
26	141.48	95.80	226.12	296.90	113.46	141.66	253.11	149.06	338.57	160.00	234.02
27	141.48	95.80	226.12	297.84	113.46	141.66	252.45	149.06	337.53	160.69	234.29
28	141.48	95.80	226.12	297.84	113.46	141.66	256.45	149.06	339.55	160.60	234.81
29	141.48	95.80	226.12	297.84	113.46	141.66	256.45	148.94	340.62	160.64	234.87

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.33 Daily Price Index for the Egyptian Capital Market (September 1996)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
1	141.48	95.80	226.12	297.84	113.46	141.66	256.45	148.94	339.48	160.64	234.48
2	141.48	95.80	226.12	297.84	113.46	141.66	256.45	148.94	340.50	160.64	234.87
3	140.21	95.80	226.12	297.94	113.46	141.66	257.45	149.43	339.48	160.65	234.89
4	140.21	95.80	226.12	298.00	113.46	141.66	265.19	149.43	344.07	160.71	235.18
5	140.21	95.80	226.12	298.01	113.46	141.66	270.11	149.43	345.26	160.72	235.99
8	142.26	95.80	226.12	298.03	113.46	141.66	273.52	152.57	353.81	160.72	237.02
9	142.26	95.80	226.12	298.02	113.46	141.66	274.93	152.57	352.01	160.72	236.93
10	142.26	95.80	226.12	298.03	113.46	141.66	274.43	152.57	349.22	160.73	236.51
11	142.26	95.80	226.12	298.04	113.46	141.66	275.90	152.57	350.95	160.74	236.74
12	142.37	95.80	226.12	298.05	113.49	141.66	275.09	154.75	350.39	160.74	236.73
15	142.37	95.80	226.12	298.50	113.49	141.66	274.12	154.00	348.79	160.75	236.28
16	142.37	95.80	226.12	297.19	113.46	141.66	278.82	154.00	352.43	160.28	236.45
17	142.94	95.80	226.12	297.22	113.46	141.66	280.57	159.00	351.73	160.29	236.37
18	144.22	95.80	226.12	297.26	113.46	141.66	281.84	160.80	356.29	159.94	235.92
19	148.92	95.80	226.12	297.27	113.46	141.66	283.57	165.80	358.87	159.94	236.04
22	148.35	95.80	226.12	297.28	113.46	141.66	283.50	175.50	363.58	159.94	236.71
23	147.90	95.80	226.12	297.29	113.46	141.66	285.45	185.46	366.58	159.94	236.95
24	147.47	95.80	226.12	297.29	113.46	141.66	285.80	190.50	368.84	159.94	237.12
25	147.07	95.80	226.12	297.02	113.46	141.66	284.80	196.49	369.17	159.80	237.08
26	148.29	95.80	226.12	298.39	113.46	141.66	285.67	196.49	368.65	159.92	237.53
29	148.29	95.80	226.12	298.85	113.46	141.66	286.67	196.49	368.44	161.43	237.87
30	148.09	95.80	226.12	297.29	113.46	141.17	286.26	196.49	364.81	161.41	237.36

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.34 Daily Price Index for the Egyptian Capital Market (October 1996)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
1	148.09	95.80	226.12	295.89	113.46	141.17	287.35	196.49	360.62	161.93	233.74
2	148.09	95.80	226.12	298.55	113.46	141.17	285.94	196.49	364.37	162.23	234.92
3	148.09	95.80	226.12	298.38	113.46	141.17	284.11	195.11	362.19	162.34	234.49
7	148.09	95.80	226.12	297.63	113.46	141.17	283.85	195.11	359.29	162.63	234.05
8	148.09	95.80	226.12	296.99	113.46	141.17	282.63	196.15	357.45	162.57	233.55
9	148.09	95.80	226.12	296.70	113.46	141.17	282.79	196.15	358.72	162.68	233.95
10	148.09	95.80	226.12	297.88	113.46	141.17	283.63	196.61	359.31	162.79	234.20
13	148.09	95.80	226.12	297.69	113.46	141.17	283.39	196.61	359.15	162.68	234.06
14	148.09	95.80	226.12	297.74	113.46	141.17	288.20	200.75	361.27	163.16	235.01
15	148.09	95.80	226.12	295.97	113.49	141.17	293.75	197.99	359.02	163.62	234.87
16	148.09	95.80	226.12	293.23	113.49	142.58	291.74	198.68	359.57	162.88	233.12
17	148.09	95.80	226.12	292.85	113.49	142.58	290.23	198.85	352.55	162.94	232.68
20	148.04	95.80	226.12	292.83	113.46	142.58	290.83	199.37	352.51	163.07	232.79
21	148.04	95.80	226.12	292.45	113.46	142.58	291.98	199.30	353.09	163.47	233.30
22	148.04	95.80	226.12	293.65	113.46	142.60	292.85	197.99	352.47	163.86	233.50
23	148.04	95.80	226.12	293.85	113.46	142.60	295.31	197.99	352.47	164.42	234.00
24	150.48	95.80	226.12	293.33	113.46	142.60	297.01	197.99	351.07	164.83	234.03
27	152.78	95.80	226.12	293.92	113.46	142.64	298.86	200.06	349.60	165.44	234.22
28	152.78	95.80	226.12	291.68	113.46	142.24	305.21	200.06	346.55	166.66	234.58
29	152.78	95.80	226.12	292.17	113.46	141.22	311.26	197.82	345.57	168.18	235.71
30	152.78	95.80	226.12	292.78	113.46	140.86	313.24	197.82	346.11	168.74	236.35
31	155.22	95.80	226.12	292.65	113.46	140.07	312.76	197.61	345.22	168.79	236.17

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.35. Daily Price Index for the Egyptian Capital Market (November 1996)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
3	155.22	95.80	226.12	293.29	113.46	140.07	311.46	196.96	345.56	168.92	236.38
4	155.22	95.80	226.12	292.88	113.46	140.07	309.28	196.96	345.53	168.23	235.75
5	155.22	95.80	226.12	299.56	113.46	140.17	307.65	196.96	358.79	168.29	239.03
6	155.22	95.80	226.12	300.55	113.46	140.17	307.53	196.61	359.47	168.66	239.52
7	155.22	95.80	226.12	300.92	113.46	140.17	309.14	195.97	359.68	169.08	239.96
10	155.22	95.80	226.12	300.90	113.49	140.17	308.97	195.97	358.75	169.29	239.92
11	155.22	95.80	226.48	301.06	113.49	140.17	307.44	195.97	358.00	169.32	239.77
12	155.28	95.80	226.48	302.61	113.46	139.39	308.36	196.66	360.89	169.65	240.76
13	155.28	95.80	226.48	302.66	113.46	139.39	310.07	196.66	360.31	170.12	241.05
14	155.28	95.80	226.48	303.11	113.46	139.39	311.73	199.42	360.21	170.82	241.65
17	155.28	95.80	226.48	304.31	113.46	139.39	313.72	199.42	361.54	172.52	242.60
18	155.28	95.80	226.48	304.83	113.46	139.39	314.63	198.04	361.69	171.89	242.98
19	155.28	95.80	226.48	306.81	113.46	139.39	317.44	198.04	365.51	172.52	244.48
20	155.28	95.80	226.48	309.53	113.46	139.39	332.71	199.42	370.36	175.60	248.43
21	155.28	95.80	226.48	319.44	113.46	139.39	334.24	199.42	378.98	179.38	253.94
24	155.28	95.80	226.48	331.55	113.46	139.39	335.40	199.42	392.42	183.07	260.54
25	155.28	95.80	226.48	335.59	113.46	139.39	334.89	199.42	392.78	185.26	262.60
26	155.28	95.80	226.48	342.99	113.46	139.39	338.50	199.42	404.86	187.00	267.11
27	155.28	95.80	226.48	346.82	113.46	139.39	337.35	200.11	409.15	187.91	268.97
28	155.28	95.80	226.48	352.21	113.46	139.39	340.25	199.42	419.90	188.67	272.27

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix C.36. Daily Price Index for the Egyptian Capital Market (December 1996)

Date	Agriculture Sector	Mining Sector	Construction Sector	Manufacturing Sector	Transportation Sector	Trade Sector	Finance Sector	Services Sector	Public subscription	Closed subscription	General Index
1	155.28	95.80	226.48	358.39	113.46	139.39	344.10	199.42	430.60	190.10	276.17
2	155.28	95.80	226.48	357.31	113.46	139.39	346.74	200.11	432.83	189.37	276.05
3	155.28	95.80	226.48	358.33	113.46	139.39	348.49	200.11	433.24	190.17	276.00
4	155.28	95.80	226.48	357.52	113.46	139.39	359.33	200.11	433.10	191.67	278.19
5	155.28	95.80	226.48	353.72	113.46	139.39	375.20	200.29	425.89	194.23	278.74
8	155.00	95.80	226.48	356.80	113.46	139.39	382.93	200.11	430.91	196.06	281.61
9	155.00	95.80	226.48	359.67	113.46	139.39	380.25	202.88	431.15	197.31	282.80
10	155.00	95.80	226.48	365.69	113.46	139.41	382.89	202.88	433.59	200.66	286.41
11	155.00	95.80	226.48	367.02	113.46	139.41	389.27	202.88	435.69	202.01	288.14
12	155.00	95.80	226.48	366.08	113.46	139.41	389.95	202.88	434.81	201.82	287.76
15	155.00	95.80	226.48	364.28	113.46	139.41	394.36	202.88	438.00	200.69	287.52
16	154.03	95.80	226.48	362.88	113.46	139.41	398.07	203.57	433.28	201.82	287.38
17	154.03	95.80	226.48	362.36	113.46	139.41	402.74	206.33	434.95	202.01	287.96
18	154.03	95.80	226.48	361.30	113.46	139.41	405.03	206.33	433.92	202.07	287.76
19	154.03	95.80	226.48	357.04	113.46	139.41	412.76	207.71	427.17	202.83	286.80
22	154.03	95.80	226.48	356.38	113.46	139.41	415.59	209.09	429.04	202.49	286.95
23	153.75	95.80	226.48	353.45	113.46	139.41	411.38	209.09	427.40	200.45	284.72
24	153.47	95.80	226.48	355.33	113.46	139.41	412.33	211.16	429.28	201.29	285.93
25	153.25	95.80	226.48	356.31	113.49	138.82	410.10	214.61	431.42	201.01	286.20
26	172.51	95.80	226.48	355.57	113.49	138.82	419.72	216.69	431.61	202.62	287.70
29	172.29	95.80	226.48	354.37	113.49	137.87	431.27	216.07	432.44	203.72	288.89
30	172.07	95.80	226.48	359.36	113.46	137.87	433.12	216.76	440.76	204.75	291.85
31	171.84	95.80	226.48	364.09	113.46	137.87	447.51	216.76	459.55	205.04	296.68

Capital Market Authority, Securities Market in Egypt, Monthly Statistical Report

Appendix D

Collected and Aanalyzed Data of the Selected Sample of the Egyptian Privatized Companies

Appendix D-1 Offering Dates and the First Trading Day of the Selected Sample of Egyptian Privatised Companies

Code	Enterprise	Offering Date	Date of the first trading day
1.	**Torah Portland Cement**	30-11-1994	03-04-95
2.	**Ameriya Cement**	08-01-1995	02-02-95
3.	**Helwan Cement**	05-11-1995	30-11-95
4.	**Paints & Chem. industries**	01-09-1994	09-10-94
5.	**Extracted Oil Co.**	30-03-1995	21-09-95
6.	**Eastern Co. for Tobacco**	21-06-1995	04-01-96
7.	**Arabia Ginning Co.**	19-09-1996	03-10-96
8.	**Arabia Drug Co.**	03-10-1996	24-10-96
9.	**Egyptian Elector Cables**	23-02-1995	05-04-95
10.	**Egy. Starch & Glucose**	19-06-1996	20-06-96
11.	**El Nasr for Crops Drying**	15-08-1996	01-09-96
12.	**Nile for Pha. & Chemicals**	07-05-1995	22-06-95
13.	**Alexandria for Ph. & Chemicals**	14-05-1995	08-06-95
14.	**Alexandria Portland Cement**	27-12-1995	28-12-95
15.	**El Nasr Clo. & Textile Co.**	12-02-1995	12-02-95
16.	**Al Ahram Beverage Co.**	25-07-1996	22-08-96
17.	**Kafr El Zaiat for Insecticides &**	15-08-1996	22-08-96
18.	**Misr for Oils & Soup**	15-08-1996	22-08-96
19.	**East Delta Flour Mills**	07-10-1996	10-10-96
20.	**North Cairo Flour Mills**	29-05-1995	21-09-95
21.	**Upper Egypt Flour Mills**	23-09-1996	03-10-96
22.	**Middle Egypt Flour Mills**	02-05-1996	09-05-96
23.	**Middle West of Delta Flour Mills**	05-09-1996	26-09-96
24.	**Southern Cairo & Giza Flour Mills**	28-05-1996	06-06-96
25.	**Memphis Pharm. Co.**	19-09-1996	26-09-96
26.	**Egyptian Fin. & Ind. Co.**	22-05-1996	30-05-96
27.	**Misr Elgdida for Housing and Reconst.**	15-02-1996	22-02-96
28.	**Nasr City Housing & De.**	07-05-1996	23-05-96
29.	**Elmaco**	16-05-1996	23-05-96
30.	**Nile Match Co.**	29-08-1996	01-09-96
31.	**Altamir & People Houses**	01-09-1996	26-09-96
32.	**Telemisr**	12-09-1996	03-10-96

Source: Capital Market Authority, Cairo, Egypt.

Appendix D-2 The Size and Value of Trading and the Prices at the Offering and First Day of Trading

Code	No. of shares in the first day of trading	Value of trading in the first day (L.E)*	Offering Price	The Price Day 1
1.	38790	1705628	31	43.3
2.	9954	398127.84	27	40
3.	329875	11918668	34	35.8
4.	13434	3955426.75	250	302.5
5.	8380	360706.2	45	41.75
6.	18750	846811.5	47.14	45.63
7.	514600	14500700	27	32
8.	8817	417803	40	50
9.	19501	2955442.59	90	165.35
10.	460000	16100000	35	36.95
11.	13555	608793	38	44.5
12.	7040	4224421.8	56.7	62.5
13.	1080	73824.5	66.15	63
14.	2045	733710.8	320	359
15.	3615	751864.5	200	210.52
16.	1075	67728	67	62
17.	106265	3942577	29	49
18.	437550	13852216	31	30.4
19.	100990	3966367	31	39.5
20.	10835	577431.5	42	53
21.	200540	9370817	40	48.5
22.	3490	72918.7	18	21
23.	453170	21748129	40	47.75
24.	1483530	27011780	26	26.74
25.	27995	1784206	50	61
26.	324852	9745560	30	33.01
27.	100	22000	210	245
28.	45865	3532367	65	77.8
29.	100	2000	16.18	20
30.	83900	2289170	27	27.5
31.	375500	10889500	29	29
32.	25475	809672	30	31.25

* L.E. is the Egyptian Pound which equals about £ 5.20 at the time of collecting data.

Appendix D-3 Daily Raw Returns for the First Ten Trading Days and (1994-1996).*

	Day of trading									
Code	1	2	3	4	5	6	7	8	9	10
1.	0.40	0.02	0.02	0.03	0.03	0.02	0.00	-0.03	-0.03	0.00
2.	0.48	0.05	0.05	0.10	0.09	0.09	0.15	0.15	0.32	0.30
3.	0.05	-0.05	0.01	0.01	0.02	0.02	0.01	0.02	0.00	0.01
4.	0.21	0.05	0.21	0.27	0.28	0.21	0.27	0.28	0.21	0.35
5.	-0.07	0.00	0.03	0.01	0.01	0.01	0.03	0.03	0.07	0.02
6.	-0.03	-0.01	-0.01	-0.01	-0.02	-0.02	-0.02	-0.01	-0.01	-0.01
7.	0.19	0.09	0.00	0.09	0.05	0.10	0.09	0.09	0.09	0.09
8.	0.25	0.00	0.00	0.00	-0.08	0.00	-0.05	-0.10	-0.13	-0.18
9.	0.84	-0.05	-0.05	-0.05	-0.09	-0.09	-0.09	-0.14	-0.09	-0.09
10.	0.06	-0.05	0.00	0.00	-0.04	0.00	-0.04	-0.01	-0.03	-0.03
11.	0.17	-0.15	-0.04	0.06	-0.15	-0.10	0.02	0.00	0.01	0.01
12.	0.10	-0.05	-0.05	-0.05	-0.05	-0.05	0.00	0.00	0.00	0.00
13.	-0.05	0.10	0.15	0.15	0.15	0.21	0.21	0.21	0.21	0.21
14.	0.12	0.01	0.01	0.01	0.01	-0.00	-0.01	-0.01	-0.01	-0.00
15.	0.05	-0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
16.	-0.07	0.00	-0.02	0.03	0.00	0.00	0.07	0.08	0.08	0.06
17.	0.69	-0.12	0.02	-0.10	-0.14	0.01	-0.01	-0.07	0.01	-0.03
18.	-0.02	-0.05	0.00	-0.04	-0.04	-0.01	-0.03	-0.05	-0.03	-0.03
19.	0.27	-0.22	-0.08	0.02	0.00	-0.13	0.00	-0.09	-0.12	-0.07
20.	0.26	0.00	0.01	0.01	0.04	0.04	0.07	0.07	0.02	0.04
21.	0.21	-0.01	-0.06	-0.00	-0.06	-0.07	0.00	-0.07	-0.07	-0.06
22.	0.17	-0.05	-0.10	-0.02	-0.10	-0.12	-0.08	-0.09	-0.02	-0.10
23.	0.19	0.13	0.13	0.13	0.13	0.12	0.12	0.12	0.10	0.10
24.	0.03	-0.03	-0.03	0.05	0.00	-0.06	0.01	0.01	-0.05	0.01
25.	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
26.	0.10	0.00	-0.03	0.02	-0.00	-0.01	0.31	0.05	0.04	0.15
27.	0.17	0.00	0.00	0.00	0.00	-0.10	-0.10	-0.10	-0.13	-0.12
28.	0.20	-0.06	-0.11	0.01	0.00	0.03	0.10	0.03	0.03	0.08
29.	0.24	-0.19	-0.19	-0.19	-0.19	-0.19	-0.19	-0.19	-0.19	-0.19
30.	0.02	0.00	-0.03	-0.00	-0.02	-0.03	0.17	0.15	-0.01	0.06
31.	0.00	0.00	0.00	0.00	-0.04	0.00	0.00	0.00	0.00	-0.05
32.	0.04	-0.07	0.02	-0.03	-0.08	-0.03	-0.07	-0.12	-0.04	-0.04

* The returns are calculated using equation 1.(the first day return is computed as the closing price to the offering price while other returns are computed as the closing price to the first day closing price).

Appendix D-4 Market Returns For the First Ten Trading Days of the 32 Egyptian IPOs (1994-96)

	Day of trading									
Code	1	2	3	4	5	6	7	8	9	10
1.	-0.00	0.00	0.01	0.01	0.00	-0.01	-0.01	-0.01	-0.02	-0.02
2.	0.11	-0.00	-0.00	-0.00	-0.00	-0.00	-0.09	-0.00	-0.00	-0.00
3.	0.01	0.00	-0.00	-0.00	0.00	0.00	0.00	-0.01	-0.01	0.00
4.	0.20	0.00	0.01	0.02	0.03	0.05	0.05	0.05	0.06	0.06
5.	-0.11	-0.00	-0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
6.	-0.04	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
7.	-0.01	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.00	-0.01	-0.01
8.	-0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
9.	0.02	-0.01	-0.01	-0.01	-0.03	-0.03	-0.02	-0.02	-0.02	-0.02
10.	0.00	-0.00	-0.00	0.00	-0.00	0.00	0.01	0.00	0.00	0.00
11.	0.02	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01
12.	0.02	-0.06	-0.06	-0.07	-0.07	-0.06	-0.08	-0.08	-0.08	-0.07
13.	-0.03	0.00	0.00	-0.00	-0.00	0.00	-0.00	-0.00	-0.00	-0.01
14.	0.01	0.11	0.11	0.11	0.11	0.10	0.10	0.10	0.10	0.09
15.	0.41	-0.30	-0.30	-0.30	-0.30	-0.30	-0.30	-0.30	-0.30	-0.30
16.	0.07	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01
17.	0.02	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01
18.	0.02	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01
19.	0.00	-0.01	-0.01	-0.01	-0.02	-0.02	-0.02	-0.02	-0.02	-0.01
20.	-0.04	-0.00	-0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
21.	-0.01	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.00	-0.01	-0.01
22.	0.00	0.00	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.02
23.	0.01	0.00	-0.00	-0.02	-0.01	-0.01	-0.02	-0.02	-0.02	-0.02
24.	0.00	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
25.	0.01	0.00	-0.00	-0.02	-0.01	-0.01	-0.02	-0.02	-0.02	-0.02
26.	-0.00	-0.00	0.00	0.00	-0.00	-0.00	0.00	0.00	-0.00	-0.01
27.	0.00	-0.00	0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.01	-0.01
28.	0.02	0.00	-0.00	-0.01	-0.01	-0.00	-0.00	-0.00	-0.01	-0.01
29.	0.00	0.00	-0.00	-0.01	-0.01	-0.00	-0.00	-0.00	-0.01	-0.01
30.	-0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01
31.	0.01	0.00	-0.00	-0.02	-0.01	-0.01	-0.02	-0.02	-0.02	-0.02
32.	0.00	-0.02	-0.02	-0.02	-0.02	-0.02	-0.01	-0.01	-0.02	-0.02

* The returns are calculated using equations 2.(the first day market return is computed as the market price to the offering price while other returns are computed as the market price to the first day market price).

Appendix D-5 Market-adjusted Daily Returns for the First Ten Trading Days of the 32 Egyptian IPOs (1994-1996)*

	Day of trading									
Code	1	2	3	4	5	6	7	8	9	10
1.	40.14	1.61	1.27	1.88	2.29	2.41	1.35	-2.10	-0.93	2.25
2.	33.68	5.28	5.65	10.17	9.58	9.03	26.49	14.99	31.99	30.17
3.	4.36	-5.03	0.59	0.71	1.74	1.91	1.20	2.59	1.32	0.65
4.	0.99	4.97	20.73	24.87	23.40	16.09	21.05	21.03	15.14	27.51
5.	4.47	0.29	3.01	0.48	0.82	0.49	1.63	1.53	5.06	0.47
6.	0.76	-1.29	-1.18	-0.44	-1.59	-1.14	-1.19	-0.95	-0.76	-1.20
7.	19.75	9.58	0.40	9.63	4.82	9.89	9.13	9.20	10.08	10.23
8.	25.14	0.00	-0.15	-0.63	-8.83	-0.83	-5.60	-10.57	-14.08	-18.28
9.	79.39	-3.80	-3.71	-3.14	-6.90	-6.90	-7.02	-12.49	-7.56	-7.83
10.	5.50	-5.21	0.44	-0.10	-4.07	0.33	-4.44	-0.94	-3.28	-3.42
11.	14.57	-14.62	-4.49	5.44	-15.02	-10.72	1.35	-0.71	0.31	0.32
12.	7.55	1.74	1.69	1.88	2.01	0.85	8.20	8.22	8.33	7.54
13.	-1.49	9.68	15.16	15.25	15.26	20.89	21.12	21.43	21.52	21.59
14.	11.02	-9.16	-8.84	-8.89	-8.83	-9.88	-9.85	-9.54	-9.26	-8.88
15.	-25.17	42.92	41.19	40.98	40.99	41.19	41.52	41.25	42.05	41.72
16.	-13.31	-0.35	-1.84	2.87	-0.57	-0.59	6.40	7.59	7.58	5.68
17.	66.28	-12.55	1.81	-10.49	-14.77	0.42	-1.42	-7.69	0.41	-3.76
18.	-4.31	-4.94	0.10	-3.92	-4.65	-1.90	-3.70	-5.17	-3.51	-3.66
19.	27.18	-20.36	-7.37	3.05	1.89	-10.84	2.04	-7.21	-10.89	-5.17
20.	32.09	0.64	1.27	1.29	3.64	3.66	5.63	5.64	0.95	2.42
21.	22.52	-0.84	-5.81	-0.08	-5.55	-7.05	-0.22	-6.95	-6.26	-5.48
22.	16.51	-4.90	-9.97	-2.41	-10.28	-13.66	-10.07	-10.86	-4.40	-11.38
23.	18.43	13.09	13.33	15.09	14.51	13.66	13.87	14.11	11.79	11.67
24.	2.78	-11.03	-10.80	-3.97	-8.27	-13.31	-7.30	-7.39	-12.57	-6.98
25.	21.06	0.00	0.21	1.77	1.26	1.44	1.63	2.68	2.51	2.40
26.	10.05	0.34	-3.07	2.09	-0.44	-0.57	31.46	4.51	4.54	15.19
27.	16.33	0.01	-0.28	-0.19	0.08	-10.18	-10.13	-9.80	-12.49	-11.75
28.	16.95	-6.17	-10.39	1.36	0.61	2.87	10.34	3.41	3.79	8.36
29.	23.53	-19.10	-18.85	-18.62	-18.60	-18.87	-18.77	-18.89	-18.60	-18.47
30.	1.86	-0.01	-3.29	-0.51	-2.04	-3.62	15.70	13.74	-1.49	5.01
31.	-1.26	-0.02	0.20	1.75	-3.13	1.42	1.62	1.83	1.66	-3.53
32.	3.68	-5.70	4.28	-1.43	-7.06	-1.48	-6.09	-10.89	-2.39	-2.20

* The returns are calculated using equation 3, (using results of the previous equations (1 and 2)).

Appendix D-6 The Underpricing(Initial Market-Adjusted Returns) and Ex Ante Uncertainty (Standard Deviation of Each Firm in the First Ten Days of Trading)

Code	Enterprise	Underpricing	Ex ant uncertainty
1.	**Torah Portland Cement**	40.14	1.48
2.	**Ameriya Cement**	33.68	10.08
3.	**Helwan Cement**	4.36	2.10
4.	**Paints & Chem. industries**	0.99	6.29
5.	**Extracted Oil Co.**	4.47	1.49
6.	**Eastern Co. for Tobacco**	0.76	0.31
7.	**Arabia Ginning Co.**	19.75	3.14
8.	**Arabia Drug Co.**	25.14	6.40
9.	**Egyptian Elector Cables**	79.39	2.70
10.	**Egy. Starch & Glucose**	5.50	2.09
11.	**El Nasr for Crops Drying**	14.57	7.03
12.	**Nile for Pha. & Chemicals**	7.55	3.22
13.	**Alexandria for Ph. & Chemicals**	-1.49	4.05
14.	**Alexandria Portland Cement**	11.02	0.40
15.	**El Nasr Clo. & Textile Co.**	-25.17	0.59
16.	**Al Ahram Beverage Co.**	-13.31	3.67
17.	**Kafr El Zaiat for Insecticides & Chemicals**	66.28	5.85
18.	**Misr for Oils & Soup**	-4.31	1.56
19.	**East Delta Flour Mills**	27.18	7.20
20.	**North Cairo Flour Mills**	32.09	1.84
21.	**Upper Egypt Flour Mills**	22.52	2.79
22.	**Middle Egypt Flour Mills**	16.51	3.57
23.	**Middle West of Delta Flour Mills**	18.43	1.08
24.	**Southern Cairo & Giza Flour Mills**	2.78	2.87
25.	**Memphis Pharm. Co.**	21.06	0.90
26.	**Egyptian Fin. & Ind. Co.**	10.05	10.28
27.	**Misr Elgdida for Housing and Reconst.**	16.33	5.41
28.	**Nasr City Housing & De.**	16.95	6.12
29.	**Elmaco**	23.53	0.18
30.	**Nile Match Co.**	1.86	6.91
31.	**Altamir & People Houses**	-1.26	1.99
32.	**Telemisr**	3.68	4.09

Appendix D-7 The Underpricing (Initial Market-Adjusted Returns) and the Informed Demand (The Natural Log of the Length of Selling Time of New Issues)

Code	Enterprise	Underpricing	ln (length of selling time)
1.	Torah Portland Cement	40.14	2.09
2.	Ameriya Cement	33.68	1.38
3.	Helwan Cement	4.36	1.40
4.	Paints & Chem. industries	0.99	1.60
5.	Extracted Oil Co.	4.47	2.23
6.	Eastern Co. for Tobacco	0.76	2.29
7.	Arabia Ginning Co.	19.75	1.11
8.	Arabia Drug Co.	25.14	1.32
9.	Egyptian Elector Cables	79.39	1.62
10.	Egy. Starch & Glucose	5.50	0.00
11.	El Nasr for Crops Drying	14.57	1.20
12.	Nile for Pha. & Chemicals	7.55	1.65
13.	Alexandria for Ph. & Chemicals	-1.49	1.38
14.	Alexandria Portland Cement	11.02	0.00
15.	El Nasr Clo. & Textile Co.	-25.17	0.00
16.	Al Ahram Beverage Co.	-13.31	1.43
17.	Kafr El Zaiat for Insecticides & Chemicals	66.28	0.90
18.	Misr for Oils & Soup	-4.31	0.90
19.	East Delta Flour Mills	27.18	0.48
20.	North Cairo Flour Mills	32.09	2.05
21.	Upper Egypt Flour Mills	22.52	1.00
22.	Middle Egypt Flour Mills	16.51	0.85
23.	Middle West of Delta Flour Mills	18.43	1.32
24.	Southern Cairo & Giza Flour Mills	2.78	0.90
25.	Memphis Pharm. Co.	21.06	0.85
26.	Egyptian Fin. & Ind. Co.	10.05	0.90
27.	Misr Elgdida for Housing and Reconst.	16.33	0.85
28.	Nasr City Housing & De.	16.95	1.20
29.	Elmaco	23.53	0.85
30.	Nile Match Co.	1.86	0.48
31.	Altamir & People Houses	-1.26	1.40
32.	Telemisr	3.68	1.32

Appendix D-8 The Underpricing (Initial Market-Adjusted Returns) and (Standard Deviation of Each Firm in the First Ten Days of Trading)

Code	Enterprise	ARI1	Log(issue size)
1.	**Torah Portland Cement**	40.14	6.23
2.	**Ameriya Cement**	33.68	5.60
3.	**Helwan Cement**	4.36	7.08
4.	**Paints & Chem. industries**	0.99	6.60
5.	**Extracted Oil Co.**	4.47	5.56
6.	**Eastern Co. for Tobacco**	0.76	5.93
7.	**Arabia Ginning Co.**	19.75	7.16
8.	**Arabia Drug Co.**	25.14	5.62
9.	**Egyptian Elector Cables**	79.39	6.47
10.	**Egy. Starch & Glucose**	5.50	7.21
11.	**El Nasr for Crops Drying**	14.57	5.78
12.	**Nile for Pha. & Chemicals**	7.55	6.63
13.	**Alexandria for Ph. & Chemicals**	-1.49	4.87
14.	**Alexandria Portland Cement**	11.02	5.87
15.	**El Nasr Clo. & Textile Co.**	-25.17	5.88
16.	**Al Ahram Beverage Co.**	-13.31	4.83
17.	**Kafr El Zaiat for Insecticides & Chemicals**	66.28	6.60
18.	**Misr for Oils & Soup**	-4.31	7.14
19.	**East Delta Flour Mills**	27.18	6.60
20.	**North Cairo Flour Mills**	32.09	5.76
21.	**Upper Egypt Flour Mills**	22.52	6.97
22.	**Middle Egypt Flour Mills**	16.51	4.86
23.	**Middle West of Delta Flour Mills**	18.43	7.34
24.	**Southern Cairo & Giza Flour Mills**	2.78	7.43
25.	**Memphis Pharm. Co.**	21.06	6.25
26.	**Egyptian Fin. & Ind. Co.**	10.05	6.99
27.	**Misr Elgdida for Housing and Reconst.**	16.33	4.34
28.	**Nasr City Housing & De.**	16.95	6.55
29.	**Elmaco**	23.53	3.30
30.	**Nile Match Co.**	1.86	6.36
31.	**Altamir & People Houses**	-1.26	7.04
32.	**Telemisr**	3.68	5.91

Appendix D-9 Durbin-Watson d test decision

Null hypothesis	Decision	If
No positive Autocorrelation	Reject	$0 < DW < d_L$
No positive Autocorrelation	No decision	$d_L \leq DW \leq d_U$
No negative Autocorrelation	Reject	$4- d_L < DW < 4$
No negative Autocorrelation	No decision	$4 - d_U < DW < 4- d_L$
No positive or negative Autocorrelation	Do not reject	$d_U < DW < 4- d_U$

Source:(Gujarati 1991,p364).

Appendix D-10 Market-Adjusted Excess Returns In the PIPOs for Holding Periods Defined between the First Day of Listing and 20th, 40th and 52nd Weeks of listing in the Stocks

Code	Enterprise	$\overline{AR}_{t\ 1\text{-}20}$	$\overline{AR}_{t\ 1\text{-}40}$	$\overline{AR}_{t\ 1\text{-}52}$
1.	**Torah Portland Cement**	14.40	9.54	-4.19
2.	**Ameriya Cement**	35.91	15.81	-6.80
3.	**Helwan Cement**	-6.59	0.29	-5.74
4.	**Paints & Chem. industries**	**132.70**	**49.25**	**-34.13**
5.	**Extracted Oil Co.**	1.71	-4.49	3.19
6.	**Eastern Co. for Tobacco**	-17.15	-2.44	1.25
7.	**Arabia Ginning Co.**	9.84	3.25	6.66
8.	**Arabia Drug Co.**	-4.87	-2.02	1.40
9.	**Egyptian Elector Cables**	-24.54	-11.41	9.11
10.	**Egy. Starch & Glucose**	-2.10	-3.45	2.29
11.	**El Nasr for Crops Drying**	10.76	0.50	-0.38
12.	**Nile for Pha. & Chemicals**	-13.85	-1.94	5.43
13.	**Alexandria for Ph. & Chemicals**	20.55	2.77	-0.12
14.	**Alexandria Portland Cement**	13.26	3.28	-4.66
15.	**El Nasr Clo. & Textile Co.**	-13.28	-3.60	3.48
16.	**Al Ahram Beverage Co.**	5.30	2.59	-1.62
17.	**Kafr El Zaiat for Insecticides &**	-17.23	-2.57	1.90
18.	**Misr for Oils & Soup**	0.87	-0.23	0.30
19.	**East Delta Flour Mills**	-1.07	-1.91	1.95
20.	**North Cairo Flour Mills**	56.88	19.59	-14.96
21.	**Upper Egypt Flour Mills**	1.95	-16.90	18.17
22.	**Middle Egypt Flour Mills**	16.48	3.84	-2.84
23.	**Middle West of Delta Flour Mills**	16.23	4.65	-4.81
24.	**Southern Cairo & Giza Flour Mills**	68.49	22.63	-15.98
25.	**Memphis Pharm. Co.**	3.28	-0.15	0.05
26.	**Egyptian Fin. & Ind. Co.**	61.48	20.28	-14.30
27.	**Misr Elgdida for Housing and Reconst.**	-1.71	-15.48	10.16
28.	**Nasr City Housing & De.**	**96.00**	**36.93**	**-25.51**
29.	**Elmaco**	-4.06	-6.82	4.10
30.	**Nile Match Co.**	3.95	-0.01	-0.14
31.	**Altamir & People Houses**	-3.45	-0.95	1.06
32.	**Telemisr**	-10.24	-8.82	6.47

Mean Returns % (all stocks)	14.06	3.50	-1.85
t-statistics (all stocks)	2.306	1.427	-1.025
Standard deviation % (all stocks)	34.49	13.87	10.21

Outliers- (4) Paints & Chem. industries and (28) Nasr City Housing & De.

Mean Returns % (excluding outliers)	7.37	0.86	0.01
t-statistics (excluding outliers)	1.791	0.503	0.011
Standard deviation % (excluding outliers)	22.55	9.373	7.25

ii