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Essays on Stock Market Openness, Cost of Capital and Investment

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Declaration of Authorship

"This thesis is the result of the author's original research. It has been composed by the author and has not been previously submitted for examination which has led to the award of a degree."

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Abstract

This thesis examines the effects of stock market openness on the cost of equity capital and investment. Whilst theoretical models and extant empirical evidence suggest that emerging markets integration with global markets promotes risk sharing between domestic and foreign investors, reducing the cost of capital and increasing investments, other strands of research take a more critical stance, counter-arguing that integration is rather an imperfect process, with cost of capital benefits restricted to subsets of firms only, and that agency costs and weak levels of institutional development partially or fully impede gains from integration to be channeled to real investments. Motivated by this setup, this thesis contributes to the financial integration literature, in particular to the debate on the pros and cons of financial openness.

The first essay studies the relationship between stock market integration and the cost of equity capital, using Brazil as a case study. The paper also places particular emphasis on the role played by asset characteristics in the process of integration. Taking imperfect integration as theoretical underpinning, international asset pricing models are estimated for stocks' portfolios sorted by characteristics of size, book-to-market ratios, illiquidity, momentum, corporate governance and investability. Results show that stock market integration, as proxied by foreign stock ownership, reduces cost of equity capital, with larger benefits reaped by large caps, highly liquid stocks and strong governance firms. Results corroborate theoretical models of imperfect integration, suggesting that integration brings beneficial effects on firms' funding costs.

In the second essay, the attention shifts to real economic effects of integration, with an investigation of the effects of stock market openness on corporate investment. Using a large sample of firms from 45 emerging and frontier markets, empirical investment models are estimated, employing dynamic panel data techniques. The analysis utilises two measures of stock openness, both at country-level and at firm-level. At country-level, *De Jure* current-account openness indices, calculated by the *International Monetary Fund* are employed, whereas firm-specific *De Facto* integration is captured by foreign institutional stock ownership. Results suggest positive effects of stock market openness on corporate investment, with findings remaining consistent across

both country and firm-level integration measures, and robust to endogeneity concerns. Stronger effects are found in countries with lower institutional development and higher expropriation risks, consistent with the idea that the influx of foreign investors brings about improvements in monitoring and governance standards. Results contribute important evidence that stock market openness, additionally to exerting positive effect on funding costs, also stimulates real economic activity, by increasing firm-level investment.

The third and last essay escalates the analysis to the macroeconomic level. The relationship between foreign portfolio equity capital flows and domestic aggregate investment is investigated, paying attention again to the role of institutional quality in this relationship. Cross-country static and dynamic panel data models are estimated, for a sample of 44 emerging and frontier markets. Results at the macro level corroborate the findings obtained at micro level, with equity inflows associated to increases in domestic investment, measured both as gross capital formation and as the growth rate of domestic capital stock per capita. Again, effects are stronger in countries with lower institutional development, consistent with firm-level evidence. In summary, results show that integration effects spillover from micro to macro level, benefiting the whole domestic economy by expanding countries' capital stock.

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CHAPTER 1

Introduction

The past thirty years have seen a gradual erosion of financial and economic barriers, and this has led to greater integration between emerging and developed capital markets. Openness to cross-border finance has brought important structural changes to the architecture of emerging financial markets. Whilst fundraising was fairly local thirty years ago, a large number of emerging markets' firms can now raise capital globally, either via more integrated domestic equity markets, through cross-listing in foreign exchanges, or both.

Advancements in the level and depth of financial globalisation came accompanied by promising avenues through which emerging markets could profit from gains in terms of financial development and real economic activity. Access to global finance can, in theory, increase the supply of funding, decrease financing costs, and lead to increases in real investments and economic growth. Yet, the question of whether such promised benefits have indeed materialised in superior economic performance remains a matter of polemic academic and policy debates.

The theoretical mechanism works as follows. It is generally accepted that higher levels of foreign stock ownership drives integration, mostly due to foreign institutional investors seeking novel investment and diversification opportunities in emerging markets. According to neoclassical international finance theory, equity market liberalisation, and consequently the influx of foreign investors to less integrated emerging stock markets, leads to improved risk sharing between domestic and international investors, which ultimately translates into lower cost of equity capital (Henry, 2000b; Bekaert & Harvey, 2000; Chari & Henry, 2004).

All else equal, according to neoclassical economic logic, following stock market openness and cost of capital reduction, physical investment increases accordingly as a trivial consequence

of lower funding costs. Building on this argument, it has been strongly suggested that stock market openness, in addition to decreasing cost of capital, also leads to increases in real investment (Bekaert *et al.* , 2005; Chari & Blair Henry, 2008).

1.1 Research Questions and Scope

Inspecting the last statement in detail, three words in particular have proved to be problematic: *all else equal*. As noted by Bekaert *et al.* (2016), some of the benefits of financial liberalisation remain uncertain, especially with respect to integration velocity, which has to do with how quickly local firms can enjoy cost of capital benefits coming from integration, and the impact of financial openness on improving the real economy, which involves the important question of whether such gains coming from the financing side are indeed channeled to productive activities, via increases in investments and capital accumulation. When mapping theory to empirical evidence, two main objections feed the controversy.

First, despite of regulatory one-off stock market liberalisation events, integration does not occur by the strike of a pen, and therefore cost of capital benefits do not necessarily kick in right away, with integration following a more complicated time-varying structure (de Jong & de Roon, 2005), often suffering reversals (Carrieri *et al.* , 2007), and possibly benefiting only a subset of firms with a few desirable characteristics summarised as *Investability*, like good governance and high liquidity, among other factors (Chari & Henry, 2004; Errunza & Ta, 2015).

Second, frictions caused by weak institutional quality and governance may exacerbate expropriation risks incurred by foreign investors, mildly or strongly blocking the risk sharing mechanism, and real investment may not react so positively to integration as predicted by theory, making integration ineffective in stimulating the real economy (Stulz, 2005). The consequence is that only countries with minimum levels of institutional quality reap real economic benefits, the so-called *Threshold Effects* (Ayhan Kose *et al.* , 2011; Bekaert *et al.* , 2011a). Given the mixed nature of extant empirical evidence, in particular the inconclusive macroeconomic results, other streams of research begun to focus on the so-called *Collateral Benefits* of financial globalisation. Such collateral facilitators are mostly linked with indirect effects feeding on local countries' governance, institutional development and macroeconomic stability (Kose *et al.* , 2009b).

A fine-tuned assessment of the pros and cons of opening financial markets depends crucially

on uncovering and dissecting the mechanisms that may allow emerging economies to fully benefit from stock market integration (Bonfiglioli, 2008). Therefore, such indirect catalysts are strong candidate mechanisms explaining how financial globalisation may spur financial and economic development, possibly through complex interactive dynamics occurring between institutional development, cost of capital and real economic effects, in particular investment.

This thesis aims to shed more light on the relationship between stock market openness, finance and economic activity, paying close attention to such mechanisms, contributing to a better understanding of how financial openness works, thus helping to identify how its theoretical benefits can be fully conveyed to finance and the real economy. In light of this, the First objective of this thesis is *to study the effects of stock market openness on the cost of equity capital and real investment in emerging markets.*

As Second objective, the thesis also pays careful attention to understanding how the so-called *Collateral Benefits* work. In particular, it does so by studying *how countries' institutional quality levels affect the relationship between stock market openness, cost of capital and investment*. Hence, this work also seeks to identify moderating and/or mediating roles played by local institutional development, and assets' characteristics, such as governance, size and liquidity.

A few comments are in place to define the scope of this work. Globalisation is a broader phenomena, and reflects an unprecedented increase in the free flow of goods and capital. It has four main facets: international trade in goods and financial assets, global diversification of productive activities, and cross-border flow of labour, or migration. This thesis is about financial globalisation, hence the focus is on globalisation of trade in financial assets and its outcomes. However, financial globalisation has its own sub-facets as well. In general, financial globalisation has three ramifications: free flow of equity securities, debt securities and derivatives. The analysis focuses on equity securities, more precisely on stock market openness (integration).

Stock market openness, or integration, in turn, is conceptualised in two ways. Whilst measures of *De Jure* integration are intended to reflect the extent to which countries are open to foreign capitals in terms of regulation and legislation, *De Facto* integration measures reflect *realised* integration, whether *De Jure* measures put in place by regulators translate into *De Facto* integration. In this thesis, *De Facto* integration is captured by foreign institutional ownership (the share of firms' equity capital held by foreign portfolio investors), whilst current-account openness (liberalisation) indices, calculated by the International Monetary Fund, reflect *De Jure* integration.

1.2 Motivation and Relevance

Ever since the financial globalisation agenda was put in march, mostly led by the *International Monetary Fund* and the *World Bank* under the umbrella of the so-called *Washington Consensus* in the late 1980s, scholars, public policy makers, corporate managers and all society as a whole have been struggling to fully understand the pros and cons of financial openness. Despite of three decades of intense research, many questions remain unsettled, as previously discussed in this introduction. Naturally, such unsettlements are highly undesirable.

As financial globalisation is one of the most important developments in modern capitalism, with strong implications for many variables economists deem highly important, such as development, capital accumulation and growth, this is the kind of phenomena that societies would like to see through its full implications as clearly as possible, with rigour and no loose ends. Clearly, given the aforementioned controversies, we haven't reached this level of understanding yet, so more research into the domains of financial globalisation where puzzles still reign is welcome.

Moreover, the current period in financial and economic history seems an appropriate time to blow some air and feed the flames of this hot and spicy debate again. With the inauguration of the Trump era in the U.S last year, the largest exporter of financial assets worldwide, although most of the protectionist counter-measures promised during campaign refer to globalisation in the trade of goods and in production, it is hard to imagine that whatever shift in globalisation occurring in the real economy will not spillover, to some extent, to the financing side. Many scholars and analysts started to question whether the once thought as unstoppable globalisation process could be halted and eventually deterred by such headwinds.

Whilst, at least as of the present moment, financial globalisation does not seem to be much affected by this shift in U.S policy towards globalisation, and whether financial globalisation is advancing or retreating in absolute terms goes beyond the scope of the work done here, this thesis is informative about whether, when balancing pros and cons and rigorously assessing statistical and econometric evidence, financial globalisation enhances or destroys economic welfare in emerging countries.

If financial openness brings about reductions in cost of capital and increases in real investment, as advocated by theory and backed by some of the empirical evidence in the extant literature, then most likely the process is virtuous and mostly welcome. If instead, harmful effects dominate, then policy makers could, and should, re-think whether it is in the best interest of

emerging economies to open up for cross-border finance, or at least to have second thoughts about the pace with which this process is being carried out by regulators on the government side and by the financial industry on the corporate side.

The financial globalisation debate, even in the academic domain, often portrays passionated opinions which may go beyond what strict scientific evidence would suggest. Some researchers often sell too expensively some alleged benefits which don't do so well when mapped from theory to empirics, like it is the case of the overstatement of risk-sharing gains (Kose *et al.* , 2009a). On the other hand, while even nobel laureates have contributed very opinionated articles blaming financial liberalisation for many modern crises and disruptions (Stiglitz, 2000), others argue that there is little systematic evidence to support widely-cited views that financial openness by itself leads to growth crisis (Kose *et al.* , 2009b).

Taking stock of such conflicts, it is the duty of scientific investigation, in particular under a positivist approach to financial economics, as strongly advocated by Milton Friedman, one of the most celebrated economists of our time, to abstract from any kind of ideological construction which can blind our sight, possibly making our assessment dangerously normative. Focusing on the facts, mechanisms and reliably obtained econometric evidence, to the best of authors' capabilities, this thesis aims to contribute with unbiased scientific evidence to this often passioned and polarised debate.

If, by the end of this journey, this thesis can provide economists, corporate managers and policy makers with a better, renewed and improved understanding of how stock market openness affects the cost of capital and investment behaviour in emerging economies, then it will have fulfilled its role of pushing a bit forward scholarly knowledge on fields of finance and economics.

1.3 Empirical Essays

This thesis comprises three empirical essays. The first essay studies the relationship between stock market integration and the cost of equity capital, looking at how stock market openness affects financing conditions. In the second essay, the attention shifts to real microeconomic effects of opening stock markets, as the relationship between stock market openness and corporate (firm-level) investment is investigated. Lastly, the third essay closes the circle, as the focus moves from micro to macroeconomic real integration effects, as this chapter analyses the

relationship between domestic aggregate investment and foreign portfolio equity capital flows. In the following sub-sections, each essay is described in more detail.

1.3.1 Stock Market Integration and Cost of Equity Capital

The first empirical essay studies the effects of stock market integration on the cost of equity capital, thus focusing on the alleged financial benefits stemming from improved risk sharing between domestic and foreign investors conveyed by stock market openness. The empirical work is motivated by models of time-varying (imperfect) equity market integration (de Jong & de Roon, 2005; Errunza & Losq, 1985), therefore it differs from one-off liberalisation studies, putting more importance on how stock market integration affects the cost of capital over time.

Using the Brazilian stock market as a case study, international asset pricing models are estimated, investigating the relationship between stock market integration, as proxied by market-level foreign stock ownership, and stocks portfolios' expected returns. The paper also has a strong focus on the role played by assets' characteristics in the integration process, and in particular how assets' characteristics can affect the relationship between equity openness and cost of capital. Pursuing this end, the empirical modelling utilises portfolios of stocks reflecting assets' characteristics, like size, growth opportunities, illiquidity, momentum and governance.

Brazil is an interesting laboratory for a study of such nature for a number of reasons. First, Brazil is a major emerging economy, and it has a dynamic and fairly well developed equity market (for emerging markets standards), BMF&Bovespa, the *Sao Paulo Stock Exchange*. Second, Brazilian regulators, in particular the Securities and Exchange Commission (CVM), document with unique granularity, on a monthly basis, the evolution of foreign stock ownership at the market level. As foreign ownership is a *De Facto* measure of integration, this variable captures how stock market openness has evolved over time, allowing to employ in the empirical modelling time series with much higher frequency than available in standard capital flows databases, such as the IMF data, which offer mostly cross-country annual data.

Third, Brazilian firms' stocks are traded in particular segments, reflecting corporate governance standards. Whilst firms voluntarily abiding by world-class best corporate governance are listed on the *Novo Mercado* segment, the remaining firms following less stringent governance norms are listed on other market segments. This separation allows studying the importance of corporate governance in the integration process with detail.

1.3.2 Stock Market Openness and Corporate Investment

In the second essay of this thesis, the attention shifts from financial to real economic variables, with investment placed in the centre of the analysis. This paper investigates the relationship between stock market openness and corporate investment for a sample of emerging and frontier markets' firms, between 2007 and 2015, employing dynamic panel data models estimated via GMM (Generalised Method of Moments). Within the financial liberalisation and investment (capital accumulation) literature domain, the paper is inserted in the space of microeconomic studies, focusing on firm-level evidence, previously investigated in Laeven (2002); Chari & Blair Henry (2008); Larrain & Stumpner (2017).

As theoretical underpinning, the essay explores a tension between the neoclassical approach to financial integration (Henry, 2000a; Bekaert *et al.* , 2005; Chari & Blair Henry, 2008), and the agency costs paradigm (Stulz, 2005). Whilst the first predicts a positive association between stock market openness and investment, channeled from reductions in the cost of equity capital brought about by improved risk sharing between domestic and foreign investors, the later advocates that agency costs in the form of expropriation of foreign investors' wealth may undermine integration, fully or partially blocking real investment gains, thus making financial openness ineffective in stimulating capital accumulation via investments.

Regression models are estimated, with corporate investment ratios as dependent variable, and both country-level and firm-level measures of integration as independent variables. Openness at country-level is proxied by current account liberalisation indices, calculated by the IMF, whereas firm-level integration is proxied by foreign institutional stock ownership. Additionally, variables capturing country-level institutional quality and expropriation risks are included in the regressions, in particular interacted with current-account openness and with foreign institutional ownership. This analysis inspects the role of agency costs and the associated risk of expropriation incurred by foreign investors in the openness-investment nexus.

A number of additional tests are also conducted. Using Brazilian data again, the importance of corporate governance quality in the integration-investment nexus is investigated in detail, as in principle good governance prevents opportunistic behaviours and mitigates expropriation. Second, seeking to inspect how mechanisms operate in detail, the essay also brings analyses on the relationship between stock market openness, valuation and growth opportunities, and between financial openness and corporate financing policies, in particular cash holdings.

1.3.3 Portfolio Equity Flows and Aggregate Investment

The third essay brings the analysis of the relationship between stock market openness and investment to the macroeconomic level, extending and complementing the second essay. This paper empirically investigates the effects of portfolio equity capital flows on aggregate domestic investment, for 44 emerging and frontier economies, employing static and dynamic panel data regressions. In the domain of real globalisation effects studies, this paper is placed in the aggregate investment literature (Henry, 2000b; Bonfiglioli, 2008; Bekaert *et al.* , 2011a).

Employing fixed effects and dynamic panel data models, regression models are estimated between domestic investment as dependent variable, proxied by both gross capital formation as a share of GDP and by capital stock growth, and foreign portfolio equity inflows (liabilities) as a share of GDP as independent variable. The paper also revisits the *Threshold Effects* hypothesis, investigating how institutional quality impacts the effect of equity inflows on domestic investment.

In a number of additional tests, the paper investigates the existence of complementarities between portfolio equity capital flows and foreign direct investment, testing whether equity inflows are associated to increases in foreign direct investment too. Lastly, it is also tested whether debt inflows and outflows have any effect on domestic investment.

1.4 Summary of Findings and Main Contributions

With respect to the financial benefits of opening stock markets, empirical evidence from the estimation of international asset pricing models show that stock market integration is associated to marginal reductions in expected returns, thus decreasing the cost of equity capital over time. Such result contributes to the globalisation and asset prices and to the time-varying stock market integration literatures, previously studied in Bekaert *et al.* (2016); Carrieri *et al.* (2013, 2007); de Jong & de Roon (2005); Chari & Henry (2004); Bekaert & Harvey (1995); Hietala (1989); Errunza & Losq (1985), among others, adding novel, in-depth and up-to-date evidence from Brazil, a major and important emerging economy.

Results also show that the strength of the effects depend upon assets' idiosyncratic characteristics. Although mostly all portfolios analysed have benefited from reductions in the cost of equity capital, marginal effects are stronger for large caps, firms with good balance between growth opportunities and cash flow generation, stocks with higher levels of liquidity, well-governed

and *Investable* firms. These findings contribute new evidence to the literature investigating the role of assets' characteristics in the process of integration, previously documented in Errunza & Ta (2015); Bae & Goyal (2010); Huang (2007); Christoffersen *et al.* (2006); Patro & Wald (2005); Chari & Henry (2004), in particular by shedding light on unexplored (or under-explored) characteristics, such as growth opportunities, liquidity and corporate governance.

Findings from the second essay suggest that the benefits from stock market openness in terms of increasing real investments are fully operative at the microeconomic level. Empirical results obtained from the estimation of dynamic panel data models show a positive response of corporate investment ratios to both increases in country-level stock market openness and firm-level foreign institutional stock ownership. Results remained robust for numerous robustness checks, in particularly to endogeneity between firm-level investment and foreign ownership.

Results validate two mechanisms channeling integration gains to real investment. The first is the country-wide effect via stock market openness, and the second is the firm-specific risk sharing channel, via foreign stock ownership. Whilst the extant literature had provided some evidence of the presence of one or the other (Chari & Blair Henry, 2008; Larrain & Stumpner, 2017; Bena *et al.* , 2017), these results show that both mechanisms are operative, for the same sample of firms. Moreover, as such findings strongly suggest that cost of capital gains are indeed passed-through physical investment, they corroborate neoclassical integration models.

The findings obtained when adding the institutional quality and governance layers to the analysis are equally interesting. Interactions between stock market openness and foreign ownership with country-level measures of institutional quality, expropriation risks and financial development show that financial openness exerts stronger effects on investment in countries with weaker overall institutional quality and development. Findings are consistent with *Collateral Benefits*, as financial openness may help improving local institutional quality (Kose *et al.* , 2009b), and through such improvements, magnifying the effects of stock openness on real investment.

Results from the third essay provide evidence that, in addition to spurring corporate investment, the benefits of stock market openness also escalate to the macro level, as findings from empirical models show that foreign portfolio equity capital inflows affect domestic investment positively. Additionally, stronger effects are found in countries with poorer levels of institutional quality, going in the same direction of results obtained at the micro level. Such findings at aggregate level fully corroborate the results from the micro-level disaggregate analysis.

On top of providing strong internal consistency to the thesis, findings also provide important contributions to the literature studying liberalisation, capital flows and investment at the macro level, previously examined in Henry (2000a); Bonfiglioli (2008); Bekaert *et al.* (2011a). First, the finding that equity inflows increase investment puts more structure on similar results reported in former research which analysed the problem under a liberalisation framework, such as Henry (2000a). Also, such result validates relationships which, although predicted by the theory of financial integration, were either not supported or only weakly supported in some other papers, such as Bosworth & Collins (1999); Bonfiglioli (2008); Bekaert *et al.* (2011a).

Another contribution is made with respect to the *Threshold Effects* debate. Differently from extant research, results suggest stronger effects of equity capital inflows on domestic capital formation in countries where institutional development is weaker (and importantly, this assertion is backed by results obtained both at micro and macro levels). Such findings are aligned, again, with the idea that financial globalisation brings about *Collateral Benefits* (Kose *et al.* , 2009b) too, and with positive spillovers in terms of enhanced governance and monitoring via increased presence of sophisticated foreign investors (Ferreira & Matos, 2008).

It is also shown that equity inflows can also spur foreign direct investments, therefore there are virtuous complementarities between portfolio and direct equity capital inflows. Lastly, a novel mechanism linking domestic investors' debt outflows (assets) and aggregate investment is uncovered. Consistent with international asset pricing models, risk sharing channeled via bond risk diversification obtained by domestic investors by investing in foreign bond markets may be reducing cost of capital, leading to increases in domestic investment.

1.5 Thesis Structure

The rest of this thesis is organised as follows. Chapter Two brings the Literature Review. Chapter Three brings the first essay, which empirically investigates the relationship between stock market integration and cost of capital. Chapter Four brings the second essay, an empirical investigation of the effects of stock market openness on corporate investment. The empirical analysis is concluded by Chapter Five, in which the effect of portfolio equity capital flows on domestic aggregate investment is analysed. Chapter Six brings concluding remarks.

CHAPTER 2

Literature Review

This chapter provides an overview of the literatures examining financial globalisation, and the effects of financial integration on the cost of capital and the real economy. First, a few introductory concepts about financial globalisation and stock market openness are discussed. Next, space is dedicated to cost of capital effects, with particular emphasis on the risk sharing channel and stock market integration regimes. The third part explores theories and empirical evidences related to effects in the real economy, and a last part summarises extant research.

2.1 Financial Globalisation

Stulz (2005) argues that, as of the period after the end of World War II, financial markets of most countries were closed to cross-border trade in financial assets. However, the period thereafter has witnessed major changes in the architecture of global financial markets, with many countries reducing such barriers sharply. This process of removal of barriers and liberalisation of trade in financial assets is often called *Financial Globalisation*. Financial globalisation occurs mostly through policies stroke by governments' pens, but it takes place even when unintended, by and large provoked by the interplay of global market forces.

As noted by Henry (2000a), stock market liberalisation is a decision by a country's government to allow foreigners to purchase stocks in that country's stock market. On the other hand, to stem the flow of foreign capitals and manage risks, countries can impose capital controls and curb inflows of foreign capital (Alfaro *et al.* , 2017). Yet, investment barriers, such as capital controls, may not prevent actual capital inflows (Bekaert *et al.* , 2016), with capital controls in

countries more open to international trade been found to be mostly ineffective (Aizenman & Noy, 2009).

Such interplay between regulatory power and market forces in driving the pace of financial globalisation calls for a closer discussion of *de Jure* and *De Facto* measures of financial globalisation. As discussed by Bekaert *et al.* (2016), measures of *De Jure* integration are intended to reflect the extent to which countries are open to foreign capital inflows and outflows in terms of regulation and legislation. In other words, *De Jure* integration reflects the extent to which countries are open to cross-border finance *in law*.

On the other hand, *De Facto* integration measures reflect *realised* integration, or in other words, whether *De Jure* measures put in place by government regulators translate into *De Facto* integration. In all, if private investors respond positively to shifts in the regulatory environment and engage in cross-border financial trade, then *De Jure* instruments are efficient, causing an increase in *de Facto* financial integration.

However, evidence suggests that global financial integration is not a smooth and continuous process, as several frictions prevent *De Jure* policies to fully translate into *De Facto* integration, mostly because political risk and low liquidity cause setbacks to integration (Bekaert & Harvey, 1995). In a recent working paper, Bekaert & Mehl (2017) suggest that global financial market integration follows a "swoosh" shape: it was high before World War I, low in the interwar period, and even higher after the liberalisation waves in emerging economies from 1990 onwards. Also importantly, a wedge between the integration of developed and emerging markets undermines global integration velocity.

In particular, *De Jure* measures of stock market liberalisation put in place by emerging markets governments do not lead to full integration because of implicit barriers in such less developed economies, such as weaker institutional quality, corporate governance and market transparency (Carrieri *et al.* , 2013).

Yet, in the long run, local government policy is one of the fundamental drivers of the pace of integration, and consequently of financial globalisation, though this mechanism works with a lagged effect (Bekaert *et al.* , 2002). A second major determinant of financial globalisation is global growth uncertainty (Bekaert & Mehl, 2017), as business cycles expansions and contractions affect investors' confidence and risk appetite, in particular to invest in riskier emerging economies.

2.2 Stock Market Openness and Cost of Equity Capital

2.2.1 Financial Integration and Risk Sharing

In this sub-section, we begin by discussing some initial concepts about integration and risk sharing, providing the reader with some basic ideas on the globalisation of finance and how integration affects (or should affect) the cost of capital, and consequently investment. In this context, this sub-section levels the terrain for the forthcoming detailed discussion of stock market integration regimes.

In fully segmented markets, foreign investors have no access to the local equity market and the domestic CAPM holds. Local investors do not benefit from global portfolio diversification and there is no risk sharing with international investors. Domestic investors bear all risks alone, resulting in higher risk and cost of capital. (Henry, 2000b).

A strong reason why market segmentation exists is because investor behavioural biases affect asset allocations (Solnik & Zuo, 2012). Despite diversification benefits, investors exhibit a home bias, investing disproportionally more in domestic stocks. This is due to capital barriers, hedging motives and information asymmetries (Lau *et al.* , 2010). Moreover, Solnik & Zuo (2016) note that domestic investors are more bullish about their home markets than foreigners.

Kose *et al.* (2009a) argue that financial integration allows agents in different countries to pool their risks, generating welfare gains by lowering consumption volatility and delinking fluctuations in domestic consumption and output. According to Henry (2000b); Bekaert & Harvey (2000); Sloek *et al.* (2002), integration brings benefits, in particular from global portfolio diversification and risk sharing. When a market is fully integrated, the global market subsumes the domestic market and all assets are priced relative to world market returns (Solnik, 1974b; Stulz, 1981; Brennan & Solnik, 1989; Buckberg, 1995; Henry, 2000a; Bekaert & Harvey, 2000; Chari & Henry, 2004). In this context, global covariance risk replaces local covariance risk, generating risk sharing gains mostly because domestic stocks tend to covary more with domestic market returns than with global market returns. Risk sharing, in turn, decreases expected returns, leading to a lower cost of equity (Bekaert *et al.* , 2005).

Moreover, when segmented markets become integrated, stock prices have been shown to grow, reflecting lower levels of risk and increased demand for local stocks (Stulz, 1999). This is known as The Revaluation Effect (Chari & Henry, 2004; Patro & Wald, 2005; Christoffersen *et al.*

, 2006). These predictions are also corroborated by studies examining cross-listing in the U.S market through ADRs (American Depositary Receipts), with cross-listed firms benefiting from higher valuation ratios, abnormal returns and a lower cost of equity capital (Doidge *et al.* , 2004; Errunza & Miller, 2000; Foerster & Karolyi, 1999)

In full integration models, the pace of integration is irrelevant for asset prices because risk sharing occurs instantaneously and the equity market becomes perfectly and immediately integrated. In contrast, theories of partial integration assert that the process of integration is imperfect. Despite numerous liberalisation events, emerging markets don't integrate in full with global markets. Instead of a one-off integration shock, market integration gradually becomes stronger over time.

This occurs for a number of reasons. First, integration is negatively affected by episodes of financial turmoil and can suffer a reversal if risk aversion escalates. There may also be implicit barriers related to institutional quality, corporate governance and political risk, which may gradually (but not instantaneously) improve over time (Carrieri *et al.* , 2013; Bekaert *et al.* , 2011b; Bekaert & Mehl, 2017). Finally, market incompleteness and weak enforceability of international financial contracts imposes frictions to integration, further limiting risk sharing (Bai & Zhang, 2012).

Even after liberalisation events, some assets (e.g. micro-caps, illiquid stocks and equities with restrictions on foreign ownership) can remain ineligible for foreign investors (Bekaert *et al.* , 2016; Errunza & Ta, 2015; de Jong & de Roon, 2005; Bekaert & Harvey, 1995; Bailey & Jagtiani, 1994). Since integration is incomplete, pricing frictions partially offset the benefits arising from risk sharing.

2.2.2 International Asset Pricing Theory

According to standard asset pricing theory, domestic market returns can explain cross-sectional variation in individual stock prices. As investment in stocks is a risky business, in principle, by understanding how risk is priced, one can understand the forces affecting stock prices. For many years, the traditional Capital Asset Pricing Model (CAPM) was the sole benchmark model to study asset prices, much influenced by the seminal works of Sharpe (1964) and Lintner (1965). In this setup, individual stocks are priced relative to aggregate domestic market returns, and in excess relative to risk-free domestic interest rates. The standard CAPM reads as below:

$$E_t[R_{it} - rf_t] = rf_t + \beta_i E_t[R_t^m - rf_t] \tag{2.1}$$

In the CAPM model, the cost of capital is a function of stocks' beta (β), the sensitivity of individual stock prices with respect to domestic aggregate returns (R_t^m). In other words, the risk premium earned over risk-free domestic interest rates is proportional to domestic systemic risk. However, the CAPM was not consistent with one particular stylised fact: investment funds take the global market as a stage, investing in domestic and foreign stocks. Given both domestic and foreign stocks co-exist in investment funds' portfolios, it is not necessarily the case that each particular asset is priced relative to its domestic national index only.

Against this backdrop, international asset pricing theory (IAPM) emerged, seeking to explain the investment behaviour of a more internationalised investment fund industry. In a number of seminal works, Solnik (1974b,a, 1983) introduced the idea of globally diversifiable systemic risk. In the context of international asset pricing models, individual stocks are priced in excess of local interest rates, but relative to a global wealth portfolio, or aggregate global market returns. The basic formulation of the IAPM is:

$$E_t[R_{it} - rf_t^d] = rf_t^d + \beta_i E_t[R_t^w - rf_t^w] \tag{2.2}$$

As noted by Solnik (1983), from the equation above a risk pricing relation is derived, in which the risk premium of a security is proportional to its international systemic risk, or its global beta coefficient. [1] With securities priced globally, risks are pooled with a larger investment community, and domestic idiosyncratic risks can be hedged against foreign economies, with diversification benefits mitigating risks and ultimately reducing the cost of capital. In sum, global diversification introduces risk sharing among investors and consumers around the world. The sub-section next explores this risk-sharing mechanism in more detail.

[1] In multi-factor international asset pricing models, a second risk factor is also included, capturing the risk premium earned on exchange rate exposure.

2.2.3 Integration Regimes: Characterising the Cost of Capital in Emerging Markets

In this section, we take a deep dive into financial integration theory, characterising risk sharing and the cost of capital in emerging equity markets, borrowing insights from several contributions found in the financial integration literature, in particular from Errunza & Losq (1985); Stulz (1999); Chari & Henry (2004); de Jong & de Roon (2005). We define three different cost of capital regimes, which vary according to the assumptions made on the level of integration, or how perfectly (imperfectly) equity markets become: Segmentation, Perfect Integration and Imperfect (Mild) Integration.

2.2.3.1 Segmentation

In financial autarky, the market is segmented and there is no risk sharing between domestic and foreign investors. In this case, the cost of capital as predicted by the CAPM holds, and is given by the expression:

$$k_i^A = E[R_i^A] = rf^A + \beta_{i,M} \cdot E[R^M - rf^A] \tag{2.3}$$

In the cost of capital expression shown above, $E[r_i^A]$ is expected return of a given security when the domestic market is in autarky, $E[R^M]$ is the expected return earned on the domestic market portfolio, and β_i^m is the sensitivity of expected returns to be earned on an equity investment on this firm with respect to the returns earned on the local market portfolio ($\beta_{i,M} = Cov[R_i^A, R^M]/Var[R^M]$), and rf^A is the local risk-free rate.

As noted by Chari & Henry (2004), the aggregate premium on the small country under autarky can be expressed as: $E[R^A - rf^A] = \gamma(W)\sigma_M^2$, whereas $\gamma(W)$ is the coefficient of relative risk-aversion, and σ_m^2 is the variance of returns in the domestic stock market. It is further assumed that all investors share the same constant relative risk-aversion coefficient, so that $\gamma(W) = \gamma$. In light of this, the pricing equation under autarky can be re-written as follows:

$$E[R_i^A] = rf^A + \beta_{i,M} \cdot \gamma\sigma_M^2 \tag{2.4}$$

2.2.3.2 Perfect Integration

When equity markets fully integrate, the influx of foreign investors generates risk sharing in the market, and the risks once borne by domestic investors alone become divided with foreigners. Local covariance risk is replaced by global covariance risk, and the local risk-free rate (rf^A) is replaced by a global risk-free rate (rf^W), satisfying $rf^W < rf^A$. All assets in the market are repriced under the international capital asset pricing model (ICAPM), and the cost of equity capital becomes:

$$k_i^L = E[R_i^L] = rf^W + \beta_{i,W} \cdot E[R^W - rf^W] \tag{2.5}$$

Under perfect integration (full liberalisation), expected returns, $E[R_i^L]$, is a linear function of expected returns earned on the global portfolio, $E[R^W]$, given by the term $\beta_{i,W}$ which captures the sensitivity of stock's expected returns with respect to expected returns earned on of the global market portfolio ($\beta_{i,W} = Cov[R_i^L, R^W]/Var[R^W]$). In analogy with the previous section, the aggregate risk premium on the world market portfolio reads as $E[R^W - rf^W] = \gamma\sigma_W^2$, and the cost of capital under perfect liberalisation is:

$$k_i^L = E[R_i^L] = rf^W + \beta_{i,W} \cdot \gamma\sigma_w^2 \tag{2.6}$$

2.2.3.3 Shifting from Local to Global Covariance Risk

Subtracting the cost of capital equation under perfect liberalisation ($E[R_i^L]$) from the cost of capital under autarky ($E[R_i^A]$) yields the change in expected returns ($\Delta E[R_i]$) rendered by stock market integration:

$$\Delta E[R_i] = E[R_i^L] - E[R_i^A] = (rf^W - rf^A) + \gamma[Cov(R_i, R^W) - Cov(R_i, R^M)] \tag{2.7}$$

The effect of integration on the cost of capital depends upon the difference between local and global risk-free rates, as well as on the difference between local and global covariance risk. It is strongly advocated in financial globalisation theory that expected returns fall after integration, provided the two assumptions shown below hold:

Assumption I: $rf^W < rf^A$

Assumption II: $Cov(R_i, R^W) < Cov(R_i, R^m)$

If these two assumptions are true, then $\Delta E[R_i] < 0$, and expected returns fall as both the risk-free rate and the equity premium shift from local to global after integration. Risk sharing takes place instantaneously, causing the cost of capital to fall and stock prices to rise, the so-called revaluation effect (Henry, 2000b; Bekaert & Harvey, 2000; Chari & Henry, 2004; Patro & Wald, 2005; Christoffersen *et al.* , 2006).

The effect brought about from the risk-free rate channel, which is common to all firms in the market, is more evident, because the risk-free rate tends to be lower in developed markets (contributing to a lower global risk-free rate) than in more segmented emerging markets (Stulz, 1999). However, the firm-specific integration effect, coming from the shift in covariance risk, deserves some deeper explanation. The cost of capital will fall if and only if the difference in the covariance between stock returns and local vis-a-vis global returns is negative, as implied by *Assumption II*.

Now, the underlying rationale for claiming that stock returns are less sensitive to global risk premiums than to local risk premiums, so that *Assumption II* holds, relies upon risk sharing and portfolio diversification. First, what investors (consumers) seek when purchasing financial assets is insurance against shocks to consumption (Romer, 2012). When the market is segmented, all investors reside in the domestic market. Hence, any shock to their wealth, which affects their consumption, is highly correlated to shocks to asset prices, because future profits are embedded in asset prices, and if the economy is hit by an adverse shock, future profits fall and so do asset prices and consumption.

Second, portfolio capital investments contribute to international sharing of consumption risks, allowing countries to smooth their consumption over time, delinking fluctuations in consumption and domestic output. (Brennan & Solnik, 1989; Kose *et al.* , 2009a). When integration occurs, foreign investors purchase equity from domestic firms, but the consumption of foreign investors is less affected by an adverse shock to this economy, because only a small fraction of foreign investors' total wealth is invested in this country. Such mechanism which reduces the exposure of investors' consumption to unexpected output shocks is referred to as risk sharing.

2.2.3.4 Imperfect Integration

Under an imperfect (partial, incomplete or time-varying) integration regime, the cost of capital effect brought about by globalisation does not kick in instantaneously, and is not equally distributed across all firms in stock market, with the revaluation of assets following a more complex process. Despite of liberalisation events, the domestic equity market remains mildly segmented, or only imperfectly integrated (de Jong & de Roon, 2005; Errunza & Miller, 2000; Errunza & Losq, 1985). Imperfect integration undermines firms' ability of taking advantage of risk sharing, by making the effect of the local risk premiums on asset prices sticky or pervasive and hence imposing hurdles to reductions in the cost of capital.

Chari & Henry (2004) argue that there are two different partial integration regimes. First, mild integration occurs when, whilst domestic investors can invest in the global portfolio, foreign investors can invest only in a subset of local stocks. This separation creates two broad portfolios of stocks in the newly-integrated stock market: investable and non-investable stocks. As theorised by Errunza & Losq (1985), if domestic and foreign investors have the same risk-aversion coefficient, then both investable and non-investable stocks are re-priced under the perfect liberalisation regime. If risk preferences differ, then domestic investors have to be compensated for holding the non-investable portfolio (claiming a *super-risk premium*), and therefore equity investments in non-investable stocks require higher expected returns.

Second, segmentation can be strong, as suggested by theoretical models developed in Hietala (1989) and in de Jong & de Roon (2005). If strong segmentation persists, local investors are not permitted to invest in the global portfolio, and therefore they hold only the domestic portfolio, comprised of both investable and non-investable assets. Investable assets are those stocks in the newly-integrated market that are added to foreign investors' portfolio, whilst non-investable assets are those that do not qualify in foreign funds strategies, for a number of reasons.

To understand how imperfect integration affects cost of capital, the more recent model by de Jong & de Roon (2005), is taken as a benchmark, though with a number of simplifications [2]. Consider that after integration occurs, some assets remain ineligible for foreign investors'

[2] First, whilst the original model considers segmentation of local markets with respect to both global and regional markets, the discussion here focuses on global segmentation only. Second, while the original paper also develops an equation to price non-investable assets, the focus here is on investable assets, although such additional equation is briefly mentioned.

trading, namely non-investable stocks (normally micro-caps, highly illiquid stocks and stocks with regulatory restrictions on foreign ownership), whereas the rest of assets become eligible for foreign investors, namely investable assets.

The cost of equity capital of investable assets is given by $E[R_i^I]$, whereas the cost of capital of non-investible assets is given by $E[R_i^X]$. Domestic investors can hold both the investable and the non-investable portfolios, whereas foreign investors can hold only the investable portfolio. As a fraction of local assets remain held only by domestic investors, these assets are partially excluded from the process of financial integration, and do not benefit from increased risk sharing directly. In this case, not all assets are priced against the world market risk premium, and the international asset pricing model does not hold for all equities in the market.

However, local investors can make use of the investable portfolio to hedge against the idiosyncratic risk from the non-investable portfolio. Because investable assets are partially priced in excess of the world market premium, they have lower covariance risk, when compared to strictly domestic assets, which are, in principle, fully priced locally. However, such full local pricing will not occur, because local investors can obtain partial risk diversification, by investing in investable assets (in other words, domestic investors gain partial access to global diversification *through* investing in investable assets).

According to this logic, local investors will price non-investable assets in excess of returns earned on the investable assets' portfolio. [3] But such hedging pressure will affect the pricing of investable assets too. Under imperfect market integration, the cost of equity capital of investable assets is given by the equation:

$$k_i^I = E[R_i^I] = (1-q) \cdot \gamma^m Cov[R_i^I, R^W] + q \cdot \gamma^m Cov[R_i^I, R^X] \tag{2.8}$$

As in the perfect integration model, expected returns on investable assets depend upon the covariance between investable assets returns and the global returns ($Cov[R_i^I, R^W]$), and on a risk aversion coefficient, γ^m. Moreover, expected returns are affected by an additional risk premium which arises because investable assets provide hedging protection against the idiosyncratic risk of non-investable assets. This hedging pressure is captured by the covariance of the returns of investable assets with the returns of non-investable assets ($Cov[R_i^I, R^X]$).

[3] The asset pricing equation for non-investable assets is given by: $E[R_i^X] = \beta_{i,I} \cdot E[R^I] + \phi \cdot q$, where $\beta_{i,I}$, the covariance between investable and non-investable assets' returns, reflects risk diversification of non-investable stocks *through* domestic investors' holdings of investable stocks.

The cost of capital is determined by both a global and a national beta. [4] The loading of each beta depends upon the level of overall market segmentation (q). Higher is segmentation (the market capitalisation of non-investable assets as a share of total market capitalisation), higher is the loading of the local beta in determining the cost of capital, and lower is the loading of the global beta. Hence, segmentation makes risk sharing less efficient, increasing the cost of equity capital. de Jong & de Roon (2005) show that the pricing equation above can be expressed in a beta-model representation as well:

$$E[R_i^I] = \beta_{i,W} \cdot E[R^W] + \theta_{i,X} \cdot q \tag{2.9}$$

Where:

$$\beta_{i,W} = \gamma^m[Cov(R_i^I, R^W)] \tag{2.10}$$

$$\theta_{i,X} = \gamma^m[Cov(R_i^I - \beta_{i,W} \cdot R^W), R^X] \tag{2.11}$$

In words, the first term refers to the sensitivity of investable assets returns with respect to global portfolio returns, whereas the second term captures an additional risk premium caused by the hedging demand by domestic investors for their positions on non-investable stocks. Such additional risk premium is proportional to the covariance of the residual of the global beta pricing equation ($R^I - \beta_{i,W} \cdot R^W$), or in other words, the fraction of investable assets returns which does not covariate with global risk premiums, with the returns of non-investable assets (R^X), which reflects the pricing friction caused by additional hedging demands.

2.2.4 Empirical Evidence

The most common result from the extant literature documents a positive effect of stock market liberalisation, integration and foreign equity capital flows on stock market returns, in line with neoclassical risk-sharing theories. The majority of papers conducted events studies, looking at how key liberalisation events (like the removal of capital controls, specific legal landmarks on foreign investments, etc) affected stock returns. Other studies focused on ADR issuing in the

[4] The original model makes no assumptions about the level of integration of debt markets, employing gross returns throughout the analysis (risk-free rates do not seem to be deducted, neither from assets nor from market returns).

U.S stock market, whereas a third line of research analysed a time-varying process of equity market integration. In this section, the most representative papers in this literature are shortly reviewed.

Buckberg (1995), under a financial integration perspective, analysed whether emerging markets became part of the global equity market after significant portfolio capitals inflows from developed economies to such emerging markets. Employing a conditional International Capital Asset Pricing Model (ICAPM), she found that already by 1991 emerging markets were to some extent integrated to developed markets, as capital inflows from developed economies caused prices in emerging markets to reflect covariance risk with the global portfolio.

Bekaert & Harvey (1995) proposed a time-varying measure of market integration, by allowing expected returns in any country to be affected either by the covariance with a world benchmark portfolio or by the variance of the local market's returns. Since in completely integrated markets only the covariance with global returns matters, whereas in a segmented market the intra-market variance is the important measure of risk, they apply a time-varying weighting to the covariance with global returns and variance with local returns for assessing the dynamic evolution of the financial integration process. Overall, they concluded that a number of emerging markets exhibited a time-varying pattern of market integration, but some countries were actually becoming less integrated.

Issuing ADRs abroad (in the U.S market) reduces the cost of equity capital, as stock prices appreciate after foreign listing (Errunza & Miller, 2000). As the risk-sharing process between domestic and U.S investors takes place, the risk premium falls and asset prices appreciate. Foerster & Karolyi (1999) and Doidge *et al.* (2004) also reported that firms from emerging and more segmented markets issuing ADRs in the U.S have also experienced long-run positive returns and increases in valuation ratios, corroborating the revaluation effect hypothesis.

One of the most important empirical evidences to this literature is contributed by Bekaert & Harvey (2000). They study the impact of financial liberalisation events on the cost of equity capital for a sample of firms from emerging markets. Cost of equity capital is measured using dividend to price ratios (dividend yields), and regressions are estimated, between the dividend yield and several measures of financial liberalisation, such as official liberalisation events and market capitalisation of foreign investors portfolio. Authors report that dividend yields drop considerable as emerging markets integrate with global equity markets, concluding that financial

liberalisation decreases the cost of equity capital.

In a similar design, Henry (2000b) studied the effect of stock market liberalisation events on expected returns in 12 emerging markets. The author concludes that, in line with the predictions from standard international asset pricing models, stock market liberalisation is associated to abnormal returns in countries' aggregate equity price indices, thus reducing liberalising countries' cost of capital by allowing risk sharing to occur between domestic and foreign investors.

de Jong & de Roon (2005) develop an international asset pricing model (IAPM) with time-varying integration and segmented markets, in which some assets are considered ineligible for foreign investors, being held strictly by domestic investors. Such a portfolio restriction generates an additional risk premium in the country's equities. Their asset pricing model equation augments the pricing equation from the ICAPM, by including the ratio of non-investable market value to the total market value as a measure of market segmentation. The theoretical model is then empirically tested for a sample of emerging markets. The main result reported is that expected returns decrease (increase) as market become less (more) segmented, consistent with the idea of time-varying stock market integration in emerging markets, and supportive of the narrative of gains in terms of cost of capital reduction as markets integrate.

Under a time-varying world market integration perspective, Carrieri *et al.* (2007) employ a Garch-in-mean method to an asset pricing equation, in order to assess the evolution on market integration for a sample of 8 emerging markets, between years 1977 and 2000. They found that all countries in the sample were at least partially integrated to global equity markets by the year 2000, but local market factors still played an important role in describing overall returns. Also, authors suggest that the integration process suffers reversals at some specific time periods, and is not equally observed across all countries in the sample, as the degree of integration varies substantially across countries. Mild segmentation best describes emerging markets integration status.

Studying first ADR issues on the U.S Market of 1,000 firms from 27 emerging markets, Fernandes (2009) finds that cross-listing is associated with positive price revaluations and decreases in expected returns and average volatility, consistent with the risk sharing hypothesis. The effects also spillover to other firms in the market, and for this reason, the author suggests that first ADR listings can be seen as liberalisation events *per se*.

Consistent with the idea of time-varying world market integration, a cross-country study

by Bekaert *et al.* (2011b) reports evidence of decreases in market segmentation in a number of countries, though segmentation remains particularly relevant in emerging markets, with the level of regulations with respect to foreign capital flows, political risk and financial development strongly contributing to the extent to which markets remain segmented from the rest of the world.

In a similar spirit, Carrieri *et al.* (2013) study how implicit barriers affect stock market integration, for a sample of 22 emerging economies. Results suggest that emerging markets are fairly less integrated than developed economies, and much of this pervasive segmentation can be explained by weaker institutional development, poorer corporate governance standards and lack of transparency in emerging stock markets.

Errunza & Ta (2015) study the effects of *Investability* on asset returns. Employing a sample of 18 emerging markets, the authors study how inclusions in the S&P Investable Weight Factor (IWF) index affect stock returns and cost of capital, finding that, as stocks gain *Investable* status, shifting from non-investable to partially and fully-investable, the cost of equity capital falls considerably. Results corroborate the economic benefits from equity market liberalisation.

Investigating market liberalisation events in China, Chan & Kwok (2017) find that risk sharing, as proxied by shifts in covariance risk (DIFCOV) can explain a substantial fraction of the revaluation of investible stocks during liberalisation reform periods. The authors conclude that liberalisation is associated with increased risk sharing, leading to lower cost of capital.

2.2.5 Asset Characteristics, Governance and Foreign Institutions

Prior research suggests that firm characteristics, such as size, investability and corporate governance, matter for integration. Chari & Henry (2004) argue that the reduction in cost of capital brought about by financial liberalisation can be split into two components: an aggregate stimuli effect, which impacts all assets through lowering the risk-free rate, and an asset-specific effect, which is stronger for investable firms.

With respect to firm size, evidence suggests that small firms benefit more from liberalisation events because they enjoy larger increases in stock prices following integration (Patro & Wald, 2005) and a weakening of financial constraints with positive effects on investment (Laeven, 2002). In contrast, Christoffersen *et al.* (2006) report that large firms' stock prices increase more after a liberalisation event.

Corporate governance seems to play a key role, both before and after integration. Stulz

(2005) suggests that strengthening corporate governance is costly, and firms are more likely to do so when they use external finance provided by foreign investors. Thus, stock market integration creates incentives for firms to improve governance. This is consistent with the argument proposed by Ferreira & Matos (2008), that foreign and independent institutional investors take a more active stance in monitoring invested firms, hence firms must improve on contracting efficiency and transparency to receive foreign capital.

Indeed, these arguments are supported by empirical evidence. Institutional investors reveal preferences in stock-picking for firms with higher corporate governance standards and more transparent management (Leuz *et al.* , 2009; Ferreira & Matos, 2008; Batten & Vo, 2015). Changes in foreign institutional ownership over time positively affect subsequent changes in firm-level corporate governance (Aggarwal *et al.* , 2011). Firms with stronger governance also experience greater equity revaluations following stock market liberalisation (Bae & Goyal, 2010). The benefits from foreign institutions also spillover to real economic activity. Bena *et al.* (2017) show that foreign ownership is associated to marginal increases in long term investment, innovation in R&D and in employment creation. Effects are particularly stronger in countries where expropriation risks are more acute, corroborating the idea that foreign investors are bringing about improvements in monitoring.

2.3 Real Economic Effects of Integration

There is an unsettled debate on whether financial globalisation has helped emerging markets to expand investments and the real economy, with a good deal of skepticism towards the existence of real economic benefits stemming from financial integration (Bekaert *et al.* , 2016). Some studies argue that liberalisation has alleviated financial constraints and decreased the cost of capital, thereby boosting investment, growth and productivity (Henry, 2000a; Laeven, 2002; Bekaert *et al.* , 2005; Ranciere *et al.* , 2006; Chari & Blair Henry, 2008; Bonfiglioli, 2008; Gupta & Yuan, 2009; Bekaert *et al.* , 2011a; Larrain & Stumpner, 2017).

On the other hand, the debate does not lack criticism. A number of empirical and theoretical studies have suggested there is no systematic investment and growth bonus linked to increasing the level of foreign ownership (or the share of foreign financing) in emerging markets (Singh & Weisse, 1998; Bosworth & Collins, 1999; Stiglitz, 2000; Aizenman *et al.* , 2007; Kose *et al.* ,

2003, 2009a; Ayhan Kose *et al.* , 2011).

The underlying rationale supporting the claim that stock market openness increases investment and economic activity builds, by and large, in the neoclassical paradigm. As argued by Bekaert *et al.* (2005), increased risk-sharing brought about by equity market openness (liberalisation) decreases the cost of capital, leading to an increase in investments.

Despite of such apparently straight-forward mechanism linking equity market integration and investment, in reality the picture is different, for many reasons. In this section, the most important papers analysing this issue are discussed, to try and make sense of the aforementioned debate. Before that, to gain more intuition on the topic and motivate the discussion of extant empirical work, a conceptual model of stock market openness and investment by Henry (2000a) is presented and discussed.

2.3.1 A Model of Stock Market Openness and Aggregate Investment

The model discussed here is developed by Henry (2000a). First, consider stocks valuation and investment in an autarkic (fully segmented) emerging market, where both equity and money markets remain closed to foreign investors. The aggregate profit per unit of invested capital is given by Π_t. All profits are paid as dividends, and let V_t represent the expected present value of aggregate profit per unit of invested capital.

Next, the cost of risk-less debt and equity are defined. It is assumed that r_t^A is the domestic risk-free rate, whereas Θ_t^A is the domestic market equity premium (the superscript A meaning Autarky). It is further assumed that there exists a global risk-free rate, defined as r_t^W, satisfying $r_t^W < r_t^A$, so that the domestic risk-free rate exceeds the global risk-free rate. Also, consider that stock market liberalisation does not affect Π_t, so that the cash flow generation process in the economy remains constant after the stock market opens for foreigners (no productivity gains). Given this setup, the valuation of the domestic stock market under autarky is given by:

$$V_t^A = \frac{\Pi_t}{r_t^A + \Theta_t^A} \tag{2.12}$$

One important implication of this equation is that the discount rate with which cash flows are evaluated against has two components: the risk-free rate, and the equity premium. Next, define

P_k as the price of a unit of physical capital, and further assume that:

$$V_t^A = \frac{\Pi_t}{r_t^A + \Theta_t^A} = P_k \tag{2.13}$$

The interpretation of the condition shown in the equation above is that the market for physical capital goods is in equilibrium, with firms indifferent between investing or keeping the capital stock constant. Now, assume this autarkic stock market goes through a wave of liberalisation events.

In autarky, the equity premium, Θ_t^A, is proportional to the variance of country's aggregate cash flows, or the local price of risk. However, when the once-segmented market opens for foreigners, becoming fully integrated, the local equity premium becomes proportional to the covariance with the world portfolio, the global price of risk. If the local price of risk exceeds the global price of risk (shown to be the case for all emerging markets by Stulz (1999)), the equity premium falls after integration. Let Θ_t^L be the equity premium after liberalisation, this implies that $\Theta_t^L < \Theta_t^A$ (with superscript L meaning Liberalised).

Although it is assumed that money markets remain closed, liberalisation may also reduce the risk-free rate, indirectly (assuming domestic savings rate remains constant), because foreign capital flows increase the total supply of loanable capital. Assume that the post-openness risk-free rate is now r_t^L, satisfying $r_t^L < r_t^A$. Given this new setup after integration, aggregate valuation after openness, V_t^L is given by:

$$V_t^L = \frac{\Pi_t}{r_t^L + \Theta_t^L} > P_k \tag{2.14}$$

According to the neoclassical investment function above, stock market openness disturbs the equilibrium between financial and physical capital which existed before integration, creating a wedge between the market value and the price of physical capital, incentivising domestic firms to expand installed capacity. Therefore, the risk sharing process, as well as increased liquidity brought about by foreign capital inflows, decreases the equity premium, indirectly reduces the risk-free rate, leading to increased aggregate investment.

Yet, two objections pointed out by Henry (2000a) deserve to be remarked. First, could be that the domestic risk-free rate is actually lower than the global risk-free rate under autarky (due to very high savings rate in autarky, for instance). Second, it may be the case that expected

aggregate profits do not remain constant after liberalisation, because the same factors causing stock market integration may also lead to an expansion in the country's investment opportunity set and productivity. Taking stock of these criticisms, the idea is that not every single country in the world will experience a drop in the cost of capital after integration, though, in general, the conceptual model provides an interesting benchmark to study the effect of stock market integration on investment.

2.3.2 Investment Gains

Levine & Zervos (1998) examine the relationship between international capital market integration and real economic variables, for a sample of 24 national stock markets, including both developed and developing countries in the same sample. The authors regress the growth rate of capital stock against measures of stock market integration, finding no statistically significant effects (authors also conducted the same test with output growth, productivity growth and domestic savings as dependent variables, finding similar insignificant results). They conclude that greater risk sharing through internationally integrated markets do not produce any effects in real economic variables, such as investment.

Looking at the effect of foreign portfolio inflows on domestic investment and savings, Bosworth & Collins (1999) examine whether increasing the share of foreign financing is associated with capital accumulation, for a sample of 58 developing countries. The authors estimate regressions between investment and savings ratios, calculated as a share of GDP, modelling these variables as a function of three types of capital flows: foreign direct investment, portfolio flows and loans, controlling for GDP growth and measures of international trade activity. Findings suggest that, whilst foreign direct investment has a positive and statistically significant effect on investment, portfolio investments seem to have little to do with capital accumulation (statistically insignificant effects).

Studying a sample of 11 emerging economies, Henry (2000a) analyses the impact of stock market liberalisation events on the growth rate of domestic private investment. In contrast with the evidence reported by Levine & Zervos (1998), the empirical results from this paper suggest that the developing countries in the sample experienced abnormally high growth rates of private investment following liberalisation. However, the author contends that, because exogenous decreases in the world cost of capital, as well as shocks to future marginal productivity of

the domestic capital stock, may be two factors causing simultaneously both liberalisation and investment growth, it is hard to tell whether liberalisation leads to a permanent growth in investment. On the other hand, as investment growth following liberalisation remains robust even after controlling for countries' fundamentals and world business cycles, the author concludes that stock market openness causes, at least, temporary investment growth.

In later years, microeconomic studies, examining the effect of stock market integration at the firm-level, gained more space, much motivated by the lack of consensus between the extant aggregate investment literature. Laeven (2002) studies whether financial liberalisation is associated with reductions in financing constraints for a panel of firms from 13 emerging markets. As the author contends, although financial reform is one of the most profound policy reforms in emerging markets, with large potential to impact positively firm performance and economic welfare, as per the empirical evidence of the time, there was no professional consensus on the net benefits of liberalisations.

Using banking and stock market liberalisation dates, Laeven (2002) estimates a dynamic model of investment, employing two-steps Arellano-Bond GMM regression models. To capture whether integration relaxes financing constraints, dummy variables capturing liberalisation dates are interacted with cash flows, output and firm size, plus triple interactions between liberalisation, cash flows and firm size. The author concludes that, before liberalisation, small firms were financially constrained, whereas large firms were not. Liberalisation reduces the cash flow sensitivity of investment for small firms, hence lowering financing constraints, but the opposite occurs for large firms. A possible explanation for this result is that, whilst new credit can be funding smaller firms, large firms seem to have lost preferential access to existing credit.

Chari & Blair Henry (2008) analyse the effect of stock market liberalisation on firm-level investment, for a sample of firms from 11 emerging markets. The authors build measures of firm-level differences in the covariance between stock returns, local and global markets, before and after liberalisation events (DIFCOV). Regression models are estimated, with changes in corporate investment ratios before and after liberalisation as dependent variable, and DIFCOV, country fixed effects, controls for growth opportunities and stock price changes as independent variables.

The authors explain that the intercept of this regression captures the common shock to all firms, caused by a drop in the risk-free rate, whilst DIFCOV reflects firm-specific liberalisation

effects. Empirical results suggests that liberalisation increases corporate investment via reductions in the risk-free rate (as to most of countries in the sample, the intercept is positive and significant), but the firm-specific effect is statistically insignificant and economically negligible.

2.3.3 Economic Growth and Productivity Gains

In a comprehensive survey of the literature examining capital account liberalisation and economic growth, Eichengreen (2001) concludes that evidence is mixed, though fairly unconvincing either when reporting null or positive effects, as results seem to depend upon sampling strategy and period and upon other methodological particularities. As he argues, the lack of support for growth effects of liberalisation is worrisome, and given empirical evidence is simply not there, it may be time to reconsider such taken-for-granted conventional wisdom that liberalisation induces economic growth.

He also urges empiricists to improve on how they measure and distinguish liberalisation and controls, and to identify the mechanisms through which liberalisation should affect growth. In a methodological critique, economists are incentivised to take a microeconomic approach to investigate the problem, as the macro framework might be actually one of the drawbacks.

Bekaert *et al.* (2005) conduct a large scale cross-country study of liberalisation and economic growth. Employing samples containing between 58 and 95 countries (depending on the liberalisation indices used), authors estimate regression models between per capita GDP growth and several measures of liberalisation, such as: liberalisation official dates, capital account liberalisation indexes calculated from various sources, measures of *First Sign* liberalisation events, like the first ADR issued in the U.S Market, or the first globally investable country fund, and the market capitalisation of investable assets as a share of total market capitalisation.

Findings from this paper point to an important role played by current account openness in fostering economic growth, as estimates show that equity market liberalisation, on average, lead to 1% annual economic growth, with findings remaining robust to alternative definitions of liberalisation, and to factors explaining global business cycles and exogenous change in countries' growth opportunities set. Results also show that economic growth post-liberalisation is higher in countries with better institutional quality.

In another cross-country study, Quinn & Toyoda (2008) study whether *De Jure* current account openness measures lead to economic growth, in 94 countries between 1955 and 2004.

The authors estimate regressions, via OLS, pooled time series and GMM, with GDP growth as dependent variable, and current account openness as main independent variable. Results support a positive effect of current account liberalisation on economic growth, for both emerging and developed countries. Moreover, authors report an independent effect stemming from equity liberalisation on growth.

Using industry-specific data for 27 3-digit ISIC industry categories, Gupta & Yuan (2009) investigate whether stock market liberalisation induces economic growth, for all emerging markets (31 countries) that liberalised their stock markets after 1980, with data covering a period between 1981 and 1998. Measures of economic activity include value-added, investment and number of establishments.

Results from this paper suggest that, consistent with the idea that stock market integration reduces financing constraints, industries with higher external finance dependence and posting better growth opportunities grew at a faster pace following liberalisation. The channel linking liberalisation and growth seems to be the growth of existing firms, as evidence suggests that growth comes from expansion in firms' sizes rather than the entry of new firms.

Disaggregating capital flows between foreign direct investment, portfolio investment, equity investment and short-term debt, Aizenman *et al.* (2013) investigate the liberalisation-growth relationship for 100 countries during years between 1990-2010, a period that, according to the authors, emerging markets became more integrated with the international financial system. Regression models are estimated, with the growth rate of GDP per capita as dependent variable, and measures of direct, portfolio, equity and short-term debt foreign capital inflows (as a share of GDP) as main independent variables.

The results reported by authors suggest a complex picture, with the type of flow, economic structure of recipient countries and global growth patterns shaping this relationship. Foreign direct investment produces the largest and most resilient growth effects. On the other hand, equity inflows produce smaller effects on economic growth, and such effects are found to be more unstable. With respect to debt flows, there are no growth effects in general, but during the Great Financial Crisis, debt flows led negative growth effects.

With strongly mixed and inconclusive evidence relating liberalisations and integration, investment and economic growth, researchers turned recently to the issue of whether liberalisation brings productivity gains. As noted by Bonfiglioli (2008), understanding the mechanism through

which financial globalisation affects economic performance is crucial for evaluating the costs and benefits of opening financial markets. In her paper, she attempts to disentangle the effects of both *De Jure* and *De Facto* measures of financial globalisation on the two main channels of economic performance: total factor productivity (TFP) and investment, studying a sample of 70 countries between 1975 and 1999.

Results from this paper offer evidence in favour of positive effects of financial globalisation on productivity, employing both *De Jure* and *De Facto* proxies of integration. On the other hand, perhaps surprisingly, financial liberalisation exerts negligible effects on capital accumulation and investment. As side results related to financial integration and the level of financial development, no association is found between financial integration and increases in financial depth, but integration can, instead, increase, to a minor extent, the likelihood of banking crises.

Bekaert *et al.* (2011a) also study the relationship between financial openness and productivity. As they argue, a simple mechanism through which financial openness should affect productivity is through improvements in domestic allocative efficiency. The paper analyses a dataset referring to 96 countries, between 1980 and 2006. Regression models are estimated, with growth rate of GDP per capita, total factor productivity and the growth rate of the capital stock as dependent variables, and several measures of financial openness as independent variables, such as official equity liberalisation dates, current account openness variables from the IMF, among others.

The findings from this study suggest that productivity effects outperform economic growth and capital accumulation effects, a finding that is interpreted by authors as explaining why, whilst growth effects are temporary, productivity effects can be seen as permanent. Such permanent effect impacting productivity, in turn, is related to improvements in stock market and banking sector development, and institutional quality, all facilitated by increased levels of integration. Moreover, results vouch in favour of *Threshold Effects*, as countries with stronger financial development and better institutions experienced greater productivity gains.

These findings are aligned with the evidence reported by Ayhan Kose *et al.* (2011). In this paper, the authors estimate the effect of financial openness, measured as countries' total stock of external assets and liabilities, as a share of nominal GDP, on GDP per capita growth, further including interactions between financial openness and measures capturing institutional quality, trade openness, financial development, among others, via dynamic panel data and other

non-parametric methods. The dataset refers to 84 countries, and spans between 1975-2004.

Results from this paper support the existence of *Threshold effects*, as the effect of financial openness on economic growth is found to be stronger for countries reaching a given (desirable) level of financial development and institutional quality. Moreover, such threshold effects are found to be stronger for debt flows than for foreign direct investment and equity flows.

Larrain & Stumpner (2017) study the effect of liberalisation on firm capital allocation and aggregate productivity, using aggregate and firm-level data from 10 eastern european countries, during these countries' accession to the European Union (2004-2007). Regression models are estimated, employing country-level TFP and firm-level measures of dispersion in capital returns as dependent variables, and *De Jure* current-account liberalisation indices around accession events as explanatory variable.

Results provide evidence in favour of productivity gains from liberalisation, in particular for industries with higher external financial dependence. Evidence also suggests that liberalisation improves capital accumulation and capital allocation efficiency, by allowing financially constrained firms to demand more capital and produce at a more efficient level, as authors document a reduction in the dispersion of marginal returns to capital.

2.3.4 The Downsides of Opening Equity Markets

Taking stock of a more critical perspective to opening financial markets, globalisation may have its downsides as well. As noted by Bekaert *et al.* (2016), it remains controversial whether financial openness is indeed beneficial, particularly in the real side. Financial integration may improve risk diversification, but fails to increase net sources of financing capital (Aizenman *et al.* , 2007). To many authors, financial globalisation is linked with increased volatility in stock returns (Stiglitz, 2000) and in consumption (Kose *et al.* , 2003).

In a calibrated neoclassical model, Gourinchas & Jeanne (2006) show that welfare gains from switching from financial autarky to perfect capital mobility are relatively limited for the typical emerging economy. In fact, as argued by Kose *et al.* (2009a), in contrast to some theoretical models, risk sharing brought about by financial integration is modest at best, with the gains spilling-over unequally towards industrialised countries. On the other hand, for emerging economies, despite of many developing countries having reduced capital controls over time and experienced a large influx of cross-border capital flows, the benefits from risk sharing seem

more shy, mostly because the composition of capital inflows is strongly skewed towards debt portfolio investments, which are not conductive to risk sharing.

This argument is aligned with Stiglitz (2000), as he contends that due to the short-termed nature of foreign portfolio capital flows, long-term capital investment by firms may be actually discouraged, because companies don't trust such volatile financial resources will stay for longer periods ahead. All these theoretical and empirical evidences contribute to a somewhat paradoxical view, which sustains that it is difficult to establish a strong and robust causal relationship between financial integration and economic growth (Kose *et al.* , 2003).

Moreover, empirical evidence relating to the 2008 financial crisis has documented a strong rebalancing of foreign equity portfolios of institutional investors, with sudden outflows of capital from emerging economies back to safe haven developed countries (Fratzscher, 2012; Forbes & Warnock, 2012). Also, foreign capital may cause exchange rate overheating and bubbles in asset prices (Aizenman & Pasricha, 2013), often triggering government interventions in the form of capital controls (Chamon & Garcia, 2016; Jinjarak *et al.* , 2013). Capital controls bring about harmful outcomes, depressing valuations and increasing cost of capital (Alfaro *et al.* , 2017).

Equity openness may not result into full market integration. Despite liberalisation, implicit barriers such as the existence of non-investable assets, weak institutional quality, political risk, lack of capital market transparency and poor corporate governance are still important, reducing the benefits from openness and keeping emerging markets segmented (Errunza & Ta, 2015; Carrieri *et al.* , 2013; Bekaert *et al.* , 2011b; de Jong & de Roon, 2005; Errunza & Losq, 1985).

Integration can suffer reversals in times of escalated risk (Carrieri *et al.* , 2007), consistent with recent findings reporting that the global financial crisis and its aftermath have provided new headwinds to financial globalisation (Bekaert *et al.* , 2016). Moreover, both risk sharing and capital market integration share a strong time-varying component, with particularly high welfare costs of foregone risk sharing occurring during times of escalated risk aversion and uncertainty, such as during financial crisis (Rangvid *et al.* , 2016).

2.4 Synthesis and Discussion of Extant Research

A number of debates, although not new at all, remain unsettled, while other relationships and mechanisms are now fairly well identified, after nearly three decades of intensively and competently conducted research. Given the complexity of financial globalisation phenomena, former research deserves lots of credit, and it is proper to any young scholar wishing to enter this debate to recognise the richness of the existing literature, while, at the same time, it is a duty to point and reflect upon its shortcomings, seeking ways to advance scholarly in the field.

With respect to stock market openness, liberalisations, integration and the cost of capital, given the accumulated evidence, it is safe to say that one-off liberalisation events increase stock prices, driving expected returns downwards, thereby reducing the cost of capital (Bekaert & Harvey, 2000; Henry, 2000a; Chari & Henry, 2004). Hence, it seems that there isn't much to be gained in this particular area, without moving to study fine-tuned specificities and particularities involved in the process. On the other hand, the time-varying integration literature, although it has had its developments, is an area with more interesting research prospects.

This is particularly the case because evidence suggests that frictions to integration, which occur over time, may bring about large positive (or negative) cost of capital effects. A growing body of literature, as referred to in previous sections, is attempting to identify what is the nature of such frictions, like political risk, corporate governance and institutional quality improvements, illiquidity and within-market segmentation (separation) between investable vis-a-vis non-investable firms (Bekaert *et al.* , 2011b; Carrieri *et al.* , 2013; Errunza & Ta, 2015).

Second, although cost of capital effects have been, in general, well identified, much less is known about how the pros (or cons) spillover at the micro level, or in other words, how firm (portfolio) characteristics enter this equation. By looking at the effects of financial globalisation on the cost of capital taking a firm (portfolio) perspective, one can learn about which assets and firms might benefit more or less from integration. This is an important issue to consider when assessing the overall benefits to local firms from stock market openness.

For instance, whether it is larger or smaller firms reaping the lions' share from integration remains unknown, with mixed evidence favouring both sides (Huang, 2007; Christoffersen *et al.* , 2006; Patro & Wald, 2005; Laeven, 2002). In light of this discussion, the first essay conducts an empirical investigation of the effects of time-varying stock market integration on the cost of equity capital, studying the Brazilian stock market in depth, a major emerging economy. The

essay places particular focus on the interplay between stock market integration and assets' characteristics, such as size, liquidity, growth opportunities, momentum and governance.

With respect to integration and the real economy, the current state of the debate leaves more room for further studies. As noted recently by Bekaert *et al.* (2016), the evidence on the real side remains controversial. While evidences on economic growth and productivity gains seem more cohesive and aligned with one another, with a number of papers reporting a positive association between financial globalisation, economic growth and productivity (Larrain & Stumpner, 2017; Bekaert *et al.* , 2011a; Gupta & Yuan, 2009; Quinn & Toyoda, 2008; Bonfiglioli, 2008), it stands out when reviewing the literature that the importance of investment calls for more attention.

Regarding firm-level investment studies, a couple of papers have shown that financial liberalisation has an indirect effect on investment through reductions in financing constraints (Laeven, 2002), and that liberalisation increases investment via a country-level cost of capital mechanism (Chari & Blair Henry, 2008). Whilst Larrain & Stumpner (2017) provide some evidence, for a limited sample of eastern european countries, that *De Jure* country-level integration measures are associated to larger firm-level capital stocks, no firm-level mechanism linking liberalisation directly to corporate investment has been established (Chari & Blair Henry, 2008).

In general, this lack of systematic evidence is problematic, because, whilst the neoclassical integration framework works well for cost of capital studies, it seems to break for investment, but the reason why remains unknown. If integration generates both country-level cost of capital reductions via reducing market-wide segmentation, and firm-specific cost of capital benefits from lowering covariance risk, then, ideally, both mechanisms should be operative in enhancing investments, though empirical evidence is still inconclusive.

A potential explanation is offered by Stulz (2005), in the theoretical twin agency costs model, as he contends that, although risk sharing may take place indeed, the mechanism breaks because foreign investors fear expropriation from opportunistic corporate insiders and government officials, with co-investment severely limited in terms of quantity. Although the twin agency costs model offers insightful ideas, it remains, by and large, untested. Bena *et al.* (2017) provide evidence more or less in line with the agency costs model, in that larger shares of foreign institutional stock ownership is associated with higher long-run firm-level investment, concurring with the idea that foreign investors help firms to improve allocation efficiency via enhanced monitoring (Ferreira & Matos, 2008).

Ideally, one would like to check whether (i) stock market openness measures at the country-level is associated to increases in corporate investment, as this channel may capture, among other effects, the country-level cost of capital mechanism, and (ii) that a firm-level mechanism is also operative, channeling the gains from lower covariance risk towards investments, and (iii) how governance and institutional quality enter this picture, as these factors gain central importance in the agency costs approach.

Taking stock of this discussion, the second essay investigates stock market openness and corporate investment, studying whether both country-level *De Jure* stock market openness, proxied by current-account openness indices, and firm-level *De Facto* realised integration, proxied by foreign institutional ownership, affect corporate investment. Additionally, the predictions from the twin agency costs model are also evaluated, as the role played by governance and institutional quality receives proper attention in the analysis.

With respect to aggregate investment, while some earlier papers have found evidence of temporary investment effects (Henry, 2000b), recent contributions, reporting convincing evidence on economic growth and productivity effects, either found no link between openness and domestic investment, or reported weaker evidences (Bekaert *et al.* , 2011a; Bonfiglioli, 2008). This is puzzling, because theoretical models suggest that, by and large, the mechanism through which financial globalisation should affect economic growth is *through* higher investment, even if by means of temporary effects (Henry, 2000a, 2007).

Other mechanisms have been suggested, in particular productivity. The argument is that improvements in stock market and banking development, plus amelioration of institutional quality brought about by financial globalisation may lead to productivity gains, which in turn is responsible for permanent, instead of temporary, gains in economic growth (Bekaert *et al.* , 2011a). Moreover, empirical evidence also suggests that financial openness is associated with increased levels of financial development (Baltagi *et al.* , 2009; Chinn & Ito, 2006). By no means this discussion makes less of econometric evidence on the productivity side. Yet, instead of discarding aggregate investment gains, which is strongly backed by theoretical models, simply because empirical evidence is lacking, it may be wiser to do more empirical testing.

Another finding which is strongly advocated in the financial globalisation literature pertains to so-called *Threshold Effects*. The underlying argument is that openness spurs economic growth and also financial development if countries reach a given threshold of institutional quality. If

countries fail to meet a given (arbitrary) quality level, capital flows and integration are found to be ineffective in stimulating economic activity (Ayhan Kose *et al.* , 2011; Bekaert *et al.* , 2011a; Chinn & Ito, 2006). Estimates backing such conclusions are obtained reliably, though when analysing this claim from another angle, one might question some of its implications.

Let us consider this: If despite of poor governance, foreign capital still flows to such countries with lower institutional quality, analysing this problem under a decreasing marginal returns logic suggests that, regardless of from which channel the benefit from financial globalisation is coming from, either via cost of capital, improved monitoring, improvements in local institutions or deepening financial markets, or even all these channels functioning together, its marginal effect should be higher where it is scarcer. If so, shouldn't we observe stronger effects in countries with poorer institutions, instead, where the marginal value of foreign capital is higher?

Indeed, firm-level evidence reported by Bena *et al.* (2017) shows that the effect of foreign ownership on firm investment is actually *stronger* in countries with *poorer* performance in directors anti-self dealing indices, in which the problem of investor expropriation is more acute. As expropriation risks undermine institutional development, this finding is in line with the idea that globalisation can actively improve institutional quality *through* enhanced monitoring, but it does not align much with the argument that it is necessary to have good governance, *ex-ante*, so that financial globalisation can affect the real economy, *ex-post*.

FDI can be seen as a source of capital accumulation by construction. Whilst evidence suggests that FDI is the type of flow exerting the largest and most stable growth effect (Aizenman *et al.* , 2013), another interesting question is whether portfolio equity investments can help in bringing even more FDI. Whether equity flows can spur FDI flows may shed light on the effect of stock market openness on capital accumulation, through a different and unexplored angle. This analysis can uncover new linkages across different types of foreign capital flows, in particular whether foreign portfolio and foreign direct investments may complement one another.

This last discussion motivates the third essay. In this paper, the relationship between aggregate investment and equity openness is investigated. Empirical models are estimated, with domestic investment as dependent variable, and *de Facto* country-level measures of financial openness, proxied by equity portfolio inflows, as independent variable. The *Threshold Effects* hypothesis is also investigated, by including interactive effects of institutional quality and equity flows. It is also tested whether equity flows increase FDI.

CHAPTER 3

Stock Market Integration and Cost of Equity Capital

3.1 Introduction

This essay empirically examines the effects of stock market integration on the cost of equity capital. [1] Two contributions are made to the globalisation and cost of capital literatures. First, the effect of stock market integration on stock returns for Brazilian stock portfolios is estimated. Foreign stock ownership is used as a proxy for the level of stock market integration, a time-varying measure of foreign investors' presence in the domestic stock market. The empirical work herein extends the findings from the integration and cost of capital literature, recently reported by Bekaert *et al.* (2016), Carrieri *et al.* (2013) and Bekaert *et al.* (2011b), with fresh evidence from a major emerging market.

Second, the role of asset characteristics is studied in detail, by analysing the effect of integration on stock portfolios sorted by size, book-to-market ratios, momentum, illiquidity and corporate governance quality. Although prior research has looked into some characteristics, evidence is limited to investability, firm size and governance (Errunza & Ta, 2015; Bae & Goyal, 2010; Huang, 2007; Christoffersen *et al.* , 2006; Patro & Wald, 2005; Chari & Henry, 2004). The in-depth analysis conducted in this essay brings forth additional factors, such as growth

[1] A paper with the contents of this Essay, together with the contents of sections 3.1, 3.2.2 and 5.5.3 and passages of the Literature Review is accepted for publication and forthcoming at *European Financial Management*, under an article named *Stock Market Integration, Cost of Equity Capital and Corporate Investment: Evidence from Brazil*, co-authored with my supervisor, David Hillier. Any citation of these contents should refer to the paper published in the journal.

opportunities, liquidity and momentum.

In general, results strongly support the claim that stock market integration decreases the cost of equity capital. Foreign ownership, the measure of integration employed, was about 10% of stock market capitalisation at the beginning of the sample period in 2001, rising steadily and reaches levels close to 25% by the end of 2015. The increase in foreign ownership was accompanied by a marginal reduction in expected returns, as econometric evidence suggests a negative partial effect of lagged foreign ownership on stock returns. It is also shown that the effects of integration are unevenly split. In particular, large market capitalisation firms, more liquid stocks and strong governance firms benefited more than their peers.

The rest the chapter is organised as follows. In Section Two, we discuss a conceptual model of stock market integration. Section Three presents the dataset, whilst Section Four brings the empirical methods. Section Five brings the results, and Section Six shows robustness checks. Section Seven concludes.

3.2 A conceptual model of imperfect stock market integration

To guide the forthcoming empirical analysis, a simple conceptual model is discussed in this section. The model builds on the time-varying integration literature (de Jong & de Roon, 2005; Errunza & Losq, 1985), with an imperfect integration setting (much simplified, though) adopted as theoretical underpinning.

An imperfectly integrated market is characterised by two classes of assets, investable and non-investable, and by two types of agents, foreign and domestic. Domestic investors can hold both investable and non-investable portfolios whereas foreign investors can hold only the investable portfolio. Since a fraction of local assets will be held solely by domestic investors, these assets are partially excluded from the process of integration and do not directly benefit from increased risk sharing. However, local investors make use of the investable portfolio to hedge against idiosyncratic risk from the non-investable portfolio.

In this context, investable asset returns depend upon their covariance with global returns (following the World CAPM) and upon an additional risk factor which arises from hedging pressures from non-investable assets. The extent to which investable assets are priced with

respect to world market returns or locally with respect to non-investable asset returns is explained by market segmentation (lack of integration). This is measured as the fraction of assets in the local market which cannot be traded by foreign investors. Investable stock returns are thus:

$$E_{t-1}[R_t^I] = \beta_i E_{t-1}[R_t^w] + \theta_i q_{t-1} \tag{3.1}$$

The first term on the right-hand side refers to the sensitivity of stock returns to global market returns, whereas the second term reflects an additional risk factor stemming from local investors' hedging demand, caused by their holdings of non-investable assets. This additional risk factor is weighted by segmentation (q_{t-1}), capturing how integration efficiency is reduced by local pricing imperfections arising from non-investable assets. Weaker market integration leads to greater pricing imperfections and a higher cost of equity capital.

We adjust de Jong & de Roon (2005)'s model by replacing the segmentation variable (q_{t-1}) by stock market integration (I_{t-1}), proxied by foreign ownership (the value of the portfolio of stocks held by foreign investors as a share of total market capitalisation). The equation becomes:

$$E_{t-1}[R_t^I] = \beta_i E_{t-1}[R_t^w] + \delta_i I_{t-1} \tag{3.2}$$

The cost of capital of investable assets, $E_{t-1}[R_t^I]$, is an increasing function of (i) the sensitivity of returns, β_i, to expected global market returns, $E_{t-1}[R_t^w]$; and (ii) a decreasing function of the sensitivity of returns, δ_i, to the level of integration in the equity market, I_{t-1}. Hence, the theoretical coefficient signs are given by $\beta_i > 0$ and $\delta_i < 0$.

3.3 Data and Variables

This section presents in detail the database and variables employed in the empirical study. Data on foreign ownership is manually collected from monthly reports published by the Brazilian Securities and Exchange Commission (CVM). [2] Stock data is from the Brazilian Center for Research in Financial Economics of the University of Sao Paulo (NEFIN, 2016), the Sao Paulo Stock Exchange (BMF&Bovespa), the Brazilian Central Bank (BACEN), MSCI Global Equity

[2] Foreign Ownership data is available on the CVM website: http://www.cvm.gov.br, section *Series Historicas, Investimento Estrangeiro*.

Indexes, and Datastream. We analyse 180 consecutive months of data for the period 2001 to 2015.

We calculate stock market integration as: $I_t = \frac{MV_t^f}{MV_t^{f+d}}$. In each month, the equity portfolio value held by foreign investors (measured in USD), MV^f, is divided by total stock market capitalisation (measured in USD), MV^{f+d}, which is the portfolio held by domestic plus foreign investors. In accordance with the methodology of the Brazilian Securities and Exchange Commission (CVM), we take a measure of foreign ownership which considers only the holdings of foreign investors in stocks, but not foreign investments on corporate and government bonds or derivatives.

The time series of foreign ownership captures how foreign investors' presence in the domestic market has evolved over time. Our variable for world market returns is the rate of return on the MSCI World Equity Index (measured in USD), R_t^w. [3] We examine size, growth opportunities, momentum and illiquidity portfolios and all returns are expressed in USD. Size portfolios are based on stocks' market capitalisation, growth opportunities portfolios are sorted on stocks' book-to-market ratios, momentum portfolios are formed on returns earned in preceding periods (cumulative returns between t-12 and t-2), and illiquidity portfolios are sorted according to the previous twelve months illiquidity moving average, with illiquidity calculated following Acharya & Pedersen (2005).

Portfolios are sorted as follows. Initially, assets listed in the BMF&Bovespa stock exchange undergo an eligibility screening. A stock is considered eligible in time *t* if it meets the following criteria: (i) the stock is the most traded equity class of the firm, (ii) the stock was traded in at least 80% of days in year *t-1*, with volume greater than R$ 500.000 per day. The initial screening process resulted in a sample of 238 companies, corresponding to 60% of listed firms and 80% of total market capitalisation. In January of year *t*, portfolios are formed from sorting firms into three portfolios (small, medium, large) according to each characteristic (Size, Book-to-Market, Momentum, and Illiquidity) as observed in period *t-1*. We use value-weighted returns (weighted by market capitalisation). [4]

Portfolios are labelled according to the magnitude of each characteristic. For example, the portfolio Size1 contains the smallest and Size3 contains the largest firms. The same labelling

[3] As foreign ownership is taken at the aggregate stock market level, it has no portfolio-specific variability, but produces a portfolio-specific regression coefficient.

[4] For further methodological details as employed by NEFIN in constructing portfolios, please refer to their website: http://www.nefin.com.br/Metodologia/Methodology.pdf

Table 3.1: Descriptive Statistics - Cost of Capital Analysis

This table presents monthly descriptive statistics (2001-2015) for the asset pricing dataset. Panel A presents data on stock market integration, calculated as the value of the portfolio held by foreign investors as a share of total market capitalisation (I_t), global returns, proxied by returns on the MSCI World Index (R_t^w), domestic market returns, proxied by returns on the MSCI Brazil index (R_t^m), global interest rates, proxied by returns on the 3-months U.S T-bill (rf_t^w), domestic interest rates, proxied by the Brazilian interbank rate (rf_t^d) and the exchange rate between the Brazilian Real and the U.S Dollar (Fx_t). Panel B presents descriptive statistics for returns of stocks' portfolios sorted by size (s1, s2, s3), book-to-market (bm1, bm2, bm3), momentum (m1, m2, m3) and illiquidity (i1, i2, i3); for portfolios double-sorted by size and book-to-market (s1bm1, s1bm2, s2bm1, s2bm2), size and momentum (s1m1, s1m2, s2m1, s2m2) and size and illiquidity (s1i1, s1i2, s2i1, s2i2); for the portfolio including all listed firms (All Firms) and the portfolio of good governance firms (Novo Mercado).

Panel A: Country Data	Mean %	Med. %	St.dev %	Min %	Max %
I_t (Integration)	13.37	12.06	5.14	5.78	22.55
I_t (de-trended)	0.00	0.00	0.63	-2.30	1.56
R_t^w (Global Returns)	0.37	1.02	4.62	-20.99	10.72
R_t^m (Domestic Returns)	1.11	1.31	6.42	-15.47	16.45
rf_t^w (U.S Risk-Free Rate)	0.12	0.07	0.14	0.00	0.42
rf_t^d (Domestic Risk-Free Rate)	1.05	0.98	0.34	0.48	1.97
Fx_t (BRL-USD Exchange Rate)	2.32	2.22	0.55	1.56	3.91
$\Delta lnFx_t$	0.38	-0.40	4.05	-10.00	18.84

Panel B: Portfolio Returns	Mean %	Med. %	St.dev %	Min %	Max %
s1	0.34	0.23	3.60	-15.24	13.53
s2	0.94	1.05	6.21	-14.86	30.81
s3	1.20	1.44	6.26	-14.10	33.69
bm1	1.48	1.06	6.15	-15.37	33.21
bm2	1.19	0.93	6.72	-17.36	30.04
bm3	0.73	0.87	7.30	-17.08	36.22
m1	0.50	0.56	7.66	-19.32	36.95
m2	1.25	1.27	6.07	-16.73	32.81
m3	1.49	0.83	6.94	-18.58	28.56
i1	1.13	1.45	6.51	-16.35	34.46
i2	1.41	0.85	6.19	-15.48	31.86
i3	1.13	0.85	6.27	-24.40	24.94
s1bm1	0.90	1.27	7.04	-20.88	25.68
s1bm2	1.40	1.28	7.16	-15.85	29.30
s2bm1	1.42	1.26	6.21	-16.12	33.63
s2bm2	0.64	0.90	6.84	-17.22	33.00
s1m1	0.33	0.33	7.43	-19.68	26.21
s1m2	1.49	1.79	6.89	-18.42	26.86
s2m1	0.81	1.17	6.85	-16.73	37.63
s2m2	1.43	1.52	6.40	-17.40	28.17
s1i1	0.57	0.37	8.62	-25.02	36.23
s1i2	1.18	0.87	6.64	-25.75	26.00
s2i1	1.17	1.36	6.44	-15.51	34.82
s2i2	1.50	1.37	6.05	-17.27	23.24
All Firms	1.04	0.95	5.42	-13.69	26.46
Novo Mercado (Good Governance)	0.79	0.64	8.15	-27.61	18.42

convention applies to the other three characteristics. In robustness checks, we additionally analyse portfolios double-sorted by size and book-to-market, size and momentum and size and illiquidity.

In further testing, the role of corporate governance is analysed. We compare the effects of integration between the broad market portfolio with all listed firms, named *All Firms*, and a special corporate governance portfolio, named *Novo Mercado (New Market)*, which is a special listing segment BMF&Bovespa relating to the highest governance standards (which corresponds to 30-40% of the total number of listed firms).

Novo Mercado is differentiated from other segments by the following criteria: (i) firms can only issue common stock (no preferential stock); (ii) there is a minimum of 25% free floating shares; (iii) firms must comply with share dispersion efforts when publicly distributing shares; (iv) boards must have a minimum of 5 directors, with 20% independent (external); (v) the CEO-Chair role must be split; and (vi) financial statements must be translated to English, among other rules.[5]

Some of these rules are observed in other segments, but never all of them together, hence there is a clear distinction in terms of governance quality between the constituents of the Novo Mercado segment and other firms in the stock market. Thus, by comparing the effects of integration on the broad portfolio (All Firms) and the Novo Mercado portfolio, we capture the role of corporate governance. In the Table below we show descriptive statistics for the dataset:

Figure 4.8 presents a time series plot for the level of foreign ownership (%) (integration) of the Brazilian equity market and the Ibovespa stock index level [6], measured in basis points:

At the beginning of our sample period, foreign ownership was around 10%. As the Brazilian market became more integrated, foreign ownership increased to approximately 25%. After running standard tests for stationarity, foreign ownership is found to be trend-stationary and stock market valuation non-stationary. As a result, foreign ownership was de-trended (yearly averages were subtracted from monthly values), and log-returns were first-differenced. These transformations produced stationary variables.

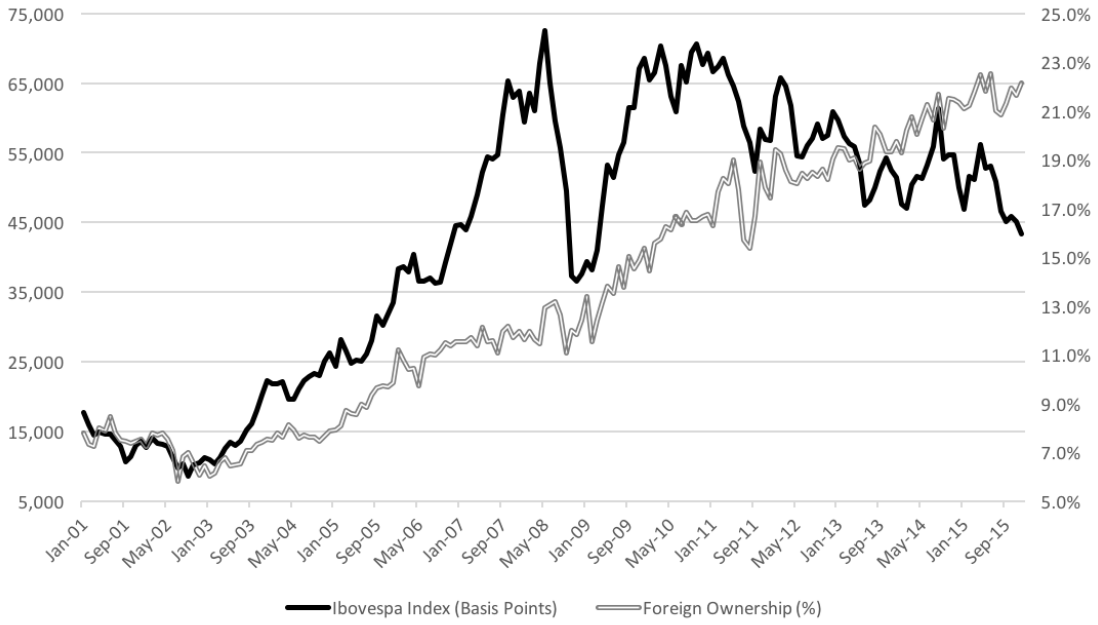
The correlation between the market index and contemporaneous foreign ownership is statistically significant and positive (0.18), whilst the correlation between returns and lagged

[5]The full set of rules is presented at the BMF&Bovespa website: http://www.bmfbovespa.com.br/en_us/listing/equities/listing-segments/novo-mercado/

[6]Ibovespa is the main index in the Brazilian stock exchange, including the largest and most liquid stocks traded in the market.

Figure 3.1: Foreign Ownership and Stock Valuations

This Figure presents time-series plots (on a monthly basis, between years 2001 and 2015) for foreign stock ownership (%), calculated as the value of the portfolio held by foreign investors as a share of total market capitalisation, and Stock Valuations, represented by the Ibovespa Index, measured in basis points.



foreign ownership is statistically significant and negative (-0.16). Such a shift in the sign of the correlation between the market index and current / lagged foreign ownership reflects two different effects of financial integration previously discussed in our literature review: a positive contemporaneous correlation refers to a pricing revaluation effect as equity prices increase when foreign investors buy stocks, whereas a negative correlation with lagged values is due to risk sharing and a gradual reduction of systematic risk brought about by increases in stock market integration.

3.4 Empirical International Asset Pricing Model

The empirical international asset pricing model shown below is estimated:

$$R_{it} - rf_t^w = \alpha_i + \beta_i(R_t^w - rf_t^w) + \delta_i I_{t-1} + \epsilon_{it} \tag{3.3}$$

Each portfolio's return is calculated in excess of U.S risk-free rates, rf_t^w. [7] Next, the Portfolio's return is estimated as a function of (i) R_t^w, the global rate of return, proxied by the

[7] In a Robustness check, we calculate portfolio returns in excess of domestic risk-free rates as well.

return on the MSCI World Index, in excess of the U.S risk-free rate, rf_t^w; (ii) I_{t-1}, lagged foreign ownership, which is measured by the proportion of equity value held by foreign investors as a share of total market capitalisation; (iii) α_i, a pricing error or deviation from the ICAPM; and (iv) ϵ_{it}, the error term. The empirical model is consistent with the theoretical equation (4.2). [8]

As suggested by Greene (2012), portfolio returns are correlated with the aggregate market return and thus exposed to the same shocks, with residuals correlated across portfolios. In light of cross-correlation of residuals, estimating single equations for each portfolio via OLS (ordinary least squares) yields inconsistent estimates, and simultaneous equations modelling is advised. Moreover, another shortcoming of pure OLS is that it fails to address heteroskedasticity and serial correlation of returns (Cochrane, 2009). To obtain consistent and efficient estimates, we model asset returns for our portfolios simultaneously via GMM (Generalised Method of Moments), with moment conditions shown below:

$$E_t[m(\alpha_i, \beta_i, \delta_i)] = E_t\{\frac{1}{t}\sum_{t=1}^{t}[(R_{it} - rf_t^w) - \alpha_i - \beta_i(R_t^w - rf_t^w) - \delta_i I_{t-1}]\} = 0, i = 1, n \qquad (3.4)$$

The model is specified with one moment condition per estimated parameter, thus the GMM model is exactly identified. The equations are estimated employing HAC (Heteroskedasticity-and-Autocorrelation Consistent) robust standard errors, calculated with Bartlett Kernel, for addressing possible issues related to heteroskedasticity and serial autocorrelation (non-spherical variance) in the error term.

Coefficients fitted for the integration variable are compared, statistically, across portfolios, by testing a null hypothesis of equality of coefficients, employing a χ^2 test. The null hypothesis is that coefficients are statistically equal to one another, and thus integration produces no portfolio-specific idiosyncratic effects: $H0 : \delta_i = \delta_j = ... = \delta_n$. Accepting the null hypothesis implies that asset characteristics are irrelevant in the integration process. Conversely, rejecting the null hypothesis offers evidence in favour of asset-specific integration effects.

[8] Although we acknowledge that other multi-factor models would also be consistent with integration theory, we keep the analysis simple by estimating an augmented single-factor model. In a robustness check we include a currency factor as an additional explanatory variable in our asset pricing model.

3.5 Results

3.5.1 Main Results

Table 3.2 presents the estimation results for our asset pricing equations. The coefficient of equity market integration, as proxied by foreign ownership, is statistically significant and negative for all portfolios analysed. It is clear that integration reduces expected returns, supporting the hypothesis of time-varying stock market integration reducing systematic risk and hence lowering expected returns and the cost of capital (Errunza & Ta, 2015; Carrieri *et al.* , 2013; de Jong & de Roon, 2005). Our results are consistent with the liberalisation literature, in that integration reduces the cost of capital (Henry, 2000a; Bekaert & Harvey, 2000; Chari & Henry, 2004; Patro & Wald, 2005; Christoffersen *et al.* , 2006).

We now discuss the role of portfolio characteristics, comparing the coefficients fitted for integration across portfolios, as shown in Panel B of Table 3.2. For size portfolios (s1, s2, s3), we find that large and mid caps (s3 and s2) benefit more than small caps (s1), with statistically significant differences in coefficients. This finding concurs with Christoffersen *et al.* (2006) and Huang (2007), as they report stronger integration effects for large firms. For book-to-market portfolios (bm1, bm2 and bm3), the effect of stock market integration on returns is statistically significantly stronger for mid book-to-market firms (bm2).

With respect to momentum (m1, m2, and m3), stocks with low momentum (m1) seem to benefit more, and the difference is statistically significant with respect to mid-momentum stocks (m2). More liquid stocks (i1) experience a stronger reduction in expected returns, and this is statistically different with respect to mid-illiquid stocks (i2).

Table 3.2: Stock Market Integration and Expected Returns

This table presents results of the estimation of an international asset pricing model as per the equation $R_{it} - rf_t^w = \alpha_i + \beta_i(R_t^w - rf_t^w) + \delta_i I_{t-1} + \epsilon_{it}$. Portfolios are sorted by characteristics of size (s1, s2, s3), book-to-market (bm1, bm2, bm3), momentum (m1, m2, m3) and illiquidity (l1, l2, l3). Integration is calculated as the value of the portfolio held by foreign investors as a share of total market capitalisation. The equations are estimated via generalised method of moments (GMM), using heteroskedasticity and autocorrelation robust standard errors (HAC Bartlett-type errors). Models are estimated on a monthly basis, between 2001 and 2015, a time series of 180 consecutive months. In Panel A, model outputs are shown. In panel B, coefficients for the variable integration (I_{t-1}) are compared across portfolios within each characteristic group (size, book-to-market, momentum and illiquidity), through a χ^2 test. The null hypothesis is that coefficients are statistically equal to one another ($H0 : \delta_i = \delta_j = ... = \delta_n$). Statistically significant coefficients are labeled as: $+p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001$.

A (Models)	s1	s2	s3	bm1	bm2	bm3	m1	m2	m3	l1	l2	l3
R_t^w - rf_t^w	0.516***	0.598***	0.591***	0.447***	0.700***	0.643***	0.893***	0.557***	0.458***	0.636***	0.467***	0.375***
	(0.037)	(0.058)	(0.062)	(0.097)	(0.056)	(0.054)	(0.079)	(0.077)	(0.067)	(0.048)	(0.091)	(0.063)
I_{t-1}	-0.276*	-1.357**	-1.494**	-1.294*	-1.893***	-1.326**	-1.872***	-1.500***	-1.430*	-1.543**	-1.035*	-1.496*
	(0.128)	(0.516)	(0.480)	(0.538)	(0.426)	(0.512)	(0.460)	(0.398)	(0.691)	(0.538)	(0.487)	(0.662)
α_i	0.001	0.007**	0.009***	0.013***	0.009***	0.004	0.002	0.010**	0.013***	0.009**	0.012***	0.009***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)

B (χ^2 Test)	s1	s2	s3	bm1	bm2	bm3	m1	m2	m3	l1	l2	l3
Size												
s1	1											
s2	6.85*	1										
s3	10.21**	1.82	1									
Book-to-market												
bm1				1								
bm2				4.53*	1							
bm3				0.01	7.12**	1						
Momentum												
m1							1					
m2							6.74**	1				
m3							1.69	0.04	1			
Illiquidity												
i1										1		
i2										19.91***	1	
i3										0.05	3.39+	1

3.5.2 The role of Corporate Governance

In this section, we investigate the effects of stock market integration on firms observing best corporate governance practices, (i.e. those listed in the *Novo Mercado* segment of BMF&Bovespa) and the broad market portfolio, which includes all firms listed in the stock market (labelled All Firms). Results are shown in Table 3.3 below:

Table 3.3: The Role of Corporate Governance

This table presents results of the estimation of an international asset pricing model as per the equation $R_{it} - rf_t^w = \alpha_i + \beta_i(R_t^w - rf_t^w) + \delta_i I_{t-1} + \epsilon_{it}$. Models are estimated for the broad portfolio (All Firms) and for the Special Corporate Governance Portfolio (Novo Mercado). Integration is calculated as the value of the portfolio held by foreign investors as a share of total market capitalisation. The equations are estimated via generalised method of moments (GMM), using heteroskedasticity and autocorrelation robust standard errors (HAC Bartlett-type errors). Statistically significant coefficients are labeled as: $+p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001$.

	All Firms	Novo Mercado
Model		
R_t^w - rf_t^w	0.490***	1.123***
	(0.033)	(0.038)
I_{t-1}	-1.071*	-2.649***
	(0.527)	(0.305)
α_i	0.008***	0.004
	(0.002)	(0.007)
Integration Coefficient Comparison		
χ^2 Test ($\delta_i^{All} = \delta_j^{NM}$)	31.02***	

The effect of stock market integration on expected return is much stronger for the good governance portfolio, when compared to the broad stocks portfolio (All Firms), and the difference in the coefficients is highly statistically significant. Firms observing best corporate governance practices enjoyed a substantially stronger fall in the cost of equity capital than their peers in the broad market portfolio.

Our results are consistent with prior research. First, financial integration is more efficient when contracting is transparent (Stulz, 2005). Second, financial systems with higher levels of financial and institutional quality tend to benefit more from integration (Chinn & Ito, 2002). Third, the quality of institutions (reflected in governance quality here) matter a great deal for emerging countries in attracting foreign equity capital (Byrne & Fiess, 2016).

3.6 Robustness checks

3.6.1 Currency Exposure

In this section, we study the role of currency exposure in the integration process. This is relevant in our analysis because the Brazilian Real suffered several shocks, mostly devaluations, during the period covered in our study (2001-2015). Taking the perspective of foreign investors, the exchange rate between local and foreign currencies affects the relative price of Brazilian stocks, and this pricing effect might affect how integration impacts cost of equity.

To disentangle integration from currency effects, we estimate a multi-factor international asset pricing model, including an additional factor, C_t, capturing currency exposure (the log-difference of the exchange rate between the Brazilian Real and the U.S Dollar), in a spirit similar to Solnik (1983) and Koedijk *et al.* (2002).

$$R_{it} - rf_t^w = \alpha_i + \beta_i(R_t^w - rf_t^w) + \delta_i I_{t-1} + \lambda_i(C_t - rf_t^w) + \epsilon_{it} \tag{3.5}$$

Table 3.4: Currency Exposure

This table presents results of the estimation of an international asset pricing model as per the equation $R_{it} - rf_t^w = \alpha_i + \beta_i(R_t^w - rf_t^w) + \delta_i I_{t-1} + \lambda_i(C_t - rf_t^w) + \epsilon_{it}$. Models are estimated for the Investable portfolio (MSCI Brazil) and for the broad portfolio (All Firms). Integration is calculated as the value of the portfolio held by foreign investors as a share of total market capitalisation. An additional risk factor is included ($C_t - rf_t^w$), capturing currency exposure. The equations are estimated via generalised method of moments (GMM), using heteroskedasticity and autocorrelation robust standard errors (HAC Bartlett-type errors). Statistically significant coefficients are labeled as: $+p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001$.

	MSCI Brazil (Investable)	All Firms
R_t^w - rf_t^w	0.839***	0.669***
	(0.041)	(0.031)
I_{t-1}	-1.415***	-1.026***
	(0.222)	(0.260)
C_t - rf_t^w	0.505***	0.649***
	(0.056)	(0.094)
α_i	-0.006***	0.001
	(0.002)	(0.003)

For brevity, models are estimated for two portfolios: MSCI Brazil portfolio (investable stocks) and All Firms (broad portfolio), with results shown in Table 3.4. We find that the currency factor is statistically significant and with positive loading on both portfolios. Even after including currency factors, the effect of integration on returns remained statistically significant and negative for both

portfolios, with stronger effects for *Investable* firms, in line with prior evidences (Chari & Henry, 2004; Errunza & Ta, 2015). Therefore, integration effects are robust to exchange rate variations, though currency factors are relevant determinants of asset prices.

3.6.2 A Closer Look at the Role of Asset Characteristics: Double-Sorted Portfolios

In this section we analyse double-sorted portfolios. This is particularly helpful in fine-tuning our analysis of the role played by asset characteristics. By double-sorting the portfolios, we check the robustness of results with a more granular sorting.

The sample is split at the median for each characteristic (s1, s2, bm1, bm2, m1, m2, i1, i2), and assets are double-sorted, creating twelve new portfolios double-sorted by size and book-to-market (s1bm1, s1bm2, s2bm1, s2bm2), size and momentum (s1m1, s1m2, s2m1, s2m2) and size and illiquidity (s1i1, s1i2, s2i1, s2i2). The results are presented in Table 3.5.

Considering first the size and book-to-market double-sorted portfolios (s1bm1, s1bm2, s2bm1, s2bm2), the greatest reduction in expected return was experienced by the s2bm1 portfolio (large caps with low book-to-market ratios or high growth opportunities). Portfolios double-sorted by size and momentum (s1m1, s1m2, s2m1, s2m2) show stronger effects for the s1m1 portfolio, with small caps posting low momentum. For size and illiquidity double-sorted portfolios (s1i1, s1i2, s2i1, s2i2), the biggest reduction in returns was experienced by portfolio s1i1, that is small liquid stocks. In all, these additional findings corroborate the evidence from the previous section, in that large firms (in particular those with high growth opportunities) and more liquid stocks (in particular liquid small caps) benefited most from integration.

Next, we estimate the models with portfolio returns in excess of the local interest rate, replacing for the global risk-free rate, as shown in Panel B of the table. We don't find significant changes in our results, concluding that integration effects remain robust even if local interest rates are used as the benchmark for risk-free investments in the domestic market.

Table 3.5: Stock Market Integration and Expected Returns - Double-sorted Portfolios

This table presents results of the estimation of an international asset pricing model as per the equation $R_{it} - rf_t^w = \alpha_i + \beta_i(R_t^w - rf_t^w) + \delta_i I_{t-1} + \epsilon_{it}$. Portfolios are double-sorted by size and book-to-market (s1bm1, s1bm2, s2bm1, s2bm2), size and momentum (s1m1, s1m2, s2m1, s2m2) and size and illiquidity (s1i1, s1i2, s2i1, s2i2). Integration is calculated as the value of the portfolio held by foreign investors as a share of total market capitalisation. In Panel A, our baseline model is estimated. In Panel B, we run a robustness check by calculating portfolio's returns in excess of the domestic risk-free rate (R_{it} - rf_t^d) in replacement for global risk-free rates. The equations are estimated via generalised method of moments (GMM), using heteroskedasticity and autocorrelation robust standard errors (HAC Bartlett-type errors). Statistically significant coefficients are labeled as: $+p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001$.

A (R_{it} - rf_t^w)	s1bm1	s1bm2	s2bm1	s2bm2	s1m1	s1m2	s2m1	s2m2	s1i1	s1i2	s2i1	s2i2
R_t^w - rf_t^w	0.790***	0.683***	0.539***	0.614***	0.905***	0.630***	0.683***	0.483***	0.931***	0.600***	0.613***	0.170*
	(0.089)	(0.052)	(0.075)	(0.057)	(0.090)	(0.083)	(0.121)	(0.055)	(0.116)	(0.103)	(0.048)	(0.068)
I_{t-1}	-1.342+	-1.362*	-1.492**	-1.415**	-2.246***	-0.850	-1.857***	-1.273*	-2.558***	-1.363*	-1.456**	-1.127*
	(0.747)	(0.647)	(0.507)	(0.482)	(0.391)	(0.714)	(0.419)	(0.554)	(0.459)	(0.656)	(0.551)	(0.452)
α_i	0.006*	0.011*	0.012***	0.004+	-0.000	0.012**	0.005+	0.012***	0.002	0.009***	0.009***	0.013***
	(0.002)	(0.005)	(0.001)	(0.002)	(0.003)	(0.003)	(0.005)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
B (R_{it} - rf_t^d)	s1bm1	s1bm2	s2bm1	s2bm2	s1m1	s1m2	s2m1	s2m2	s1i1	s1i2	s2i1	s2i2
R_t^w - rf_t^w	0.796***	0.688***	0.544***	0.619***	0.910***	0.635***	0.688***	0.488***	0.936***	0.605***	0.618***	0.175**
	(0.087)	(0.050)	(0.072)	(0.054)	(0.087)	(0.081)	(0.119)	(0.054)	(0.114)	(0.100)	(0.046)	(0.066)
I_{t-1}	-1.302+	-1.322*	-1.452**	-1.374**	-2.206***	-0.810	-1.816***	-1.233*	-2.518***	-1.323+	-1.415*	-1.087*
	(0.771)	(0.668)	(0.530)	(0.499)	(0.405)	(0.737)	(0.436)	(0.577)	(0.458)	(0.679)	(0.573)	(0.475)
α_i	-0.003+	0.002	0.002	-0.006***	-0.010**	0.003	-0.004+	0.003+	-0.007+	-0.000	-0.000	0.004+
	(0.001)	(0.004)	(0.001)	(0.001)	(0.002)	(0.003)	(0.002)	(0.001)	(0.003)	(0.002)	(0.002)	(0.002)

3.6.3 Causality

According to the positive feedback and momentum trading hypotheses (Froot *et al.* , 2001; Kaminsky *et al.* , 2004), stock prices may drive increases in integration. In this section we check for the direction of causality. The economic intuition behind the test is as follows: If foreign investors respond to current stock prices in the local market by investing in local stocks, stock returns will lead to greater integration, consistent with feedback trading. However, if foreign ownership causes changes in stock returns, integration theory holds.

To verify the direction of causality, we run Granger causality tests between foreign ownership and domestic market returns, proxied by the returns earned on the MSCI Brazil Index ($R_t^m - rf_t^w$). According to the conditional asset pricing literature, local interest rates affect expected market returns (Jagannathan & Wang, 1996; Petkova & Zhang, 2005). Consequently, we include a control variable for interest rates in our test. We run causality tests between foreign ownership (I_t) and the market return ($R_t^m - rf_t^w$), controlling for local interest rates, proxied by the Brazilian interbank rate (Δrf_t^d). [9]

The tests employ one, two, and three lags, consistent with optimal lag selection tests based on information criteria. The null hypothesis is that lagged values of x_j are jointly insignificant explanatory variables in a regression equation in which x_i is the dependent variable, after controlling for past values of x_i too. If lagged regressors x_j are jointly statistically significant, then x_j Granger-causes x_i. The results are shown in Table 3.6 below:

We find that foreign ownership Granger-causes changes in domestic market returns (with negative coefficients, not shown) in all models, independently of the lag structure specified, though the significance of the test statistic is stronger with a one-period lag specification. However, market returns do not Granger-cause integration, and this result holds for all models, therefore causality runs from stock market integration to asset prices.

3.6.4 Longer Time Horizon

We now briefly comment on some additional robustness checks. First, we looked at the effect of integration on expected returns over a longer time horizon, from 1995 till 2015. We don't have portfolio data dating back to the nineties, but we estimated models for the domestic market

[9] In addition to interest rates, we also tested models including default risks and dividend yields, finding that these variables do not Granger-cause the local market return.

Table 3.6: Granger Causality Tests (χ^2) - Integration and Domestic Returns

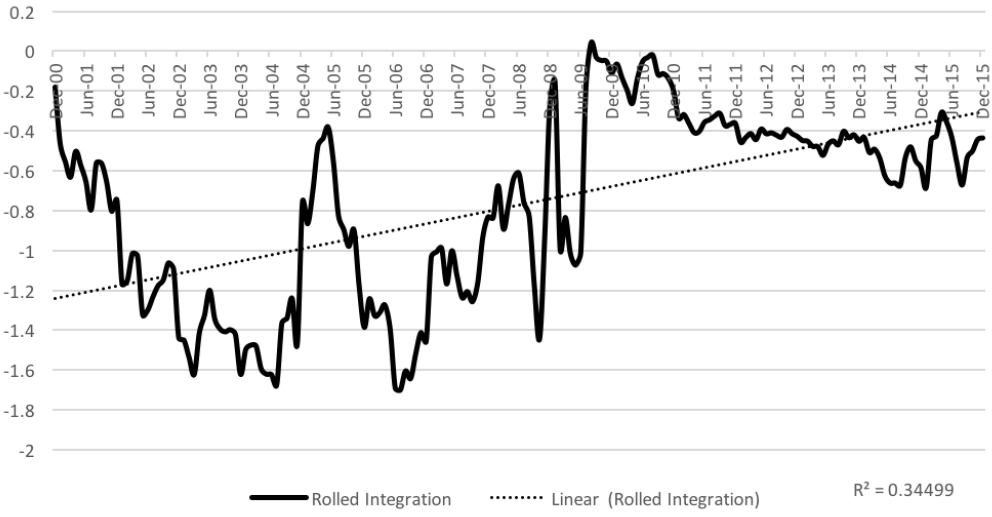
This table presents results of Granger-causality tests (χ^2) between stock market integration (I_t), domestic market returns ($R_t^m - rf_t^w$) and domestic interest rates (Δrf_t^d). The Model is estimated on a monthly basis, between years 2001 and 2015, covering a time series of 180 consecutive months. Statistically significant coefficients are labeled as: $+p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001$.

lags: $t-1$	Equations		
Excluded	$R_t^m - rf_t^w$	I_t	Δrf_t^d
$R_t^m - rf_t^w$	1	0.04	1.98
I_t	5.41*	1	0.00
Δrf_t^d	1.43	0.07	1
ALL	6.42*	0.12	2.01
lags: $t-1, t-2$	Equations		
Excluded	$R_t^m - rf_t^w$	I_t	Δrf_t^d
$R_t^m - rf_t^w$	1	0.04	2.94
I_t	5.94+	1	0.07
Δrf_t^d	2.60	0.17	1
ALL	7.75	0.20	3.02
lags: $t-1, ..., t-3$	Equations		
Excluded	$R_t^m - rf_t^w$	I_t	Δrf_t^d
$R_t^m - rf_t^w$	1	0.51	3.06
I_t	6.35+	1	0.59
Δrf_t^d	5.03	0.42	1
ALL	10.29	0.93	4.17

index, R_t^m (MSCI Brazil portfolio). We find that the same results obtained previously still hold, with integration reducing expected returns. To assess the time-varying pattern of integration, we estimated the integration coefficient over time on a 72-month rolling window (with similar findings for 36, 48 or 60-months rollings). We show the dynamics of integration in Figure 3.2 below:

Figure 3.2: Time-Varying Integration Effects (Monthly Rolled Estimates)

This Figure presents time-varying effects of stock market integration on stock returns (estimated for the MSCI Brazil stocks' portfolio), obtained via rolled estimates, with a 72 months rolling window, between 1995 and 2015 (as a 72 months rolling window is employed, starting in 1995, the first point estimate is obtained in year 2000).



The rolling window gives the first point estimate in the year 2000. The effect of integration on expected returns was stronger at the beginning of the period, converging to near-zero values, especially around the 2008 financial crisis. The effect of integration on expected returns becomes smaller as we approach the end of the sample period, and it seems stock market integration yields decreasing marginal returns over time.

3.7 Conclusions

This essay studied the effects of stock market integration on the cost of equity capital, using the Brazilian equity market as a case study. Results show that increased levels of stock market integration (proxied by foreign ownership) reduce firms' cost of capital, as increases in foreign stock ownership drive expected returns downwards. This finding corroborates time-varying theories of stock market integration, and provides fresh evidence from a major emerging market on the beneficial effects of financial globalisation.

Evidence also shows that asset characteristics play an important role in the integration process, as the benefits from integration are unevenly distributed. Size, book-to-market, liquidity, investability and good corporate governance all impact the strength of integration on expected returns. In particular, firms abiding by best corporate governance standards benefited much more from the integration process in terms of enjoying reductions in the cost of capital than their peers with less stringent governance, a result which strengthens the idea that emerging markets have to improve on institutional quality, to reap the full benefits from globalisation.

On the other hand, large firms also seem to be benefiting more than small and mid caps. In principle, this is not very good news, because larger firms tend to be less financially constrained (they have a larger base of pledgeable assets to offer as collateral in debt contracts, for instance), hence they already enjoy a relatively lower cost of capital, despite of integration. A similar reasoning holds for liquidity, the fact that more liquid stocks experienced greater drops in stock returns brings additional cost of capital benefits for those stocks already enjoying lower cost of funding, for the illiquidity premium commanded on more liquid stocks is, logically, lower. Yet, practically all portfolios analysed reaped benefits from integration, a very desirable outcome.

Our paper has practical, managerial and public policy implications. Both entrepreneurs, managers and regulators should team up to improve on country and firm-level governance, to increase the benefits from integration. It also seems a matter of interest for public policy makers and regulators to shift the pendulum of who is benefiting the most towards smaller firms, as these firms have less access to debt markets, thus cheap equity funding can be very important.

The evidence strongly suggests that by increasing local stock market integration, firms will enjoy a lower cost of capital. As theory postulates, such lower cost of equity financing, in principle, should translate into higher physical capital accumulation, all else equal. Yet, *all else equal* are important words in this statement, for extant empirical evidence tells us that the mechanism conducing cost of capital gains to the real economy is not so straight-forward. Indeed, real economic effects of stock market integration, in particular investment, is the topic of the forthcoming chapter, with the cost of capital-investment mechanism scrutinised in detail.

The paper has a number of limitations. Foreign ownership is a good proxy for integration, but as any proxy it is an imperfect measure. In our asset pricing models we employ a market-wide measure of foreign ownership, with no portfolio-specific variation. A single country is studied. Findings are robust for Brazil, but they cannot be readily generalised to other emerging markets.

CHAPTER 4

Stock Market Openness and Corporate Investment

4.1 Introduction

In this chapter, we extend our analysis done in the first chapter and investigate whether openness to cross-border equity investments produces effects on real economic activity at firm-level, studying corporate investment. As the ultimate objective of an efficient financial market is to provide resources to be employed in productive activities, the pervasive question of whether stock market integration is linked to real growth and higher investment is important.

This issue is particularly relevant because there is no consensus on the role of financial integration on capital accumulation and economic growth (Bekaert *et al.* , 2016). Given the current state of the debate is best described as unsettled, this chapter contributes by providing up-to-date and fresh evidence on the real economic effects of opening equity markets, joining a growing recent body of work done on the link between financial globalisation, foreign capitals and current account openness and variables like economic growth, aggregate and corporate investment and productivity gains, previously studied in Larrain & Stumpner (2017), Bena *et al.* (2017), Bekaert *et al.* (2011a), Gupta & Yuan (2009), Bonfiglioli (2008), Chari & Blair Henry (2008), Aizenman *et al.* (2007) and Bekaert *et al.* (2005), among others.

In particular, the extant evidence with respect to the effect of stock market openness on firm-level investment is fairly modest. This empirical essay relates to a few of such studies, either directly or indirectly. A couple of papers have examined the role played by stock market

liberalisation in providing firms with incentives to increase capital stocks in emerging economies, such as Laeven (2002) and Chari & Blair Henry (2008). Whilst the first paper finds evidence that liberalisation reduces financing constraints (with no direct investment effects), the former reports positive effects on investment, but via country-level liberalisation-induced reductions in cost of capital only, with no firm-specific mechanism linking liberalisation and investment, with both papers considering short-run effects after liberalisation mostly.

Larrain & Stumpner (2017) report positive effects of liberalisation on firms' capital stock, employing country-level *De Jure* equity liberalisation indices as main explanatory variable, though this paper focuses on productivity gains, and studies eastern european countries only. Bena *et al.* (2017) study the effect of foreign institutional ownership on investment for an hybrid sample of developed and a few emerging markets, providing evidence that a larger share of foreign stock ownership, which can be seen as a firm-level *De Facto* measure of risk sharing, is associated to higher long-term investment.

With respect to existing papers, this essay contributes to the literature and strengthens empirical evidence on how stock market openness affects firm investment in a number of ways. First, both country-level *De Jure* and firm-level *De Facto* measures of integration are employed in the empirical analysis, with equity and foreign capital liberalisation indices capturing country-level openness, and foreign stock ownership capturing firm-level integration. By studying openness in these two dimensions for the same sample of firms, the paper reconciles policy-induced effects operating at stock market level, which in theory affect all firms via reductions in the cost of capital, with cross-sectional risk-sharing properties, operating at firm-level, scrutinising how the openness-investment mechanism works.

Second, both country-level *De Jure* and firm-level *De Facto* proxies are time-varying equity openness measures, allowing to analyse how investment responds to country-level and firm-level increases (decreases) in openness degree over time, whilst the liberalisation event literature focuses more on one-off liberalisation events. Third, this paper focuses exclusively on emerging and frontier economies. This is important, because, as argued by Henry (2007), much of the inconclusiveness of results relating stock market openness and real economic variables can be attributed to hybrid samples, mixing developed and emerging countries in the same study.

Fourth, this essay provides a closer look at the role played by corporate governance and institutional quality in the integration-investment nexus. Here, two arguments have been proposed

in the literature, with an interesting tension between them. On one hand, the Neoclassical theory of financial integration postulates that as equity markets in developing countries become more integrated with global equity markets, the cost of equity capital falls due to improved risk sharing between local and foreign investors (Christoffersen *et al.* , 2006; Patro & Wald, 2005; Chari & Henry, 2004). As local firms gain access to cheaper finance, physical investment increases accordingly (Chari & Blair Henry, 2008; Bekaert *et al.* , 2005; Laeven, 2002; Henry, 2000b). Benefits can come from governance as well, as foreign investors exert stronger discipline on entrenched managers (Bena *et al.* , 2017; Ferreira & Matos, 2008).

On the other hand, the so-called Twin Agency Costs theory proposed by Stulz (2005) sustains that because of substantially large agency costs arising from corporate insiders' and state rulers' discretionary and opportunistic behaviour, risk sharing is imperfect, as under the severe threat of expropriation foreign investors have reduced incentives to co-invest with corporate insiders. Such frictions related to contracting inefficiency and poor institutional quality reinforce one another, thus why they are called twin agency costs, reducing the ability of firms to take advantage of a lower cost of equity capital brought about by financial globalisation. It turns out that corporate investment may respond to financial integration sub-optimally at best.

Fifth, in a mechanism inspection test, the paper analyses whether stock market openness affects corporate cash holdings policy, an important component of firms' financing structure. Whist a great deal of research was done on the relationship between liberalisation and integration, cost of capital and investment, how corporate financing choices respond to integration stayed at the margin of the debate. This paper makes a first contribution to incorporate corporate financing policies on the stock market integration debate.

To guide the empirical analysis, a simple model of corporate investment is developed, exploring the relationship between investment and equity market openness under both the neoclassical and agency costs paradigms. From this model, testable hypotheses are derived. Based on the neoclassical argument, the baseline hypothesis vouches for positive effects of equity openness on investment, via risk-sharing and reduced cost of capital.

Taking stock of the agency costs perspective, an alternative hypothesis is charted, in which we argue for an important role played by corporate governance and agency costs, with investment responding weakly to foreign equity capital when governance is poor and institutional quality is low, for funds provided by foreign investors end up partially expropriated, tunnelled

away from productive investments. On the other hand, as stock market openness and the influx of foreign investors may, actually, actively bring about improvements in institutional quality and corporate governance, the agency costs mechanism may work the other way round as well, with openness stimulating investment more in countries with weaker institutions and governance.

The empirical analysis occurs in two dimensions. First, a large scale cross-country analysis is conducted. Firm-level investment is measured by net capital expenditures divided by net capital stock, whilst stock market openness is proxied both at country-level, by Equity and Foreign Capital Flow Openness indexes, from the *International Monetary Fund*, and at firm-level, by foreign institutional ownership. The sample includes over 12,000 firms from 45 emerging and frontier markets, and the analysis employs dynamic panel data techniques. Moreover, the analysis brings a closer examination on how institutional quality affects the integration-investment relationship, with institutional quality captured by a number of country-level measures calculated by a variety of sources (*International Country Risk Guide, Heritage Foundation, World Bank*).

Second, hooking on the Brazilian case developed in the first chapter, a time series analysis is conducted, estimating the effect of foreign ownership (measured at aggregate country-level) on corporate investment for Brazilian firms, employing Vector Autoregressive Models. Stocks are split into two portfolios, clustering firms according to explicit corporate governance standards: *Novo Mercado* (a special corporate governance listing segment) and *Ex-Novo Mercado* (firms with less stringent governance). This analysis brings more understanding about the role of governance, and also helps with identification issues, as VAR models can handle cross-equations feedback effects, mitigating endogeneity concerns.

From the cross-country firm-level analysis, results show that both country-level stock market openness indices and firm-level foreign stock ownership cause statistically significant marginal increases to investment ratios. Interestingly, these findings validate both country-level and cross-sectional risk sharing mechanism, channeling cost of capital gains to physical capital accumulation, as predicted by neoclassical theory. Results also suggest that stock market openness produces marginal shifts in corporate cash policies, with firms becoming less conservative and holding marginally lower cash balances. As cash holdings depend strongly on the cost of external finance, this result also suggests that a mechanism linking stock market openness to lower cost of equity capital is indeed operative. Findings remain robust to a number of robustness checks, such as endogeneity (reverse causality) between foreign ownership, investment and

cash, sampling issues and other mechanism inspections.

Interactions between country-level measures of good institutional quality and low expropriation risks with both country-level and firm-level integration measures all took negative, and in most of cases, statistically significant coefficients. This evidence implies that the effect of stock market openness on corporate investment is stronger in countries with poorer institutional quality and higher expropriation risks, corroborating the monitoring improvement channel brought about by openness to financial globalisation, in line with the idea that foreign equity investments enhance monitoring, substituting for low governance mechanisms at the country-level.

From the time series VAR analysis of Brazilian firms, findings suggest positive effects of stock market integration on investment, but only for those well-governed firms listed on the *Novo Mercado* special corporate governance segment, whilst the response of investment of firms with less stringent governance is marginally negative. This evidence, in turn, vouches in favour of the twin agency costs approach, as it is shown that the influx of foreign investors spurs corporate investment only when firm-level governance is efficient and expropriation risks are mitigated. In all, evidence suggests that the governance mechanism works differently at country and firm level, as stock market openness substitutes for low governance at the country-level, whereas firm-level good governance plays a key role in conducing risk-sharing to investments cross-sectionally.

The rest of the chapter is organised as follows. In Section Two, we discuss a simple model of investment and integration. Section Three presents the dataset, and Section Four brings the empirical models. Section Five brings Results, while Section Six shows batteries of robustness checks. In Section Seven, empirical findings are discussed with extant research. Finally, Section Eight concludes.

4.2 A Model of Market Openness and Investment

In this section, we discuss a simple model of investment, to guide our forthcoming empirical modelling. We consider two frictions in the neoclassical framework: (i) imperfect equity market integration and (ii) agency costs. Initially, we discuss what happens to risk sharing and the cost of capital if equity market integration is mild or incomplete. Next, we derive implications of stock market integration for investment, under both the neoclassical and the agency costs paradigms.

4.2.1 Cost of Capital with Imperfect Integration

The cost of capital framework builds largely on conceptual foundations borrowed from the models by de Jong & de Roon (2005) and Errunza & Losq (1985). To begin with, consider the cost of capital under imperfect integration regime, similar to as developed in the Literature Review section:

$$k_e = E[R] = (1 - s) \cdot \beta^w E[R^w] + s \cdot \beta^m E[R^m] \tag{4.1}$$

Under an imperfect integration regime, the cost of capital is determined by both a global and a national beta, as shown in the equation above. The global beta captures the sensitivity of assets' expected returns with respect to the global portfolio, whereas the domestic beta reflects the sensitivity of securities' expected returns with respect to local market returns. [1] The loading of each beta depends upon the level of overall market segmentation, labelled s. Higher is segmentation (the market capitalisation of non-investible assets as a share of total market capitalisation), higher is the loading of the local beta in determining the cost of capital, and lower is the loading of the global beta. Logically, market-wide integration is higher when segmentation is lower.

Recalling that $\beta^w \cdot E[R^w] = k_e^g$ and that $\beta^m \cdot E[R^m] = k_e^s$ (meaning that by multiplying the stocks' beta coefficient by the market return, we obtain an expression for the securities' cost of capital, in both regimes), the equation can be rewritten as below:

$$k_e = (1 - s) \cdot k_e^g + s \cdot k_e^s \tag{4.2}$$

Considering that integration allows for risk sharing between domestic and foreign investors, whilst in segmented markets domestic investors have to bear all risks alone, we assume that expected returns in segmented markets are higher than in perfectly integrated (globalised) markets.

Assumption I: $k_e^s > k_e^g$

[1] Originally, as explained during the literature review, imperfect integration theory considers that pervasive local pricing relates the covariance of returns of non-investable assets to the covariance of returns of investable assets. To make the analysis more simple and tractable, here it is assumed that local pricing remains relative to the overall local market, R^m. Therefore, this assumption rules out partial diversification benefits, which could be obtained by domestic investors via equity purchases of investable stocks.

Thus far, risk sharing operates mainly at the *market-wide* level, as a more (less) segmented market will produce a higher (lower) cost of capital, consistent with Assumption I and with theories of risk sharing. Next, we make a slight alteration to the original model, making the very sensitivity of expected returns with respect to global and local risk premiums as a function of *firm-level risk sharing properties*.

We do so by assuming that corporate ownership structures play a role in determining the exposure of firms' cost of equity to global and local risk premiums. In this setting, we can conjecture that the cost of capital of firms with a higher share of foreign ownership is more sensitive to global risk premiums, whereas the cost of capital of firms with a higher share of domestic ownership is more affected by local risk premiums.

Assumption II: The exposure of firms' cost of capital to global (local) market risk premium depends positively (negatively) upon the share of the equity capital which is held by foreign (domestic) investors.

This assumption is justified in the following grounds: consider that a necessary condition for the returns of investible assets to covariate with the returns of non-investible asset is that both investible and non-investible stocks must coexist in domestic investors' portfolio. Now suppose an extreme case, where foreign investors hold 100% of the equity of a given investible asset. In this case, this investible asset cannot be in the domestic investors' portfolio, because if domestic investors hold no equity at all in this investible firm, they cannot trade on it and hence this asset is useless for hedging purposes.

The covariance between this investible asset and the non-investible portfolio gets marginalised as domestic investors hold less of its equity, for they trade less on it and hence induce lower pricing frictions due to their hedging behaviour. Adopting a more realistic view of how the equity of investible assets is distributed between foreign and domestic investors, consider foreign investors hold a share equivalent to f of an investible asset's equity, whereas domestic investors hold a share equivalent to $1 - f = d$. Ruling out extreme cases of total or zero foreign ownership, further assume that $0 < f < 1$, so that both foreign and domestic investors hold non-zero shares. The equation becomes:

$$k_e = f \cdot (1-s) \cdot k_e^g + (1-f) \cdot s \cdot k_e^s \tag{4.3}$$

Now, the effects of both global (local) market risk premium and of market segmentation are weighted by how much of the equity of this firm is held by foreign and domestic investors. If foreign investors hold a larger share of the equity of a firm, then the adverse effects of market segmentation are weaker, and the global market risk premium takes on more importance in determining the cost of capital.

Proposition I: Under imperfect integration, the cost of capital is a decreasing function of market-wide integration and of firm-specific foreign ownership.

That segmentation increases cost of capital is trivial, given segmentation loads directly on the local market returns, which is higher than global returns. We show Proposition I fully holds for firm-level risk sharing by differentiating the cost of capital equation (4) with respect to foreign ownership (f), which yields:

$$\frac{\partial k_e}{\partial f} = (1-s) \cdot k_e^g - s \cdot k_e^s \tag{4.4}$$

For non-negative values of market segmentation (s), this expression is negative if and only if $k_e^g < k_e^s$. This condition is met by Assumption I, and therefore $\frac{\partial k_e}{\partial f} < 0$.

4.2.2 Implications for Investment

To analyse the impact of stock market openness on investment, two situations are brought forth. First, under a pure neoclassical integration regime, cost of capital reductions promoted by integration should plainly lead to higher investment, as developed in the first sub-section. Yet, if agency costs come to play and undermine integration, then expropriation risks should affect investment decisions. This case is studied in the second sub-section.

4.2.2.1 Investment with Neoclassical Integration

The investment model discussed here builds on a discrete-time version of the model of investment with adjustment costs by Romer (2012), with a few adaptations. The model setup is as follows. An industry is populated with N homogenous firms. Cost of acquiring and installing capital are negligible, there are no taxes and depreciation is conveniently set to be equal to zero. A representative firm's profits is proportional to its capital stock, k_t, and decreasing in the industry-wide capital stock, K_t. Such assumptions are consistent with a constant returns to scale production function, competitive output markets, perfectly elastic supply of inputs and with a downward-sloping demand curve for the industry's output.

The growth of firms' capital stock is captured by investments, i_t. Firms face costs of adjusting their capital stocks, though, and such costs are assumed to be a quadratic function of investment. Such assumptions imply that it is costly to increase the capital stock, and the marginal adjustment cost is an increasing function of the size of the adjustment. The adjustment cost is set at $0.5a \cdot i_t^2$, with $a > 0$.

The cost of capital faced by firms is consistent with the imperfect integration regime as developed in the last section. [2] It is given by k_e, satisfying $k_e'(s) > 0$ and $k_e'(f) < 0$, or in other words, the cost of capital increases with respect to market-wide segmentation, s (conversely it decreases with respect to integration), and decreases with respect to firm-level foreign stock ownership, f. [3] The firm's objective function is to choose capital stock and investment as to maximise profits:

$$\Pi = \max_{k_t, i_t} \sum_{t=0}^{\infty} \frac{1}{(1+k_e)^t} \cdot [\pi(K_t, k_t) - i_t - 0.5a \cdot i_t^2] \tag{4.5}$$

Profit maximisation obeys a standard constraint on the law of capital accumulation. The capital stock in the current period must equal the capital stock in the preceding period plus current investment. This constraint reads as:

$$k_t = k_{t-1} + i_t \tag{4.6}$$

[2] This is the only difference with respect to Romer (2012)'s model, as in the original model the cost of capital is generally defined as an interest rate r.

[3] Throughout the model exposition, general condition $y'(x) > 0$ ($y'(x) < 0$) imply that y is an increasing (decreasing) function of x.

The firm will maximise profits subject to this capital accumulation constraint, obeying:

$$L = \max_{k_t, i_t} \sum_{t=0}^{\infty} \frac{1}{(1+k_e)^t} \cdot [\pi(K_t, k_t) - i_t - 0.5a \cdot i_t^2] + \sum_{t=0}^{\infty} \lambda_t (k_{t-1} + i_t - k_t) \tag{4.7}$$

Given the investment problem faced by this representative firm is dynamic in nature, there will be an infinite number of constraints, and as well of Lagrange multipliers, λ_t. The interpretation of this Lagrange multiplier is that it captures the marginal value of relaxing the capital accumulation constraint on the lifetime value of the firm. Next, define $q_t = (1+k_e)^t \lambda_t$ as the present discounted value of all Lagrange multipliers. q_t captures the additional value to the firm of an additional unit of capital, or in other words, the shadow value of capital.

To obtain the first order condition for capital (k_t), recall that this is a dynamic maximisation, therefore k_t appears in the objective function in period t and in period $t+1$ as well, because in $t+1$, the law of motion of capital is given by $k_{t+1} = k_t + i_{t+1}$. The Lagrangean then reads as:

$$L = \max_{k_t, i_t} \sum_{t=0}^{\infty} \frac{1}{(1+k_e)^t} \cdot [\pi(K_t, k_t) - i_t - 0.5a \cdot i_t^2] + q_t(k_{t-1} + i_t - k_t) + q_{t+1}(k_t + i_{t+1} - k_{t+1}) \tag{4.8}$$

Differentiating the Lagrangean with respect to the capital stock, k_t, and equating to zero, yields:

$$\frac{\partial L}{\partial k_t} = \frac{1}{(1+k_e)^t} \cdot [\pi(K_t) - q_t] + \frac{1}{(1+k_e)^{t+1}} \cdot q_{t+1} = 0 \tag{4.9}$$

Rearranging the condition above, and solving for q_t, yields the shadow value of capital, the so-called Tobin's Q:

$$q_t = \pi(K_t) + \frac{1}{(1+k_e)} \cdot q_{t+1} \tag{4.10}$$

As per the condition above, Tobin's Q satisfies $q_t'(\pi) > 0$, $q_t'(k_e) < 0$ and $q_t'(q_{t+1}) > 0$. These conditions imply that Q is an increasing function of cash flows, a decreasing function of the cost of capital, and an increasing function of the future value of capital. Now, recall that the cost of capital increases with respect to market-wide segmentation, conversely it decreases with respect to market-wide stock market integration, and also decreases with respect to foreign

ownership, then if follows by construction that Tobin's Q also satisfies $q_t'(f) > 0$ and $q_t'(s) < 0$. This implies that Tobin's Q increases with respect to market-wide integration and with respect to firm's foreign stock ownership.

Proposition II: Tobin's Q is an increasing function of stock market openness.

Having obtained the optimal level for the capital stock, next first order conditions are obtained for investment (i_t). Differentiating the Lagrangean with respect to investment yields:

$$\frac{\partial L}{\partial i_t} = -1 - a \cdot i_t + q_t = 0 \tag{4.11}$$

Rearranging the equation above, and solving for investment, gives optimal investment:

$$i_t = \frac{(q_t - 1)}{a} \tag{4.12}$$

The relationship shown below is the well-known result that corporate investment is an increasing function of Tobin's Q, as investment clearly satisfies $i_t'(q_t) > 0$. Investment also decreases with respect to adjustment costs, a. Taking stock of these conditions, and plus bearing in mind the implications of *Proposition II*, it turns out that corporate investment, being an increasing function of Tobin's Q, also satisfies $i_t'(f) > 0$ and $i_t'(s) < 0$. Thus, investment increases with respect to market-wide integration and also with respect to firm foreign stock ownership.

Hypothesis I: Corporate Investment is an increasing function of stock market openness.

4.2.2.2 Investment with Agency Costs

This section introduces expropriation risk as a friction to stock market openness, building on the expropriation function by Stulz (2005), with some minor adaptations. As dully noted by Stulz (2005), agency costs related to inside ownership discretion arise when corporate insiders take advantage of imperfect contracting and expropriate minority investors. Insiders own fraction α, whereas portfolio investors hold β, with $\alpha + \beta = 1$. Corporate insiders expropriate a share equal

to e of firm's cashflows $\pi(K_t, k_t)$. [4] Expropriation is costly to insiders, though. The deadweight quadratic cost function paid by insiders to expropriate is shown below:

$$0.5[g_i + q_c](Max[e - c, 0]^2) \cdot \pi(K_t, k_t) \tag{4.13}$$

Variable c represent the amount insiders can freely expropriate, without bearing any costs or consequences. Variable g_i captures firm-level governance, whereas q_c captures country-level institutional quality. Insiders receive a payoff equal to:

$$P = e \cdot \pi(K_t, k_t) + (1 - e) \cdot \alpha \cdot \pi(K_t, k_t) - 0.5[g_i + q_c](Max[e - c, 0]^2 \cdot \pi(K_t, k_t) \tag{4.14}$$

The first term $e \cdot \pi(K_t, k_t)$ refers to the appropriation of private benefits, by expropriating firm's cashflows. The second term, $(1 - e) \cdot \alpha \cdot \pi(K_t, k_t)$, represents the payoff to insiders from cashflow rights (net of cash insiders have expropriated from portfolio investors, e). The third term refers to the expropriation costs. Insiders maximise payoff with respect to expropriation, e, which yields:

$$\frac{\partial P}{\partial e} = 0; e = c + \frac{(1 - \alpha)}{(g_i + q_c)} \tag{4.15}$$

The optimum expropriation value e is a decreasing function of firm-level governance (g_i), because better governance stimulates stricter monitoring. Country-level institutional quality (q_c) also decreases insiders' incentives to expropriate because regulators enforce minority investors' rights more stringently. Lastly, expropriation decreases with respect to insider's cashflow rights (α), because there is no point for insiders to expropriate their own cashflows.

Expropriation by insiders, e, reduces cashflows available to be distributed amongst all shareholders. Therefore, for $e > 0$, cashflows are given by $(1 - e)\pi(K_t, k_t)$. In light of this, such reduced amount of cashflows enters firm's profit maximisation, which now becomes:

$$\Pi = \max_{k_t, i_t} \sum_{t=0}^{\infty} \frac{1}{(1 + k_e)^t} \cdot [(1 - e)\pi(K_t, k_t) - i_t - 0.5a \cdot i_t^2] \tag{4.16}$$

[4] In the fully-fledged Twin Agency Costs model, cashflows are expropriated by both insiders and government. To keep things simple, in this model only insiders expropriate.

The effect of expropriation on capital and on investment is trivial. With corporate insiders tunnelling cashflows, portfolio investors discount firm value. Recalculating Tobin's Q for the agency costs paradigm, labeled q_t^A, yields:

$$q_t^A = (1-e)\pi(K_t) + \frac{1}{(1+k_e)} \cdot q_{t+1}^A \tag{4.17}$$

Expropriation drives a wedge between firm valuation under neoclassical and agency costs approaches, with $q_t > q_t^A$. To see how foreign stock ownership enters this picture, recall that expropriation is a decreasing function of insiders' cashflow rights (α), and therefore an increasing function of portfolio investors' ownership stake (β). The shares of insiders plus portfolio investors equate all firms' shares, thus $\beta = 1 - \alpha$. Logically, β includes the shareholdings of both foreign and domestic portfolio investors. Define $\beta = f + d$, with f capturing foreigners share and d capturing domestic minority investors share. Replacing for expropriation yields:

$$q_t^A = [1 - (c + \frac{(f+d)}{(g_i + q_c)})] \cdot \pi(K_t) + \frac{1}{(1+k_e)} \cdot q_{t+1}^A \tag{4.18}$$

Holding the cost of capital constant, Tobin's Q now decreases with respect to foreign ownership, because insiders' expropriation is greater when foreign ownership is larger. Considering that foreign ownership decreases the cost of capital, then foreign ownership exerts mixed positive and negative effects on Tobin's Q. Investment with agency costs is:

$$i_t^A = \frac{(q_t^A - 1)}{a} \tag{4.19}$$

Again, investment (i_t^A) is an increasing function of Tobin's Q. As expropriation reduces the value of an additional unit of capital inside the firm, this devaluation is passed through firm's incentive to invest. This analysis implies that $i_t > i_t^A$, thus expropriation also drives a wedge in investment between the neoclassical and the agency costs model. As expropriation depends negatively on country's institutional quality (q_c) and on firm's governance (g_i), these variables mitigate negative effects of foreign ownership through expropriated cashflows.

Hypothesis II: Agency costs reduce investment gains from stock market openness.
Hypothesis III: Institutional Quality and Governance magnify investment gains from stock market openness.

4.3 Data and Variables

This section describes the dataset and variables used in the second essay, in which the relationship between stock market openness and corporate investment is analysed. The empirical analysis occurs in two dimensions. First and foremost, cross-country firm-level panel data models are estimated for a sample of emerging and frontier markets firms. Second, as a robustness check, time series models are estimated for Brazilian firms, hooking on the Brazilian cost of capital study developed in the first essay.

4.3.1 Cross-country Panel Data Analysis

4.3.1.1 Dataset and Variables Description

The dataset employed in the cross-country firm-level panel data analysis includes companies from 45 mid and low income countries (emerging and frontier economies). Firm-level data for non-financial firms is collected from Osiris database (Bureau Van Dijk) for Brazil, Chile, China, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, Philippines, Poland, Russia, Qatar, South Africa, Taiwan, Thailand, Turkey (emerging) and United Arab Emirates, Argentina, Bahrain, Bangladesh, Croatia, Estonia, Jordan, Kenya, Kuwait, Lebanon, Lithuania, Kazakhstan, Mauritius, Morocco, Nigeria, Oman, Pakistan, Romania, Serbia, Slovakia, Sri Lanka, Tunisia and Vietnam (frontier). Table 4.1 brings a summary of the variables used in the analysis:

The dependent variable employed in regression models is corporate investment ratios (IK_t), calculated as net capital expenditures (Capex) divided by net capital stock (property, plant and equipment). Investment-Capital ratio is a widely used variable for capturing expansions of firms' capital stock in the empirical investment literature (Eberly *et al.* , 2012; Chari & Blair Henry, 2008; Aivazian *et al.* , 2005; Laeven, 2002). To capture equity market and overall financial openness at the country-level, two indices by Jahan & Wang (2016) (available at the International Monetary Fund database) are employed. Such indices are part of a more comprehensive set of indices measuring current account openness (equity, bonds, etc), referred to as a *De Jure* measures of equity openness or liberalisation. [5]

[5]There are other indices often used in the literature, such as the Chinn-Ito Financial Openness Index by Chinn & Ito (2006). The index used in this paper, by Jahan & Wang (2016) is the latest development in the area, and as the authors point out, it is designed exactly to overcome a few limitations of earlier indices. On top of that, as the

Table 4.1: Variables Description: Corporate Investment Analysis

Variables	Legend	Calculation	Interpretation	Source
Dependent Variable				
Investment Ratio	IK_{it}	Net Capex / PPE	Investment	BVD
Openness Measures				
Equity Openness	EOP_{ct}	Index [0,1]	Equity Market	IMF
		(1 if fully liberalised)	Openness Degree	
Foreign Capital Open.	FKO_{ct}	Index [0,1]	Financial Market	IMF
		(1 if fully liberalised)	Inflow Openness	
Foreign Ownership (%)	F_{it}	Foreign Ownership	Foreign Ownership	BVD
Foreign Ownership (0/1)	F_{it}^{d}	1 if foreign invested, 0 otw	Foreign Ownership	BVD
Agency Costs Proxies				
Law and Order	OLI_{ct}	Index [1,6]	Rule of Law	ICRG
Property Rights	PRI_{ct}	Index [0,100]	Legal Rights	Heritage
Investor Protection	MIP_{ct}	Index [0,10]	Exprop. Risks	World Bank
Development Proxies				
Financial Development	FD_{ct}	Private Credit/GDP	Financial Dev.	World Bank
Economic Development	ED_{ct}	GDP/employed pop.	Economic Dev.	World Bank
Control Variables				
Lagged Investment	IK_{it-k}	Net Capex / PPE	Lagged Investment	BVD
Tobin's Q	Q_{it}	(MVE + Debt) / Assets	Growth Opps.	BVD
Cash Flows	CF_{it}	Cash Flows / PPE	Financing Frictions	BVD
Total Assets	TA_{it}	Total Assets in USD	Firm Size	BVD
Additional Variables				
MSCI Constituency	$MSCI_{it}$	1 if firm is a MSCI Constituent, 0 otw	Exogenous change in Foreign Ownership	MSCI
Cash Holdings	C_{it}	Cash / Assets	Cash Holdings	BVD
Capex/Assets	I_{it}	Capex / Assets	Capital Investments	BVD
Cash Flows/Assets	CF_{it}	Cash Flows / Assets	Cash Flows	BVD
Working Capital	NWC_{it}	Current Assets / Assets	Liquid Assets	BVD
Leverage/Assets	L_{it}	Total Debt / Assets	Capital Structure	BVD
Dividends Dummy	D_{it}	1 if D > 0, 0 otw	Dividend Policy	BVD
Market Value	MK_{it}	Market Capitalisation	Valuation	BVD

The openness indices employed in this essay are calculated by analysing information contained on the *Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER)*, tracking regulatory strictness over time, like additions and removals of capital controls, providing a measure with time series variation of overall country-level financial openness. This is an advantage with respect to particular liberalisation landmarks, often employed in the event study liberalisation literature, because while the first takes advantage of one-off liberalisation events, the former tracks how liberalisation has evolved over time. [6]

To illustrate why this is important, one can think about the case of Brazil (though this applies to other markets as well). Seminal papers in the liberalisation literature establish a number of dates (which are not always consistent across papers, by the way) associated to different events, in which the Brazilian equity market became liberalised (allegedly). For instance, Henry (2000a) dates liberalisation to 1988, when the first *Country Investment Fund* is established. On the other hand, Bekaert *et al.* (2005) consider the official liberalisation to be 1991, plus other additional events, like the first ADR issuance (American Depositary Receipt) in 1992, whilst the *Country Investment Fund* is dated from 1992 (which differs from the first reference).

Yet, throughout the last 20 years, Brazilian regulators pulled back a number of anti-liberalisation measures, by and large capital controls on equity and debt, which have most likely contributed to undermine integration and marginally reinstate some degree of segmentation (Alfaro *et al.* , 2017; Chamon & Garcia, 2016; Jinjarak *et al.* , 2013). Therefore, if one takes account of one-off liberalisation events only, ignoring how *De Jure* openness evolves over time, the picture captured by such measures seems incomplete, at best.

The first and main measure used in the paper is the Equity Openness (Liberalisation) Index, capturing the degree of liberalisation of equity (stocks) investments. It has four components: purchase of local stocks by non-residents, sale or issue of local stocks by non-residents, purchase of stocks abroad by residents, and sale or issue abroad by residents. The second measure, used complementarity, is the Foreign Capital Inflow Liberalisation Index, which takes into consideration other types of financial assets, such as bonds and derivatives (hence this is a

authors show, all such indices are highly correlated with one another, so differences across indices are not very large.

[6] One disadvantage of tracking equity openness over time instead of studying specific liberalisation windows is that, in event studies, the new informational content brought about by one-off liberalisation events is likely to be stronger, for researchers try to identify the *first event* that has occurred. On the other hand, as both types of methodologies rely on exogenous variation on the incentives for foreign equity investments, caused by regulatory shifts (out of firms' control), in terms of econometric identification both seem equally appropriate to study corporate decision-making such as investments.

more comprehensive measure, not restricted to equity).

Both indexes are measured on a [0,1] scale, with scores closer to 1 representing stronger openness to cross-border capital flows. In the context of our research design, such variables provide valuable information for two reasons. First, they represent *De Jure* measures of equity openness, and as they are taken at the country-level, such variables are more likely to be exogenous to firms' characteristics. [7] Second, in countries more open to foreign flows, firms are more likely to receive foreign equity investments because portfolio investors face less stringent regulatory barriers. [8] Indeed, firm-level foreign stock ownership and country-level openness indices are positively and statistically correlated.

Additionally, *De Facto* firm-level openness is captured by foreign portfolio (institutional) ownership (F_{it}). Foreign stock ownership was employed in several studies as a firm-level measure of internationalisation of ownership structures (Kang & Stulz, 1997; Dahlquist & Robertsson, 2001). As foreign institutional investors are major actors in the process of financial globalisation, this measure captures the extent to which firms' ownership structure is financially open to foreign shareholders. Foreign portfolio ownership is calculated as the relative share of stocks which is held by foreign portfolio (institutional) investors. [9] When this variable is inspected in detail, it turns out that its distribution is skewed and leptokurtic, with truncation around zero, which could affect the consistency of estimates. This problem is dealt with by designing a dummy variable, taking the value of 1 if the firm is invested by foreign shareholders, and zero otherwise, to be employed complementarily. This transformation produced a variable with improved distributional properties.

The other financial variables shown are control variables often found in empirical corporate investment studies (Eberly *et al.* , 2012; Chari & Blair Henry, 2008; Laeven, 2002). In line with the neoclassical model of investment, the main control variable included in the models is Tobin's Q (Q_{it}), calculated as market capitalisation plus total debt divided by total assets. Second, controls for cash flows (CF_{it}), calculated as cash flows divided by the capital stock, and for

[7] As individual firms are small entities in the economy, a given characteristic of firm *i* is not likely to cause a country-level characteristic c. On the other hand, corporate behaviour is likely to respond to policy shifts in the regulatory environment.

[8] Using liberalisation indexes not only strengthens identification, but also helps with the issue of capital controls: some countries in our sample impose restrictions on foreign ownership, like China. Hence, cross-country regulatory strictness with respect to foreign capitals is taken in to consideration in the models.

[9] We sum across the holdings of banks, investment banks, insurance funds, mutual funds, pension funds, sovereign wealth funds, and foundations, capturing foreign portfolio ownership. The variable does not include Foreign Direct Investment with lasting economic interest.

lagged investment (IK_{it-1}), are also included, addressing the role played by financing frictions and adjustment costs in affecting firm investment (Eberly *et al.* , 2012). Lastly, a control for firm size (TA_{it}) is included, proxied by total assets.

Firm-level financial and openness data is complemented with a number of country-level variables capturing expected agency costs and financial and economic development. Following Pinkowitz *et al.* (2006), the Law & Order index (LOI_c), from *International Country Risk Guide (ICRG)* is used as a proxy for legal rights enforcement. As complementary measures, proxies calculated by other institutions are also employed: the Property Rights Index (PRI_{ct}) from the *Index of Economic Freedom* by Heritage Foundation, and the Minority Investor Protection Index (MIP_{ct}), from the World Bank. In line with the financial openness literature, the stock of private credit as a share of GDP (FD_{ct}) is employed as proxy for financial development (Baltagi *et al.* , 2009), whereas GDP divided by employed population (ED_{ct}) captures economic development.

4.3.1.2 Descriptive Statistics

Table 4.2 brings descriptive statistics. The average investment-to-capital rate is 19%. When looking at measures of financial openness, the average for Equity Liberalisation (Openness) is 0.19, whereas for Foreign Capital Inflows is 0.32, out of a maximum of 1 for strongly open (fully liberalised) economies. Such low scores show that emerging and frontier markets are still fairly closed to foreign equity capital flows, as usually more developed economies obtain scores closer to unity. The mean for foreign ownership (measured as a dummy) is 0.22, hence 22% of firms in the sample are invested by foreign portfolio shareholders. When averaging across firms with non-zero foreign shareholders, the average share owned by foreign investors is 7.0%.

In Table 4.3, country-level statistics are shown for the dependent and main independent variables. There is substantial heterogeneity in investment across countries, with firms posting higher investment ratios in Hungary, Poland, Brazil, South Africa and Vietnam (with investment ratios around 25%), and lower averages in countries like Lebanon, Romania, Bulgaria and Croatia (with investment-ratios around 10% only). Also, we see that some countries have strongly liberalised equity markets, like Bulgaria, Estonia and Romania, with scores closer to 1, whilst other countries remain quite closed, like China and India, scoring 0. Foreign portfolio investors hold higher shares in countries like Brazil, Poland, Mexico and South Africa, with average holdings above 10%, whereas investors seem more shy in other places, in particular in

Table 4.2: Descriptive Statistics: Corporate Investment Analysis

Variables	**Legend**	**Mean**	**Std. Dev.**	**25% Perc.**	**Median**	**75% Perc.**
Investment Ratio (%)	IK_{it}	19.17	19.28	5.08	13.10	26.24
Equity Openness [0-1]	EOP_{ct}	0.20	0.32	0	0	0 .250
Capital Inflow Openness [0-1]	FKO_{ct}	0.32	0.32	0.070	0.140	0.50
Foreign Ownership (%)	F_{it}	7.00	10.35	0.81	3.08	8.94
Foreign Ownership (0/1)	F_{it}^{d}	0.226	0.418	0	0	0
Tobin's Q	Q_{it}	1.49	1.39	0.82	1.07	1.59
Cash Flows (%)	CF_{it}	81.70	292.29	6.83	20.30	49.59
Assets (USD million)	TA_{it}	569.60	1,743.43	18.54	77.56	300.56
Law & Order Index	LOI_{ct}	3.53	1.41	3.00	4.00	4.50
Property Rights Index	PRI_{ct}	44.13	18.42	30.00	50.00	55.00
Investor Protection Index	MIP_{it}	6.10	1.27	4.50	6.70	7.30
Credit/GDP (%)	FD_{ct}	88.67	44.57	50.05	94.83	130.64
GDP/pw (USD)	ED_{ct}	34,461.79	24,031.43	14,681	21,630	54,169
MSCI Constituency	$MSCI_{it}$	0.12	0.32	0.00	0.00	0.00
Cash Holdings	C_{it}	0.16	0.24	0.03	0.09	0.19
Capex-Assets	IA_{it}	0.05	0.06	0.01	0.03	0.07
Cash Flows-Assets	CFA_{it}	0.06	0.09	0.02	0.06	0.10
Net Working Capital	NWC_{it}	0.07	0.25	-0.06	0.06	0.21
Leverage	L_{it}	0.50	0.24	0.32	0.49	0.66
Dividends (dummy)	D_{it}	0.61	0.49	0.00	1.00	1.00
Market Value	MK_{it}	473.25	1,367.65	106.55	556.57	2,801.02

Middle-East countries, with average holdings below 5%.

Table 4.4 brings country-level averages for control, agency and development variables. Tobin's Q is above unity for the majority of countries, thus, on average, firms have incentives to build up capital stocks. With respect to firm size, there is a good deal of heterogeneity, as in some countries big businesses seem to predominate, in particular in Latin-America, where on average firms have assets in place exceeding USD 1 billion, whereas in South Asia firms tend to be smaller, with assets in place below USD 500 million. Though, as flagged in Table 4.2, standard deviation on assets is large.

Regarding institutional quality, we see some countries with relatively good scores in all three indexes, like Chile, South Korea and Taiwan, whilst other countries seem to offer investors poorer governance and higher expropriation risks, like Kenya, Jordan, Egypt and Vietnam. Financial development seems more abundant in Asia, as countries like China, South Korea, Taiwan and Malaysia all post credit to GDP ratios above 100%, whereas Latin-American countries stay below the average.

Table 4.3: Descriptive Statistics - Corporate Investment Analysis (Country Averages I)

Countries	Invest. IK_{it}	Equity Open. EOP_{ct}	Foreign K. Open. FKO_{ct}	Foreign Own. F_{it}	Foreign Own. F_{it}^{d}	Firms n	Firms (%)
Arab Emirates	16.47	0.50	0.79	3.86	0.29	61	0.30
Argentina	20.98	0.22	0.29	8.90	0.21	87	0.43
Bangladesh	12.30	0.31	0.04	2.80	0.06	221	1.08
Bulgaria	11.37	1.00	1.00	8.12	0.12	172	0.84
Bahrain	14.39	0.69	0.71	12.01	0.10	22	0.11
Brazil	24.50	0.22	0.52	16.08	0.39	369	1.81
Chile	14.84	0.44	0.90	6.17	0.30	203	1.00
China	21.99	0.00	0.02	3.85	0.11	4,265	20.93
Colombia	11.41	0.00	0.11	7.36	0.27	60	0.29
Czech Rep.	16.47	0.34	0.87	12.28	0.39	12	0.06
Estonia	15.25	0.97	0.97	17.26	0.77	16	0.08
Egypt	13.99	0.84	0.81	5.48	0.21	216	1.06
Greece	12.48	0.50	0.86	6.89	0.37	205	1.01
Croatia	10.51	0.53	0.54	4.37	0.30	108	0.53
Hungary	25.81	0.53	0.28	11.76	0.26	38	0.19
Indonesia	17.74	0.09	0.30	7.52	0.32	434	2.13
India	20.74	0.00	0.11	7.08	0.15	4,486	22.01
Jordan	12.52	1.00	0.93	10.23	0.08	186	0.91
Kenya	22.13	0.25	0.58	2.85	0.34	40	0.20
South Korea	22.11	0.75	0.88	5.74	0.36	1,738	8.53
Kuwait	15.24	0.50	0.64	1.22	0.11	156	0.77
Kazakhstan	16.97	0.12	0.25	20.51	0.08	30	0.15
Lebanon	9.10	0.28	0.21	2.00	0.25	4	0.02
Sri Lanka	13.47	0.25	0.07	6.41	0.09	231	1.13
Lithuania	15.85	0.81	0.93	11.98	0.51	27	0.13
Morocco	20.39	0.25	0.43	2.80	0.28	58	0.28
Mauritius	17.79	0.59	0.86	5.30	0.28	43	0.21
Mexico	16.61	0.00	0.29	11.92	0.56	115	0.56
Malaysia	13.77	0.38	0.45	5.34	0.34	887	4.35
Nigeria	18.31	1.00	0.83	4.63	0.14	124	0.61
Oman	16.72	0.75	0.82	7.07	0.12	108	0.53
Peru	12.56	1.00	0.98	10.45	0.16	128	0.63
Philippines	21.57	0.22	0.33	7.92	0.30	236	1.16
Pakistan	12.82	0.06	0.38	2.42	0.14	483	2.37
Poland	24.22	0.00	0.46	15.90	0.40	613	3.01
Qatar	20.21	0.50	0.86	4.83	0.41	30	0.15
Romania	9.94	1.00	1.00	7.44	0.46	75	0.37
Serbia	13.49	0.56	1.00	7.87	0.44	18	0.09
Russia	17.41	0.25	0.41	8.49	0.21	351	1.72
Slovakia	12.69	0.50	0.61	3.19	0.33	29	0.14
Thailand	17.71	0.00	0.35	7.54	0.28	618	3.03
Tunisia	18.82	0.00	0.00	2.69	0.12	52	0.26
Turkey	20.52	0.25	0.54	6.91	0.37	357	1.75
Taiwan	16.01	.	.	5.19	0.40	1,718	8.43
Vietnam	23.73	0.00	0.16	4.50	0.09	670	3.29
South Africa	26.37	0.25	0.52	10.69	0.49	282	1.38

Table 4.4: Descriptive Statistics - Corporate Investment Analysis (Country Averages II)

Countries	TQ Q_{it}	Cashflows CF_{it}	Assets TA_{it}	Law & Order. LOI_{ct}	Prop. Rights PRI_{ct}	Invest. Prot. MIP_{ct}	Fin. Dev FD_{ct}	Eco. Dev. ED_{ct}
Arab Emirates	1.20	117.60	1947.81	3.60	49.00	6.00	65.77	93,187
Argentina	1.61	71.94	668.54	2.05	21.50	6.00	13.58	31,734
Bangladesh	2.01	44.55	90.92	1.95	23.00	5.30	38.90	5,433
Bulgaria	1.16	60.00	64.87	2.30	30.00	7.20	61.80	40,287
Bahrain	1.02	114.21	343.81	4.30	60.00	4.80	64.55	82,563
Brazil	1.81	178.17	2028.85	1.80	50.00	6.50	53.97	29,169
Chile	1.53	130.95	1330.66	4.20	89.00	6.30	99.22	47,811
China	1.96	69.67	826.48	3.50	21.00	4.30	124.50	21,630
Colombia	1.27	190.95	1642.31	1.75	44.00	7.20	43.59	28,119
Czech Rep.	1.64	137.67	2936.51	4.50	69.50	5.80	45.84	55,939
Estonia	1.20	31.08	288.29	3.60	84.50	5.50	80.45	53,117
Egypt	1.53	114.39	399.15	2.90	36.00	4.50	34.34	36,556
Greece	1.09	33.52	522.90	4.05	48.00	6.20	103.16	53,117
Croatia	0.96	12.80	312.21	4.10	36.00	6.50	66.21	53,601
Hungary	1.39	104.29	1107.44	3.60	66.00	5.50	51.80	56,301
Indonesia	1.65	73.18	474.27	2.65	30.00	5.30	30.66	21,182
India	1.49	78.82	242.81	3.65	50.50	7.30	50.05	14,681
Jordan	1.20	80.96	78.60	3.60	55.50	3.70	77.21	41,084
Kenya	2.43	282.96	263.00	1.80	33.50	4.70	28.42	6,335
South Korea	1.29	33.68	786.50	4.50	70.50	7.30	137.90	68,415
Kuwait	1.11	188.49	539.42	4.30	50.00	5.70	66.34	158,302
Kazakhstan	1.54	21.14	1047.87	3.35	31.00	6.70	42.30	46,768
Lebanon	1.07	38.64	774.60	3.60	26.00	4.30	87.03	42,497
Sri Lanka	1.37	82.12	69.48	2.50	42.50	6.00	33.19	24,560
Lithuania	1.32	94.31	161.44	3.60	55.50	6.20	50.12	54,296
Morocco	1.71	210.56	505.46	4.30	37.00	5.00	63.59	22,027
Mauritius	1.24	26.71	458.35	0.00	63.50	6.50	88.36	40,924
Mexico	1.51	69.02	2519.13	1.80	50.00	5.80	25.06	39,052
Malaysia	1.13	72.03	419.05	3.60	52.00	7.80	110.89	54,169
Nigeria	1.83	39.38	236.17	1.80	30.00	6.80	19.16	19,511
Oman	1.29	138.63	147.36	4.50	50.50	4.30	42.91	85,342
Peru	1.05	65.56	514.16	2.80	39.00	6.00	27.44	22,259
Philippines	2.04	179.75	694.09	2.25	30.00	3.80	32.54	16,456
Pakistan	1.25	53.78	136.10	2.90	30.00	6.70	21.03	13,512
Poland	1.49	115.21	423.00	4.05	55.50	6.00	46.98	53,736
Qatar	1.54	188.18	2469.27	4.50	61.50	4.50	44.73	173,966
Romania	0.87	29.45	614.85	3.40	36.50	5.80	34.58	37,818
Serbia	0.98	17.71	391.18	3.15	40.50	5.50	42.09	26,573
Russia	1.48	45.15	1692.63	3.20	26.00	5.70	44.26	46,902
Slovakia	0.85	36.92	1119.81	3.60	50.50	5.30	44.68	61,022
Thailand	1.45	69.28	390.78	2.25	46.50	6.30	123.08	23,853
Tunisia	1.68	170.33	111.20	4.50	46.00	5.00	69.35	34,055
Turkey	1.39	193.30	594.39	3.35	49.50	6.80	46.18	56,665
Taiwan	1.45	75.72	501.24	4.50	70.00	6.70	154.00	64,490
Vietnam	1.06	103.05	65.17	3.60	13.00	4.50	95.75	8,914
South Africa	1.59	168.82	1060.62	2.10	50.00	7.20	148.61	44,046

4.3.2 Time Series Analysis (Brazilian Firms)

4.3.2.1 Dataset and Variables Description

In this section we present data and variables used to model the relationship between corporate investment and foreign ownership, in a time series analysis undertaken for Brazilian firms. This test focuses on corporate governance, taking advantage of explicit governance criteria adopted by BMF&Bovespa (The Brazilian Stock Exchange), in which equities are listed in particular market segments, contingent on the quality of governance standards adopted by firms.

In this analysis, Brazilian stocks are divided into two broad groups: a portfolio with constituents of the *Novo Mercado* Corporate Governance Index, labeled *NM*, and all other firms pooled together in a portfolio labeled *Ex-NM*. We create portfolios based on corporate governance quality following empirical evidence showing that firms observing best corporate governance practices receive more equity financing from foreign institutional investors (Ferreira & Matos, 2008; Leuz *et al.* , 2009). [10]

The variables employed in the empirical analysis follow an augmented version of the investment model by Romer (2012), with corporate investment (IK_t) modelled as a function of growth opportunities (YK_t) and lagged investment (IK_{t-k}), plus our additional variable capturing stock market integration (I_t), which augments the model. We measure investment by calculating investment ratios (capital expenditures divided by property, plant and equipment).

One problem with the neoclassical approach is that growth opportunities is often proxied by Tobin's Q, a stock market-based proxy. This has been criticised by some authors, because stock prices tend to diverge from fundamentals (Bond & Cummins, 2001). In light of this critic, and also considering that in the panel data analysis we employ a stock-based measure of Tobin's Q, in this test we drop stock-based measures of growth opportunities, using an alternative measure to capture firms' fundamentals and hence putting more structure (robustness) in the estimated models. We employ a sales-based measure of growth opportunities, calculated as net revenues divided by the capital stock (property, plant and equipment).

We also include a number of exogenous variables which may potentially affect investment: local interest rates, proxied by the Brazilian interbank deposit rate (Swap PRE-DI rate), international interest rates, benchmarked by the U.S 3-months T-bill, the exchange rate between

[10] Indeed, institutional ownership is 32% in the Novo Mercado portfolio and 12% in the Ex-Novo Mercado portfolio.

the Brazilian Real and the U.S Dollar, the natural logarithm of the Brazilian Retail Sales Index (calculated by government agency IBGE, measured in basis points), to capture economic expectations and consumer confidence, a dummy for the 2008 financial crisis, and quarterly dummies to absorb any seasonal effects.

We use quarterly data from corporate financial statements for non-financial firms, sourced from Datastream, WorldScope and Capital IQ. In every quarter between 2005 and 2015, we calculate the simple median for the investment rate (IK_t) and growth opportunities (YK_t) for the two aforementioned portfolios. The Novo Mercado portfolio has 128 firms and the Ex-NM portfolio has 261 firms. For integration, we use foreign ownership as in earlier tests. [11]

4.3.2.2 Descriptive Statistics

Descriptive statistics are presented in Table 4.5. Investment rates are higher for the Novo Mercado portfolio: median quarterly investment is 5.3% for the NM portfolio and 3.5% for the Ex-NM portfolio. These quarterly rates correspond to yearly rates of 21% and 14%, respectively. These numbers are similar as those reported in other papers studying corporate investment in emerging economies (Laeven, 2002; Chari & Blair Henry, 2008). Also, firms in the Novo Mercado portfolio enjoy a substantially higher growth opportunity set than their peers (quarterly medians are 1.20 and 0.59, respectively).

4.4 Empirical Panel Data Model: Arellano-Bond Dynamic Panel

Investment is modelled as a function of stock market openness variables (equity openness indices and foreign ownership), controlling for lagged investment, Tobin's Q, cashflows and firm size. According to the economics' firm investment literature, consistent estimation of panel data investment models requires controlling for both firm unobserved heterogeneity (fixed effects) and lagged investment (Eberly *et al.* , 2012). However, firm fixed effects and lagged investment are endogenous covariates by construction, thus OLS cannot accommodate both (Greene, 2012).

[11] Now foreign ownership is calculated by dividing the portfolio of equities held by foreign investors by the market capitalisation of the Ibovespa Index consituents, as on a quarterly basis market capitalisation data is available for the Ibovespa constituents only, but not for all firms in the market. In any case, this does not interfere with the analysis because the constituents of the Ibovespa Index correspond to 80-85% of total market capitalisation.

Table 4.5: Descriptive Statistics - Quarterly Investment Data, Brazil (2005-2015)

This table presents descriptive statistics for the corporate investment dataset (with all variables expressed both in levels and in first-differences, Δ). Panel A presents data for the Novo Mercado portfolio (firms adopting good governance practices), whereas Panel B presents data for the Ex- Novo Mercado portfolio (firms with less stringent governance quality). For both portfolios, descriptive statistics are shown for investment rates, calculated as capital expenditures divided by property, plant and equipment (IK_t) and for growth opportunities, calculated as net revenues divided by property, plant and equipment (YK_t). Panel C presents data on stock market integration, calculated as the value of the portfolio held by foreign investors as a share of Ibovespa Index's market capitalisation (I_t), plus control variables: local interest rates, proxied by the Brazilian interbank rate (Rf_t), global interest rates, proxied by the U.S 3-months T-bill (Rf_t^{us}), the exchange rate between the Brazilian Real and the U.S Dollar (Fx_t) and economic expectations, proxied by Brazilian Retail Sales Index (S_t).

	Mean	Med.	St.dev	Min	Max
Panel A: Novo Mercado Portfolio					
IK_t % (Investment Rate)	5.75	5.33	1.79	2.85	10.37
ΔIK_t %	-0.04	0.06	1.34	-3.78	2.51
YK_t (Growth Opportunities)	1.23	1.20	0.20	0.87	1.72
ΔYK_t	0.05	-0.01	0.19	-0.53	0.62
Panel B: Ex Novo Mercado Portfolio					
IK_t % (Investment Rate)	3.52	3.04	1.29	1.70	7.15
ΔIK_t %	-0.01	-0.00	0.09	-2.29	1.98
YK_t (Growth Opportunities)	0.70	0.70	0.07	0.49	0.84
ΔYK_t	0.01	0.02	0.09	-0.20	0.16
Panel C: Integration and Exogenous Variables					
I_t % (Integration)	20.07	20.71	4.75	12.18	27.02
ΔI_t %	0.34	0.49	1.12	-3.97	2.39
Rf_t % (Local Interest Rate)	2.74	2.63	0.70	1.58	4.61
ΔRf_t %	-0.02	-0.02	0.25	-0.51	0.42
Rf_t^{us} % (International Interest Rate)	1.28	0.14	1.82	0.00	4.99
ΔRf_t^{us} %	-0.06	-0.01	0.40	-1.54	0.62
Fx_t (Exchange Rate)	2.14	2.06	0.48	1.58	3.87
ΔFx_t	0.02	-0.01	0.18	-0.25	0.68
S_t (Retail Sales Index)	91.65	93.8	18.75	61.20	116.10
ΔlnS_t	0.01	0.01	0.01	-0.02	0.04

This creates a problem because both are important determinants of corporate investment ratios and omitting one or another may lead to inconsistent estimates. Fortunately, these two important effects are fully reconciled in dynamic panel data models, as GMM allows estimating, consistently, equations with individual effects, lagged dependent variables and no strictly exogenous variables (Arellano & Bond, 1991).

Although corporate investment and country-level measures of equity openness are exogenous, endogeneity possibly arising from reverse causality or simultaneity between investment and firm-level measures of equity openness (foreign ownership) can affect the consistency of the estimates, as foreign investors may buy stocks from firms posting high investment ratios. This issue is dealt with by employing instrumental variables models, estimated via Arellano-Bond Two-Stages GMM (Generalised Method of Moments). The model below is estimated [12]

$$lnIK_{it} = \alpha_i + \gamma EOP_{ct-1} + \beta lnQ_{it} + \delta lnCF_{it} + \lambda lnTA_{it} + \phi lnIK_{it-k} + \epsilon_{it} \tag{4.20}$$

$$lnIK_{it} = \alpha_i + \gamma F_{it} + \beta lnQ_{it} + \delta lnCF_{it} + \lambda lnTA_{it} + \phi lnIK_{it-k} + \epsilon_{it} \tag{4.21}$$

Consistent estimation of the dynamic model involves solving two problems. First, to get rid of firm-level unobserved heterogeneity, the equation is first-differenced so that firm fixed effects are wiped out. The first-differenced equation (shown only for the first model) reads as:

$$\Delta lnIK_{it} = \gamma \Delta EOP_{ct-1} + \beta \Delta lnQ_{it} + \delta \Delta lnCF_{it} + \lambda \Delta lnTA_{it} + \phi \Delta lnIK_{it-k} + \Delta \epsilon_{it} \tag{4.22}$$

As noted by Greene (2012), because the covariance between first-differenced lagged dependent variables and first-differenced errors is non-zero, OLS still renders inconsistent estimates. A solution is offered by Anderson & Hsiao (1981), with lagged levels, which are uncorrelated with first-differenced errors, serving as instruments for first-differenced lagged dependent variables, whereas standard first-differences instrument for exogenous variables. Endogenous explanatory variables (other than the lagged dependent variable) can also be instrumented via lagged levels. This endogenous treatment is applied to foreign portfolio ownership in a robustness check model.

[12] As in Eberly *et al.* (2012), firm-level determinants enter the investment equation contemporaneously. Equity openness, given its policy-induced nature and its determination at country-level, is lagged by one period, allowing some delay in firms' reaction to changes in the regulatory landmark on foreign equity investments.

This procedure allows using a large set of instruments (for $y_{t-3} - y_{t-2}$, y_{t-1} is available, whereas for $y_{t-4} - y_{t-3}$ both y_{t-1} and y_{t-2} become available, and so on), with the crucial assumptions that instruments are valid and that second-order serial correlation in the error term is absent. The first assumption can be tested through the Sargan's test of over-identifying restrictions (with null hypothesis of valid instruments), whilst the second assumption can be tested through the Arellano-Bond test (with null hypothesis of no second-order correlation).

Next, moderating (mediating) effects of institutional quality, expected agency costs and financial and economic development are tested, employing country-level measures: the Law & Order Index, the Property Rights Index, the Minority Investor Protection Index and Credit/GDP. Country-level variables enter the equations both in linear form and interacted with country and firm-level measures of equity openness. Generically summarising all moderating (mediating) variables as M_{ct}, the empirical models with interactions read as:

$$lnIK_{it} = \alpha_i + \gamma EOP_{ct-1} + \delta M_{ct} + \eta EOP_{ct} \cdot M_{ct} + Controls + \epsilon_{it} \tag{4.23}$$

$$lnIK_{it} = \alpha_i + \gamma F_{it} + \delta M_{ct} + \eta F_{it} \cdot M_{ct} + Controls + \epsilon_{it} \tag{4.24}$$

4.5 Results

4.5.1 Neoclassical Model

Results for the estimation of dynamic investment models are shown in Table 4.6. On column (1), the first model employing the Equity Openness (liberalisation) Index is shown. The partial effect of equity openness on firms' investment ratios is statistically significant and positive, therefore a stronger degree of openness to cross-border equity capitals at the country-level (on a 0-1 scale) is associated to marginal increases in investment at the firm-level. This finding provides evidence of beneficial effects of equity market openness on the real economic side.

With respect to control variables, investment ratios increase with respect to Tobin's Q, in line with the neoclassical investment function. Also, internally-generated cash flows and lagged investments (t-1 and t-2) both affect current investment positively, corroborating that financing frictions and adjustment costs can affect corporate investments. Lastly, the coefficient fitted for Total Assets is statistically significant and positive as well, therefore larger firms invest more. At

the bottom of the table, Model Tests are shown. For all models estimated, the null hypothesis is accepted for Sargan's test of over-identifying restrictions, implying instrumental variables are valid. Regarding the Arellano-Bond's test of serial correlation in first-differenced errors, the null hypothesis is also accepted, therefore second-order serial correlation is absent. Such tests' diagnostics vouch in favour of correct econometric specification of the empirical investment model.

On column (2), a second equation is estimated, this time with countries' score on the Capital Inflow Index as a measure of market openness. Once again, the coefficient is positive and highly statistically significant, corroborating prior findings. Moreover, as this proxy captures openness to other types of foreign investments as well, like in bonds, this result provides evidence that current-account openness taken more broadly can help firms in expanding their capital stocks. In this second equation, all control variables kept the same signals and statistical significance too.

Next, column (3) brings the result of the estimation of another model, in which foreign portfolio ownership (equity investments made by foreign institutional investors) is the main independent variable. The partial effect of foreign institutional ownership on corporate investment ratios is statistically significant (at 10% level, though) and positive again, therefore suggesting that a higher degree of foreign stock ownership is associated to marginal increases in firms' investments.

On column (4), a different model specification is tested, including foreign ownership as a dummy variable (taking the value of 1 if the firm is foreign equity invested, and zero otherwise), and with foreign ownership entering the model as an endogenous variable (hence instrumented via GMM). This analysis focuses on discrete investment differences between investable and non-investable firms. The effect on investment remains positive and statistically significant (this time at 0.05 level), therefore firms receiving foreign portfolio equity capital invest more than peers financed entirely with domestic equity capital. The findings are also robust to endogeneity between foreign stock ownership and investment ratios.

In summary, results point to an important role played by foreign portfolio equity capitals in financing firms' investments. Interestingly, the findings remained consistent across models estimated with both *De Jure* country-level current-account openness (regulatory measures put in place at policy level) and *De Facto* firm-level openness (firms' ability to attract foreign investors).

Table 4.6: Dynamic Investment Models I

(1) $lnlK_{it} = f(EOP_{ct-1}, lnQ_{it}, lnCF_{it}, lnTA_{it}, lnIK_{it-1}, lnIK_{it-2})$.

(2) $lnlK_{it} = f(FKO_{ct-1}, lnQ_{it}, lnCF_{it}, lnTA_{it}, lnIK_{it-1}, lnIK_{it-2})$.

(3,4) $lnlK_{it} = f(F_{it}, lnQ_{it}, lnCF_{it}, lnTA_{it}, lnIK_{it-1}, lnIK_{it-2})$.

$lnlK_{it}$ is the natural logarithm of investment ratios, and is modelled as a function of: EOP_{ct} (equity liberalisation); or FKO_{ct} (foreign capital liberalisation); or F_{it} (foreign ownership, either continuous or as a dummy), plus control variables (lnQ_{it}, the natural logarithm of Tobin's Q, $lnCF_{it}$, the natural logarithm of cash flow ratios, TA_{it}, the natural log of total assets, $lnIK_{it-1}$, $lnIK_{it-2}$, lagged investment ratios). All models include years and firms fixed effects, and are estimated via Arellano-Bond Two-Stages GMM.

*** Significant at 0.01 level; $**$ Significant at 0.05 level; $*$ Significant at 0.1 level.

Dependent Variable: Investments	(1)	(2)	(3)	(4)
Equity Openness	0.150***			
	(0.057)			
Foreign Capital Openness		0.328***		
		(0.120)		
Foreign Ownership			0.026*	
			(0.014)	
Foreign Ownership (0/1)				0.194**
				(0.093)
Tobin's Q	0.174***	0.171***	0.107*	0.128***
	(0.048)	(0.042)	(0.056)	(0.030)
Cash Flows	0.054***	0.051***	0.067***	0.050***
	(0.017)	(0.016)	(0.020)	(0.013)
Total Assets	0.323***	0.375***	0.159**	0.304***
	(0.063)	(0.059)	(0.069)	(0.045)
Investments [t-1]	0.308***	0.304***	0.389***	0.335***
	(0.028)	(0.024)	(0.036)	(0.018)
Investments [t-2]	0.052***	0.055***	0.048**	0.049***
	(0.018)	(0.016)	(0.022)	(0.013)
Years Fixed Effects	Yes	Yes	Yes	Yes
Firms Fixed Effects	Yes	Yes	Yes	Yes
Endogenous Variables	IK_{it-1}	IK_{it-1}	IK_{it-1}	IK_{it-1}
	IK_{it-2}	IK_{it-2}	IK_{it-2}	IK_{it-2}
				F_{it}
Model Tests				
Over-Identifying Restrictions (Sargan)				
χ^2 Statistic	13.83	12.01	13.55	54.84
p-value	0.73	0.84	0.33	0.17
2nd Order Autocorrelation (Arellano-Bond)				
z Statistic	0.64	0.85	-0.29	0.68
p-value	0.52	0.39	0.76	0.49
Number of Obs.	21,941	27,494	14,296	45,887
Number of Firms	7,972	8,463	3,752	11,267
Model χ^2 Statistic	467.16***	592.82***	552.62***	1,080.82***

4.5.2 Agency Costs Model

In this section, estimation results for models addressing the agency costs approach to equity market integration are analysed and discussed. In extended models, proxies for expected agency costs and financial development are included in the empirical models, both in linear form and interacted with measures of equity openness and/or foreign ownership. Results are shown in Table 4.7. First, equity openness (EOP) is interacted with the Property Rights Index (PRI), drawn from the Economic Freedom Index from Heritage Foundation. Whilst the linear term of this variable is not statistically significant, the interaction with equity openness (EOPxPRI) is statistically significant and negative. The interpretation of this interaction is that the marginal effect of stock market openness on corporate investment ratios is weaker (stronger) in countries with higher (lower) levels of property rights protection (a proxy for institutional quality).

Similar tests are repeated, employing alternative proxies for institutional quality. On column (2), the Law & Order Index from International Country Risk Guide is included linearly and interacted with equity openness. The linear term is positive but statistically insignificant, whereas the interaction is again statistically significant and negative. Therefore, similarly as in the previous model, the gains from opening stock markets are larger in countries where rule of law is poorer.

On column (4), foreign stock ownership replaces for equity market openness (hence a shift from a country-level to firm-level measure of openness), and is interacted with the Minority Investor Protection Index, from World Bank Doing Business Report. The coefficient of investor protection is statistically significant and positive, thus firms invest relatively more in countries where the risk of expropriation incurred by minority investors is lower. The interaction term between foreign ownership and investor protection is negative, hence the marginal benefit of foreign stock ownership is lower in countries where investor protection is high. This finding is in line with those reported in columns (1) and (2).

Lastly, the role played by financial development in the equity openness-investment nexus is addressed in model (3). Financial development is proxied by private domestic credit as a share of GDP, from World Bank Development Indicators, and enters the equation linearly and interacted with equity openness (EOP x FD). The linear coefficient is positive (though insignificant), whereas the interaction is negative and statistically significant (at 10% level, though).

The interpretation of such negative interaction is that equity market openness is more (less) efficient in propelling corporate investment in countries where the level of financial development is

relatively lower (higher). Considering that financial development and all measures of institutional quality are positively correlated, this result goes in the same direction as those obtained from previous models.

Table 4.7: Dynamic Investment Models II - Agency Costs and Development

$$lnlK_{it} = f(EOP_{ct-1}, EOP_{ct-1} \cdot M_{ct}, lnQ_{it}, lnCF_{it}, lnTA_{it}, lnIK_{it-1}, lnIK_{it-2}).$$

$lnlK_{it}$ is the natural logarithm of investment ratios, and is modelled as a function of: EOP_{ct} (equity liberalisation); or F_{it} (foreign ownership, %), plus and interaction between measures of openness (foreign ownership) and agency/development proxies, generically labeled M_{ct} (property rights, law and order, investor protection and financial development) and control variables (lnQ_{it}, the natural logarithm of Tobin's Q, $lnCF_{it}$, the natural logarithm of cash flow ratios, TA_{it}, the natural log of total assets, $lnIK_{it-1}$, $lnIK_{it-2}$, lagged investment ratios). All models include years and firms fixed effects, and are estimated via Arellano-Bond (GMM).

*** Significant at 0.01 level; $**$ Significant at 0.05 level; $*$ Significant at 0.1 level.

Dependent Variable: Investments	(1)	(2)	(3)	(4)
Equity Openness (EOP)	0.339***	0.367***	1.044**	
	(0.120)	(0.119)	(0.514)	
Foreign Ownership (F)				0.058***
				(0.018)
Property Rights (PRI)	0.101			
	(0.072)			
EOP x PRI	-0.277**			
	(0.132)			
Law and Order (LOI)		0.050		
		(0.054)		
EOP x LOI		-0.339**		
		(0.133)		
Fin. Develop (FD)			0.196	
			(0.150)	
EOP x FD			-0.197*	
			(0.110)	
Investor Protection (MIP)				0.117**
				(0.053)
F x MIP				-0.057***
				(0.021)
Tobin's Q	0.174***	0.175***	0.172***	0.108*
	(0.048)	(0.048)	(0.049)	(0.056)
Cash Flows	0.053***	0.054***	0.054***	0.064***
	(0.017)	(0.017)	(0.017)	(0.020)
Assets	0.323***	0.325***	0.325***	0.159**
	(0.063)	(0.063)	(0.063)	(0.068)
Investments [t-1]	0.308***	0.307***	0.307***	0.380***
	(0.028)	(0.028)	(0.028)	(0.036)
Investments [t-2]	0.052***	0.052***	0.051***	0.045**
	(0.018)	(0.018)	(0.018)	(0.022)
Years Fixed Effects	Yes	Yes	Yes	Yes
Firms Fixed Effects	Yes	Yes	Yes	Yes
Endogenous Variables	IK_{it-1}	IK_{it-1}	IK_{it-1}	IK_{it-1}
	IK_{it-2}	IK_{it-2}	IK_{it-2}	IK_{it-2}
Model Tests				
Over-Identifying Restrictions (Sargan)				
χ^2 Statistic	13.88	13.78	13.87	13.50
p-value	0.73	0.74	0.73	0.33
2nd Order Autocorrelation (Arellano-Bond)				
z Statistic	0.65	0.65	0.64	-0.29
p-value	0.51	0.51	0.52	0.77
Number of Obs.	21,941	21,941	21,941	14,296
Number of Firms	7,972	7,972	7,972	3,752
Model χ^2 Statistic	471.81***	471.49***	468.92***	568.47***

4.6 Robustness Checks and Extensions

4.6.1 Inspecting the Mechanism I: Stocks' Valuation and Growth Opportunities

The findings from the empirical analysis corroborate the idea that stock market openness and a higher influx of foreign investors can help firms to increase investments. Such finding are closely aligned with and corroborate theories of risk sharing and reduced cost of capital as a product of increased equity market integration, as discussed in the theory section and shown in the simple conceptual model developed as a guideline for empirical modelling.

In this robustness check section, we try to establish a stronger link between equity valuations and stock market openness, by formally inspecting the mechanism of equity cost reduction which is advocated in our theory. To do so, we bring forth the *Revaluation Effect* hypothesis. According to former research, equity market liberalisations and a stronger presence of foreign investors is linked with a positive revaluation of domestic stocks, with increased stock prices reducing future expected returns, thus driving downwards firms' cost of equity capital. (Henry, 2000b; Christoffersen *et al.* , 2006).

We empirically check whether the influx of foreign equity investments is associated to an increase in stock valuations, estimating equity valuation models. Two measures of corporate valuation are used. The first is Tobin's Q, following Lang & Stulz (1994), Porta *et al.* (2002), Kalcheva & Lins (2007), among others. The second is market value of equity, as in Pinkowitz *et al.* (2006). Control variables include cash flows, firm size, investments and capital structure (leverage ratios), plus firm and year fixed effects absorbing firm unobserved heterogeneity and business cycle shocks, respectively.

Two variables are used to proxy for foreign equity investments: first, a dummy capturing MSCI Investability is coded, taking the value of 1 if the firm is a MSCI Emerging Markets Index constituent, and zero otherwise (tracking both additions and deletions over time), as former research suggests that this measure captures exogenous variation in foreign stock ownership because many funds track MSCI indexes when picking stocks to invest (Bena *et al.* , 2017; Aggarwal *et al.* , 2011). Second, foreign ownership, as described in previous analyses, is employed again. [13]

[13] Another alternative explored in the literature is to employ MSCI investability as an instrumental variable for

Table 4.8: Testing the Cost of Capital (Growth Opportunities) Channel

(1) $lnQ_{it} = f(MSCI_{it}, lnCF_{it}, lnIK_{it}, lnL_{it}, lnTA_{it})$

(2) $lnQ_{it} = f(F_{it}, lnCF_{it}, lnIK_{it}, lnL_{it}, lnTA_{it})$

(3) $lnMK_{it} = f(MSCI_{it}, lnQ_{it}, lnCF_{it}, lnIK_{it}, lnL_{it}, lnTA_{it})$

(4) $lnMK_{it} = f(F_{it}, lnQ_{it}, lnCF_{it}, lnIK_{it}, lnL_{it}, lnTA_{it})$

Two measures of stock valuation (performance) are used: $lnMK_{it}$, the natural logarithm of market capitalisation, and lnQ_{it}, the natural logarithm of Tobin's Q. Stock valuation is modelled as a function of: $MSCI_{it}$, a dummy taking the value of 1 if the firm is a constituent of MSCI Emerging Markets Index, zero otherwise; F_{it}, foreign ownership, calculated as a dummy taking the value of 1 if the firm is foreign invested, zero otherwise; $lnCF_{it}$, the natural logarithm of cash flow ratios; $lnlK_{it}$, the natural logarithm of investment ratios; lnL_{it}, the natural logarithm of leverage ratios; $lnTA_{it}$, the natural logarithm of total assets. All models include years and firms fixed effects, and are estimated with heteroskedasticity robust standard errors clustered at panel level, shown below coefficients.

*** Significant at 0.01 level; $**$ Significant at 0.05 level; $*$ Significant at 0.1 level.

y = Tobin's Q, Market Cap	(1)	(2)	(3)	(4)
Dependent Variable	Tobin's Q	Tobin's Q	Market Cap.	Market Cap.
MSCI Investability	0.215***		0.073***	
	(0.017)		(0.014)	
Foreign Ownership		0.079***		0.056***
		(0.006)		(0.005)
Cash Flows	0.066***	0.066***	0.042***	0.042***
	(0.002)	(0.002)	(0.002)	(0.002)
Investments	0.013***	0.013***	0.012***	0.014***
	(0.002)	(0.001)	(0.001)	(0.001)
Leverage	0.198***	0.190***	-0.459***	-0.465***
	(0.010)	(0.009)	(0.008)	(0.008)
Size	-0.113***	-0.105***	0.892***	0.894***
	(0.008)	(0.008)	(0.008)	(0.008)
Tobin's Q			1.409***	1.424***
			(0.008)	(0.007)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
R^2	0.762	0.761	0.987	0.987
Adjusted R^2	0.716	0.714	0.985	0.984
Number of Obs.	77,259	89,093	77,259	89,093
Number of firms	12,241	14,365	12,241	14,365
F Statistic	251.160***	285.883***	8,312.516***	9,254.388***

Estimation results are shown in Table 4.8. In column (1), a regression in which Tobin's Q is the dependent variable and MSCI Investability is the main independent variable is shown. Results suggest that addition to MSCI statistically increases Tobin's Q ratios, providing evidence that the influx of foreign investors is associated to a positive revaluation effect. Control variables, in general, have fairly reasonable coefficients: corporate valuation increases with respect to cash flows, investments, leverage, but decrease with respect to size (as Tobin's Q also proxies for growth opportunities, the implication is that smaller firms enjoy better investment opportunity sets).

In column (2), a second specification is tested, this time with foreign ownership itself proxying for foreign equity investments. In line with the first model, foreign invested firms have relatively higher valuation ratios than strictly domestic firms, with all control variables remaining fairly unchanged. Moreover, both models have a fairly high R^2 at 0.76, suggesting that the variables included in the models capture with good explanatory power how equities are been valued by investors.

Next, models with market value of equity as proxy for corporate valuation are estimated, with results shown in columns (3-4). Inclusion in the MSCI index is associated with an increase on market value of equity, in line with the results obtained with Tobin's Q as proxy for corporate stock performance. This finding remains robust when employing foreign ownership as well, as shown in the column next. With respect to control variables in the models, cash flows, investment ratios and Tobin's Q are associated with higher equity valuations. [14] Some of the control variables have now flipped coefficients: leverage is associated to lower market value, and larger firms have an absolute higher market valuation. [15]

4.6.2 Inspecting the Mechanism II: Cash Holdings

In this section, we approach the relationship between stock market openness and cost of equity capital through a different angle, studying how openness affects corporate financing structure,

foreign stock ownership, but it turns out that MSCI constituency and Tobin's Q are directly correlated, thus although MSCI can serve as a relevant instrument for foreign ownership, is not a truly exogenous instrument when estimating a valuation model.

[14] Although Tobin's Q is used with a similar purpose as market value of equity in previous models (to capture stock performance), here it proxies for growth opportunities. It is worth commenting that simply dropping Tobin's Q as an explanatory variable from the market value of equity models does not alter the results at all.

[15] This is likely due to the fact that differently from market value of equity, Tobin's Q is normalised by total assets, which is a measure of size. Given that a larger assets base is mechanically linked with a larger market value of assets, this can explain a positive coefficient.

with a particular focus on corporate cash policies. As discussed by Bekaert *et al.* (2016), much ink has flowed in discussing how globalisation has affected trade, stock returns and the real economy. However, how firms' financing choices adjust to financial openness was never at the center of the debate. Yet, financing decisions can tell a lot about how financial openness affects corporate behaviour.

Moreover, as noted by Bonfiglioli (2008), to understand the costs and benefits of opening financial markets, it is crucial to identify the mechanisms through which financial globalisation operates. In this robustness check section, we investigate the existence of a channel linking stock market openness and corporate financing policies. As financing choices are intimately linked with the cost of external finance, expected agency costs and the investment opportunity set faced by firms (as we shall discuss in the next sub-section), the analysis conducted in this section seeks strengthening the link between financial globalisation, cost of capital and investment.

4.6.2.1 The Rationales for Holding Cash

It is well established in the cash literature that costly external finance and agency costs both contribute to firms' propensity to accumulate cash. First, cash is valuable because external finance is more costly and firms have unanticipated funding needs associated with investment opportunities and profit shortages (Nikolov & Whited, 2014). Firms exhibit a higher propensity to save on transaction costs when external finance is more costly, income is more uncertain and investment policy is lumpy (Riddick & Whited, 2009). Moreover, firms hold cash as precautionary savings, to cope with unexpected shocks in the supply of external finance (Bates *et al.* , 2009), particularly those firms possessing valuable investment opportunities (Han & Qiu, 2007; Ferreira & Vilela, 2004). In summary, cash derives its value because it provides firms with an alternative to cope with costly external finance, the so-called benefit of financial flexibility (Gamba & Triantis, 2008; Strebulaev & Whited, 2012).

Second, the cost of external finance increases in the presence of asymmetric information between insiders and external investors (Ozkan & Ozkan, 2004). This is particularly true because entrenched managers and insiders tend to build excessively high cash balances, envisaging expropriation and thereby increasing their personal utility by diverting cash, tunnelling firms' resources to investments yielding private benefits or to perquisites consumption (Stulz, 2005;

Pinkowitz *et al.* , 2006; Kalcheva & Lins, 2007; Nikolov & Whited, 2014).

4.6.2.2 The Link Between Stock Market Openness and Cash Holdings

Crossing insights and findings from the cash holdings' determinants literature with the extant research on financial globalisation, it is hypothesised that stock market openness reduces firms' incentives to hold cash, via two channels. First, as discussed theoretically and demonstrated empirically, openness alleviates financial constraints by lowering the cost of equity capital (Chari & Blair Henry, 2008; Gupta & Yuan, 2009). Also, in a more open financial market, transaction costs of accessing external equity become cheaper. With foreign investment banks joining emerging markets, they can better certify the quality of the offer, lowering adverse selection costs and consequently reducing underpricing (Ljungqvist *et al.* , 2003). Also, fundraising costs may decrease due to stronger competition between underwriting services providers (Stulz, 1999).

Second, a more open equity market can help reducing agency costs, by stimulating firms to improve corporate governance (Stulz, 2005). In particular, stricter external monitoring is put in place by foreign investors (Ferreira & Matos, 2008; Aggarwal *et al.* , 2011), reducing insiders' incentives (proclivity) to expropriate because the risk (cost) of getting caught can be augmented by stronger external discipline.

4.6.2.3 Empirical Cash Model

The dependent variable employed in the cash holdings models is the natural logarithm of cash-assets ratios (C_{it}), calculated as cash and equivalents scaled by total assets. The independent variables are the same financial openness variables used in previous analyses: Foreign Capital Openness (FK_{ct}) at country-level and foreign stock ownership (F_{it}) and MSCI Investabiity ($MSCI_{it}$) at firm-level.

We control for a number of variables which can affect cash policies, in line with the literature on the determinants of cash holdings (Chen *et al.* , 2014; Caprio *et al.* , 2013; Kalcheva & Lins, 2007; Ferreira & Vilela, 2004; Dittmar *et al.* , 2003; Opler *et al.* , 1999). Control variables include growth opportunities, Q_{it} (natural logarithm of Tobin's Q ratios), investments, I_{it} (capital expenditures scaled by total assets), operating cash flows, CF_{it} (cash flows scaled by total assets), net working capital, W_{it} (current assets minus current liabilities, net of cash, scaled by

total assets), leverage, L_{it} (total debt scaled by assets), and dividends, D_{it} (a dummy taking the value of 1 if the firm pays dividends, zero otherwise).

A dynamic cash model is estimated, in accordance with empirical evidence suggesting that lagged cash also influences current cash holdings (Ozkan & Ozkan, 2004). Similarly as to the corporate investment analysis, endogeneity between firm-level foreign stock ownership and cash holdings calls for treatment, as previous research has shown that foreign investors reveal stock-picking preferences for firms keeping high cash balances (Dahlquist & Robertsson, 2001). In light of this, when employing foreign ownership as a regressor, this variable enters the model endogenously, instrumented through GMM. The model below (already expressed in differences) is estimated via Arellano-Bond Two-Stages GMM:

$$\Delta C_{it} = \gamma \Delta FK_{ct-1} + \beta \Delta Q_{it} + \sigma \Delta I_{it} + \delta \Delta CF_{it} + \eta \Delta W_{it} + \lambda \Delta L_{it} + \tau \Delta D_{it} + \phi \Delta C_{it-k} + \Delta \epsilon_{it} \tag{4.25}$$

Additionally, an agency costs model is also estimated, including the Minority Investor Protection Index (MIP_{ct}), both in linear form and interacted with foreign capital openness ($FKO_{ct} \cdot MIP_{ct}$). The idea, similarly as to the tests conducted in the investment models, is to check whether the effect of financial openness on cash holdings is possibly moderated (mediated) by expropriation risks, testing for the improvements in monitoring channel brought about by foreign investors, as advocated in the liberalisation literature.

4.6.2.4 Results

Estimation results for cash holdings models are shown in table 4.9.

In the first column of the table, estimation results for a cash holdings model with countries' score on the Foreign Capital Inflows Openness index as main explanatory model is shown. Openness to foreign capitals at country-level is negatively and statistically significantly associated to lower cash balances at firm-level. This result is consistent with the hypothesis that openness to cross-border finance reduces equity financing constraints, lowering external financing costs and thus making internally accumulated cash balances marginally less important in firms financing structure. Also importantly, this result suggests a linkage between equity market integration and corporate financing structure.

We briefly comment on the coefficients fitted for control variables and models' tests diagnostics. As shown at the bottom of the Table, all models pass both Sargan's test of over-identifying restrictions and Arellano-Bond's test of second-order serial correlation in first-differenced errors (except the model shown in column 4, which fails Sargan's test). With respect to our choice for modelling cash holdings dynamically, results suggest that indeed cash holdings are strongly persistent over time, as lagged cash (first and second lags) explain current cash, consistent with dynamic cash models (Ozkan & Ozkan, 2004).

Tobin's Q ratios, cash flows, and dividends are associated to larger cash balances. The positive effect of Tobin's Q is in line with the idea that firms with valuable growth opportunities hold more cash (Han & Qiu, 2007; Ferreira & Vilela, 2004). The positive relationship of cash holdings and cash flows captures the so-called the cash flow sensitivity of cash (Almeida *et al.* , 2004). The positive association between cash holdings and dividends is in line with Huang *et al.* (2013) and Chen *et al.* (2014), possible reflecting a propensity for cash accumulation to smooth dividend payouts.

Investment, leverage and working capital are found to be negatively associated with corporate cash holdings. The negative partial effect of investment on cash is in agreement with former research reporting that firms with high investments reduce cash (Kalcheva & Lins, 2007; Huang *et al.* , 2013; Caprio *et al.* , 2013; Chen *et al.* , 2014). Lastly, leverage and working capital reduce cash holdings, in line with findings reported by Opler *et al.* (1999); Kalcheva & Lins (2007).

In the second column of the table, an agency costs model is estimated, in which countries' score on the Minority Investor Protection index is included as an additional explanatory variable when modelling cash holdings. This proxy for expropriation risks is included both linearly and interacted with foreign capital openness.

Lower expropriation risk at country-level (a higher score in the investor protection index) is associated to lower cash holdings at firm-level, consistent with the idea that stronger governance schemes reduce insiders' incentives to accumulate cash for tunnelling purposes. This negative relationship is also supported by former research examining cash holdings and expected agency costs (Kalcheva & Lins, 2007).

More importantly, the interaction of investor protection and foreign capital openness is statistically significant and negative, suggesting that openness to foreign finance produces a stronger negative adjustment in cash policies for firms located in countries where expropriation

risks are higher. This result is consistent with the idea that openness to cross-border finance and consequently the influx of foreign investors helps emerging markets in improving governance mechanisms and monitoring, as suggested in extant research (Ferreira & Matos, 2008; Aggarwal *et al.* , 2011; Stulz, 2005), and also concurs with the evidence from investment models, in that foreign openness increases investment more in countries where institutional quality is poorer.

In the third column, foreign stock ownership is included as our measure of firm-level *De Facto* openness. As previously mentioned, due to the endogenous relationship of cash and foreign ownership, the later variable enters the models instrumented via GMM (lagged levels). Foreign portfolio investments are associated to marginal reductions in corporate cash holdings, corroborating prior findings obtained with country-level *De Jure* proxies. Moreover, considering that foreign ownership may be seen as a direct proxy for monitoring (as the literature suggests that foreign investors exert stronger monitoring vis-a-vis domestic investors), this finding can be interpreted as linking stronger firm-level monitoring to lower cash holdings, further corroborating the findings obtained with country-level investor protection.

Lastly, in the fourth column another specification is tested, with MSCI Investability proxying for the influx of foreign equity investments. Results suggest that inclusion in the MSCI Emerging Markets Index is statistically and negatively associated with lower cash balances, strengthening the link between foreign openness and marginal reductions in cash holdings (although this last result should be taken more cautiously because the instrumental variables for lagged cash may be invalid, as the model failed Sargan's specification test).

Table 4.9: Dynamic Cash Holdings Models

$$C_{it} = f(FKO_{ct-1}, Q_{it}, CF_{it}, IA_{it}, WC_{it}, L_{it}, D_{it}, C_{it-1}, C_{it-2}).$$

C_{it} is the natural logarithm of cash-asset ratios, and is modelled as a function of: FKO_{ct} (foreign capital inflow index); or F_{it} (foreign ownership, %); or $MSCI_{it}$ (Investability), plus control variables (Q_{it}, the natural logarithm of Tobin's Q; CF_{it}, cash flow-assets ratios; IA_{it}, investment-assets ratios; WC_{it}, net working capital-assets ratios; L_{it}, debt-assets ratios; D_{it}, a dividends payment dummy; $lnCH_{it-1}$, $lnCH_{it-2}$, lagged cash-assets ratios). All models include years and firms fixed effects, and are estimated via Arellano-Bond Two-Stages GMM.

*** Significant at 0.01 level; $**$ Significant at 0.05 level; $*$ Significant at 0.1 level.

y = ln(Cash Ratios)	(1)	(2)	(3)	(4)
Capital Inflow Open. (FKO)	-0.306***	-0.911***		
	(0.083)	(0.165)		
Investor Protection (MIP)		-0.090***		
		(0.034)		
FKO x MIP		0.842***		
		(0.174)		
Foreign Ownership			-0.051**	
			(0.021)	
MSCI				-0.090**
				(0.043)
Tobin's Q	0.110***	0.107***	0.128***	0.077***
	(0.024)	(0.024)	(0.027)	(0.018)
Investments	-1.360***	-1.353***	-1.515***	-1.332***
	(0.122)	(0.121)	(0.157)	(0.108)
Cash Flows	0.810***	0.810***	0.960***	0.800***
	(0.109)	(0.109)	(0.133)	(0.091)
Working Capital	-0.914***	-0.923***	-0.930***	-0.970***
	(0.058)	(0.058)	(0.082)	(0.050)
Leverage	-0.941***	-0.947***	-0.371***	-1.028***
	(0.099)	(0.099)	(0.120)	(0.083)
Dividends	0.069***	0.068***	0.044***	0.055***
	(0.014)	(0.014)	(0.016)	(0.011)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Endogenous Variables	CH_{it-1}	CH_{it-1}	CH_{it-1}	CH_{it-1}
	CH_{it-2}	CH_{it-2}	CH_{it-2}	CH_{it-2}
			F_{it}	
Model Tests				
Over-Identifying Restrictions (Sargan)				
χ^2 Statistic	12.75	11.48	32.92	29.81***
p-value	0.12	0.17	0.61	0.00
2nd Order Autocorrelation (Arellano-Bond)				
z Statistic	0.68	0.69	-0.43	0.88
p-value	0.49	0.49	0.66	0.37
Number of Obs.	42,058	42,058	23,213	59,912
Number of Firms	11,209	11,209	5,553	12,059
Model χ^2 Statistic	1,488.46***	1,505.72***	787.42***	1,984.18***

4.6.3 Inspecting the Mechanism III: Corporate Governance and Time Series Analysis from Brazil

Our analysis thus far provided evidence that openness to foreign equity finance is associated to lower cost of capital and higher investment, with stronger effects linked with improvements in institutional quality and monitoring as side effects brought about by financial integration. Yet, as results regarding the agency costs paradigm were obtained mostly with country-level governance measures, a firm-level governance mechanism can contribute a great deal in closing this circle. In this robustness check section, we focus on corporate governance.

To do so, we hook on the Brazilian case, as investigated in the first chapter. As it was previously mentioned, Brazil offers an interesting laboratory to dig into governance, in particular because BMF & Bovespa (the Brazilian Stock Exchange) segments firms according to explicit corporate governance standards. As only those firms abiding by world-class best governance practices can have their shares quoted in the *Novo Mercado* special corporate governance segment, such segmentation allows clustering firms in two broad groups: firms with good governance and firms with less stringent governance.

4.6.3.1 Empirical Time Series Model

We fit a Vector Autoregressive Model with additional exogenous covariates. The vector of endogenous variables is $\mathbf{y}_t = [IK_t, I_t, YK_t]$, including investment, integration and growth opportunities. The vector of exogenous variables is $\mathbf{x}_t = [Rf_t, Rf_t^{us}, Fx_t, S_t, d2008, Q_t]$, and contains local and international interest rates, the exchange rate between the Brazilian Real and the U.S dollar, the natural logarithm of the Brazilian Retail Sales Index and dummies for the 2008 crisis period and for financial quarters. Our VAR is specified as:

$$\mathbf{y}_t = \boldsymbol{a} + \mathbf{A_1}\mathbf{y}_{t-1} + \ldots + \mathbf{A_n}\mathbf{y}_{t-n} + \mathbf{B}\mathbf{x}_t + \boldsymbol{e}_t \tag{4.26}$$

In the system of equations above, $\mathbf{y}_t$ is a vector of endogenous variables, $\mathbf{A_1}, ..., \mathbf{A_n}$ are vectors of coefficients fitted for endogenous variables, $\mathbf{x}_t$ is a vector containing exogenous covariates, $\mathbf{B}$ is a vector of coefficients for exogenous variables, $\mathbf{a}$ is a vector of intercepts, and $\mathbf{e_t}$ is the error vector.

We test for stationarity employing the Augmented Dickey-Fuller test, and all variables are found to have unit root with 95% confidence level. Hence, we first-differenced all variables. Optimal lag selection tests based on information criteria pointed to a model with four lags (FPE, AIC, HQIC and SBIC). We carried out standard tests to ensure a correct model specification. First, we test for Eigenvalue stability condition, finding that all Eigenvalues lie within the unit circle, hence the VAR is stable. Second, we test for serial correlation in the lag structure of the model, employing a Lagrange Multiplier test, accepting the null hypothesis of no serial correlation. We test for residual normality, employing the Jarque-Bera test, finding normally distributed residuals.

4.6.3.2 Results

Our analysis is based on four components following the time series literature (Stock & Watson, 2001; Kilian *et al.* , 2013; Luetkepohl, 2011). First, we inspect the coefficients fitted by our VAR model. Second, we conduct Granger Causality tests. Third, we study Forecast Error Variance Decompositions. Fourth, we compute Impulse-Response functions. We show the full results of these analyses for the Novo Mercado portfolio, comparing with the Ex-Novo Mercado portfolio by graphical inspection of Impulse-Response functions.

We focus on the coefficients fitted for the investment rate equation (first column of Table 4.10). Investment is highly persistent, as lagged investment statistically explains current investment. The effect of stock market integration on corporate investment is statistically significant and positive, as both the first (0.25) and third (0.30) lags of integration cause increases to investment. The same holds for the effects of growth opportunities, as both the second (0.016) and fourth (0.017) lags are statistically significant and positive. With respect to exogenous variables, investment is a decreasing function of international interest rates, an increasing function of the exchange rate, was negatively affected by the 2008 crisis and tends to be lower in the second quarter of the year.

Moreover, we find that both integration and growth opportunities Granger-cause investment. Interestingly, integration and investment have a mutual feedback relationship, as past levels of investment also Granger-causes integration, but in this case the effect is negative (as per the fitted VAR coefficients shown in column 2). It seems that increased integration affects investment positively, but foreign investors join the market following periods of low investment.

In the third part of the table Forecast Error Variance Decompositions are shown. We find

that lagged investment explains 45% of changes in current investment, whereas changes in growth opportunities explain 40%, and another 13% is explained by integration. Hence, lagged investment and growth opportunities explain most of variations in current investment, but stock market integration plays a non-negligible role as well.

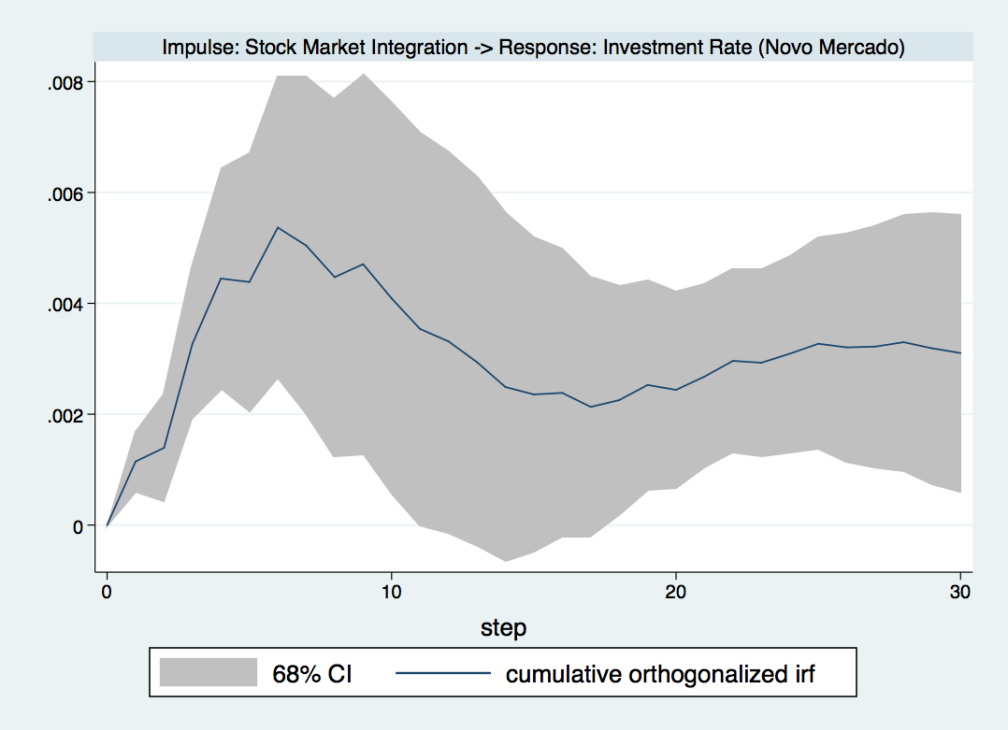
Table 4.10: VAR Model - Stock Market Integration and Corporate Investment (Novo Mercado)

This table presents results of the estimation of a VAR model between investment, integration and growth opportunities for the *Novo Mercado* Corporate Governance Portfolio. In the VAR setting, Investment (ΔIK_t), integration (ΔI_t) and Growth Opportunities (ΔYK_t) are modelled endogenously and simultaneously. Additionally, exogenous variables were included as controls: local interest rates, proxied by the Brazilian interbank rate (ΔRf_t), international interest rates proxied by the U.S 3 months T-bill (ΔRf_t^{us}), the exchange rate between the Brazilian Real and the U.S dollar (ΔFx_t), the natural log of the Brazilian Retail Sales Index, as a proxy for economic expectations (ΔS_t), a dummy variable for the 2008 financial crisis period ($d2008$), and quarterly dummies ($Qt1, Qt2, Qt3, Qt4$), where $Qt1$ is the baseline. In the second part of the table, Granger Causality tests are reported, whereas in the third part we show Forecasts of Error Variance Decompositions. Models are estimated on a quarterly basis, between years 2005 and 2015, covering a time series of 44 consecutive quarters. Statistically significant coefficients are labeled as: $+p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001$.

VAR	Investment ($\Delta I/K_t$)	Integration (ΔI_t)	Growth ($\Delta Y/K_t$)
ΔIK_{t-1}	-0.010	-0.073	0.326
ΔIK_{t-2}	0.083	-0.368***	1.779
ΔIK_{t-3}	0.345***	-0.246***	1.905
ΔIK_{t-4}	-0.213+	-0.116	-3.297
ΔI_{t-1}	0.251+	-0.652***	.000
ΔI_{t-2}	-0.070	-0.389***	.007
ΔI_{t-3}	0.300*	-0.134	.0150
ΔI_{t-4}	0.074	-0.435***	-.007
ΔYK_{t-1}	0.010	0.008	-0.459***
ΔYK_{t-2}	0.017***	-0.006	-0.133
ΔYK_{t-3}	0.000	-0.019**	-0.126
ΔYK_{t-4}	0.016*	0.017**	0.287+
ΔRf_t	0.838	-0.829+	29.004**
ΔRf_t^{us}	-1.116***	-0.462+	7.364
ΔFx_t	0.014+	-0.008	0.201
ΔS_t	0.111	0.091	4.791***
$d2008$	-0.018***	-0.010***	0.008
$Qt2$	-0.017***	0.016***	-0.204*
$Qt3$	0.001	-0.001	-0.145
$Qt4$	0.003	0.002	0.003
R^2	0.850	0.872	0.716
$RMSE$	0.007	0.006	0.156
χ^2	222.536***	267.223***	98.622***
Granger Causality Tests (χ^2)		Equations	
Excluded	ΔIK_t	ΔI_t	ΔYK_t
ΔIK_t	1	28.46***	5.02
ΔI_t	14.60***	1	7.84+
ΔYK_t	14.64***	32.08***	1
ALL	30.47***	78.39**	14.20+
FVED % (ΔIK_t)	ΔIK_t	ΔI_t	ΔYK_t
$t = 1$	100	0	0
$t = 2$	95.20	3.17	1.62
$t = 3$	81.95	4.93	13.11
$t = 4$	70.97	9.88	19.13
$t = 5$	62,72	8.50	28.77
$t = 6$	60.57	10.89	28.52
$t = 7$	53.97	12.66	33.35
$t = 8$	48.13	13.26	38.59
$t = 9$	48.24	13.23	38.51
$t = 10$	45.76	13.82	40.40

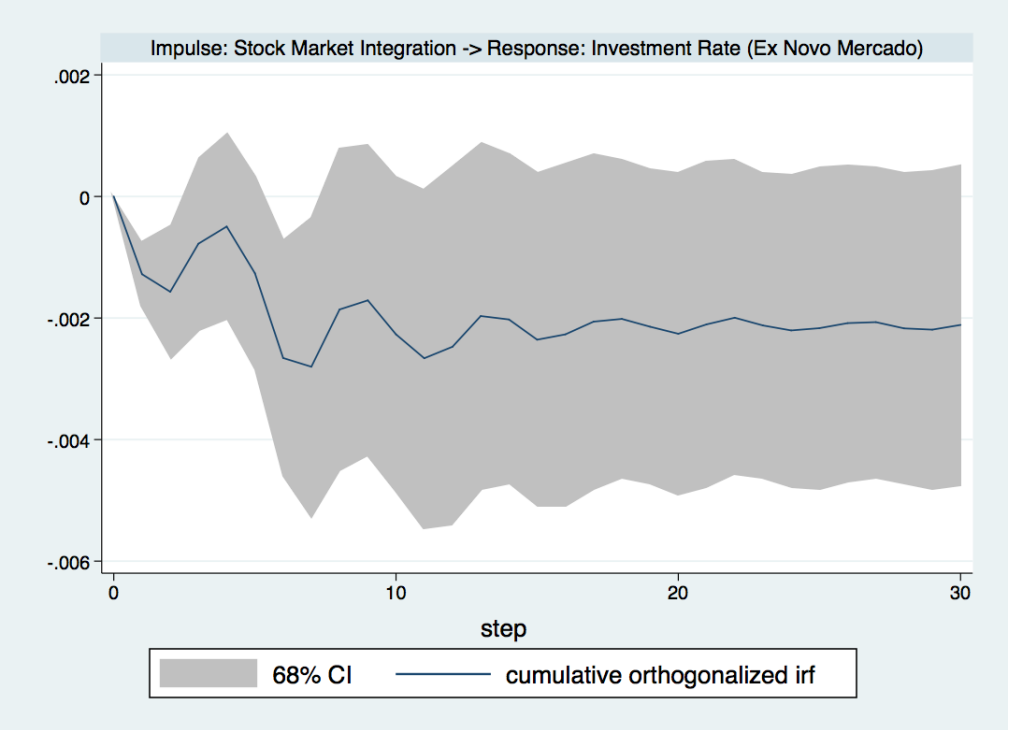
Lastly, we analyse Impulse-Response functions (IRFs). Because IRFs are correlated, we calculate cumulative orthogonalised Impulse-Response functions (COIRFs), showing the response of investment to a one-time, unitary shock on stock market integration, for both the Novo Mercado and Ex Novo Mercado portfolios.

Figure 4.1: Impulse Response Function: Integration and Investment (Novo Mercado)



Referring to Figures 4.1 and 4.2, for firms in the Novo Mercado portfolio, a one standard deviation impulse to stock market integration shifts investment rates upwards by 0.40-0.60%. The cumulative effect rises until 6-8 periods forward, and then stabilises. Interestingly, for the Ex-Novo Mercado portfolio the response of investment is actually negative (-0.20-0.30%). Therefore, stock market integration benefits investment but only for firms following best corporate governance practices.

Figure 4.2: Impulse Response Function: Integration and Investment (Ex Novo Mercado)



Our findings are in line with models of corporate investment, as investment responds positively to innovations in growth opportunities (Romer, 2012), with lagged investment effects stemming from adjustment costs (Eberly *et al.* , 2012). Our results concur with findings from other papers which have reported positive effects of financial integration on investment and real economic activity, both at aggregate-level and firm-level (Henry, 2000b; Laeven, 2002; Bekaert *et al.* , 2005; Chari & Blair Henry, 2008; Gupta & Yuan, 2009). Moreover, the evidence we provide on the crucial role played by corporate governance is in line with the argument of Stulz (2005), corroborating that financial globalisation boosts investment only if agency costs and expropriation risks are low.

4.6.3.3 A robustness test with firm-level regressions

In this section we estimate firm-level investment regressions on a yearly basis, building again on a sample of Brazilian firms. Integration is again proxied by foreign ownership, taken at firm-level (F_{it}). To capture corporate governance, we include a dummy taking the value of one if the firm is listed on Novo Mercado (NM_i), and zero otherwise. We control for growth opportunities (YK_{it}) and for firm size (log sales, lnS_{it}).

We test for endogeneity between investment and foreign ownership employing a Durbin-Wu-Hausman test (test statistics are shown together with regression results). Though exogeneity is rejected, the test statistic has weak significance (at 10% level). Thus, we estimate the model via both ordinary least squares and instrumental variables. Foreign ownership is instrumented by $MSCI_{it}$, a dummy taking the value of 1 if the firm is a constituent of MSCI Emerging Markets Index, and zero otherwise. This variable is correlated with foreign ownership ($0.19, p < 0.01$), but uncorrelated with investment. We estimate the equation below, with results shown in Table 4.11:

$$IK_{it} = \alpha + \beta_1 F_{it} + \beta_2 YK_{it} + \beta_3 lnS_{it} + \beta_4 NM_i + \beta_5 F_{it} \cdot NM_i + e_{it} \tag{4.27}$$

Foreign ownership marginally increases investment, and investment is an increasing function of growth opportunities, but a decreasing function of firm size. In the second column, we estimate the model via instrumental variables using the MSCI constituency dummy as an instrument for foreign ownership. Again, we find that foreign ownership causes increases in investment, and the coefficients for the control variables remain fairly unchanged.

In the third column, we include the dummy for good governance, and an interaction of this dummy and foreign ownership. The dummy is statistically significant and positive, hence well-governed firms invest more. The interaction of foreign ownership and governance is statistically significant and positive, and after its inclusion, the linear term of foreign ownership becomes negative (statistically insignificant). Thus, foreign ownership increases investment only for well-governed firms, in line with the findings from our VAR model.

Table 4.11: Firm-level Investment Regressions: Brazilian Evidence

This table presents results of the estimation of firm-level investment regressions, on yearly basis (2006-2015). We estimate the model: $IK_{it} = \alpha + \beta_1 F_{it} + \beta_2 YK_{it} + \beta_3 lnS_{it} + \beta_4 NM_i + \beta_5 F_{it} \cdot NM_i + e_{it}$, via OLS and Instrumental Variables (with the variable $MSCI_{it}$ as instrument for foreign ownership). Statistically significant coefficients are labeled as: $+p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001$.

Dep. Var: IK_{it}	OLS	IV	OLS
Foreign Ownership (F_{it})	0.124***	0.390**	-0.099
	(0.042)	(0.168)	(0.064)
Sales to Capital (YK_{it})	0.286***	0.278***	0.278***
	(0.024)	(0.025)	(0.024)
Size (lnS_{it})	-2.019***	-2.059***	-1.728***
	(0.458)	(0.460)	(0.442)
Novo Mercado (NM_i)			4.316**
			(1.880)
$F_{it} \cdot NM_i$			0.214***
			(0.082)
Intercept	43.701***	40.138***	37.215***
	(6.809)	(6.844)	(6.717)
Years Fixed Effects	Yes	Yes	Yes
R^2	0.262	0.227	0.282
N obs	823	823	823
N firms	173	173	173
Endogeneity Test (DWH)		2.96+	

4.6.4 Sampling Issues

Going back to the cross-country analysis, some countries contribute a disproportionate larger number of firms (observations) to the fitted models: China, India, South Korea and Taiwan, totalling altogether nearly 50% of sample size. In light of this, one might be interested in making sure this feature is not driving the empirical findings in any way. To address this issue, additional models are estimated, excluding observations from the aforementioned countries.

Such sub-sampling procedure provides interesting insights for two reasons. First, it cleans the estimations from sampling biases, because if particular countries contribute too many observations, the fitted coefficients could reflect the realities of that particular markets, and not an overall pattern shared by the remaining firms located in other countries in the sample. Second, it allows generating a second sub-sample, with which the robustness of findings can be re-tested. Results are reported in Table 4.12.

In column (1), a model having the equity openness index as main independent variable is estimated. Compared to the original model as shown in Table 4.6, the sample is trimmed from 21,000 observations to 9,000, and the number of firms reduced from 8,000 to 3,600. Yet, results remain similar as those obtained employing the full sample, with firms located in countries more open to cross-border equity capitals investing marginally more. All control variables remain statistically significant, with coefficients keeping their signs and orders of magnitude. Also, the model passes both specification tests again (Sargan and Arellano-Bond).

In column (2), the model is estimated with openness to capital inflows as main independent variable. As mentioned before, this variable captures a broader view of capital account openness, going beyond liberalisation of equity investments. Similar to the full-sample model, the coefficient fitted for capital inflow openness remains statistically significant and positive in the trimmed sample model, hence firms residing in countries more open to capital flows invest marginally more. Again, coefficients and statistical significance of control variables remain fairly unchanged, and tests diagnostics point for a proper model specification.

Lastly, in column (3) country-level measures of financial openness are replaced with foreign stock ownership again, a *De Facto* firm-level proxy for foreign equity investments. Higher levels of foreign institutional ownership are associated to higher firm investment ratios. In summary, trimming the sample and excluding those countries contributing a disproportionate larger number of observations did not alter the results, hence findings are general to all markets studied, with

no problems related to country-level sampling biases.

Table 4.12: Dynamic Investment Models III - Sub-Sampling

$$lnlK_{it} = f(EOP_{ct-1}, lnQ_{it}, lnCF_{it}, lnTA_{it}, lnIK_{it-1}, lnIK_{it-2}).$$

$lnlK_{it}$ is the natural logarithm of investment ratios, and is modelled as a function of: EOP_{ct} (equity liberalisation); or F_{it} (foreign ownership, %), plus and interaction between measures of openness (foreign ownership) and agency/development proxies, generically labeled M_{ct} (property rights, law and order, investor protection and financial development) and control variables (lnQ_{it}, the natural logarithm of Tobin's Q, $lnCF_{it}$, the natural logarithm of cash flow ratios, TA_{it}, the natural log of total assets, $lnIK_{it-1}$, $lnIK_{it-2}$, lagged investment ratios). A number of models with sub-samples are estimated, excluding firms from those countries providing a disproportionate number of observations to the sample (China, India, Korea and Taiwan), to make sure results are not driven by any particularities related to such countries. All models include years and firms fixed effects, and are estimated via Arellano-Bond Two-Stages GMM.

*** Significant at 0.01 level; $**$ Significant at 0.05 level; $*$ Significant at 0.1 level.

	(1)	(2)	(3)
Equity Openness	0.263***		
	(0.091)		
Capital Inflow Openness		0.303**	
		(0.134)	
Foreign Ownership			0.033*
			(0.017)
Tobin's Q	0.232***	0.235***	0.118*
	(0.070)	(0.060)	(0.063)
Cash Flows	0.080***	0.080***	0.094***
	(0.025)	(0.023)	(0.028)
Assets	0.367***	0.335***	0.110
	(0.101)	(0.092)	(0.081)
Investments [t-1]	0.344***	0.335***	0.344***
	(0.046)	(0.038)	(0.051)
Investments [t-2]	0.090***	0.075***	0.016
	(0.029)	(0.025)	(0.036)
Firm Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Model Tests			
Over-Identifying Restrictions (Sargan)			
χ^2 Statistic	21.36	22.93	14.52
p-value	0.26	0.19	0.27
2nd Order Autocorrelation (Arellano-Bond)			
z Statistic	0.23	0.64	0.02
p-value	0.81	0.52	0.97
Number of Obs.	9,730	12,152	7,776
Number of Firms	3,628	3,834	2,091
Model χ^2 Statistic	243.81***	312.15***	181.78***

4.7 Discussion

In general, the findings from the empirical analysis are consistent with the neoclassical liberalisation argument, in that equity market openness to foreign investors improves risk sharing, leading to lower cost of capital, ultimately spurring investment (Chari & Blair Henry, 2008; Bekaert *et al.* , 2005; Laeven, 2002; Henry, 2000a). Moreover, the analysis uncovers both country-level and firm-level risk-sharing mechanisms, channeling gains from globalisation to firm-level investment. Such findings corroborate Hypothesis I, and the predictions from theoretical models of integration, in that equity market liberalisation induces a country-level cost of capital reduction shock to all firms, and a firm-specific effect which depends on cross-sectional risk-sharing properties. In all, results support positive effects of stock market openness on the real economy.

Two mechanism inspections also help strengthening the findings. First, both foreign stock ownership and MSCI Investability lead to higher valuation ratios. As higher valuation is associated to a lower cost of financing, the implication is that foreign equity investment is indeed reducing the cost of capital, as predicted by theory. This result also corroborates the existence of a *Revaluation Effect* of domestic assets due to increased exposure of domestic stocks' to foreign equity capital (Errunza & Miller, 2000; Christoffersen *et al.* , 2006).

Second, it is shown that stock market openness at country-level and foreign ownership at firm-level both contribute to a shift in corporate cash policies towards a less conservative cash management, with firms marginally reducing cash holdings as markets further integrate. Cash policy is intimately linked with the cost of external finance, as firms hold more cash when external finance is costly, and also with agency costs, as asymmetric information make external finance more costly too, again contributing to cash accumulation. Therefore, this finding goes in line with the idea that integration reduces the cost of equity financing, and also mitigates agency costs. Moreover, this result also uncovers a new mechanism through which stock market openness affects corporate behaviour, which is via firms' financing structure.

Findings are also in line with the idea that foreign institutional ownership, instead of incentivising invested firms to adopt a short-termed managerial approach, may actually discipline managers to take a long-term horizon. Enhanced monitoring put in place by foreign institutions may persuade corporate insiders, who may prefer a quiet life, to take more risks, fostering investments and long-run value creation, (Bena *et al.* , 2017).

Interestingly, the results obtained when taking stock of the role played by institutional

quality in the equity openness-investment nexus suggest that stock market openness and foreign stock ownership are relatively more efficient in stimulating investment in countries with weaker institutional quality, more acute expropriation risks and in countries with lower financial development. This result concurs with Bena *et al.* (2017), and is in synergy with the idea that foreign investors may induce firms to improve governance over time, taking a more active stance in monitoring invested firms (Aggarwal *et al.* , 2011; Ferreira & Matos, 2008).

On the other hand, these findings do not, directly, corroborate the twin agency cost theory by Stulz (2005), although country-level expropriation risks do not subsume firm-specific contracting structures that may lead to additional, and maybe more stringent, expropriation risks, and this is not covered in the cross-country analysis, which lacks firm-level governance measures. Yet, findings are also in stark contrast to the *Threshold Effects* hypothesis, which contends that financial globalisation improves the real economy only if institutional quality patterns are elevated (Bekaert *et al.* , 2011a; Ayhan Kose *et al.* , 2011).

Although the issue at play here is very complex, in general these results make sense, for two main reasons. First, if foreign investors are helping with better governance, it follows from fundamental neoclassical economics that the marginal benefit of improved governance should be higher where it is more scarce, exactly in countries with weaker institutional quality and where expropriation is more likely to occur. Second, this story also fits with financial development levels, because if foreign capital supply substitutes for lack of affordable capital in the local financial market, the marginal benefit should be higher where local financing markets are more underdeveloped and credit is more rationed, which is the case empirically supported here.

Yet, results from Brazil are different. Findings show that only well-governed firms are benefiting from integration, and this time the evidence concurs with the agency cost theory. As it is argued by Stulz (2005), by pursuing their own interests at the expenses of foreign investors, corporate insiders and state-rulers impose strong agency costs on foreigners, limiting the ability of a country to take advantage of financial globalisation. In fact, as it is shown that firms with poor governance, in which expropriation risks faced by foreign investors are more severe, do not benefit from increases in integration, then this argument may hold. This result partially corroborates Hypotheses II and III, but only with respect to firm-level governance, whilst the results for country-wide institutional quality reject both hypotheses.

Moreover, Stulz (2005) also suggests that, because improving corporate governance is a

costly business, firms are more willing to pay such costs when they bid to receive capital from foreign investors. Hence, could be that foreign investors have induced governance improvements *ex-ante*, and good-governance firms are now benefiting from integration because of such improvements, or, instead, could also be that only those well-governed firms are getting enough foreign capital as to be able to expand installed capacity. Clearly, both scenarios are possible.

Unfortunately, in the analysis of Brazilian firms, governance, although having cross-sectional and portfolio-level variation, is a time-constant measure (both in the time-series analysis, in which governance is used as a sorting criteria, and in the cross-sectional analysis, where it enters the models interacted with foreign ownership). Thus, there is no way to know for sure which of the two mechanisms is operating here. Given such limitation in the research design, it is wiser to avoid strong statements, though it seems safe to say that firm-level governance matters for the openness-investment relationship.

As the evidence on the role played by institutional quality seems mixed, certainly the issue is highly complex. Two summarising considerations are offered. First, the cross-country analysis refers to 45 countries, and looks at time-varying measures of country-level governance, hence contributing a more generalisable evidence. Based on this assertion, one can argue that improvements in monitoring brought by opening equity markets to foreigners improve allocative efficiency and institutional development, strengthening the effect of stock market openness on corporate investment.

Second, country-level and firm-level governance may produce distinct effects on investment. When country-level governance is weak, stock market openness helps improving it, leading to more investment, relative to other countries where country-level governance is marginally higher. However, this effect will only pass-through if firm-level governance is also strong, otherwise the risk sharing mechanism breaks, and investment will not increase.

4.8 Conclusions

The objective of this essay was to investigate the effects of stock market openness on firm-level investment. Empirical results show that stock market openness, proxied both by country-level *De Jure* measures of equity liberalisation, and by foreign institutional stock ownership, a firm-level *De Facto* integration measure, is associated to increases in corporate investment ratios. Such findings reveal important linkages between stock market integration and real economic activity, adding novel evidence to this long-dated debate on the pros and cons of financial globalisation.

Moreover, the effect of openness on investment is found to be stronger in countries with weaker governance, suggesting that a mechanism through which financial integration helps to improve overall governance quality is also operative. In light of this, gains from cross-border finance can come from three sides: cost of capital, economic output and institutional quality. As the fundamental corollary of Institutional Economic theory postulates, better institutions are among the main determinants of superior economic performance. Hence, stock market openness may enhance long-term growth as well.

Stock market openness also is shown to affect corporate behaviour through policies other than investment. Empirical evidence shows that stock market openness is associated to marginal reductions in corporate cash policies, in line with the idea that globalisation reduces financing constraints and mitigates agency costs. More importantly, this finding suggests the existence of a novel mechanism linking financial openness and corporate financing structure, bringing a fresh corporate finance approach to the financial globalisation debate, which has focused almost exclusively on cost of capital and real economic effects until now. This finding may encourage researchers to pursue new avenues of research in the globalisation domain.

The essay leaves two important messages for policy makers and corporate managers in Emerging and Frontier markets. First, it is shown that stock market openness and higher levels of foreign stock ownership increase investment, the benefits from financial integration go beyond affecting solely financial and institutional variables, such as stock returns, market liquidity and institutional quality. Additionally to all these desirable effects, the benefits from equity market integration spillover to the real sector, affecting real economic variables such as investment. This evidence at the microeconomic level may have crucial implications for economic growth and employment at the aggregate level, two highly important economic variables.

Second, corporate managers can increase investment by attracting foreign portfolio share-

holders, but they can do even better by pursuing improvements on governance and contracting efficiency as well. More transparent disclosure policies and better governance standards which help reducing the risks of expropriation as perceived by foreign portfolio investors can certainly help firms making the most of the foreign capital they get. But local governments and firms have to work side-by-side, to mitigate the adverse impact of agency costs, allowing firms to fully benefit from opening financial markets.

This essay suffers from a number of limitations. In particular, the cross-country firm-level panel data analysis runs through a relatively short time series period (2007-2015), mostly due to limited firm-level data availability (mostly for frontier markets). With limited within time series variation in the panel structure, most of the results capture cross-sectional differences, but any temporal dynamics captured in the models are short lived. By failing to capture a longer time horizon, results reflect the economic reality of a few business cycles only, which is a limitation.

Also importantly, the cross-country study misses firm-level measures of corporate governance, as governance is proxied at country-level only. This is partially remedied with the case study of Brazilian firms, but even there, governance is time-invariant, thus the picture is incomplete. Although it is a very common feature in the extant literature to give a country-level treatment to governance, it is clear that the analysis here would have benefited from in-depth firm-level data, in particular because the openness-invesment-governance nexus seems quite complex, and it is only partially captured by the models estimated.

The analysis looks at investment, an important measure of firm-level economic activity, but there are other relevant measures too. For instance, how stock market liberalisation affects innovation, via R&D investments, seems an interesting venue for future research, and would complement recent evidence linking innovation to foreign stock ownership. This study brings a primer on the relationship between openness and financing structure, though other components of corporate financing structure, in particular debt, are totally disregarded. Capital structure implications of stock market openness is for sure a thrilling research avenue for papers to come.

Lastly, this essay has studied publicly listed firms, which represent an important share of the overall population of firms in domestic economies. However, there are other firms at the margin of equity markets. In fact, stock market capitalisation as share of GDP is, on average, only 69% in the countries covered in this sample. If stock openness shifts away resources from unlisted to listed firms, then even if stock market openness increases corporate investment, this

might not *necessarily* translate into expansion in aggregate investment. This reflection stresses the necessity to investigate the openness-investment relationship at the macro level as well, with aggregate domestic investment at the core of the analysis. This is done in the third essay, coming next in Chapter Five.

CHAPTER 5

Portfolio Equity Flows and Aggregate Investment

5.1 Introduction

In the third and last empirical essay, the attention shifts from the micro to the macro level, as this paper investigates how foreign equity capital flows affect aggregate investment. Foreign equity capital flows are stronger when stock markets are more open, and capital inflows can reduce the risk free rate, facilitate risk sharing as foreign investors purchase more domestic shares, and increase liquidity levels, with all these factors leading to lower equity premiums, thus reducing the cost of equity capital and increasing investment (Henry, 2000a).

This paper extends and complements the second essay, but it also brings distinctive contributions of its own. As the analysis occurs at the macro level, this paper joins other works in the space of aggregate investment studies, previously examined in Levine & Zervos (1998); Bosworth & Collins (1999); Henry (2000b); Bonfiglioli (2008); Bekaert *et al.* (2011a), among others. Whilst Henry (2000a) shows that one-off liberalisation events leads to increases in investment, other papers either found no statistically significant effect, or reported only much weaker evidences, despite the fact that a positive response of investment to increased financial openness and equity capital flows is well structured in financial integration theory.

Additionally, the role played by institutional quality is revisited. Extant research suggests that financial openness stimulates economic activity and development when accompanied by high levels of institutional development (Ayhan Kose *et al.* , 2011; Bekaert *et al.* , 2011a; Chinn & Ito,

2006). Yet, another view is that the influx of foreign equity capitals also reflects the increased presence of foreign investors in the market, such that financial openness dynamically interacts with institutional and financial development, allowing emerging countries to gain from better governance standards and from enhanced monitoring technologies rented from sophisticated investors from industrialised countries (Bena *et al.* , 2017; Aggarwal *et al.* , 2011; Ferreira & Matos, 2008; Stulz, 2005).

Empirical cross-country panel data models are estimated, for a sample of 44 emerging and frontier markets, for a time series spanning from 1995 to 2014. Investment, measured both as gross capital formation and as the growth of capital stock per capita, is modelled as a function of foreign equity capital flows, plus a set of control variables. Empirical results show that increases in foreign equity inflows (liabilities) are associated to marginal increments in domestic aggregate investment. Interactions of equity inflows with institutional quality variables took negative values, suggesting stronger effects in countries where institutional development is lower.

Additionally, two new channels linking capital flows and domestic investments are further investigated. First, it is tested whether foreign equity inflows can help countries to attract more foreign direct investments, hence the paper tries to identify the existence of virtuous complementarities between portfolio (financial) and direct (productive) equity capital flows. In line with this potential channel, results suggest that foreign equity capital inflows are statistically associated to marginal increases in foreign direct investment flows.

Second, the chapter investigates the relationship between bond flows (debt liabilities and assets) and domestic investment. While extant research documents no relationship between bond inflows and/or outflows and domestic investment, empirical findings show that debt outflows (assets), which are financial investments in foreign bonds done by domestic investors, can increase domestic investment as well. This evidence uncovers a novel mechanism through which financial openness can benefit emerging markets.

Overall, findings from this macro analysis are strongly aligned with those obtained from the micro analysis in the second essay, providing internal consistency between the two papers. Moreover, results endorse the theoretical mechanism linking risk sharing gains and increased liquidity to positive response of domestic capital formation, in line with neoclassical integration theory. Evidence on the role played by institutional quality challenge extant research, contributing to the discussion on *Threshold Effects*, *Collateral Benefits* and *Monitoring Improvements*.

5.2 Data and Variables

5.2.1 Dataset and Variables Description

This section describes the dataset employed in the third empirical essay. The analysis of the relationship between equity market openness and investment in emerging and frontier markets is now brought to an aggregate level (country-level), with domestic aggregate investment models estimated, complementing and extending the analysis conducted with corporate investment in the second empirical essay.

A panel dataset with country-level variables is formed, gathering economic and international financial statistics from multiple sources: International Monetary Fund (IMF), Penn World Table (PWT), United Nations Conference on Trade and Development (UNCTAD), and World Bank Worldwide Governance Indicators (WB WGI). Table 5.1 brings the variables employed in the analysis:

Table 5.1: Variables Description: Aggregate Domestic Investment Analysis

Variables	Legend	Calculation	Interpretation	Source
Variables				
Equity Inflows	EL_{it}	Equity Liabilities/GDP	Equity Inflows	IMF
Equity Outflows	EA_{it}	Equity Assets /GDP	Equity Outflows	IMF
Equity Globalisation	EG_{it}	Liab. + Assets /GDP	De Facto Integration	IMF
Equity Openness	EOP_{it}	Index [0,1]	De Jure Integration	IMF
Investment	I_{it}	Capital Formation/GDP	Investment	PWT
FDI Stock	FDI_{it}	FDI/GDP	FDI	UNCTAD
FDI Inflow	$FDIF_{it}$	FDI Inflow /GDP	FDI	IMF
GDP Growth	ΔY_{it}	$lnY_{it} - lnY_{it-1}$	Growth Opps.	PWT
TFP	TFP_{it}	Relative Index (U.S=1)	Productivity	PWT
Trade	XM_{it}	Imports + Exports/GDP	Trade Openness	PWT
Capital Stock/pc	K_{it}	Capital Stock/Population	Investment	PWT
Capital Growth	ΔK_{it}	$lnK_{it} - lnK_{it-1}$	Investment	PWT
Corruption Control	CCI_{it}	Index [-2.5,+ 2.5]	Corruption	WB WGI
Regulatory Quality	RQI_{it}	Index [-2.5,+ 2.5]	Legal Rights	WB WGI

The dependent variable used in the main regression models is domestic aggregate investment (I_{it}), proxied by gross capital formation as a share of GDP (gross domestic product) and sourced from PWT (with *i* indexing countries and *t* indexing years). The main independent variable used in the analysis is Equity Inflows (EL_{it}), calculated as equity liabilities scaled by GDP (equity portfolio investments done by residents of countries *j,..,k*, i.e, foreigners, in the domestic equity market of country *i*), with data from IMF. This variable is a country-level measure of how much foreign portfolio equity capital flows into the domestic stock market, capturing *De Facto* stock inflows.

When stock market openness is taken at the country-level, the benefits from portfolio diversification, which can bring gains in terms of cost of capital, can come from two sides: foreign investors buying stocks in the domestic market (captured by equity liabilities), but also from domestic investors buying stocks abroad in foreign equity markets. To capture a broader effect of opening stock markets to globalisation, additional models are also tested, employing two alternative (complementary) measures of equity openness.

The first is Equity Outflows, calculated as equity assets scaled by GDP (investments done by country *i*'s residents in foreign equity markets *j,..,k*). The second is Equity Globalisation, calculated as equity liabilities plus assets scaled by GDP, which captures both inflows and outflows of equity capitals, being thus a broader measure of the degree of stock market globalisation of a given country *i*.

A number of control variables are included in the models, to mitigate omitted variable biases and obtain consistent estimates. Such controls reflect, to a good extent, domestic firms' incentives to invest, proxied with country-level variables, as the level of aggregation is now macro. First, a control for Total Factor Productivity (TFP), is included, as in more productive economies, firms may have stronger incentives to expand installed capacity via investments, as the output obtained per unit of invested capital tends to be higher.

Second, a control for economic growth, proxied by the growth rate of gross domestic product, is also included, for economic growth may expand the investment opportunity sets faced by firms in the economy, stimulating investments. Third, as financial and trade openness can be correlated, a control variable for international trade is also added, proxied by total trade (imports plus exports) scaled by GDP. Lastly, models include country fixed effects to control for countries' unobserved heterogeneity, and year dummies, to absorb business cycle shocks.

In robustness (additional) tests, the growth rate of countries' capital stock per capita (ΔK_{it}) also serves as dependent variable, as an alternative proxy for domestic investment. The effect of equity flows on investment can also be approached through the angle of foreign direct investments, as FDI expands the domestic capital stock as well. Models relating foreign direct investment (FDI) and equity openness are also estimated, with FDI normalised by GDP and calculated both as a stock (FDI_{it}) and as a flow ($FDIF_{it}$).

The role of institutional quality in the domestic investment-equity flows nexus is also analysed, similarly as done in the corporate investment tests. Two variables are used, both from the World Bank Worldwide Governance Indicators. The first is the Control of Corruption Index (CCI_{it}), which captures the strength of corruption deterrence mechanisms. The second is the Regulatory Quality Index (RQI_{it}).

5.2.2 Descriptive Statistics

Table 5.2: Descriptive Statistics - Aggregate Investment Analysis

Variables	Mean	Std. Dev.	25% Perc.	Median	75% Perc.
Equity Inflows/GDP (%)	0.537	2.564	-0.019	0.131	0.592
Equity Outflows/GDP (%)	0.639	2.356	0	0.025	0.431
Equity Globalisation/GDP (%)	1.134	4.031	0	0.307	1.120
Equity Openness Index (0/1)	0.449	0.362	0.250	0.250	0.750
Investment/GDP (%)	22.546	7.661	17.465	21.628	26.394
FDI Stock /GDP (%)	29.144	23.840	11.562	21.300	41.256
FDI Inflow /GDP (%)	3.711	4.688	1.085	2.556	4.604
GDP Growth (%)	4.074	5.184	1.924	4.044	6.141
Productivity (TFP)	0.942	0.1517	0.881	0.96818	1.019
Trade/GDP (%)	52.400	36.200	25.200	43.800	67.200
Capital Stock/pc ($)	50,112	61,677	15,702	31, 339	54,433
Capital Stock/pc Growth (%)	5.624	7.753	1.254	4.438	8.877
Corruption Control	-0.100	-0.617	-0.517383	-0.164	0.321
Regulatory Quality	0.216	0.610	-0.255	0.243	0.656

Descriptive statistics are shown in Table 5.2. Data is collected for 44 emerging and frontier

countries, on yearly basis, between 1995 and 2014. The mean for equity inflows is 0.53%, whereas for equity outflows is 0.63% and for equity globalisation is 1.13%, with all flow measures calculated as a share of gross domestic product. The average score on the equity openness index is 0.44. As the index ranges between [0,1], this average score suggests equity openness is mild at best. The graphs below show how portfolio equity flows and equity openness have evolved over time, comparing Emerging & Frontier Markets with OECD (industrialised) countries:

Figure 5.1: Foreign Equity Capital Flows

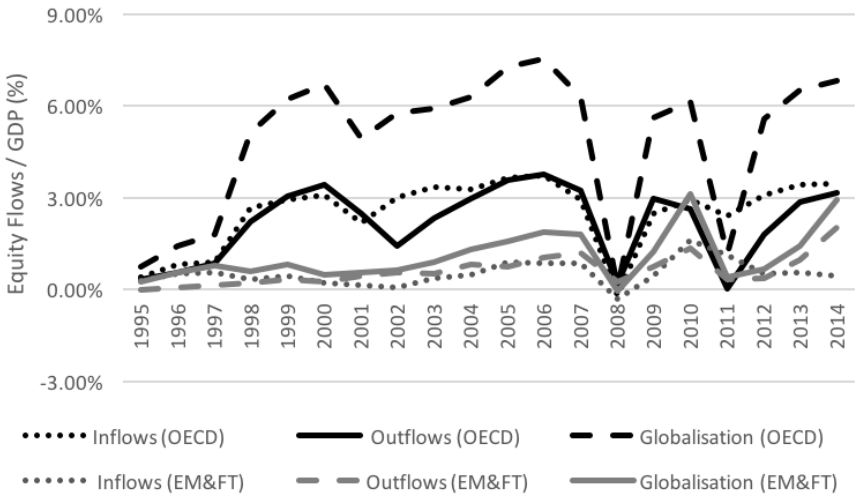
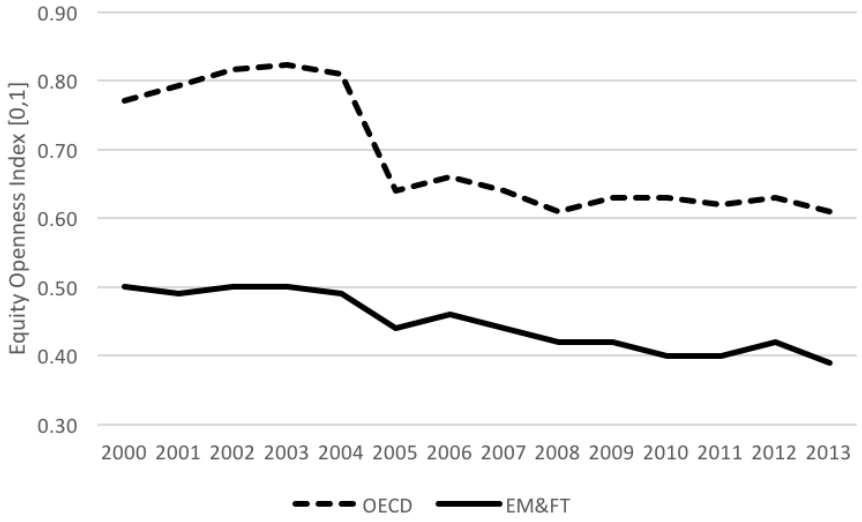


Figure 5.1 shows the evolution of foreign equity capital flows over the last 20 years. Participation in equity flows is much higher for OECD (industrialised countries) than in Emerging and Frontier Markets, what shows that developing economies, despite of increasing their share in capital flows, are still at the margin of this process. Whilst OECD countries receive, on average, 3% of GDP in terms of equity inflows (liabilities), the same figure for Emerging and Frontier markets is around 1%. With respect to equity globalisation (inflows + outflows), it corresponds to 6-7% of developed countries' GDP, whilst it stays between 1-2% of developing economies.

Global equity flows peaked in the eve of the 2008 great financial crisis, when it suffered a strong hit, with equity inflows going below zero both in developed and developing countries, though the crisis hit harder on developing economies, as net inflows reaches -0.30% GDP. After 2009, global flows start recovering, and as of the end of the period covered in the analysis, it gained momentum again, with all equity flows series growing at relatively fast rates.

Such lower participation in global equity flows shown for emerging and frontier economies

Figure 5.2: Equity Openness Index



is consistent with the fact that such economies remain relatively more closed to foreign equity capital investments, and this relative isolation is driven by regulatory strictness induced by government policies. This is shown in Figure 5.2, which reports countries' scores on the Equity Liberalisation Index. The score runs between [0,1], with values closer to 1 indicating full liberalisation.

Although both industrialised and developing countries seem to be moving to less integrated regimes over time, there is a large wedge between the two groups, with industrialised countries showing much higher stock market openness indices. No wonder why such countries can receive and send larger volumes of foreign equity capital. This is feasible because *De Jure* integration is much higher, and indeed, as shown in Figure 5.1, *De Facto* openness seems to be responding well to more open regulatory environments.

With respect to measures of investment, gross capital formation as a share of GDP is, on average, 22%, whereas foreign direct investment stock accounts for 29% of GDP, and FDI flows correspond to 3.7% of GDP. Cross-country average GDP growth is fairly high, around 4%. Total Factor Productivity average is 0.94. As productivity is normalised with respect to the U.S, this implies that countries in the sample are marginally less productive than the United States (the benchmark of TFP index), as expected, given the sample refers to emerging markets. The average Trade openness is 52%, thus the sum of imports and exports account for nearly half of countries' GDP.

The mean for capital stock per capita is USD 50,000, with annual growth rate of 5.6%. When looking at measures of institutional quality, the sample mean for the corruption control index is -0.10, and 0.21 for the regulatory quality index. As both indices run between -2.5 and +2.5, institutional quality seems quite poor across the sample.

Tables 5.3 and 5.4 report variables' averages, in detail, for all countries in the sample. Quickly commenting on a few interesting numbers, some countries post relatively high equity capital inflows, in particular South Africa, Vietnam, Mauritius, Greece, Lebanon and Bahrain. Also remarkable are the high globalisation indices of Middle Eastern countries, such as Bahrain, Kuwait, Qatar and Oman, mostly due to equity assets.

In terms of investments, China, South Korea, Qatar and Malaysia all have gross capital formations above 30% of GDP. With respect to economic growth, we see China, India, Nigeria, Qatar, Kazakhstan, Sri Lanka and Vietnam leading the way. FDI attraction is particularly high in eastern european countries, like Estonia, Bulgaria, Hungary and Serbia.

Table 5.3: Descriptive Statistics - Aggregate Investment (Country Averages I)

Countries	Eq. Inflows	Eq. Outflows	Eq. Glob.	Eq. Open.	Investment	FDI Stock	FDI Inflows
Argentina	-0.08	0.07	-0.02	0.38	17.71	19.77	2.16
Bahrain	1.67	5.10	7.18	0.59	28.19	64.60	5.87
Bangladesh	0.01	0.00	0.01	0.50	21.94	4.28	0.65
Brazil	0.61	0.03	0.64	0.14	21.08	19.23	2.85
Bulgaria	0.11	0.14	0.25	0.91	16.94	50.30	8.46
Chile	0.69	3.23	3.89	0.62	24.94	59.85	6.94
China, People's	0.45	0.09	0.59	0.00	35.42	12.50	3.83
Colombia	0.23	0.00	0.17	0.06	19.94	22.32	3.29
Croatia	0.12	0.28	0.40	0.46	24.00	31.30	4.23
Czech Republic	0.35	0.52	0.87	0.48	26.67	43.75	4.91
Egypt	0.01	0.11	0.07	0.91	12.04	26.97	2.53
Estonia	0.65	0.76	1.26	0.98	26.24	59.88	8.73
Greece	0.93	0.24	0.93	0.59	24.44	10.90	0.65
Hungary	0.31	0.36	0.62	0.70	21.22	57.03	9.44
India	0.84	0.01	0.88	0.00	26.57	6.96	1.32
Indonesia	-0.02	0.04	0.29	0.16	24.94	14.42	1.04
Jordan	0.18	0.45	0.60	1.00	22.65	62.08	7.25
Kazakhstan	0.27	0.61	1.00	0.07	17.00	47.23	8.04
Kenya	0.12	0.06	0.18	0.25	12.73	5.91	0.52
Korea, Republic	0.73	0.57	1.31	0.70	34.35	9.70	1.09
Kuwait	0.25	3.48	3.73	0.61	21.00	3.98	0.44
Lebanon	1.54	0.77	2.31	0.48	29.82	86.25	10.51
Lithuania	0.10	0.32	0.43	0.89	17.34	26.24	3.26
Malaysia	-0.04	0.50	0.56	0.32	30.65	38.90	3.41
Mauritius	5.81	2.69	6.26	0.66	23.13	18.26	8.87
Mexico	0.16	0.00	0.16	0.00	21.11	23.43	2.65
Morocco	0.08	0.02	0.11	0.25	29.67	33.72	2.47
Nigeria	0.52	0.46	0.99	1.00	9.88	21.46	1.80
Oman	0.92	0.97	2.04	0.75	28.86	18.80	1.88
Pakistan	0.18	0.01	0.24	0.14	12.61	9.74	1.25
Peru	0.10	0.92	1.02	1.00	22.40	23.64	4.15
Philippines	0.44	0.02	0.46	0.23	19.09	13.87	1.52
Poland	0.31	0.18	0.49	0.05	18.26	26.63	3.45
Qatar	0.12	6.98	7.09	0.68	34.39	15.28	3.45
Romania	0.17	0.08	0.25	0.89	20.73	25.68	3.65
Russia	0.09	0.04	0.12	0.14	15.95	16.54	2.15
Serbia	0.25	0.02	0.27	0.42	17.85	28.37	7.07
Slovak Republic	0.07	0.02	0.09	0.75	23.04	44.89	4.31
South Africa	1.97	1.25	3.22	0.25	18.01	32.15	1.60
Sri Lanka	-0.51	-0.63	-1.23	0.25	19.20	13.55	1.31
Thailand	0.84	0.18	1.04	0.07	27.78	30.65	3.12
Tunisia	0.04	0.00	0.04	0.00	21.56	60.81	2.90
Turkey	0.27	0.01	0.28	0.39	18.73	13.92	1.35
Vietnam	1.44	-0.05	0.75	0.00	23.95	43.77	6.11
Total	0.54	0.64	1.13	0.45	22.55	29.14	3.71

Table 5.4: Descriptive Statistics - Aggregate Investment (Country Averages II)

Countries	GDPg gr.	TFP	Trade Open.	K. Stock/pc	K. Stock gr.	Corruption	Regulatory
Argentina	3.29	0.87	20.90	40,110	2.67	-0.42	-0.55
Bahrain	4.75	1.02	100.71	116,003	6.56	0.34	0.70
Bangladesh	5.56	.	17.09	4,595	7.58	-1.05	-0.93
Brazil	2.89	0.97	22.26	36,171	5.95	-0.06	0.15
Bulgaria	2.06	1.05	53.76	20,074	9.79	-0.22	0.50
Chile	4.10	0.91	50.31	38,333	6.08	1.44	1.48
China, People's	7.37	0.74	25.09	20,114	11.62	-0.47	-0.24
Colombia	3.38	0.95	22.68	26,096	3.57	-0.29	0.19
Croatia	1.95	1.04	56.77	59,734	5.38	-0.05	0.37
Czech Republic	2.24	0.94	100.75	123,534	2.78	0.33	1.09
Egypt	4.31	1.10	13.01	8,293	7.92	-0.50	-0.38
Estonia	4.15	0.92	138.67	59,451	6.53	0.83	1.38
Greece	0.82	1.12	41.47	128,462	3.01	0.23	0.74
Hungary	2.12	1.04	115.78	62,238	5.80	0.47	1.07
India	6.68	0.83	11.86	8,187	8.89	-0.44	-0.35
Indonesia	4.04	0.97	23.66	20,205	11.99	-0.78	-0.34
Jordan	4.63	1.02	63.42	19,045	7.10	0.16	0.23
Kazakhstan	5.99	0.75	43.77	33,467	2.68	-0.96	-0.39
Kenya	3.90	0.94	20.58	4,242	2.89	-0.97	-0.24
Korea, Republic	4.31	0.94	73.93	92,904	5.74	0.42	0.79
Kuwait	3.77	1.18	69.88	125,915	0.42	0.50	0.14
Lebanon	3.83	.	62.11	46,698	7.55	-0.71	-0.18
Lithuania	4.29	0.85	99.28	45,608	6.96	0.19	1.04
Malaysia	4.71	0.93	109.65	42,634	4.20	0.28	0.56
Mauritius	4.22	0.98	51.33	38,246	4.91	0.51	0.66
Mexico	2.99	1.03	49.57	34,046	3.84	-0.34	0.36
Morocco	4.31	1.01	33.56	20,564	4.76	-0.19	-0.15
Nigeria	6.20	0.93	31.87	4,581	17.10	-1.13	-0.87
Oman	3.23	.	75.47	71,037	9.47	0.34	0.46
Pakistan	3.84	.	13.05	5,571	4.60	-0.94	-0.63
Peru	4.58	0.90	28.81	18,821	5.69	-0.31	0.37
Philippines	4.58	0.98	34.83	13,472	3.93	-0.56	-0.04
Poland	3.94	0.89	48.75	35,635	4.16	0.41	0.84
Qatar	10.81	1.03	95.37	194,564.	10.70	0.93	0.37
Romania	2.58	0.84	42.08	39,766	8.45	-0.27	0.36
Russia	3.40	0.79	29.28	42,787	-0.68	-0.93	-0.33
Serbia	2.66	0.75	38.42	39,859	5.58	-0.50	-0.37
Slovak Republic	3.85	0.92	114.36	57,035	4.13	0.24	0.93
South Africa	2.99	0.95	32.98	23,618	5.15	0.28	0.48
Sri Lanka	5.44	0.80	23.68	14,220	8.12	-0.25	-0.08
Thailand	3.17	0.95	57.38	36,554	3.78	-0.26	0.26
Tunisia	4.06	0.96	46.10	30,806	4.87	-0.03	-0.08
Turkey	3.98	0.95	30.96	30,178	6.12	-0.11	0.30
Vietnam	6.40	.	47.97	7,724	11.83	-0.60	-0.61
Total	4.16	0.94	52.45	50,112	5.96	-0.10	0.22

Table 5.5: Correlation matrix - Aggregate Investment Analysis

	EL	EA	EG	EOP	Invest.	FDI S.	FDI F.	Δ GDP	TFP	Trade	K/pc	Δ K	CCI	RQI
EL	1.00													
EA	0.30***	1.00												
EG	0.58***	0.90***	1.00											
EOP	0.00	0.13***	0.07*	1.00										
Invest.	0.09**	0.13***	0.12***	-0.03	1.00									
FDI S.	0.06	0.14***	0.12***	0.18***	0.15***	1.00								
FDI F.	0.38***	0.19***	0.24***	0.16***	0.17***	0.47***	1.00							
Δ GDP	0.04	0.02	0.04	-0.05	0.24***	-0.06*	0.10**	1.00						
TFP	0.03	0.10**	0.07*	0.26***	0.29***	0.20***	0.07*	0.07**	1.00					
Trade	0.01	0.18***	0.11***	0.32***	0.37***	0.46***	0.27***	-0.02	0.26***	1.00				
K/pc	0.06	0.34***	0.23***	0.16***	0.42***	0.03	0.03	0.01	0.31***	0.43***	1.00			
Δ K	0.08**	0.06	0.07*	0.10**	0.15***	0.09**	0.13***	0.26***	0.15***	0.04	-0.14***	1.00		
CCI	0.12***	0.26***	0.21***	0.29***	0.40***	0.20***	0.17	-0.01	0.28***	0.57***	0.53***	-0.08**	1.00	
RQI	0.09**	0.19***	0.16***	0.33***	0.30***	0.32***	0.24***	-0.15***	0.25***	0.66***	0.42***	-0.10**	0.81***	1.00

Note: *** Significant at 0.01 level; $**$ Significant at 0.05 level; $*$ Significant at 0.1 level.

Table 5.5 reports a correlations matrix. Domestic aggregate investment, the dependent variable in the forthcoming empirical modelling, is positively and statistically correlated with all variables capturing stock market openness: equity inflows (0.09), equity outflows (0.13) and equity globalisation (0.12). Aggregate investment also correlates positively with foreign direct investment, both when measured as stocks (0.15) and as flows (0.27), with economic growth (0.24), and with total factor productivity as well (0.29). Additionally, investment is correlated with trade openness (0.37), capital stock (0.42), capital stock growth (0.15) and with variables reflecting countries' institutional quality and governance, such as the indices of corruption control (0.40) and regulatory quality (0.30).

Foreign equity capital inflows (EL), the main explanatory variable employed in the forthcoming econometric modelling, is positively and statistically correlated with a number of variables capturing real economic activity, such as domestic aggregate investment (0.09), foreign direct investment flows (0.38) and capital stock growth (0.08). Equity inflows also correlates positively with other measures of equity openness (as naturally expected), such as equity outflows (0.30) and equity globalisation (0.58), and with variables reflecting prevailing levels of institutional quality and overall governance, captured by the indices of corruption control (0.12) and regulatory quality (0.09).

The inspection of correlation coefficients provides some preliminary indication that stock market openness, as proxied by equity portfolio inflows, and real economic activity, measured either by domestic investment, capital stock growth or foreign direct investment flows, are positively and statistically associated. Additionally, a number of other interesting correlations also emerge. First, institutional quality and equity flows are positively correlated, possibly indicating that countries with better institutions may receive more foreign equity capital, which is plausible because foreign investors are usually risk-averse and fear the risk of expropriation, which is higher in countries with lower institutional quality.

Second, domestic investment is positively correlated with the quality of institutions, which is also reasonable, as institutional economics suggests a positive association between institutional quality and economic performance. Third, equity flows and foreign direct investment are positively correlated, suggesting that financial and productive foreign investments may walk hand-in-hand. Fourth, all variables specified as controls in domestic investment models (economic growth, productivity, trade openness and institutional quality) proved to be correlated with investment.

5.3 Empirical Models

5.3.1 Panel Fixed Effects

The main empirical model is specified with domestic investment, measured as gross capital formation as a share of GDP (I_{it}) as dependent variable, and with foreign portfolio equity inflows, measured as equity liabilities as a share of GDP (EL_{it}) as the main explanatory variable. [1] In principle, equity capital flows should affect investment through two channels. First, an increase in net inflows should reduce the risk-free rate, second, equity inflows represent purchases of domestic stocks by foreigners, bringing about risk-sharing, thus decreasing the equity premium (Henry, 2000a).

Regulators' decision to further open stock markets, as well as increases in domestic investment, might be both correlated with other facts linked with economic fundamentals, in particular with concomitant improvements in the growth opportunity set faced by countries, and by shocks to the marginal productivity of domestic capital. Moreover, this is particularly important because liberalisation-induced investment relies upon the assumption that profits per unit of capital remain constant throughout liberalisation periods (Henry, 2000a).

In light of this, it is important to control for such effects, to net out growth opportunities and productivity gains from the estimates, and to obtain a cleaner partial effect of stock market openness variables *per se* on domestic investment. GDP growth (ΔY_{it}) is included to control for changes in the growth opportunity set enjoyed by countries, whereas total factor productivity (TFP_{it}) absorbs changes in domestic capital productivity, and international trade as a share of GDP (XM_{it}) captures growth opportunities induced by the foreign sector. Omitted variable bias is dealt with by controlling for country unobserved heterogeneity via country fixed effects, whilst year fixed effects absorb business cycle shocks. Non-spherical variance of the error term is tackled by employing heteroskedasticity-robust standard errors, clustered at country-level.

$$I_{it} = \alpha_i + \gamma EL_{it} + \beta \Delta Y_{it} + \delta TFP_{it} + \phi XM_{it} + \epsilon_{it} \tag{5.1}$$

Risk-sharing can come from equity assets as well. When domestic investors buy stocks abroad, they pool the risk of their investments across a larger number of countries, reaping gains

[1] Other measurements have been also suggested in the literature, such as estimates of the *stock* of foreign equity liabilities, calculated up to 2004 in Lane & Milesi-Ferretti (2007). Yet, up-to-date time series (1995-2014), as made available at the IMF database, refer to foreign equity *flows* only.

from portfolio diversification. Such gains can decrease the equity premium claimed by domestic investors in their domestic markets as well. Hence, it is interesting investigating how equity portfolio outflows, as well as inflows plus outflows altogether, may affect domestic investment. To test for such additional risk sharing channel, the equation above is also estimated with equity assets (EA_{it}) and equity globalisation (EG_{it}), which is the sum of assets and liabilities, included, alternatively, as explanatory variables.

5.3.2 Institutional Quality

To test for the role played by institutional quality, in line with the *Threshold Effects* hypothesis, variables capturing institutional development are further included in the empirical models. Two proxies are employed, the Control of Corruption Index (CCI_{it}), and the Regulatory Quality Index (RQI_{it}), both drawn from the World Bank Worldwide Governance Indicators. Such variables enter the equations in linear form and, more importantly, interacted with equity capital flows. The equations below are estimated:

$$I_{it} = \alpha_i + \gamma EL_{it} + \eta CCI_{it} + \lambda EL_{it} \cdot CCI_{it} + \beta \Delta Y_{it} + \delta TFP_{it} + \phi XM_{it} + \epsilon_{it} \tag{5.2}$$

$$I_{it} = \alpha_i + \gamma EL_{it} + \eta RQI_{it} + \lambda EL_{it} \cdot RQI_{it} + \beta \Delta Y_{it} + \delta TFP_{it} + \phi XM_{it} + \epsilon_{it} \tag{5.3}$$

The interpretation of the test is as follows. The *Threshold Effects* hypothesis postulates that capital flows affect economic activity positively only if countries have good institutional quality (a minimum threshold level must be reached). Both indices capture institutional quality increasingly, hence higher scores reflect better quality.

In this setup, if the interactions are statistically significant and positive, then, in fact, those countries with good institutional quality are benefiting from equity inflows in terms of expanding investment. Conversely, if interactions are statistically significant, but negative, then countries with weak institutional quality, instead, are those benefiting the most. Logically, if interactions are statistically insignificant, then the test is inconclusive.

5.3.3 Equity Inflows and Foreign Direct Investment

An additional battery of models is estimated to test whether portfolio equity inflows can affect domestic capital accumulation by spurring foreign direct investment (FDI). The empirical specifi-

cation remains fairly similar, with the only differences being that the dependent variable shifts from domestic capital formation to foreign direct investment (measured both as a stock and as a flow, as a share of GDP), and with an additional control for institutional quality in the main equation, for multinational firms may prefer to invest in countries with good institutions. The model below is estimated:

$$lnFDI_{it} = \alpha_i + \gamma EL_{it} + \beta \Delta Y_{it} + \delta TFP_{it} + \phi XM_{it} + \eta RQI_{it} + \epsilon_{it} \tag{5.4}$$

5.3.4 Dynamic Panel - GMM

Potential endogeneity between equity flows and domestic investment may affect the consistency of the estimates. If equity inflows increases as a response to investment growth in preceding periods, then omitting lagged investment may provoke biased estimates. It is also possible that this relationship may occur simultaneously, with a contemporaneous growth in investment leading to increases in equity inflows, if foreign investors revaluate the domestic capital stock in the very short-run. Dynamic Panel models can tackle these issues, assuring the consistency of estimates. The equation below is estimated via Arellano-Bond GMM panel data models:

$$\Delta I_{it} = \gamma \Delta EL_{it} + \beta \Delta(\Delta) Y_{it} + \delta \Delta TFP_{it} + \eta \Delta XM_{it} + \phi \Delta I_{it-k} + \Delta \epsilon_{it} \tag{5.5}$$

Two alternative specifications of this model are tested. First, equity inflows is included as an exogenous regressor, whilst the only endogenous explanatory variable is lagged domestic investment. Second, equity inflows enter the equation specified as an endogenous covariate as well, thus instrumented via GMM-style instrumental variables (lagged levels). By testing these two different specifications, model inconsistency concerns are fairly mitigated. Model specification is tested employing both Sargan's test of over-identifying restrictions and Arellano-Bond's test of second-order serial correlation in first-differenced errors.

5.4 Results

5.4.1 Main Results

Empirical results are shown in Table 5.6. In column 1, results for the baseline empirical model is reported. The effect of equity inflows on domestic investment is statistically significant and positive, suggesting that *De Facto* integration is associated with higher levels of country capital accumulation. Control variables go in the expected direction, with GDP growth and productivity both statistically increasing domestic investment. The coefficient fitted for trade openness is positive, though statistically insignificant. [2]

This result corroborates prior findings obtained with firm-level data in the second essay, strengthening the evidence in favour of positive effects of stock market integration on investment, equally at micro and macro levels. Again, the hypothesis that risk-sharing brought about by openness to inflows of foreign equity investments stimulates physical investment through lower cost of capital is confirmed. [3]

In columns 2 and 3, it is tested whether risk-sharing can also come from domestic investors purchasing foreign stocks, with equity assets and equity globalisation (the sum of equity liabilities and assets) entering the models as explanatory variables. The positive effect on investment persists, for both models, though with much weaker statistical significance (coefficients are equal to zero at 0.05 confidence level).

Taking stock of these results, and focusing on the strength of the statistical test, it appears that the main force behind increases in investment is risk-sharing brought by *foreign investors* to the domestic market (significant at 0.01 level), rather than gains from portfolio diversification obtained by *domestic investors* purchasing foreign stocks (significant at 0.10 only).

Yet, the magnitude of coefficients is quite similar for both inflows and outflows, and the coefficient fitted for equity globalisation is weakly significant as well. In light of this, although the strongest effect seem to be coming from equity capital inflow, there is some non-negligible evidence that risk-sharing benefits feed into capital accumulation via both liabilities and assets

[2] A number of additional control variables, not strongly backed by the literature, but with some intuitive appeal, are also tested, such as exchange rates, human capital stock, market size (log GDP), labour compensation share of GDP, government share of GDP, consumption share of GDP, exports and imports price levels, among others, with insignificant coefficients in most cases, and with no changes to result at all.

[3] Multicolllinearity diagnostics via VIF (Variance Inflation Factors) are conducted, with test results rejecting the presence of multicollinearity.

channels. In sum, such results support positive effects of stock market openness on domestic economic activity.

Table 5.6: Equity Flows and Domestic Investment

$$(1)\ I_{it} = \alpha_i + \gamma EL_{it} + \beta \Delta Y_{it} + \delta TFP_{it} + \phi XM_{it} + \epsilon_{it}$$

$$(2)\ I_{it} = \alpha_i + \gamma EA_{it} + \beta \Delta Y_{it} + \delta TFP_{it} + \phi XM_{it} + \epsilon_{it}$$

$$(3)\ I_{it} = \alpha_i + \gamma EG_{it} + \beta \Delta Y_{it} + \delta TFP_{it} + \phi XM_{it} + \epsilon_{it}$$

I_{it} is gross capital formation as a share of GDP; EL_{it} is equity liabilities (capital inflows) as a share of GDP; EA_{it} is equity assets (capital outflows) as a share of GDP; EG_{it} is equity liabilities plus assets as a share of GDP; ΔY_{it} is GDP growth; TFP_{it} is productivity; XM_{it} is exports plus imports as a share of GDP. All models include years and country fixed effects, and are estimated with heteroskedasticity robust standard errors clustered at country-level, shown below coefficients.

*** Significant at 0.01 level; $**$ Significant at 0.05 level; $*$ Significant at 0.1 level.

Dependent Variable: Investment	(1)	(2)	(3)
	Equity Inflows	Equity Outflows	Equity Globalisation
Equity Liabilities/GDP	0.084***		
	(0.031)		
Equity Assets/GDP		0.109*	
		(0.063)	
Equity Globalisation/GDP			0.048*
			(0.025)
GDP Growth	0.245***	0.239***	0.236***
	(0.070)	(0.072)	(0.073)
Productivity (TFP)	0.181***	0.181***	0.180***
	(0.046)	(0.049)	(0.048)
Trade/GDP	0.015	0.019	0.020
	(0.021)	(0.020)	(0.020)
Country Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
R^2	0.763	0.780	0.778
Adjusted R^2	0.740	0.758	0.756
Number of Observations	689	669	664
Number of Countries	39	39	39
Time Series	1995-2014	1995-2014	1995-2014
F-Statistic	16.299***	16.225***	15.153***

5.4.2 Institutional Quality

This section examines the role of institutional quality in the openness-investment relationship. Corruption deterrence and regulatory quality measures are included in the regression models, both linearly and interacted with equity inflows. Results are shown in Table 5.7.

In column 1, results are shown for a model with equity inflows interacted with the corruption control index. The effect of equity inflows on domestic investment remains statistically significant and positive (tough the test loses statistical strength), whilst the interaction between the two variables is weakly statistically significant, but negative. The linear term of corruption control is positive, suggesting higher investment in less corrupt countries, though the coefficient is statistically insignificant. In Column 2, a similar equation is estimated, this time with the regulatory quality index employed as proxy for institutional quality. Although results suggest that better regulatory quality is associated to higher investment, in this particular specification neither equity inflows nor the interaction with regulatory quality are statistically significant.

Tests with equity globalisation are also conducted. In Column 3, equity globalisation is interacted with the control of corruption index. This time, the partial effect of equity globalisation on investment is highly significant (at 0.01 level), and more interestingly, the interaction with corruption control is statistically significant and negative. In column 4, the same test with equity globalisation is repeated, now with regulatory quality proxying for institutional quality degree. In this model, equity globalisation is again statistically significantly and positively associated with investment, and the coefficient fitted for regulatory quality is also statistically significant and positive, whereas the interactive term remains statistically significant and negative.

In all, these result suggests stronger effects of equity openness on investment in countries with weaker corruption deterrence mechanisms and with poorer regulatory quality, or, in other words, with lower levels of institutional quality. Moreover, such findings are fully in line with the results obtained with firm-level data, in the second essay. On the other hand, and perhaps even more interestingly, findings from both firm and country-level analyses are in stark contrast with the *Threshold Effects* argument, in that financial openness seem to be helping the most where institutional quality is actually weaker, favouring the claim that improvements in governance made possible by globalisation are greasing the wheels of economic activity.

Table 5.7: Equity Flows, Institutional Quality and Domestic Investment

$$(1)\ I_{it} = \alpha_i + \gamma EL_{it} + \eta CCI_{it} + \lambda EL_{it} \cdot CCI_{it} + \beta \Delta Y_{it} + \delta TFP_{it} + \phi XM_{it} + \epsilon_{it}$$

$$(2)\ I_{it} = \alpha_i + \gamma EL_{it} + \eta RQI_{it} + \lambda EL_{it} \cdot RQI_{it} + \beta \Delta Y_{it} + \delta TFP_{it} + \phi XM_{it} + \epsilon_{it}$$

$$(3)\ I_{it} = \alpha_i + \gamma EG_{it} + \eta CCI_{it} + \lambda EG_{it} \cdot CCI_{it} + \beta \Delta Y_{it} + \delta TFP_{it} + \phi XM_{it} + \epsilon_{it}$$

$$(4)\ I_{it} = \alpha_i + \gamma EG_{it} + \eta RQI_{it} + \lambda EG_{it} \cdot RQI_{it} + \beta \Delta Y_{it} + \delta TFP_{it} + \phi XM_{it} + \epsilon_{it}$$

I_{it} is gross capital formation as a share of GDP; EL_{it} is equity liabilities (capital inflows) as a share of GDP; EG_{it} is equity liabilities plus assets as a share of GDP; CCI_{it} is the score on Corruption Control Index; RQI_{it} is the score on Regulatory Quality Index; ΔY_{it} is GDP growth; TFP_{it} is productivity; XM_{it} is exports plus imports as a share of GDP. All models include years and country fixed effects, and are estimated with heteroskedasticity robust standard errors clustered at country-level, shown below coefficients.

*** Significant at 0.01 level; $**$ Significant at 0.05 level; $*$ Significant at 0.1 level.

Dependent Variable: Investment	(1)	(2)	(3)	(4)
Equity Liabilities/GDP	0.308*	0.354		
	(0.162)	(0.226)		
Equity Globalisation			0.206***	0.188**
			(0.055)	(0.080)
Corruption Control	0.020		0.023	
	(0.015)		(0.015)	
Regulatory Quality		0.025**		0.028**
		(0.012)		(0.012)
Equity Liabilities x Corruption	-0.417*			
	(0.246)			
Equity Liabilities x Regulatory		-0.355		
		(0.257)		
Equity Globalisation x Corruption			-0.308***	
			(0.092)	
Equity Globalisation x Regulatory				-0.188**
				(0.089)
GDP Growth	0.248***	0.257***	0.248***	0.253***
	(0.063)	(0.064)	(0.068)	(0.068)
Productivity	0.164***	0.162***	0.160***	0.160***
	(0.047)	(0.048)	(0.046)	(0.048)
Trade GDP	0.016	0.012	0.021	0.017
	(0.022)	(0.022)	(0.020)	(0.021)
Country Fixed Effects	Yes	Yes	Yes	Yes
Years Fixed Effects	Yes	Yes	Yes	Yes
R^2	0.780	0.781	0.794	0.795
Adjusted R^2	0.755	0.756	0.770	0.770
Number of Observations	588	588	569	569
Number of Countries	39	39	39	39
Time Series	1995-2014	1995-2014	1995-2014	1995-2014
F Statistic	13.493***	13.843***	13.489***	12.213***

5.4.3 Can Equity Flows Spur FDI?

This section turns to the question of whether foreign portfolio equity capital flows can be helpful in terms of bringing more foreign direct investments to recipient countries. FDI, in particular greenfield investments (i.e, foreign direct investments which builds industrial, commercial or distributional facilities from the ground), is an important component of country's capital stock. Therefore, if equity capital can, in addition to bring about increases in overall domestic capital formation, as demonstrated in previous analyses, be shown to help attracting more FDI as well, then the link between equity flows and capital accumulation can be even stronger.

Results are shown in Table 5.8. Two measures of FDI are employed, first, FDI measured as a stock relative to GDP, and second, measured as a flow relative to GDP. In Column 1, FDI stock is modelled as a function of equity inflows, plus control variables. The effect of equity inflows on FDI is statistically significant and positive, suggesting that, indeed, stock market openness can spur FDI attraction. With respect to control variables, only institutional quality loads statistically positively on FDI, while GDP growth, productivity and trade openness don't seem to affect it. Yet, as shown at the bottom of the table, adjusted R-square is quite high (0.86), suggesting a fairly good model fit, despite of insignificant controls. In column 2, the same equation is estimated, this time employing equity globalisation, with no statistically significant effects.

In columns 3 and 4, the same model is estimated, this time with FDI measured as a flow relative to GDP. In column 3, results are shown for a model with equity inflows as explanatory variable. Similarly to the results obtained with FDI stock, increases in portfolio equity flows are associated to marginal increases in foreign direct investment flows. Also, FDI flows is shown to increase with respect to GDP growth, and also exhibits a positive relationship with institutional quality. Productivity and trade openness still produce null effects on FDI attraction. In column 4, results are shown for a model employing equity globalisation as explanatory variable, with findings remaining qualitatively similar.

A few comments are in place. First, both productivity and trade, although statistically insignificantly, load negatively on FDI. Although this might seem surprising, such coefficients can be explained by theories of multinational firms' integration strategies. First, high productivity may drive labour costs upwards, because more productive workers demand higher wages. What multinational firms seek in emerging markets (often called *South Economies*), like those in our sample, is by and large to minimise costs (Markusen, 2004; Navaretti & Venables, 2006).

Therefore high productivity, although very desirable for local businesses and policy makers, may discourage vertical FDI for its impacts on labour costs.

Table 5.8: Equity Flows and Foreign Direct Investment

$$(1)\ lnFDI_{it} = \alpha_i + \gamma EL_{it} + \beta \Delta Y_{it} + \delta TFP_{it} + \phi XM_{it} + \eta RQI_{it} + \epsilon_{it}$$

$$(1)\ lnFDI_{it} = \alpha_i + \gamma EG_{it} + \beta \Delta Y_{it} + \delta TFP_{it} + \phi XM_{it} + \eta RQI_{it} + \epsilon_{it}$$

FDI_{it} is foreign direct investment stock as a share of GDP (or, alternatively, FDI inflows as share of GDP); EL_{it} is equity liabilities (capital inflows) as a share of GDP; EG_{it} is equity liabilities plus assets as a share of GDP; RQI_{it} is the score on Regulatory Quality Index; ΔY_{it} is GDP growth; TFP_{it} is productivity; XM_{it} is exports plus imports as a share of GDP. All models include years and country fixed effects, and are estimated with heteroskedasticity robust standard errors clustered at country-level, shown below coefficients.

*** Significant at 0.01 level; $**$ Significant at 0.05 level; $*$ Significant at 0.1 level.

Dependent Variable: FDI	(1)	(2)	(3)	(4)
	FDI Stock	FDI Stock	FDI Inflow	FDI Inflow
Equity Liabilities/GDP	0.769**		5.697***	
	(0.338)		(1.169)	
Equity Globalisation		0.875		3.090***
		(0.643)		(0.935)
GDP Growth	-0.939	-0.395	3.970**	3.730**
	(0.794)	(0.824)	(1.816)	(1.809)
Productivity	-0.518	-0.485	-0.576	-0.490
	(0.422)	(0.406)	(0.632)	(0.639)
Trade	0.127	0.148	-0.614	-0.618
	(0.124)	(0.121)	(0.418)	(0.432)
Regulatory Quality	0.520***	0.425**	0.518*	0.468
	(0.181)	(0.170)	(0.300)	(0.353)
Country Fixed Effects	Yes	Yes	Yes	Yes
Years Fixed Effects	Yes	Yes	Yes	Yes
R^2	0.875	0.883	0.611	0.614
Adjusted R^2	0.861	0.870	0.567	0.569
Number of Observations	587	569	576	560
Number of Countries	39	39	39	39
F Statistic	7.289***	4.393***	6.390***	3.232***

With respect to trade, a negative relationship with FDI has a theoretical interpretation as well. Multinational firms may be investing in countries with limited trade because tariff costs are too high (thus why trade openness is shy), the so-called *Tariff Jumping FDI*, precisely to save on such high trade costs (Caves, 2007).

Second, in general, results suggest a positive association between equity openness and foreign direct investments, in particular FDI flows. This result is interesting, and has some important implications. It shows that countries can increase capital accumulation by attracting

more FDI via stock market openness. As FDI is important for its contribution to the domestic capital stock, especially greenfield FDI, but also because extant evidence suggests that FDI produces the largest growth effect amongst all types of foreign capital, such positive association between portfolio equity flows and FDI is highly desirable and positive, with potentially virtuous effects on economic activity.

Third, the findings from this analysis uncover a novel mechanism liking different types of capital flows. Given that portfolio equity investments can help bringing more FDI, there seems to be some good deal of complementarity between both types of foreign capital flows. As stock market openness stimulates domestic investment, but at the same time it also has an independent effect on FDI, policy makers can take advantage of this dual and mutually-reinforcing mechanism, by promoting reforms that can attract more both productive and financial equity capital.

5.5 Robustness Checks

5.5.1 Lagged Regressors

The robustness checks section begins with estimation of models with lagged regressors. As domestic investment and foreign equity flows can be endogenous, either by reverse causality or simultaneity, this helps to ensure that estimates are consistent, as by lagging regressors, causal relationships are better uncovered. Results are shown in Table 5.9.

In column 1, the model with lagged foreign equity inflows is shown. In this lagged specification, the effect of equity liabilities on domestic investment remains positive, and statistically significant. With respect to the control variables, productivity and economic growth again explain cross-country variation in investment, with statistically significant and positive coefficients, whereas the effect of trade openness remains insignificant.

Next, results of a model estimated with equity outflows (assets) as independent variable are shown in Column 2. Results show that equity investments of domestic investors on foreign stocks are not statistically associated to increases in domestic investment. In Column 3, results report estimation of a model with equity globalisation (liabilities plus assets) as independent variable, and again, the model provides no support for any statistically significant effect on investment.

Table 5.9: Equity Flows and Domestic Investment: Lagged Regressors

$$(1)\ I_{it} = \alpha_i + \gamma EL_{it-1} + \beta \Delta Y_{it-1} + \delta TFP_{it-1} + \phi XM_{it-1} + \epsilon_{it}$$

$$(2)\ I_{it} = \alpha_i + \gamma EA_{it-1} + \beta \Delta Y_{it-1} + \delta TFP_{it-1} + \phi XM_{it-1} + \epsilon_{it}$$

$$(3)\ I_{it} = \alpha_i + \gamma EG_{it-1} + \beta \Delta Y_{it-1} + \delta TFP_{it-1} + \phi XM_{it-1} + \epsilon_{it}$$

I_{it} is gross capital formation as a share of GDP; EL_{it} is equity liabilities (capital inflows) as a share of GDP; EA_{it} is equity assets (capital outflows) as a share of GDP; EG_{it} is equity liabilities plus assets as a share of GDP; ΔY_{it} is GDP growth; TFP_{it} is productivity; XM_{it} is exports plus imports as a share of GDP. All models include years and country fixed effects, and are estimated with heteroskedasticity robust standard errors clustered at country-level, shown below coefficients.

*** Significant at 0.01 level; $**$ Significant at 0.05 level; $*$ Significant at 0.1 level.

Dependent Variable: Investment	(1)	(2)	(3)
	Equity Inflows	Equity Outflows	Equity Globalisation
Equity Liabilities/GDP [t-1]	0.070**		
	(0.028)		
Equity Assets/GDP [t-1]		0.291	
		(0.203)	
Equity Globalisation [t-1]			0.114
			(0.085)
GDP Growth [t-1]	0.283***	0.270***	0.264***
	(0.064)	(0.058)	(0.061)
Productivity [t-1]	0.128***	0.133***	0.130***
	(0.044)	(0.045)	(0.044)
Trade [t-1]	0.017	0.021	0.024
	(0.020)	(0.019)	(0.019)
Country Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
R^2	0.767	0.788	0.786
Adjusted R^2	0.743	0.766	0.763
Number of Observations	652	636	631
Number of Countries	39	39	39
Time Series	1996-2014	1996-2014	1996-2014
F Statistic	13.333***	13.653***	12.646***

Such findings strengthen empirical evidence, supporting the idea that foreign capital inflows increase domestic investment, via increased risk sharing channeled by the inflow of foreign equity capital, and, as an additional or alternative explanation, via increased stock market liquidity, which also decreases the domestic equity premium, reducing cost of capital. Yet, risk sharing from domestic investors' equity holdings in foreign assets is not stimulating investment.

5.5.2 Dynamic Domestic Investment Models

This section brings results for the estimation of dynamic investment models. As previously discussed, dynamic models put more structure on two crucial aspects of domestic investment empirical modelling. First, by controlling for past levels of investment, omitted variable biases are attenuated, in particular virtuous past investment cycles which pass-through current cycles, and, in analogy with microeconomic models, costly adjustments of domestic capital stocks.

Second, dynamic models can help mitigating endogeneity concerns. In this particular case, foreign equity flows can be induced by higher domestic investment, as foreign investors reprice the domestic capital stock concomitantly as it grows, thus buying more stocks as a response to increases in investment. Independent variables can be treated as endogenous covariates in the GMM procedure, as they can be instrumented via GMM-style instrumental variables (lagged levels). Estimation results are shown in Table 5.10.

In the first column of the table, estimation results for a model with equity capital inflows, taken to be an exogenous covariate, are shown. The partial effect of equity inflows on domestic investment remains statistically significant and positive (0.06), despite of controlling for lagged domestic investment. The hypothesis that market openness stimulates domestic investment is again corroborated, with stronger support from a more stringent empirical specification.

With respect to control variables, economic growth and productivity are both statistically significant and positive again, therefore the structure of results remains fairly consistent across the many empirical specifications tested in the analysis. Interestingly, after controlling for lagged investment, the effect of trade openness turns out to be statistically significant and positive too. At the bottom of the table, results for Sargan's over-identifying restrictions and for Arellano-Bond second-order serial correlation are shown. For the two tests, the null hypothesis is accepted, therefore instrumental variables are valid and exogenous, and second-order serial correlation in first-differenced errors is absent. In all, such tests vouch in favour of proper model specification.

Table 5.10: Dynamic Domestic Investment Models - GMM

(1,2) $I_{it} = \alpha_i + \gamma EL_{it} + \eta I_{it-1} + \beta \Delta Y_{it} + \delta TFP_{it} + \phi XM_{it} + \epsilon_{it}$

(3,4) $I_{it} = \alpha_i + \gamma EG_{it} + \eta I_{it-1} + \beta \Delta Y_{it} + \delta TFP_{it} + \phi XM_{it} + \epsilon_{it}$

I_{it} is gross capital formation as a share of GDP; EL_{it} is equity liabilities (capital inflows) as a share of GDP; EG_{it} is equity liabilities plus assets as a share of GDP; ΔY_{it} is GDP growth; TFP_{it} is productivity; XM_{it} is exports plus imports as a share of GDP. All models include years and country fixed effects.

*** Significant at 0.01 level; $**$ Significant at 0.05 level; $*$ Significant at 0.1 level.

Dependent Variable: Investments	(1)	(2)	(3)	(4)
Equity Liabilities/GDP	0.061***	0.615**		
	(0.015)	(0.253)		
Equity Globalisation			0.028	0.149
			(0.026)	(0.092)
Lagged Investment	0.679***	0.753***	0.705***	0.811***
	(0.057)	(0.066)	(0.079)	(0.099)
GDP Growth	0.270***	0.371***	0.328***	0.344***
	(0.037)	(0.048)	(0.043)	(0.050)
Productivity	0.176***	0.101***	0.174***	0.131***
	(0.027)	(0.022)	(0.026)	(0.027)
Trade	0.047***	0.029***	0.040***	0.037***
	(0.007)	(0.006)	(0.007)	(0.008)
Country Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Treatment of Equity Flows	Exogenous	Endogenous	Exogenous	Endogenous
Model Tests				
Over-Identifying Restrictions (Sargan)				
χ^2 Statistic	20.09	17.00	19.94	15.23
p-value	1.00	1.00	1.00	1.00
2nd Order Autocorrelation (Arellano-Bond)				
z Statistic	-1.46	-1.83	-1.41	-1.89
p-value	0.14	0.07	0.16	0.06
Number of Observations	644	644	617	617
Number of Countries	39	39	39	39
Time Series	1996-2014	1996-2014	1996-2014	1996-2014
χ^2 Statistic	16,721***	9,061***	8,031***	15,105***

In the second column of the table, foreign equity inflows is included as an endogenous variable. The coefficient remains statistically significant and positive, but it becomes much larger (0.60). All control variables kept their signs and statistical significances materially unchanged, hence the model remains fairly stable. With respect to tests diagnostics, over-identifying restrictions are valid, though in this specification there is weak statistical support for second-order serial correlation in first-differenced errors.

Comparing across the two models shown in columns 1 and 2, the first one, with equity inflows modelled as an exogenous covariate, seems more reliable, for two reasons. First, the coefficient fitted for equity inflows has the same order of magnitude as previously obtained with different model specifications (0.06 in the dynamic model, 0.07 in the lagged fixed-effects model, and 0.08 in the contemporaneous fixed-effects model). On the other hand, the larger coefficient obtained when setting equity inflows as an endogenous variable can be attributed to netted-out feedback effects occurring between equity inflows and investment.

Second, the first model has also more reliable test diagnostics, as both instrument validity and absence of second-order serial correlation are strongly accepted, whilst the second model could be affected by some degree of serial correlation (though statistical evidence is weak only). Regardless of such considerations, inference is also fairly valid even if equity inflows and investment have some degree of endogeneity nonetheless, providing another layer of support for positive effects of equity inflows on investment.

Lastly, in columns 3 and 4, models are estimated with equity globalisation (liabilities plus assets) as independent variables. Results provide no statistical evidence of any effects of broader equity openness on investment, similarly as to the results obtained with lagged regressors. Interestingly, as more stringent empirical specifications are tested, the positive effects of equity openness on investment coming from risk-sharing and liquidity gains brought about by foreign investors investing in the domestic markets (equity inflows) gain strengthened empirical support.

On the other hand, empirical evidence of any benefits stemming from portfolio diversification benefits from domestic investors buying foreign stocks (equity outflows) seems to vanish, or to become much weaker. Such findings provide evidence that the risk-sharing mechanism is originated from the influx of foreign capital to domestic economies, and not from risk diversification benefits obtained by domestic investors from investing abroad, via outflow of equities to foreign stock markets.

5.5.3 Eastern European Countries E.U Accession: A natural experiment

This section provides an additional robustness test, by exploiting the natural experiment of accession of eastern european countries to the European Union. The motivation for the analysis is borrowed from the test done by Larrain & Stumpner (2017). The authors argue that eastern european countries promoted important current account liberalisation reforms, to catch up with western european standards, thus the accession period marks a moment in history in which such countries became financially more open by policy-induced reforms. Building on this setup, they use this natural experiment to study the effect of current account openness on economic activity. There are important differences between the tests conducted in this section and theirs, though, which must be highlighted.

First, Larrain & Stumpner (2017) study the ascension process of 10 eastern european countries, focusing on aggregate, industry-level and firm-level productivity as dependent variables (additionally capital stock growth and employment at firm-level are also employed), whilst the test done in this section has domestic gross capital formation as dependent variable. Second, authors use external finance dependence (both at industry and at firm-level) as identification strategy to separate the effects of financial liberalisation across treated (external financially dependent) and control groups. In our test, the treated group has eastern european countries, whereas the control group has western european countries, therefore the identification strategy is taken at the cross-country level, instead of cross-firm and cross-industry level.

The research design is as follows. The treatment group includes Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia, as these countries entered the European Union in the first accession wave, in 2004. The control group includes Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and the United Kingdom, the current members as of 2004. [4]

The idea of the test is simple. It has been argued extensively in this paper that increased stock market integration increases domestic investment. If the current-account reforms put in place by the eastern block to join the E.U, which rendered equity markets more open, are

[4]Bulgaria and Romania joined the E.U in 2007, whereas Croatia joined in 2013, therefore these countries are not neither in the treatment nor in the control group by the time of the experiment in 2004, and for this reason they are excluded from the analysis. However, the same analysis is conducted for the accession of Bulgaria and Romania, in separate (not shown for redundancy reasons), and qualitatively similar results are obtained.

indeed conductive of risk-sharing, leading to more investment, then domestic capital formation for the eastern block (new entrants) should have increased *relatively more* than domestic capital formation of the western block (existing members) when comparing the period before entry, the years before 2004 (pre-treatment) and the period after entry, the years after 2004 (post-treatment).

The analysis begins with a graphical inspection of gross capital formation, for eastern (treatment) and western (control) european countries around 2004, the year in which the eastern block officially joined the European Union, as shown in Figures 5.3 and 5.4.

Figure 5.3: Domestic Investment (Europe): Treated (Eastern) and Control (Western)

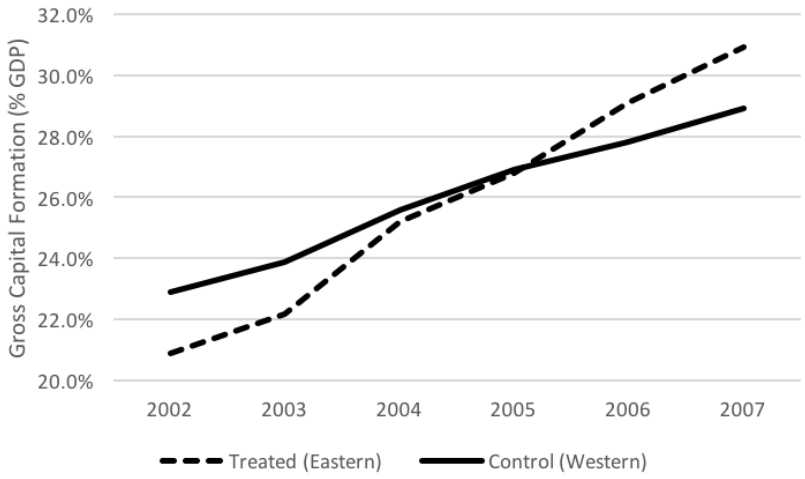
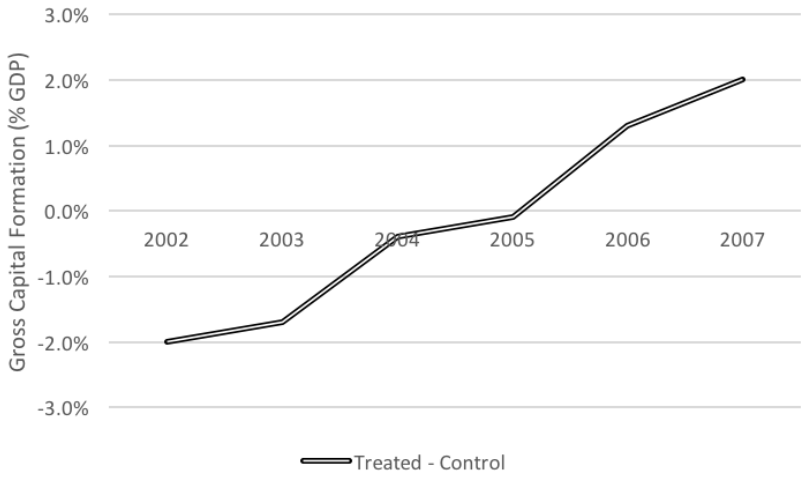


Figure 5.4: Domestic Investment (Europe): Treated (Eastern) - Control (Western)



As it is shown in Figure 5.3, investment was higher in western european countries than in the

eastern european block before 2004, as it is evidenced by the wedge between the black line on top (western countries) and the dotted line below (eastern countries), with investment showing parallel growth trends (of similar magnitude) for both groups in the year before accession. This wedge closes strongly towards zero between 2003 and 2004 (the year in which the eastern block joined the E.U officially), and reverts afterwards, with eastern european countries accumulating more capital stocks as a share of GDP than western countries.

Figure 5.4 shows the evolution of the difference in investment ratios (Treatment minus Control). The difference is negative before 2004, reflecting lower investment in the treated group, but it approaches zero with the accession in 2004, and thereafter becomes positive, reflecting investment growth. From a simple graphical inspection, it seems fair to suggest that economic integration, together with current account openness reforms, has allowed the eastern block to increase investments.

Next, a more formalised study is conducted. Although the graphical inspection has proven to be quite useful and illustrative, it is important to put more statistical rigour in the analysis. The empirical modelling employs the diff-in-diff approach (D-i-D), with models estimated both with and without country and years fixed effects, so models are robust to country unobserved heterogeneity and business cycle shocks.

To see whether stock markets in the eastern block became indeed *relatively* more open as a function of EU accession (or, in other words, if the eastern block has catched up with western countries in terms of stock market liberalisation), first a diff-in-diff model is estimated, with the scores obtained by countries in the Equity Openness Index, as calculated by the IMF, as dependent variable. The equation below is estimated:

$$EOP_{it} = \alpha_i + \beta Post_t + \delta Treat_i + \gamma Treat_i \cdot Post_t + \epsilon_{it} \tag{5.6}$$

Next, the diff-in-diff equation is estimated with domestic investment as dependent variable, testing the hypothesis that reforms which made stock markets more open in eastern countries have contributed to capital accumulation. The equation estimated is:

$$I_{it} = \alpha_i + \beta Post_t + \delta Treat_i + \gamma Treat_i \cdot Post_t + \epsilon_{it} \tag{5.7}$$

Although the diff-in-diff analysis of investment around accession may uncover some facets of financial integration, this test alone is not enough to fully establish whether financial openness has contributed to capital accumulation. The reason is because the accession to the E.U has affected a very large number of other variables which may also lead to increases in investment, like the removal of trade barriers, investment treatises, strengthening of political, cultural and commercial ties among eastern and western european countries, just to mention a few.

To fully scrutinise the openness-investment mechanism, it takes exploring an additional channel, which is whether the accession to the E.U has stimulated investment *through* a higher degree of stock market openness, and the word *through* is crucial here. To investigate this, another diff-in-diff equation is estimated, with a triple interaction between the treated group (eastern european countries), the post-treatment dummy and the score on the equity liberalisation index, which captures stock market openness reforms specifically, lagged by one period, to reflect financial reforms enacted *before* accession, in order to meet the E.U standards. The equation below is estimated:

$$I_{it} = \alpha_i + \beta Post_t + \delta Treat_i + \phi EOP_{it-1} + \lambda EOP_{it-1} \cdot Treat_i \cdot Post_t + \epsilon_{it} \tag{5.8}$$

Results for the estimation of diff-in-diff models are shown in Table 5.11. In the first and second columns, results of the estimation of a model with equity liberalisation as dependent variable are shown. In the first column, the model is estimated via simple OLS, whereas in the second column country and year fixed effects are also included (hence why the stand-alone coefficients for Treated and Post are wiped out in the second model, for they are both subsumed by country-level and years fixed effects).

Inherent to diff-in-diff analysis, we are interested about the coefficient fitted for the interaction, Treatment x Post. The coefficient is statistically significant and positive (0.23), in both specifications. As the equity openness index runs between [0,1], this result shows that the wedge between western and eastern countries shrank by 0.23, hence eastern countries became, indeed, relatively more open to foreign equity capital with the current-account reforms enacted to join the E.U.

In columns 3 and 4, estimation results are shown for models with investment as dependent variable. The interaction between Treatment x Post is statistically significant and positive (0.027), with and without controlling for country and business cycle heterogeneity. Therefore, in line

Table 5.11: East European Countries E.U Accession: Diff-in-Diff

(1,2) $EOP_{it} = \alpha_i + \beta Post_t + \delta Treat_i + \gamma Treat_i \cdot Post_t + \epsilon_{it}$

(3,4) $I_{it} = \alpha_i + \beta Post_t + \delta Treat_i + \gamma Treat_i \cdot Post_t + \epsilon_{it}$

(5,6) $I_{it} = \alpha_i + \beta Post_t + \delta Treat_i + \phi EOP_{it-1} + \lambda EOP_{it-1} \cdot Treat_i \cdot Post_t + \epsilon_{it}$

EOP_{it} is the Equity Openness Index from the IMF; I_{it} is gross capital formation. $Treat_i$ is a dummy variable characterising the Eastern European countries which have joined the European Union in the year 2004; it takes the value of 1 for the treatment group (Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia); and it takes the value of 0 for the control group (Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and United Kingdom). $Post_t$ is a dummy variable characterising the pre-post treatment period: it takes the value of 0 prior to 2004 (the year in which the Eastern block joined the Eurozone), and the value of 1 thereafter (2004-2014). Models 1, 4 and 6 are simple diff-in-diff OLS estimates, whereas models 2, 4 and 6 include years and country fixed effects. Models are estimated with heteroskedasticity robust standard errors clustered at country-level, shown below coefficients.

*** Significant at 0.01 level; $**$ Significant at 0.05 level; $*$ Significant at 0.1 level.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	Equity Open.	Equity Open	Investment	Investment	Investment	Investment
Post	-0.175***	(.)	0.012**	(.)	0.019*	(.)
	(0.034)	(.)	(0.005)	(.)	(0.010)	(.)
Treatment	-0.273***	(.)	-0.038***	(.)	-0.044**	(.)
	(0.070)	(.)	(0.007)	(.)	(0.020)	(.)
Treatment x Post	0.236***	0.234***	0.027***	0.027***		
	(0.081)	(0.062)	(0.010)	(0.006)		
Eq. Open. (EOP) [t-1]					-0.004	0.006
					(0.021)	(0.008)
EOP[t-1] x Treat x Post					0.055**	0.032***
					(0.023)	(0.010)
Country Fixed Effects	No	Yes	No	Yes	No	Yes
Year Fixed Effects	No	Yes	No	Yes	No	Yes
R^2	0.069	0.697	0.109	0.692	0.141	0.791
Adjusted R^2	0.060	0.659	0.103	0.661	0.130	0.763
Number of Observations	333	333	480	480	333	333
Number of Countries	24	24	24	24	24	24
Time Series	2000-2014	2000-2014	1995-2014	1995-2014	2000-2014	2000-2014
Treated Countries	10	10	10	10	10	10
Control Countries	14	14	14	14	14	14
Treatment Group	East Europe	East Europe	East Europe	East Europe	East Europe	East Europe
Control Group	West Europe	West Europe	West Europe	West Europe	West Europe	West Europe
Pre-Treat Period	2000-2003	2000-2003	1995-2003	1995-2003	2000-2003	2000-2003
Post-Treat Period	2004-2014	2004-2014	2004-2014	2004-2014	2004-2014	2004-2014
F	13.271***	14.118***	15.878***	19.277***	14.752***	8.914***

with preliminary results from graphical inspection, econometric evidence shows that capital accumulation increased relatively more in eastern than in western countries following the eastern blocks' accession to the E.U.

Lastly, in columns 4 and 5, results for models including the triple interaction between equity openness, the treatment group and the post-treatment dummy are shown. The coefficient of this triple interaction is statistically significant and positive (0.05 and 0.032, without and with country and years fixed effects, respectively). The interpretation is that the accession to the E.U has stimulated capital accumulation in eastern european countries *through* more integrated stock markets. This test is repeated, with equity openness lagged by 2, 3 and 4 periods to capture stock market openness reforms preceding accession in earlier years (EOP[t-k] x Treated x Post, k=2,3,4), and results remained qualitatively similar. The results from this natural experiment reinforce empirical evidences from previous sections, further corroborating the existence of a mechanism linking stock market openness to increases in domestic investment.

5.5.4 Capital Stock Growth

In this robustness test, an alternative measure of investment is employed as dependent variable in the regression models. Gross capital formation, in levels, is replaced by the growth rate of country's capital stock per capita (ΔK_{it}). Results are shown in Table 5.12.

In column 1, results for the estimation of a model with equity inflows as independent variable are shown. The partial effect of equity inflows on investment remains statistically significant and positive (0.163), though this time the coefficient reads as the effect of an increase in equity flows on investment *growth*. In column 2, the model is estimated with equity globalisation as independent variable. The coefficient fitted for equity globalisation is statistically significant and positive, though fairly smaller (0.114). This finding is again consistent with the idea that equity capital inflows are more conductive of risk sharing than equity outflows.

In columns 3 and 4, additional models are estimated, this time omitting the control for productivity. The reason is because productivity data is missing in PWT database for 5 countries in the sample (Bangladesh, Lebanon, Oman, Pakistan and Vietnam). In this test, it is checked whether results also hold when including these countries in the sample, which make findings generalisable for the full sample.

In fact, omitting productivity does not seem to change results, neither qualitatively nor

Table 5.12: Equity Capital Flows and Capital Stock Growth

$$(1)\ \Delta K_{it} = \alpha_i + \gamma EL_{it} + \beta \Delta Y_{it} + \delta TFP_{it} + \phi XM_{it} + \epsilon_{it}$$

$$(2)\ \Delta K_{it} = \alpha_i + \gamma EG_{it} + \beta \Delta Y_{it} + \delta TFP_{it} + \phi XM_{it} + \epsilon_{it}$$

ΔK_{it} is Capital Stock per capita growth; EL_{it} is equity liabilities (capital inflows) as a share of GDP; EG_{it} is equity liabilities plus assets as a share of GDP; ΔY_{it} is GDP growth; TFP_{it} is productivity; XM_{it} is exports plus imports as a share of GDP. All models include years and country fixed effects, and are estimated with heteroskedasticity robust standard errors clustered at country-level, shown below coefficients.

*** Significant at 0.01 level; $**$ Significant at 0.05 level; $*$ Significant at 0.1 level.

Dependent Variable: Capital Stock Growth	(1)	(2)	(3)	(4)
Equity Liabilities/GDP	0.163***		0.170***	
	(0.049)		(0.053)	
Equity Globalisation		0.114***		0.106***
		(0.020)		(0.024)
GDP Growth	0.244***	0.264***	0.250***	0.261***
	(0.080)	(0.088)	(0.068)	(0.075)
Productivity	0.071*	0.081**		
	(0.038)	(0.040)		
Trade/GDP	0.038	0.039	0.054**	0.053**
	(0.023)	(0.024)	(0.021)	(0.021)
Country Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
R^2	0.397	0.404	0.382	0.390
Adjusted R^2	0.339	0.344	0.325	0.331
Number of Observations	689	664	765	723
Number of Countries	39	39	44	44
Time Series	1996-2014	1996-2014	1996-2014	1996-2014
F Statistic	8.686***	19.118***	10.204***	13.148***

quantitatively, as in both models, equity inflows and equity globalisation remain statistically significant and positive, and show the same order of magnitude in terms of size. Moreover, trade openness seems to capture some of the productivity effects, as it becomes statistically significant after productivity is dropped. We can conclude that equity inflows is associated to higher investment in those countries missing in the previous analyses as well, thus results are general to all countries in the sample.

5.5.5 What About Debt Openness? Bond Flows and Investment

Thus far, the paper has focused exclusively on equity capital inflows, much owed to empirical evidence suggesting that debt capital inflows are not conductive of risk sharing (Kose *et al.* , 2009a). In this section, the analysis is extended to incorporate bond flows, first, with the objective of double checking if such empirical evidence vouching against debt flows also holds for this sample.

Second, although bond inflows (liabilities) can be ineffective in stimulating the economy, mostly because such capital tends to go to governments, via purchases of sovereign debt, less is known with respect to bond outflows (assets). Differently from debt liabilities, international asset pricing models suggest that debt assets have a good potential to bring about gains in terms of risk sharing. In principle, if global risk free rates tend to subsume local risk free rates when emerging markets integrate, then it should to be the case that domestic investors in emerging markets are gaining access to foreign risk-less debt (like U.S bonds and Eurobonds), diversifying-away the risk of bond portfolios.

Table 5.13 brings results of the estimation of investment models, with bond inflows, (DL_{it-1}), outflows (DA_{it-1}) and bond globalisation, including both debt liabilities and assets (DG_{it-1}), all tested as independent variables. Additionally, a very broad measure of financial globalisation is also tested as a determinant of investment (FG_{it-1}), which comprises both equity and debt inflows and outflows.

Column 1 reports estimation results for the model with debt liabilities as independent variable. Debt liabilities are not associated with investment, confirming the idea that debt inflows do not improve risk sharing. However, as shown in Column 2, the effect of debt assets on investment is statistically significant and positive (0.15). This finding provides novel evidence that domestic investors may be benefiting from bond portfolio diversification by investing in foreign bonds, lowering risks and hence reducing cost of capital, ultimately leading to higher domestic investment.

Lastly, results of models estimated with bond globalisation and financial globalisation are shown in columns 3 and 4. Bond globalisation is shown to affect investment positively, but clearly the effect comes from debt assets, as shown in the previous analysis. With respect to financial globalisation, which includes equity and debt inflows plus outflows, the effect on investment is weakly statistically significant and positive, but as demonstrated by former analyses, this is

mostly due to risk sharing enhancements channeled through equity inflows and debt outflows.

Table 5.13: Bond Flows and Domestic Investment

$$(1)\ I_{it} = \alpha_i + \gamma DL_{it-1} + \beta \Delta Y_{it-1} + \delta TFP_{it-1} + \phi XM_{it-1} + \epsilon_{it}$$

$$(1)\ I_{it} = \alpha_i + \gamma DA_{it-1} + \beta \Delta Y_{it-1} + \delta TFP_{it-1} + \phi XM_{it-1} + \epsilon_{it}$$

$$(1)\ I_{it} = \alpha_i + \gamma DG_{it-1} + \beta \Delta Y_{it-1} + \delta TFP_{it-1} + \phi XM_{it-1} + \epsilon_{it}$$

$$(1)\ I_{it} = \alpha_i + \gamma FG_{it-1} + \beta \Delta Y_{it-1} + \delta TFP_{it-1} + \phi XM_{it-1} + \epsilon_{it}$$

I_{it} is gross capital formation as a share of GDP; DL_{it} is debt liabilities (bond inflows) as a share of GDP; DA_{it} is debt assets (bond outflows) as a share of GDP; DG_{it} is debt liabilities plus assets as a share of GDP (debt globalisation); FG_{it} is equity liabilities plus equity assets plus debt liabilities plus debt assets as a share of GDP (financial globalisation); ΔY_{it} is GDP growth; TFP_{it} is productivity; XM_{it} is exports plus imports as a share of GDP. All models include years and country fixed effects, and are estimated with heteroskedasticity robust standard errors clustered at country-level, shown below coefficients.

*** Significant at 0.01 level; $**$ Significant at 0.05 level; $*$ Significant at 0.1 level.

Dependent Variable: Investment	(1)	(2)	(3)	(4)
Debt Liabilities/GDP [t-1]	0.012			
	(0.134)			
Debt Assets/GDP [t-1]		0.150***		
		(0.049)		
Debt Globalisation [t-1]			0.123***	
			(0.039)	
Financial Globalisation [t-1]				0.068*
GDP Growth [t-1]	0.294***	0.255***	0.247***	0.262***
	(0.063)	(0.061)	(0.059)	(0.063)
Productivity [t-1]	0.134***	0.133***	0.129**	0.126***
	(0.043)	(0.049)	(0.048)	(0.046)
Trade/GDP [t-1]	0.007	0.016	0.015	0.023
	(0.018)	(0.018)	(0.018)	(0.020)
Country Fixed Effects	Yes	Yes	Yes	Yes
Years Fixed Effects	Yes	Yes	Yes	Yes
R^2	0.786	0.789	0.790	0.784
Adjusted R^2	0.764	0.767	0.768	0.760
Number of Observations	588	588	569	569
Number of Countries	39	39	39	39
Time Series	1995-2014	1995-2014	1995-2014	1995-2014
F Statistic	13.699***	14.649***	15.650***	12.451***

5.6 Discussion

Results show that equity capital inflows can increase domestic investment, corroborating a number of previous studies, equally at micro and macro level, such as Henry (2000b); Laeven (2002); Chari & Blair Henry (2008); Larrain & Stumpner (2017), establishing an important relationship between aggregate investment and equity market openness, a mechanism which, although backed by theories of financial globalisation, was not found to be operative in other studies, such as Levine & Zervos (1998); Bosworth & Collins (1999); Bonfiglioli (2008).

Findings are particularly interesting with respect to which types of countries are benefiting the most from foreign equity capitals. Whilst extant research suggests that only those nations with good levels of institutional quality can benefit from financial openness in terms of increasing economic activity, as it takes reaching minimum levels of institutional development so that gains from globalisation will unfold, the so-called *Threshold Effects* hypothesis (Ayhan Kose *et al.* , 2011; Bekaert *et al.* , 2011a), the results reported in this paper go in stark contrast.

Findings show that the partial effect of portfolio equity capital inflows on domestic capital formation is stronger in countries with weaker corruption deterrence schemes and poorer regulatory quality, two measures of institutional quality. Such findings suggest that, although *Threshold effects* may be valid when comparing across developed and developing countries, when only emerging and frontier markets are analysed, the opposite effect occurs, with foreign equity investments spurring investment where foreign capital is more scarce, and where institutions need to be shaken and improved the most, precisely those countries with weak institutions.

A possible theoretical explanation of results is that, as suggested by Stulz (2005); Ferreira & Matos (2008); Aggarwal *et al.* (2011), foreign investors bring about improvements in monitoring and governance to emerging economies, and such improvements may channel risk-sharing benefits from foreign capital to investment. Moreover, these results are aligned with the empirical microeconomic evidence, both as reported in the second essay, and in Bena *et al.* (2017). Financial globalisation may be bringing improvements in financial and institutional development, with positive effects spilling-over to investment, greasing the wheels of economic performance, in line with the *Collateral Benefits* hypothesis (Kose *et al.* , 2009b).

Additionally, empirical results show that the benefits from equity capital inflows can come from two different channels. The first is via increasing overall capital formation, directly, whereas the second is via attracting more foreign direct investments. These findings extend previous

evidences on the role played by foreign direct investment as the most effective type of foreign capital flow in terms of improving the real economy (Aizenman *et al.* , 2013). Such complementarity between portfolio and direct equity investments can bring about virtuous cycles of real economic gains for emerging markets.

The findings from this paper also help to scrutinise the channel conducing risk-sharing gains, which translate into increases in investments. Regression results strongly suggest that, whilst equity inflows are associated to gains in investment, the effects of equity outflows are empirically more fragile, vanishing when more stringent specifications are estimated. Thus, the reduction in risk and increase in liquidity caused by the influx of foreign investors to domestic equity markets is the main force driving the fall in cost of capital that ultimately spurs investment.

The paper also identifies a novel risk-sharing mechanism benefiting domestic investment, via bond assets or debt outflows from domestic to foreign debt markets. This finding can be explained by international asset pricing models, as domestic investors gain access to foreign risk-less debt, diversifying bond portfolio risks. Interestingly, the same analysis shows that bond inflows do not affect investment, in line with previous empirical contributions suggesting that debt capital inflows are not conductive of risk sharing (Kose *et al.* , 2009a).

5.7 Conclusions

This essay studied the relationship between portfolio equity capital flows and domestic investment. The analysis explores cross-country data from 44 emerging and frontier markets, between years 1995 and 2014. Results demonstrate that foreign equity inflows increase aggregate investment, measured both as gross capital formation and as the growth rate of domestic capital stock. Additionally, it is shown that foreign equity capital can stimulate economic activity through a second channel too, via increasing foreign direct investments. In summary, results point to positive and desirable effects of stock market openness, in particular coming from foreign capital inflows. Results have academic (theoretical and empirical) and public policy implications.

In light of controversial evidence on real economic effects of stock market openness, the results found here allow suggesting that opening stock markets to foreign investors is doing good for emerging economies, as domestic physical capital accumulation is responding positively to foreign equity inflows. This conclusion has important ramifications into public policy design.

Whilst policy makers in many countries remain skeptical towards globalised equity markets, often pulling back capital controls to curb on undesired side effects of capital flows, such as exchange rate volatility and sudden stops and entrenchment, the findings presented here show that the real economy is very likely to respond positively to foreign equity inflows, with expansions in capital stock stimulating supply, demand and job creation.

The results backing the conclusions of this paper are not immune to criticism, as a number of limitations affect our work. First and foremost, although portfolio equity flows is a proxy often employed in the literature, and it does capture stock market openness to a good extent, for the simple reason that capital flows much less to more segmented stock markets because numerous barriers impede larger quantities of capital to enter these markets, it is a transient measure, with series often exhibiting a good deal of instability.

In principle, there are other measures of aggregate *De Facto* stock market integration that were employed in the extant literature, such as the stock (instead of the flow) of countries' foreign equity liabilities and assets, but such measures are based on estimates (true values are hard to be assessed), and more importantly, they are not periodically calculated by international institutions, such as the IMF, much due to the complexity involved in obtaining such estimates (existing series run only up to 2004, being hence fairly outdated). Future work with updated estimates of the stock of liabilities and assets can definitely offer a fine-tuned outlook on the relationship between domestic investment and financial globalisation.

This paper looks at investment, and reports positive effects from equity inflows, but it could be interesting to study how the turnover of inflows and outflows can affect domestic investment instability. If the gains in terms of increases in average investment are partially (or fully) offset by losses due to volatility, then the overall impact of stock market openness on domestic investment may need an appraisal. Future studies examining the relationship between capital inflows and investment volatility can clearly shed more light on this issue.

Even after taking stock of these criticisms, this paper leaves important messages to the financial globalisation debate, joining a number of other papers in the literature and adding novel evidence to the stock of knowledge in the field. Hopefully future work can benefit from the evidences provided here, taking over from the limitations of this work, so that financial economists can make an informed assessment to feed policy makers and corporate managers on the pros and cons of opening stock markets.

CHAPTER 6

Conclusions

After a long and deep dive into the turbulent seas of financial globalisation, which has filled hundreds of pages in this manuscript, and that took three years of transpiration and intense work from this Author, the Conclusions Chapter brings this thesis to a closure.

As it was mentioned during the introductory chapter, if by the end of the journey, this thesis had helped academics and practitioners to make a better sense and improve their understanding of how the complex process of stock market openness affects the cost of equity capital enjoyed by firms and investment decisions in emerging economies, then this work would have fulfilled its objective of pushing a bit forward knowledge on the field.

Now it is time to take a final stock of the lessons learnt, the contributions offered, to point out the shortcomings and limitations of this research, and to offer some advice on new avenues to be further explored. The forthcoming sections bring reflections upon these points.

6.1 Summary of Empirical Findings

Stock market openness to cross-border equity financing decreases the cost of equity capital enjoyed by local firms and stimulates investment. In one simple statement, this is the major conclusion of this thesis. Obviously, a number of mechanisms and nuances are working behind the scenes, backing this conclusion. In this section, the main empirical findings are recapitulated.

6.1.1 Cost of Equity Capital

Results from the estimation of international asset pricing models show that stock market integration, measured as market-wide foreign stock ownership, causes marginal decreases in stocks portfolios' expected returns. Such findings provide novel and up-to-date empirical evidence supporting the validity of theoretical models of time-varying equity market integration, with evidence pertaining to a major emerging economy such as Brazil. Results remained robust to numbers of robustness checks, like causality tests, the exposure of stock returns and integration to exchange rate variations, to tests expanding the analysis to incorporate longer time horizons, as well as dynamic effects analysed through rolled estimates.

Moreover, findings also speak, to some extent, to the liberalisation literature. In general, the main conclusion from liberalisation studies is that one-off *De Jure* liberalisation events increase stock prices, reducing expected returns, dividend yields and ultimately lowering the cost of financing. One shortcoming of this literature is that the effects are observed in the short-run and during a few periods ahead, but afterwards it is hard to tell whether this initial stimulus to integration has continued to affect the cost of capital over time.

This can be particularly problematic because many countries, some times occasionally and other times quite often, pull back regulatory impediments in the forms of capital controls, which in principle, can be seen as anti-liberalisation counter-measures. In the time-varying approach developed in this thesis, the time series of foreign ownership, which is a *De Facto* integration measure, captures how stock market integration has evolved over time, thus providing an interesting picture of how the dynamics of integration affect cost of capital. In light of this, the findings from this study extend and complement extant evidence from liberalisation studies.

The second focal point of the first essay was the role played by assets' characteristics in the process of stock market integration. Empirical results strongly suggest that assets' idiosyncrasies are important determinants of the magnitude of integration effects. Characteristics of size, book-to-market, illiquidity, momentum, corporate governance and *investability* all have been shown to matter for integration efficiency. Findings related to characteristics remained robust even employing a more granular sorting criteria, with assets double-sorted by size and book-to-market, size and liquidity, and size and momentum.

Results show that large and mid caps benefit more than small caps, especially stocks of large firms posting higher growth opportunities. Regarding liquidity, less illiquid stocks (or, in

other words, more liquid stocks) posted higher integration coefficients, hence benefiting the most from integration, in particular highly-liquid small caps. Corporate governance also has been shown to be a decisive characteristic. Firms quoted in the *Novo Mercado* segment, which are those firms voluntarily abiding to world-class corporate governance standards, reaped much stronger reductions in the cost of capital as a result of increases in stock market integration, when compared to other firms observing less stringent governance. Such results suggest that researchers should focus in detail on firms and portfolios characteristics, to gain more insight on how stock market openness benefits local firms.

These results show that some particular asset characteristics, mostly those with high desirability in the eyes of foreign institutional investors, such as liquidity, size and governance, are operating as catalysts, conveying stronger integration effects to firms' cost of equity capital. When inspecting these preferences in detail, a number of reasons suggest that such preferences for these types of stocks are fairly intuitive, and are based on rational economic and financial behaviour of foreign investors.

Foreign investors may prefer more liquid stocks because it is easier to get rid of these investments in the case a downturn in the business cycle occurs and a recession suddenly kicks in, a quite normal phenomena when dealing with emerging markets. This can also be the case when the turmoil comes from abroad, such as during the Great Financial Crisis of 2008, when many investment funds pulled back equities from emerging economies to safe-haven developed markets. With respect to asset size, larger firms normally are followed by better reputation and higher market coverage, reducing asymmetric information and expected agency costs.

Preference for good governance is trivial, as well-governed firms normally perform better, hence having better stock performance, and also because good corporate governance mechanisms reduce expropriation risks incurred by foreign investors, reducing expected agency costs as well. While liquidity and size are more natural characteristics, findings suggest that, by improving on corporate governance, firms can obtain better results from the process of financial openness in terms of reducing their equity funding costs.

6.1.2 Corporate Investment

Having studied how integration affects cost of capital, the attention shifted to the important question of whether opening stock markets also produces real economic effects, in terms of

stimulating corporate investment. The theoretical framework which motivates the empirical test is built around an interesting tension between the neoclassical and the agency costs paradigms. Whilst the first paradigm suggests that corporate investment should increase following integration, for risk sharing between domestic and foreign investors reduce cost of capital, the later suggests a more critical and less optimistic approach, with agency costs arising from expropriation risks incurred by foreign investors offsetting risk sharing benefits. In this context, either firms do not increase investments, or investment gains are very modest.

The relationship between corporate investment and stock market openness is empirically tested for a large sample of emerging and frontier markets firms, employing dynamic panel data models. Two measures of integration are employed, a country-level *De Jure* measure, proxied by equity and foreign capital flows openness indices, provided by the *International Monetary Fund*, plus a firm-level *De Facto* measure, proxied by foreign institutional stock ownership, which captures firm-specific risk sharing properties. To test for presence of agency costs, country-level measures of institutional quality and expropriation risks are included in the models, both linearly and, more importantly, interacted with measures of stock openness.

Results show that stock market openness and foreign stock ownership are both associated with marginal increases in corporate investment ratios. This result is strongly aligned with the neoclassical paradigm, providing support for the concept that improved risk sharing decreases equity funding costs, as such gains are channeled to real investment. Crucially, the essay identifies two channels through which openness benefits kick in: a country-wide and a firm-specific mechanism. When inspecting the cost of capital mechanism in detail, results also show that stock market openness increases equity valuations, thus indeed reducing funding costs as suggested by theory, and is also associated to adaptations in corporate financing structures, as firms have been shown to turn to less conservative cash policies because the marginal benefit of accumulating cash decreases with lower external funding costs.

Turning to the issue of agency costs, the interactions between institutional quality and expropriation risks loaded negatively on investment, suggesting that the marginal effect of stock market integration on investment is actually weaker (stronger) in countries with high (low) institutional development. This result does not corroborate the agency costs paradigm, as expropriation risks do not seem to block the mechanism conducing cost of capital gains to investment, and actually, it goes the other way round, with stock openness stimulating investment

the most precisely in countries where institutions are poorer. Yet, when studying the Brazilian market in detail, with portfolio and firm-level governance measures, it is shown that the effect of integration on investment is indeed stronger for well-governed firms, and this finding fully aligns with the agency costs paradigm.

There are two mechanisms that can reconcile these two apparently conflicting results, though, and both mechanisms may interact with one another. The first is the so-called *Collateral Benefits* (Kose *et al.* , 2009b), whereas the second is *Improved Monitoring* (Aggarwal *et al.* , 2011; Ferreira & Matos, 2008). Under this logic, financial openness brings about improvements in countries' institutional development, mostly due to the exposure to the global investor community, with foreign investors exerting stricter monitoring to local firms and bringing more sophisticated governance standards rented from more developed economies (Stulz, 2005).

Such ameliorations may be spilling-over to the real microeconomic sector, allowing firms to increase investment. In this context, the presence of foreign investors can be seen as a *good (asset)* yielding utility in terms of bringing improvements in institutional quality, catalysing such gains to the real economy, and hence it is fairly logical that the marginal utility (benefit) of this good will be higher where institutions are weaker. In this case, expropriation risks are not simply given and do not remain static, becoming a function of stock market openness too.

Recalling the expropriation cost function discussed in the investment model, this is analogous to saying that both firm-level governance and country-wide institutional quality respond to increases in stock market openness over time. This implies that governance satisfies $g'(f) > 0$ and $g'(s) < 0$, thereby governance quality is an increasing function of foreign ownership, and a decreasing function of segmentation (increasing function of integration). Projecting this to firm-level governance, foreign ownership may be inducing internal governance reforms, greasing the mechanisms that convey cost of capital gains to investment, and this is also consistent with the firm-level evidence from Brazilian firms that well-governed companies benefited more.

With respect to country-wide institutional quality, in turn, it would satisfy $q'(s) < 0$, being a decreasing function of market segmentation, and therefore increasing with respect to integration. This condition could explain why the effect of stock market openness hits stronger on investment where institutional quality is weaker: because openness, at the same time that it stimulates investment directly, brings positive changes in country-wide governance, which is initially weak, thereby affecting investment indirectly *through* the *Collateral Benefits* of institutional development.

In summary, governments decision to open stock markets to foreign investors, as well as firms' efforts to attract foreign institutional investors, both have proven to bring highly beneficial outcomes. Such benefits unfold in three distinct ways, and their effects interact with one another: lower funding costs, higher real investments and better institutional quality and governance.

6.1.3 Aggregate Domestic Investment

The third and last empirical essay studies whether the benefits of stock market openness observed at the firm-level can be generalised to the whole economy, via gains in domestic capital formation. This is an important question, mostly because stock markets in emerging markets are not as well developed as in industrialised countries, and therefore the sample of listed firms might not, necessarily, portray a fully-fledged representation of the entire population of firms. If stock market openness, despite of increasing capital accumulation for publicly quoted firms, somehow shifts domestic resources to these companies, then the net effect may not be necessarily positive.

Cross-country static and dynamic panel regressions are estimated, with domestic investment proxied by gross capital formation, and by capital stock per capita growth in a robustness test. Portfolio equity inflows (liabilities) is the main explanatory variable, as improved risk sharing and liquidity benefits are channeled via foreign portfolio capital injections in the aggregate stock market. The issue of institutional quality is again revisited. Similarly as in the firm-level analysis, measures of institutional quality are interacted with equity capital inflows.

Results suggest that equity capital inflows marginally increase domestic aggregate investment. Importantly, findings remained robust to endogenous specification of equity inflows in the domestic investment equation, via GMM instrumental variables. Such findings with aggregate data strongly corroborate the results obtained with disaggregate firm-level data, putting a good deal of structure in the findings. More importantly, results allow concluding that benefits generated by opening stock markets and increasing the influx of foreign equity capital in terms of capital accumulation fully generalise into the whole economy, and hence are not restricted to the sample of publicly listed firms.

Regarding institutional quality, it is shown that the effects of equity inflows on investment are stronger in countries with lower levels of institutional quality, again echoing the findings from firm-level regressions. In summary, the accumulated evidence points towards important

gains from stock market openness, and such benefits are stronger in countries with lower institutional quality, where foreign capital seem to be needed the most, both to bring about its virtuous influence on institutional development, and to reduce funding costs and increase real investments.

6.2 Managerial Implications

The empirical results from this thesis suggest that emerging markets firms benefit a great deal from attracting foreign institutional investors to the shareholders' base. This way, financial risks can be better shared amongst domestic and foreign investors, with firms gaining access to lower equity funding costs. Findings also suggest that, by doing so, firms will also be able to increase investments in capital stock accumulation, which lays a strong basis for future growth.

Moreover, results from the study of the Brazilian market showed that firms with better governance standards have benefited more, both in terms of enjoying a lower cost of funding and of increasing investments. In light of this, managerial reforms envisaging governance improvements will certainly help firms to make the most of the process of stock market integration, and to obtain the best outcomes from foreign portfolio investments.

Also Importantly, results corroborate, though indirectly, the idea that openness to cross-border finance may bring about improvements in governance *per se*. Therefore, a better mix between domestic and foreign investors may also provide the stimuli for firms to enhance internal governance, improving their reputation in the eyes of foreign institutions. In fact, as strongly suggested by extant research, such institutions are key actors in fostering these improvements, hence better governance can be helpful both *ex-ante*, to attract more foreign investors, and *ex-post*, as governance improves through better monitoring brought by foreign investors.

6.3 Public Policy Recommendations

This thesis leaves a number of important messages and recommendations in the public policy domain. Regulators have the power of, by the strike of a pen, enact *De Jure* integration or segmentation measures. Therefore, it is crucial for government officials taking such hard decisions to make an informed assessment of what is there to gain or lose when they decide

to liberalise current-accounts, or conversely, to deter the free flow of financial investments via capital controls and other impediments.

First, stock market openness directly reduces equity funding costs and increases real economic activity via investments in capital formation. Assuming that, in each emerging market government in our sample, there is a well-intentioned social planner willing to maximise the utility of a representative national citizen, and that utility is increasing with respect to investment, which generates wealth and employment, then emerging economies have much to gain from stock market integration, as per the evidence demonstrated in this work.

Second, evidence indirectly suggests that cross-border finance will also generate benefits in terms of improvements in institutional quality. Under an Institutional Economics approach, this is highly desirable because, according to this view, strong and well-functioning institutions are key for superior economic performance. Therefore, policies towards financial openness may bring what we may call a *Virtuous Trinity*: lower funding costs for firms, higher capital accumulation rates at firm and country-levels, and better institutional development.

As such betterments can certainly increase the welfare of national citizens, either entrepreneurs, workers, or both, financial openness seems to be a fair public policy to be pursued by regulators. But simply opening the gates may not suffice. As the good outcomes from financial openness may be enhanced by *ex-ante* institutional development as well, regulators, entrepreneurs and the whole society have to team up, so that better institutions may precede foreign capital inflows, and be consequently improved by this seemingly virtuous exchange of ideas and best practices between local and foreign investors.

In light of this, legal reforms strengthening contracts enforcement, which can alleviate expropriation risks as perceived by foreign investors and thus sell a better image of emerging countries abroad, as well as business reforms which can ease the bureaucratic burden, so heavy in many emerging economies, just to mention a few ameliorations in the overall level of institutional quality that can be achieved, would most likely be seen as highly positive by the global investor community. Similarly, sound macroeconomic policies, rendering emerging economies more stable and resilient to unexpected shocks, can also certainly play a crucial role in deepening integration of emerging markets, guaranteeing the continuation of its benefits.

In summary, results from this thesis recommend regulators to further open stock markets, allowing an increased presence of foreign investors. Crucially, it is also recommended that policy

makers should enact reforms that can help improving institutional quality *ex-ante*, thus greasing the mechanisms conducting welfare gains from integration to finance and the real economy.

6.4 Limitations and Future Work

There are numerous limitations affecting this work that deserve proper acknowledgement. Most of such shortcomings were already discussed in each empirical essay, so this section does more like a cursory reminder. The portfolio-level cost of capital analysis lacks portfolio-specific variability in the integration (foreign ownership) variable. Although portfolio-specific integration coefficients are fitted, such lack of portfolio-level variation in the measure capturing integration leaves the analysis a bit coarse. Future work employing not only portfolio-specific but also firm-specific measures of foreign stock ownership in the study of cost of capital effects can certainly bring about a more detailed analysis, which would be very welcome. Also, the asset pricing analysis refers to Brazil only, so results have to be interpreted with caution, for they cannot be readily generalised to other emerging economies.

With respect to the paper on stock market openness and corporate investment, the main shortcoming is that when analysing the role played by agency costs, the analysis lacks firm-specific governance data. In the absence of richer information, country-level institutional quality and investor protection data is employed (a popular approach in the extant literature, though), but it must be recognised that more granular governance data could certainly have rendered the analysis more informative.

Another shortcoming of this essay is the short time series period covered in the panel data analysis (2007-2015). As mentioned before, because of this, the larger part of the variability is cross-sectional, hence the analysis is a bit poor in capturing dynamics. This is not a big deal when employing firm-level regressors, because the sample is fairly large, but when using country-level data in the models, then this issue takes on more importance. This problem is partially remedied thesis-wise, with the country-level analysis in the third essay (which runs along 20 years, from 1995-2014), but it remains as a limitation of the second essay nonetheless.

This paper also does a primer analysis on how corporate financing structure may adjust to integration, studying the effect of stock market openness on cash holdings policies. This is a very valid effort, and brings evidence on a novel mechanism linking stock market openness

and corporate behaviour, although it has its limitations as well. First, the theory backing cost of capital and investment effects relies on well-structured theoretical models. The link established between cash and integration is built by crossing literatures, which is ok, but clearly to better establish such linkage a theoretical model would be very helpful. Second, the analysis leaves corporate debt totally neglected, which is another important limitation.

In the third and last essay, the study of aggregate domestic investment and foreign equity capital inflows also suffers from a few limitations. In this paper, equity capital inflows is the explanatory variable, and although this variable captures risk sharing channeled via foreign equity investments, it is a transient and unstable variable, so it captures the level of stock market openness with imperfection. As previously discussed, other variables which could approximate country-level integration in more detail, such as estimates of equity liabilities stocks, are available only for outdated time periods, so it is very questionable whether employing these proxies would bring about much value added. Yet, future work, possibly employing *up-to-date* cross-country estimates of equity liabilities stocks' as a proxy for openness can certainly do a better work.

With respect to cost of capital, this work focuses on equity cost. Yet, financial openness most likely affects, somehow, the cost of debt too. As the cost of capital depends both on the cost of equity and debt, cost of capital implications of financial openness are only partially addressed in this thesis. In fact, how financial globalisation affects cost of debt, at firm-level, seems an interesting avenue for future enquiry, tagging along with how stock and bond market integration may affect capital structures. Lastly, a fine-tuned analysis of the role of firm characteristics in the integration-investment relationship is welcome, such as financing constraints, capital structure, dividend policy, ownership structure, just to name a few.

After taking stock of limitations and suggesting a few directions for future work, this thesis comes to an end. A final reflection is due, though. Looking back to the 1990s, economists had limited knowledge about what to expect from financial globalisation, so many theories, so many prophecies, but many question marks. Nearly 30 years after, much was learnt. Many of the questions made back then were given consistent answers by a rich and growing literature, while others remain puzzling scholars and policy makers now and likely in years to come. To this debate, this thesis has added its small share to increase the stock of wisdom in the field, and this Author is humbly grateful for having the opportunity to extend such contributions. The journey was challenging, but equally exciting, and most importantly, enlightening.

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