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Essays on IFRS and Investment

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Essays on IFRS and Investment

Tese apresentada ao Departamento de Contabilidade e Atuária da Faculdade de Economia, Administração e Contabilidade da Universidade de São Paulo como requisito parcial para a obtenção do título de Doutora em Ciências.

Orientador: Prof. Dr. Francisco Henrique Figueiredo de Castro Junior

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À minha família.

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I must continue to follow the path I take now.
If I do nothing, if I study nothing, if I cease searching, then, woe is me, I am lost.

Vincent van Gogh

Resumo

Santana, V. F. (2018). *Essays on IFRS and Investment* (Tese de Doutorado, Universidade de São Paulo, São Paulo).

Esta pesquisa tem como objetivo investigar o papel da adoção das IFRS no investimento, tanto no nível macro, estudando fluxos de investimento estrangeiros, quanto no nível micro, estudando o investimento no nível das firmas. Os proponentes da adoção das IFRS argumentam que elas promovem informação não somente comparável entre fronteiras, mas também de maior qualidade, diminuindo restrições e facilitando a eficiência de alocação de investimentos. Dividida em três partes, esta tese avalia essa proposição analisando o papel das IFRS na dinâmica de fluxos de capitais entre países, na sensibilidade do investimento estrangeiro na América Latina a choques financeiros globais, e na eficiência da alocação de capital por parte das firmas. O primeiro ensaio estuda a interação entre a atração de capital entre países vizinhos e suas decisões de adotar as IFRS. Estimando um modelo espacial autorregressivo, a pesquisa mostra que maiores fluxos de investimento estrangeiro direto para um dado país implicam em maiores fluxos também para os seus vizinhos; e a adoção das IFRS reforça essa dinâmica. Isso sugere que, em termos de atração de capital estrangeiro, quanto mais países adotam as IFRS, mais vantajoso é para os seus vizinhos também se tornarem adotantes. O segundo ensaio foca no efeito moderador das IFRS no impacto de choques financeiros globais na volatilidade de fluxos de capital na América Latina. Analisando Argentina, Brasil, Chile, Colômbia, México, e Peru, através de um modelo em painel longo via FGLS, os resultados mostram que a adoção minimiza os efeitos dos choques de incerteza internacionais. Finalmente, o último ensaio estuda o papel das IFRS para minimizar restrições financeiras, através da estimação de um modelo de equação de Euler de investimento. Os resultados mostram que a adoção das IFRS é capaz de minimizar as restrições financeiras das firmas diminuindo o custo de capital externo. Firmas em países com baixo desenvolvimento financeiro e econômico, porém adotantes das IFRS, têm níveis de restrições financeiras similares a firmas em países com alto desenvolvimento econômico ou financeiro, mas que não são adotantes. Tomados em conjunto, os resultados são consistentes com a hipótese de que informação financeira de alta qualidade melhora a eficiência de alocação de recursos. Maior atratividade de capital estrangeiro, menor sensibilidade a choques financeiros globais na América Latina, e alívio de restrições financeiras indicam que a adoção das IFRS é capaz de aperfeiçoar as decisões de investimentos. Estes resultados são importantes principalmente sob a perspectiva de políticas públicas, mostrando que as IFRS podem ter efeitos positivos na eficiência de alocação de recursos, a qual se espera que aumente o desempenho econômico e, consequentemente, o crescimento.

Palavras-chave: Contabilidade Internacional. Finanças. Investimentos. Fluxos de capital.

Alocação eficiente.

Abstract

Santana, V. F. (2018). *Essays on IFRS and Investment* (PhD dissertation, University of São Paulo, São Paulo).

This research investigates the role of IFRS on investment, both at the macro level, studying cross-border foreign investment, and at the micro level, studying firm-level investment. The IFRS proponents argue it provides financial information not only comparable across different countries, but also of high quality, minimizing constraints and facilitating investment allocation efficiency. Divided into three different essays, this dissertation evaluates this proposition analyzing the role of IFRS in the interdependent dynamics of cross-country capital flows, in the sensitivity of foreign investment to global financial shocks in Latin America, and in the efficiency of firm-level capital allocation. The first essay studies the interaction between the attraction of capital flows among neighbor countries and their decision to adopt IFRS. Estimating a spatial autoregressive model I show that higher foreign direct investment inflows to a given country imply in higher inflows to its neighbors, and the adoption of IFRS reinforces this. This suggests that, in terms of foreign capital attraction, the more countries adopt IFRS the more advantageous it is for its neighbors also to become adopters. The second essay focuses on the moderating effect of IFRS for the impact of international market uncertainty on the volatility of capital flows in Latin America. Analyzing Argentina, Brazil, Chile, Colombia, Mexico, and Peru via a panel FGLS model, the results show that although IFRS is related to large and more volatile foreign investment inflows, there is some evidence that the adoption minimizes the effects of international uncertainty shocks. Finally, the third essay studies the role of IFRS to ease firms financing constraints along with financial development, via the estimation of an Euler equation investment model. The results show IFRS adoption is capable of minimizing firms' financing constraints decreasing the cost of external capital. Firms in countries with both low economic and financial development but adopting IFRS have similar financing constraints levels as firms in high financial or economic development countries who do not adopt IFRS. Taken together, the results are consistent with the hypothesis that higher quality accounting information can improve investment decisions. Increased attraction of capital flows, decreased sensitivity to uncertainty shocks in Latin America, and minimized firms' financing constraints indicate IFRS adoption is able to improve investment allocation. These results are important mainly from a policy perspective, showing IFRS can have positive effects on resource allocation efficiency, which is expected to improve economic performance and, consequently, growth.

Keywords: International Accounting. Finance. Investment. Capital flows. Efficient allocation.

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Acronyms

ARMA Autoregresive Moving-Average. 58

BOPS Balance of Payments. 53, 59

CBOE Chicago Board Options Exchange. 50, 55, 59, 69

EEA European Economic Area. 21, 24
EU European Union. 21, 24, 31, 34

FD Financial Development. 85, 90, 93, 96
FDI Foreign Direct Investment. 28, 30, 31, 32, 34, 36, 37, 39, 41, 42, 43, 44, 51, 52, 53, 54, 55, 56, 60, 61, 62, 63, 67, 103
FGLS Feasible Generalized Least Squares. 11, 32, 51, 58
FPI Foreign Portfolio Investment. 28, 30, 31, 32, 34, 36, 37, 39, 41, 42, 43, 44, 53, 54, 55, 56, 60, 61, 62, 103

GAAP Generally Accepted Accounting Principles. 15, 16, 17, 23
GARCH Generalized Autoregressive Conditional Heteroskedasticity. 50, 54, 55, 59
GDP Gross Domestic Product. 29, 32, 33, 36, 37, 39, 40, 41, 49, 54, 55, 59, 60, 61, 62, 67, 77, 84, 85, 86, 87, 90, 91, 92, 93, 94, 95, 96, 97
GFD Global Financial Development. 36, 59, 84, 86
GKF Gross Capital Flows. 55, 56, 59
GMM Generalized Method of Moments. 32, 77, 84, 90, 91, 92, 94, 95, 97

IAASB International Auditing and Assurance Standards Board. 14
IAESB International Accounting Education Standards Board. 14
IAS International Accounting Standards. 52
IASB International Accounting Standards Board. 10, 13, 16, 18, 19, 21, 26, 75
ICRG International Country Risk Guide. 36, 59
IESBA International Ethics Standards Board for Accountants. 14
IFAC International Federation of Accountants. 14
IFRS International Financial Reporting Standards. 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 23, 24, 26, 27, 28, 29, 30, 31, 32, 34, 36, 37, 39, 42, 43, 44, 49, 50, 51, 52, 53, 55, 56, 58, 59, 60, 61, 62, 63, 66, 67, 69, 73, 74, 75, 79, 81, 82, 84, 86, 87, 90, 91, 92, 93, 94, 95, 96, 97, 98, 103, 104
IFS International Financial Statistics. 59
IGBC *Indice General de la Bolsa de Valores de Colombia.* 57
IGBVL *Indice General de la Bolsa de Valores de Lima.* 57
IGPA *Indice General de Precios de Acciones.* 57
IMF International Monetary Fund. 14, 53, 54, 59, 75
IPC *Índice de Precios y Cotizaciones.* 57

IPSASB International Public Sector Accounting Standards Board. 14

ML Maximum Likelihood. 32
MPK Marginal Profit of Capital. 81, 82, 83, 114

PCA Principal Components Analysis. 57, 59, 67, 85

ROSC Reports on the Observance of Standards and Codes. 14

SAR Spatial Autoregressive. 11, 28, 29, 32, 37, 41
SARIMA Seasonal Autoregressive Integrated Moving-Average. 55, 59
SEC Securities and Exchange Comission. 23, 26
SME Small and Medium Sized Enterprises. 16, 24

US United States. 23, 54, 55

VIX Volatility Index. 50, 55, 56, 58, 59, 61, 62, 63, 66, 67, 69

WDI World Development Indicators. 36

1 Introduction

According to the World Bank (2018), in most countries the private sector is the main source of growth and job creating via productive investment. To fund such investment one needs capital and credit. Capital and credit providers, that is, investors and lenders, must trust in the financial situation of the companies they are funding, thus, requiring transparent, high-quality and comparable financial reporting.

"Financial reporting practices used by a particular company for an annual report" (Nobes & Parker, 2010, p. 29) is what defines accounting systems. While this definition is very simple, understanding the factors that culminate in the use of a specific set of accounting procedures by firms in a certain country is much more complex, and involves historical, cultural and economic factors. More generally, the accounting system in a specific country is developed to attend the economic needs of this country, which, in turn, depends on its development history[1].

According to Nobes and Parker (2010, p. 29), accounting is "clearly affected by its environment"[2]. Among the factors influencing different accounting systems, the authors cite culture, the providers of finance, taxation, and legal systems. A classical example is the difference between the regions of Continental Europe and the Anglo-Saxon countries. While the countries in the Continental Europe have developed an accounting model to intermediate the relation between firms and the Government, being useful for taxes and dividend payment, the United Kingdom developed a model to attend different demands arising after the industrial revolution, which was designed as a mean to monitor and inform the activities of big companies to their shareholders, that is, a model designed for the capital markets (Mackenzie et al., 2013)[3]. And then these blocks of common accounting systems were spread throughout different regions of the world through colonization and commercial transactions. For example, Nobes and Parker (2010) cite the case of China and Japan, whose commercial legal systems were based on translation versions of the

[1] A full account and analysis of the historical economic and cultural development of different countries and how these differences are reflected on the countries' accounting systems can be seen in the work of Nobes and Parker (2010).

[2] An interpretive literature in accounting discusses the other way of this relationship, that is, how accounting affects the environment in which it is inserted. As examples of this literature, see Hines (1988), Morgan (1988) and Hines (1991).

[3] For a better examination and discussion about the Anglo-Saxon model, see Alexander and Archer (2000) and Nobes (2003).

German commercial code, due to the transactions between them and Germany in the nineteenth century.

However, in the last decades, awareness of these differences in accounting practices around the world has led to attempts to reduce them, in particular by the efforts of the International Accounting Standards Board (IASB) to promote accounting harmonization through the global adoption of the International Financial Reporting Standards (IFRS). This movement implies in a variety of countries, with different economic and cultural structures, moving towards a single foreign financial reporting system.

The case for global accounting harmonization is twofold. First, the IFRS proponents argue on the need of more comparable information across borders, to make investments in different countries comparable, eliminating information restrictions hampering the flow of capital around the world. As internationalization of business activities increases, having uniform accounting standards to create comparable information about investments in different countries can booster international business relationships, facilitating cross-border capital flows. Second, the IFRS proponents also claim on its superior quality, arguing the international standards should provide information not only comparable, but also of high quality. Since well-founded investment decisions are only possible if the agents have access to high-quality information about the economic events of interest, IFRS adoption is expected to increase investment efficiency by providing such information.

Therefore, the expectation around IFRS adoption is improving the functioning of capital markets through providing higher quality information for the agents. But, why should we care about the well functioning of capital markets? Barberis and Thaler (2003) argue that our ultimate concern is that capital is allocated to the most promising investments opportunities, that is, we should invest more in activities with potential to generate income. If market's prices are right, that is, if they reflect the underlying fundamentals, they are able to appoint these activities and, thus, contribute to the efficient allocation of capital in the economy. Improving investment decisions is, hence, the main concern of Finance.

Accordingly, the objective of general purpose financial reporting (IASB, 2010, p. A27) guiding the development of the IFRS is "to provide financial information about the reporting entity that is useful to existing and potential investors, lenders and other creditors in making decisions about providing resources to the entity". In this dissertation, I empirically evaluate the hypothesis that this objective in being fulfilled, investigating the role of IFRS on investment, both at the macro level, studying cross-border foreign investment, and at the micro level, studying firm-level investment. To do this, I divide the study into three different, although complementary, parts designed to evaluate three different hypotheses:

1. IFRS adoption attracts foreign capital through a network of countries.
2. IFRS adoption moderates the sensitivity of capital flows to international financial

shocks in Latin America.

3. IFRS adoption increases the efficiency of firms' allocation of investment.

To test the first hypothesis, I explore the interaction between the attraction of capital flows among neighbor countries and their decision to adopt the IFRS. Since high quality and low-cost information on both country and firm-level factors is necessary to enable cross-border capital flows (Obstfeld, 1998), and being the accounting financial system the primary source of information on firms, one should expect the financial reporting system to influence capital flows. To investigate this, I analyze the role of IFRS in the spatial dynamic relationship of international capital flows, questioning whether countries adopt the international standards aiming capital inflows gains, and how this dynamics works. To do so, I estimate a Spatial Autoregressive (SAR) model which gives both the interdependence effect of capital flows and the direct and indirect of IFRS to such flows.

For testing the second hypothesis, I continue to investigate foreign investments, but I focus on the sensitivity of capital flows in Latin America to global financial shocks. As emphasized by Adler, Djigbenou, and Sosa (2016), global shocks often impact net capital flows to emerging markets and, more broadly, impact their economic activity (Calvo & Reinhart, 2000; IMF, 2013). The accounting literature brings evidence on IFRS facilitating cross-border investments (DeFond, Hu, Hung, & Li, 2011; Gordon, Loeb, & Zhu, 2012; Márquez-Ramos, 2011), but its effects on the sensitivity of such investments is still unexplored. Further, focusing on Latin America is of special importance because emerging economies are found to present different, and sometimes conflicting, effects regarding IFRS adoption (Daske, Hail, Leuz, & Verdi, 2008; J. Kim & Shi, 2012; Li, 2010). To explore this question, I estimate Feasible Generalized Least Squares (FGLS) long panel regressions to analyze the effect of global financial shocks in the volatility of capital flows and how IFRS moderates this effect.

Finally, to test the third hypothesis, I turn to the domestic firm-level investment decisions, analyzing the effects of IFRS adoption in the efficiency of capital allocation. While several authors have explored how IFRS is associated with better functioning financial markets in the accounting literature (see, e.g., Daske et al., 2008; J. Kim & Shi, 2012; Li, 2010), and several authors have explored how more developed financial markets can influence capital allocation efficiency in the Economics literature (see, e.g., Beck & Levine, 2002; Durnev, Li, Mørck, & Yeung, 2004; Wurgler, 2000), the specific link of of accounting information to capital allocation efficiency has been mostly neglected. In this part I develop the case that IFRS, via improving the amount and quality of firm-specific information, contributes to alleviate firms' financing constraints. To do so, I estimate an Euler equation investment model analyzing the effect of IFRS on minimizing firms' financing constraints along with financial development.

Each of these three objectives is defined to constitute an independent essay, but they are expected to jointly provide a panorama on the general topic of the role of IFRS

adoption in investment, both at the macro and at the micro level.

Furthermore, this research also presents an innovative measure for IFRS adoption. As one can see in the details of the profiles covering the IFRS adoption across the world, the extent to which countries adopt IFRS, that is, which firms are required / permitted to adopt which standards, as well as the processes of each country to endorse and converge the international standards to the domestic setting, vary widely. While some authors have addressed this (e.g., Ball, 2006; Holthausen, 2009), most empirical studies did not incorporate this question in their analysis. Therefore, to the extent of my knowledge, this is the first study to empirically considerate variations in IFRS adoption when evaluating its economic effects.

The study is organized as follows. After this introduction, Chapter 2 brings the details on the adoption of IFRS in the world, developing the IFRS measure used in the last two essays. Chapter 3 brings the research constituting the first essay; the second essay is presented in Chapter 4; and Chapter 5 presents the research of the third essay. Finally, Chapter 6 brings some concluding remarks regarding the three essays that form this research.

2 IFRS Adoption in the World

2.1 Introduction

By August 2018, from the 216 countries listed at the World Bank database[1], the IFRS Foundation (IFRS Foundation, 2018) kept profiles[2] of 161 plus five other jurisdictions: Anguilla (British overseas territory in the Caribbean), Chinese Taipei (Taiwan), Montserrat (British overseas territory in the Caribbean), Palestine and the European Union. These profiles detail the extent to which countries adopt IFRS, that is, which firms are required / permitted to adopt which standards, as well as the processes of each country to endorse and converge them to the domestic setting.

A brief search through the profiles shows the manifold ways countries incorporate IFRS into their market, as discussed by Zeff and Nobes (2010). The authors first settle that the IASB has no authority of its own to impose accounting standards across the world, so it is up to local institutions to impose in one way or another the IFRS to the firms under their jurisdiction. Therefore, according to the authors, IFRS (or any other set of standards) can be inserted into a jurisdiction by several different methods, such as adopting the IASB's processes, rubber stamping each standards separately, endorsing them with the possibility of changing them, fully or partially converging national standards, or solely allowing the use of IFRS.

In this chapter I evaluate these processes specifying which types of firms are allowed, required of prohibited to use which IFRS and how the standards are made available in the domestic setting. As a result of this analysis I gauge a measure of IFRS adoption quantifying such differences. I then use this measure as the variable of interest in the second and third essays in chapters 4 and 5, where I am concerned about the empirical effects of IFRS adoption. The first essay in Chapter 3 focuses on the adoption *decision* so I use a standard dummy variables to measure it.

The IFRS adoption differences across countries were somehow bespoken by the literature, as in Ball (2006), who lists his concerns that there would be inevitable substantial differences in IFRS implementation among countries. This concern, is not only due to the differences in the adoption process as in Nobes and Zeff (2008, 2016) and Zeff and

[1] http://databank.worldbank.org/data/home.aspx
[2] https://www.ifrs.org/use-around-the-world/use-of-ifrs-standards-by-jurisdiction/

Nobes (2010), but also due to market and legal features leading to differences in the enforcement of the international standards, as discussed by Holthausen (2009). Nonetheless, most empirical studies did not incorporate this question in their analysis. An exception is Christensen, Hail, and Leuz (2013), who explicitly evaluated other changes in enforcement along IFRS adoption in the European Union, arguing that other mechanisms besides the formal set of accounting standards should effectively change the quality of accounting information in a given country.

Albeit such changes in enforcement that relate to the quality of accounting and auditing are certainly important to evaluate the state of IFRS adoption and application, this kind of information is not always observable. As Christensen et al. (2013) explain in their appendix, they gathered the enforcement information through surveys sent to PricewaterhouseCoopers and to all national regulators in the countries of their sample, explicitly focusing on regulatory and policy changes in the period of 2001 to 2009. Notwithstanding, some information can be publicly accessed. The International Monetary Fund (IMF) and the World Bank jointly publishes the Reports on the Observance of Standards and Codes (ROSC). The reports assess 12 difference areas of countries financial architecture from fiscal and monetary policy transparency to financial markets infrastructures, including accounting and auditing. This latter is managed by the World Bank which covers both IFRS and the International Standards on Auditing[3]. The reports are published by country and address the development of the accountancy profession, including policy recommendations, and reporting practices, including compliance with IFRS (when adopted) and auditing standards.

Although comprehensive, on the downside the ROSC are slowly updated. By August 2018, the most recent reports are from Zambia, the Philippines, Myanmar and Pakistan completed and disclosed in 2017. From the 111 available countries, less than half of their reports were completed after 2010 and only 10% were completed after 2015. The ROSC have information from the International Federation of Accountants (IFAC), which encompasses the International Auditing and Assurance Standards Board (IAASB), the International Accounting Education Standards Board (IAESB), the International Ethics Standards Board for Accountants (IESBA) and the International Public Sector Accounting Standards Board (IPSASB). The IFAC also publishes reports on the extent of countries adoption of the standards issued by these boards. For instance, the most recent Global Status Report on these international standards was published in December, 2017, but the report's[4] information are disclosed only aggregated.

Therefore, both comprehensive and up to date information on countries' levels of enforcement are not available. Still and all, the details of the adoption are declared by the countries themselves in the IFRS Foundation profiles, which are fairly regularly updated;

[3]http://www.worldbank.org/en/programs/rosc#2
[4]https://www.ifac.org/publications-resources/international-standards-2017-global-status-report

by August 2018, all the profiles were dated after June 2016. In the website I collect information about the extent of IFRS adoption for different types of firms (public, non-public and foreign) and financial statements (consolidated and separate) as well as about the endorsement process of the adoption, including details on whether it is forced by law and if there were any accounting policies eliminations of changes in the standards. With this information I build an IFRS variable that varies from zero (no adoption is allowed for any type of firm) to one (full adoption fully endorsed for all firms), achieving different levels and nuances of IFRS adoption among countries.

Section 2.2 shows the details I collect and how I categorize and classify them in order to measure IFRS adoption as compound index[5]. In Section 2.3 I present the results of the analysis, showing the level of IFRS adoption for 220 countries / jurisdictions from 1995 to 2020[6], as well as patterns by regions and by ways of adoption. Finally, Section 2.4 brings some concluding remarks on this analysis.

2.2 Categorization and Classification of IFRS Adoption

The profiles present a set of answers provided by each jurisdiction's relevant authority (usually the stock exchange regulator, or a board for the accounting profession or the Ministry of Finance) on its state of IFRS adoption. The questionnaire is divided into the following categories:

1. Relevant jurisdiction authority: indicating the organizations, their role in the jurisdiction, their website and contacts;
2. Commitment to Global Financial Reporting Standards: whether the jurisdiction have committed to adopt a set of global accounting standards and whether this set is the IFRS. Here, the jurisdiction indicates its current adoption state and provide relevant comments;
3. Extent of IFRS application: whether the IFRS are required or permitted for domestic firms who trade and do not trade in a public market, as well as for foreign firms listed in this market, and whether the IFRS are required or permitted in firms' separate financial statements;
4. IFRS endorsement: which IFRS are required or permitted; which standards the audit reports or the basis of presentation footnotes states and if they allow for "dual reporting" (conformity with both IFRS and local Generally Accepted Accounting Principles (GAAP)); whether and how the IFRS are incorporated into laws and

[5]The full tabulated data are available upon request.

[6]Although the profiles are collected in 2018 they have information on the future for countries who are yet to adopt specific measures.

regulations; if there is a formal endorsement process for new or amended standards issued by the IASB; and if the jurisdiction eliminated accounting policy options permitted by IFRS and/or made modifications to any standards (explaining which ones);

5. Translation of IFRS: whether and how the English standards are translated into the local language; and
6. Application of the IFRS for Small and Medium Sized Enterprises (SME) standard: whether the IFRS for SME were adopted and, if not, whether it is under consideration; if and which modifications were made to it; which firms apply the IFRS for SME and if they are required or permitted to do so; and which other standards the SME use if not the IFRS for SME.

It is worth noting that the IFRS Foundation asks for the *current* adoption status. However, most countries specifies when the adoption process have occurred, that is, the year of the mandatory adoption, the years in which they eventually had voluntary or partial/transition adoption, and so on. When the jurisdictions did not provide dates, I searched through other sources, such as the regulations websites and research papers.

Interestingly, several jurisdictions explicitly states there were no local set of accounting standards (local GAAP) before adopting IFRS. The United Arab Emirates, for instance, says "there has never been a local IFRS" in the country and Timor Leste says "accounting standards have not yet been adopted".

To measure the adoption of IFRS, I aggregate these information into two categories: (i) type and extent of adoption, and (ii) endorsement. Each category has a number of classifications. Each category receives a weight and each classification receives a grade following to a level of importance *ad hoc* attributed to it according to the objective of this research. These two categories have subcategories which, then, have their own classification. At each level, categories sum to one and the classifications of each category are graded from zero (no adoption) to one (full adoption).

It is important to highlight that these weights and grades carry a great level of arbitrariness. I defined them aiming to obtain a grade for the level of each country that reflects both higher dissemination of IFRS and higher efforts of the country to converge to the international standards. For instance, the objective of this research is to examine how greater quality of accounting information helps investments decisions. This is, of course, more important for firms who rely of external finance, so the application of IFRS in the consolidated financial statements of public domestic firms is of higher importance. However, the application in separated/individual financial statements of public firms as well as for non-public firms imply in greater efforts of business people to understand and incorporate IFRS. Other studies, with different objectives, might arrive at different schemes. The categories and classifications are defined and weighted as follows.

Type and Extent of Adoption (weight: 0.70). Some countries make a public commitment to adopt IFRS as global accounting standards before (or only) the mandatory adoption. Some countries have partial, mandatory or a period of transition before the full adoption when, generally, some firms use some or all standards. Finally, the mandatory, or full, adoption indicates the period from which at least all listed firms are required to apply IFRS in their consolidated financial statements.

At this point, most countries have different requirements for domestic publicly-traded (listed) or closely-held firms (non public, non listed firms) and for foreign firms. Several countries have different requirements for consolidated and for separate or individual financial statements. Table 2.1 shows the types of adoption and the categories for the mandatory/full type, indicating the grades and weights attributed to them.

Table 2.1: Types and Extent of IFRS Adoption

Grade	Type	
0.0	Not Adopted	
0.1	Formal Commitment to adopt IFRS as global accounting standards	
0.2	Early, Voluntary or Partial Adoption	
1.0	Mandatory Adoption	
	Weight	Category of the Extent of Mandatory or Full Adoption
	0.50	Public Domestic Consolidated Financial Statements
	0.30	Public Domestic Separate/Individual Financial Statements
	0.10	Public Foreign Firms
	0.10	Non Public Domestic Firms

The Formal Commitment and Early, Voluntary or Partial Adoption receives very low grades because they require little effort from the country in terms of reforms and regulations. The mandatory adoption receives the higher grade because it is expected to guarantee the use of IFRS. Since the focus of this research is on information to be useful to investors and creditors, the use of IFRS by the public domestic consolidated financial statements is of most importance, so this classification receives half of the weight of the Mandatory Adoption category. Considering that applying IFRS to the individual or separate financial statements requires reforms at the management and control level, which should improve the effectiveness of IFRS application, I assign a high weight for this subcategory. The use of IFRS by public foreign firms does not require much effort from the country, so it has a lower weight. Finally, while IFRS use by non-public domestic firms may be important from a regulatory point, it often occurs because the country did not have a local domestic GAAP. Nevertheless, when a country does not have an active stock exchange so that the category of publicly-listed firms does not make sense, the Non-Public category weights one, that is, it bears all the weight of the mandatory adoption classification

For the Mandatory Adoption, countries sometimes do not permit IFRS at all, or

permit or requires for some, or all, or all but some firms. In most cases the exceptions are financial institutions. Table 2.2 indicates these classifications in a graded hierarchy. The scale is not linear because levels are not necessarily additive. For instance, I consider the levels of Permitted to all but some equivalent to Required to some.

Table 2.2: Extent of Mandatory/Full Adoption: Classifications

Grade	Classification
0.000	Not permitted (all)
0.150	Permitted (some)
0.300	Permitted (all but some)
0.300	Required (some)
0.500	Permitted (all)
0.600	Required (all but some)
1.000	Required (all)

Countries where all classifications are Required (all) has a 1.00 (full) grade for the Type and Extent of adoption category.

While defining who should apply IFRS in the country is the first and most important point to evaluate the adoption, it is no use to require all firms to use IFRS if there is no law enforcement or any directive about which standards should be followed or if they are not even translated to the local business language. Therefore, a substantial share of the adoption should dwell on how IFRS is endorsed. So I assign a weight of 0.70 to the Type and Extent of Adoption leaving 30% of the final assessment to depend on the endorsement process.

Endorsement (weight: 0.30). Countries have different processes to endorse and incorporate the IFRS issued by the IASB into their local setting. Some of them adopt the IFRS automatically as and when issued by the IASB and some have a formal process to analyze and endorse new standards and amendments. Some countries incorporates IFRS into local laws and some do not, or do so indirectly.

Table 2.3 indicates the subcategories (and their weights) for the endorsement analysis and their respective classifications' grades. First, defining which standards should be followed by the firms in the jurisdiction is the most important category, with a assigned weight of 0.40. In this category, some countries choose specific standards that suits them (lower category), while some have adopted all the standards but has not followed subsequent publications of the IASB. When a country automatically endorses all the standards it entails lower efforts to evaluate the impacts of IFRS on the local market, signaling little concern on the financial reporting issue. Therefore, the higher category is when the country has a formal endorsement process where it adopts all standards as issued by the IASB after evaluating their implications.

The force of law category also receives a high weight because of its enforcement

implications. If there is no law force at all, this category has a zero grade. The middle case is when the force of law is only partial or indirect, or if it only occurred in the beginning. The changes or eliminations in accounting policies compute a 0.20 weight, which is downgraded at half if these were changes or eliminations for all firms and by 20% if such changes were for only some firms. Finally, the translation process accounts for 10% of the whole endorsement category.

Table 2.3: Endorsement: Categories and Classifications

Category (weight)	Grade	Classification
Which IFRS (0.40)	0.20	Designated IFRS (some standards)
	0.50	As issued by the IASB once (no updates)
	0.70	As issued by the IASB (not locally endorsed)
	1.00	As issued by the IASB and locally endorsed
Force of law (0.30)	0.00	No / Not yet
	0.50	Initially / Partially / Indirectly
	1.00	Yes
Accounting Policy Elimination or Changes (0.20)	0.50	Yes
	0.80	For some firms
	1.00	No
Translation of IFRS (0.10)	0.00	No
	1.00	Yes / Not applicable (English is the official language)

Countries where all categories are classified at the highest level receives a 1.00 (full) grade for Endorsement category.

Figure 2.1 summarizes the scheme here described, showing the two categories (Type and Extent of Adoption, and Endorsement) composing the IFRS variable and their respective classifications or subcategories. Categories are shown in gray and have weights summing one and classifications are shown in white and have grades from zero to one. The figure shows 70% of IFRS adoption, as I defined, depends on the type and extent of adoption. There are four different types so that countries who have at least made a formal commitment or have engaged on some kind of early, voluntary of partial application of the international standards have a small amount of adoption instead of zero as is usually seen in empirical works with binary variables. When a country establishes the mandatory adoption I then evaluate its directives on which types of firms are permitted or required to use IFRS, with seven possibilities ranging from Not Permitted (grade zero) to Required to all firms (grade one). For the public domestic firms case I also consider whether IFRS applies to their consolidated and individual, or separate, financial statements.

The remaining 30% of the adoption is due to the endorsement process. 40% of it accounts for which standards are adopted and 30% for whether and how the standards are enforced by local laws and regulations. 20% refers to accounting policy eliminations or changes in the original standards and the remaining 10% of the endorsement category refers to the standards translation from English to the local business language.

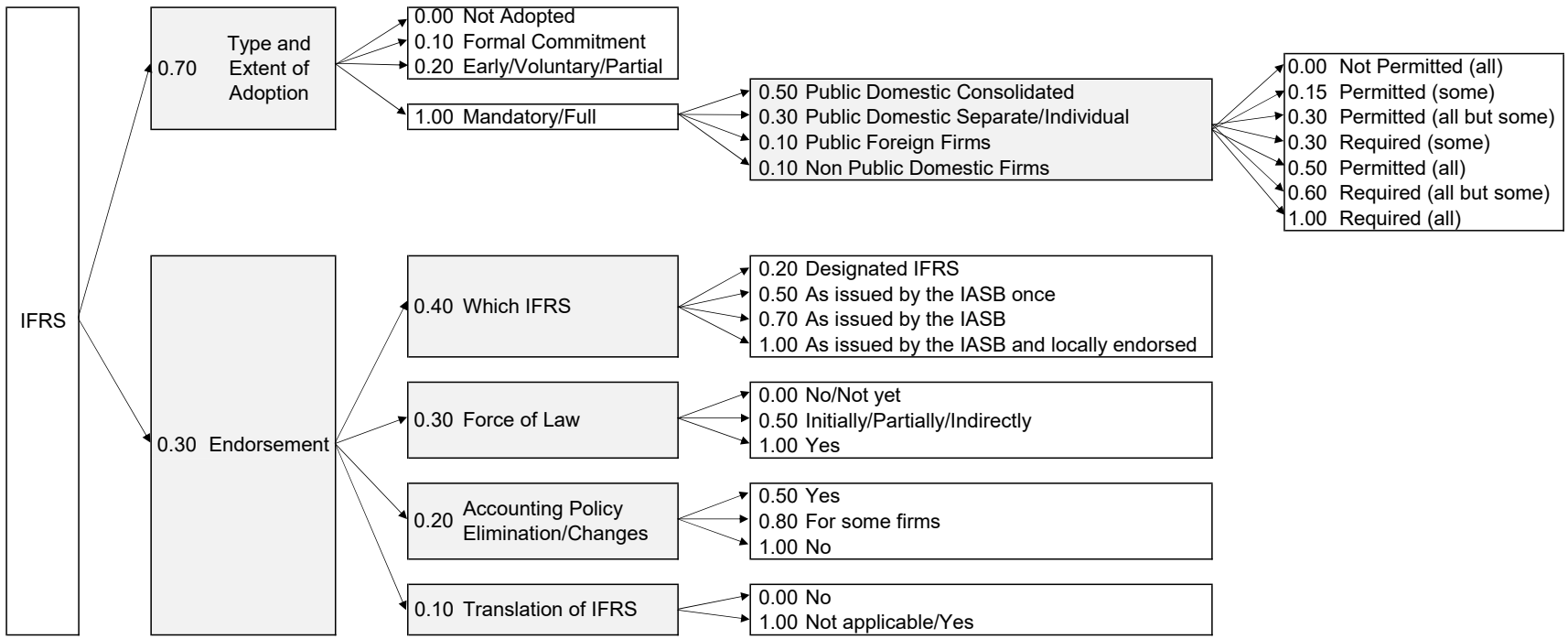

Figure 2.1: Categorization of IFRS Adoption

To yield the IFRS adoption level for each country I multiply the classifications' grades by the weight of their category and sum the categories at each level. For instance, a country with the highest level of adoption would be $0.70 + 0.30 = 1.00$:

1. Type and Extent of adoption: Mandatory adoption ($0.70 \times 1.00 \times (0.50 + 0.30 + 0.10 + 0.10) = 0.70$):
   (a) Public domestic consolidated: required (all): $1.00 \times 0.50 = 0.50$);
   (b) Public domestic separate/individual: required (all): $1.00 \times 0.30 = 0.30$);
   (c) Public foreign firms: required (all): $1.00 \times 0.10 = 0.10$);
   (d) Non Public domestic firms: required (all): $1.00 \times 0.10 = 0.10$).
2. Endorsement ($0.30 \times (0.40 + 0.30 + 0.20 + 0.10) = 0.30 \times 1.00 = 0.30$):
   (a) Which IFRS: As issued by the IASB and locally endorsed ($1.00 \times 0.40 = 0.40$);
   (b) Force of law: Yes ($1.00 \times 0.30 = 0.30$);
   (c) Accounting Policy eliminations/Changes: No ($1.00 \times 0.20 = 0.20$);
   (d) Translation: Yes ($1.00 \times 0.10 = 0.10$).

2.3 IFRS Adoption Results

The scheme described in the previous section for calculating the level of IFRS adoption was applied for each country's case. The first part was to identify the year of each type of adoption. Therefore, a same country may have different levels of adoptions throughout the years. As an example, Colombia assumed the formal commitment do adopt IFRS in 2009, had an early adoption from 2013 and the mandatory/full adoption is from 2015.

After identifying the dates and type of adoption I separate the mandatory adoption cases and calculate their extent. In some cases, the extent of adoption is also different over years. For instance, Brazil required IFRS for domestic firms in 2010 but until 2012 foreign firms were only permitted to apply IFRS. When the jurisdiction does not describe the extent of adoption by dates I assume they all took place in the mandatory adoption year. The same assumption is made for all categories when dates are not explicitly mentioned. Further, I calculate the countries' levels of endorsement in the same fashion.

Figure 2.2 shows the level of IFRS adoption for each of the 220 countries / jurisdictions, from the year 1995, according to the procedure described in Section 2.2. In the figure one can see clusters of adoption. There is the European case which countries, either for being part of the European Union (EU) or of the European Economic Area (EEA), with few exceptions, mandatorily adopted the IFRS in 2005. Central and West African countries started the adoption in 2018, the Caribbean countries adopted in the early 2000s and the South American countries in the 2010s.

Most importantly, one can see nuances in the level of adoption. The United States and Japan are usually presented as important cases of non-adoption. However, in this

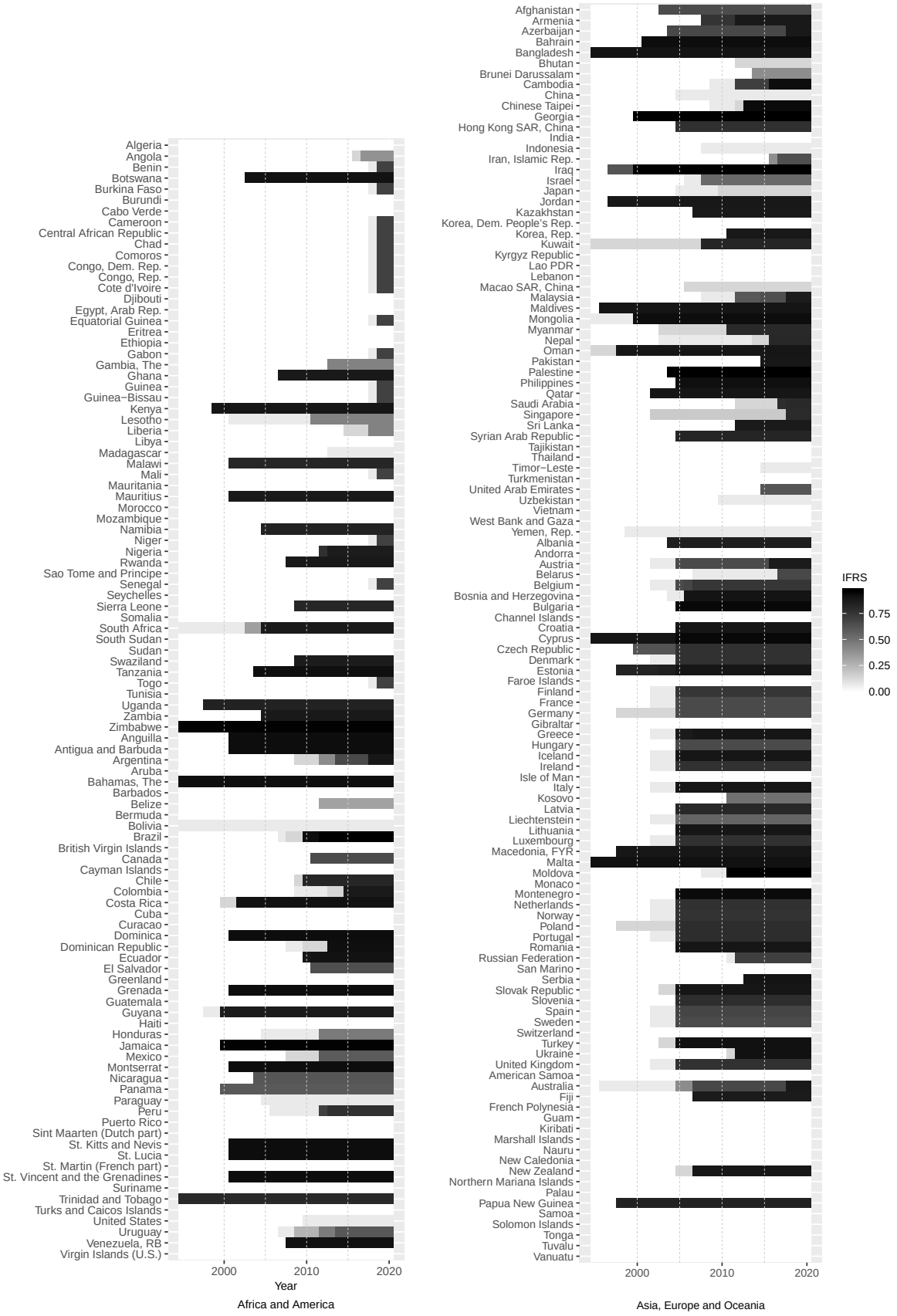

Figure 2.2: IFRS Adoption

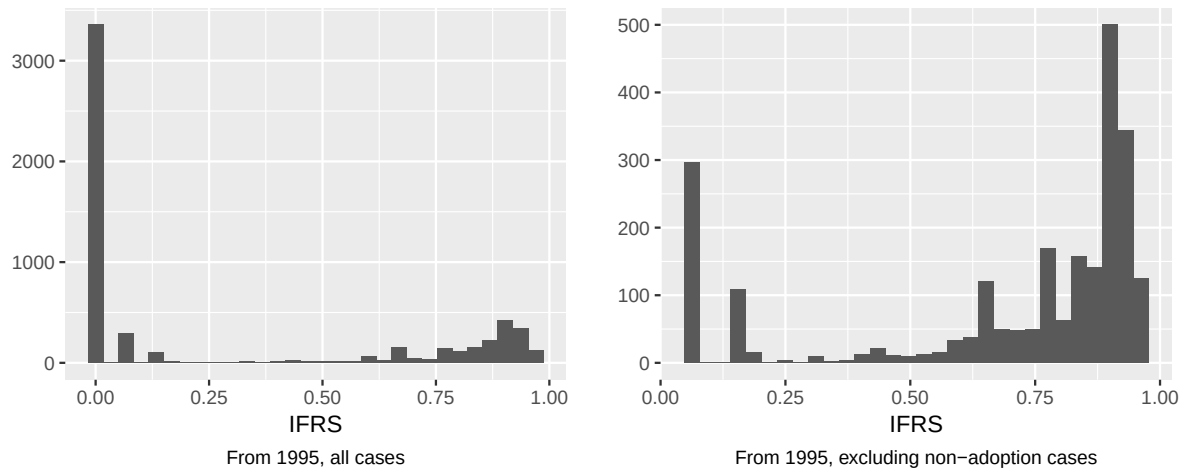

Figure 2.3: Histogram of IFRS Adoption

method, although they have not mandatorily adopted IFRS for domestic listed firms, the IFRS have some place for them. Nevertheless, is still important to highlight the differences between this non-null but low level of adoption from higher levels.

From the total of 165[7] completed profiles, only 21 of them have not yet mandatorily adopted IFRS. However, most of these countries have some level of adoption. Seven of them (Barbados, Bermuda, Cayman Islands, Guatemala, Paraguay, Suriname and Switzerland) permit the adoption for all public domestic firms. Bolivia, Japan and Yemen permit the adoption for certain types of firms — Japan explains that their eligible criteria cover virtually all listed firms. Macao, Madagascar, Timor-Leste and Uzbekistan do not have an active stock exchange, but they either permit or require IFRS for some types of firms. China, Egypt, India, Indonesia, Thailand, United States and Vietnam do not permit IFRS in the consolidated financial statements of their listed domestic firms. However, the United States[8] together with Thailand and Egypt, permit the international standards for foreign listed firms, while China and India, along with Thailand, argue their national standards are significantly converged to IFRS.

Figure 2.3 shows the distribution of the IFRS adoption levels among countries, first showing all cases and then excluding the non-adoption cases). From it, one can see that while several cases are concentrated in lower levels of adoption, most cases are

[7] I excluded the profile of the European Union which is encompassed by the individual profiles of its member states.

[8] There is no centralized determinant of financial reporting practices for firms whose capital market activities fall outside the Securities and Exchange Comission (SEC) requirements. Many of the private firms have contractual requirements with their financing providers to prepare their financial statements in accordance with United States (US) GAAP. Other private firms nevertheless may choose to prepare financial statements with different purposes for which they can select the accounting framework that better fits that purpose. In practice they mainly select either US GAAP or the US income tax basis of accounting. But if they are, for instance, subsidiaries of or have significant ownership held by an IFRS user firm they may prepare their financial statements using IFRS. Therefore, the use of IFRS for non-public firms in the US is possible but depends on other countries' directives and it is not common.

concentrated around 0.80. Excluding the non-adoption cases, the mean level of adoption is 0.692, the median is 0.835, the minimum is 0.070 (countries such Indonesia, Paraguay, China and the United States) and the maximum is 0.970 (Brazil). Therefore, none of the countries achieved the full level of adoption in all categories but several usually considered non-adopters have some level of adoption.

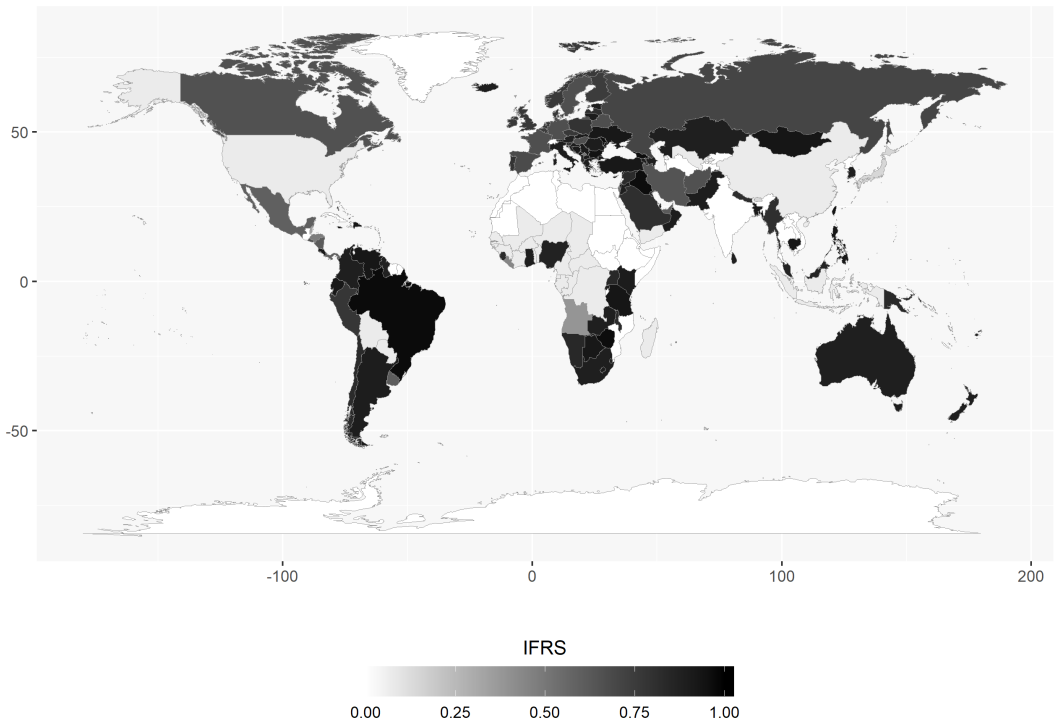

Figure 2.4: Geographical Distribution of IFRS Adoption

Figure 2.4 shows the geographical distribution of the level of IFRS adoption, considering the data for 2018. From it one can see that most of the non-adopters[9] are clustered in North Africa, and South Asia. It is interest to note the European case. Although the EU directives, followed by both EU member states and the EEA countries of Iceland, Liechtenstein and Norway, require IFRS for the consolidated financial statements, they leave to the countries' choice the use in the separate or individual financial statements. While most countries require IFRS only for the consolidated, some countries such as Austria, Greece and Italy also require for the separate financial statements. In the classification method used here, this generates differences in the level of adoption among European countries. Besides the EU, the West and Central African nations[10] also follow common accounting standardization, which is an elaboration of the French *Plan Comptable* for SME and will require IFRS for listed companies and companies seeking financing in a public capital market starting on January 1st, 2019.

[9]For the Figure, the countries without a profile at the IFRS Foundation (2018) are considered non-adopters.

[10]Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Congo, Dem. Rep., Congo, Rep., Cote d'Ivoire, Equatorial Guinea, Gabon, Guinea, Guinea-Bissau, Mali, Niger, Senegal, and Togo.

(a) Type and Extent (b) Endorsement

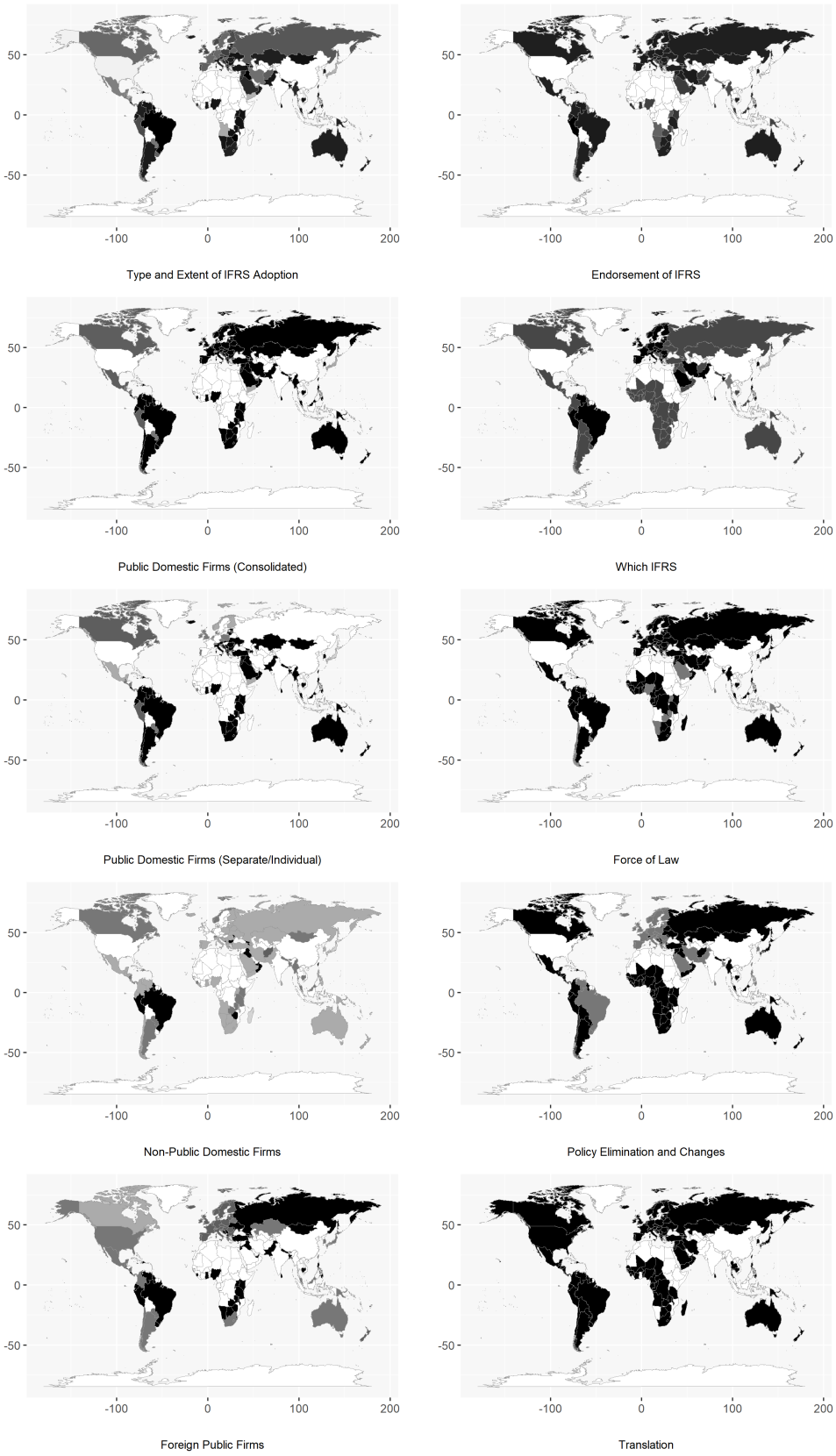

Figure 2.5: Categories of IFRS Adoption

Figures 2.5a and 2.5b show the geographical distributions of IFRS adoption categories. For the Extent and Type of Adoption divisions it is clear that most countries have higher levels of adoption only for the consolidated financial statements produced by publicly-held firms, followed by foreign public firms. Only a few countries use IFRS for the separate or individual financial statements. The United States, for instance, does not allow its domestic firms to publish their financial statements in IFRS but, since 2007, the SEC allows all foreign firms to present their financial statements in IFRS.

The Endorsement category is much more uniform across countries. Most countries adopt the IFRS as issued by the IASB and almost all of the adopters do so by force of law. Many countries also made modification and changes in the original standards. This is usually necessary when there are particular features in the market that are incongruent with a certain standard. Finally, only in a few cases the IFRS are not translated to the local business language.

2.4 Concluding Remarks

In this chapter I categorized and discussed the different levels of IFRS adoption among countries. Breaking down the IFRS harmonization into two major categories, namely (i) the type and extent of adoption and (ii) endorsement, I achieved different levels of adoption among countries whose firms mandatorily use IFRS as well as among countries who have either made a formal commitment to adopt or introduced a voluntary or partial adoption process.

The analyses show that, by 2018, only a few nations are not mandatory adopters of IFRS, but several of those have incorporated the international standards into their markets by some extent. Among the mandatory adopters there is great variation mainly in the extent of adoption. The results show that most adopters require IFRS for the consolidated financial statements of public domestic firms, but only some also demand for the individual or separate reports. Many also require or permit foreign firms to use IFRS but only a few extend the international standards for the non-listed or private firms. With respect to the endorsement processes, most countries adopt the IFRS as issued by the IASB and include them in their domestic setting via force of law. However, many countries also postulate changes to the original standards, but they are usually very specific and are introduced via a formal evaluation process.

All told, the results from this chapter are important because they show accounting harmonization is far from being binary, as the empirical literature in IFRS usually considers. Adopters are almost never full adopters and non-adopters usually included IFRS into their markets at some level. In Chapters 4 and 5 this diversity of IFRS adoption is explored in empirical analyses of the economic effects of accounting harmonization.

3 Spatial dynamics of international capital flows

3.1 Introduction

This essay aims to investigate the role of IFRS adoption in the spatial dynamics of international capital flows[1]. We investigate the effects of countries' decision do adopt the international standards in the dynamics of capital flows in order to understand how the attraction of capital among countries may potentially explain the spatial patterns of adoption across time.

Capital flows have been crossing international borders in increasing speed and volume. According to Bussière and Phylaktis (2016), global capital flows increased from 7% of world GPD in 1998 to over 20% in less than 10 years. When analyzing factors that attract capital into countries, the provision of high quality and low-cost information on both country-level factors, such as foreign reserves and national institutions strength, and on the quality of firm-level investments (Obstfeld, 1998) is crucial. For the latter, accounting data is the main source of information that external users can access; but, throughout history, accounting standards have differed substantially across borders (Nobes & Parker, 2010). Nevertheless, in the last decades this scenario has been changing with the global convergence towards one single accounting system represented by the IFRS.

Capital flows among different countries cannot, however, be analyzed only considering the countries' own characteristics. As many authors have pointed (e.g., Baltagi, Egger, & Pfaffermayr, 2007; Blonigen, 2005; Boero, Mandalinci, & Taylor, 2019; H. Kim, Cho, & Kim, 2015), international capital flows are interdependent, that is, a country's own inflow depend on other countries' inflows. Similarly, the decision to adopt IFRS is also not independent across countries. According to Hail, Leuz, and Wysocki (2010a, 2010b), it involves not only economic but also political factors, specifically the competition between standard setters and the political ramifications of the adoption involving cooperation among countries.

Specifically assessing the interaction among countries for explaining IFRS adop-

[1]This chapter is a joint work with André Luis Squarize Chagas.

tion, Ramanna and Sletten (2014) focus on what they call network effects. Besides analyzing countries' power, domestic governance institutions, foreign trade and investment flows[2], the authors also analyzed countries' geographical positions and trade partners. According to them, IFRS can be a product of a network effect because adopting a specific set of accounting standards can be more appealing to a country if other countries have adopted it before.

As Ramanna and Sletten (2014) point, countries do not adopt IFRS all at once, so the increasing adoption throughout the years can be due to the growing value of the IFRS network. Thus, there might be direct and indirect, via the network, benefits around the adoption. Consistent with this, they found IFRS adoption presents regional and trading patterns. The authors found a country is more likely to adopt IFRS if other countries in its geographical region are already adopters and if its trader partners are already adopters.

In this essay we evaluate how such a growing value network is being formed regarding the attraction of capital flows. We have two hypotheses:

1. Complementarity Effect: The more capital inflows to a given country, the more inflows go to its neighbors. The adoption of IFRS reinforces the effect via the network.
2. Substitution Effect: The more capital inflows to a given country, the less inflows go to its neighbors. The adoption of IFRS minimizes the effect via the network.

In the first hypothesis there is a competition for capital among neighbor countries, and in the second one investment flows to groups of neighbor countries. If IFRS facilitates cross border investment, them it is expected either to reinforce the complementarity effect or to minimize the substitution effect.

To evaluate this, we analyze the international capital flows spatial interdependence via a SAR model, in which we allow countries' Foreign Direct Investment (FDI) and Foreign Portfolio Investment (FPI) inflows to depend on the inflows to their neighbors, so that IFRS can have both direct and indirect effects on the inflows. The SAR model jointly estimates the autoregressive component of capital flows, identifying the complementarity or the substitution effect, and their response to IFRS. The marginal effects of the IFRS variable gives the reinforcement or minimizing outcome, allowing us to understand how IFRS impacts the attraction of foreign investment across countries.

The design used by Ramanna and Sletten (2014)[3] does not allow for spatial effects, however, their results bring important insights for a formal spatial analysis, suggesting

[2]The authors found that more powerful countries are less likely to adopt IFRS and that the likelihood of adoption first increases and then decreases with the levels of governance, and the expected changes in foreign trade and investment do not appear to influence the adoption decision.

[3]Ramanna and Sletten (2014) used a duration analysis modeling IFRS adoption decisions as functions of the relative time of adoption, including as covariates the proportion of countries within each region that are already IFRS adopters to assess the geographical network and, then, changing it by the percentage of exports to countries that are already IFRS adopters, to assess the trade network.

that economic neighborhood relations are important in the IFRS adoption patterns. Although the geographical relationship are significant in their work, it is probably just reflecting economic relations that were developed around the physical regions.

A crucial point when estimating spatial models is how the neighborhood relationships are defined to build the spatial weights matrix, which delineates how spatially close are each pair of observations. For the foreign investment literature, while Blonigen, Davies, Waddell, and Naughton (2007) and Baltagi et al. (2007) use geographical distances for defining the spatial weights, "economic distance" is what drives the interdependence among countries. In this essay we use a weight matrix based on trade flows, aiming to capture the underlying economic structure driving the spatial dependence on capital flows. We look for the long-term imports and exports relationships between each pair of country in the sample.

For example, the neighborhood relationship between Australia and Chile is measured by the natural logarithm of the historical mean, in order to capture long-term relationships, of total exports and imports between the two countries. Doing so we yield symmetric weight matrix, where the relationship from country i to country j is the same as from country j to country i. Yet, this is likely not true. Pairs of countries with different sizes or levels of development, for example, probably have non-symmetric relationships. To deal with this, we also define a non-symmetric weight matrix where the neighborhood relationship is scaled by the Gross Domestic Product (GDP) per capita. Then, the "distance" between the pair Australia–Chile is different from the pair Chile–Australia, for example. Moreover, an economic non-symmetric, rather than a geographical symmetric weight matrix, is more likely to capture hindrances to countries' international relations such as economic and trade barriers. Additional details on the weight matrix are given in Section 3.3.

The problem with using economic measures to define spatial weights is that it is very likely to generate an endogenous spatial weight matrix, where both the outcome and the neighbors affecting that outcome are determined by economic forces. In the example, the trade flows between Australia and Chile may depend on the countries' level of development, which will also define their capital inflows. Therefore, using a geographic weight matrix may not fully capture the relationship of interest, but an economic weight matrix will potentially generate biased estimates. To tackle this problem, we employ an estimator for SAR models with an endogenous weight matrix. We use the estimator developed by Kelejian and Piras (2014), in which the endogenous weight matrix is said to be formed by two sets of exogenous variables, one of them is observable and the other may even be unknown. As the observable set, we use exogenous variables from a gravity model of trade (Anderson, 2011; Baltagi, Egger, & Pfaffermayr, 2014). We also considered using the estimator of Qu and Lee (2015), however, the Kelejian and Piras (2014) estimator is more adequate when using the gravity model for defining the weight matrix.

Our results indicate that there is a complementarity effect for foreign capital flows both from direct and portfolio investment. That is, a country have more capital inflows the higher are the inflows to its neighbors. Regarding the effect of IFRS, we found that the decision to adopt the international standards is accompanied by higher net FDI inflows, though lower net FPI inflows. Since we work with net inflows, IFRS is likely increasing FPI gross outflows more than gross inflows to the countries of the sample. Mostly important, while IFRS has significant direct effects on capital net inflows, around half of the total effect is indirect, that is, through the neighbors network. These results are in line with the idea from Ramanna and Sletten (2014) on a growing value of an IFRS network. While the authors do not thoroughly explore how this network works, our results indicate that it works directing and reinforcing the effects of FDI net inflows.

These results contribute to two different literatures. First, through introducing the IFRS phenomenon on spatial dependence models of capital flows, it adds firms' financial transparency as an important factor explaining the cross-border investments dynamics on global economies. Second, explicitly evaluating such a spatial dynamics, the complementarity effects bring important insights on the reasons why countries choose to change their domestic accounting systems for IFRS. This is of special interest for the literature on the economic consequences of global financial harmonization, since understanding why countries adopt IFRS in the first place is crucial to understand its true effects. Finally, the results are important from a policy perspective. The proponents of IFRS argue that one of the paths by which the adoption is expected to boost economic growth is through the attraction of foreign investment. In this essay we show not only that IFRS facilitates foreign investment, but also that it occurs via the direct adoption as well as via the neighbors' adoption in the countries' network.

The chapter is structured as follows. The next section brings a brief literature review on IFRS and capital flows, Section 3.3 develops the models and describes the Kelejian and Piras (2014) estimator for spatial autoregressive models with endogenous weight matrix. Section 3.4 describes the countries included in the sample, the variables used and the data sources, as well as the construction of the weight matrices. Section 5.4 discusses the results and, finally, Section 5.5 presents some concluding remarks.

3.2 Literature Review

The workhorse of the literature on the economic effects of IFRS adoption focuses on accounting quality, cost of capital, information asymmetry, among others (see, e.g., A. Ahmed, Neel, & Wang, 2013; Barth, Landsman, & Lang, 2008; Christensen et al., 2013; Daske et al., 2008; J. Kim & Shi, 2012). Nevertheless, there are a few papers specifically analyzing international markets' linkages. For example, Covrig, Defond, and Hung (2007) argue in favor of the ability of accounting harmonization to attract foreign capital showing

that foreign mutual fund ownership is higher in countries where firms moved voluntarily to the international standards. Further, following the mandatory adoption of IFRS by the EU member states, DeFond et al. (2011) test the hypothesis that IFRS improves financial information comparability and, then, attracts cross-border investment finding an increase in foreign investment among companies in countries who experienced improvements in financial statements comparability after the adoption.

Khurana and Michas (2011) also bring evidence in favor of more fluid investment flows following IFRS adoption. The authors analyze the tendency of investors from the United States to overweight domestic stocks in their portfolios (home bias) and found it decreases for countries adopting IFRS, suggesting that a common set of accounting standards facilitates cross-border investment. Although not specifically assessing IFRS, Bae, Tan, and Welker (2008) analyze how the difference between countries' accounting information induce economic costs by showing that the higher this difference is, lower is the level of foreign analyst following and forecast accuracy, collaborating for making the case for the efforts to decrease countries' financial information differences.

Other studies explicitly analyzed whether IFRS adoption attracts FDI. Márquez-Ramos (2011), for instance, find that countries adopting IFRS experience benefits regarding the flow of FDI and also trade, arguing that accounting harmonization acts reducing information costs and investors' uncertainty. Further, Gordon et al. (2012) also brings evidence that IFRS adoption leads to greater FDI inflows, specially for emerging countries.

The literature on foreign investment points several factors as determinants of FDI flows. Blonigen (2005), for instance, cites firm-level characteristics, such as intangible assets, and country-level characteristics, such as exchange rates movements, and trade linkages. The authors also points that FDI patterns present spatial interdependence, that is, neighbor countries' FDI flows can affect a country's own flow. This spatial dependence has been explored by a few papers, such as Baltagi et al. (2007), who used distance as a proxy for trade costs as spatial weights allowing third-country effects, that is, spillover effects. H. Kim et al. (2015) also studied spillover effects on capital flows, focusing on FPI and specifically evaluating the interdependence among countries' background such as language, culture, and colonial relationships. The authors find that this interdependence does explain returns and risk differentials among countries.

Boero et al. (2019) cites some examples in which this interdependence is expressed, such as in financial and real linkages or global common shocks and geopolitical risk. For Blonigen et al. (2007), the presence of spatial dependence on investment flows is due to a multilateral decision-making process implying that FDI decisions across countries are not independent. Specifically, according to the authors, the spatial autoregressive model is of special interest for the literature on FDI since the spatial lag coefficient brings information about the strength of countries interdependence and allows for substitution or complementarity effects.

3.3 Model

We estimate the following SAR model:

$$y_{ct} = \rho_1 \mathbf{W} y_{ct} + \alpha_1 IFRS_{ct} + \mathbf{X}_{ct}\beta_1 + u_{ct}, \tag{3.1}$$

where *IFRS* is a dummy variable indicating the moment from adoption for each country, $\mathbf{W}$ is the spatial weights matrix which defines the neighborhood relationships between each pair of countries in the sample, y is either FDI or FPI net inflows, $\mathbf{X}$ includes countries' size, financial development, GDP growth, openness and risk, and c denotes countries and t denotes years. Details on the data and variables are in Section 3.4.

The spatial lag allows for spatial interdependence in the capital flows, in line with previous work such as Baltagi et al. (2007), so that there is a feedback effect of the explanatory variables, including IFRS, due to the spatial dependence. Therefore, the estimated parameters from Equation (3.1) indicate only direct effects, so the total response must also include the feedback effect from the countries' neighbors. This indirect effect occurs through the weight matrix $\mathbf{W}$.

To estimate SAR models one can rely on Maximum Likelihood (ML) methods (Lee, 2004; Ord, 1975) and instrumental variables methods (Kelejian & Prucha, 1998) including Generalized Method of Moments (GMM) and FGLS estimators. Nonetheless, the asymptotic properties of these estimators are all based on the assumption that the weight matrix $\mathbf{W}$ is exogenous.

When estimating the spatial model in Equation (3.1), it is crucial to understand the nature of the spatial weights matrix $\mathbf{W}$, that is, how the neighborhood relationships are defined. Blonigen et al. (2007) and Baltagi et al. (2007) use geographic distance, although the economic interdependence among countries comes from economic relationships, which are reflected in the geographic patterns, making the latter significant in their works. Analogously, in the duration analysis of Ramanna and Sletten (2014) the geographical relationships are likely just reflecting economic relations that were developed around the physical regions. Such thoughts leads one to consider building a neighborhood matrix derived from economic relationships to properly capture countries' interdependence. Nevertheless, an economic spatial weight matrix is very likely to be endogenous, i.e., with entries defined by the same process that generates the outcome variable. For instance, trade and investment flows may both depend on economic growth and interest and exchange rates. Thence, using the traditional methods for estimating SAR models will most likely generate biased estimations.

In this research, the spatial interdependence effect of capital flows is expected to occur through economic linkages. We cannot expect this relationship to be exogenous in the models so, to overcome this problem, we the employ estimator developed by Kelejian and Piras (2014). The authors explain that in a typical spatially autocorrelated model,

the error term is

$$u_N = \rho \mathbf{W}_N u_N + \epsilon_N$$
$$u_N = (I_N - \rho \mathbf{W}_N)^{-1} \epsilon_N,$$

so that $(I_N - \rho \mathbf{W}_N)$ must be non-singular and $\mathrm{E}[\epsilon_N] = 0$. If $\mathbf{W}$ is endogenous, it is correlated with ϵ_N and $\mathrm{E}[u_N] = \mathrm{E}\left[(I_N - \rho \mathbf{W}_N)^{-1} \epsilon_N\right] \neq 0$. The specification would, then, imply in an error term whose mean is not zero. And if this mean involves exogenous variables that could partially determine the elements of $\mathbf{W}$ as well as unknown parameters, the mean error would not even be a constant vector. To overcome this problem, the authors specify a nonparametric form for the error term:

$$u_N = \mathbf{R}_N \epsilon_N, \tag{3.2}$$

where $\mathbf{R}_N$ is an $NT \times NT$ non-stochastic matrix and ϵ_N is a random vector with mean zero.

Here, we model the neighborhood relationships according to the trade flows between each country i with each country j of the sample. To do so, we look for the long-term imports and exports relationships between each pair (i, j) according to the exports data available at the Exporter Dynamics Database from the World Bank. As explained in Section 3.1, we measure the neighborhood between each pair (i, j) of countries as the natural logarithm of the historical mean, in order to capture long-term relationships, of total exports and imports between the two countries:

$$w_{ij}^{sym} = \log\left(1 + \sum_t \left(Imp_{ij,t} + Exp_{ij,t}\right)/T\right). \tag{3.3}$$

Doing so we yield symmetric weight matrix, where the relationship from country i to country j is the same as from country j to country i. We also define non-symmetric relationships, scaling the long-term mean of total imports plus exports by the GDP per capita of country i:

$$w_{ij}^{nonsym} = \log\left(1 + \frac{\sum_t \left(Imp_{ij,t} + Exp_{ij,t}\right)/T}{GDPpc_i}\right). \tag{3.4}$$

In the model of Kelejian and Piras (2014), some of the weight matrix elements w_{ij} are specified to be zero and the others are positive. Trade is defined to be zero for pairs of the same country and is either zero or positive for pairs of different countries. The subset of elements that are not specified to be zero, that is, elements for which $i \neq j$, denoted by w_{ij}^* is an unknown function of two sets of exogenous variables. One set, $p_{ij,N}$ is observable

and known, and the other, $q_{ij,N}$ is not observable and might be unknown:

$$\mathrm{E}\left[w^*_{ij,N}\right] = f\left[p_{ij,N}, q_{ij,N}\right]$$
$$w^*_{ij,N} = f\left[p_{ij,N}, q_{ij,N}\right] + \zeta_{ij,N},$$

where $\mathrm{E}\left[\zeta_{ij,N}\right] = 0$. The function that maps $p_{ij,N}$ and $q_{ij,N}$ is unknown, but Kelejian and Piras (2014) explain the researcher can specify at least some of the exogenous variables that appear in it. Since w^*_{ij} in our case is the log of trade we include the log of countries' population, area and geographical distance between each pair, as predicted by a gravity model of trade (Anderson, 2011). Thence, we define:

$$w^*_{ij,N} = a_1 + pop_{i,N}a_2 + pop_{j,N}a_3 + area_{i,N}a_4 + area_{j,N}a_5 + dist_{ij,N}a_6 + \zeta_{ij,N}, \tag{3.5}$$

where $pop_{i,N}$ and $pop_{j,N}$ is the log of country i and country j population, respectively, $area_{i,N}$ and $area_{j,N}$ are the log of the surface area (squared kilometers) of countries i and j and $dist_{ij,N}$ is the log-distance between the main city of each country. The complete description of the variables are in Table 3.1. Further details of the model, including the assumptions, estimation and inference, can be seen in Kelejian and Piras (2014).

3.4 Data

Our analyses comprise data from 1998 to 2014. For the FDI analyses we have 96 countries (1,632 observations) with all information available for the full period, and for the FPI data the number of available countries falls to 83 (1,411 observations). Figure 3.1 shows the countries included in the sample indicating their main city, which is the city where the main stock exchange is located or, when there is no stock exchange, the capital city.

The information about IFRS adoption were obtained in the jurisdictional profiles at the IFRS Foundation (2018), as detailed in Chapter 2. Figure 3.2 shows the spread of mandatory IFRS adoption in a World map. From 138 countries in the initial sample, 13% were adopters by 2000. This percentage jumped to 43% in 2005, mainly due to the adoption by the EU in that year. In 2010 the adoption spread through the other continents. More than half of the countries were adopters in 2010 and in 2015 the percentage approaches 70%. However, this is if we only consider mandatory adoption to public domestic companies. As one can see in Chapter 2, almost every country listed by the World Bank have some type of adoption.

Figure 3.1: Cities of the Sample

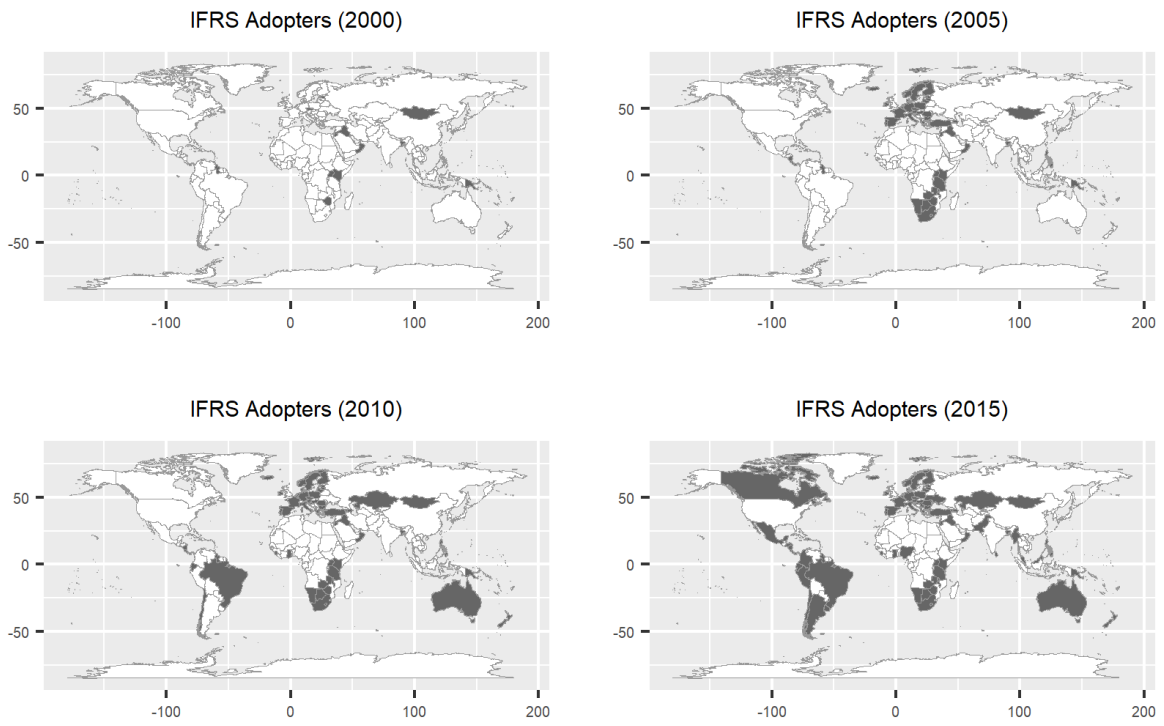

Figure 3.2: Spread of IFRS Adoption

Table 3.1: Variables' Description

Variable	Name	Description	Source
IFRS	IFRS Adoption	Dummy indicating the mandatory adoption of IFRS.	Compiled from the IFRS Foundation (2018).
FDI	FDI	Net FDI inflows as a percentage of GDP.	World Development Indicators (WDI), World Bank.
FPI	FPI	Net FPI inflows as a percentage of GDP.	WDI, World Bank.
Imp	Imports	Imports value.	Exporter Dynamics, World Bank.
Exp	Exports	Exports value.	Exporter Dynamics, World Bank.
pop	Population	Log of population.	Calculated from data from the WDI, World Bank.
area	Surface Area	Log of squared kilometers.	Calculated from data from the WDI, World Bank.
dist	Geographical Distance.	Log of the Harvesine great circle distance between the main city of each pair of country in meters. The main city is the city in which the main stock exchange is located or, when there is no stock exchange in the country, the capital city.	Calculated from data of the ggmap R package Data Science Toolkit.
GDPpc	GDP per capita	GDP per capita (current US$).	WDI, World Bank.
Size	Country's Size	Log of US Dollar GDP.	Calculated from data from the WDI, World Bank.
FD	Financial Development	Mean of financial institutions' depth (private credit by deposit money banks as a percentage of GDP), efficiency (inverse of bank net interest margin) and stability (bank z-score) and financial markets' depth (outstanding domestic private debt securities plus stock market capitalization as a percentage of GDP), efficiency (stock market turnover ratio) and stability (inverse of stock price volatility).	Calculated from data from the Global Financial Development (GFD) Database, World Bank.
Risk	Country risk	Single rating based on ratings of political (government stability, socioeconomic conditions, investment profile, internal conflict, external conflict, corruption, military in politics, religion in politics, law and order, ethnic tensions, democratic accountability, bureaucracy quality), economic (current account as a % of GDP, budget balance, GDP growth, GDP per capita, inflation, current account as a % of GDP) and financial (foreign debt as a % of GDP, exchange rate stability, debt service as a % of exports, current account as a % of exports, international liquidity) risk.	International Country Risk Guide (ICRG), PRS Group.
Growth	GDP Growth	Three-year log-rate of GDP growth.	Calculated from data from the WDI, World Bank.
Openness	Trade Openness	Total imports plus exports as a percentage of GDP.	Calculated from data from the WDI, World Bank.

Table 3.1 shows the description and sources of the variables used in this essay, including IFRS adoption, the international capital flows and the set of controls for the SAR model, the trade data for building the neighborhood matrix, and the data for the gravity model.

Table 3.2 presents the descriptive statistics for the variables used both in the gravity model and in the SAR model. While all countries have positive net FDI inflows, several have negative FPI inflows. The mean (standard deviation) FDI across countries is 4.36% (5.53%) and the mean FPI is 1.03% (7.03%). The countries with higher levels of FDI are Malta, the Netherlands, Singapore and Mongolia (except for the Netherlands, these are also the ones with higher FPI inflows), and the ones with the lower levels for both FDI and FPI are Indonesia, Bangladesh, Kuwait and Japan. The countries with the larger populations (areas) are China, India, United States, Indonesia and Brazil (Russia, Canada, United States, China and Brazil). The countries more financially developed are Denmark, the United States and Japan and the countries less financially developed are Sierra Leone, Republic of Congo and Zambia. The risk variable have higher values for less risky countries, which are Norway and Switzerland and the more risky are Sudan and Haiti. The countries who have grown more in the period are Nigeria, Angola and China. On the opposite side are Japan, Germany and Italy. Lastly, the countries with higher levels of trade relative to GDP are Singapore, Malta and Malaysia and the countries with lower levels are Brazil, United States and Japan.

Table 3.2: Descriptive Statistics by Country

Country	Size	FDI	FPI	Pop	Area	IFRS	FD	Risk	Growth	Openness
Albania	22.75	5.87	0.08	14.91	10.27	0.65	0.52	66.02	0.28	63.91
Angola	24.23	7.38	0.84	16.83	14.04	0	0.36	61.98	0.46	123.86
Argentina	26.40	2.52	1.02	17.49	14.84	0.06	0.32	68.71	0.19	34.27
Australia	27.34	3.10	−3.13	16.85	15.86	0.47	1.14	80.22	0.24	42.67
Bahamas, The	22.97	4.45		12.74	9.54	1	0.85	77.29	0.16	69.79
Bahrain	23.52	5.35	10.46	13.76	6.60	0.82	0.77	76.71	0.29	143.02
Bangladesh	25.12	0.82	0.05	18.78	11.91	1	0.42	62.82	0.22	38.78
Bolivia	23.32	4.66	0.61	16.04	13.91	0	0.46	68.75	0.25	61.16
Botswana	22.95	3.65	3.42	14.45	13.27	0.71	0.48	80.12	0.20	97.11
Brazil	27.78	3.24	−1.13	19.05	15.96	0.29	0.66	68.35	0.19	24.16
Bulgaria	24.15	9.58	1.09	15.85	11.62	0.59	0.49	69.51	0.28	115.04
Cameroon	23.66	1.51	0.02	16.70	13.07	0	0.34	66.21	0.20	49.59
Canada	27.78	3.51	−0.84	17.30	16.12	0.24	1.05	84.01	0.19	69.26
Chile	25.64	7.48	2.50	16.61	13.54	0.29	0.64	77.67	0.22	66.19
China	28.74	3.60	0.08	20.96	16.07	0	1.15	75.64	0.43	45.76
Colombia	25.89	3.45	−0.42	17.59	13.95	0	0.34	64.01	0.24	34.12
Congo, Rep.	22.57	9.33	0.19	15.17	12.74	0	0.20	63.33	0.32	131.50
Costa Rica	23.93	5.87	−0.50	15.27	10.84	0.76	0.58	73.89	0.25	78.81
Cyprus	23.62	9.29	1.29	13.85	9.13	1	0.88	76.98	0.16	99.94
Czech Republic	25.62	5.68	−0.09	16.15	11.28	0.88	0.56	76.12	0.21	118.68
Denmark	26.28	2.96	2.59	15.51	10.67	0.59	1.36	85.00	0.11	91.28
Dominican Republic	24.33	4.02	−0.83	16.05	10.79	0.12	0.68	69.56	0.22	53.11
Ecuador	24.54	1.40	1.04	16.45	12.48	0.29	0.39	62.71	0.23	55.86

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Table 3.2 – *Continued from previous page*

Country	Size	FDI	FPI	Pop	Area	IFRS	FD	Risk	Growth	Openness
Egypt, Arab Rep.	25.64	2.77	0.20	18.18	13.82	0	0.67	66.10	0.26	51.56
El Salvador	23.47	2.93	−1.16	15.61	9.95	0.24	0.62	70.68	0.15	67.74
Ethiopia	23.57	2.46		18.18	13.91	0	0.44	59.24	0.31	44.40
Finland	26.03	3.93	1.73	15.48	12.73	0.59	0.96	85.53	0.13	74.24
France	28.39	2.25	−1.21	17.96	13.22	0.59	1.02	76.97	0.10	55.47
Germany	28.69	2.46	0.81	18.22	12.79	0.59	1.22	83.32	0.08	71.53
Ghana	23.49	4.86	−0.70	16.91	12.38	0.47	0.26	64.76	0.29	86.74
Guatemala	24.14	0.98	−0.31	16.41	11.60	0	0.55	68.53	0.22	58.53
Guinea	22.28	2.84		16.11	12.41	0	0.28	55.26	0.13	53.89
Guyana	21.27	7.55	0.32	13.53	12.28	0.88	0.45	62.49	0.26	159.89
Haiti	22.36	1.06		16.05	10.23	0	0.45	55.06	0.18	59.25
Honduras	23.11	5.49	−0.16	15.83	11.63	0.18	0.84	64.29	0.27	89.19
Hungary	25.30	9.13	−1.88	16.13	11.44	0.59	0.51	73.42	0.19	140.91
Iceland	23.28	7.09	−4.52	12.67	11.54	0.59	0.91	77.43	0.14	83.38
India	27.55	1.47	−0.93	20.87	15.01	0	0.79	67.70	0.28	41.05
Indonesia	26.60	0.88	−0.72	19.25	14.46	0	0.45	62.40	0.28	57.76
Israel	25.88	3.47	0.85	15.77	10.00	0.41	0.95	70.98	0.17	70.81
Italy	28.19	1.11	−0.57	17.88	12.62	0.59	1.03	76.66	0.09	51.05
Jamaica	23.16	5.00	1.14	14.83	9.30	0.88	0.46	68.36	0.12	89.16
Japan	29.21	0.20	0.43	18.66	12.84	0	1.28	82.72	0.02	27.78
Jordan	23.49	8.34		15.64	11.40	1	1.10	70.98	0.28	122.62
Kenya	23.94	0.93	−0.31	17.43	13.27	0.94	0.47	62.65	0.28	60.32
Korea, Rep.	27.45	1.16	−0.67	17.70	11.51	0.24	1.14	79.11	0.15	83.28
Kuwait	25.08	0.45	18.92	14.74	9.79	0.41	0.76	82.13	0.31	91.95
Madagascar	22.57	5.14		16.75	13.28	0	0.23	61.66	0.19	61.17
Malawi	22.07	3.14	−0.01	16.42	11.68	0.82	0.32	59.88	0.19	59.14
Malaysia	25.81	3.32	−0.33	17.08	12.71	0.18	1.04	77.13	0.21	184.35
Mali	22.63	2.46	0.28	16.40	14.03	0	0.37	62.95	0.28	55.76
Malta	22.62	22.65	32.81	12.91	6.01	1	0.89	78.47	0.18	236.57
Mexico	27.53	2.64	−1.16	18.52	14.49	0.18	0.58	72.81	0.19	56.02
Mongolia	21.97	11.61		14.76	14.26	0.88	0.52	66.74	0.38	114.64
Morocco	24.93	2.02	−0.23	17.25	13.01	0	0.98	72.19	0.17	62.56
Namibia	22.67	5.50	8.35	14.54	13.62	0.59	0.65	76.78	0.21	86.18
Netherlands	27.22	20.15	0.44	16.61	10.63	0.59	1.11	84.07	0.12	126.94
Nicaragua	22.68	5.58		15.51	11.78	0.65	0.48	59.34	0.17	81.11
Niger	22.05	5.16	−0.19	16.47	14.05	0	0.44	58.16	0.24	51.76
Nigeria	25.63	2.77	−0.58	18.78	13.74	0.18	0.46	60.62	0.47	58.00
Norway	26.45	3.04	8.33	15.37	12.86	0.59	0.84	90.08	0.21	69.97
Oman	24.30	2.21	−0.07	14.82	12.64	1	0.70	80.33	0.29	103.98
Pakistan	25.54	1.32	−0.21	18.87	13.59	0	0.86	57.77	0.23	36.26
Panama	23.75	8.31	−0.11	15.03	11.23	0.88	1.25	73.01	0.27	134.57
Papua New Guinea	22.74	1.41	−0.54	15.68	13.05	1	0.23	65.70	0.25	101.90
Paraguay	23.27	1.43		15.58	12.92	0	0.45	65.31	0.19	96.75
Peru	25.26	3.89	−0.55	17.15	14.07	0.18	0.52	70.26	0.22	43.67
Philippines	25.60	1.46	−0.76	18.28	12.61	0.59	0.63	70.06	0.21	69.66
Poland	26.50	3.56	−1.58	17.46	12.65	0.59	0.50	75.63	0.22	73.95
Portugal	25.95	3.95	−0.13	16.16	11.43	0.59	0.98	76.06	0.11	68.14
Romania	25.31	3.91	−0.75	16.86	12.38	0.59	0.32	66.58	0.29	69.26
Russian Federation	27.41	2.33	0.30	18.79	16.49	0.18	0.44	70.03	0.32	54.47
Saudi Arabia	26.57	2.53	1.71	17.02	14.58	0	0.78	77.75	0.28	78.85
Senegal	22.92	2.16	−0.54	16.27	12.19	0	0.49	63.64	0.20	69.22
Sierra Leone	21.44	6.43		15.55	11.19	0.35	0.18	56.52	0.29	52.22
Singapore	25.76	17.48	14.15	15.33	6.55	0	1.06	87.85	0.20	323.02
Slovak Republic	24.83	4.34	−1.52	15.50	10.80	0.59	0.64	74.35	0.23	136.99

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Table 3.2 – *Continued from previous page*

Country	Size	FDI	FPI	Pop	Area	IFRS	FD	Risk	Growth	Openness
South Africa	26.18	1.66	−1.78	17.71	14.01	0.59	0.86	70.17	0.16	57.46
Spain	27.69	3.35	−2.10	17.60	13.13	0.59	1.24	75.29	0.14	56.03
Sri Lanka	24.16	1.27	−1.15	16.79	11.09	0.18	0.54	61.88	0.29	67.20
Sudan	24.16	3.96		17.26	14.66	0	0.54	52.19	0.33	32.97
Sweden	26.70	5.32	0.91	16.03	13.02	0.59	0.89	85.25	0.13	82.05
Switzerland	26.81	4.33	5.79	15.84	10.63	0	1.16	88.83	0.14	104.09
Tanzania	23.68	3.99	−0.02	17.53	13.76	0.65	0.48	62.18	0.34	44.76
Thailand	26.11	3.39	−0.20	18.00	13.15	0	0.88	70.52	0.16	125.98
Togo	21.58	4.19	0.72	15.58	10.95	0	0.32	60.24	0.19	92.46
Trinidad and Tobago	23.45	5.37	1.73	14.08	8.54	1	0.59	77.72	0.27	102.22
Tunisia	24.23	3.18	−0.02	16.14	12.01	0	1.02	70.80	0.15	94.77
Turkey	26.92	1.46	−1.01	18.05	13.57	0.59	0.68	60.65	0.29	46.70
Uganda	23.15	4.01		17.20	12.39	1	0.27	62.00	0.25	44.88
United Kingdom	28.46	4.53	−3.71	17.93	12.40	0.59	1.14	79.62	0.12	54.34
United States	29.89	1.79	−0.63	19.51	16.09	0	1.33	77.44	0.13	26.13
Uruguay	24.00	4.28	−1.31	15.02	12.08	0.18	0.31	71.51	0.20	50.98
Venezuela, RB	25.98	1.64	−0.01	17.12	13.72	0.41	0.38	62.41	0.30	46.94
Vietnam	24.93	5.34		18.26	12.71	0	0.69	68.26	0.35	134.90
Zambia	23.02	5.81	−0.67	16.33	13.53	0.59	0.22	62.54	0.33	66.62

Variables' descriptions are in Table 3.1.

Finally, Table 3.3 shows the correlation between each pair of variables. FDI and FPI are positively correlated and both are negatively correlated with countries' size measured by GDP, population and area. Countries with higher levels of trade also have larger FPI and FDI inflows, as well as less risky countries, more financially developed and with larger growth rates. IFRS is negatively, though low, correlated with countries' size, but is positively correlated mainly with FDI inflows. In addition, countries more financially developed, less risky and with higher levels of trade are more likely to adopt IFRS.

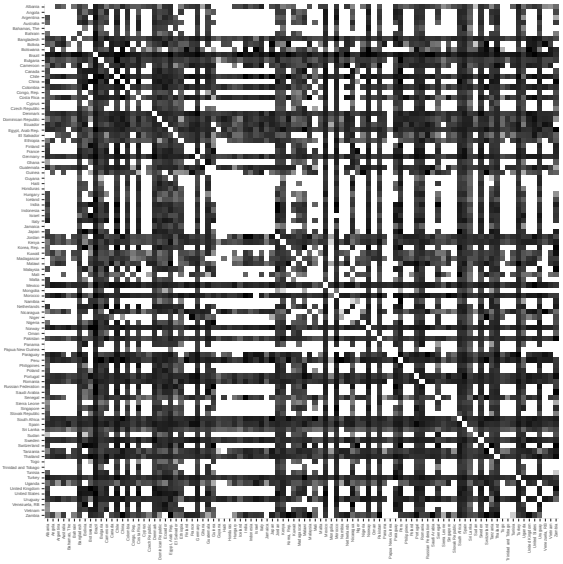
Table 3.3: Correlation Matrix

	Size	FDI	FPI	Pop	Area	IFRS	FD	Risk	Growth	Openness
Size	1	−0.14	−0.13	0.65	0.37	−0.03	0.59	0.50	−0.002	−0.23
FDI		1	0.31	−0.30	−0.30	0.18	0.07	0.14	0.09	0.48
FPI			1	−0.28	−0.35	0.01	0.05	0.21	0.02	0.35
Pop				1	0.67	−0.31	0.10	−0.16	0.05	−0.52
Area					1	−0.27	−0.10	−0.19	0.08	−0.57
IFRS						1	0.12	0.16	0.07	0.23
FD							1	0.62	−0.14	0.16
Risk								1	0.005	0.29
Growth									1	0.02
Openness										1

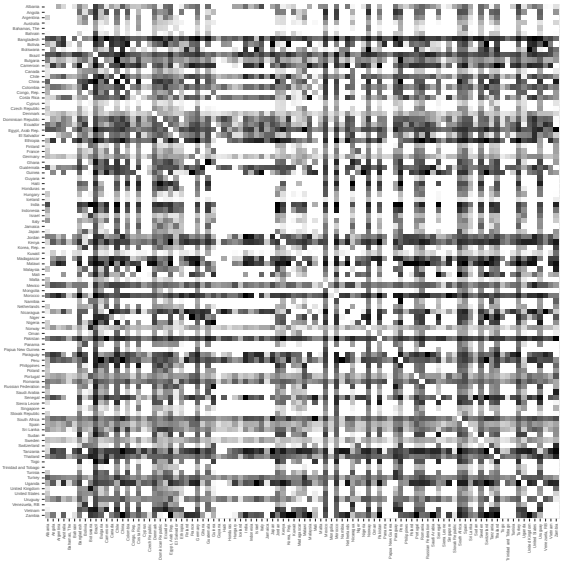
Variables' descriptions are in Table 3.1.

The endogenous weight matrix $\mathbf{W}$ is computed in two different ways. In the first way we measure the long-term trade relationships between each pair ij of countries, yielding a symmetric weight matrix, as would be with a geographical distance weight matrix. As discussed in Section 3.3, such symmetric relationships may not be accurate, so

(a) Long-term Mean of Total Imports plus Exports



(b) Long-term Mean of Total Imports plus Exports scaled by GDP



(c) Inverse of Geographical Distance

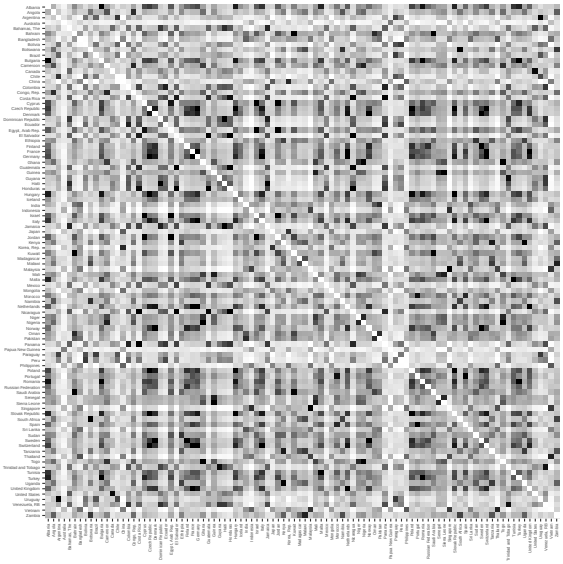


Figure 3.3: Weight Matrices

we also design a trade weight matrix scaled by country i's GDP, gauging a non-symmetric weight matrix. Figure 3.3 compares the weights of these two matrices with a traditional geographical one.

The symmetric trade flow matrix generates several zero neighborhood relationships, although there are no islands, that is, every country in the sample have trade partners. The more isolated countries are Papua New Guinea, Mongolia and Guyana, with fewer and more distant neighbors. They have 20, 26 and 29 trade partners, respectively. The more integrated countries are Brazil, Norway and Morocco, with many

close trade neighbors. Morocco has 93 trade partners, and Brazil and Norway, together with Germany, Mexico, Pakistan, Portugal, South Africa, Spain, Sweden, Thailand and Turkey, have the highest number of trade partners in the sample, 95 each.

The non-symmetric matrix generates trade relationships with more nuances. At the row dimension, the more isolated countries are Mongolia, Papua New Guinea and Guyana, and at the column dimension are Iceland, The Bahamas and Cyprus.

3.5 Results

3.5.1 Gravity Model

The specification of Equation (3.5) comes from the gravity model of trade in Economics. Gravity models come from an allusion to the Newton's law for the gravitational forces GF between two objects i and j:

$$GF_{ij} = \frac{M_i M_j}{D_{ij}}, \quad i \neq j; \tag{3.6}$$

in which it depends on the objects' masses M and on the inverse of the distance D between them. Translated to explain trade patterns between countries i and j, countries masses are usually measured by GDP or population. Anderson (2011) explains the gravity model is one of the most successful empirical model in economics although it is usually disregarded due to its lack of economic theory.

Due to the model's sucess to explain bilateral trade, the variables of the gravity model are good candidates for instruments for trade flows. Aiming to evaluate whether trade causes growth, Frankel and Romer (1999) estimate a gravity model including as countries' masses their population and area and, besides distance, they also include dummies for landlocked countries and for pairs of countries with a common border. Similarly, Cavallo and Frankel (2008) also estimate a gravity model as an instrument for trade using exogenous variables as masses and distance. We follow these authors and define Equation (3.5) as a gravity model in the log form using countries' population, area and geographical distance to instrumentalize the trade flows $w^*_{ij,N}$ in the endogenous weight matrix.

Table 3.4 shows the estimation results of Equation (3.5) for the FDI and FPI samples, both considering $w^*_{ij,N}$ for the symmetric and non-symmetric weight matrices. The models of trade scaled by GDP have higher explanatory power for the two samples and almost all of the variables are statistically significant. Countries' population has a large positive mass effect and distance has large negative effects on trade. Hence, these estimations validate our choice of instruments for the trade endogenous $\mathbf{W}$ in the SAR model in Equation (3.1), which is our main model of interest, whose results are presented in the following section.

Table 3.4: Gravity Model OLS Estimation Results

	Dependent variable:			
	FDI Sample		FPI Sample	
	Trade	Trade/GDP	Trade	Trade/GDP
	(1)	(2)	(3)	(4)
pop_i	0.668***	0.357***	0.571***	0.335***
	(0.048)	(0.018)	(0.057)	(0.021)
pop_j	0.668***	0.307***	0.571***	0.266***
	(0.048)	(0.018)	(0.057)	(0.021)
$area_i$	−0.015	0.033**	0.029	0.044***
	(0.039)	(0.015)	(0.045)	(0.016)
$area_j$	−0.015	0.010	0.029	0.031*
	(0.039)	(0.015)	(0.045)	(0.016)
$dist_{ij}$	−0.767***	−0.314***	−0.574***	−0.208***
	(0.077)	(0.029)	(0.088)	(0.032)
Constant	−2.131	−4.354***	−2.936*	−5.406***
	(1.421)	(0.527)	(1.633)	(0.588)
Observations	9,120	9,120	6,806	6,806
R^2	0.074	0.137	0.058	0.127
Adjusted R^2	0.073	0.136	0.057	0.126
F Statistic	144.882***	288.373***	83.613***	197.252***

Note: *p<0.1; **p<0.05; ***p<0.01
Variables' descriptions are in Table 3.1.

3.5.2 Spatial Autoregressive Model

Table 3.5 shows the estimation results of Equation (3.1) using the estimator of Kelejian and Piras (2014). We present the model for both FDI and FPI net inflows considering for each both a symmetric and a non-symmetric endogenous weight matrix of trade. The spatial autoregressive coefficient is positive for all the specifications, near to 0.5 for the FDI inflows and to 0.6 for the FPI inflows. This result shows there is a complementarity effect, that is, a country's higher inflows imply in higher inflows also for its neighbors. This is more prominent for FPI inflows. Further, the autoregressive coefficient is slightly smaller for the non-symmetric matrix in the FDI model but slightly larger in the FPI model. The difference is very small, though, and for the other coefficients as well.

Due to the spatial autoregressive term, the coefficients in Table 3.5 cannot be interpreted as marginal effects, since there is a feedback effect running through the neighborhood matrix. Hence, each variable has its direct effects, as measured by the coefficients in Table 3.5 as well as its indirect effect through the spatial autoregressive component.

First, analyzing the direct effect, there is a striking difference for the financial variables between FDI and FPI net inflows. Larger countries have lower capital inflows while more open and faster growing countries have higher inflows. IFRS, financial development and risk, however, have opposite direct effects for FDI and FPI. Higher levels of financial development and lower risk imply in higher FDI but lower FPI net inflows. Similarly,

Table 3.5: SAR Estimation Results

	Dependent variable:			
	FDI	FDI	FPI	FPI
	(1)	(2)	(3)	(4)
Wy	0.480***	0.463***	0.574***	0.599***
	(0.000)	(0.000)	(0.000)	(0.000)
IFRS	0.006***	0.006***	−0.006***	−0.006***
	(0.000)	(0.000)	(0.000)	(0.000)
Size	−0.001***	−0.001***	−0.004***	−0.004***
	(0.000)	(0.000)	(0.000)	(0.000)
FD	0.011***	0.011***	−0.012***	−0.012***
	(0.000)	(0.000)	(0.000)	(0.000)
Growth	0.018***	0.018***	0.003***	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)
Openness	0.095***	0.096***	0.070***	0.071***
	(0.000)	(0.000)	(0.000)	(0.000)
Risk	−0.013***	−0.012***	0.240***	0.239***
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	−0.016***	−0.015***	−0.066***	−0.065***
	(0.000)	(0.000)	(0.000)	(0.000)
Spatial Fixed Effects	Yes	Yes	Yes	Yes
Weight Matrix	Symmetric	Non-symmetric	Symmetric	Non-symmetric
Observations	1,632	1,632	1,411	1,411
R^2	0.256	0.255	0.181	0.179
Ajdusted R^2	0.215	0.213	0.128	0.126

Note: *p<0.1; **p<0.05; ***p<0.01
Variables' descriptions are in Table 3.1.

IFRS adopters have higher FDI but lower FPI net inflows.

In Table 3.6 we present the estimated indirect and, then, the total marginal effect for each variable. From the table we see that the indirect effect is always reinforcing the direct effect and in a similar magnitude, so that the total effect is much larger than the coefficients in Table 3.5. Therefore, around half of the total effect of each variable on capital inflows for a certain country is due to its effects of the countries neighbors, that feedback through their trading relationships.

Specifically analyzing the role of IFRS adoption, when a country adopts the international standards, its net FDI (FPI) inflows seem to increase (decrease). Moreover, this also happens when its neighbors adopt. This suggests a similar intuition as in the work of Ramanna and Sletten (2014), that is, countries adopt IFRS due to an increase in value in the network. In our case, this increased value is reflected in higher FDI inflows. When neighbors adopt there is an increase in capital inflows throughout the whole trade network, so that it makes the adoption more attractive for the neighbor countries, at least when we consider FDI. We work with *net* inflows rather than *gross* and as one can see in Table 3.2, net FPI inflows are often negative. In other words, it is common for countries to have more FPI outflows than inflows. Therefore, IFRS, as well as risk and financial

Table 3.6: SAR Model Marginal Effects

	FDI (symmetric W)			FDI (non-symmetric W)		
	Direct	Indirect	Total Effect	Direct	Indirect	Total
IFRS	0.0061	0.0056	0.0117	0.0061	0.0052	0.0112
Size	−0.0009	−0.0008	−0.0016	−0.0009	−0.0008	−0.0016
FD	0.0110	0.0100	0.0210	0.0112	0.0096	0.0208
Growth	0.0177	0.0162	0.0339	0.0178	0.0151	0.0329
Openness	0.0960	0.0875	0.1835	0.0961	0.0818	0.1779
Risk	−0.0131	−0.0119	−0.0250	−0.0125	−0.0107	−0.0232
	FPI (symmetric W)			FPI (non-symmetric W)		
	Direct	Indirect	Total Effect	Direct	Indirect	Total
IFRS	−0.0063	−0.0083	−0.0146	−0.0065	−0.0095	−0.0160
Size	−0.0037	−0.0048	−0.0085	−0.0037	−0.0054	−0.0091
FD	−0.0126	−0.0166	−0.0291	−0.0124	−0.0182	−0.0306
Growth	0.0033	0.0043	0.0076	0.0034	0.0050	0.0083
Openness	0.0709	0.0935	0.1645	0.0717	0.1049	0.1765
Risk	0.2431	0.3205	0.5636	0.2419	0.3541	0.5960

Note: All coefficients are statistically significant at the 1% level.
Variables' descriptions are in Table 3.1.

development, may be contributing to the increase of FPI outflows more than to inflows.

3.6 Concluding Remarks

This research aimed to investigate the spatial dynamics of foreign investment in order to understand how the attraction of capital among countries relates to the adoption of IFRS. To do so we modeled a spatial autoregressive model with an endogenous weight matrix (Kelejian & Piras, 2014) for net FDI and FPI inflows for a sample of 96 and 83 countries, respectively, from 1997 to 2014.

We hypothesized countries either compete (substitution effect) or cooperate (complementarity effect) to attract foreign investment. The results point to the complementarity effect hypothesis, where higher foreign investment inflows to a country imply on higher inflows also for its neighbors in the trade network. Regarding the role of countries' decision to adopt IFRS, we found that, for the FDI net inflows, adopter countries receive higher net investment, but half of the effect comes from the trade network in which it is inserted. Thereupon, IFRS adoption reinforces the complementarity effect of the trade network. We found negative effects for FPI inflows but, since we use net inflows, a possible reason is that IFRS stimulate FPI outflows more than inflows.

Our results are consistent with an increasing network value of IFRS adoption as suggested by Ramanna and Sletten (2014), where the more neighbor countries adopt the international standards more advantageous it is for a country to adopt. Specifically analyzing international capital flows, we show IFRS adoption facilitate the flow of foreign

investment throughout countries' network.

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4 Capital flows sensitivity to international financial shocks in Latin America

4.1 Introduction

This essay examines the role of IFRS adoption in the sensitivity of capital inflows in Latin America to international financial shocks. I study how foreign investment volatility in Latin American countries reacts to an increase in global financial risk and uncertainty, and then I investigate how the application of IFRS in the country moderates this reaction.

According to Bussière and Phylaktis (2016), the years before the global financial crisis showed a pattern of rising globalization, where global capital flows increased from 7% of world GDP in 1998 to over 20% in 2007. This trend was, however, sharply hit by the crisis, suffering large reversals at the end of 2008. Nevertheless, this retrenchment was much shorter lived in emerging economies, so that capital flows increased again subsequently. The authors explain this was partly motivated by the accommodative monetary policies of developed economies after the crisis, which reduced investments' yields in these economies, encouraging investors to seek higher returns in the emerging economies.

Economic theory says the free movement of capital across national borders should lead to an efficient allocation of resources and, consequently, raise productivity and economic growth for all countries. Nonetheless, S. Ahmed and Zlate (2014) point that large and volatile capital flows can also create economic distortions and policy challenges. The authors show emerging markets received sizable net inflows of private capital for several years before the global financial crisis, but these inflows turned sharply negative during the crisis and increased in the second half of 2009 and 2010. Since then, according to the authors, net inflows have slowed but volatility has increased, especially through foreign portfolio holdings.

Along with the uncommon movement of capital flows in the last decades, several emerging countries started their process to adopt IFRS, as detailed in Chapter 2. In Latin America, Costa Rica adopted in 2002, Nicaragua in 2004, Paraguay in 2005, Guatemala and Venezuela in 2008, Chile in 2009, Brazil and Ecuador in 2010, El Salvador in 2011,

and Argentina, Honduras, Mexico, Peru and Uruguay in 2012 (IFRS Foundation, 2018).

The literature has brought evidence of IFRS facilitating cross-border investments[1], as briefly discussed in Section 4.2. The effect of IFRS adoption on foreign investment has been extensively studied before, but how it may influence the volatility, rather than the volume, of such flows remains an unexplored issue. Besides, the effects of IFRS in emerging markets is still an open issue. Some authors (see, e.g., Gordon et al., 2012; J. Kim & Shi, 2012) argue countries with poorer corporate transparency have the greatest potential to increase information quality through IFRS adoption. On the other hand, some authors (e.g., Daske et al., 2008; Li, 2010) argue emerging countries are less capable of enjoying the expected IFRS benefits due to weak enforcement mechanisms as well as to firms' lack of incentives to prepare transparent financial statements.

The way IFRS may interact with global financial shocks is also not clear. For instance, IFRS, as a common business language across borders, is expected to increase investors' familiarity with foreign markets (DeFond et al., 2011), minimizing their reluctance to keep cross-border investments (Karolyi & Stulz, 2003), called home bias (Covrig et al., 2007; Márquez-Ramos, 2011), which would make investors less willing to retrench from foreign markets after uncertainty shocks. On the other hand, a common business language is also expected to increase financial markets integration (Brown, 2011; Tarca, 2012), so that IFRS adoption could actually increase countries' exposure to financial shocks. Thereupon, if IFRS have contributed to internationalizing the Latin American capital markets, they might have become more sensitive to global financial shocks (Adler et al., 2016), so that one may expect higher retrenchment of foreign investors during such events for adopter countries.

Therefore, I have two competing hypotheses:

1. International capital flows of IFRS adopters have lower sensitivity to global financial shocks. IFRS as a common business language reduces investors' home bias making them less willing to retrench from Latin American countries.
2. International capital flows of IFRS adopters have a higher sensitivity to global financial shocks. IFRS as a common business language increases Latin American markets' integration making them more vulnerable to global financial shocks.

To test the hypotheses, I conduct the subsequent analyses. First, I evaluate whether IFRS adoption is followed by an increase in the amount of gross international capital inflows to Latin America, as already investigated in the literature for different groups of countries. Next, I study how international financial shocks affect the behavior of these investments studying the impact of the Chicago Board Options Exchange (CBOE) Volatility Index (VIX) on the volatility of these capital flows. To calculate capital flows volatility I apply a Generalized Autoregressive Conditional Heteroskedasticity

[1] Including the results in Chapter 3.

(GARCH) model to quarterly gross foreign investment inflows, estimating quarterly series of volatility.

Following, I question how the adoption of the IFRS moderates this impact, investigating whether IFRS make these countries more or less vulnerable to international shocks, that is, whether the impact of financial shocks on capital flows volatility is lower or higher under the international standards, using the IFRS adoption measure developed in Chapter 2. Finally, I explicitly study the effect of market integration under the second hypothesis. For these analyses I use quarterly macroeconomic data for Argentina, Brazil, Chile, Colombia, Mexico, and Peru, which are the Latin American countries for which I have enough data available, so I rely on FGLS estimations for long panel linear regressions. Details are in Section 4.3.

The results show that despite being related to large and more volatile foreign investment inflows, the evidence indicates that IFRS minimizes the effects of international financial shocks, although the results are only valid for FDI inflows at a 10% significance level. In spite of the analyses of market integration indicating it is not related to IFRS, when including the two of them in the regression neither is statistically significant. Thus, although limited, the evidence point to the first hypotheses where IFRS minimizes foreign investors' home bias and make capital inflows to Latin America less susceptible to global financial risk.

The main contribution of this research is to evaluate foreign investment volatility, highlighting that larger capital flows to emerging economies may be problematic, so that IFRS adoption can also bring policy challenges. Nevertheless, the interaction between IFRS and foreign investment in Latin America is not straightforward since I show that despite being related to larger and more volatile inflows, it is also related to lower vulnerability to international financial risk. Additionally, focusing this analysis in Latin American countries is of particular interest for two main reasons. First, the uncommon movements of both capital flows and accounting standards in the region creates an intriguing and challenging set. Second, with the financial accounting research focusing in developed countries, important results that could be useful for public policy are kept unknown, since the conclusions obtained from developed markets are in the most part not directly applicable to emerging markets.

This Chapter is structured as follows. Section 4.2 brings a brief review on the literature of IFRS and foreign investment in emerging economies. Section 4.3 presents the data and the models used in the analysis. Section 5.4 presents some descriptive statistics and the regression results and, finally, Section 5.5 presents some concluding remarks on the study conducted in this essay.

4.2 Literature Review

The literature that relates IFRS adoption and foreign investment flows develops the argument that a common business language should decrease investment frictions across borders. Covrig et al. (2007), for instance, studied the voluntary adoption of the International Accounting Standards (IAS) on foreign mutual funds ownership. Arguing that the use of IAS should reduce foreign investors' information costs the authors found foreign mutual funds strongly prefer international over domestic accounting standards. Moreover, the effect is higher for poor information environments and firms with low investor visibility. DeFond et al. (2011), in turn, investigated the mandatory IFRS adoption by the European Union lead to increased investment by foreign mutual funds. The authors found an increase in foreign mutual fund ownership following higher accounting information uniformity with the mandatory IFRS adoption in 2005.

Interestingly, both Covrig et al. (2007) and DeFond et al. (2011) found the effect is only for foreign mutual funds while domestic mutual funds do not react to the adoption. According to the authors, this is consistent with domestic investors being more familiar with local accounting standards and having access to alternative information channels. Hence, foreign investors are the ones with more potential to benefit from accounting harmonization.

As in Covrig et al. (2007), Márquez-Ramos (2011) rationales over information acquisition costs and home bias, but tackling both foreign investment and trade. As Portes and Rey (2005) point, the cost of acquiring information in foreign markets overweights the benefits of diversification, generating gravity patterns in equity investment as seen in the trade of goods. Nevertheless, Márquez-Ramos (2011) argues IFRS adoption should reduce information acquisition costs and investors uncertainty and, then, facilitate cross border investment and trade. Accordingly, studying the European Union case, she finds increased trade and investment flows following the adoption.

Further, Gordon et al. (2012) specifically analyze the effect of IFRS adoption on FDI. Following the arguments of increased transparency and comparability, the authors find an increase in FDI inflows after the adoption; however, the result is mainly driven by inflows to developing, rather than developed, countries. This result is important because it is common in the literature to find no effect of IFRS adoption for less developed countries. A common argument is that IFRS is only able to improve the information environment where firms (managers and auditors) have already incentives to present transparent financial information (e.g., Daske et al., 2008; Li, 2010).

When discussing the potential to attract foreign capital through IFRS adoption, Gordon et al. (2012) argue countries with poorer corporate transparency have the greatest potential to increase transparency through the adoption of the international standards. Further, according to the authors, these countries are the ones with the greatest potential

for increasing foreign investment. Also in this line, J. Kim and Shi (2012), analyzing the effect of IFRS in stock prices' informativeness, document the effect is more pronounced in countries with weaker institutional environments. They argue countries with poor investor protection, less developed financial system and poorer corporate governance, stock prices' informativeness then to be lower when compared to countries with steady institutional environments in the first place so that effect of IFRS might be more intense for less developed countries.

On the other hand, Daske et al. (2008) analyzed the effects of IFRS in stock markets liquidity, cost of equity capital and firm value and found the positive results only hold for countries where firms already have incentives to present transparent financial statements and with robust enforcement mechanisms. Li (2010) focused on the cost of capital and found the reduction associated with IFRS adoption is only significant for countries with strong legal enforcement. Furthermore, Christensen et al. (2013), somewhere in the middle of these two arguments, analyzing the response of market liquidity to IFRS adoption, found the significant effects only hold for countries where changes in enforcement supported the adoption. The authors, then, conclude that the effects in liquidity are most likely to be due to a bundle comprising IFRS adoption and changes in enforcement. They argue IFRS might be a pre-condition to the enforcement changes take place, or the effect would be smaller without the switch in the accounting standards.

Emerging economies are also sometimes controversial regarding foreign investment flows. S. Ahmed and Zlate (2014) call attention to the increased capital flows' volatility in emerging economies, whose expanding market integration is a matter of concern on their exposure to global financial shocks. This motivates Adler et al. (2016) to study their sensitivity to global risk aversion and monetary policy shocks, which often impact net capital flows to emerging markets and, more broadly, impact their economic activity (Calvo & Reinhart, 2000; IMF, 2013). The authors analyze the retrenchment of foreign investors following global financial shocks both regarding monetary policy and global risk aversion, showing interesting distinctions between gross and net inflows, highlighting the stabilizing role of domestic investors. Additionally, the authors explore whether the capital flows' sensitivity varies according to countries' heterogeneity, showing, for instance, that more integrated markets are more sensitive to global financial shocks.

4.3 Data and Models

Data on capital flows are from the Balance of Payments (BOPS) database of the IMF. As in Adler et al. (2016), foreign (gross) capital inflows are defined as the positive net incurrence of liabilities in the BOPS financial account by a certain country in a certain quarter (negative incurrence are defined as outflows). In the BOPS, the financial accounts includes (i) FDI, (ii) FPI, (iii) financial derivatives and (iv) other. I consider the total

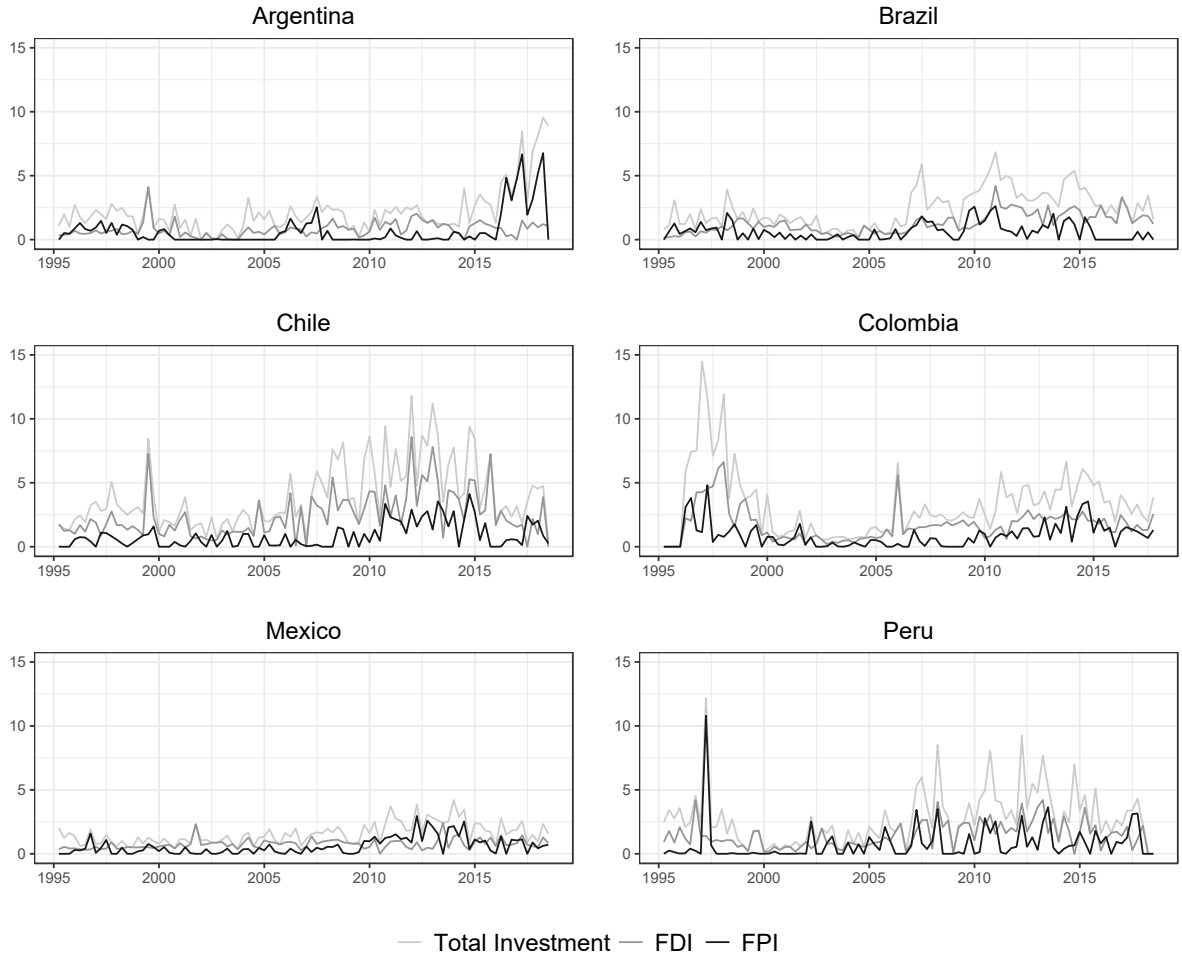

Figure 4.1: Gross Foreign Investment Flows

level of investment (including these four categories) as well as FDI and FPI separately. The data are in US Dollars and are scaled by the GDP. The frequency is quarterly.

The IMF keeps data for all countries around the World, but the availability for a long enough time series is usually restricted to more developed countries. When filtering for Latin America, only six countries—Argentina, Brazil, Chile, Colombia, Mexico and Peru—have data from 1995. Figure 4.1 shows the evolution of the quarterly gross capital flows (total investment, FDI and FPI) for these six countries.

Figure 4.1 shows gross capital flows are usually higher than GDP for all the six countries. The peak is the level of total foreign investment (including FDI, FPI, financial derivatives and other types of investment) to Colombia in the late 1990s. At the same period Peru also received an uncommon high FPI (and total investment) inflow. Mexico is the country with lower inflows. Further, FPI is zero in several quarters, specially for Argentina. Finally, it is also clear from the figure that volatility increased after the 2008 financial crisis for most inflows in all countries (except Argentina, in which the last few quarters of the sample are the more volatile).

Capital flows volatility are estimated according to a GARCH(m,s), model (Boller-

slev, 1986; Engle, 1982) applied to the residuals of a Seasonal Autoregressive Integrated Moving-Average (SARIMA)$(p,d,q)\times(P,D,Q)_4$[2] model to exclude the time-series effects of the quarterly capital flows series (Box, Jenkins, Reinsel, & Ljung, 1970)[3].

Figure 4.2 show the behavior of quarterly VIX, created by the CBOE to represent forward-looking expectation of market volatility. It is derived from prices of the S&P 500 market index options and is usually seen as a measure of market risk and investors' sentiment. In spite of representing the US market, this measure is widely used as a measure of global risk and uncertainty (see, e.g. Adler & Tovar, 2013; Bloom, 2009).

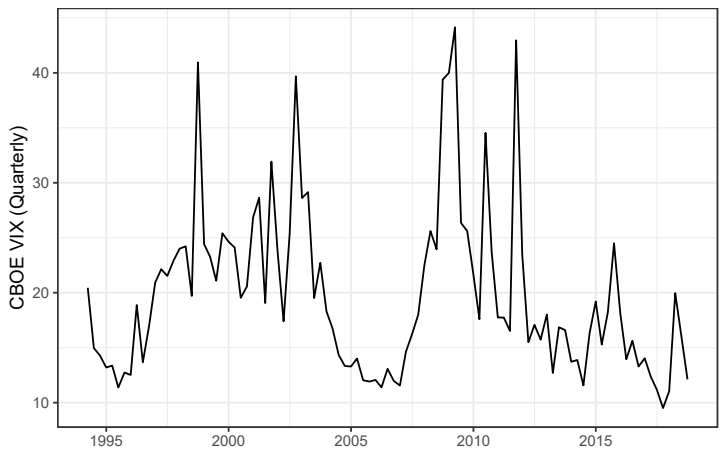

Figure 4.2: Chicago Board Options Exchange Market Volatility Index

The first analysis is to evaluate the role of IFRS adoption on the amount of foreign investment flows in Latin America, for which I design the following empirical model:

$$GKF_{ct} = \beta_0 + \beta_1 IFRS_{ct} + \beta\mathbf{X} + u_{ct}, \tag{4.1}$$

where Gross Capital Flows (GKF) are in the form of total investment (including FDI, FPI, financial derivatives and other types), FPI or FDI and c denotes countries and t quarters. IFRS is the compound index including details of the adoption by the six countries of the sample, as developed in Chapter 2. $\mathbf{X}$ is a set of control variables which includes countries' one-year GDP growth, risk, trade openness and stock market size.

The second analysis turns to the effect on capital flows volatility, rather than on their amount. I estimate the following empirical model:

$$GKFVol_{ct} = \beta_0 + \beta_1 VIX_{t-1} + \beta\mathbf{X} + u_{ct}, \tag{4.2}$$

where $GKFVol_{ct}$ denotes capital flows volatility for the three measures of foreign invest-

[2]This is the notation for a quarterly multiplicative seasonal model which incorporates both nonseasonal (p,d,q) and seasonal (P,D,Q) parameters.

[3]The orders of the the SARIMA models are automatically selected according to the Akaike Information criteria. The volatility models are defined as a GARCH(1,1).

ment (total investment, FPI and FDI), and c denotes countries and t quarters. First, I evaluate whether the volatility is affected by international financial shocks, measured by the log of VIX. I include the VIX lagged to one quarter because (i) the VIX is computed according to forward-looking market risk expectations and (ii), as is common on investment decisions models, I define that the resources allocation decision are made in the beginning of each period according to the information set available at that moment. Thereupon, if investors consider the forward looking international market risk to decide on investment in Latin American countries, the VIX is included in their information set at $t-1$.

Next, I extend the model to include an interaction with IFRS to understand how the adoption moderates the way capital flows volatility is sensitive to international financial shocks in the following form:

$$GKFVol_{ct} = \beta_0 + \beta_1 VIX_{t-1} + \beta_2 IFRS_{c,t-1} + \beta_3 VIX \times IFRS_{c,t-1} + \beta \mathbf{X} + u_{ct}. \tag{4.3}$$

The same rationale is applied to the IFRS lagged variable, that is, I consider it to be part of the investors information set at the beginning of each quarter. Further, in these models I also include among the control variables the amount of investment ,GKF, representing either Total Investment, FDI or FPI in the equations.

Finally, I study the role of market integration for the sensitivity of capital flows to the VIX. WhereasAdler et al. (2016) measure countries' integration through their total holdings of foreign financial assets and liabilities, I focus on stock market integration. Stock market integration is an important concept, specially when dealing with emerging economies, because of contagion (Bekaert, Harvey, & Ng, 2005; Tai, 2007) and there is some evidence that IFRS is associated with more integrated markets (Cai & Wong, 2010). Thence, I expand Equation (4.3) to include an interaction with Market Integration (*MktInt*):

$$\begin{aligned} GKFVol_{ct} = \beta_0 + \beta_1 VIX_{t-1} + \beta_2 IFRS_{c,t-1} + \beta_3 MktInt_{c,t-1} + \beta_4 VIX \times IFRS_{c,t-1} + \\ + \beta_5 VIX \times MktInt_{c,t-1} + \beta_6 IFRS \times MktInt_{c,t-1} + \\ + \beta_7 VIX \times IFRS \times MktInt_{c,t-1} + \beta \mathbf{X} + u_{ct}. \end{aligned} \tag{4.4}$$

Market integration is usually defined as the correlation between countries' main stock market index; but there is also some controversies about the concepts and measures for it, as Pukthuanthong and Roll (2009) discuss. The authors argue that, theoretically, cross-country correlations of stock indexes returns are a poor measure because there are multiple global sources of returns volatility and countries may have different sensitivities to them. Based on this rationale, they propose a measure of market integration based on the proportion of a country's returns that can be explained by global factors. The

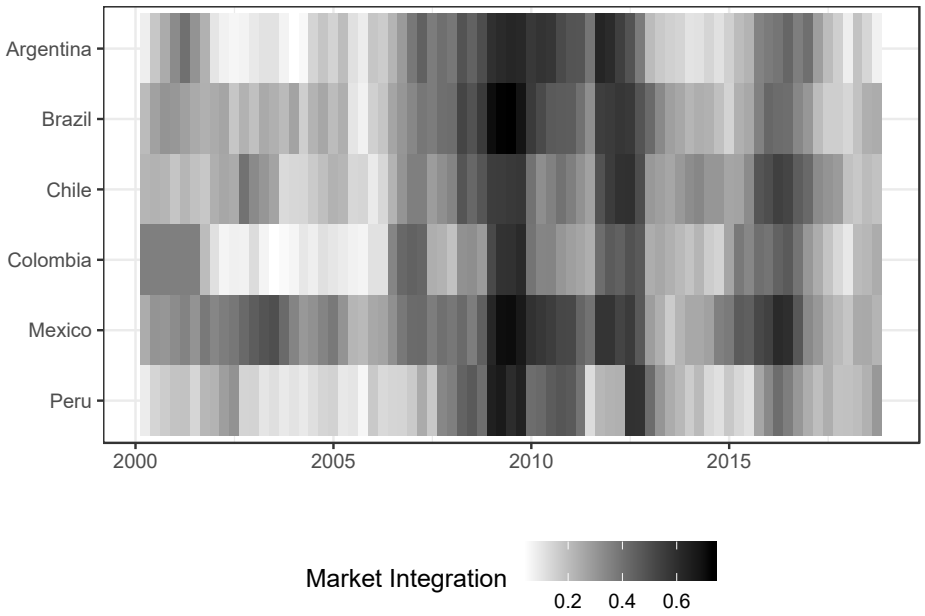

Figure 4.3: Latin America stock markets integration

smaller this proportion, the more the country is influenced by local or regional factors. Therefore, they propose measuring market integration as the R^2 of a multifactor model where the factors are extracted applying a Principal Components Analysis (PCA) to a set of countries' stock market indexes. I follow this approach to estimate Latin America's countries stock market integration.

I collect a sample of stock market indexes available at Datastream for the period of 1995–2018. Indexes from 70 different countries are included in the analysis, but for several of them data is available only for the most recent years. I compute the PCA analysis using daily log-returns for these indexes[4] for rolling quarters[5], extracting the number of factors whose eigenvalues are higher than one, as is usual in PCA analysis[6]. Once these factors are extracted, they are regressed against the main stock market index log-returns from Argentina, Brazil, Chile, Colombia, Mexico and Peru[7].

Figure 4.3 shows the level of market integration over the quarters from 2000 on. The figure shows market integration was smaller in the early 2000 and heavily increases around the 2008 global financial crisis and the Eurozone crisis, as expected due to contagion effects (Kaminsky, Reinhart, & Vegh, 2003). Whereas it reduces again after the

[4]Excluding the Argentine, Brazilian, Chilean, Colombian, Mexican, and Peruvian indexes.

[5]I estimate over rolling quarters to avoid poor fitting due to a small number of observations for only one quarter.

[6]The number of factors extracted at each quarter varies, but I extract, on average, 9 factors. This number is similar to the work of Pukthuanthong and Roll (2009), who chose to select 10 factors at each period, gauging an average of 90% of common variance.

[7]The main stock market index in Argentina is the Merval, in Brazil is the Bovespa Index, in Chile is the *Indice General de Precios de Acciones* (IGPA), in Colombia is the *Indice General de la Bolsa de Valores de Colombia* (IGBC) (until 2013) and the COLCAP (from 2013), in Mexico is the *Índice de Precios y Cotizaciones* (IPC), and in Peru is the *Indice General de la Bolsa de Valores de Lima* (IGBVL).

crisis, market integration is higher in the later years of the sample. On average, Mexico is the most integrated market (0.395), followed by Brazil (0.330), and Chile (0.322). The less integrated market is Peru (0.260), followed by Colombia (0.263), and Argentina (0.289). This suggests larger stock markets tend to be more integrated.

Some comments must be made about the estimation of Equations (4.1) to (4.4). Usually, panel models estimation methods rely on asymptotics valid for short panels, that is, panels with a large N (individuals) and small T (time periods). However, is this essay I have only six countries (individuals) with data for 84 quarters, forming a long panel—small N and large T, where inference must be made on the assumption that $T \to \infty$. Thus, time series characteristics must be incorporated into the model.

As Cameron and Trivedi (2005) discusses, correlation across time for a given individual can be incorporated into the model using an Autoregresive Moving-Average (ARMA) model for the errors allowing the parameters to differ among individuals. Specifically, if errors $u_{ct} = \rho_c u_{c,t-1} + \epsilon_{ct}$, where $\epsilon_{ct} \sim (0, \sigma_c^2)$ are heteroskedastic and ρ_c also differs across countries, estimating separate time series regressions for each c using T time periods yields consistent $\hat{\rho}_c$ and $\hat{\sigma}_c$ since $T \to \infty$. Nevertheless, using FGLS, one can also yield consistent estimates for these parameters using all NT observations allowing for heteroskedasticity and country-specific correlation across time, as well as for correlation across the country units.

Finally, Table 4.1 summarizes the variables used in the equations in this section, specifying their definitions and sources, including the capital flows and IFRS variables, the VIX, the control variables and the market integration measure.

Table 4.1: Variables' Description

Variable	Name	Description	Source
GKF	Gross Capital Flows	*TotalInvest* (total investment including direct, portfolio, financial derivatives, and other types of investment), as a percentage of GDP. Quarterly.	BOPS, IMF.
		FDI, as a percentage of GDP. Quarterly.	BOPS, IMF.
		FPI, as a percentage of GDP. Quarterly.	BOPS, IMF.
GFKVol	Volatility of GKF	Volatility of GKF estimated via a SARIMA-GARCH model. Quarterly	Estimated using data from the BOPS, IMF.
GDPGrowth	GDP growth	Three-quarter GDP growth log-rate. Quarterly.	International Financial Statistics (IFS), IMF.
Risk	Previous year country risk	Single rating based on the more details ratings of political (government stability, socioeconomic conditions, investment profile, internal conflict, external conflict, corruption, military in politics, religion in politics, law and order, ethnic tensions, democratic accountability, bureaucracy quality), economic (current account as a % GDP, budget balance, GDP growth, GDP per capita, inflation, current account as a % of GDP) and financial (foreign debt as a % of GDP, exchange rate stability, debt service as a % of exports of goods and services (XGS), current account as a % of exports of goods and services (XGS), international liquidity) risk. Yearly.	ICRG, PRS Group.
Openness	Trade Openness	Total imports plus exports as a percentage of GDP. Quarterly.	IFS, IMF.
StckMktSize	Previous year stock market size	Outstanding domestic private debt securities plus stock market capitalization as a percentage of GDP. Yearly.	GFD, World Bank.
IFRS	IFRS adoption	Composite index including details on the type and extent of adoption and endorsement. Yearly.	Data compiled from the IFRS Foundation (2018).
VIX	VIX	Log of the CBOE market VIX estimated as the implied volatility of S&P500 index options. Quarterly.	Bloomberg
MktInt	Market Integration	R^2 of a regression of the domestic market index on factors extracted via PCA formed by foreign market indexes using daily log-returns on rolling quarterly windows. Quarterly.	Estimated using data from Datastream, Thomson Reuters.

4.4 Results

4.4.1 Descriptive Statistics

Table 4.2 shows the means and standard deviation for each variable for each country. The table shows Chile is the country who receives the highest amount of investment (total investment, FPI or FDI), and Mexico is the country which receives the lowest amounts—except FPI, for which Argentina has the lowest values. Chile is also the country with the highest volatile investment flows and Mexico and Brazil with the lowest.

Table 4.2: Descriptive Statistics

		Argentina	Brazil	Chile	Colombia	Mexico	Peru
TotalInvest	Mean	1.839	2.447	4.290	2.815	1.562	2.783
	Std. dev.	1.065	1.486	2.761	1.627	0.846	2.239
FPI	Mean	0.507	0.660	0.922	0.794	0.618	0.781
	Std. dev.	0.907	0.689	1.037	0.862	0.685	1.441
FDI	Mean	0.786	1.298	2.731	1.558	0.764	1.481
	Std. dev.	0.605	0.797	1.903	0.880	0.396	1.045
TotalInvestVol	Mean	1.091	0.946	2.256	1.333	0.661	2.184
	Std. dev.	0.123	0.253	0.649	0.392	0.145	0.560
FPIVol	Mean	0.407	0.600	0.815	0.665	0.506	1.550
	Std. dev.	0.458	0.168	0.308	0.283	0.209	0.013
FDIVol	Mean	0.640	0.519	1.784	0.728	0.803	0.978
	Std. dev.	0.235	0.118	0.499	0.481	0.180	0.266
GDPGrowth	Mean	0.275	0.607	0.711	0.256	0.433	0.438
	Std. dev.	0.106	0.220	0.184	0.138	0.184	0.136
Risk	Mean	0.688	0.678	0.773	0.657	0.720	0.697
	Std. dev.	0.056	0.039	0.028	0.026	0.031	0.025
Openness	Mean	0.039	0.035	0.083	0.055	0.066	0.058
	Std. dev.	0.021	0.015	0.031	0.019	0.022	0.025
StckMktSize	Mean	0.275	0.607	0.711	0.256	0.433	0.438
	Std. dev.	0.106	0.220	0.184	0.138	0.184	0.136
$IFRS_{t-1}$	Mean	0.146	0.325	0.316	0.138	0.161	0.192
	Std. dev.	0.238	0.441	0.396	0.274	0.241	0.311
VIX_{t-1}	Mean	2.976	2.976	2.967	2.935	2.976	2.976
	Std. dev.	0.338	0.338	0.344	0.361	0.338	0.338
$MktInt_{t-1}$	Mean	0.275	0.310	0.323	0.271	0.366	0.245
	Std. dev.	0.174	0.157	0.132	0.158	0.151	0.155

Variables' descriptions are in Table 4.1.

Chile has the highest GDP growth for the sample, is the less risky (higher value) and open and has the largest stock market relative to GDP. Brazil has the highest level of IFRS adoption, close to Chile. Although the two countries were the first to adopt the international standards among the six of the sample (mandatory adoption in 2010), Chile

does not require IFRS for all non-public and foreign firms (Brazil does) and permitted an early adoption only from 2009 (Brazil permitted from 2008).

Table 4.3 shows the Pearson correlation between each pair of variables. First, the correlations between explanatory and dependent variables are relatively low, so that there are no concerns regarding multicolinearity. The dependent variables, on the other hand, are very close. Capital flows are highly correlated with each other and higher levels of capital flows usually indicate higher volatility. Higher GDP growth also correlates with higher levels and variability of capital flows (except FPI volatility) as well as country risk. Openness is also highly correlated with capital flows and their volatility, as well as stock markets size.

Finally, countries with more integrated stock markets and adopting IFRS have higher levels and higher variability in investment, but the VIX correlates in the opposite direction (except for total investment volatility). While the VIX has low negative correlations with capital flows amounts and volatility, it has a stronger negative relationship with countries' GDP growth and a strong positive relationship with Market Integration. These results indicate Latin America relative integration with international markets where both their economic and stock market activities accompany the international risk expectations.

Table 4.3: Correlation Matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) *TotInvest*	1	0.66	0.81	0.46	0.37	0.29	0.10	0.33	0.58	0.33	0.42	−0.11	0.23
(2) *FPI*		1	0.26	0.19	0.15	0.28	0.08	0.14	0.33	0.13	0.29	−0.13	0.12
(3) *FDI*			1	0.48	0.44	0.23	0.07	0.35	0.56	0.40	0.39	−0.05	0.22
(4) *TotInvestVol*				1	0.70	0.64	0.19	0.25	0.45	0.28	0.25	0.01	0.04
(5) *FDIVol*					1	0.26	0.08	0.46	0.55	0.43	0.28	−0.04	0.12
(6) *FPIVol*						1	0.14	0.08	0.29	0.17	0.27	−0.07	−0.02
(7) *GDPGrowth*							1	0.22	0.15	−0.06	−0.18	−0.23	−0.14
(8) *Risk*								1	0.55	0.32	0.09	−0.14	0.27
(9) *Openness*									1	0.42	0.53	−0.17	0.43
(10) *StckMktSize*										1	0.48	−0.07	0.31
(11) $IFRS_{t-1}$											1	−0.21	0.27
(12) VIX_{t-1}												1	0.30
(13) $MktInt_{t-1}$													1

Variables' descriptions are in Table 4.1.

4.4.2 Regressions

Table 4.4 shows the results for the association between IFRS adoption and the amount of foreign investment inflows. The table presents the results for the three types of investment: (i) total (including foreign direct, portfolio, financial derivatives and other types), (ii) FPI and (iii) FDI. As specified in section 4.3, I control for countries GDP growth, risk, openness and stock market size.

Table 4.4 shows countries' trade openness is positive and strongly related to the level of foreign investment. As Márquez-Ramos (2011) points, international trade and investment are closely related. Country risk is only significant for total investment and FDI (less risky countries receives more investment), and the stock market size is only significant for FDI. Finally, after controlling for these factors, IFRS is strongly positively associated with higher levels of foreign investments. This is consistent with several studies who have been showing IFRS facilitates cross-border investment.

Table 4.4: IFRS and the Level of Foreign Investment

	Dependent variable:		
	Total Investment	FPI	FDI
	(1)	(2)	(3)
Intercept	−1.585	0.066	−1.234*
	(1.267)	(0.705)	(0.673)
GDPGrowth	−1.005	1.218	−0.102
	(2.408)	(1.387)	(1.220)
Risk	3.847*	0.206	2.302**
	(1.961)	(1.092)	(1.054)
Openness	17.127***	7.703***	9.508***
	(4.610)	(2.294)	(2.455)
StckMktSize	0.035	−0.212	0.522**
	(0.402)	(0.222)	(0.216)
$IFRS_{t-1}$	1.376***	0.472***	0.649***
	(0.334)	(0.178)	(0.167)
Observations	469	469	469
N Country	6	6	6
N Quarter	84	84	84
Wald Statistic	83.357***	37.458***	137.589***

Notes: *p<0.1; **p<0.05; ***p<0.01
The model is estimated as a panel regression with AR(1) Prais-Winsten correction and Parks-Kment FGLS.
Variables' descriptions are in Table 4.1.

Next, I move to the analysis of capital flows sensitivity to international shocks, regressing their estimated volatility against the VIX plus the control variables. Table 4.5 shows the results of the estimations for Equation (4.2). First, capital flows volatility are highly associated with the capital flows levels and trade openness. Second, the relationships vary if we consider total investment or solely FPI and FDI. One thing to keep in mind is that total investment volatility is likely better estimated since FDI and especially FPI are less consistent over time. As Figure 4.1 shows, FPI inflows are often zero, mainly for Argentina and Peru. Notwithstanding, FDI volatility seems to follow a different process than total investment and FPI, since it is negatively related to GDP growth and positively related to lower levels of countries risk.

Finally, foreign investment (except for FPI) volatility increases following increments in the VIX, indicating Latin American countries suffer from higher capital flows

volatility following shocks in the international markets' uncertainty. This is a concern relative to these countries economic development since, as discussed previoulsy in this Chapter, volatile capital flows can create economic distortions and represent challenges to public policies and development.

Table 4.5: VIX and the Volatility of Foreign Investment

	Dependent variable:		
	Total Investment Volatility	FPI Volatility	FDI Volatility
	(1)	(2)	(3)
Intercept	1.021***	1.181***	−0.225
	(0.298)	(0.162)	(0.204)
GFK	0.077***	0.061***	0.038***
	(0.010)	(0.012)	(0.012)
GDPGrowth	2.200***	1.087***	−0.651**
	(0.492)	(0.321)	(0.268)
Risk	−1.427***	−1.016***	0.537**
	(0.338)	(0.181)	(0.225)
Openness	6.684***	3.747***	6.644***
	(0.681)	(0.431)	(0.364)
StckMktSize	0.405***	0.070*	0.354***
	(0.071)	(0.039)	(0.049)
VIX_{t-1}	0.178***	−0.009	0.055*
	(0.063)	(0.036)	(0.031)
Observations	469	469	469
N Country	6	6	6
N Quarter	84	84	84
Wald Statistic	420.351***	183.186***	674.231***

Notes: *p<0.1; **p<0.05; ***p<0.01
The model is estimated as a panel regression with no autocorrelation and Parks-Kment FGLS.
Variables' descriptions are in Table 4.1.

Next, Table 4.6 presents the results for Equation (4.3), where I evaluate the role of IFRS adoption to moderate the effect of VIX on capital flows volatility. First, including the IFRS variables does not significantly change the results from Table 4.5. Second, IFRS is positively associated with capital flows volatility. This is consistent with the idea that IFRS adoption indicates higher countries' financial integration, either driving or following it. Finally, the interaction between VIX and IFRS is negative for all three types of investment, but the results must be taken cautiously, since it is statistically significant (at 10%) only for FDI inflows.

Taken broadly, the results so far are consistent with the idea that accounting harmonization decreases foreign investors costs to acquire and process information (Covrig et al., 2007; DeFond et al., 2011; Gordon et al., 2012) from Latin American markets, both increasing the amount of investment as well as decreasing (at least partially) its sensitivity to international financial shocks. This last result is aligned with IFRS contributing to

Table 4.6: VIX, IFRS and the Volatility of Foreign Investment

	Dependent variable:		
	Total Investment Volatility	FPI Volatility	FDI Volatility
	(1)	(2)	(3)
Intercept	0.756*	0.648***	−0.365
	(0.331)	(0.194)	(0.235)
GFK	0.072***	0.059***	0.042***
	(0.010)	(0.012)	(0.013)
GDPGrowth	2.477***	1.635***	−0.689**
	(0.534)	(0.339)	(0.295)
Risk	−1.337***	−0.490**	0.610**
	(0.355)	(0.212)	(0.258)
Openness	6.546***	2.285	6.814***
	(0.725)	(0.477)	(0.429)
StckMktSize	0.349***	−0.019	0.365***
	(0.080)	(0.047)	(0.055)
VIX_{t-1}	0.249***	0.062	0.076**
	(0.069)	(0.040)	(0.038)
$IFRS_{t-1}$	0.869*	0.647*	0.627*
	(0.489)	(0.353)	(0.366)
$IFRS_{t-1}$	−0.250	−0.138	−0.220*
	(0.167)	(0.122)	(0.125)
Observations	469	469	469
N Country	6	6	6
N Quarter	84	84	84
Wald Statistic	477.547***	207.118 ***	591.429***

Notes: *p<0.1; **p<0.05; ***p<0.01

The model is estimated as a panel regression with no autocorrelation and Parks-Kment FGLS.

Variables' descriptions are in Table 4.1.

Table 4.7: VIX, IFRS, Market Integration and the Volatility of Foreign Investment

	Dependent variable:		
	Total Investment Volatility	FPI Volatility	FDI Volatility
	(1)	(2)	(3)
Intercept	0.281	0.437	-1.417^{***}
	(0.522)	(0.389)	(0.376)
GFK	0.076^{***}	0.067^{***}	0.039^{***}
	(0.011)	(0.015)	(0.015)
GDPGrowth	2.062^{***}	1.463^{***}	-1.090^{***}
	(0.584)	(0.439)	(0.366)
Risk	-0.642^{*}	-0.226	0.960^{***}
	(0.365)	(0.323)	(0.292)
Openness	7.999^{***}	3.337^{***}	9.635^{***}
	(0.838)	(0.628)	(0.567)
StckMktSize	0.467^{***}	0.049	0.416^{***}
	(0.087)	(0.064)	(0.063)
VIX_{t-1}	0.291^{**}	0.097	0.353^{***}
	(0.144)	(0.099)	(0.101)
$IFRS_{t-1}$	-1.181	1.000	0.668
	(2.047)	(1.368)	(1.412)
$MktInt_{t-1}$	-2.012	-1.091	0.669
	(1.234)	(0.865)	(0.791)
$VIX \times IFRS_{t-1}$	0.191	-0.356	-0.400
	(0.732)	(0.490)	(0.503)
$VIX \times MktInt_{t-1}$	0.355	0.197	-0.422^{*}
	(0.391)	(0.275)	(0.251)
$IFRS \times MktInt_{t-1}$	6.935	0.517	1.095
	(4.598)	(3.177)	(3.107)
$VIX \times IFRS \times MktInt_{t-1}$	-1.697	0.065	-0.015
	(1.617)	(1.117)	(1.091)
Observations	469	469	469
N Country	6	6	6
N Quarter	84	84	84
Wald Statistic	526.743^{***}	245.345^{***}	850.548^{***}

Note: *p<0.1; **p<0.05; ***p<0.01

The model is estimated as a panel regression with no autocorrelation and Parks-Kment FGLS.

Variables' descriptions are in Table 4.1.

decrease foreign investors home bias (Covrig et al., 2007; Márquez-Ramos, 2011) towards Latin America.

As hypothesized in section 4.1, the previous literature suggested IFRS could be either associated with lower capital flows sensitivity to international financial shocks, through discouraging home bias, or with higher sensitivity, through increased market integration. I cannot properly separate the effects of home bias and IFRS adoption, since the two of them would imply higher volume of foreign investment, so I next investigate the channel of market integration.

Table 4.8: IFRS and Market Integration

	Dependent variable:
	Market Integration
Intercept	−0.081
	(0.112)
GDPGrowth	0.146
	(0.123)
Risk	0.270**
	(0.136)
Openness	0.626*
	(0.374)
StckMktSize	0.078**
	(0.034)
VIX_{t-1}	0.038*
	(0.022)
$IFRS_{t-1}$	0.017
	(0.028)
Observations	469
N Country	6
N Quarter	84
Wald Statistic	25.336***

Note: *p<0.1; **p<0.05; ***p<0.01
The model is estimated as a panel regression with AR(1) Prais-Winsten correction and Parks-Kment FGLS.
Variables' descriptions are in Table 4.1.

Consistent with the results pending to the lower home bias hypothesis, the estimations in Table 4.7 shows no significant results for the Market Integration analysis, as designed in Equation (4.4). Insomuch as the Market Integration interactions are not statistically significant, the IFRS variable and its interaction with VIX are also no longer significant. There are two possible explanations for that. First, including more variables could be simply increasing the estimation errors, since the sample size is relatively low. Second, as Table 4.3 shows, IFRS and Market Integration are positively correlated, so that omitting it in the regression would cause a positive bias to IFRS making it to appear significant (as it is in Table 4.6). Once it is included, IFRS no longer becomes significant.

Trying to understand the relationship between IFRS and Market Integration better and discern between these two possibilities, I estimate an equation of the latter against

the former plus the usual set of controls. The results are in Table 4.8. Including GDP growth, local and international risk, trade openness and stock market size, no correlation between Market Integration and IFRS remains. Therefore, is not very likely that the results of IFRS on Table 4.6 are due to bias induced by Market Integration, but rather to increased estimation errors.

Despite holding only for FDI inflows and being sensitive to including the market integration interactions, the results presented in this section form some evidence regarding the role of IFRS to capital flows sensitivity in Latin America to international financial shocks. The estimations form evidence that, first, capital flows in Latin America respond with higher variation to international uncertainty shocks measured by the VIX, and, second, that although IFRS is associated with both larger levels and higher volatility of foreign investment, it seems to decrease its sensitivity to international financial shocks.

4.4.3 Alternative Specifications

Table 4.9 presents the results of Equations (4.1), (4.3) and (4.4) where IFRS is a standard dummy variable indicating the period from mandatory adoption for each country. The only difference between using the two different specifications for IFRS is that the interaction between IFRS and VIX is significant only for the FDI inflows when considering the extent and level of endorsement of the adoption but it is significant only for the total investment inflows when considering the binary specification. This suggests that FDI investors are more sophisticated and able to distinguish different levels of IFRS adoption; when considering all types of investors they are only able to differentiate between adoption and non-adoption. Further investigation should be made in this direction to clearly assess how different types of investors consider different levels of adoptions. None of the other previous results changes if I consider the binary adoption assessment.

Next, I include not only the SP&500 VIX, which is built for the United States market, but also consider the volatility for the Euro Stoxx 50 Index (Eurozone) and for the FTSE 100 index (United Kingdom). I also considered including the Nikkei 225 VIX but its data is only available up to 2005. Furthermore, the Euro Stoxx 50 VIX is only available from 1999 and the FTSE 100 VIX from 2000. Hence, the final panel size is smaller, 381 observations. These three volatility indexes are highly correlated between each other (pairwise correlations are over 87%), so I apply PCA to them, extracting one common global factor. The correlation between this factor and the SP&500 VIX is 96.6%. The (unreported) analysis gauges similar conclusions, but are in general weaker, likely due to the decrease in the sample size. Finally, I also consider estimating Market Integration for each quarter, instead of using four rolling quarters. The (unreported) estimations do not indicate any differences in the results for Market Integration.

Table 4.9: Models with IFRS Mandatory Adoption Dummy

	Dependent variable:								
	Level			Volatility					
	Total Investment	FPI	FDI	Total Investment	FPI	FDI	Total Investment	FPI	FDI
Intercept	−1.515	0.017	−1.048	0.657**	0.449**	−0.285	−0.082	0.15	−1.386***
	(1.279)	(0.713)	(0.684)	(0.314)	(0.191))	(0.233)	(0.499)	(0.291)	(0.368)
GFK				0.066***	0.061***	0.043***	0.069***	0.067***	0.033**
				(0.010)	(0.012)	(0.013)	(0.011)	(0.013)	(0.015)
GDPGrowth	−1.253	1.15	−0.393	2.569***	1.699***	−0.566*	2.403***	1.575***	−0.987***
	(2.427)	(1.390)	(1.242)	(0.511)	(0.323)	(0.294)	(0.582)	(0.367)	(0.374)
Risk	3.695*	0.290	1.967*	−1.200***	−0.236	0.568**	−0.492	0.083	0.957***
	(1.978)	(1.104)	(1.072)	(0.344)	(0.221)	(0.26)	(0.369)	(0.235)	(0.303)
Openness	18.529***	7.472***	11.159***	5.774***	1.413***	6.345***	7.121***	2.376***	9.129***
	(4.656)	(2.324)	(2.489)	(0.72)	(0.481)	(0.468)	(0.845)	(0.538)	(0.639)
StckMktSize	0.148	−0.166	0.579***	0.347***	−0.035	0.358***	0.426***	0.01	0.378***
	(0.400)	(0.215)	(0.22)	(0.075)	(0.046)	(0.052)	(0.085)	(0.05)	(0.064)
VIX_{t-1}				0.264***	0.084**	0.068*	0.373***	0.12	0.346***
				(0.065)	(0.037)	(0.035)	(0.138)	(0.080)	(0.098
$IFRS_{t-1}$	0.923***	0.363***	0.353***	0.929**	0.584**	0.343	0.019	0.164	0.307
	(0.255)	(0.139)	(0.132)	(0.380)	(0.262)	(0.253)	(1.536)	(0.953)	(1.066)
$MktInt_{t-1}$							−1.028	−0.645	0.872
							(1.153)	(0.671)	(0.758)
$VIX \times IFRS_{t-1}$				−0.258**	−0.115	−0.114	−0.074	−0.01	−0.179
				(0.130)	(0.09)	(0.087)	(0.555)	(0.344)	(0.383)
$VIX \times MktInt_{t-1}$							0.107	0.092	−0.456*
							(0.366)	(0.212)	(0.240)
$IFRS \times MktInt_{t-1}$							3.518	1.415	1.176
							(3.403)	(2.139)	(2.305)
$VIX \times IFRS \times MktInt_{t-1}$							−0.878	−0.391	−0.23
							(1.210)	(0.760)	(0.819)
Wald Statistic	83.677***	83.677***	83.677***	83.677***	83.677***	83.677***	83.677***	83.677***	83.677***

Note: *p<0.1; **p<0.05; ***p<0.01

The model is estimated as a panel regression with AR(1) Prais-Winsten correction and Parks-Kment FGLS. All equations are estimated using 84 quarters for six countries, summing 469 observations. The variables are as defined in Table 4.7.

4.5 Concluding Remarks

This research aimed to study the role of IFRS adoption to the sensitivity of foreign investment inflows in Latin America to international financial shocks. Economic theory says free capital flow among countries should increase efficiency of capital allocation; howbeit, in practice there are several concerns about the impact of large and volatile capital inflows specially to emerging economies (Adler et al., 2016; S. Ahmed & Zlate, 2014).

The literature shows IFRS adoption is followed by an increase in foreign investment (e.g., Covrig et al., 2007; DeFond et al., 2011; Khurana & Michas, 2011); however, its role for the volatility, rather than to the amount, remained unexplored. To fill this gap, I investigated how the CBOE VIX relates to investment inflows volatility and how IFRS moderates this relationship. I hypothesized IFRS could either increase capital flows sensitivity to global financial shocks if the adoption increases countries' market integration, or decrease, if the adoption lessen foreign investors' home bias towards Latin American countries.

Using a measure of IFRS adoption that captures not only the adoption/non adoption status but also the extent and level of endorsement of IFRS application, I find IFRS relates to both larger and more volatile investments flows, but there is some evidence that it helps to minimize the sensitivity of capital flows to international financial shocks. This results are consistent with the lower home-bias hypothesis, suggesting that although adopting IFRS attracts higher and more volatile foreign investment inflows, such flows become more stable for being less sensitive to international financial markets shocks.

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5 Financing constraints and capital allocation efficiency

5.1 Introduction

This research aims to investigate the role of accounting information for firms' investments allocation efficiency. Specifically, I assess how the adoption of IFRS contributes to ease financing constraints, via improving firms' information environment, along with financial development and, consequently, to decrease the cost of external capital, improving firms' intertemporal decision to allocate investment,

According to the IASB (2010), in the Conceptual Framework for Financial Reporting, the relevant and faithful financial information helps users to make more confident resource allocations decisions which result in the more efficient functioning of capital markets and a lower cost of capital for the economy as a whole. This is, therefore, the ultimate concern for the case of providing high quality and comparable accounting information.

Discussing how financial accounting information can influence economic activity, Bushman and Smith (2001) explain three paths. The first one is providing information about investments opportunities, the second one is improving governance mechanisms, and the third is reducing adverse selection and liquidity risk. Furthermore, the authors argue that the association between financial accounting information and economic performance is expected to vary with other factors, such as the financial system structure and the legal environment. Such countries' differences, for instance, usually put into doubt the effectiveness of the adoption of the IFRS around the world. As Holthausen (2009) puts, a common set of accounting standards across countries is unlikely to lead to similar financial reporting outcomes across countries if the other forces that govern the quality of financial statements are not also converged. The author even argues that "it is not at all obvious that similar financial reporting outcomes would lead to greater economic efficiency given cross countries in other institutional features" (Holthausen, 2009, p. 448).

The literature about the effects of IFRS in capital markets around the world is vast but not rarely controversial. Several studies document financial markets improvements around IFRS adoption (Barth et al., 2008; Byard, Li, & Yu, 2011; Horton, Serafeim, & Serafeim, 2013), but the literature also documents results moderated by countries'

characteristics (Christensen et al., 2013; Daske et al., 2008; Gordon et al., 2012; J. Kim & Shi, 2012; Li, 2010), so that the interactions between IFRS and other institutions in the functioning of financial markets is still a hazy issue.

The accounting literature seems to agree that IFRS has positive effects on the level of development of financial markets. However, there are still some controversies about the circumstances of these effects, that is, how they interact with other factors and through which mechanism they work. While J. Kim and Shi (2012) defend a more active role of IFRS in ameliorating information constraints, Daske et al. (2008) and Li (2010) are more skeptical, arguing the quality of pre-existing institutions dictates the effects of IFRS, and Christensen et al. (2013) emphasize a joint work of accounting systems and other institutions. How IFRS can affect the relationship between financial development and real economic activity may, hence, vary according to different mechanisms and different environments.

The role of financial development to economic growth forms a large bulk of research in Economics, discussed in section 5.2. Despite all the controversies, this literature indicates greater financial development leads to better allocation of resources and, consequently, economic growth. If IFRS can improve the functioning of financial markets, then it can improve capital allocation efficiency. This is what I investigate in this essay.

First, I analyze how financial development minimizes financing constraints by reducing the cost of external capital and, then, I assess whether financial reporting reforms have their own role on investment efficiency along with the other features of financial markets development. Considering the literature on IFRS, I hypothesize that the adoption may merely reinforce the effect, being effective only under already developed financial markets, or it may have an active role substituting weaker features in financial markets, being effective for less financially and economically developed countries. Further, IFRS adoption may be effective regardless of the given level of financial development. I enumerate the following hypotheses:

1. The adoption of IFRS decreases firms' financing constraints, increasing investment allocation efficiency only when financial markets are already developed.
2. The adoption of IFRS decreases firms' financing constraints, increasing investment allocation efficiency only when financial markets lacked developments in the first place.
3. The adoption of IFRS decreases firms' financing constraints, increasing investment allocation efficiency regardless of other financial markets development features.

Each of the three hypothesis projects a different role of IFRS. The first points to the literature who argue IFRS is only effective along with other reforms or under already developed environments (e.g., Christensen et al., 2013; Daske et al., 2008; Li, 2010). The second dwells on the literature who argue less privileged environment have more to benefit

from financial reporting reforms (e.g., Gordon et al., 2012; J. Kim & Shi, 2012). Finally, the third one complies with the notion promoted by the IASB that a common business language via accounting harmonization throughout the world is necessary to improve resources' allocation efficiency.

To test these hypotheses, I estimate Euler equation models of investment in which financial development and IFRS enter as possible factors to relief firms' constraints in an intertemporal optimization problem. The results show that IFRS adoption is capable of improving firms' financing possibilities decreasing their need to rely on internal funds to invest in their activity. The results show that, in general, firms can decrease their financing constraints by half with the international standards. The results are only seen when analyzing countries with different levels of economic development, although the marginal effect of IFRS is roughly the same for countries with different levels of economic and financial development. Firms in countries with low economic and financial development, and adopting IFRS, have similar levels of financing constraints as firms in low economic but high financial development (or with low financial but high economic development) countries who do not adopt IFRS. The results are consistent with the hypothesis that higher quality accounting information can improve the efficiency of firms' capital allocation decisions for countries with different levels of development.

These results are critical from a policy perspective because they show that the positive effects of IFRS adoption documented in the literature are not limited to the financial economy, but it also seems to benefit real investment, which can boost economic development. The main contribution of this research is providing evidence that the financial reporting system relates to economic development, which is to be useful for policymakers and international organizations who have been supporting IFRS adoption throughout the world, such as the World Bank and the IMF (IFRS Foundation, 2018). Therefore, the main contribution of this essay is discussing the real economy effects of IFRS global harmonization, explicitly assessing its impacts on investment decisions and, consequently, to economic growth.

This chapter is structured as follows. Section 5.2 discusses the literature on finance and growth and then analyzes the role of accounting information and, specifically, of IFRS. Section 5.3 explains the Euler equation strucutural model as developed by Love (2003) and expanded to accommodate IFRS. Section 5.4 presents the data and the results of the estimation model. Finally, Section 5.5 presents some concluding remarks.

5.2 Background

The discussion on whether and how finance affects economic growth is an old issue, according to King and Levine (1993), coming from Schumpeter (1911), who argued financial intermediaries are essential for technological innovation and economic development. How-

ever, the authors point that this issue is also controversial, as when one reads Lucas (1988, p. 6), who, when treating economic development, decided to abstract from monetary matters, affirming that the importance of finance have been "badly over-stressed". Despite such controversies, the relationship between several aspects of financial development and real economic activity have been extensively studied. The works of Shaw (1973) and McKinnon (1973) are usually referred as the first ones who boosted this literature, and analytical foundations of growth theory that explores how finance can influence growth can be seen in Pagano (1993). The author presents a endogenous growth model, showing financial intermediation can influence not only the levels of capital stocks, but also growth, through affecting the proportion of savings funneled to investment, the social marginal productivity and the savings rate.

Further researches have explored several aspects of this relationship. One important problem this literature addresses is whether finance *causes* growth or if it is simply following changes in growth. Levine (1997) make an extensive review on the evidence regarding the association and influence of finance on economic development. The author shows the concern about the direction of causality in this literature is old, citing the early work of Goldsmith (1969), and then lists several more recent papers with different econometric techniques, examining their claim on causality, such as Calderón and Liu (2003), King and Levine (1993), Levine and Zervos (1998) and Levine, Loayza, and Beck (2000). King and Levine (1993), for instance, rely on pooled cross-section data, and show financial development is a good predictor of economic growth. Although the authors also specify two and three-stages least squares models using previous levels of financial development as instruments, which maintains their mains results, their claim regarding causality is still limited. Similarly, Levine and Zervos (1998, p. 544) finds stock markets' liquidity is positively and significantly correlated with both current and future rates of economic growth, however, as the authors themselves highlight, their analysis does not solve the issue of causality.

Notwithstanding, the recent literature has been presenting evidences consistent with the hypothesis that finance does matter for growth. Levine (2005) concludes with his review that finance matters for growth and that this relationship is not being driven by reverse causality. For example, Calderón and Liu (2003), found financial development generally leads to economic growth,while in some countries there is Granger-causality in both directions, and argue financial systems stimulate economic growth and, simultaneously, economic growth impels financial development. Interestingly, the authors found financial development seems to contribute more to causing economic growth in developing countries than in industrial countries, implying that emerging economies have more room for financial and economic improvement. Furthermore, the authors also document the effect increases with time, suggesting financial development takes time to influence the real economy.

Levine et al. (2000) explore the issue of causality with methods trying to expand the temporal precedence evidence, dealing with bias induced by simultaneity and omitted variables, using generalized method-of-moments (GMM) dynamic panel estimators and cross-sectional instrumental variables estimators. The authors found the exogenous component of financial development is positively and robustly related to economic growth. As an example of the implication of their results, the authors assess if Argentina had presented the average level of financial development of emerging countries in the period of 1960 to 1995, it would have experienced one percentage point faster real GDP per capita growth per year.

In the literature on finance and growth the role of information is always emphasized (e.g., Levine, 2005; Levine et al., 2000). Considering that the information flow in financial markets is the central issue in the mainstream financial accounting research, it is surprising accounting appears so timidly in this literature. As an example of the few papers regarding financial development who consider the role of accounting is the work of Levine et al. (2000), who show countries where firms present relatively comprehensive and accurate financial statements have financial intermediation better developed than countries where firms are less transparent. Furthermore, in their sensitivity analyses, the authors employed a measure for the quality of the accounting environment as an instrumental variable and concluded that the effect of accounting systems in growth occurs through financial development.

When examining the determinants of financial development, the authors argue information about firms is critical for (i) identifying the best investments, improving comparability across firms, and (ii) exert corporate governance, since financial contracts that use accounting measures to trigger particular actions will only work with reliable and clear measures. The authors show, then, cross-country differences in accounting standards, along with creditors' rights and enforcement quality, help to explain cross-country differences in the level of development in financial intermediation, concluding that countries where accounting standards produce high quality and comparable financial statements tend to be more financially developed, and that reforms that strengthen creditors' rights, enforcement and accounting practices can accelerate economic growth.

Rajan and Zingales (1998), based on the theoretical argument that financial markets and institutions help firms to overcome problems of moral hazard and adverse selection, argue financial development should have a more prominent effect on firms who depend more on external finance, and then, show firms from industries that rely more on outside capital grow relatively faster in countries that are more financially developed. It is interesting to highlight the authors use two proxies for financial development, the first one is the traditional ratio of domestic credit plus market capitalization to GDP and the second one is simply the accounting standards of each country, reflecting, in their argument, the potential for obtaining finance.

While Levine et al. (2000) argue the accounting systems affect financial intermediation and then growth, and Rajan and Zingales (1998) argue accounting standards improve firms' ability to raise capital, both arguments are essentially the same, highlighting the role of high-quality information for economic activity. In their survey regarding financial systems and industry growth, Rajan and Zingales (2001, p. 480) argue that, from a policy perspective, a country aiming economic development should "fix its financial plumbing", that is, its legal codes and accounting systems.

Bushman and Smith (2001) develop theoretical links between accounting information and economic performance. According to the authors, the effects of financial information occurs through three channels: (i) helping managers identify and distinguish between good and bad investment opportunities, (ii) disciplining managers and (iii) reducing adverse selection and liquidity risk. As explained by the authors, in the first channel, accounting information enables managers and investors to identify good opportunities, leading to more accurate capital allocation, and in the second channel, it acts as a direct input to corporate control mechanisms besides supporting the information aggregation and monitoring functions of stock markets. Finally, Bushman and Smith (2001) explain the third channel arguing the pre-commitment of firms to the timely disclosure of high-quality financial statements attracts more resources to the capital markets lowering liquidity risk for investors, which facilitates long-term corporate investments without requiring investors to commit their resources over such long periods.

There are some researches who specifically analyze the first channel, that is, how information collaborates with a more efficient capital allocation. Wurgler (2000), for instance, shows countries with more developed financial markets present more efficient capital allocation, that is, they invest more in growing industries and decrease investment more in their declining industries. Importantly, although financially developed countries do not necessarily present higher levels of investments they seem to allocate their investment more efficiently. According to Wurgler (2000), better capital allocation is associated with strong minority investors, lower state ownership and higher stock prices' informativeness. The author shows countries with stock markets where more firm-specific information is incorporated into stock prices, measured as stock price synchronicity, exhibit a better allocation of capital.

Habib (2008) explores the mechanism of stock price informativeness for capital allocation efficiency, specifically assessing the role of the financial reporting system. According to the author, financial reporting provides the primary source of information about firms' performance, thus, financial accounting information is expected to facilitate capital allocation decisions, as theorized by Bushman and Smith (2001). Using the same measures of capital allocation as Wurgler (2000) and using a measure that captures the intensity and timeliness of financial disclosure and their interpretation and dissemination by analysts and the media, and a measure that captures the intensity of governance

disclosure, Habib (2008) finds corporate transparency is positively associated with more efficient allocation of capital.

Both works of Habib (2008) and Rajan and Zingales (1998) are concerned about how the quality of accounting systems varies across countries. Rajan and Zingales (1998) point that more developed countries tend to have better accounting standards, but exceptions call their attention. They highlight Malaysia presented accounting standards with high levels as Australia and Canada, and Belgium and Germany were at the same level as Korea, the Philippines and Mexico, and Portugal were listed among the worst accounting measures. However, a few years later, almost all of the countries studied by Rajan and Zingales (1998) had their accounting practices converged to the same set of standards, the IFRS.

Comparative international accounting research has shown the origins of accounting systems in different countries are strictly related to environmental factors such as the legal and political systems, social climate and cultural aspects (Gray, 1988), which has led to differences in accounting practices over countries. Nobes and Parker (2010) point the awareness of these differences has led to impressive attempts to reduce them, most prominently by the International Accounting Standards Board, through the issuance of the IFRS.

These attempts seems to have been working. According to the IFRS Foundation (Pacter, 2015), the IFRS is the financial reporting system used in several jurisdictions from Europe, the Americas, Africa, Middle-East and Asia-Oceania. For the first time in History, there is a substantial number of firms domiciled in different countries using the same accounting standards (Tarca, 2012). According to Nobes and Parker (2010), this movement towards global accounting harmonization is a result of several factors, including the emergence of global financial markets and political issues. Tarca (2012), in a review over the studies evaluating the global IFRS convergence, points the benefits of global accounting standards are compelling. She explains the use of one set of high quality financial standards has the potential to improve investments' transparency and comparability, allowing firms to achieve lower costs of capital and markets to allocate funds more efficiently. Hence, the arguments around IFRS adoption lie in the reasoning that IFRS provides higher quality financial information and, in line with the arguments of Bushman and Smith (2001), Habib (2008) and Wurgler (2000), improves market prices informativeness and, consequently, capital allocation.

5.3 Model

In this essay I estimate a structural model of investment in the form of Euler equations. Traditionally, financing constraints are estimated using the Q-theory of investment (Hubbard, 1998). Nevertheless, Love (2003) explains that although both the Q-theory

and Euler equation models come from the same firm value optimization problem, the Euler equation model requires less stronger assumptions to be estimated. Namely, the Q-theory requires a proxy for the unobservable marginal q. According to the author, the commonly used proxy of the market-to-book ratio carries bias correlated to the level of financial development of a given country in the denominator. Similarly, the book value will also carry bias correlated to the level of accounting quality, invalidating its use for cross-country studies.

Rajan and Zingales (1998) study the relationship between finance and growth using industry-level data arguing they are improving on the previous literature (e.g., King & Levine, 1993) who focused on country-level data. Rajan and Zingales (1998) say they are able to correct for country and industry characteristics rendering their model less vulnerable to omitted variable bias and mispecification. Wurgler (2000), studying the role of financial development on the efficiency of capital allocation also rely on industry data. The author argues he does not estimate a structural investment model due to lack of data, so he assumes that optimal investment implies increasing investment in growing industries and decreasing investment in declining ones.

Wurgler (2000) estimates the efficiency of capital allocation as the elasticity coefficient between investment and value-added. According to author, the coefficient can be interpreted as an adjustment cost from the Q-theory of investment in Hubbard (1998) and its correlation with financial development is what indicates capital markets frictions. The author says value added growth is what proxies for growth opportunities; however, Love (2003) argues this proxy is questionable. She says value-added growth is likely to capture not industries' productivity growth but growth in size. Further, Love (2003) adds a concern on reverse causality in Wurgler (2000)'s approach, since the author assumes in his model that investment growth promote value-added growth, but the reverse case will indicate firms are growing in size but not necessarily in productivity.

I follow the approach of Love (2003) and estimate a structural investment model with financing constraintsin the form of Euler equations[1] using firm-level data. Love (2003) explains that through the Euler equations is possible to control for future growth opportunities (including the marginal productivity of investment) and to identify the information set available at each decision-making point, allowing the specification of valid instruments and an appropriate estimation technique. Finally, the estimated parameters can be interpreted as structural parameters.

[1]Parker (2007) explains that the mathematics of Euler equations were developed by Bernoulli, Euler, Lagrange and others long ago jointly with the classical dynamics of physical objects, but they first appeared in Economics in Ramsey (1928). An Euler equation is a form to characterize an intertemporal first-order condition for a dynamic optimal choice problem equating marginal costs and benefits. It is a difference or differential equation used as a law of motion for the economic variables of the model, being useful for any problem in which choices are linked over time, such as is the case of the present essay, where firms are choosing investment over time subject to capital stock adjustment cost including financial markets frictions.

Using firm-level data rather than industry or country aggregates allows for firm heterogeneity in the productivity of capital. Even inside a same industry, some firms might be more productive than others. Therefore, allocating capital to industries is not as efficient as allocating capital to the most productive firms. Furthermore, one feels more comfortable treating financial development and IFRS adoption as exogenous to firms instead of to industries or countries. In the next steps I present the theoretical model and its empirical form, as developed by Love (2003), which follows closely the specification from Gilchrist and Himmelberg (1998).

In the model, shareholders, or managers, are maximizing the present value of the firm which equals to the expected discounted value of dividends subject to capital accumulation and external financing constraints:

$$V_t\left(K_t, \xi_t\right) = \max_{\{I_{t+s}\}_{s=0}^{\infty}} D_t + \mathrm{E}_t\left[\sum_{s=1}^{\infty} \beta_{t+s-1} D_{t+s}\right], \tag{5.1}$$

$$\text{subject to} \quad D_t = \Pi\left(K_t, \xi_t\right) - C\left(I_t, K_t\right) - I_t \tag{5.2}$$

$$K_{t+1} = \left(1-\delta\right) K_t + I_t \tag{5.3}$$

$$D_t \geq 0, \tag{5.4}$$

where D_t are dividends paid to shareholders, given by the constraint (5.2) which defines that sources equal uses; β_{t+s-1} is a discount factor from $t+s$ to t. In the capital accumulation constraint (5.3), K_t is the beginning of period capital stock, I_t is the investment expenditure and δ is the depreciation rate. The profit function $\Pi\left(K_t, \xi_t\right)$ includes a productivity shock ξ_t. The investment adjustment cost is given by $C\left(I_t, K_t\right)$, which assumes to result in a loss of part of the investment. The financing constraints are introduced via the non-negativity of dividends constraints (5.4), whose multiplier is denoted by λ_t. This multiplier is what denotes the cost associated with raising new equity. This implies equity financing is costly and this extra cost is due to information or contracting costs (see, e.g. Jensen & Meckling, 1976; Myers & Majluf, 1984). In the model, this constraints are considered exogenous to the firm and represent the shadow cost of finance.

As detailed in the Appendix A, the first order conditions of the previous optimization problem result in the following Euler equation:

$$1 + \left(\frac{\partial C}{\partial I}\right)_t = \beta_t \mathrm{E}_t\left[\Theta_t\left\{\left(\frac{\partial \Pi}{\partial K}\right)_{t+1} + \left(1-\delta\right)\left(1 + \left(\frac{\partial C}{\partial I}\right)_{t+1}\right)\right\}\right], \tag{5.5}$$

where $\partial C/\partial I$ is the marginal adjustment cost of investment, $\partial \Pi/\partial K$ is the Marginal Profit of Capital (MPK) and

$$\Theta_t = \frac{1+\lambda_{t+1}}{1+\lambda_t}. \tag{5.6}$$

is the cost of external finance between t and $t+1$.

As Love (2003) explains, the intuition behind the Euler Equation (5.5) is that the marginal cost of investing today, given by the adjustment cost and the price of investment goods (normalized to one), is equal to the discounted marginal cost of postponing the investment until tomorrow, given by the foregone MPK plus the future adjustment cost and price of investment.

If a firms is financially constrained, i.e., it cannot raise capital, the cost of external capital today rises relative to tomorrow. Thus, $\lambda_t > \lambda_{t+1}$, so that Θ_t falls and the firm postpone its investments. In perfect capital markets $\lambda_t = \lambda_{t+1}$ and $\Theta = 1$ for all t and the firm is never constrained. In imperfect capital markets, Θ_t depends on state-variables that can be identified by observable firms' characteristics, via an ad hoc parametrization (Myers & Majluf, 1984; Whited, 1992):

$$\Theta_t = a_{0i} + aCash_{i,t-1}. \tag{5.7}$$

Studying the effect of financial development, Love (2003) expands the parametrization to include the effect of financial development on how important Cash is for investment:

$$\Theta_{it} = a_{0i} + (a_1 + a_2 FD_c)\, Cash_{i,t-1}, \tag{5.8}$$

so that if $a_2 < 0$, then financial development reduces the sensitivity of investment to internal funds.

In this essay, to evaluate the role of IFRS minimizing financing constraints I add an IFRS variable in the parametrization allowing both cash and financial development to vary according to IFRS adoption:

$$\begin{aligned}\Theta_{it} = a_{0i} + a_1 FD_{c,t-1} + a_2 IFRS_{c,t-1} + a_3 FD \times IFRS_{c,t-1} + a_4 Cash_{i,t-1} + \\ + a_5 Cash \times FD_{ci,t-1} + a_6 Cash \times IFRS_{ci,t-1} + a_7 Cash \times FD \times IFRS_{ci,t-1},\end{aligned} \tag{5.9}$$

where *Cash* varies over firms and over time and *FD* and *IFRS* vary over countries and over time[2]. It is also important to note that the stock of cash and the level of financial development and IFRS adoption are lagged in one period. This is so because I am assuming firms make their investment decision at the beginning of each period (or in the end of the previous period) so the information set influencing that decision should be at this period.

Since a_{0i} is constant over time and firm-specific and *FD* and *IFRS* (and their interaction) are country-time specific they are excluded from the estimation model because I remove firm and country-time fixed effects. Thence, the cost of external capital is written

[2]Love (2003) uses a time-constant measure for financial development measured at the beginning of her sample period.

as:

$$\Theta_{it} = a_1 Cash_{i,t-1} + a_2 Cash \times FD_{ci,t-1} + a_3 Cash \times IFRS_{ci,t-1} + \\ + a_4 Cash \times FD \times IFRS_{ci,t-1}, \tag{5.10}$$

The MPK function comes from a Cobb-Douglas production function in the form $F(K, L) = AK^{\alpha_K} L^{\alpha_L} X^{\alpha_X}$, in which L is labor, A is a technology parameter and X are quasi-fixed factors such as intangible assets, research and development capital or managerial output. From its first order condition, one can arrive in a sales-based definition for MPK:

$$\frac{\partial \Pi}{\partial K} = MPK_{it} = \theta \frac{S}{K} \approx \theta_i + \bar{\theta} \frac{S}{K_{it}}, \tag{5.11}$$

where $\theta = \alpha_K/\mu$, in which α_K is the capital share in the production function and μ is the markup. In the estimation model, α_K is considered industry-specific and μ is considered either industry or firm-specific and they are captured by fixed effects in the estimation model.

The adjustment cost function is given by $C(I_t, K_t) = \frac{\alpha}{2}\left(\frac{I}{K_t} - g\frac{I}{K_{t-1}} - v_i\right)^2 K_t$, in which the g parameter captures investment persistence, since it may be easier for firms to continue investment at some fraction g so that the marginal adjustment cost is of investment is

$$\frac{\partial C}{\partial I_{it}} = \alpha \left(\frac{I}{K_{it}} - g\frac{I}{K_{it-1}} - \nu_i \right), \tag{5.12}$$

where $\alpha\nu_i$ is captured by firm fixed effects. Finally, the adjustment cost function may also include technology shocks that are captured by time fixed effects.

Furthermore, I rely on rational expectations to replace the expectation by realized values plus an error term e_{it}. This error term is orthogonal to any information available at the time when the investment decision is made. Therefore, I am assuming that e_{it} is not correlated with the variables at $t-1$, so that the orthogonality condition (sequential exogeneity) for this model is that $\mathrm{E}\left[e_t|\mathbf{X}_{t-s}\right] = 0$ for $s \geq 1$.

Finally, the model is linearized using a first-order Taylor approximation around the means. This allows to separate the discount factor β_t in a linear term to allow it to be captured by country-time fixed effects, as well as the several firm-specific terms to be captured by firm fixed effects. Then, the right side term in Equation (5.5) is written as:

$$\beta_t \Theta_{it}\{\cdot\}_{it} = \bar{\beta}\gamma\Theta + \bar{\beta}\{\cdot\}_{it} + \gamma\beta_t, \tag{5.13}$$

where $\bar{\beta}$ is the mean of β_t, γ is the mean of $\{\cdot\}_{it}$ and the mean of Θ_{it} is considered to be one, since its value should be around one.

Substituting Equations (5.11), (5.12) and (5.13) into (5.5), replacing the expectation with an error term, and grouping the firm and country-time specific parameters into fixed effects I arrive at the following estimation model:

$$\frac{I}{K_{it}} = \beta_1 \frac{I}{K_{i,t+1}} + \beta_2 \frac{I}{K_{i,t-1}} + \beta_3 \frac{S}{K_{i,t+1}} + \beta_4 Cash_{i,t-1} + \beta_5 Cash \times FD_{ci,t-1} + \\ + \beta_6 Cash \times IFRS_{ci,t-1} + \beta_7 Cash \times FD \times IFRS_{ci,t-1} + f_i + d_{ct} + e_{it}, \quad (5.14)$$

where the estimation parameters relate to the structural parameters in the following ways:

$$\beta_1 = \frac{\bar{\beta}(1-\delta)}{1+\bar{\beta}(1-\delta)g}; \qquad \beta_2 = \frac{g}{1+\bar{\beta}(1-\delta)g}; \qquad \beta_3 = \frac{\bar{\beta}\bar{\theta}}{\alpha(1+\bar{\beta}(1-\delta)g)};$$
$$\beta_4 = \frac{\bar{\beta}\gamma a_1}{\alpha(1+\bar{\beta}(1-\delta)g)}; \qquad \beta_5 = \frac{\bar{\beta}\gamma a_2}{\alpha(1+\bar{\beta}(1-\delta)g)}; \qquad \beta_6 = \frac{\bar{\beta}\gamma a_3}{\alpha(1+\bar{\beta}(1-\delta)g)};$$
$$\beta_7 = \frac{\bar{\beta}\gamma a_4}{\alpha(1+\bar{\beta}(1-\delta)g)}. \quad (5.15)$$

The details of this derivations are given in the Appendix A.

The estimation of Equation (5.14) is as follows. To exclude the firms fixed effects f_i I take the first differences of the variables. The country-time fixed effects d_{ct} are excluded from the model subtracting the mean for each country at each time period. Both regressors and instruments are country-year differenced prior to estimation. To tackle the sequential exogeneity assumption I estimate the model via GMM including as instruments all lags of the regressors plus all the lags of the cost of goods sold (Cogs), cash flow and their interaction with cash, sales and investment, as well as interactions of financial development and IFRS with GDP per capita[3], investment, sales and cash, and interactions of IFRS with trade[4], investment, sales and cash, and also industry dummies.

5.4 Data and Estimation Results

Financial development is measured as a compound index capturing the size, stability and efficiency of both credit and capital markets, as built by Beck, Demirgüç-Kunt, and Levine (2010) and available at the GFD database of the World Bank[5]. Beck et al. (2010) develops several measures for four different aspects of both financial markets and financial institutions. Besides size, stability and efficiency the database also includes measures for access to credit and stock markets, alhtough they are available for only a limited number of countries and time periods. For these three characteristics, also considering availability, I select the following measures (Beck et al., 2010):

[3]The idea is to instrumentalize financial development and IFRS adoption by economic development.
[4]The idea is to instrumentalize IFRS adoption by countries' economic openness.
[5]http://databank.worldbank.org/data/source/global-financial-development

- Financial Institutions:
  1. Depth (Size): Private credit by deposit money banks to GDP (%), which measures the financial resources provided to the private sector by domestic money banks as a share of GDP. Domestic money banks comprise commercial banks and other financial institutions that accept transferable deposits, such as demand deposits.
  2. Efficiency: Bank net interest margin (%), which is the accounting value of bank's net interest revenue as a share of its average interest-bearing (total earning) assets. Higher bank net interest margin indicates higher banks profitability and lower efficiency of the credit market, so I use its inverse.
  3. Stability: Bank Z-score, which captures the probability of default of a country's commercial banking system. The Z-score compares the buffer of a country's commercial banking system (capitalization and returns) with the volatility of those returns and is a standard measure for financial institutions stability in the literature.
- Financial Institutions:
  1. Depth (Size): Outstanding domestic private debt securities to GDP (%), which is the total amount of domestic private debt securities (amount outstanding covering long-term bonds and notes, commercial paper and other short-term notes) issued in domestic markets as a share of GDP, plus stock market capitalization to GDP (%), which is the total value of all listed shares in a stock market as a percentage of GDP.
  2. Efficiency: stock market turnover ratio (%), which is the value of shares traded during the period divided by the average market capitalization for the period.
  3. Stability: Stock price volatility, measured as the average of the 360-day volatility of the national stock market index. Higher volatility indicates lower stability, so I use its inverse.

I standardize these variables (because they are in different scales) and calculate their means[6] for each country at each year to gauge the Financial Development (FD) index I use in the regressions.

[6] I also considered using PCA to extract a common financial development factor. However, PCA do not allow for missing data so I would lose groups of country-year observations if one indicator is missing for a certain country in a certain period. There are several alternative PCA with different methods to infer the missing variables. Nevertheless, I preferred to adhere with the simplest aggregation method which is taking means.

Table 5.1: Variables' Description

Variable	Name	Description	Source
I/K	Investment to Capital Ratio	Investment is defined as capital expenditures (Capex), and capital is defined as property, plant and equipment minus Capex.	Worldscope.
S/K	Sales to Capital Ratio	Sales is net sales, and capital is defined as property, plant and equipment minus Capex.	Worldscope.
Cash	Cash stock	Cash plus short term investments scaled by total assets.	Worldscope.
Cogs	Cogs	Cost of goods sold scaled by capital.	Worldscope.
CashFlow	Cash flow	Variation in cash stock scaled by capital.	Worldscope.
FD	Financial Development	Mean of financial institutions' depth (private credit by deposit money banks as a percentage of GDP), efficiency (inverse of bank net interest margin) and stability (bank z-score) and financial markets' depth (outstanding domestic private debt securities plus stock market capitalization as a percentage of GDP), efficiency (stock market turnover ratio) and stability (inverse of stock price volatility).	Calculated from data from the GFD, World Bank.
IFRS	IFRS adoption	Composite index including details on the type and extent of adoption and endorsement. Yearly.	Data compiled from the IFRS Foundation (2018).
GDP	GDP	Log of GDP.	WDI, World Bank.
Trade	Trade	Imports plus Exports as a percentage of GDP.	WDI, World Bank.

Table 5.1 summarizes the descriptions of the variables and instruments used in the models, including their definitions and sources. The IFRS variable is the compound index capturing different levels of IFRS adoption by different countries developed in Chapter 2. The sample includes non-financial and non-service firms[7] from 32 different countries for a 15 years (2002 to 2016) period. It is important to note that IFRS adoption is likely to change the definition of cash, as well as of the other accounting variables in the model, used in the financial statements of firms from a certain country. This would induce bias in my estimations. However, Worldscope analysts harmonize accounting figures presentation and disclosure using standard data definitions in the coding of financial accounts, so that the concern that IFRS adoption would lead to systematic differences in the measured value of cash stocks and other variables is minimized.

5.4.1 Descriptive Statistics

Table 5.2 shows the distribution of the sample (number of observations and number of firms) by country. The total sample has 52,118 observations for 4,324 firms. 26% of total observations (firms) are from the United States, followed by the United Kingdom with 10%. The country with lower representation in the sample is Saudi Arabia with less than 0.60% (0.65%) of total observations (firms). Ten countries have less than 1% of observations (firms) and the ten largest countries in the sample account for almost 75% of total observations (firms).

Table 5.3 shows the mean values for variables used as regressors and instruments. Australia, South Africa, Singapore, Saudi Arabia, and Brazil are the countries with higher levels of investment and Malaysia, Switzerland, Portugal, Peru, and Mexico are the countries with the lowest levels. China, Israel, Sweden, and Singapore have the highest levels of Cash (around 20% of total assets), and New Zealand and Portugal have the lowest levels (6%). Cash Flows scaled by capital are on average close to zero and are negative for New Zealand, China, and Denmark.

Poland, Peru, Greece, Mexico, Turkey, and Brazil have the lower levels of financial development and Denmark, United States, Spain, Japan, and China are the most financially developed. Switzerland is the only country in the sample without any level of IFRS adoption, followed by the United States and Saudi Arabia. Turkey, Greece and South Africa have the higher level of IFRS adoption. Switzerland, Denmark, Ireland, and Sweden have the highest GDP per capita and China, Peru, and South Africa are on the opposite side. Finally, Singapore, Hong Kong and Malaysia have the highest levels of trade and Brazil, United States, and Japan the lowest.

Table 5.4 shows the correlation between the variables. Investment is positive and highly correlated with sales, cash and cost of goods sold but it is poorly correlated with

[7]SIC codes 6, 7 and above

Table 5.2: Sample Distribution by Country

Country	Number of Obs.	Percentual (%)	Number of Firms	Percentual (%)
Australia	2,498	4.79	212	4.90
Austria	620	1.19	46	1.06
Belgium	595	1.14	45	1.04
Brazil	795	1.53	65	1.50
Canada	2,316	4.44	195	4.51
China	1,029	1.97	86	1.99
Denmark	365	0.70	30	0.69
Finland	946	1.82	75	1.73
France	3,039	5.83	232	5.37
Germany	3,305	6.34	258	5.97
Greece	533	1.02	45	1.04
Hong Kong	1,066	2.05	93	2.15
Ireland	477	0.92	35	0.81
Israel	341	0.65	31	0.72
Italy	1,331	2.55	107	2.47
Japan	627	1.20	44	1.02
Malaysia	2,996	5.75	268	6.20
Mexico	408	0.78	38	0.88
Netherlands	989	1.90	84	1.94
New Zealand	315	0.60	27	0.62
Peru	320	0.61	26	0.60
Poland	736	1.41	62	1.43
Portugal	440	0.84	35	0.81
Saudi Arabia	305	0.59	28	0.65
Singapore	2,684	5.15	230	5.32
South Africa	351	0.67	27	0.62
Spain	642	1.23	60	1.39
Sweden	515	0.99	43	0.99
Switzerland	1,773	3.40	135	3.12
Turkey	740	1.42	65	1.50
United Kingdom	5,381	10.32	448	10.36
United States	13,640	26.17	1,149	26.57
Total	52,118	100	4,324	100

Table 5.3: Mean Variables by Country

Country	I/K	S/K	Cash	Cogs	Cash Flow	FD	IFRS	GDP	Trade
Australia	0.15	2.48	0.11	1.79	0.03	0.73	0.46	10.59	0.42
Austria	0.10	1.65	0.08	1.17	0.02	0.39	0.50	10.63	0.97
Belgium	0.10	2.36	0.10	1.71	0.02	0.08	0.59	10.60	1.50
Brazil	0.13	1.56	0.18	1.01	0.03	−0.02	0.42	8.89	0.26
Canada	0.12	2.11	0.11	1.50	0.02	0.57	0.20	10.60	0.66
China	0.12	1.28	0.21	0.88	−0.01	0.73	0.05	8.05	0.52
Denmark	0.10	2.61	0.16	1.80	−0.01	1.16	0.59	10.86	0.95
Finland	0.10	3.18	0.09	2.27	0.02	0.31	0.55	10.63	0.76
France	0.12	3.13	0.10	2.41	0.03	0.43	0.49	10.50	0.56
Germany	0.10	2.85	0.09	1.93	0.02	0.65	0.52	10.54	0.75
Greece	0.11	1.83	0.08	1.31	0.03	−0.13	0.75	10.07	0.56
Hong Kong	0.10	1.63	0.17	1.15	0.09	0.54	0.52	10.31	3.52
Ireland	0.11	3.41	0.11	2.20	0.03	0.53	0.58	10.80	1.73
Israel	0.09	2.25	0.21	1.51	0.03	0.45	0.31	10.19	0.72
Italy	0.09	2.02	0.09	1.02	0.03	0.45	0.70	10.40	0.52
Japan	0.09	1.59	0.13	1.00	0.01	0.80	0.08	10.55	0.29
Malaysia	0.07	1.53	0.19	1.18	0.01	0.59	0.12	8.82	1.81
Mexico	0.08	1.91	0.13	1.30	0.02	−0.12	0.12	9.04	0.57
Netherlands	0.10	3.31	0.08	2.38	0.02	0.58	0.54	10.67	1.31
New Zealand	0.10	2.13	0.06	1.50	−0.00	0.50	0.57	10.31	0.58
Peru	0.08	1.37	0.14	0.99	0.01	−0.23	0.20	8.23	0.48
Poland	0.12	2.32	0.15	1.70	0.01	−0.26	0.70	9.29	0.81
Portugal	0.08	1.60	0.06	1.38	0.03	0.43	0.61	9.89	0.69
Saudi Arabia	0.13	1.59	0.17	1.16	0.01	0.14	0.05	9.87	0.85
Singapore	0.12	2.57	0.20	1.91	0.06	0.54	0.17	10.49	3.87
South Africa	0.15	2.07	0.13	1.44	0.01	0.18	0.70	8.58	0.59
Spain	0.09	2.03	0.08	1.48	0.01	0.84	0.68	10.31	0.57
Sweden	0.10	3.25	0.21	2.28	0.02	0.22	0.50	10.76	0.85
Switzerland	0.08	2.46	0.17	1.53	0.02	0.58	0.00	11.06	1.08
Turkey	0.10	1.95	0.14	1.51	0.03	−0.06	0.83	9.16	0.49
United Kingdom	0.11	2.93	0.08	1.85	0.03	0.61	0.55	10.59	0.55
United States	0.11	3.06	0.13	1.91	0.03	1.01	0.02	10.73	0.27

Variables' descriptions are in Table 5.1.

Table 5.4: Correlation Matrix

	I/K	*S/K*	*Cash*	*Cogs*	*CshFlow*	*FD*	*IFRS*	*GDP*	*Trade*
I/K	1	0.25	0.12	0.20	0.02	0.02	0.003	0.02	−0.01
S/K		1	0.08	0.93	0.05	0.10	−0.005	0.16	−0.06
Cash			1	0.03	−0.05	−0.01	−0.12	−0.14	0.17
Cogs				1	0.03	0.06	0.01	0.12	−0.02
CshFlow					1	0.004	−0.005	0.01	0.01
FD						1	−0.33	0.42	−0.20
IFRS							1	0.10	0.04
GDP								1	−0.12
Trade									1

Variables' descriptions are in Table 5.1.

cash flow, financial development and IFRS. IFRS correlates negatively with cash and with financial development. GDP is highly correlated with financial development and also with IFRS, but negatively correlated with cash.

5.4.2 Estimation Results

Table 5.5 shows the GMM estimation results for three versions of Equation (5.14). The first column shows the estimation of the financing constraints, where investment depends on the firms' cash stocks. The results show the coefficient of cash is positive and statistically significant, implying firms do not have full access to financial markets to finance their economic activities so they need to rely on internally generated funds to invest. In other words, firms are financially constrained.

In the second column I estimate the effect of financial development. The coefficients imply that the partial effect of the cash stock on investment in a country with a low level of financial development of 0.135 (first quartile of the sample), such as Saudi Arabia and South Africa, is 0.134, and for a country with a high level of financial development of 0.656 (third quartile of the sample), such as the United Kingdom, Germany or Australia, is 0.058. That is, firms in a country five times more financially developed are 40% less constrained. Further, for countries with the highest levels of financial development, such as Denmark and the United States (FD index is around one), firms are not financially constrained, since the partial effect of cash is around zero.

Finally, the third column of Table 5.5 presents the results for the full model including the interactions with IFRS. The results indicates that, once controlling the effect of cash for financial development and IFRS adoption no significant financing constraints remains.

Table 5.2 highlights how much the sample is unbalanced by country. Since my variables of interest are country-level the results might be biased towards the effect in these largest countries. To tackle this concern I re-estimate the models for a more balanced

Table 5.5: Estimation Results: All Firms

	Dependent variable:		
	Investment (I/K)		
	(1)	(2)	(3)
I/K_{t-1}	0.136^{***}	-0.049^{*}	-0.071^{***}
	(0.022)	(0.030)	(0.024)
I/K_{t+1}	0.779^{***}	1.731^{***}	1.712^{***}
	(0.116)	(0.143)	(0.101)
S/K_{t+1}	0.032^{***}	0.020^{**}	0.026^{***}
	(0.005)	(0.008)	(0.007)
$Cash_{t+1}$	0.067^{***}	0.154^{**}	0.160
	(0.022)	(0.065)	(0.101)
$Cash \times FD_{t-1}$		-0.147^{**}	-0.144
		(0.075)	(0.107)
$Cash \times IFRS_{t-1}$			-0.111
			(0.166)
$Cash \times FD \times IFRS_{t-1}$			0.087
			(0.209)
Observations	52,118	52,118	52,118
Wald Statistics	766.365^{***}	363.634^{***}	641.603^{***}
Sargan Chi-Squared Stat	149.533	225.485	361.988
Sargan Chi-Squared P-value	0.999	0.998	0.999
AR(1) test p-value	0.000	0.000	0.000
AR(2) test p-value	0.000	0.057	0.183

Note: *p<0.1; **p<0.05; ***p<0.01

Variables' descriptions are in Table 5.1. The model is estimated via GMM excluding country-time and firm fixed effects including as instruments all lags of the regressors plus all the lags of Cogs, cash flow and their interaction with cash, sales and investment, as well as interactions of financial development and IFRS with GDP per capita, investment, sales and cash, and interactions of IFRS with trade, investment, sales and cash, and also industry dummies.

Table 5.6: Estimation Results: Country-balanced firms

	Dependent variable:		
	Investment (I/K)		
	(1)	(2)	(3)
I/K_{t-1}	0.188***	−0.002	−0.031
	(0.033)	(0.033)	(0.029)
I/K_{t+1}	0.580**	1.567***	1.572***
	(0.230)	(0.169)	(0.151)
S/K_{t+1}	0.043***	0.034***	0.034***
	(0.011)	(0.013)	(0.011)
$Cash_{t+1}$	0.079***	0.140**	0.213*
	(0.027)	(0.056)	(0.113)
$Cash \times FD_{t-1}$		−0.212***	−0.291**
		(0.080)	(0.147)
$Cash \times IFRS_{t-1}$			−0.176
			(0.185)
$Cash \times FD \times IFRS_{t-1}$			0.295
			(0.235)
Observations	25,400	25,400	25,400
Wald Statistics	396.117***	288.708***	359.681***
Sargan Chi-Squared Stat	127.466	188.698	323.961
Sargan Chi-Squared P-value	0.999	0.999	0.999
AR(1) test p-value	0.000	0.000	0.000
AR(2) test p-value	0.005	0.463	0.784

Note: *p<0.1; **p<0.05; ***p<0.01
Variables' descriptions are in Table 5.1. The model is estimated via GMM excluding country-time and firm fixed effects including as instruments all lags of the regressors plus all the lags of Cogs, cash flow and their interaction with cash, sales and investment, as well as interactions of financial development and IFRS with GDP per capita, investment, sales and cash, and interactions of IFRS with trade, investment, sales and cash, and also industry dummies.

sample, in which I randomly select 100 firms for each country with more than 100 firms in the sample. Table 5.6 presents the results for this analysis. The results for the first two specifications are similar to the ones considering the whole sample, but the last column shows significant estimates for cash and financial development. Considering this more balanced sample, the partial effect of Cash on investment for a country with a low level of financial development (first quartile) is 0.173, and for a country with a high level of financial development (third quartile) the partial effect is only 0.022. Still, IFRS do not appear to significantly affect financing constraints.

Nevertheless, the literature suggests, as seen in Section 5.2, that IFRS adoption has different effects in different countries. Besides being unbalanced in the number of firms and observations, the sample is also high unbalanced in the level of economic development, as Figure 5.1 shows. I split the sample into a low development (with observations for which the GDP per capita is under the average) and high development sample (with observations for which the GDP per capita is above the average) and re-estimate the models. Table

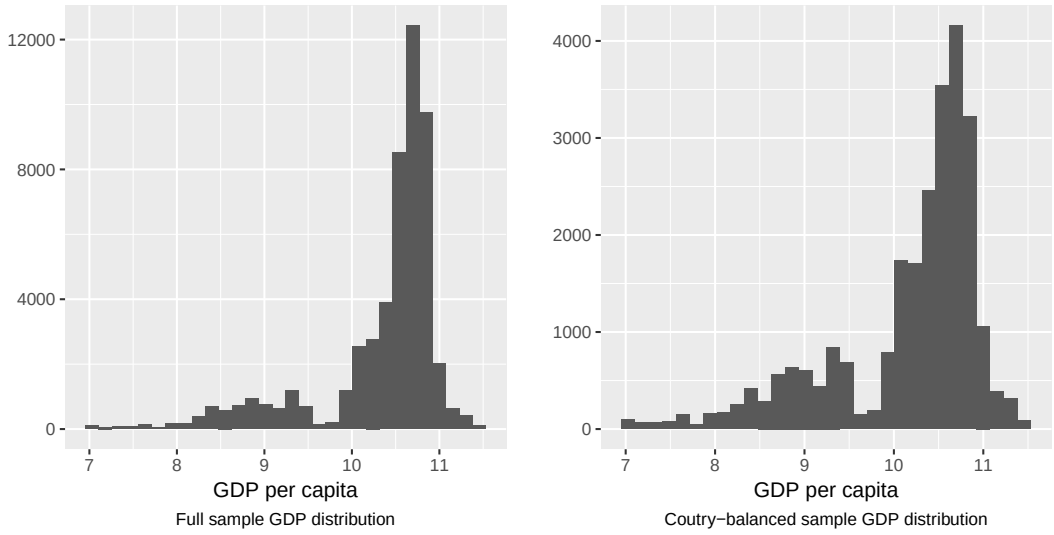

Figure 5.1: GDP distribution

5.7 shows the summary statistics for financial development and IFRS adoption for the four different samples.

Table 5.7: Summary Statistics of FD and IFRS for Different Samples

Variable	Stat	All	Country-balanced	Low GDP	High GDP
FD	Min.	−0.536	−0.536	−0.536	0.838
	1st Qu.	0.135	0.135	−0.106	0.879
	Median	0.445	0.445	0.165	1.004
	Mean	0.413	0.413	0.203	1.084
	3rd Qu.	0.656	0.656	0.479	1.207
	Max.	2.184	2.184	1.847	2.184
IFRS	Min.	0.000	0.000	0.000	0.000
	1st Qu.	0.070	0.070	0.000	0.070
	Median	0.593	0.593	0.070	0.404
	Mean	0.424	0.424	0.337	0.391
	3rd Qu.	0.767	0.767	0.788	0.767
	Max.	0.970	0.970	0.970	0.893

Variables' descriptions are in Table 5.1.

Table 5.8 shows the results for the low GDP sample and Table 5.9 shows the results for the high GDP sample. First, comparing the first column of each table one can see that firms in high developed countries are not financially constrained, since the coefficient of cash is only statistically significant for the low GDP sample. Second, analyzing the role of financial development ,the results in the second column of each table says that firms under low economic development face financing constraints, but the levels of financial development are not enough to relief such constraints. As Table 5.7 shows, the mean financial development for the the low GDP sample is only 0.203 and the mean for the high GDP sample is 1.084, more than five times higher. Table 5.4 shows the correlation between FD and GDP per capita is 0.420.

Table 5.8: Estimation Results: Firms in Low GDP

	Dependent variable:		
	Investment (I/K)		
	(1)	(2)	(3)
I/K_{t-1}	−0.033	−0.054	−0.086*
	(0.062)	(0.055)	(0.050)
I/K_{t+1}	0.938***	0.938***	0.550***
	(0.240)	(0.242)	(0.170)
S/K_{t+1}	0.038***	0.037***	0.026***
	(0.009)	(0.009)	(0.007)
$Cash_{t+1}$	0.079*	0.075*	0.324***
	(0.045)	(0.043)	(0.080)
$Cash \times FD_{t-1}$		−0.048	−0.405***
		(0.059)	(0.106)
$Cash \times IFRS_{t-1}$			−0.570***
			(0.132)
$Cash \times FD \times IFRS_{t-1}$			0.676***
			(0.225)
Observations	13,119	13,119	13,119
Wald Statistics	48.324***	50.736***	93.267***
Sargan Chi-Squared Stat	134.663	163.761	268.03
Sargan Chi-Squared P-value	0.999	0.999	0.999
AR(1) test p-value	0.000	0.000	0.000
AR(2) test p-value	0.774	0.924	0.445

Note: *p<0.1; **p<0.05; ***p<0.01

Variables' descriptions are in Table 5.1. The model is estimated via GMM excluding country-time and firm fixed effects including as instruments all lags of the regressors plus all the lags of the Cogs, cash flow and their interaction with cash, sales and investment, as well as interactions of financial development and IFRS with GDP per capita, investment, sales and cash, and interactions of IFRS with trade, investment, sales and cash, and also industry dummies.

Table 5.9: Estimation Results: Firms in High GDP

	Dependent variable:		
	Investment (I/K)		
	(1)	(2)	(3)
I/K_{t-1}	−0.029	−0.071**	−0.084***
	(0.028)	(0.032)	(0.026)
I/K_{t+1}	1.406***	1.593***	1.159***
	(0.162)	(0.152)	(0.089)
S/K_{t+1}	0.037***	0.040***	0.050***
	(0.010)	(0.010)	(0.008)
$Cash_{t+1}$	0.004	0.115	0.272***
	(0.046)	(0.095)	(0.100)
$Cash \times FD_{t-1}$		−0.057	−0.182**
		(0.091)	(0.076)
$Cash \times IFRS_{t-1}$			−0.514***
			(0.172)
$Cash \times FD \times IFRS_{t-1}$			0.354**
			(0.150)
Observations	38,999	38,999	38,999
Wald Statistics	282.231***	315.381***	549.480***
Sargan Chi-Squared Stat	155.006	216.457	413.341
Sargan Chi-Squared P-value	0.999	0.999	0.999
AR(1) test p-value	0.000	0.000	0.000
AR(2) test p-value	0.012	0.208	0.662

Note: *p<0.1; **p<0.05; ***p<0.01

Variables' descriptions are in Table 5.1. The model is estimated via GMM excluding country-time and firm fixed effects including as instruments all lags of the regressors plus all the lags of the Cogs, cash flow and their interaction with cash, sales and investment, as well as interactions of financial development and IFRS with GDP per capita, investment, sales and cash, and interactions of IFRS with trade, investment, sales and cash, and also industry dummies.

Table 5.10: Estimation Results: Marginal Effects

	Low GDP	
	No IFRS	Mean Level of IFRS (0.337)
Low FD: −0.106 (Greece and Mexico)	0.367	0.150
High FD: 0.479 (Israel and Italy)	0.130	0.047
	High GDP	
	No IFRS	Mean Level of IFRS (0.391)
Low FD: 0.879 (Japan and China)	0.112	0.032
High FD: 1.207 (Denmark and U.S.)	0.052	0.018

However, when analyzing the role of IFRS adoption some interesting results appear. Let us first consider the low GDP sample. For a country with a low FD level of −0.106, such as Greece and Mexico, and with no IFRS adoption, the estimated partial effect of cash on investment is 0.367. For the mean adoption level (0.337), the partial effect falls to 0.150 and for higher levels of adoption the constraints are nullified. For a country with a high FD level in the low GDP sample of 0.479, as is the case of Israel or Italy, the partial effect of cash with no IFRS adoption is 0.130, which falls to 0.047 with the mean adoption level.

Now I consider the high GDP sample. For a country with a low FD level of 0.879, as is close to Japan and China, and with no IFRS adoption, the estimated partial effect of cash is 0.112. For the mean adoption level of this sample (0.391) the partial effect of cash falls to 0.032. For a country with a high FD level of 1.207, as Denmark and the United States, the partial effect of cash on investment is only 0.052 and falls to 0.018 with a mean level of IFRS adoption. Table 5.10 summarizes these results.

In sum, the results indicate that countries with low economic and financial development can drop their financing constraints by half adopting IFRS even if the adoption is in a considerably restricted extent. These countries under IFRS have similar levels of financing constraints as countries with low GDP and high FD (or low FD and high GDP) and without IFRS. Furthermore, the effect of the adoption is similar in different countries, although their levels of financing constraints vary considerably. At first glance, these results suggest IFRS could act as a substitute for financial development to improve capital allocation efficiency. Although I do not test this directly, I consider the accounting system as part of the financial system as a whole, so that adopting IFRS is a way to improve the functioning of the financial system, in other words, to increase financial development.

Finally, I re-estimate the models using the binary IFRS variable, indicating the mandatory adoption / non-adoption status. The results are in Table 5.11. Except for the first column (full sample) in which the coefficient of cash appears statistically significant, there are no considerably different results considering the dummy for IFRS adoption.

Therefore, the evidence point to IFRS having significant ability to reduce firms'

Table 5.11: Estimation Results: IFRS Dummy Variable

	Dependent variable:			
	Investment (I/K)			
	All Firms	Country-balanced	Low GDP	High GDP
	(1)	(2)	(3)	(4)
I/K_{t-1}	-0.071^{***}	-0.032	-0.071	-0.088^{***}
	(0.024)	(0.029)	(0.050)	(0.027)
I/K_{t+1}	1.691^{***}	1.570^{***}	0.613^{***}	1.165^{***}
	(0.105)	(0.155)	(0.164)	(0.090)
S/K_{t+1}	0.027^{***}	0.033^{***}	0.027^{***}	0.049^{***}
	(0.007)	(0.011)	(0.007)	(0.008)
$Cash_{t+1}$	0.174^{*}	0.219^{**}	0.244^{***}	0.213^{**}
	(0.091)	(0.099)	(0.070)	(0.094)
$Cash \times FD_{t-1}$	-0.152	-0.350^{**}	-0.360^{***}	-0.133^{*}
	(0.099)	(0.136)	(0.094)	(0.073)
$Cash \times IFRS_{t-1}$	-0.088	-0.103	-0.320^{***}	-0.377^{***}
	(0.115)	(0.125)	(0.089)	(0.117)
$Cash \times FD \times IFRS_{t-1}$	0.042	0.294	0.444^{***}	0.222^{**}
	(0.148)	(0.179)	(0.138)	(0.110)
Observations	52,118	25,400	13,119	38,999
Wald Statistics	571.716^{***}	369.674^{***}	87.455^{***}	555.143^{***}
Sargan Chi-Squared Stat	335.818	319.833	251.359	402.570
Sargan Chi-Squared P-value	0.999	0.999	0.990	0.999
AR(1) test p-value	0.000	0.000	0.000	0.000
AR(2) test p-value	0.166	0.781	0.666	0.675

Note: *p<0.1; **p<0.05; ***p<0.01

Variables' descriptions are in Table 5.1, except for IFRS which here is a dummy variable indicating the mandatory adoption. The model is estimated via GMM excluding country-time and firm fixed effects including as instruments all lags of the regressors plus all the lags of the Cogs, cash flow and their interaction with cash, sales and investment, as well as interactions of financial development and IFRS with GDP per capita, investment, sales and cash, and interactions of IFRS with trade, investment, sales and cash, and also industry dummies.

financing constraints by around half, decreasing their cost of external capital and, thus, improving investment efficiency. Most important, although the levels of financing constraints vary widely among countries with different levels of economic development, IFRS seems to have roughly the same effect for both low and high developed groups.

5.5 Concluding Remarks

This research aimed to investigate the role of IFRS adoption for firms' efficiency of capital allocation. To do so, I estimated a structural investment model with financing constraints in which financial development (Love, 2003) and IFRS enter as factors to minimize firms' need for internal funds to make capital investments.

The results indicate that IFRS adoption is capable of decreasing firms' financing constraints along with financial development, making them less dependent on internally generated funds to finance their activities. The results show that, generally, IFRS reduces the partial effect of cash stocks on investment by half. Firms in countries less economically and financially developed have the highest levels of financing constraints but they drop to similar levels of firms in countries with either low financial and high economic development or high financial and low economic development when adopting IFRS at an average level.

Since I use an IFRS variable which allows for different levels of adoption and endorsement, the results indicate that not only full mandatory adoption can generate effects. The average adoption level of the sample (0.350), which would be consistent, for instance, with an adoption where all public domestic firms are permitted to use IFRS in their consolidated financial statements without force of law, is estimated to reduce financing constraints by half.

These results are consonant with the hypothesis that the higher quality accounting information brought with IFRS adoption can improve firms decision to allocate investment over time by decreasing their cost of external capital. Therefore, IFRS facilitates not only financial investments, as the literature has been providing evidence, but also improves real investment efficiency.

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6 Conclusion

This research aimed to investigate the role of IFRS on investment, both at the macro level, studying cross-border foreign investment, and at the micro level, studying firm-level investment. Divided into three different essays, I investigated the role of IFRS in the interdependent dynamics of cross-country capital flows, in the sensitivity of foreign investment to global financial shocks in Latin America, and in the efficiency of firm-level capital allocation.

In the first essay presented in Chapter 3, I investigated the spatial effects of international capital flows among countries and how the adoption of IFRS affects their dynamics. Using the estimator of Kelejian and Piras (2014) for a spatial autoregressive model with an endogenous weight matrix, the results show a complementarity effect among countries for foreign investment, that is, the higher the net inflow to a given country, higher are the inflows to its neighbors. IFRS seems to have a positive effect on the net inflows of FDI but a negative effect on the net inflows of FPI. However, one possibility is that the international standards stimulate FPI outflows, decreasing net inflows. Further, the results indicate that from the total effect of IFRS, and of the other explanatory variables, half is via the spatial autoregressive component. This result is in line with the idea of a growing value network of IFRS adoption, as suggested by Ramanna and Sletten (2014), in which the more countries adopt the standards, the more advantageous it is for its neighbors to follow.

In the second essay, presented in Chapter 4, I studied the effect of IFRS on the impact of international market uncertainty on the volatility of capital flows to Latin America. Analyzing Argentina, Brazil, Chile, Colombia, Mexico and Peru, the results show that despite IFRS being related to large and more volatile foreign investment inflows, there is some evidence that the adoption minimizes the effects of international uncertainty shocks, although the results are only valid for FDI inflows at a 10% significance. Therefore, although limited, the evidence suggests IFRS minimizes foreign investors' home bias and, thus, make capital inflows to Latin American less susceptible to global financial risk.

Finally, in the third essay, I study the role of IFRS to ease firms financing constraints along with financial development. Estimating a structural investment model I find IFRS adoption is capable of improving firms' financing possibilities, decreasing their cost of external capital and, then, minimizing their need to rely on internal funds to invest

in their activity. The results indicate that firms can decrease their financing constraints by half adoption IFRS. Consequently, firms in countries with both low economic and financial development but adopting IFRS have similar financing constraints levels as firms in low economic but high financial development (of with low financial but high economic development) countries who do not adopt IFRS.

Taken together, the results are consistent with the hypothesis that higher quality accounting information can improve investment decisions. Increased countries' attractiveness for capital flows, decreased sensitivity to uncertainty shocks in Latin America, and minimized firms' financing constraints indicate IFRS adoption is able to improve investment allocation decisions. These results are important in two main ways. First, they complement the literature on international capital flows dynamics and volatility and firms' financing constraints explicitly assessing the role of accounting information. Second and most important, these results are crucial from a policy perspective. They show IFRS can have positive effects not only to financial markets but to real investment decisions as well.

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A Derivations

A.1 Euler Equation

The derivations in this sections follows Love (2001).

The dynamic optimization problem in equations (5.1), (5.2), (5.3) and (5.4) can be rewritten in a Bellman equation form, substituting infinite maximization with a single period problem:

$$V_t\left(K_t, \xi_t\right) = \max_{\{I_t\}} D_t + \beta_{t+1}\mathrm{E}_t\left[V_{t+1}\left(K_{t+1}, \xi_{t+1}\right)\right] + \lambda_t D_t, \tag{A.1}$$

$$= \max_{\{I_t\}} \left(1+\lambda_t\right) D_t + \beta_{t+1}\mathrm{E}_t\left[V_{t+1}\left(K_{t+1}, \xi_{t+1}\right)\right], \tag{A.2}$$

in which λ is the multiplier of the non-negativity of dividends constraint (5.4). Finding the first-order condition:

$$\left(1+\lambda_t\right)\left(\frac{\partial D}{\partial I}\right)_t + \beta_{t+1}\left(\frac{\partial V}{\partial K}\right)_{t+1} = 0, \tag{A.3}$$

where $\left(\frac{\partial V}{\partial K}\right)_{t+1} = q_{t+1}$ is the marginal q, that is, the increase in the market value of the firm to an additional unit of capital.

Using the envelope theorem:

$$q_t = \left(\frac{\partial V}{\partial K}\right)_t = \left(1+\lambda_t\right) D_t + \beta_{t+1}\mathrm{E}_t\left[V_{t+1}\left(K_{t+1}, \xi_{t+1}\right)\right]\left(1-\delta\right). \tag{A.4}$$

Combining these two equations to eliminate q_t and q_{t+1}:

$$-\left(\frac{\partial D}{\partial I}\right)_t = \beta_{t+1}\mathrm{E}_t\left[\left(\frac{1+\lambda_{t+1}}{1+\lambda_t}\right)\left(\frac{\partial D}{\partial K}\right)_{t+1} - \left(1-\delta\right)\left(\frac{\partial D}{\partial I}\right)_{t+1}\right] \tag{A.5}$$

The derivatives are:

$$\left(\frac{\partial D}{\partial I}\right)_t = -\left(\frac{\partial C}{\partial I}\right)_t - 1; \tag{A.6}$$

$$\left(\frac{\partial D}{\partial K}\right)_t = -\left(\frac{\partial \Pi}{\partial K}\right)_t - \left(\frac{\partial C}{\partial K}\right)_t; \tag{A.7}$$

$$\left(\frac{\partial C}{\partial K}\right)_t = \alpha\left(\left(\frac{I}{K}\right)_t^2 - \left(\frac{I}{K}\right)_t\left(\frac{I}{K}\right)_{t-1}\right). \tag{A.8}$$

As in Love (2001), I ignore the derivative (A.8) of the adjustment cost function to capital, because it is a second order effect equal to the difference in squared I/K ratios. Since in the data the average I/K is 0.108 so that the squared term is 0.011, its effect is immaterial.

So, substituting the derivatives into (A.5) I arrive at equation (5.5):

$$1 + \left(\frac{\partial C}{\partial I}\right)_t = \beta_t \mathrm{E}_t\left[\Theta_t\left\{\left(\frac{\partial \Pi}{\partial K}\right)_{t+1} + (1-\delta)\left(1 + \left(\frac{\partial C}{\partial I}\right)_{t+1}\right)\right\}\right].$$

A.2 Estimation Model

Assuming rational expectations, the Euler equation is rewritten as:

$$1 + \left(\frac{\partial C}{\partial I}\right)_t = \beta_t \Theta_{it}\left\{\left(\frac{\partial \Pi}{\partial K}\right)_{t+1} + (1-\delta)\left(1 + \left(\frac{\partial C}{\partial I}\right)_{t+1}\right) + e_{it}\right\}. \tag{A.9}$$

Linearizing via a fist-order Taylor expansion (ignoring constant terms), where the mean of $\{\cdot\}$ is γ, the mean of β_t is $\bar{\beta}$ and the mean of Θ is 1:

$$1 + \left(\frac{\partial C}{\partial I}\right)_t = \bar{\beta}\gamma\Theta_{it} + \bar{\beta}\left\{\left(\frac{\partial \Pi}{\partial K}\right)_{t+1} + (1-\delta)\left(1 + \left(\frac{\partial C}{\partial I}\right)_{t+1}\right) + e_{it}\right\} + \gamma\beta_t. \tag{A.10}$$

Replacing the MPK and the marginal adjustment cost functions:

$$\begin{aligned}
1 + \alpha\left(\frac{I}{K_{it}} - g\frac{I}{K_{i,t-1}} - \nu_i\right) &= \bar{\beta}\gamma\Theta_{it} + \bar{\beta}\Bigg\{\theta_i + \bar{\theta}\frac{S}{K_{i,t+1}} + \\
&\quad + (1-\delta)\left(1 + \alpha\left(\frac{I}{K_{i,t+1}} - g\frac{I}{K_{it}} - \nu_i\right)\right) + e_{it}\Bigg\} + \gamma\beta_t \\
1 + \alpha\frac{I}{K_{it}} - \alpha g\frac{I}{K_{i,t-1}} - \alpha\nu_i &= \bar{\beta}\gamma\Theta_{it} + \bar{\beta}\theta_i + \bar{\beta}\bar{\theta}\frac{S}{K_{i,t+1}} + \bar{\beta}(1-\delta) + \\
&\quad + \bar{\beta}(1-\delta)\alpha\frac{I}{K_{i,t+1}} - \bar{\beta}(1-\delta)g\alpha\frac{I}{K_{it}} - \bar{\beta}(1-\delta)\nu_i + \\
&\quad + \bar{\beta}(1-\delta)e_{it} + \gamma\beta_t \\
\alpha\frac{I}{K_{it}} + \bar{\beta}(1-\delta)g\alpha\frac{I}{K_{it}} &= \bar{\beta}\bar{\theta}\frac{S}{K_{i,t+1}} + \alpha g\frac{I}{K_{it}} + \bar{\beta}\bar{\theta}\frac{S}{K_{i,t+1}} + \bar{\beta}\gamma\Theta_{it} + \\
&\quad + \alpha\nu_i - \bar{\beta}(1-\delta)\nu_i + \gamma\beta_t + \bar{\beta}(1-\delta)e_{it}.
\end{aligned}$$

The term $\alpha\nu_i - \bar{\beta}(1-\delta)\nu_i$ is wrapped into firms' fixed effects f_i, $\gamma\beta_t$ is captured by country-time fixed effects d_{ct} and $\bar{\beta}(1-\delta)e_{it}$ is the error term u_{it}, so that:

$$\begin{aligned}
\alpha(1+\bar{\beta}(1-\delta)g)\frac{I}{K_{it}} &= \bar{\beta}\bar{\theta}\frac{S}{K_{i,t+1}} + \alpha g\frac{I}{K_{it}} + \bar{\beta}\bar{\theta}\frac{S}{K_{i,t+1}} + \bar{\beta}\gamma\Theta_{it} + f_i + d_{ct} + u_{it}, \\
\frac{I}{K_{it}} &= \frac{\bar{\beta}(1-\delta)\alpha}{\alpha(1+\bar{\beta}(1-\delta)g)}\frac{I}{K_{i,t+1}} + \frac{\alpha g}{\alpha(1+\bar{\beta}(1-\delta)g)}\frac{I}{K_{i,t-1}} + \\
&\quad + \frac{\bar{\beta}\bar{\theta}}{\alpha(1+\bar{\beta}(1-\delta)g)}\frac{S}{K_{i,t+1}} + \frac{\bar{\beta}\gamma}{\alpha(1+\bar{\beta}(1-\delta)g)}\Theta_{it} + \\
&\quad + f_i + d_{ct} + u_{it} \\
&= \frac{\bar{\beta}\gamma}{1+\bar{\beta}(1-\delta)g}\frac{S}{K_{i,t+1}} + \frac{g}{1+\bar{\beta}(1-\delta)g}\frac{I}{K_{i,t-1}} + \\
&\quad + \frac{\bar{\beta}\bar{\Theta}}{\alpha(1+\bar{\beta}(1-\delta)g)}\frac{S}{K_{i,t+1}} + \frac{\bar{\beta}\gamma}{\alpha(1+\bar{\beta}(1-\delta)g)}\Theta_{it} + \\
&\quad + f_i + d_{ct} + u_{it}. \qquad \text{(A.11)}
\end{aligned}$$

Now, from equation (5.10):

$$\begin{aligned}
\Theta_{it} &= a_1 Cash_{i,t-1} + a_2 Cash \times FD_{ci,t-1} + a_3 Cash \times IFRS_{ci,t-1} + \\
&\quad + a_4 Cash \times FD \times IFRS_{ci,t-1},
\end{aligned}$$

and defining:

$$\beta_1 = \frac{\bar{\beta}(1-\delta)}{1+\bar{\beta}(1-\delta)g}; \qquad \beta_2 = \frac{g}{1+\bar{\beta}(1-\delta)g}; \qquad \beta_3 = \frac{\bar{\beta}\bar{\theta}}{\alpha(1+\bar{\beta}(1-\delta)g)};$$
$$\beta_4 = \frac{\bar{\beta}\gamma a_1}{\alpha(1+\bar{\beta}(1-\delta)g)}; \qquad \beta_5 = \frac{\bar{\beta}\gamma a_2}{\alpha(1+\bar{\beta}(1-\delta)g)}; \qquad \beta_6 = \frac{\bar{\beta}\gamma a_3}{\alpha(1+\bar{\beta}(1-\delta)g)};$$
$$\beta_7 = \frac{\bar{\beta}\gamma a_4}{\alpha(1+\bar{\beta}(1-\delta)g)}.$$

I have the final estimation model in equation (5.14):

$$\begin{aligned}
\frac{I}{K_{it}} &= \beta_1\frac{I}{K_{i,t+1}} + \beta_2\frac{I}{K_{i,t-1}} + \beta_3\frac{S}{K_{it}} + \beta_4 Cash_{i,t-1} + \beta_5 Cash \times FD_{ci,t-1} + \\
&\quad + \beta_6 Cash \times IFRS_{ci,t-1} + \beta_7 Cash \times FD \times IFRS_{ci,t-1} + f_i + d_{ct} + e_{it}.
\end{aligned}$$