UNIVERSITE LIBRE DE BRUXELLES SOLVAY BRUSSELS SCHOOL OF ECONOMICS AND MANAGEMENT

FINANCIAL SYSTEMS: ESSAYS ON THE CULTURAL DETERMINANTS AND THE RELEVANCE FOR ECONOMIC DEVELOPMENT



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A mon Grand-Père et Parrain

 $To \ Education$

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Executive Summary

The thesis analyzes macro-economic determinants and roles of financial sector development.

The literature argues that the size and efficiency of both banking systems and financial markets - the two major components of a financial system - matter for economic development. In the same vein, the quality of financial institutions and regulations are instrumental in the construction of a strong financial system.

We study several aspects of financial sector development in relation to three recent phenomena, namely, the rise of Islamic banking and finance, the increasing interest for emerging stock markets, and the growing remittance flows.

This thesis is made up of three essays.

The first essay extends the literature on the determinants of financial sector development, from the angle of culture. We show that, on average, Islamic finance favors the development of the banking sector in Muslim countries. We provide evidence that several countries have indeed been successful in launching a new, Shariah-compliant, banking system, while not harming the existing, conventional, banking sector. Our empirical analysis uses a newly-constructed original database on the size and performance of Islamic deposit banks globally over the period 2000 to 2005.

The second essay focuses on stock markets, in particular, the less-studied emerging equity markets. We confirm traditional literature findings on unconditional stock returns, over a panel of 53 Major and Frontier markets. Mainly, volatility is high, big surprises happen, and return correlations with the rest of the world are low but have been rising over the last decades. In spite of large differences in market size and liquidity, Frontier market returns are qualitatively similar to Major markets', except correlations, which are lower in Frontier markets. At current correlation levels, the latter continue to bring substantial diversification benefits to international investors.

The last essay examines the relationship between remittances and economic growth. It confirms that remittances are important for developing countries as they stimulate domestic investment. It then demonstrates, theoretically and empirically, that improving the access to bank deposit accounts is crucial to channel remittances to more productive uses. This is even more true when the access to international borrowing is costly.

The 2008-2009 financial crisis has propelled the improvement of financial systems to the top of policymakers' agendas. Our work contributes to a better understanding of the importance of finance in economic outcomes. It also brings a novel perspective on the determinants of financial systems.

Executive Summary (French)

Notre thèse a pour objet l'étude des déterminants et des rôles macro-économiques des secteurs financiers dans le monde.

Selon la littérature scientifique, la taille et l'efficacité des systèmes bancaires et des marchés financiers – les deux composantes principales d'un système financier – sont importantes pour le développement économique. Il apparaît également que la qualité des institutions et des régulations financières contribuent à la création d'un système financier fort.

Au travers de trois essais, nous examinons plusieurs aspects du développement du secteur financier, qui sont en relation avec trois phénomènes récents; à savoir: la croissance de la finance islamique, l'intérêt grandissant pour les marchés boursiers émergents, et l'augmentation des flux de transferts de fonds des migrants.

Dans le premier essai, nous nous intéressons aux facteurs culturels comme déterminants des secteurs financiers et, en particulier, au rôle de la religion musulmane. Nous montrons que, en moyenne, la finance islamique favorise le développement du secteur bancaire dans les pays musulmans. Plusieurs pays ont en effet réussi à développer un nouveau secteur bancaire compatible avec la Shariah, sans porter ombrage au secteur bancaire non islamique avec lequel il co-existe. Notre analyse empirique est fondée sur une base de données nouvelle et originale. Celle-ci a pour intérêt de fournir des indicateurs de taille et de performance des banques islamiques de dépôt dans le monde, pour la période 2000-2005.

Dans le deuxième essai, nous explorons les rendements inconditionnels obtenus sur les marchés boursiers, en particulier les marchés émergents d'actions. Notre analyse d'un large panel de 53 marchés émergents "Majeurs" et "Frontières" confirme les résultats traditionnellement observés dans la littérature. Ainsi, pour l'essentiel, les deux types de marchés sont volatils et émaillés d'événements extrêmes. De plus, les rendements des marchés émergents sont faiblements corrélés avec ceux du reste du monde, même si ces corrélations ont augmenté au cours des derniers décennies. Malgré d'importantes différences en terme de taille et de liquidité, les rendements sur marchés "Frontières" sont qualitativement similaires à ceux des marchés "Majeurs", à l'exception des corrélations. Ces dernières sont en effet actuellement plus faibles dans les marchés "Frontières", qui continuent dès lors à offrir d'importants bénéfices de diversification aux investisseurs internationaux.

Dans le dernier essai, nous examinons la relation entre les transferts d'argent des migrants et la croissance économique. Nous confirmons l'idée que les transferts de fonds des migrants sont importants pour les pays en voie de développement. Mais surtout, nous démontrons, de manière théorique et empirique, qu'il est crucial de faciliter dans ces pays l'accès aux comptes de dépôt bancaires, afin de transformer une plus grande part des transferts des migrants en investissements productifs. Ceci est d'autant plus vrai quand l'accès aux autres sources de capitaux internationaux est coûteux.

En conclusion, la crise financière de 2008-2009 a fait de l'amélioration des systèmes financiers la priorité de nombreuses politiques économiques. Dans cette perspective, notre travail apporte une contribution à une compréhension plus fine de l'importance de la finance pour l'économie, ainsi qu'une vision novatrice des déterminants des systèmes financiers.

Table of Contents

A	Acknowledgements ii											
Executive Summary vii												
Еz	Executive Summary (French) ix											
Table of contents xiii												
1	1 Introduction											
	1.1 Foreword											
	1.2	1.2 Starting definitions										
	1.3	.3 Institutions, culture, finance and growth: current state of the debate										
		1.3.1	Financial systems and economic growth	6								
		1.3.2	The determinants of financial systems	7								
		1.3.3	A role for culture?	9								
	1.4	Mai	n research challenges and thesis contribution $\ldots \ldots \ldots \ldots$	10								
	1.5 Thesis research questions											
Ι	On the Determinants of Financial System Development											
2	Doe	es Islar	nic Finance Spur Banking Sector Development?	23								
	2.1	Intr	oduction	25								
	2.2	2.2 Islamic banking data		29								
		2.2.1	Current situation	29								
		2.2.2	IFIRST database	30								
		2.2.3	Islamic banking development: A few indicators from IFIRST	33								
	2.3	2.3 Cross-section methodology										
		2.3.1	Standard controls for financial sector development $\ . \ . \ .$	36								

		2.3.2	Sample	. 37						
		2.3.3	The effect of Islamic banking on total banking development	. 38						
		2.3.4	Complementarity vs. substitution between the conventional							
			and the Islamic banking sectors	. 39						
	2.4	Cross	s-section results	. 41						
	2.5	2.5 Differences-in-differences analysis								
	2.6 Concluding remarks									
	2.7	Appe	endix	. 56						
3	Emerging and Frontier Stock Market Returns: Empirical Behav-									
	ior	and Lit	erature Findings in Perspective	61						
	3.1	duction	. 63							
	3.2	Defin	itions and typology of emerging markets	. 66						
		3.2.1	Definitions	. 66						
		3.2.2	Emerging stock markets: Stylized facts and typology $\ . \ .$.	. 68						
	3.3	Data	challenges	. 75						
		3.3.1	Common data flaws	. 75						
		3.3.2	Empirical data	. 78						
	3.4	3.4 Realized returns								
	3.5	Key risk parameters in the context of a stand-alone investment								
		3.5.1	Volatility	. 86						
		3.5.2	Higher-order moments	. 89						
	3.6	The	contribution of emerging markets in global portfolio investment:							
		The	role of correlations	. 92						
	3.7 Conclusions and suggestions for further research									
		3.7.1	Appendix	. 109						
тт	0	n the]	Importance of Financial System Development for							
E	conc	omic De	evelopment	125						
4	Remittances and Domestic Investment in Developing Countries:									
	\mathbf{An}	An Analysis of the Role of Financial Sector Development 127								
4.1 Introduction										

xii

	4.2 Theory									
		4.2.1	The model	132						
		4.2.2	Remittance receivers and the banking sector	133						
		4.2.3	Equilibrium in the loanable funds market	135						
		4.2.4	Deposits and remittances	136						
		4.2.5	Investment and remittances	136						
4.3		Empiri	ical methodology	138						
		4.3.1	Specification	138						
		4.3.2	Data	140						
4.4		Empirical results								
		4.4.1	Cross-section results	143						
		4.4.2	Panel-data results	148						
	4.5	Conclu	ıding remarks	152						
	4.6	Appen	dix	159						
5	Con	clusion		167						
Bibliography										
List of tables										
Table of figures										
Acronyms										
Appendix										

Chapter 1

Introduction

1.1 Foreword

Since the early days of the modern economic world, there has been a passionate debate on financial systems and their usefulness for people. Nevertheless, a striking dichotomy remains, until today, between the important functions played by financial systems at both macro- and micro-economic level, and the oftentimes relatively negative image of finance in many parts of the globe.

We therefore decided to focus our research on the macro-economic roles of financial systems, as well as on the potential determinants of financial system development. For a long time, international agencies such as the World Bank and the International Monetary Fund have engaged large and notable efforts towards better measuring, understanding, and recommending about financial systems roles and reforms around the world. The 2008-2009 global financial crisis could only further underline the need for a deeper understanding of potential causes and consequences of financial system development, and propelled the topic at the very top of policymakers' agendas.

An extensive literature exists on the topic. The bottom-line of it is that institutions matter for financial system development, and that finance fosters economic growth¹.

In this thesis, we contribute to the existing literature by studying financial system development in relation to three recent macro-economic phenomena. Two of them concern financial systems determinants; the last one relates to consequences of financial systems. First, we test whether culture, through Islamic Finance, can affect the level of financial system development. Second, we analyze two key microdeterminants of an international stock investment in emerging markets, namely, risks and returns. Finally, we examine how the level of financial development mediates the impact of remittances on economic growth in receiving countries.

This introductory section exposes a few important definitions, provides a quick overview of the current state of the scientific debate, highlights some contributions of this thesis to current research challenges, and finally, describes the structure of this work.

¹Several authors also document the fact that countries with a higher level of financial development experience faster reduction in poverty levels (see, for example, Beck, Demirgüç-Kunt and Levine, 2007, and World Bank, 2007). Finance would thus be not only pro-growth, but also pro-poor. Our thesis focuses on the the "pro-growth" part of the story.

1.2 Starting definitions

The object of our research is **financial system development**. Along the chapters of this thesis, we relate finance to the concepts of **economic development**, and society's **culture**.

A financial system is a set of elements through which capital from savers (e.g., households with a surplus) is allocated to users of funds (e.g., investors willing to fund a project). The financial system performs an intermediation function, through either institutions (banks or institutional investors such as pension funds, insurance companies and mutual funds), or securities markets (such as stock or debt markets). These aspects of a financial system can be more or less developed from a country to another. Usually, bank intermediation dominates in emerging countries. The need of an intermediation arises from the existence of transaction costs and asymmetries of information. In the presence of such "market frictions", financial systems fulfil five major functions², i.e., they help

- 1. ease the exchange of goods and services through the provision of *payment services*;
- 2. mobilize and pool savings from a large number of investors;
- 3. acquire, produce and process *information* ex ante about enterprises and possible investment projects, thus allocating society's savings to its most productive use;
- 4. *monitor*, ex post, investments and exert corporate governante after providing finance; and
- 5. facilitate the trading, diversification, and management of liquidity and intertemporal *risk*.

The literature has developed a series of indicators of financial system development. Those are usually classified into three broad categories, i.e., size, efficiency, and reach. Size indicators, such as "Private Credit by Deposit Money Banks", "Bank Total Domestic Assets" or "Stock Market Capitalization", usually scaled to country

 $^{^{2}}$ See, for example, Beck (2009) or Levine (2005).

GDP, capture the depth of the financial system (be it of intermediaries or securities markets). Efficiency measures, such as "Banks Overhead Costs to Total Assets" or "Stock Market Turnover Ratio"³, document the cost efficiency, or liquidity, with which financial services are delivered to the marketplace. Reach indicators, such as the "Number of ATMs per 100,000 people" or "Number of Listed Firms", measure the extent to which the financial system is accessible for the population, people or firms, as a whole⁴. Amongst those measures, the size indicators display the largest availability and history, with yearly data from 1960 over a large panel of developed and developing countries.

Financial system development refers to the ability of financial intermediaries to reduce transaction costs and ameliorate information. Although most of the above indicators are not directly measuring the effect of financial systems on transaction and information issues, higher values of those indicators are usually interpreted as indicating higher levels of financial system development. This is the view we accept in the present work.

Financial systems cannot be abstracted from **institutions** that allow them to operate. Institutions can be defined as "a set of rules, compliance procedures, and moral and ethical behavioral norms designed to constrain the behavior of individuals in the interest of maximizing the wealth or utility of principals"⁵ (see, for example, North, 1981; Glaeser et al., 2004). The most obvious institution necessary to the well-functioning of a financial system is law and regulation. Indeed, financial intermediation creates contractual claims between individuals and companies. This requires to define, protect and enforce rights and duties of investors (creditors or shareholders) vis-à-vis debtors. In the same vein, an effective prudential regulation and supervision of financial intermediaries is essential to ensuring a stable and healthy financial system. Other important institutions are those allowing information sharing amongst economic agents, such as credit bureaus or credit registries. The role of those institutions - public or private - is to collect information on credit histories

 $^{{}^{3}}$ I.e., the total value of stocks traded over the year, divided by total market capitalization at the beginning or end of the year.

⁴For a review of financial sector data, see Beck et al. (2008), or Beck, Demirgüç-Kunt and Levine (2000), and Beck and Demirgüç-Kunt (2009).

⁵The two essential aspects of institutions are the constraints on government, and a permanent or durable character of these constraints.

and current indebtness of various borrowers, and share it with lenders (see Djankov, McLiesh and Shleifer, 2007).

Another aspect of our work concerns **economic development**. This concept lies at the crossroads of the notions of economic growth and human development.

Economic growth is defined by the World Bank as the "quantitative change or expansion in a country's economy".

The notion of economic development evolved through time from a purely quantitative concept, similar to economic growth, to a quantitative *and* qualitative concept, similar to human development. The latter view includes in the definition elements such as the quality of human resources (education), social aspects of the society (e.g., maldistribution of income, disintegration of the family), and environmental issues (e.g., destruction, pollution). In spite of several imperfections, the most commonly used indicator of economic development is the percentage increase in gross domestic product (GDP) per capita or gross national product (GNP)⁶ per capita during a given year⁷.

Finally, we address the question of a potential role for **culture** in finance. Culture may be defined as "those customary beliefs and values that ethnic, religious, and social groups transmit fairly unchanged from generation to generation" (Guiso, Sapienza and Zingales, 2006). In spite of a currently advanced globalization of the economic environment, lots of cultural differences remain across the world. Hence, it is very likely that people's cultures continue nowadays to drive economic behaviors in general, and finance in particular, through beliefs or values transmitted by the education or the social environment. In this thesis, a section adresses the influence of Muslim beliefs in shaping some of the world's financial systems.

⁶To make data on GDP (or, GNP) per capita comparable over time and across countries, one generally measures them using "Purchasing Power Parity" (PPP) real (constant) USD. PPP data correct for price differences between countries, while constant currency units account for the inflation over time. These data are provided by the Penn World Tables and the World Bank (World Bank, 2009).

⁷Several attempts were made to develop alternative measures of economic development. To name only a few, the "Net Economic Welfare" of Nordhaus and Tobin (1972), and Samuelson and Nordhaus (1992); the "Unitary Index" (Drewnowski and Scott, 1966); the "Physical Quality of Life Index" (Morris, 1979); the "International Human Suffering Index" (Population Crisis Committee, 1992); the "Human Development Index" or HDI (United Nations Development Program, 2008).

1.3 Institutions, culture, finance and growth: current state of the debate

1.3.1 Financial systems and economic growth

Until very recently, there have been divergent, if not opposite views on the role of finance in the economy⁸.

Some economists argue that the role of finance in the economy is minor. Lucas (1998) believes that the importance of financial matters is "badly over-stressed" in popular and professional discussion. A related literature considers that finance follows the development of the enterprises, and simply responds to changes in the "real sector" (e.g., Robinson, 1952). Levine and Renelt (1992) conclude, in an empirical study, that the only determinant of growth that resists changes to the conditioning information set is the share of investment on GDP, and that, in turn, trade openness is the only factor robustly associated with investment.

At the other end of the spectrum, for Nobel Laureate Miller (1998), the idea that "financial markets contribute to economic growth is a proposition too obvious for serious discussion".

Between these two extremes, another stream of the literature (e.g., Hamilton, 1781; Bagehot, 1873; Schumpeter, 1912; Gurley and Shaw, 1955; Goldsmith, 1969; McKinnon, 1973) defends the view that economic growth, one of the most extensively studied economic phenomena, cannot be fully understood without clarifying the financegrowth nexus.

Nevertheless, even amongst those economists who recognize a role for finance as a determinant of growth, two opposite views have long co-existed.

For some, finance is harmful to economic growth. Adams (1819) claims that banks harm the "morality, tranquility, and even wealth of nations"⁹. In some models (e.g., Bencivenga and Smith, 1991; King and Levine, 1993), higher returns following from better-functioning financial systems may decrease savings rate and, under certain conditions, harm economic growth.

Finally, since the early 1990s, a strong and consistent literature body has provided

 $^{^{8}}$ Levine (2005) provides an excellent and extensive review on theoretical and empirical research on the connection between finance and growth. In the present section, we have no other ambition than providing our reader with a simplified and synthetic introduction to the topic.

 $^{^{9}}$ Quoted in Hammond (1991), and Levine, Loayza and Beck (1999).

convincing theoretical and empirical evidence on a positive causal role of financial system development on economic growth (King and Levine, 1993; Demirgüç-Kunt and Maksimovic, 1998; Levine and Zervos, 1998; Neusser and Kugler, 1998; Rousseau and Wachtel, 1998, 2000; Beck, Levine and Loayza, 2000; Levine, Loayza and Beck, 2000; Beck, Levine, 2004; Levine, 2005; Klein and Olivei, 2008).

In a empirical study of the channels through which financial intermediaries influence growth, Beck, Levine and Loayza (2000) find that financial intermediaries exert a large, positive long-run impact on total factor productivity growth, which feeds through to overall GDP growth¹⁰.

Such results have important consequences in two major respects. First, they contribute to increasing the attention of decision-makers to the importance of helping develop and maintain sound financial systems. Second, they justify and stimulate research on the determinants of financial systems.

1.3.2 The determinants of financial systems

There are wide cross-country variations in the level of development of financial systems. Hence, a natural question arises: Why did some countries develop well-functioning, growth-enhancing, financial systems, while others did not?

This question has been addressed actively by the literature, though less extensively than the finance-growth relationship, since the mid-1990s. Recent researches have contributed to creating a consensus on the traditional macro-economic determinants of financial system development. Hereunder, we briefly expose the historical determinants, the role of current institutions, and some other traditional determinants.

Two major theories exist on the historical determinants of financial systems. The "law and finance theory" stresses the role of the legal system in protecting the relative rights of the investor and those of the State. This theory was pioneered by La Porta, Lopez-de-Silanes, Shleifer and Vishny (1997, 1998), who identified four different historical legal traditions, namely, the British common law, the French, German, Scandinavian civil laws¹¹. Those were spread in the world through occu-

¹⁰They also find that the long-run links between financial intermediary development and both physical capital growth and private savings rates are tenuous.

¹¹A fifth category is oftentimes added in recent studies, i.e., the Socialist (transition) countries, who have inherited Soviet laws after the breakup of the Soviet Union. This category does not apply

pation or colonization by one of the European powers. Researches have shown that those traditions differ with respect to the priority they attach to protecting the rights of private investors vis-à-vis the State, and that this has important consequences on financial development. In particular, the British common law has evolved, historically, towards placing a higher emphasis on protecting investors' rights than does the French civil law. As predicted by the theory, common-law areas are indeed usually associated with higher levels of financial development today. Beck and Levine (2005) further discuss the "law and finance theory" and the mechanisms through which legal origin influences finance.

The "endowment theory", developed by Acemoglu, Johnson and Robinson (2001), emphasizes the role of geography and the disease environment in shaping institutional development. It states that Europeans adopted different colonization policies depending on the local geographic and disease conditions. Environments favorable to settlement induced the establishment of "Neo-Europe"-type of institutions with strong private property rights (this is the case of, e.g., United States, Australia, and New Zealand), whereas unfriendly environments triggered the establishment of "extractive" institutions with weak private property rights protection (for example, Congo, Ivory Coast, and much of Latin America). The theory holds that these institutions persisted until now and influence today's financial development. This justifies the use of a measure of average "absolute latitude" of the country as a proxy for initial endowments.

Beck, Demirgüç-Kunt and Levine (2003) confirm the empirical validity of both theories¹².

Next to the historical determinants, current institutions influence financial systems around the world. Djankov, McLiesh and Shleifer (2007) conclude that two key institutional features, namely creditor legal protection¹³, and information sharing institutions¹⁴, are both associated with higher ratios of private credit to GDP.

Finally, several other factors have been retained by the literature. Inflation has a

to countries that have re-established their pre-communist legal systems.

¹²They also find that the endowment theory explains, empirically, more of the cross-country variation in financial intermediary and stock market development, than does the law and finance theory.

¹³The "power theories" of credit stem from the work of Townsend (1979), Aghion and Bolton (1992), and Hart and Moore (1994, 1998).

¹⁴The "information theories" of credit have been first developed by Jaffe and Russel (1976) and Stiglitz and Weiss (1981).

negative impact on financial development (see Boyd, Levine and Smith, 2001). International financial openness and liberalization of domestic systems help develop the financial sector (see Chinn and Ito, 2002; Demirgüç-Kunt and Detragiache, 1998). According to Aggarwal, Demirgüç-Kunt and Martinez Peria (2006), so does the amount of remittances received by a country.

1.3.3 A role for culture?

Several authors have identified that ethnic diversity (see Easterly and Levine, 1997) and the main religions practiced by the country's population (see, for example, Putnam, 1993; Landes, 1998; Stulz and Williamson, 2003) are associated with financial system development, although they usually find that the macro-economic impact is less robust than several of the above-described factors (see Beck, Demirgüç-Kunt and Levine, 2003).

Additionally, several micro studies document a strong impact of culture on financial behavior of people. For example, Hsee and Weber (1999) show that the level of risk aversion in investments from Chinese individuals was higher that the one of US individuals. Similarly, Grinblatt and Keloharju (2000) showed that investors are more likely to deal stocks of firms that are located close to the investor, that communicate in the investor's native tongue, and that have chief executives of the same cultural background.

Using survey data¹⁵, Guiso, Sapienza and Zingales (2003) have established that religious beliefs are associated with people's economic attitudes. More recently, the same authors (2006) provide evidence that several culturally-determined values (such as thriftiness) or beliefs (such as trust towards others) influence economic outcomes, such as the savings rate or the propensity to become an entrepreneur. Unfortunately, so far, survey data limitations prevented from assessing the existence of a link between culture and financial development by replicating Guiso, Sapienza and Zingales' (2006) methodology¹⁶.

¹⁵The World Values Surveys (World Values Survey, 2005) provide very rich information on a large number of individuals across over 66 independent countries. Those surveys have been executed periodically under the supervision of the Institute for Social Research of the University of Michigan, since 1981. Disaggregated data are freely available on www.worldvaluessurvey.org.

¹⁶The variable "trust in the banking system" - a variable that could typically be instrumented by the religion or ethnic origin - has been recently added in the World Values Surveys questionnaires, but unfortunately remains empty so far for all countries but one.

1.4 Main research challenges and thesis contribution

The main challenges in research on financial system development are threefold. We briefly address key issues regarding the data, the econometrics and the models.

One of the major difficulties is the availability and quality of data measuring various aspects of financial system development. Apart from the standard difficulties of comparing data from countries with very different national account systems and methodologies, financial system indicators, as described above, are only proxies of a non directly observable variable, namely, the performance of financial systems in reducing transaction costs and information asymmetries. Given the importance of financial systems for country development, the World Bank and the IMF have undertaken, over the last decade, efforts for evaluating the stability and efficiency of financial systems in the world, under the "Financial Sector Assessment Programs" (FSAP). One of the objectives is to provide researchers and policymakers with reference financial development benchmarks, which could help trigger policy reforms. This ambition can only be achieved provided that data are of high quality and cover countries with comparable structural characteristics or at comparable development stages. Even if important data limitations remain, substantial efforts have been made by official agencies as well as private organizations to collect, produce and improve financial indicators across an increasing sample of countries¹⁷.

Our work has greatly benefited from the databases and quantitative research developed by the "Financial and Private Sector" Research Group of the World Bank, and made freely available to the research community. Whenever possible, we strive to enrich the current body of research by either producing original data – the "IFIRST", "Islamic Finance Recording and Sizing Tool", was developed during this thesis – and provides a series of yearly indicators on the development of the Islamic financial system across all countries where it exists over the period 2000-2005), or by enlarging commonly-used datasets using newly-available data (e.g., we present data on emerging stock markets, that include a series of more recently covered "Frontier" markets).

Another potential hurlde to quick and easy recommendations regarding financial systems is related to three technical difficulties, namely, measurement errors (a

¹⁷A recent review of existing indicators of financial development is provided by Beck et al. (2008).

typical example is remittance flows, a large part of which are unofficial¹⁸), omitted variables (e.g., unobservable country effects), and the potential two-way relationship between growth and finance. The difficulty of identifying the exogenous component of finance (the so-called "identification problem") is one of the obvious sources of the long-lasting disagreement amongst economists on the role of finance in the economy. However, providing evidence on causality is a pre-requisite to providing sound recommendations to policymakers. Econometric techniques are becoming increasingly sophisticated and nowadays offer a decent panel of possible solutions to mitigate those issues and increase our confidence in empirical results. An excellent review of the econometric tools of finance and growth is provided by Beck (2009). Throughout this work, we rescourse to a variety of techniques, such as cross-section, panel data, instrumental variables, and differences-in-differences regressions.

Finally, as briefly evoked above, a variety of models and theories co-exist, regarding not only the determinants of financial systems, but also the effects on growth. Sometimes, the models' predictions contradict each other. In one of our chapters, we argue that we need to recognize the multi-faceted character of financial system development. In particular, the impact of financial system may change depending on the aspect considered. Think, for example, that a higher financial development is usually associated with a larger size of domestic banks and markets, but also with a greater international openness. These are two very different aspects of financial system development. In our study of remittances, we consider the latter two aspects separately in a theoretical model, and show that each aspect produces contrary effects. We then test the empirical predictions. In another chapter, we enlarge the finance-growth debate through looking at the link between finance and human development, and show that conclusion reached on long-run growth are not necessarily transposable to long-run human development.

1.5 Thesis research questions

Our thesis is made up of four papers inspired by the salient recent macro-economic trends in economic and financial development.

¹⁸Through time, an increasing part of remittances are becoming recorded ("official") in the national account statistics, which creates a systematic bias towards heavily increasing flows.

Before outlining the thesis content, we summarize key macro-economic trends identified over the last two decades¹⁹. One, both developed and developing countries have steadily improved over time in terms of average economic wealth and human welfare (HDI). Two, there has been a gradual deepening over time of the banking sector in developing countries (whereas, in developed countries, the size of the banking sector relative to GDP has been relatively stable over time). Three, Islamic depositmoney banks are emerging very quickly on the financial scene; they account for an increasing part of Muslim countries' banking assets. Four, the size of stock markets has strongly increased over the last 20 years in both developed and developing economies; in particular, there has been a strong increase in relative market capitalization over the last 5 years (up to before the financial crisis). Finally, remittance flows²⁰ have been steadily increasing over time and are a crucial source of external capital for developing countries.

The last three statements give rise, respectively, to our three topics of interest in this thesis. The research questions posed in each of those contexts, as well as the thesis structure, are detailed below.

In the two first papers, we contribute to the analysis of the determinants of, respectively, banking sector and stock market development. In the next two papers, we explore the relation between finance and economic development, in the presence of cross-border financial flows. We address, respectively, the potential impact private of financial flows on economic development, and the indirect role of the financial sector in mediating the impact of remittances on growth.

The first paper reasserts the role of culture in shaping some of the world's financial systems. It proposes an original strategy that goes beyond using religious or ethnic composition in each country's population as a proxy for culture. The recent phenomenon of Islamic finance across Muslim²¹ countries provides a very interesting case for analyzing culture and financial development, as Islamic finance is legally allowed in

¹⁹The underlying data are presented in appendix.

²⁰As noted earlier, part of the increase is, most probably, attributable to a better capture of remittance flows in official records. It is, however, unlikely that this measurement issue only account for all the observed growth.

²¹In the present work, a "Muslim" country is defined as a country with at least 10% Muslims in the population. The quotes indicate that this terminology is a linguistic shortcut. Definitions of Islamic finance and Islamic deposit-money banks are given in the dedicated chapter.

some Muslim countries and forbidden in others, for many reasons that are mainly exogenous to the financial system (e.g., in several Muslim countries, the political elite strives to avoid or prevent any religious intermingling in the state affairs). Moreover, in all "Islamic banking friendly" countries (as of 2005, 32 countries) but two (Iran and Sudan), the Islamic banking sector coexists with a conventional sector. We exploit the history of the introduction of Islamic banks (since 1975) and the variation in the penetration levels across countries to test whether the legal acceptance of Islamic institutions in a Muslim context accelerates or harms the development of the banking sector.

The second paper analyzes emerging stock markets from the perspective of an international investor. It reviews, in the form of an investor's guide, the risk and return performance of a large panel of emerging stock markets in the world, based on realized monthly returns over the last 17 years. Specifically, it establishes a typology of emerging markets according to the coverage by international information providers, such as Standard & Poor's. It then compares the unconditional risk-return features of traditional emerging markets (such as Argentina, South Africa or Russia) and newly-discovered, or more recently opened, "Frontier" markets (such as Jamaica, Namibia, or Ukraine).

The third and last paper of the thesis starts from an area of disagreement in the remittances and growth literature in developing countries. Even though there is a consensus about a role for the local financial system in mediating the impact of remittances in the local economy, a disagreement remains about the sign of the relationship²². We propose an original theoretical model that includes two aspects of the local banking system, namely, the financial depth (a proxy for the costs of opening a bank account) and the international openness. We show, both theoretically and empirically, that these two aspects traditionally associated with financial sector development have conflicting effects on the marginal impact of remittances on investment.

 $^{^{22}}$ In a study of developing countries, both Giuliano and Ruiz-Arranz (2009) and Mundaca (2009) find that remittances have a positive impact on investment, and that financial sector development matters in the relationship. However, while Giuliano and Ruiz-Arranz (2009) find that remittances have a weaker impact at higher levels of financial sector development, Mundaca (2009) obtains the opposite relationship empirically, on a set of Latin American countries.

Altogether, the four upcoming chapters aim at contributing to a better understanding of the determinants of financial system development and of the macroeconomic effects of finance on growth and development. We aim at both pushing forward the literature on commonly-studied fields, such as emerging stock investment or the domestic impact of remittances, and at extending the debate to lesser-known factors, such as the role of culture in economics or the effect of capital flows on human development.

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Part I

On the Determinants of Financial System Development

Chapter 2

Does Islamic Finance Spur Banking Sector Development?

Does Islamic Finance Spur Banking Sector Development?¹

Abstract

Islamic finance is one of the most prominent phenomena over the last decade in the banking industry in the Middle-East and South-East Asia. In spite of the substantial size and growth of this segment recently, the role of Islamic banking in the economy is still heavily debated and very few empirical work is available. This paper studies the empirical impact of Islamic banking on banking sector development. It circumvents the lack of data through a newly-constructed and comprehensive database, "IFIRST", covering Islamic commercial banks worldwide over the period 2000-2005. This database is, to our knowledge, unique in the industry.

We find strong and consistent empirical evidence that the development of Islamic banking in Muslim countries leads to a higher banking sector development, as measured by the amount of private credit or bank deposits scaled to GDP. This effect occurs through the development of a new, Shariah-compliant, banking industry, which does not harm the conventional banking system. Additionally, we provide evidence that the Islamic banking sector acts as a complement to the conventional banking in Muslim countries, when both systems co-exist and the Islamic sector reaches a medium penetration in the total banking sector. An analysis of reforms confirms that introducing Islamic financial institutions generally increases banking development.

JEL: F37, O16, Z12.

Key words: culture, religion, Islamic Finance, financial sector development, growth.

¹This paper has been written by Laurent Gheeraert.

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2.1 Introduction

Islamic finance can be defined as a type of finance that respects the principles of the Shariah, i.e., the Islamic law. The Shariah involves a series of prohibitions as well as prescriptions regarding the practice of finance. In short, prohibitions include paying or receiving interest (called "riba"), speculating or gambling ("gharar" or "maysir"), and being involved in prohibited ("haram") industries, such as those related to alcohol, pork, pornography, weapons, or conventional banking. Obligations include almsgiving (one of the five pillars of Islam, called "zakat"), fairly sharing economic profits and losses through appropriate financial agreements ("PLS" or "Profit-and-Loss Sharing" agreements), and fostering a productive use of money through requiring a real, non-monetary, underlying in each financial transaction (such as a consumer good or a commodity)².

In practice, the application of Shariah rules to finance leaves a large room for interpretation by "Shariah scholars" and Islamic finance practitioners. The modern Islamic financial system has developed since the 1970s in two major poles, namely, the Middle-East and South-East Asia, with the foundation of several Islamic banks and the creation of a rapidly increasing set of specific financial instruments. After a series of ups and downs (several Islamic banking institutions went bankrupt in the 1980s), Islamic banking seems to have reached a favorable period since the mid-1990s and has displayed since then impressive growth rates, in terms of both assets and number of active institutions.

The theoretical motivation behind the development of Islamic banking is the enhancement of both economic and social welfare, e.g., through allowing more people to participate in a "fairer" banking system (see, for example, Karich, 2002 and 2004). A stream of the literature highlights the welfare-enhancing role of Islamic finance, through the encouragement of ethical values and an alternative financial behavior (see, for example, Usmani, 2002; Saleem, 2008). However, at the same time, some researches argue that Islamic banking has detrimental economic consequences, e.g., due to the role of certain values or imposed restrictions on finance and economics

²It is not the purpose of this paper to detail the theoretical and practical functioning of Islamic banking. Excellent references on this include Vogel and Hayes, 1998; Warde, 2000; Ayub, 2002; Iqbal and Molyneux, 2005; Iqbal and Mirakhor, 2007.

(see, for example, Volker, 2006; Kuran, 1995 and 2004; Cobham, 1992)³.

The divergences in the literature on the effects of Islamic finance are far from being settled. It is however essential for the policymaker to know whether allowing Islamic financial institutions to operate has desirable, or, possibly, detrimental outcomes for the economy.

The objective of this paper is to test the empirical impact of the recent development of the Islamic banking industry on Muslim countries' overall banking sector development. We focus on assessing whether the presence of Shariah-compliant banks, in a Muslim environment, has stimulating or detrimental effects on the overall banking sector development, as measured by private credit or bank deposits over GDP.

Banking sector development is important in economics, as a large body of literature has confirmed its positive role in economic growth (for a genuine literature review, see Levine, 2005). Hence, any implication of Islamic finance on the banking sector development has potentially important consequences for economic growth.

To our knowledge, no other paper so far has tested, at the macro-economic level, the overall empirical impact of Islamic finance, through Islamic banking, on the banking sector development. The recent work of Weill (2009) focuses on one dimension of banking sector development, i.e., market power. Weill observes, using a sample of Islamic and conventional banks in 17 countries over the period 2000 to 2007, that, contrary to his starting hypothesis, Islamic banks have a lower market power than conventional banks. According to this study, Islamic banks have a low ability to influence the price of products and hence need to compete effectively with their conventional counterparts. Such empirical results do not support the hypothesis that the expansion of Islamic banking would lower bank competition and hence be detrimental to economic growth.

Islamic banking can impact financial sector development through many channels. First, it may increase the participation in the banking system, through either a drop in the proportion of "unbanked" individuals, or a rise in the volume of money deposited per client. In particular, strong believers who refused to participate or restricted their

³Between these two streams of the literature, several research pieces shed light on the theoretical conditions under which Islamic finance have desirable, or undesirable, outcomes. See, for example, Bjorvatn, 1998; Aggarwal and Yousef, 2000; Ibrahim, 2003. In turn, Solé (2007) sheds light on the practical challenges in developing Shariah-compliant banking alongside conventional institutions.

participation in the conventional banking system may decide to become bank clients or to increase their banking activities if Shariah-compliant institutions offer them the requested "peace of mind" (this hypothesis is worked out and illustrated in the "Islamic Banking McKinsey Competitiveness Report", McKinsey & Company, 2005). Second, Islamic banking may modify the level of trust in the banking system. As Guiso, Sapienza and Zingales (2006) show in the context of entrepreneurship, trust is an important culturally-influenced factor, which influences economic outcomes⁴. Depending on the behavior and reputation of Shariah-compliant institutions, Islamic banking may either increase or lower the overall trust in the banking system. Given the successful track-record of Islamic financial institutions over the last 10 to 15 years, we expect the trust effect, if any, to be positive. Third, Islamic finance may bring financial innovation and foster the development of new financial products fulfilling the needs of depositors, investors or borrowers. Fourth, the creation of new Islamic banking institutions, or the conversion of existing conventional banks into Islamic ones, may affect the banking market structure. Potential negative impacts include a too high market power of Islamic banks, or lower incentives to lend. Potential positive impacts include a higher degree of competition in the market due to an increased number of players, a low market power of Islamic banks, or higher incentives for Islamic banks to lend money. According to Weill's (2009) findings, the latter positive impact prevails. All these factors relate to the level of both deposit and credit in the economy, with the exception of the incentives to lend, which only impact the level of credit. The bottom-line of our research is an assessment of the overall net effect of Islamic banking on the total level of deposit and credit relative to the economy. Given the five potential channels above, we expect this effect to be positive.

To overcome the lack of reliable comprehensive data on Islamic banking, we developed a data collection methodology and built, in partnership with experts in the industry, an original and comprehensive database – the "IFIRST" or "Islamic Finance Recording and Sizing Tool" – which in its current version focuses on the retail banking segment. It identifies the list of all active Islamic retail banks worldwide over the period 2000-2005. Then, based on individual institutions' annual reports

⁴In particular, Guiso, Sapienza and Zingales (2006) show that the exogenous, culturallydetermined, component of trust significantly and positively influences the probability of becoming an entrepreneur.

and complementary information sources, the IFIRST provides yearly data on several financial indicators, such as size, efficiency, and timing, at the global, country and institution levels. Among others, the database provides the assets and deposits size of Islamic banks per country, and the starting year of operations of each Shariahcompliant institution. The "IFIRST" database is, to our knowledge, unique in the industry.

Our regression methodology involves both cross-section and differences-in-differences estimations.

In the cross-section regressions, we assess, through ordinary least squares (OLS), the effect of the Islamic private credit (deposits) on the overall size of private credit (deposits). Both variables are expressed as a ratio to country GDP. In order to control for potential reverse-causality, we also instrument the Islamic private credit (deposits) by the age of the oldest Shariah-compliant institution in the country. Then, we examine more deeply the complementarity vs. substitution effect between the Islamic and the conventional banking sectors. To do so, we regress the conventional private credit (deposits) on the Islamic private credit (deposits) and other standard literature control variables. We examine the latter effect by groups of countries, according to the penetration of Islamic banking in the country's banking system.

Finally, in response to some criticism of instrumental variables (e.g., Glaeser et al., 2004), we make use of the time series dimension in our data and perform an analysis of reforms, or differences-in-differences estimation. Our goal is to assess the robustness of the cross-section relationships by comparing financial development before and after increases in Islamic banking. We do this in two alternative ways recommended by Bertrand, Duflo and Mullainathan (2004) and applied by Djankov, McLiesh and Shleifer (2007), namely, panel regressions and collapsing information into "pre-" and "post-reform" periods.

Our results can be summarized as follows. To begin with, the level of development of Islamic banking in countries with a sizeable Muslims proportion significantly stimulates the overall banking sector development. The effect is sizeable, as reaching the median sample level in Islamic banking development entails, in our sample, a 7 percent higher level of private credit over GDP compared to the no Islamic banking case (the sample mean credit to GDP value is 32%). Then, we confirm that the latter effect is due to the complementarity between the Islamic and the conventional sectors. Complementary effects however, are only significant only when Islamic banking co-exists with conventional banking and reaches a medium level of development. When the penetration of Islamic banking is too low or too high, we find no significant effect of complementary nor substitution between the two sectors. Finally, time-series evidence confirms our cross-sectional findings and shows that overall banking development increases following the introduction of new Islamic banks.

The remainder of the paper is organized as follows. Section 2 briefly describes the current situation regarding Islamic banking data and presents our original database. Section 3 reviews the literature and explains our cross-section methodology. Section 4 exposes our main cross-section results, along with several robustness checks. Section 5 details our analysis of reforms, and section 6 concludes.

2.2 Islamic banking data

2.2.1 Current situation

Almost 35 years after the inception of the first modern Islamic bank in the United Arab Emirates in 1975 (the Dubai Islamic Bank), it remains difficult to find reliable macro-economic data on the Islamic banking sector. Today, researchers and practitioners are still hardly able to size the market properly. Also, because data are only available at the institution level and oftentimes non-exhaustive, performing cross-country macro-economic tests involving Islamic banking remains difficult. The lack of data partly explains the dearth of empirical evidence on the effects of Islamic banking at the macro-economic level.

The directories published since a few years by the General Council for Islamic Banks and Financial Institutions or CIBAFI (e.g., CIBAFI, 2006) are a valuable source of information and include some accounting information dedicated to Islamic financial institutions. There are, unfortunately, a few shortcomings. Indeed, the coverage of Islamic institutions is only partial, there is no discrinction between banking segments (e.g., retail, wholesale, or investment banks are all considered, indifferently), and data are only paper-based.

The most widely used source in the empirical literature on Islamic banking is

Bankscope, a generalist database on banking which covers more than 29,000 financial institutions in the world. It provides a binary classification of banks as Islamic or not, yielding a list of over 75 Islamic banks, with data available electronically. There are, however, serious data issues in the Bankscope database. As for the CIBAFI Islamic finance directories, Bankscope does not seek to cover all banks in a country, and does not make a distinction, amongst identified Islamic banks, between different banking activity segments. More worryingly, several authors, such as Cihak and Hesse (2008), report misclassification issues in the Bankscope database. Bankscope defines an Islamic bank as a member of the "International Association of Islamic Banks" plus 20 non-member banks that are considered "Islamic" by FitchRatings. However, the final list includes several banks which do not report any Islamic operation, and omits several important and internationally-recognized Islamic banks.

In sum, there is a obvious lack of reliable and comprehensive data in Islamic finance. This may be attributed to the diversity of Shariah-compliance standards in the industry⁵, and the slow convergence towards globally accepted accounting standards for Islamic institutions⁶.

2.2.2 IFIRST database

For these reasons, we have built our own database on Islamic financial institutions. To do so, we developed a data-collection methodology and built, in collaboration with professionals in the industry, what is to our knowledge the first comprehensive database on Islamic retail banks globally. The "IFIRST", or "Islamic Finance Recording and Sizing Tool", is an electronic database dedicated to Islamic finance, which currently covers the period 2000-2005.

The database is built in three steps. First, we establish, using classification criteria, the exhaustive list of Islamic banks active globally in the retail banking segment per year and per country. The list includes full-fledge Shariah-compliant institutions,

⁵For example, some financial products accepted by the Shariah boards in Malaysia would not be acceptable in Saudi Arabia, *and* vice-versa. There is, today, no internationally-recognized Sharia board authority in Islamic finance.

⁶The AAOIFI (Accounting and Auditing Organization for Islamic Financial Institutions), created in 1990 and headquartered in Bahrain, is the major international institution in charge of preparing and issuing Financial Accounting Standards and Shariah Standards in the Islamic finance industry. Although it has made a lot of progress recently through several new standard publications (see AAOIFI, 2008), a lot of work remains.

as well as the rarely-covered "Islamic windows"⁷ of conventional banks. Then, we collect, yearly, a series of information on each institution in the list, with monetary variables in both local currency and US dollars. Finally, using intra- and extrapolation methods for missing data, we compute country, region, and world aggregates on the available variables.

IFIRST defines an Islamic financial institution as a financial institution whose products and operations are subject to approval and monitoring regarding Shariahcompliance, by a Shariah board. When the Shariah board's responsibility is limited to a part of the institution's operations, called an "Islamic window", only that particular segment of the institution is retained as Islamic. An "Islamic window" might be a separate legal entity (subsidiary), or a department of an institution. In any case, the Shariah-compliance requires that the funds and operations be "segregated" from other activities of the bank. This rule allows to clearly identify the scope of Shariahcompliant activities.

To classify a financial institution in the "retail banking" segment, IFIRST uses two criteria. First, the institution must be a "deposit-money bank" in the IMF sense (International Monetary Fund, 1984), i.e., a financial institution that has "liabilities in the form of deposits transferable by check or otherwise usable in making payments". Second, the main target client base of the institution must be individuals and not corporations nor institutional investors.

or each Islamic retail bank in our list, IFIRST collects accounting and operational information from a variety of sources, depending on availability. In order of priority, the following information sources are used. The most reliable information – the "primary sources"– are those issued officially by the institution, including the annual reports (found either through the website or sent by the institution upon request), the bank's website information, or press releases by the bank. Then, we resort to information from sources other than the institution itself – the "secondary information". These include reports from regulatory authorities, press clippings, or the CIBAFI Islamic finance directories. When no information is found in any of the above-mentioned sources, IFIRST uses a gap-filling method, based on data on com-

⁷Some conventional banks have set-up Shariah-compliant departments or subsidiaries, called "Islamic windows". This is the case, for example, of international financial institutions such as HSBC (Amanah), Citibank (Citi-Islamic) or Standard Chartered. In our database, Islamic windows are also considered Islamic financial institutions.

parable Islamic banks in the country or region⁸. Overall, primary data cover more than 90% of the total size of the sector.

Monetary data in local currency are converted in US dollars using market exchange rates from the International Financial Statistics (IFS) of the International Monetary Fund (IMF, 2006). Balance sheet elements are converted using the applicable exchange rate at the accounts closure date, whereas average exchange rates over the period are applied to elements of the profit & loss statements.

The original indicators provided in the IFIRST database are of four types, namely, typology, size, efficiency and timing variables. Typology variables indicate, for each institution, whether it is a full-fledge entity or an "Islamic window" of an otherwise conventional bank. Size variables include the number of institutions (full-fledge and/or windows), and balance sheet items such as total assets, deposits and equity. Efficiency variables include the return on assets, return on equity, and net profit per employee. Timing variables indicate the closure date of annual accounts, the year of incorporation or conversion from a conventional to a Shariah-compliant institution, and the starting year of Islamic operations of each institution⁹.

Overall, the IFIRST database improves upon current datasets through the use of a strong methodology, which involves consistent definitions and criteria, an appropriate treatment of Islamic windows and a clear focus on a given segment of the banking industry (making institutions more comparable in terms of activities). It also provides an exhaustive coverage allowing to compute country and world totals, and a clear bottom-up construction of geographic aggregates (providing a disaggregation up to the institution level)¹⁰. Last but not least, the content has been discussed and validated by a number of industry experts.

⁸When intermediary years are missing in a time series, we intrapolate data using averages between available years. Otherwise, we extrapolate missing data using a two-step method, similar to the World Bank gap-filling method. In a first step, we provide an estimate of the bank's asset size based on the age of the institution and the growth rate of other Islamic banks in the country (or region). In the particular case of missing data on Islamic windows with available data for the bank as a whole, we rely whenever possible on available proxies of the proportion of Shariah-compliance, such as the number of converted branches over the total number of branches. In a second step, when yearly asset data are available, we compute other variables (e.g., deposits) by assuming that ratios to the asset size (e.g., deposits to assets), are identical to the average of other Islamic banks, each year, in the country (or region).

⁹The incorporation date and the effective start of operations might indeed significantly differ.

 $^{^{10}}$ Note that this methodology may involve some double counting, when banks have cross-participations, or cross-deposits. Our analysis of annual reports shows that this is a minor issue over the period considered.

2.2.3 Islamic banking development: A few indicators from IFIRST

Our database shows that global assets of Islamic retail banks grew from 102 to 354 billion US dollars between end 2000 and end 2005¹¹. These figures imply an average annualized growth rate of 29% over 5 years¹². Over the same period, the number of Shariah-compliant retail financial institutions almost doubled, from 120 to 196. Our figures are well in line with rough estimates encountered in the literature: quoted global Shariah-compliant assets usually range between 250 billion to over 500 billion US dollars, spread over 200 to 300 Islamic institutions, and growth rates in the sector's asset size vary between 15 and 30% (see, for example, Chong and Liu, 2009, The Banker, 2008, El Qorchi, 2005)¹³.

Using IFIRST, we are able to construct various proxies for the level of development of Islamic banking across countries.

The most straightforward one is a dummy variable that takes value 1 if Islamic banking exists in the country (that is, at least one Islamic bank is active in the country) in a given year, and 0 otherwise. It is denoted by "IF exist".

A second measure is the number of years since the existence of active Islamic banks in the country, accounts for the history of Islamic banking in this country. It is denoted by "IF years". We regard the age of the Islamic banking sector in a country as a proxy for the openness of the country's regulation to Islamic banking. Indeed, in all countries where they function, Islamic banks are regulated by the national regulatory authorities. Most of the time, launching an Islamic financial institution is only possible if the regulator is willing to grant a licence for it. To name only one example, the Central Bank of Kuwait issued one Islamic bank licence, to Kuwait Finance House, in 1977. In spite of requests from several banks, the Kuwaiti regulatory authority issued the second and third Islamic licences only in 2004, allowing the creation of a new Islamic bank (Bubiyan) and the conversion of an existing bank into an Islamic bank (Kuwait Real Estate Bank, now Kuwait International Bank).

A third type of measure, denoted by "IF inst" relates to the number of Islamic

 $^{^{11}}$ Iran and Sudan, the two countries in the world with fully Shariah-compliant financial systems, account on average for 45% of these figures.

 $^{^{12}}$ The average annual growth in Shariah-compliant assets over 2000-2005 amounts to 27% when Iran and Sudan are excluded.

¹³The major issue in the majority of the literature is that the timing and scope of the numbers are often unclear (e.g., do the figures include investment bank assets, how about equity funds?). In most of the papers, the figures seem to refer to "Islamic finance" as a whole.

banks, per year and per country and counts the number of Islamic banks active in the country, i.e., authorized by the national regulator. In order to factor in the size of the local economy, we often scale this measure by the logarithm of Muslim population. The latter data are from, respectively, the World Development Indicators (World Bank, 2009), and the Association of Religion Data Archives (ARDA, 2005), which provides population breakdowns by religion in 181 countries¹⁴. The number of Islamic financial banks relative to the logarithm of Muslim population is denoted by "IF inst/Muslims".

Fourth, the part of Shariah-compliant assets (or, deposits) in the country total, measures the penetration of Islamic banking in the overall banking system. The latter variable is not directly available from IFIRST. To construct it, we combine data from IFIRST and the Financial Structure Database (Beck, Demirgüç-Kunt and Levine, 2000, Beck and Demirgüç-Kunt, 2009). The Islamic penetration in assets in country i, expressed in percentage, is computed as:

$$IFpen(assets)_i = \frac{Assets(IF)_i}{Assets(total)_i}$$

where $Assets(IF)_i$ are the total Shariah-compliant banking assets in US dollars (available in IFIRST) country i and $Assets(total)_i$ are the total banking assets (Islamic and conventional) in US dollars in the same country (available from the Financial Structure Database and the World Development Indicators¹⁵).

The penetration of Islamic deposits is computed in a similar way, using the same sources:

$$IFpen(dep)_i = \frac{DEP(IF)_i}{DEP(total)_i}$$

where $DEP(IF)_i$ are the total Shariah-compliant banking deposits in US dollars (available in IFIRST) country i and $DEP(total)_i$ are the total banking deposits (Islamic and conventional) in US dollars in the same country (available from the Financial Structure Database and the World Development Indicators).

 $^{^{14}}$ We proceed with 2003 data as time-series data on the share of Muslims in the population are not available. The latter variable, however, is rather stable over time.

¹⁵Variables in the Financial Structure Database are expressed as a ratio of GDP. We multiply the ratios by total GDP, using data from the World Development Indicators (World Bank, 2009).

As both penetration ratios are very close to each other¹⁶, we define the overall Islamic banking penetration level by the average between the two measures:

$$IFpen_i = \frac{IFpen(assets)_i + IFpen(dep)_i}{2}$$

Finally, we easily compute indicators of the size of Islamic private credit (deposits) relative to the domestic economy, by computing the following ratios:

$$PC/GDP(IF)_i = \frac{PC(IF)_i}{GDP_i}$$

$$DEP/GDP(IF)_i = \frac{DEP(IF)_i}{GDP_i}$$

where $PC(IF)_i$ $(DEP(IF)_i)$ is the amount of Shariah-compliant private credit (deposits) in country i, in US dollars¹⁷.

Graph 2.1 in appendix reports the values of our major indicators of Islamic retail banking development across various countries. As of 2005, Islamic retail banking institutions were allowed to operate in 35 countries in the world. Across those countries and over the period 2000-2005, the average penetration of Shariah-compliant assets in the retail banking sector varies from less than 1% (in the US, the UK, Russia, Thailand, South Africa, Kazakhstan or Indonesia) to close to 50% (in Yemen, Bahrain, Brunei or Saudi Arabia), and even 100%, i.e., a fully Shariah-compliant banking system, in Iran and Sudan. Interestingly, Islamic retail banking is present in a few non-Muslim countries, such as the US, the UK, or South Africa (which all have less than 3% Muslims in the total population), while it remains banned in several Muslim countries, such as, for example, Libya, Morroco, Oman, or Syria. In 2005, amongst

$$PC(IF)_i = IFpen(assets)_i * PC(total)_i$$

where $PC(total)_i$ is the total private credit in US dollars (available from the Financial Structure Database and the World Development Indicators) and $IFpen(assets)_i$ is the Islamic penetration in banking assets defined as above.

¹⁶The correlation between Islamic asset and deposit penetration measures is over 99%, and the respective means are quasi identical (44.2 and 44.8%, respectively, across countries with Islamic banking).

 $^{^{17}}DEP(IF)_i$ is directly available from IFIRST, but not $PC(IF)_i$. We approximate the latter by:

Unfortunately, we do not have a measure of Islamic credit penetration. We assume in this paper that Islamic asset penetration is a good approximation for Islamic credit penetration. It may be the case, though, that Islamic banks have different credit policies than their conventional counterparts, implying a credit penetration higher or lower than suggested by their asset or deposits penetration. Further research will certainly have to go deeper on that point.

the 57 member countries of the Organization of the Islamic Conference (OIC), almost half of the countries (28) did not have any Shariah-compliant institution in the retail banking segment. Reasons for the absence of Islamic banking are diverse. In many countries, Islamic finance remains a sensitive topic. In several of them, it is not politically accepted by the ruling powers.

This diversified pattern of introduction of Islamic banking in the world provides an interesting opportunity to examine macro-economic consequences of Islamic banking.

2.3 Cross-section methodology

2.3.1 Standard controls for financial sector development

The literature on the traditional determinants of financial sector development can be summarized as follows. First, the size of the economy positively affects financial sector development. The latter, indeed, entails fixed institutional costs, which are only covered when the economy is large enough (Mulligan and Shleifer, 2005; La Porta et al., 1997). Second, quickly growing economies are likely to have a greater demand for finance (La Porta et al., 1997). Third, inflation negatively impacts financial sector development as it increases the risk of financial contracting and affects the value of outstanding debt (Boyd, Levine and Smith, 2001). Fourth, the efficiency of the legal system positively affects the ability and willingness of the financial sector to enter contractual agreements (La Porta et al., 1997, 1998). Fifth, a country's legal origin not only affects the extent of creditor rights, but also has an independent effect on financial sector development (Beck, Demirgüc-Kunt and Levine, 2003; Beck, Levine and Loayza, 2000; La Porta et al., 1997, 1998). Finally, other characteristics have been shown to influence financial development, such as the presence of information sharing institutions (Djankov, McLiesh and Shleifer, 2007), the degree of capital account openness or liberalization of financial system (Chinn and Ito, 2002; Demirgüç-Kunt and Detragiache, 1998), remittances (Aggarwal, Demirgüç-Kunt, Martinez Peria, 2006), geography and initial endowments (Acemoglu, Johnson and Robinson, 2001, 2002). Interestingly, the religion practiced by the majority of the population has been shown to impact financial development (Stulz and Williamson, 2003), although this effect is not necessarily robust to the inclusion of other controls

(Beck, Demirgüç-Kunt and Levine, 2003).

In our regressions, we follow Djankov, McLiesh and Shleifer (2007) and control for country size defined as the log of the country's GDP, the growth in per capita GDP (over the period 1980-2005), the efficiency of the legal system measured by the number of days to enforce a simple contract (using the "Lex Mundi Project" data from Djankov et al., 2003¹⁸), a measure of contemporaneous inflation, the Djankov, McLiesh and Shleifer's (2007) index of creditor rights, and legal origin (from La Porta et al., 1997, completed by Djankov, McLiesh, and Shleifer, 2007¹⁹). In order to properly isolate the effects of Islamic banking in our regressions below, we include as additional controls a dummy for developing, i.e., "low and middle income" countries (as defined by the World Bank classification²⁰), and a dummy for oil-dependent countries (provided by the World Economic Outlook). Standard macro-economic control data are from the World Development Indicators (World Bank, 2009).

2.3.2 Sample

We restrict our sample to the countries with a sufficient proportion of Muslims, and require a minimum threshold of 5% Muslims in the population. The reason is twofold. First, we leave out of the regression a large number of countries with a structural zero on the Islamic finance dimension. Over the countries with religious composition information in ARDA, more than half of the countries have less than 5% Muslims, while more than a third of the countries have less than 1% Muslims. In the absence of a target market in many of those countries, Islamic finance is for them simply not a policy option. Second, it allows to focus on examining the impact of Islamic banking in a Muslim context. We count, as of 2005, 32 countries with Islamic retail banks in countries with a minimum of 5% Muslim population²¹.

¹⁸The variable provided by Djankov et al. (2003) is the number of days to enforce a contract of unpaid debt worth 50% of the country's GDP per capita.

¹⁹La Porta et al. (1997) define four types of legal systems across the world, namely, the English common law, the French, German, and Scandinavian civil laws. Djankov, McLiesh, and Shleifer (2007) extend the La Porta et al. (1997) legal origin classification from 49 to 133 countries, and add a fifth category, "socialist" legal origin, for countries that have inherited Soviet laws. The latter does not apply for countries that have gone back to their pre-communist legal systems such as the Baltic and East European countries.

²⁰The 2008 World Bank country classification splits countries according to their income levels (GNI per capita) in 2007.

²¹Three countries with Islamic retail banks (US, UK, and South Africa) are de facto excluded from our sample due to our threshold of Muslims proportion. These countries are typical examples of the introduction of Islamic banking in a non-predominantly Muslim context, which is beyond the scope

Given the data requirements of the control variables, our final cross-sectional sample comprises of 55 countries, of which 20 with active Shariah-compliant banks²²(see figures 2.1 and 2.2). Table 2.4 characterizes our sample composition.

We test the robustness of our results to alternative threshold values of Muslims proportion, or to including in the sample only member and observers countries of the Organization of the Islamic Conference (OIC), in spite of the reduced sample size²³.

2.3.3 The effect of Islamic banking on total banking development

We measure banking development using two alternative variables provided by the Financial Structure Database (Beck, Demirgüç-Kunt and Levine, 2007, Beck and Demirgüç-Kunt, 2009), namely, "private credit by deposit money banks and other financial institutions over GDP" and "bank deposits over GDP". These indicators proxy for two important aspects of a banking system, respectively the ability of banks to attract resources in the form of money deposits, and, on the asset side, their ability to perform credit allocation.

In order to examine the overall empirical relationship between banking sector development and Islamic banking, we use the following equations:

$$PC/GDP_{i} = \alpha_{1}PC/GDP(IF)_{i} + \alpha_{2}X_{i} + \epsilon_{i}$$
$$DEP/GDP_{i} = \alpha_{1}'DEP/GDP(IF)_{i} + \alpha_{2}'X_{i} + \epsilon_{i}'$$
(2.1)

where PC/GDP_i (DEP/GDP_i) is the ratio of private credit (deposits) to GDP in country i, PC/GDP(IF) (DEP/GDP(IF)) is the ratio of Islamic private credit (deposits) to GDP, X is a matrix of controls (including a constant), *i* is a countryindex, and ϵ and ϵ' are randomly distributed error terms. All data are averaged over the 2000-2005 period, in order to smooth temporary shocks. We estimate the

out of this study. Furthermore, comprehensive Islamic banking data are very difficult to obtain on those countries (in particular, they have a large proportion of Islamic windows, on which banks do generally not disclose figures separately) and the IFIRST database only provides estimated data.

²²Unfortunately, the following areas with Islamic finance are not covered by measures of legal system efficiency and creditor rights provided by Djankov, McLiesh and Shleifer, 2007: Qatar, Bahrain, Sudan, Brunei, Palestine, Iraq and Gambia. Also, we have no data in the Financial Structure Database on the United Arab Emirates, Palestine, Lebanon, Bosnia and Herzegovina, Guina, Iraq, Azerbaijan. Still, countries in our sample account altogether for 90% of Shariah-compliant assets.

 $^{^{23}\}mathrm{Restricting}$ our sample to the OIC members and observers leaves only 36 countries in our regressions.

 α coefficients through ordinary least squares (OLS) with heteroskedasticity-robust standard errors (White or sandwich estimators).

Our estimators are unbiased and consistent as long as the right-hand side of our equations does not omit important country characteristics, and our independent variables, in particular, Islamic banking development, are not endogenous to banking development. We address potential reverse-causality concerns, through estimating the same equations with a two-stage least squares methodology. In the first stage, we instrument the Islamic banking variables, PC/GDP(IF) or DEP/GDP(IF), by the number of years of existence of a Shariah-compliant system. We argue that the latter variable is a valid instrument for PC/GDP(IF) or DEP/GDP(IF), as (1) it is highly correlated with each the Islamic banking variables, (2) it is cannot, logically, be caused by the average size of the banking sector over the recent period (2000-2005), and (3) it should a priori principally influence the size of the banking sector solely through the Islamic banking sector channel.

In a later section, we provide an alternative methodology, the differences-indifferences, that also addresses the issue of potential reverse-causality.

2.3.4 Complementarity vs. substitution between the conventional and the Islamic banking sectors

In order to further understand the relation between Islamic banking development and overall banking sector development, we study potential complementarity vs. substitution effects between the Islamic and conventional parts of the banking sector. We indeed have the following relationship:

> $PC/GDP_i = PC/GDP(IF)_i + PC/GDP(CONV)_i$ $DEP/GDP_i = DEP/GDP(IF)_i + DEP/GDP(CONV)_i$

where PC/GDP_i and DEP/GDP_i represent the total banking sector over GDP in country i, PC/GDP(IF) and DEP/GDP(IF) are the Islamic part of the banking sector, and PC/GDP(CONV) and DEP/GDP(CONV) are the conventional banking sector.

The following specification allows to assess in a direct way whether the Islamic

and conventional banking sectors are significant complements or substitutes of each other:

$$PC/GDP(CONV)_{i} = \beta_{1}PC/GDP(IF)_{i} + \beta_{2}X_{i} + \epsilon_{i}$$
$$DEP/GDP(CONV)_{i} = \beta_{1}'DEP/GDP(IF)_{i} + \beta_{2}'X_{i} + \epsilon_{i}'$$
(2.2)

Note that, by construction, $\alpha_1 = \beta_1 + 1$ and $\alpha'_1 = \beta'_1 + 1$.

A negative β_1 (β'_1) indicates a substitution relationship, whereas a positive β_1 (β'_1) would reveal a complementarity relationship between the Islamic and conventional sectors (as measured by the respective proxies for banking sector development).

Additionally, we assess whether the impact of Islamic banking on the conventional banking sector development differs according to the penetration level of Islamic banking. Using average penetration levels over the 2000-2005 period, we allocate each country to one of the four groups: high (over 18% Islamic banking penetration), medium (between 3 and 18%), low (lower than 3% but different from 0%), or no Islamic banking²⁴. Our sample splits into 6 countries with high Islamic banking , 7 with medium, 7 with low and 35 with zero Islamic banking penetration over the 2000-2005 period. We construct dummy variables and interact them with the Islamic banking variable in the following way:

$$PC/GDP(CONV)_{i} = \gamma_{1}PC/GDP(IF)_{i} * IFgroup_{i} + \gamma_{2}PC/GDP(IF)_{i}$$
$$+\gamma_{3}IFgroup_{i} + \gamma_{4}X_{i} + \epsilon_{i}$$
$$DEP/GDP(CONV)_{i} = \gamma_{1}'DEP/GDP(IF)_{i} * IFgroup_{i} + \gamma_{2}'DEP/GDP(IF)_{i}$$
$$+\gamma_{3}'IFgroup_{i} + \gamma_{4}'X_{i} + \epsilon_{i}'$$
(2.3)

where *IF group* is a matrix of three dummy variables (taking value 1 for, respectively,

high, medium, and low Islamic banking penetration).

We estimate our cross-sectional coefficients through ordinary least squares, with heteroskedasticity-robust standard deviations (White or sandwich estimators).

 $^{^{24} \}rm Selected$ thresholds are the ones that break down countries with Islamic finance into comparable group sizes.

2.4 Cross-section results

Looking at summary statistics (see figure 2.1 and tables 2.4 to 2.6), we observe that Islamic banking is associated, on average, with low economic development. Amongst the 32 "Muslim" countries with Islamic retail banks in 2005, 25 are developing countries as per the World Bank classification. In our final sample of 20 countries with Islamic banks, 18 are developing. As to the unconditional relation between Islamic banking and banking development, the average private credit to GDP over the 158 countries of the Financial Structure Database is 44.9 percent, but it is only 36.5 percent across the 20 countries in our sample with Islamic banks. However, in the subset of "Muslim" countries, those with Islamic banks seem to be better off than average, as the average private credit to GDP is only 32.0 percent across the 55 "Muslim" countries. We turn to regression analyses to examine whether there is an autonomous role of Islamic banking in overall banking development beyond other country factors.

Our first set of regressions analyze the effect of Islamic banking development on overall banking development. Table 2.1 reports the estimated coefficients of equations 2.1, which assesses the effect of Islamic banking on the overall banking sector.

The signs of regression controls OLS coefficients are in line with the literature and all the effects have the expected signs. Country size, past GDP growth, and creditor rights all enter the regression significantly and positively. The time to enforce contract payment and the level of inflation have a significant and negative impact on financial development. The dummy for developing countries has a strong negative effect. Other dummies, which control for oil-dependent economies and legal origin are not significant. However, we keep them in the base-line regressions as they might interfere with our measures of Islamic banking development.

Results on the Islamic banking variable, with and without instrument, are in line with our expectations of a positive and significant impact of Islamic banking on the total banking sector.

In order to estimate the size of the effects, we compute the median impact on the dependent variable, implied from the Islamic banking coefficient value. This is done by multiplying the estimated coefficient by the median value of the respective Islamic banking proxy in the sample of countries with Islamic banks (available in

		Dependent variable:					
	Total Private Credit to GDP		Total Bank	Deposits to GDP			
	(OLS)	(IV)	(OLS)	(IV)			
PC/GDP(IF)	1.233^{**} (.612)	1.380^{*} (.776)	. ,				
$\mathrm{DEP}/\mathrm{GDP}(\mathrm{IF})$			1.204^{*} (.671)	1.548^{**} (.687)			
GDP	3.956^{***} (1.408)	3.829^{***} (1.475)	$\begin{array}{c} 4.333^{***} \\ (1.282) \end{array}$	4.025^{***} (1.327)			
GDP/cap growth	4.442^{**} (1.995)	4.612^{**} (2.292)	5.702^{***} (1.696)	6.070^{***} (1.904)			
Contract enf. days	-17.243^{***} (4.784)	-17.448^{***} (4.748)	-7.813^{*} (4.267)	-8.353^{*} (4.544)			
Inflation	-1.366^{***} (.409)	-1.373^{***} (.421)	-1.245^{***} (.423)	-1.268^{***} (.448)			
Creditor rights	4.364^{*} (2.469)	4.304^{*} (2.503)	7.315^{***} (1.413)	7.183^{***} (1.387)			
Developing dummy	-27.578^{***} (9.131)	-27.253^{***} (9.404)	-8.626 (8.661)	-7.930 (9.043)			
Fuel dummy	-7.019 (8.712)	-6.752 (9.155)	-7.266 (8.304)	-6.262 (9.260)			
French legal origin	$2.573 \\ (6.841)$	$2.860 \\ (6.768)$	$8.370 \ (5.581)$	$8.906 \ (5.570)$			
German legal origin	$3.752 \\ (8.406)$	$4.579 \\ (8.664)$	194 (7.460)	$1.701 \\ (7.636)$			
Socialist legal origin	$3.037 \\ (6.101)$	$3.715 \\ (6.692)$	-1.607 (7.663)	016 (8.146)			
Constant	$56.972 \\ (46.301)$	$\begin{array}{c} 60.270 \ (46.207) \end{array}$	-28.715 (43.379)	-20.288 (45.085)			
Nb countries	55	55	55	55			
Adjusted \mathbb{R}^2	.757	.756	.716	.711			

Table 2.1: Cross-section: IF effect on total banking development

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

table 2.6). The median empirical impact of Islamic banking on private credit to GDP is a sizeable 7 percent, from a mean private credit to GDP in our sample of 32 percent. The median impact on deposits to GDP amount to 7 percent as well, from a mean level of 36 percent across our sample.

The instrumental variable (IV) estimates confirm our findings, and yield slightly higher coefficient estimates. The first stage regressions confirm the significant impact of our instrument, the age of the Islamic banking industry in the country, on the respective Islamic banking variables. Overall, our results do not seem to be driven by reverse-causality.

.All coefficients on the Islamic banking proxy are greater than 1, which suggests a complementarity effect between the Islamic and the conventional banking sectors. In other words, money that flows into the Islamic sector seem to not entirely come from the conventional sector. Such an effect, however, is not significant when regression equations 2.2 are performed, that is, when all countries are included in the regression.

In order to better understand the complementarity effect, we examine whether there are differences depending on the penetration levels of Islamic banking in the domestic market. To do so, we interact our Islamic banking variables with country group dummies, following equation 2.3. Table 2.2 displays the effects of Islamic banking development on the conventional banking sector when Islamic banking reaches a low, medium or high proportion of the domestic financial sector.

We observe that Islamic banking is indeed a significant complement of conventional banking, but only in the medium Islamic banking penetration group. The effects in the two other groups are insignificant. This is coherent with expectations. When Islamic banking has not yet reached a critical mass, the effect on the conventional sector is not apparent yet. When the Islamic sector is relatively high, we expect it to exert a higher competitive pressure on the conventional sector. In sum, this result suggests that a balanced co-existence between the Islamic and conventional banking sectors has the most benefitial effects on the banking system²⁵.

We perform a series of robustness checks on our cross-country regressions. First, we replace our country size control, the logarithm of GDP, by the logarithm of population, in line with Mulligan and Shleifer (2005). This leads to an even stronger significance of Islamic banking. Second, following the information theories of credit (Djankov, McLiesh and Shleifer, 2007), we replace the legal origin by indicators of information sharing institutions. We use the dummy variable accounting for the presence of absence of credit agencies, private or public, in a country, provided by Djankov, McLiesh and Shleifer (2007) in a large cross-section of countries in 1999. Our results are qualitatively the same. Third, we add complementary controls to the regressions, namely, the Chinn-Ito index of financial openness, remittances, or absolute latitude. Most of these controls (except remittances) are non significant and our other coefficients are hardly modified by the addition of any combination of the latter. In sum, our results are very robust to changes in the conditioning information set.

Finally, we re-run the regressions with modified samples. Working with the sample

 $^{^{25}}$ One should, however, remain careful on these results, as the sample size is small (there are, at the most, 7 countries in a single, non-zero, Islamic finance penetration group).

	Dependent variable:					
	Conv. F	rivate Credit	to GDP	Conv.	Deposits to	GDP
	(1)	(2)	(3)	(4)	(5)	(6)
PC/GDP(IF)	-51.442 (35.987)	3.275^{***} (.682)	739 (.488)			
$\mathrm{DEP}/\mathrm{GDP}(\mathrm{IF})$, , ,	× ,	-23.866 (45.595)	2.440^{***} (.656)	537 $(.610)$
1[non LOW]	-4.499 (15.233)			-7.458 (17.817)		
1[non MED]		8.130^{*} (4.807)			7.401^{*} (4.416)	
1[non HIGH]			-10.173 (11.505)			-8.58 (12.268)
$1[\text{non LOW}] \ge PC/GDP(IF)$	51.804^{***} (36.220)			$24.111 \\ (45.773)$		
$1[\text{non MED}] \ge PC/GDP(IF)$		-3.600 (0.962)			-2.625 (1.159)	
1[non HIGH] X PC/GDP(IF)			$3.348^{***} \\ (0.957)$			2.349^{**} (1.008)
1[non LOW] X DEP/GDP(IF)	51.804^{***} (36.220)			$24.111 \\ (45.773)$		
$1[\text{non MED}] \ge \text{DEP}/\text{GDP}(\text{IF})$		-3.600 (0.962)			-2.625 (1.159)	
1[non HIGH] X DEP/GDP(IF)			$3.348^{***} \\ (0.957)$			2.349^{**} (1.008)
GDP	3.592^{**} (1.687)	4.180^{***} (1.508)	4.048^{***} (1.399)	3.937^{***} (1.507)	4.458^{***} (1.360)	4.349^{***} (1.295)
GDP/cap growth	4.866^{***} (1.816)	$2.925 \\ (2.134)$	$3.084 \\ (2.147)$	5.744^{***} (1.703)	4.610^{**} (2.004)	4.782^{**} (1.993)
Contract enf days	-23.729^{***} (7.440)	-16.185^{***} (4.302)	-16.272^{***} (4.360)	$-9.396^{st} (5.389)$	-7.054^{*} (4.001)	-7.218^{*} (3.970)
Inflation	-1.421^{***} (.408)	-1.109^{***} (.396)	-1.180^{***} (.425)	-1.259^{***} (.428)	$^{-1.056^{**}}_{(.439)}$	-1.115^{**} (.460)
Creditor rights	4.595^{**} (2.326)	$3.357 \\ (2.371)$	$\substack{3.905\\(2.412)}$	7.714^{***} (1.582)	${\begin{array}{*{20}c} 6.482^{***} \ (1.369) \end{array}}$	${6.931}^{***}_{(1.348)}$
Developing dummy	-21.064^{*} (12.486)	-33.043^{***} (9.258)	-33.107^{***} (9.676)	-7.404 (10.746)	$^{-12.596}_{(9.636)}$	-12.533 (10.102)
Fuel dummy	-2.314 (10.163)	-9.878 (7.981)	-8.133 (8.125)	$^{-4.643}_{(10.336)}$	-9.746 (8.228)	-8.722 (8.314)
French legal origin	$5.208 \\ (7.166)$	$\substack{\textbf{3.220}\\(6.780)}$	$\underset{(6.933)}{2.832}$	$9.653 \\ (6.257)$	$8.778 \\ (5.580)$	$8.502 \\ (5.717)$
German legal origin	$\substack{6.229\\(9.650)}$	$4.110 \\ (8.019)$	$4.713 \\ (7.904)$	$.844 \\ (8.048)$	$.150 \\ (7.276)$	$.680 \\ (7.261)$
Socialist legal origin	$\underset{(8.604)}{2.880}$	$ \begin{array}{r} 1.100 \\ (5.643) \end{array} $	$\underset{(5.860)}{2.585}$	$-3.668 \\ (9.990)$	-3.065 (7.547)	-1.799 (7.724)
Constant	$100.673 \\ (70.448)$	$\substack{43.981 \\ (48.204)}$	${64.065 \atop (43.961)}$	$^{-5.138}_{(62.979)}$	-38.517 (44.738)	-20.665 (43.112)
Nb of countries	55	55	55	55	55	55
Adjusted R ²	.748	.777	.773	.683	.71	.708

Table 2.2: Cross-section: IF effect on conventional banking by country group

Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Notes: LOW, MED and HIGH represent the groups of countries with, respectively, a low, medium and high penetration of Islamic banking in the country's banking system (as defined in the main text). non LOW, non MED, and non HIGH designate all countries except those with, respectively, a low, medium, and high Islamic finance penetration.

1[x] is the indicator function, which takes value 1 when a country belongs to group x, and value 0 otherwise. Hence, the impact of the Islamic finance variable in the LOW, MEDIUM and HIGH groups are read directly in the first (\hat{PC}/GDP IF) and second (DEP/GDP IF) lines of the table.

of OIC countries, or changing the 5% Muslims threshold to 10% or even 20% does not qualitatively affect our results. Next, some argue that the fully Shariah-compliant countries, such as Iran, have an a-typical approach of Islamic finance which cannot be compared to the kind of Islamic finance practiced in other areas. Our main results hold when excluding Iran from our sample.

2.5 Differences-in-differences analysis

Differences-in-differences analyses provide an interesting alternative econometric strategy to the use of instrumental variables, that has been criticized in the literature (e.g., Glaeser et al., 2004²⁶). It involves comparing levels of the dependent variable, i.e., financial development, before and after a specific treatment or reform, in our case, the introduction of Islamic banking, or a change in the number of Islamic institutions. We use two alternative procedures recommended by Bertrand, Duflo and Mullainathan (2005), and applied by Djankov, McLiesh and Shleifer (2007) to financial sector development. These methodologies make use of the time-series dimension of our data. We indeed know, from IFIRST, when modern Islamic banking was introduced in each country since its birth in 1975, and the number of active Islamic banks yearly. We are interested in "reforms", i.e., either the introduction of Islamic banking, or the change in the number of Shariah-compliant institutions.

The first procedure involves collapsing time-series information into average preand post-reform values.

The regression is constructed in the following way. First, we identify the various years and countries where a reform took place, say the launching of Islamic banking. For clarity, we give a number to each reform. Second, each year where a reform took place, we compute, per country, the average levels of financial development in a time window, say 5 years, before the reform, and the same across 5 years following the reform. Taking differences in these values, we then calculate, in each country, the change in financial development around that given year. Third, for each reform year, we split our sample into countries that had a reform, and countries without reform. The sub-samples are, logically, different each year. Fourth, we compute, for each

²⁶They show, in particular, that the validity of several instruments used in the literature on the determinants of financial development can be heavily discussed.

reform year, the average change in financial development across the sub-sample of "no-reform" countries. We then use the data in the following regression:

$$\Delta FDref_i = \phi_1 + \phi_2 \Delta FDnoref_i + \epsilon_i \tag{2.4}$$

where the subscript j denotes the reform number. $\Delta FDref_j$ is the difference between pre- and post-reform values of financial development in the reform country that undertook the reform number j. $\Delta FDnoref_j$, the control variable, is the average change in financial development in the no-reform sub-sample corresponding to the year of the j's reform. Finally, ϵ_j is the estimation error for observation j.

The coefficient ϕ_2 captures the world trend in financial development around reform years. ϕ_1 is the coefficient of interest. A positive value indicates that the studied reform leads, on average, to a higher change in financial development than one would have expected if there were no reform.

Given the lower data requirements, our sample extends to several "Muslim" countries that were not included in our cross-section regressions. We however exclude from our sample the countries where severe political crisis periods coincided with the launch of Islamic banking (this is the case of Sudan in 1983 and Algeria in 1991 which underwent civial wars, and Iran in 1983 with the Iran-Iraq war). We consider three time windows (of 3, 4 and 5 years) and two types of reforms, namely the launch of Islamic banking, and the authorization of new Islamic banks. The former type of reform yields, at best, only 14 observations, which too small for analysis. The latter reform produces between 41 to 49 observations, for time windows of, respectively, 5 and 3 years.

Table 2.3 displays the results on the change in overall financial development around a change in the number of Islamic banks. Columns (1) to (3) use private credit to GDP as a proxy for financial development, while deposits to GDP is used in the next three columns.

The coefficient of interest, i.e., the constant, is positive in all cases, and significant in 5 cases out of 6. It indicates that increasing the number of Islamic banking institutions raises the ratio of private credit to GDP by 0.7 to 1 percent, and the deposits to GDP ratio by around 0.8 percent. The magnitude of the effects is smaller than reported in the cross-sections, but the results are statistically significant.

	Dependent variable: Difference between the average of the ratio in private credit (deposit) to GDP taken x years after reform and the average of the same ratio taken x years prior to the reform Private Credit to GDP					
	x=5 yrs	x=4 yrs	x=3 yrs	x=5 yrs	x=4 yrs	x=3 yrs
Change in avg private credit to GDP (no reform countries)	836 (.986)					
Change in avg private credit to GDP (no reform countries)		-1.399 (1.092)				
Change in avg private credit to GDP (no reform countries)			-1.646 (1.162)			
Change in avg deposits to GDP (no reform countries)				$.612 \\ (.569)$		
Change in avg deposits to GDP (no reform countries)					$.178 \\ (.565)$	
Change in avg deposits to GDP (no reform countries)						380 (.594)
Constant	$.096^{**}$ (.042)	$.073^{*}$ (.041)	$.054 \\ (.036)$	$.083^{***}$ (.024)	$.082^{***}$ (.023)	$.078^{***}$ (.023)
Nb of countries \mathbf{p}^2	41	44	49	41	44	49
K ⁻	.018	.035	.043	.031	.003	.011

Table 2.3: Change in the ratio of private credit (deposits) to GDP following a change in number of Islamic institutions

Robust standard errors in parentheses.

* significant at 10%; ** significant at 5%; *** significant at 1%

Our second procedure takes advantage of the within country variations through panel-data regressions with country fixed effects. The dependent variable is then the ratio of private credit (deposits) to GDP each year. Control variables are the same as in the cross-section regression, with the exception of variables that are constant through time, the effect of which is accounted for in the country fixed effects. We also include year dummies to capture short-term shocks to the world economy. The available IF proxies with a time-series dimension are "IF exist", which takes value 1 in the years when Islamic banks are active in the country and 0 otherwise, and "IF inst" which counts the number of active Islamic banks each year in the country.

Table 2.4 reports estimated coefficients in the panel regressions, and two types of standard errors. The first line below each coefficient contains robust standard errors, that correct for heteroskedasticity, but not for potential serial correlation in the error terms. The second lines are standard errors clustered by country, as recommended by Bertrand, Duflo and Mullainathan (2005) that impose no restriction on error term autocorrelation. Those are often higher than the robust standard errors, however, when there are many observation years, clustering may blow up standard errors in a sizeable manner (Djankov, McLiesh and Shleifer, 2007).

	Dependent variable:				
	Private Credit to GDP		Deposits	to GDP	
	(1)	(2)	(3)	(4)	
IF exist (robust standard errors)	$8.756 \\ (1.855)^{***}$		$9.150 \\ (1.405)^{***}$		
(errors clustered by country)	(6.716)		$(4.497)^{**}$		
IF inst		$1.638 \\ (.324)^{***} \\ (.768)^{**}$		1.101 (.228)*** (.350)***	
GDP	$19.270 \\ (1.207)^{***} \\ (4.053)^{***}$	$17.752 (1.260)^{***} (3.898)^{***}$	$11.706 \\ (1.029)^{***} \\ (2.703)^{***}$	$11.083 \\ (1.043)^{***} \\ (2.623)^{***}$	
Inflation	008 (.005) (.006)	009 (.006) (.008)	006 (.004) (.007)	008 (.005) (.007)	
Constant	-398.259 (26.420)*** (88.707)***	-365.082 (27.494)*** (85.204)***	-235.478 (22.300)*** (58.325)***	-221.515 (22.563)*** (56.532)***	
Year dummies	yes	yes	yes	yes	
Country effects	yes	yes	yes	yes	
Nb of observations	1625	1590	1623	1588	
Nb of countries	63	63	63	63	
Adjusted \mathbb{R}^2	.37	.387	.478	.474	

Table 2.4: Panel-data: IF effect on total banking development

Robust standard errors in parentheses.

* significant at 10%; ** significant at 5%; *** significant at 1%

Using robust standard errors, the effect of Islamic banking is, again, positive and significant in all regressions, using either private credit or deposits to GDP as the dependent variable and either type of IF proxies. Using standard errors clustered by country weakens the effects (one coefficient out of 4 loses significance) but does not modify our interpretation as most of the coefficients remain significant. The size of the effects is very close to the one obtained on cross-country regressions, with median impacts from the introduction of Islamic banking ranging from 8.8 to 9.2 percent of GDP on private credit and deposits.

In sum, the empirical results from the differences-in-differences analyses confirm a significant and positive role for Islamic banking in overall banking development. We are aware that differences-in-differences methods do not go around the potential concern that the timing of introduction of new Islamic banks may be endogenous. That would be the case if Islamic banking would be allowed to grow when the financial regulator expects the banking system to grow. Still, the convergence of the results from various methodologies provides a strong case for the role of Islamic banking in "Muslim" countries' financial development.

2.6 Concluding remarks

This paper provides an original analysis of the role of Islamic banking as a determinant of overall banking development in countries with a sizeable Muslim population.

Islamic banking has been growing very quickly over the recent years, due to both a rapid increase in the size of existing Islamic banks, and the creation of new Shariah-compliant institutions, from scratch or through the conversion of formerly conventional entities. From 2000 to 2005, total assets on the books of Islamic retail banks have more than tripled, and the number of institutions has almost doubled. As of end 2005, we identify, in the retail segment, 196 active Islamic banks operating in 35 countries in the world, and totalling 354 millions US dollars of assets.

In this context of high pressure for growth, it is crucial for the regulator to understand whether Islamic banking has desirable or detrimental side-effects on the economy. In particular, does Islamic banking help or hamper the development of the banking sector?

To our knowledge, this paper is the first to raise that question empirically. We circumvent the lack of reliable data on Islamic banking through building a unique database, IFIRST, on Shariah-compliant retail banking institutions worldwide over the period 2000 to 2005. From our database, we construct a series of indicators of Islamic banking development.

Using cross-section regressions that control for traditional determinants of banking development, we show that Islamic banking has a strong statistically significant effect on the development of the banking sector as a whole. This occurs, in countries where Islamic banking is authorized, through the development of a Shariah-compliant banking sector, which does not crowd out the conventional banking sector. We also find that Islamic banking is most benefitial when it co-exists with the conventional system and reaches a medium penetration level in the country's financial system. In such conditions, the Islamic and conventional banking sectors act as complements of each other. Finally, we corroborate these findings through differences-in-differences analyses, which show that financial development significantly rises upon the introduction of additional Islamic banks.

There are several potential explanations to our findings, each of which corresponds to a potential channel through which Islamic banking may influence the economy. First, in a Muslim environment, Islamic banking may increase the participation of the population in the banking system. Second, Shariah-compliant institutions may also raise the overall trust in the banking system and hence generate positive externalities on the sector. Third, Islamic finance may give a boost to financial innovation. Fourth, Islamic banks may have different credit policies. Finally, the introduction of new financial institutions may significantly affect the competitive structure of the banking industry. Our findings reinforce Weill's (2009) standpoint that Islamic banks do not necessarily have a high market power and may actually enhance competition amongst local banking players. We believe that each of those potential channels is an equally relevant piece of the research agenda. Additional research, be it in the form of case studies, micro- or macro-economic empirical or theoretical work, is strongly needed on those topics.

A logical extension of this research regards the study of the link between Islamic banking and economic growth. Besides, additional research should further test and possibly challenge our results, which are a first contribution on this important issue. Moreover, Islamic finance is still young and small with respect to global banking. We expect the industry to display a lot of new developments in the future, that may or not reinforce its potentially benefitial outcomes for the economy. Future evolutions of the industry will certainly require a closer, and perhaps increasingly critical, look at the economic implications of Islamic finance from both practicioners and researchers.

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2.7 Appendix



Figure 2.2: Islamic finance summary statistics (con't)



Sources: IFIRST (2007), World Development Indicators (World Bank, 2009), Financial Structure Database (Beck, Demirüç-Kunt and Levine, 2000; Beck and Demirüç-Kunt, 2009). Countries included are those in our final sample with active Islamic banking institutions as of 2005.
Table 2.4: Sample description features								
Variable	Worlbank	Cross-	Cross-	Sample				
	$\operatorname{countries}$	$\mathbf{section}$	$\mathbf{section}$	cover	age			
		\mathbf{sample}	\mathbf{sample}	\mathbf{rati}	os			
			(countries					
			$\mathbf{with} \ \mathbf{IF})$					
	(1)	(2)	(3)	(2)/(1)	(3)/(1)			
Nb of countries	212	55	20	26%	9%			
Nb of developing	144	47	18	33%	13%			
countries								
Nb of oil-dependent	15	5	2	33%	13%			
countries								
Nb of countries with	35	20	20	57%	57%			
Islamic finance								
Private credit to	44.910	31.963	36.460	71%	81%			
GDP (average)								
Deposits to GDP	47.922	35.669	43.448	74%	91%			
(average)								
IF assets (total)	207	186	186	90%	90%			

Table 2.5: Summary statistics - Cross-section sample

Variable	Mean	Median	Std Dev	Min	Max
Drivete gradit to CDD	21 062	17.949	24 201	<u> </u>	141.009
Private credit to GDP	31.903	17.042	04.021 00.100	2.000	141.902
Deposits to GDP	35.669	28.17	29.196	3.788	113.857
IF assets	3375	0	13888	0	92055
IF exist	0.364	0	0.485	0	1
IF years	7.109	0	10.103	0	29
IF inst	1.9	0	3.981	0	19.333
IF inst/Muslims	0.111	0	0.231	0	1.188
IF penetration	0.06	0	0.165	0	1
GDP	23.713	23.405	1.979	20.643	28.449
GDP/cap growth	1.082	1.313	1.632	-2.443	4.772
Contract enf. days	5.836	5.966	0.625	3.296	6.593
Inflation	7.618	5.597	6.932	0.652	30.376
Creditor rights	1.633	2	1.192	0	4
Developing dummy	0.855	1	0.356	0	1
Fuel dummy	0.091	0	0.29	0	1
French legal origin	0.491	0	0.505	0	1
German legal origin	0.055	0	0.229	0	1
Nordic legal origin	0	0	0	0	0
Socialist legal origin	0.109	0	0.315	0	1
Nb of countries			55		

		mance			
Variable	Mean	Median	Std. Dev.	Min.	Max.
Private credit to GDP	36.46	22.996	31.722	5.16	116.538
Deposits to GDP	43.448	35.637	30.877	6.520	113.857
IF assets	9282	716	22146	14	92055
IF exist	1	1	0	1	1
IF years	19.55	21.5	5.835	8	29
IF inst	5.225	2.833	5.173	1	19.333
IF inst/Muslims	0.304	0.179	0.299	0.061	1.188
IF penetration	0.164	0.064	0.244	0	1
GDP	24.419	24.806	1.65 .995	26.76	
GDP/cap growth	1.341	1.568	1.784	-1.603	4.663
Contract enf. days	5.832	5.966	0.619	3.296	6.346
Inflation	9.084	7.997	7.506	1.618	30.376
Creditor rights	1.59	2	1.047	0	3
Developing dummy	0.9	1	0.308	0	1
Fuel dummy	0.1	0	0.308	0	1
French legal origin	0.55	1	0.51	0	1
German legal origin	0	0	0	0	0
Nordic legal origin	0	0	0	0	0
Socialist legal origin	0.1	0	0.308	0	1
Nb of countries			20		

 Table 2.6: Summary statistics - Cross-section sample (countries with Islamic finance)

ist			Т	ał 	ole	e 2	2.	7:	(Co	or	re	ela	iti	io:	n	ta	ab	le	9		
Sociali	legal	origin	D																			
Nordic	legal	origin	D																			
German	legal	origin	D																	П		-0.08
French	legal	origin	D																-	-0.24		-0.37
ng Fuel	dummy																	1	0.07	-0.08		-0.11
Developi	dummy																	-0.23	-0.01	-0.13		0.17
Creditor	rights															1	-0.22	-0.01	-0.56	0.21		0.15
t Inflation															1	0.17	0.22	0.11	-0.27	-0.16		0.96
p Contract	enf.	davs	- -											1	0.12	0.01	0.39	0.17	0.01	0		0.03
GDP/ca	growth												Ч	-0.27	-0.11	0.14	-0.11	-0.21	-0.1	0		0.91
GDP												1	0.44	-0.3	0.03	0.3	-0.5	0.15	-0.12	0.13		0.16
IF	sl pene-	tration									Ч	0.14	-0.16	0.11	0.21	0.04	-0.08	0.07	-0.12	-0.09		0.13
IF	inst/Mus									П	0.52	0.35	0.32	0.08	0.1	0.18	0.09	-0.01	-0.17	-0.12		0.1.4
IF inst									1		0.53	0.36	0.31	0.09	0.11	0.17	0.09	-0.01	-0.17	-0.12		0.14
ΙF	years							1	0.64	0.64	0.51	0.23	0.09	-0.03	0.07	-0.02	0.05	-0.01	0.17	-0.17		0.12
ΙF	exist						1	0.94	0.64	0.64	0.48	0.27	0.12	0	0.16	-0.03	0.1	0.02	0.09	-0.18		0.09
IF	assets					-	0.32	0.37	0.59	0.58	0.88	0.24	-0.11	0.1	0.21	0.15	-0.1	0.13	-0.18	-0.06		0.00
Deposits	to	GDP				0.08	0.2	0.29	0.35	0.38	0.04	0.65	0.56	-0.41	-0.34	0.36	-0.51	-0.11	-0.03	0.11		-0.96
Private	credit	to	GDP		0.92	0.11	0.1	0.18	0.26	0.28	0.06	0.63	0.46	-0.58	-0.35	0.29	-0.66	-0.07	-0.06	0.14		-0.10
				Private credit to GDP	Deposits to GDP	IF assets	IF exist	IF years	IF inst	IF inst/Musl	IF penetration	GDP	GDP/cap growth	Contract enf. days	Inflation	Creditor rights	Developing dummy	Fuel dummy	French legal origin	German legal origin	Nordic legal origin	Socialist lagal origin

Table 2.8: List of acronyms

Acronym	Meaning
AAOIFI	Accounting and Auditing Organization for Islamic Financial Institutions
ARDA	Association of Religious Data Archives
CIBAFI	General Council for Islamic Banks and Islamic Financial Institutions
CIA	Central Intelligence Agency (USA)
GDP	Gross Domestic Product
IF	Islamic Finance
HDR	Human Development Report
IFIRST	Islamic Finance Recording and Sizing Tool
IFS	International Financial Statistics
IMF	International Monetary Fund
LLSV	La Porta, Lopez-de-Silanes, Shleifer, Vishny
OIC	Organization of the Islamic Conference
OLS	Ordinary Least Squares
PLS	Profit and Loss Sharing
WDI	World Development Indicators (World Bank database)

Chapter 3

Emerging and Frontier Stock Market Returns: Empirical Behavior and Literature Findings in Perspective

Emerging and Frontier Stock Market Returns: Empirical Behavior and Literature Findings in Perspective¹

Abstract

Emerging stocks increasingly draw the attention of international investors, given several specificities in return behavior. This paper surveys the literature on emerging stocks' unconditional returns, and confronts it with empirical observations. We use a database of 53 emerging country indices over the period from 1981 to mid-2008, including 33 Major and 20 Frontier markets, rarely covered in the literature. Finally, we compare Major to Frontier market returns.

Data on both types of markets confirm the literature consensus about three distinguishing features of emerging market stock returns: (1) volatility is high, (2) third and fourth moments matter, (3) correlations with developed market returns are low, although they have been rising over the last decades. However, contrary to some papers and in accordance with others, we do not find that emerging stock returns are, on average, significantly different from developed markets'.

In spite of wide macro-economic differences in GDP, market size and liquidity, the return patterns in Frontier markets are very similar to Major markets', except correlations. Those are significantly smaller both amongst Frontier markets, as well as between Frontier and developed or Major markets. Using a mean - Value-At-Risk optimization framework, we show that, at current correlation levels, the low systematic risk contribution of Frontier markets is an argument for their inclusion in global investment portfolios.

JEL: G15, G11, F30.

Key words: emerging stock markets, frontier markets, equity returns, investment, moments.

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3.1 Introduction

Emerging stock markets have long been viewed as a residual category in the landscape of investment opportunities. Still today, some international investors may be reluctant to investing in emerging stocks, or restrict their emerging stock markets investments to a negligible portion of their portfolio. The reasons behind the limited popularity of emerging stock markets amongst international investors are manifold. These are, to name only a few, poor information (due to, e.g., a lower, or absence, of coverage by market information providers, or minimal accounting standards); lax market regulations, supervision and enforcement; high transaction costs; legal restrictions on foreign ownership; extensive government involvement with listed companies; high perceived risk; or even cultural differences² (for a discussion of emerging market microstructure and investment barriers, see, for example, Derrabi and Leseure, 2005, Glen, 2000, and Bekaert, 1995).

However, in spite of the numerous remaining barriers, the interest in emerging stock investment is growing. The main arguments in favor of emerging stock market investment are generally twofold. First, a high return potential is inferred from a favorable history of returns in several emerging markets, and from the high room for future macro-economic growth (e.g., GDP per capita). Second, portfolio diversification benefits are expected due to the low correlation with global stock market returns. Together with the opening-up of new investment horizons following several financial liberalizations in the 90s (see, for example, Bekaert, Harvey and Lundblad, 2003), the size of emerging stock markets has been growing at a very rapid pace. At the end of 2007, emerging markets (i.e., equity markets located in developing countries), accounted for 23 percent (14.9 Trillion USD) of the global market capitalization, from a mere 7 percent (1.7 Trillion USD) only a decade before. The 2008 financial crisis did not modify this global picture: Although they were badly hurt by the 2008 financial crisis, at the end of 2008, emerging markets had contracted to their 2006 market capitalization level, whereas developed markets as a whole were back to their 2004 level. At the end of 2008, emerging markets still accounted for 19 percent (6.6 Trillion

 $^{^{2}}$ See, for example, Stulz and Williamson (2003), or Grinblatt and Keloharju (2000). The latter show that investors are more likely to trade stocks of firms that are located close to the investor, that communicate in the investor's native tongue, and that have chief executives of the same cultural background.

USD) of the world total. From end 1997 to end 2008, in the midst of the financial crisis, the cumulative annual growth rate in emerging stock market capitalization is still an impressive 13 percent per annum³.

This paper aims at providing market stakeholders with a critical view on the current knowledge about the unconditional distribution of emerging stock market returns, through both a survey of the literature, and empirical analyses.

Understanding emerging stock market return features is important for at least three types of stakeholders. First, the professional international investor cannot afford to ignore the investment opportunity offered by increasingly liberalized emerging stock markets. Yet, a cautious approach of investment is necessary to decide which general guidelines to adopt and to assess the impact on expected risks and returns. Second, local companies need to correctly understand the mechanics behind their cost of capital in order not only to minimize their funding costs, but also to make valuecreating investment decisions. This is becoming especially true as more and more companies in emerging countries are either privatized or coping with an increasingly competitive economic environment. Third, at the macro level, emerging country policymakers are confronted with a growing need to, if not attract, at least cope with foreign equity investment. Therefore, it is crucial for them to understand the microdeterminants of international investment. The purpose of this paper is to contribute to this understanding from the angle of unconditional return distributions over a large panel of emerging markets.

We start by defining the concept of an "emerging stock market" and clarifying the scope of the latter investment category. A literature survey shows that, in spite of large increases in size and liquidity over the last decade, the majority of the emerging stock markets are still below the radar of global scientific empirical studies. To our knowledge, the maximum number of emerging countries covered together in a single empirical study of returns is 31 (in Erb, Harvey, Viskanta, 1998). Whereas such choices are rightfully justified by important data limitations and methodological choices, they result in a very partial view of the emerging markets universe, which comprises nowadays of over a hundred countries. Logically, this picture is similar with regard to the coverage of emerging markets by major financial information providers,

³Source: World Development Indicators (World Bank, 2009)

such as S&P or MSCI. Together, both institutions provide currently information (at the minimum, a country equity index calculated on a monthly basis) on 58 emerging countries. This represents, again, hardly half the total number of emerging markets. We propose a typology of emerging markets derived from S&P Emerging Markets Database (hereafter, EMDB) and the World Bank country classifications, into "Major", "Frontier", "below-the-radar", and "no (active) stock exchange" countries. A top-down macro-economic analysis of key indicators shows that there are wide differences in level of development, size and liquidity between these groups of countries.

We then stress and discuss several important challenges in emerging stock data, before examining the behavior of emerging stock returns, from the perspective of an international US investor. Our data run over the period from beginning 1981 to mid-2008, which spans a number of crises (e.g., the 1987 stock market crash, the Mexican 1994 crisis, the Asian 1998 crisis, the 2000-2002 dot-com bubble burst), but excludes the latest 2008 financial crisis, ongoing at the time of writing. Our analysis confronts literature findings to historical data from S&P Emerging Markets Database (EMDB) on Major countries and the more recent EMDB Frontier markets. Our database includes 53 emerging market indices with a history of at least 5 years of monthly data, amongst which 20 Frontier markets, rarely covered in the literature.

Our objective is twofold: First, to confront our empirical observations to traditional literature findings, and second, to assess whether Fontier markets returns display significant differences with Major markets. The structure we follow is a review of statistical moments of the stock return distribution relevant to the international investor. When making a stand-alone investment, the investor is concerned about returns' mean, standard deviation, but also about skewness (a potential asymmetry of returns towards good, or bad returns) and kurtosis (the frequency of occurence of extreme events, positive or negative). In the context of a portfolio investment, the key parameter, in addition to expected returns, is the correlation between assets.

For each moment, we present key literature standpoints, confront them with our empirical observations, and compare the behavior of Frontier and Major market returns. Our finding can be summarized as follows. Our overall data confirm the major literature findings on emerging stock market returns, i.e., (1) volatility is high, (2) third and fourth moments matter⁴, and (3) correlations, both within emerging mar-

 $^{^{4}}$ We show that this issue is not specific to emerging markets as it is also present in developed

kets, and with developed markets, are relatively low, although they have been rising over the last decades. However, as to the literature divergences about the relative attractiveness of average returns in emerging versus developed markets, we do not find evidence in our data that realized returns in emerging markets are on average significantly higher than in developed markets. At last, in contrast with wide differences in liquidity and relative size between Major and Frontier markets, return patterns are qualitatively similar between the two types of markets, with one notable exception: Frontier markets display lower correlations, both amongst them, and with developed or Major markets. We illustrate, using a mean - Value-At-Risk optimization framework with the no short-selling constraint in emerging markets, how the addition of Frontier stock markets in a global portolio shifts the efficient investment frontier towards more desirable outcomes. We find that the inclusion of Major stock indices to a global portolio increases the optimal modified Sharpe ratio from 0.041 to 0.048, while the additional inclusion of Frontier indices further increases the optimal Sharpe ratio to 0.060.

The remainder of the paper is organized as follows. Section 2 precisely defines the scope of the analysis, proposes a typology of emering markets, and presents key macro-economic stylized facts. Section 3 discusses common data challenges in emerging markets and presents our dataset. Section 4 analyzes realized returns. Sections 5 reviews the risk parameters of a stand-alone emerging market investment (standard deviation, and higher-order moments). Section 6 examines the role of correlations in a global international portfolio approach. Section 7 concludes and proposes avenues for further research, given the current state of the literature.

3.2 Definitions and typology of emerging markets

3.2.1 Definitions

A coherent approach of emerging stock market returns starts with a rigorous definition of the scope of research. The variety of the definitions encountered in the literature, involving varying degrees of subjectivity, is indeed a potential source of divergence in results or interpretations.

equity markets.

Originally, an emerging stock market is a stock market located in a developing country⁵ (Beim and Calomiris, 2001). A country is deemed developing (using the World Bank vocabulary, a "low or middle income" country) if its per capita Gross National Income (GNI), expressed in USD, falls below a certain hurdle that changes through time. A widely accepted reference hurdle for per capita GNI is the one set by the World Bank every year in July. The World Bank computes the GNI per capita in USD using the "Atlas" conversion factor, which is an average of inflation-adjusted exchange rates effective over the last three years (see World Bank, 2009). Doing so, it strives to soften the impact of exchange rate fluctuations in the cross-country comparison of national incomes and avoids a series of jumps from a category to another for borderline countries.

This straightforward criterion serves as a basis for a binary classification of countries, and, by the same token, stock markets, as developing or developed. This direct, location-based, definition has the merits of simplicity and objectivity.

However, alternative definitions have been established, in an attempt to address two main drawbacks of the location-based definition, namely the instability in the country list⁶, and the lead time entailed by the communication of official GNI data (approximately six months after year-end). Another implicit objective of alternative definitions might also be to protect the consistency of existing databases and the trademark "emerging stock market" (a term coined by the International Finance Corporation, IFC, in 1981).

Standard & Poor's Emerging Markets Database, proposes a multi-criteria definition for an emerging stock market: "A stock market that is in transition - increasing in size, activity, or level of sophistication" (Standard & Poor's, 2007). S&P classifies a stock market as "emerging" if it meets at least one of several general criteria: (i) it is located in a low or middle-income economy as defined by the World Bank, (ii) it does not exhibit financial depth; the ratio of the country's market capitalization to GDP is low, (iii) there exists broad based discriminatory controls for non-domiciled investors, and/or (iv) it is characterized by a lack of transparency, depth, market

⁵In this paper, the term "emerging market" designates an emerging *equity* (or, *stock*) market, not to be confused with "emerging country", especially when non location-based definitions of emerging (stock) markets are used.

⁶The systematic and mathematical "Atlas method" does not always succeed in eliminating the impact of wide exchange rate fluctuations (such as in Asia in the late 1990s).

regulation, and operational efficiency. S&P also requires that a country exceed the World Bank GNI threshold for at least three consecutive years before it is accepted in the "developed nations" category. Overall, proposed changes to the original definition impose more requirements for a market to graduate from the emerging status. As a consequence, the S&P definition retains more markets in the "emerging" status than would the location-based definition. To do so, the S&P criteria involve subjective professional evaluations. This may be wise if one acknowledges that a country's level of wealth does not always imply that its stock market(s) has (have) all typical features of a developed stock market.

S&P further distinguishes between two categories in emerging markets, namely "Major" and "Frontier" markets, based on size, liquidity and availability of information. Frontier markets are relatively small and illiquid even by emerging market standards, and information is generally less available than in Major markets (Standard & Poor's, 2007). In practice, for the construction of the national and global indices, S&P evaluates countries and decides on the market status (e.g., developed, emerging Major, or emerging Frontier) yearly in October, and decisions are implemented in November. In general, changes of categories rarely occur and are announced at least three months prior to the effective implementation⁷. S&P provides daily data on Major indices, and, given the lower liquidity, monthly data on Frontier markets.

The majority of the empirical literature on emerging stocks relies on the inclusion in an established emerging markets database, such as the S&P EMDB, at a certain point of time. Below, we propose a typology of emerging stock markets, derived from both the World Bank and S&P classifications, and depict their main macro-economic features.

3.2.2 Emerging stock markets: Stylized facts and typology

This section explores macro indicators of economic development, stock market penetration, age, size and liquidity, on various categories of countries. First, we show the major differences and similarities between developed and developing countries. Then, we propose a typology of emerging stock markets, and analyze the same indicators

⁷In S&P EMDB, since its inception in 1981, only Portugal (in 1999) and Greece (in 2001) graduated from emerging to developed market status. Additionally, Slovakia was moved from the Major to the Frontier markets in 2004 in response to a shrinking size.

across subgroups of emerging markets.

We start from the World Bank 2008 country classification (built on the basis of the 2007 GNI threshold of 11,455 USD per capita), i.e., 65 developed and 144 developing countries. The World Development Indicators (hereafter, WDI) provide a series of indicators on economic development (e.g., GDP, population) and stock market indicators (e.g., market capitalization, stock traded value, turnover ratio) on the group totals⁸. Additionally, we provide the information of the total number of active stock exchanges, and the number of countries with and without a stock exchange, in each group.

To do so, we built a list of all stock exchanges active as of January 2007, in each country of the world, following a two-step methodology. We started from existing listings of world stock exchanges⁹ and, for each of them, we confirmed through alternative sources (e.g., Internet search, or press clipping) whether the referenced stock exchange was still active or not in the beginning of 2007. Then, for countries where no active stock exchange was found in the previous step, we performed a web search to further check the absence of an active stock exchange. For each country, we indicate the year in which the first trading took place, as found in the various sources visited. Table 3.7 in appendix presents the resulting detailed list of active stock exchanges globally, country by country.

Table 3.1 summarizes the key macro-economic indicators for both developed and developing countries. Basic economic indicators confirm the well-known fact that developing countries represent the lion's share of the world's population, but only a small fraction of global GDP. The developing zone average GDP per capita is a mere 7% of the developed countries equivalent (respectively, 2,600, versus 38,000 USD per apita). The room for growth of the developing area is a stunning factor 14. Over the last 16 years, the developing zone's GDP per capita grew on average 2 times more quickly than the developed zone, but with much higher variations from a year to

⁸When data are missing for some countries in a group, the World Bank uses a systematic gapfilling method in order to provide a reasonable approximation on each group total (see World Bank, 2009).

⁹Our main sources include the Rutgers University 2007 Webguide on "Stock and Commodity Exchanges", the list of global stock exchanges provided by Wall-Street.com, information from the World Federation of Exchanges, and the Federation of Euro-Asian Stock Exchanges. Complementary sources are mentioned in the notes of table 3.7.

	\mathbf{Unit}	Developed countries	Developing countries	Ratio De- veloping vs. De- veloped countries
Basic macro-economic indicator	s			
Nb of countries		65	144	2
Population	Bil. people	1.1	5.6	5.3
GDP	USD Tr.	40	14	0.35
Avge GDP / cap	USD	38,162	2,574	0.07
GDP / cap real growth $(1990-2007)$				
Avge		2.4%	4.9%	2.0
$St. \ Dev.$		8%	26%	3.0
Correlation with the world		0.88	0.80	0.91
Stock market development indic	cators			
Nb of countries with a stock exch.		48	101	2.1
Active in 1929		29	25	
Starting activity from 1989		13	53	
Nb of stock exch.		78	142	1.8
Stock market size				
$Market \ cap \ (97)$	USD Tr.	21	1.7	0.08
Market cap - avge growth (97-07)		9%	25%	2.8
$Market \ cap \ (07)$	USD Tr.	50	15	0.30
Stock market relative size				
Market cap per stock exch.	USD Bil.	635	105	0.17
Market cap / GDP		1.2	1.0	0.85
$Market \ cap \ / \ population$	$USD \ / \ cap$	47,003	2,685	0.06
Stock market liquidity				
Stock traded value	USD Tr.	87	12	0.14
Stock traded value / GDP		216%	83%	0.39
Turnover ratio		175%	80%	0.46

Table 3.1: Macro indicators:	Developing vs.	developed countries
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Notes:

"Developed" and "developing" countries are, repectively, "high income" and "lower and middle income" countries as defined in the World Bank 2008 country classification, based on 2007 GNI thresholds. Restricting the analysis to countries with at least 200,000 inhabitants in 2007 would eliminate 32 countries out of 209 (16 developed and 15 developing). However, the full sample is presented, as 10 countries with less than 200,000 inhabitants do in effect have an active stock exchange (5 developing countries: Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines; and 5 developed countries: Antigua and Barbuda, Bermuda, Cayman Islands, Channel Islands, Faeroe Islands).

When counting the number of stock exchanges, global exchanges are counted only one time, unless they have a presence in different countries, in which case each country location is counted. Whenever a stock market located in a country is officially set-up on behalf of several countries, the occurence is split evenly across all concerned countries (this is the case for the "Bourse des Valeurs Mobilières" in Côte d'Ivoire, serving Bénin, Burkina Faso, Côte d'Ivoire, Mali, Niger, Sénégal, Togo and Guinée Bissau; and the "Eastern Caribbean Securities Exchange", serving the eight member territories of Anguilla, Antigua and Barbuda, Dominica, Grenada, Montserrat, Saint Kitts and Nevis, Saint Lucia, and Saint Vincent and the Grenadines).

Standard macro-indicators, including market capitalization and stock traded value are from WDI (2009). Exhaustive group totals (e.g., total population, GDP, average GDP per capita) are computed by the World Bank using a standard "gap-filling" approximation methodology for missing country data.

Data on existing stock exchanges in January 2007 are built based on the following sources: World Bank Country Classification (2008, using 2007 GNI threshold), World Developing Indicators (2009), S&P (2007), Rutgers University 2007 Webguide on "Stock and Commodity Exchanges", Wall-Street.com, stock exchanges associations (World Federation of Exchanges, Federation of Euro-Asian Stock Exchanges), The University of Chicago Library, Wikipedia, The Numa Directory of Exchanges. Further details on the methodology are provided in table 3.7 (appendix). another (as measured by the standard deviation). However, the average GDP growth in developing countries is highly correlated (80%) with the world, which indicates in general pro-cyclical behavior of economies.

When it comes to stock market development indicators, results are more contrasted, depending on the indicator considered.

On a series of measures, the developing world nowadays approaches or reaches the level of stock market development of developed countries. First of all, the proportion of developing countries with an active stock market is a striking 70%, which is similar to the ratio in developed countries $(74\%)^{10}$. Second, the overall market capitalization of developing countries is, at the end of 2007, 30% of the developed market total size, which represents a size, relative to GDP, only slightly inferior to that of developed countries¹¹.

However, developing stock markets differ macro-economically from their developed counterparts in mainly four respects. First, the vast majority of the stock exchange institutions in developing countries are very young. Out of 101 emerging countries with a stock market, 53 launched their local stock market since the collapse of USSR in 1989 (against 13 over 48 countries with stock exchanges in the developed nations). Yet, next to them, several exchanges have long histories. Many of today's emerging markets are actually re-emerging markets, which for one reason or another disappeared from sight at some point in time. As Goetzmann and Jorion (1999) note, China, Malaysia, India, Egypt, Poland, Romania, Czechoslovakia, Colombia, Uruguay, Chile, Venezuela and Mexico all had active equity markets in the 1920s. As surprising as it is, one finds nearly as many stock exchanges that have known the 1929 crisis in the emerging world as in the developed world (respectively, 25 and 29 countries had an active stock exchange in 1929). Second, the high ratio of market capitalization over GDP is very recent: It is the result of a very rapid growth in emerging market capitalizations over the last 10 years (25% over 1997-2007, compared to 9% in developed countries). A big part of this growth comes from new company listings and the creation of new emerging equity markets. The remaining growth stems from capital appreciation. Third, the ratio of market capitalization to population is still

¹⁰This result is not fundamentally modified when we exclude small countries.

¹¹As stated above, the 2008 financial crisis did not affect such relative statements, as developed markets have been hurt almost as badly as developing markets.

17 times lower than in developed countries. Fourth, the liquidity, measured as either the stock traded value over GDP, or the turnover ratio¹², lags way behind developed market levels. In other words, the trading activity of emerging stock markets is, on average, relatively smaller. We will have to take this into account when dealing with data.

We now focus on the emerging stock markets group of countries and propose a typology within those. Using the definitions above, we define the universe of emerging stock markets as all the markets covered in the S&P EMDB (Major and Frontier), plus all developing countries not covered by the EMDB. That is, all developing countries, plus developed countries whose stock market is still considered emerging by S&P criteria. We then partition emerging stock markets in a mutually exclusive and collectively exhaustive way into four subgroups, namely, in decreasing order of stock market coverage intensity: Major, Frontier, other developing with, and without an active stock exchange (as of January 2007). To do so, we follow the S&P EMDB classification of Major and Frontier countries: Major (Frontier) markets are those included in the EMDB IFCG¹³ (EMDB Frontier) database in January 2007, and with a coverage history of at least five years. We follow the S&P typology, instead of, for example, the MSCI one, as the S&P database has a longer history of data across a wider panel of countries. Other developing, with and without stock exchanges, are split according using the World Bank 2008 country classification, and our list of active stock exchanges globally.

As of January 2007, the S&P/IFCG indices comprise of 35 countries, among which 3 have too short histories (Kuwait, Qatar and the UAE, are part of the indices since January 2006¹⁴). We retain one additional country in the Major markets category, Slovakia, as it was shifted from the Major to the Frontier group by S&P in November 2004, following a shrink in market size, but spent the majority of its index history (since 1997) under the Major status. Thus, the Major markets category comprises of 33 countries. Amongst those, 1 is not in the World Bank list of countries (Taiwan), and 8 are developed countries as per the World Bank classification (Bahrain, Cezch

¹²The turnover is the ratio of stock traded value, i.e., the summed value of all the trades that took place during the year, to the market capitalization at the end of the year.

¹³IFC Global emerging market indices.

¹⁴We classify those countries under "other developing countries, with a stock exchange".

Republic, Hungary, Israel, Korea, Oman, Saudi Arabia, and Slovakia). At the same date, the S&P EMDB covers 20 Frontier markets (all with at least five year history as of 1/1/2007), of which 3 countries considered developed as per World Bank standards (Estonia, Slovenia, Trinidad & Tobago). Remaining developing countries are categorized according to the existence or absence of an active stock exchange in January 2007. The latter subgroups contain, respectively, 60 and 43 countries. We refer to "other developing countries, with stock exchange", as countries "below-the-radar" of major international market information agencies¹⁵. The latter is the widest subgroup in the typology. The detailed list of countries with the typology is presented in table 3.7 in appendix.

Table 3.2 presents macro indicators per emerging stock market group. Across all indicators, there are wide differences between country subgroups. Generally, the level of economic and stock market development is increasing when the stock market coverage is higher (between, respectively, "no stock market", "below-the-radar", "Frontier" and "Major" countries).

Looking at the basic macro-economic indicators, GDP per capita is higher by approximately 50 percent from a subgroup to another. This is consistent with the traditional view of the literature that, after controlling for the two-way relationship, stock market development stimulates economic growth (see, for example, Bekaert,Harvey and Lundblad, 2005, Levine, 2003, and Levine and Zervos, 1998). Major countries displayed, on average over the last 17 years, a quicker and less volatile GDP growth, more correlated with the rest of the world, than the rest of emerging stock markets¹⁶. Growth volatility is highest and world correlations lowest in the "no stock market" countries. Clearly, developing countries without a stock market generally pertain to the lowest income category.

We then compute, on the three subgroups of countries which have an active stock exchange, a series of stock market development indicators.

¹⁵Our definition of "below-the-radar" countries therefore includes countries only recently covered by international market information companies (since less than 5 years). Considering the MSCI emerging markets database would not increase the number of covered stock markets, as all countries covered from at least 5 years by MSCI are also covered by the S&P EMDB. Only the split between Major and Frontier markets would be different, as MSCI and S&P use different criteria and professional appreciations.

¹⁶We checked whether these results on the Major countries are driven by China and India. All results qualitatively hold when excluding the latter countries from the EMDB Major sample.

		EMDB - Major	EMDB - Frontier	Other devel- oping (with stock exch.)	Other devel- oping (no stock exch.)
Basic macro-economic indicator	s				
Nb of countries		33	20	60	43
Population	Bil. people	4.1	0.4	0.6	0.3
GDP	USD Tr.	13.6	0.8	0.8	0.3
Avge GDP / cap	USD	3,296	2,251	1,465	917
GDP / cap real growth (1990-2007)					
Avge		5.2%	2.3%	3.7%	3.7%
St. Dev.		24%	38%	38%	51%
Correlation with the world		0.78	0.52	0.52	0.41
Stock market development indic	cators				
Nb of countries with a stock exch.		33	20	60	-
Active in 1929		23	5	2	-
Starting activity from 1989		4	8	45	-
Nb of stock exch.		76	24	55	-
Stock market size					
Market cap (97)	USD Tr.	1.8	0.03	0.04	-
Market cap - avge growth (97-07)		22.5%	24.5%	14.2%	n.a.
Market cap (07)	USD Tr.	16.4	0.4	0.17	-
Stock market relative size					
Market cap per stock exch.	USD Bil.	216	16	3	n.a.
Market cap / GDP		1.2	0.5	0.2	-
Market cap / population	USD / cap	3,981	1,053	311	-
Stock market liquidity	, -	*	,		
Stock traded value	USD Tr.	14.7	0.04	0.04	-
Stock traded value / GDP		108%	4%	4%	-
Turnover ratio		90%	9%	21%	<i>n.a.</i>

Table 3.2: Macro indicators, per emerging stock market group

Notes:

Definitions, methodology and sources are similar to those of the previous table.

This table partitions "developing countries" in a mutually exclusive and collectively exhaustive way, relying on S&P EMDB (Emerging Markets Database) classification, and the existence or not in a stock exchange in developing countries. The sole exception concerns countries included in the EMDB but not considered developing countries in the World Bank classification. In order to maintain the coherence with our paper, as well as much of the emerging markets literature, such countries are included in the table.

"EMDB - Major" cover IFCG countries (IFC, Global indices) with at least 5 years of data as of 1/1/2007, plus Slovakia (33 countries).

The "EMDB - Fontier" cover 20 countries (all with at least 5 years history as of 1/1/2007).

Remaining developing countries are classified according to the existence or absence of an active stock market as of January 2007.

Calculations on macro-economic and stock market development indicators (except data on the number of countries and number of stock exchanges, which are exhaustive) exclude countries with insufficient information, e.g., missing GDP, population or stock market data (5 countries excluded over 33 in the EMDB Majors: Bahrain, Oman, Taiwan, Venezuela, Zimbabwe; no country excluded over the 20 Frontier countries; 9 countries excluded over the 60 other developing with stock exchange, and 10 excluded over the 43 other developing without a stock exchange).

All size, relative size, and liquidity measures indicate wide discrepancies between Major, Frontier, and "below-the-radar" countries. First, the market capitalization of Frontier and "below-the-radar" countries taken together is not even 4% of Major markets'. Even when scaled to GDP, relative market capitalization is more than doubling from "below-the-radar" to Frontier markets, and further so from Frontier to Major markets. Another sizeable difference between subgroups is the liquidity, which is 4 to 25 times higher in Major versus other markets. Furthermore, most of the emerging stock exchanges established after 1989 (45 out of 57) are still not covered by international market information providers. On average, Major markets are in majority those with longer histories of trading, while the sample of "belowthe-radar" markets are biased towards new stock exchanges.

In conclusion, our typology on emerging stock markets shows that the wide majority of the markets are still "below-the-radar" of international market information agencies such as S&P or MSCI: we count 60 such countries, for 53 S&P-covered Major and Frontier countries. Additionally, there are wide differences in stock market development levels between Major, Frontier, and "below-the-radar" countries. Therefore, we may wonder whether such differences are also present at the level of stock returns behavior. The remainder of the paper discusses in parallel stock returns behavior in Major and Frontier markets.

3.3 Data challenges

3.3.1 Common data flaws

This subsection exposes a series of potential data issues in emerging stock series. In the next subsection, we describe how we strive to mitigate or deal with them in our empirical dataset.

Studying emerging stock markets returns often means dealing with imperfect, incomplete, or short-lived data. Common issues affecting data in emerging stock markets come from four types of sources, namely, (1) lack of transparency, (2) illiquidity, (3) survivorship bias, and (4) short history.

None of the issues above is the prerogative of emerging stock market data, as they may also be present in developed markets. However, they are often more serious in emerging markets than in developed markets.

One, some structural difficulties commonly arise with emerging markets securities. For example, many emerging markets have firms with multiple classes of shares carrying different ownership rights and restrictions. In the Chinese case, the same company may quote A and B shares altogether, with, possibly, different prices. Atype shares are quoted in renminbi and accessible only to Chinese citizens and selected foreign institutional investors, while B-shares are quoted in international currencies and accessible to all, Chinese and foreigners. The concomitant existence of different stock prices increases the risk of inaccurate or inconsistent data. A common solution for tracking the performance of such companies consists in treating multiple shares of a given firm as a single portfolio, weighted by the value of all outstanding security classes (see, for example, Rouwenhorst, 1999).

Two, although the trading activity of some of the emerging markets is impressive compared to the developed markets¹⁷, a substantial number of emerging markets stocks are infrequently traded. Therefore, several authors¹⁸ prefer monthly data to weekly or daily data, in order to mitigate the possible influences of infrequent trading. Monthly data may also be preferable to yearly data, especially when data series from various sources need to be linked together (Goetzmann and Jorion, 1999). The use of monthly data does not free the analysis of all infrequent trading bias, but unfortunately, liquidity-related data (such as volume information) are even scarcer than price data.

Another related challenge is the determination of the most relevant conversion rate from local currency to a common international currency (usually, the USD). The issue concerns two types of markets. First, the illiquidity on the stock exchange may lead to an asynchronization between stock price (in local currency) and the exchange rate. Second, the illiquidity on the local currency market(s) might cause either unavailability or plurality of exchange rate quotes. Usually, authors follow the S&P EMDB guidelines, in which the exchange rate conversion is based on a rate quoted on the last day of the period (e.g., week, month) in a financial journal such as the Wall Street Journal or the Financial Times (Standard & Poor's, 2007; International Finance Corporation, 1993). When a number of exchange rates exist,

¹⁷For example, Harvey (1995a, 1995b) finds that 5 emerging markets have hiver turnover than the average turnover in the US, Japan, and the UK, and that 10 emerging markets have higher turnover than the UK. In our 2007 sample, we do not find any emerging country (Major or Frontier) with a higher turnover ratio than the US, UK, and Japan average. However, 4 emerging markets (China, Korea, Pakistan and Saudi Arabia) have a higher turnover ratio than Japan.

¹⁸Such as Henry and Kannan (2007), Mateus (2004), Bekaert and Harvey (2002b), Rouwenhorst (1999), Jorion and Goetzmann (1999), Bekaert and Harvey (1997), Harvey (1995a, b).

S&P uses the nearest equivalent "free market" rate or a rate that would apply to the repatriation of capital of income. In some cases, even the newspaper rates are not used and S&P relies on its correspondents in the particular markets.

Three, the large majority of the authors in emerging markets suspect the presence of a serious survivorship bias (Jorion and Goetzmann, 1999, discuss this issue in depth; see also Rouwenhorst, 1999; Bekaert and Harvey, 1997; Harvey, 1995a, b). Survivorship has three potential sources. First, the large number of countries and stock exchanges included in the definition of "emerging stock markets" and the difficulty to find quality data de facto implies inclusion choices. As Harvey (1995b) puts it, "the small number of countries that are included in the sample are the winners". The second source of survivorship bias also arises from inclusion decisions, this time at individual stock level. Indeed, country indices, such as the S&P emerging stock markets indices, are often constructed on the basis of a selection of stocks, according to various criteria (see below). However, these criteria, such as size, liquidity, historical or expected financial performance, implicitly reveal information about the history of the company. Finally, a more serious problem, sometimes called the "lookback bias" (Harvey, 1995b) arises from backtracking of data. Indeed, defining an equity index from a selection of companies (or even, stock markets) at a given date implies that those companies are the ones that were successful, as they are still existing at that date. Using these stocks only to compute past values of the index leads to overestimating returns, as firms that dropped out of the market before the selection date are easily omitted.

Four, even if data were trustworthy, there is, generally, a relatively short history of data, either because the market is new, or because the systematic coverage by information providers is recent. Short data series, combined to need to use medium- to low-frequency data due to the lack of liquidity, make it difficult to obtain statistically conclusive evidence on emerging market data (see, for example, Bruner et al., 2002).

In conclusion, the potential flaws in emerging stock market data quality impose important methodological choices and a prudent analysis of the results. Below, we explain and justify our database choices.

3.3.2 Empirical data

Data on emerging stock markets are from two types of sources, i.e., global databases and local information sources.

The most common global sources are the S&P's (formerly IFC's¹⁹) EMDB, the MSCI International Equity Indices for Emerging and Frontier markets, and the IMF's International Financial Statistics (IFS). Local sources include regulatory authorities, stock exchange institutions or federations (e.g., FEAS, the Federation of Euro-Asian Stock Exchanges), investment banks or brokerage companies. For a good indication on possible local sources, see the Rutgers University Webguide on Stock and Commodity Exchanges (2006). Yet, each of those local sources has its own methodology, and should therefore be treated with the highest care.

We choose to exclude local sources in order to maintain consistency in the treatment of potential data issues such as dividend computation, exchange rate determination, and multiple share classes inclusion. Amongst global sources, the IFS has the longest coverage history: It provides, over a nice panel of countries, monthly stock price data as reported by the local authorities, from 1948. Unfortunately, contrary to S&P EMDB or MSCI, the IFS index does not include dividends, and uses monthly average prices instead of end-of-month prices. It also suffers from non-comparability problems due to the variety of data sources used²⁰. Therefore, we do not use IFS data. Both S&P EMDB and MSCI provide total (i.e., gross dividend inclusive) return indices, with a professional and uniform treatment of the issues of exchange rate, multiple share classes, and low liquidity. Following a vast majority of papers on emerging stock markets (see the synoptic view of selected papers in table 3.12), we use the S&P EMDB due to a longer history of data, and a wider country coverage, along with a sound index methodology. We access the data from Datastream.

Started in 1981 (and back-tracked from 1975²¹) with 10 emerging stock markets, the EMDB has expanded to 17 markets by 1985, 26 by 1995, 51 by 1998, 53 by 2003, and 56 markets in 2006 across Asia, Latin America, Eastern Europe, Africa

 $^{^{19}{\}rm The}$ IFC pioneered the EMDB development efforts from 1981, and sold the database to S&P in 1999.

²⁰Jorion and Goetzmann (1999), in their seminal study of long-term equity capital appreciation, have no other choice than linking data from multiple sources (amongst which, the IFS, and the League of Nations). Their final database is an impressive panel of 39 equity price indices over the period 1921-1996. Unfortunately, dividends are excluded.

²¹Except for the Jordan financial market, which started operations in January 1978.

and the Middle East. Markets covered include Major and, from 1996, Frontier countries, which are smaller and less liquid than Major markets (Standard & Poor's, 2007). Using a selected sample of stocks in each market, EMDB calculates IFCG (IFC Global) indices of stock market performance designed to serve as benchmarks consistent across national boundaries²² (Standard & Poor's, 2006). As explained in the Standard & Poor's (2007) emerging index methodology, stocks are selected for inclusion in the index based on size, free float, liquidity, and corporate domicile.

For each EMDB country, stocks are selected in order of liquidity until the market capitalization target of 70-80% coverage is met. Once constituents are selected, respective market capitalizations are adjusted in order to exclude portions of a company that are controlled by strategic or government holders, as well as cross holdings of shares (the "float adjustment"). Additionally, any selected share must have traded frequently and consistently²³ in the past months, and must have reasonable prospects for a continued trading presence on the same stock exchange. Regarding multiple share classes, when a class of shares is selected for the S&P index principally due to its trading activity, but other share classes of the same issuer are not selected, only the selected share class' market capitalization is included in the index, not the company's entire share capital. Finally, companies included in the index must be legally registered and domiciled in an emerging market. The indices might also include stocks whose issuing company is headquartered in an emerging market but listed only on foreign stock exchanges (in which case, these stocks are treated as domestically-listed companies)²⁴. EMDB provides free-float weighted total return indices in both local currency and USD. Prices are scaled by a "capital adjustment factor" that corrects for price effects associated with stock splits, stock dividends, and right issues.

IFCG indices are not adjusted for foreign investment restrictions (such as the legal limits to foreign equity investment). For some Major markets (but unfortunately none of the Frontier markets) and from 1989, S&P computes IFCI (Investable) in-

²²S&P also provides daily, weekly, monthly, quarterly, or yearly data on more than 2,200 stocks by company, industry, country, region.

²³For example, if the value traded is high due to a large block trade, the liquidity criterion will not be met.

²⁴This is the case, for example, for companies headquartered in emerging countries that trade primarily or exclusively in the form of American Depositary Receipts (ADRs). An ADR is a stock that trades in the United States but represents a specified number of shares in a foreign corporation.

dices, using information on foreign investment limits in each market. Due to the much smaller coverage (both across time and geographies), and given the very high correlation between IFCG and IFCI indices²⁵, we focus in this paper on IFCG indices.

In spite of all precautions taken in the EMDB, some data issues remain. First, EMDB data from 1975 to 1981 are backtracked, i.e., they were calculated in 1981 on the basis of existing companies at that time; hence, returns over that period may be overestimated due to the potential survivorship bias. Therefore, we exclude this period from our sample. Thus, our final sample period is January 1981 to June 2008. In order to soften the impact of illiquid assets, we use monthly data. Another type of survivorship bias arises from S&P's market inclusion decisions. Indeed, the selected markets are the ones with adequate breadth (e.g., number of companies listed), depth (e.g., market cap and turnover) and infrastructure (e.g., regulatory structure, custody, clearance and settlement). We strive to mitigate the market selection bias by using a large country coverage, including the rarely-studied Frontier countries. Next, we require a minimum data history of 5 years on each index. Finally, some data errors are sometimes reported about the EMDB (e.g., in Rouwenhorst, 1999), especially in individual company data. We check the presence of extreme log-returns in our sample. We detect 14 points outside the boundaries of -75% and 75% in monthly logreturns²⁶ (amongst which, 5 for Argentina and 4 for $Zimbabwe^{27}$). Upon individual analysis of these occurences, we do not detect any rounding or digit error. Because of the frequent occurrence of real extreme events in emerging stocks, it is difficult to identify pure outliers, so we decide to keep all observations.

Our final database comprises of 10,907 monthly return datapoints, of which 8153 over 33 Major markets (from 1981 to 2008), and 2754 over 20 Frontier markets (from 1996 to 2008). Relative to the usual standards of the literature (see synoptic view in table 3.12), this is a large database.

The following sections are devoted to the analysis of statistical moments of the unconditional returns distribution in Major and Frontier markets. The first moment,

²⁵Across 22 active IFCI indices, 17 have a correlation with their IFCG counterpart higher than 99%, and the average correlation is 97%. The only large divergence between IFCG and IFCI is China, where the correlation is 47%.

 $^{^{26}}$ In terms of simple returns, this corresponds approximately to a halving or doubling of the index value (respectively, -53% and 112%).

²⁷The period of hyper-inflation in Zimbabwe, starting from mid-2008, is exluded from our sample period anyway. The 4 extreme values detected relate to earlier periods.

average returns, is a key input paramater in all investment decisions. We then review the risk-related moments that matter in the context of a stand-alone investment (second to fourth moments, i.e., standard deviation, skewness and kurtosis). Finally, we analyze correlations, the key risk parameter in the context of a portfolio investment. For each moment, we confront traditional literature findings to our empirical results. Table 3.12 summarizes in a synoptic table methodologies and findings from key selected papers of the literature.

3.4 Realized returns

The prospect of good returns is one of the major drivers of investment decisions. We study the history of emerging market returns, and assess a posteri whether they have been more or less attractive than developed markets. We also examine relative performances of Major and Frontier markets, and potential regional heterogeneities.

Total returns can be computed in two main ways: arithmetic, or continuously compounded returns.

Let $P_{i,t}$ be the total return index value for country index i in month t, $r_{i,t}$ the monthly arithmetic return and $R_{i,t}$ the monthly continuously compounded return, or log-return, for country index i between months t-1 and t. Then, we have:

$$r_{i,t} = (P_{i,t} - P_{i,t-1})/P_{i,t-1}$$

and

$$R_{i,t} = \ln(P_{i,t}/P_{i,t-1})$$

In the literature, authors who study emerging market returns using simple arithmetic averages consistently find that realized emerging equity average returns are higher than in conventional markets (Rouwenhorst, 1999; Harvey, 1995b, confirmed by Malkiel and Mei, 1998; Mobius 1996, 1994). This is true for USD returns, and usually even more for local currency returns, as a result of high inflation.

Harvey (1995b) computes monthly returns of the 20 S&P/IFC EMDB country value-weighted indices. Data are plagued with common data issues for emerging stock

markets. However, Harvey tackles the issue of the "lookback bias", by separately analyzing the full sample (1976-1992) and a "no backtracking" sample (i.e., on a reduced period: 1981-1992). He concludes that the potential lookback bias does not affect his conclusions, and finds out that the average returns are roughly 50% higher than the MSCI World composite index, for a US-based international investor. The picture is even clearer from the perspective of local investors, as in 90% of the cases, returns are found to be higher in local currency than in USD. In spite of indisputably high (arithmetic) average returns, the paper points that the range of is wide (from 72% for Argentina, to -11% for Indonesia).

Harvey also footnotes that, due to the high volatility, the choice between geometric and arithmetic average returns matters greatly. Henry and Kannan (2007) argue that using arithmetic average of continuously compounded returns provides a more appropriate metric than arithmetic returns for comparing emerging markets with developed markets²⁸. The two methods give similar outputs over short horizons, and in markets with relatively low volatility. But, when volatility is high - which is the oftentimes the case in emerging markets (see next section) - the traditional simple arithmetic method overstates the performance of emerging markets.

Using continuously compounded returns, Henry and Kannan (2007) analyze US and EMDB Major monthly stock index returns over the period 1976-2005. First, they find that Major countries yielded a 7.78% average return, against 7.69% over the same period for the US. They conclude that, despite a twice higher GDP growth in emerging countries, stock returns did not significantly outperform the US. Indeed, high growth implies high returns only if the stock market has not already capitalized the growth into current prices. Finally, they point out a significant heterogeneity across regions, as Latin American stock returns outperformed Asia, even when eliminating the effect of the 1997-1998 Asian crisis and despite the Latin America debt crisis (1982-1989).

Mateus's (2004) analysis of EU accession countries over the period 1986-2002 seems to corroborate Henry and Kannan (2007)'s view on realized return performance in emerging markets in another part of the world. Indeed, contrary to developed markets (e.g., MSCI World, Europe and Germany), which all display positive results,

²⁸Working with the simple (arithmetic) average of continuously compounded returns comes down to using the geometric average of arithmetic returns, which indeed measures the realized performance of a buy-and-hold strategy with dividend reinvestment. Contrary to the simple average of arithmetic returns, the frequency of data does not matter.

arithmetic monthly USD mean returns have been negative for 6 out of 13 EU accession countries.

Recent papers analyzing Frontier markets usually report good realized performances in those markets when compared to Major and developed markets (e.g., Girard and Sinha, 2008; Speidell and Krohne, 2007). For example, Girard and Sinha (2008) find, using arithmetic average returns, that the S&P Frontier Index returned 8.42% from 1996 to 2004, compared to 2.57% for the Major market index and 4.35% for the world index.

A major concern in most studies is the limited history of data. As our econometric test below show, it is difficult to interpret short-term returns, and we can only rely on long-term returns to have a reasonable proxy for the rate of return to equity in an economy. Addressing this point, Jorion and Goetzmann (1999) bring substantial evidence to moderate the enthusiasm about the amplitude of realized returns in emerging markets. Their main contribution is the construction and analysis of a new historical financial database covering 39 markets, of which 17 emerging markets, over the period 1921-1996. Their methodology strives to both mitigate survivorship bias (e.g., through a systematic inclusion of crisis periods, as well as breaks in stock market histories), and to increase the number of observations to improve the significance of statistical tests (their conclusions rely upon more than 8,000 data points on emerging countries, which is high compared to the standard emerging stock markets literature; see table 3.12). They conclude that the only countries that have sustained high real returns for many years are those considered developed. In particular, there is no country with a higher (real) return than the US. Besides, emerging stock markets have often provided negative returns to equity investors, frequently because of a major national or institutional collapse (Beim and Calomiris, 2001, referring to Jorion and Goetzmann, 1999). In another paper, Goetzmann and Jorion (1999) argue that pre-emergence returns, usually not picked up in databases, are systematically lower than post-emergence returns. In a general simulation model of global markets with a realistic survival process²⁹, they find that returns are greatest when markets have just emerged. Hence, the simple fact of conditioning the data analysis on recent emergence induces empirical regularities. Therefore, historical performance will be a

²⁹Goetzmann and Jorion (1999) consider a simplified model where markets emerge because the market prices of existing firms increase, or submerge following price drops.

poor guide to future returns.

Following the argument of Henry and Kannan (2007), we study continuously compounded returns.

We build, through the simple averaging of country indices log-returns, two composite indices, for Major and Frontier markets. The former include 33 countries over the period 1981-2008, the latter 20 countries over 1996-2008³⁰. For benchmarking purposes, we use developed market indices: 4 national indices (the US S&P500, the Japanese TOPIX100, the British FTSE100, and the German DAX30), and one global index, the MSCI World³¹. All are total return indices (with gross dividend reinvestment) and expressed in USD. We divide our sample into 3 time windows, the recent (1996-2008), the early (1981-1996), and the full period (1981-2008). Summary statistics per market are presented in table 3.8 (recent period), table 3.9 (early period), and table 3.10 (full period).

Observations on average returns are summarized in table 3.3 (in annualized terms).

	Recent period 96-08	Early period 81-96	Full period 81-08
Nb of monthly obs.	149	180	329
Major (avge)	12.7%	10.5%	11.5%
Frontier (avge)	10.9%	n.a.	n.a.
MSCI	7.8%	13.2%	10.7%
Major - MSCI	4.9%	-2.7%	0.8%
Frontier - MSCI	3.1%	n.a.	n.a.
Major - Frontier	1.8%	n.a.	n.a.
M I D	1	1 11 1 15 1	

Table 3.3: Mean returns - Summary statistics

Note: Returns are expressed in log-returns and annualized. Detailed data per country are presented in appendix.

Over the recent period (1996-2008), Major markets, with an average annualized return of 12.7%, have outperformed Frontier (10.9%), which themselves have done better than developed markets (7.8%). We test the statistical significance of the

³⁰This is an alternative to using ready-made S&P Composite indices, that are available only over shorter time periods. Although weights are different, the correlation between our Major composite and the S&P IFCG Composite is 93%.

³¹The MSCI World is an index of 1500 stocks over 23 countries. As its name does not suggest, the MSCI world index does not include emerging markets.

differences in mean returns between Major and MSCI, Frontier and MSCI, and Major and Frontier, using the standard t-statistics for equality of distribution means $(\mu_x = \mu_y)$ when the true standard deviations, σ_x and σ_y are unknown and different from each other:

$$t = \frac{\overline{x} - \overline{y}}{\sqrt{s_x^2/n_x + s_y^2/n_y}}$$

where \overline{x} and \overline{y} are the sample means, s_x^2 and s_y^2 the sample variances, n_x and n_y the sample sizes (both equal to 149 in our case). t follows a Student's distribution with v degrees of freedom, where v is given by (using Satterthwaite's, 1946, formula):

$$\upsilon = \frac{(s_x^2/n_x + s_y^2/n_y)^2}{\frac{(s_x^2/n_x)^2}{n_x - 1} + \frac{(s_y^2/n_y)^2}{n_y - 1}}$$

We perform the tests on the monthly log-returns of indices, and conclude that the differences are too small, or the period too short, for any of the observed mean differences to be statistically significant at any conventional level. As an illustration, for the observed difference between Major and MSCI World returns in the recent period (which is 4.9% annually) to be significant at the 5% level, we would need to observe the same sample means and variances over a much larger time span, namely, 688 months or 57 years. That is, almost 5 times the 12-year period we have. Differences in average returns between Major and Frontier, as well as Frontier and developed markets, are even less significant. Moreover, depending on the period considered, emerging markets may also have underperformed developed markets (10.5% versus 13.2% in the earlier period).

Looking at regional differences (see table 3.11), we observe that, over the full period, Asia had the lowest (10.1%), and Latin America the highest (14.9%) average returns. However, even if this ranking is consistent across the 3 time periods, here again, the differences are not significant over the time windows we have. Finally, we note, in both Major and Frontier samples, a wide dispersion between individual market's average returns (from -11.2% for Bulgaria to 25.2% for Nigeria, in the recent sample).

In conclusion, although the question seems a priori simple, the literature does not converge in its assessment of realized equity returns in emerging markets. Radical differences in conclusions arise from varying methods used (e.g., arithmetic versus continuously compounded or geometric returns), varying periods studied (e.g., shortversus long-term data), and various country clustering (e.g., regional differences).

Our data do not support the hypothesis of a higher attractiveness of average returns in emerging versus developed markets. Similarly, in spite of divergent GDP evolution patterns (discussed in the stylized facts), our stock data do not reveal any systematic difference between Frontier and Major equity returns.

3.5 Key risk parameters in the context of a stand-alone investment

3.5.1 Volatility

Equity return volatility is measured by the standard deviation of returns.

There are several reasons why return volatility is an important variable to be considered in emerging markets by investors as well as corporations. According to Bekaert and Harvey (1997), risk premiums in segmented capital markets are directly related to the volatility of equity returns in the local market. Hence, higher volatility implies higher capital costs, and higher idiosyncratic risk in low-diversified portfolios. Higher volatility may also increase the value of the "option to wait", hence delaying investments. De Santis and Imrohoroglu (1997) insist on the importance of volatility in the pricing of derivative securities. Although most emerging markets still lack a number of sophisticated financial instruments, characterizing the distribution and the dynamics of stock prices is a necessary first step towards their development.

The literature largely ratifies two well-known facts. First, volatility is higher in emerging markets, compared to developed economies. Second, there is a large cross-sectional dispersion in volatility across emerging markets.

Harvey (1995a), when comparing the sample of EMDB stock market indices to the MSCI World, obtains a 80% higher average standard deviation for emerging equity returns. In his data, no single emerging stock market displays a lower volatility than the MSCI World index returns.

Similarly, Bekaert and Harvey (1997) conclude, based on a study of 20 EMDB countries over the period 1976-1992, that both the range and the magnitude of the

volatilities is much greater than found in developed markets. They indeed observe that the EMDB countries volatility ranges from 18% (Jordan) to 104% (Argentina), compared to 15% (US) and 33% (Hong-Kong) measured for developed countries over the same period by Harvey (1993). They also note that there are 12 out of 20 emerging countries with volatility higher than 33%.

Notwithstanding the fact that volatility is higher in emerging markets, Henry and Kannan (2007) show evidence of heterogeneity in standard deviation of stock returns. They indeed find Latin America stock to have displayed a significantly higher volatility than Asia over the period 1976-2005 (respectively, 35 vs. 30%, and 15% for the US)³².

There are a variety of potential causes to both high volatility and wide dispersion in volatility in emerging countries.

First, emerging country indices have a low diversification. This may be due to the small number of stocks included in the index, yet, the EMDB portfolio sizes are comparable to the MSCI portfolios for developed countries and still display a higher volatility (Harvey, 1995b). Even with many stocks in the index, the local index market capitalization may be concentrated in a few large companies (Harvey, 1995a). More importantly, developing countries' economic sectors are likely to be concentrated in relatively few industries. Hence, the stocks that compose the local index are likely to be highly correlated, and the index weakly diversified. As a result of economic development and integration into world capital markets, the industry mix is expected to become less concentrated and diversified. Therefore, countries with varying degrees of development and world integration will have different degrees of industry diversification, which explains the wide dispersion in volatilities across markets (Harvey, 1995a; Bekaert and Harvey, 1997).

Second, emerging markets are oftentimes not fully integrated³³ with world markets. Therefore, they are likely to be exposed to local risk factors which may be volatile (Harvey, 1995b). In an analysis of the events that cause large shifts in the volatility of emerging stock markets, Aggarwal, Inclan and Leal (1999) indeed find

 $^{^{32}}$ Our data indicate that the difference in volatilities between the two regions goes in the other direction in the 96-08 period (see table 3.11). This also holds without the inclusion of Frontier markets in the regional samples.

³³By definition, markets are completely integrated when they quote the exact same price for assets with the same risks. When markets are segmented, two assets bearing the same risks may have different prices on each market.

that most events around the periods of volatility shifts tend to be local.

Our empirical findings regarding volatilities (summarized in table ..., in annualized terms) are in line with the literature.

	Recent period	Early period	Full period
	96-08	81-96	81-08
Major (avge)	35.4%	41.3%	36.7%
Major (min)	13.5%	17.0%	13.5%
Major (max)	150.1%	80.6%	104.1%
Frontier (avge)	29.1%	n/a	n/a
Frontier (min)	16.7%	n/a	n/a
$\mathbf{Frontier} \ (\mathbf{max})$	51.3%	n/a	n/a
MSCI	13.7%	14.4%	14.1%
S&P500	14.3%	14.2%	14.3%
FTSE100	13.9%	20.3%	17.0%
TOPIX100	19.8%	25.5%	22.1%
DAX30	22.0%	20.1%	21.0%
Major - MSCI	21.7%	26.9%	22.6%
Frontier - MSCI	15.4%	n/a	n/a
Major - MSCI	6.4%	n/a	n/a
Major Composite	18.1%	15.3%	16.6%
Frontier Composite	11.2%	n/a	n/a

Table 3.4: Returns volatility - Summary statistics

Note: Standard deviation of log-returns are annualized. Detailed data per country are presented in appendix.

Across all periods, the average volatility in both types of emerging markets is largely higher than in any of our developed markets. In the recent period, Major markets had on average the highest volatility (35%) and the largest variance dispersion, from 13% in Bahrain to 150% in Zimbabwe (followed by 59% for Russia). Frontier markets displayed high volatilities as well, 29% on average. The range across Frontier markets (from 17% in Mauritius to 51% in Bulgaria) is large, even though smaller than Major markets. This compares to a 14% standard deviation of MSCI World returns, and a range from 14% to 22% on our five developed markets. In total, only 9 out of 53 countries display lower volatilities than the German DAX30.

The picture is totally different when looking at the emerging market Composites. An investment in the Frontier markets Composite even yielded a lower volatility than an MSCI investment (11% versus 14%). The volatility in the Major composite is also reduced (to 18%) compared to individual markets. This is due to diversification benefits from low correlations amongst national indices, especially within Frontier markets. We discuss diversification benefits in our analysis of correlations.

In conclusion, the consensus on emerging stock return volatility characteristics in the literature is very high. Our empirical data confirm that emerging index volatilities, even though very different from market to market, are generally high compared to developed markets. This is true for Major and Frontier markets, although Frontier indices have displayed, on average, somewhat lower volatilities. When combining emerging, and in particular Frontier markets together in a composite portfolio, the volatility sharply drops due to diversification. We come back to diversification benefits in the section dedicated to correlations.

3.5.2 Higher-order moments

It is a well-know fact in the standard literature that risk-return relationship is generally not fully characterized by the first and second moments. Indeed, financial return distributions may be asymmetric, or have different degrees of extreme returns occurence. Emerging markets do not escape the rule.

The third moment, or skewness, of a distribution is a measure of the symmetry of the distribution. The unbiased estimator of the standardized skewness coefficient is computed as:

$$\frac{n}{(n-1)(n-2)} \sum_{t=1}^{n} (\frac{R_t - \overline{R}}{s})^3$$

where n is the sample size, R_t the return between time t and t-1, \overline{R} the average return over the period, and s the unbiased standard deviation estimator.

A normal distribution is symmetric and has zero skewness. Usually, papers that deal with potential skewness in financial series assume that investors have a preference over skewness, i.e., prefer positively skewed distribution to negatively skewed distributions (e.g., Bekaert, Erb, Harvey and Viskanta, 1998).

The fourth moment, or kurtosis, characterizes the tails of the distribution, i.e., the frequency of extreme returns, negative or positive. The unbiased estimator of the standardized (excess) kurtosis coefficient is computed as:

$$\frac{n(n+1)}{(n-1)(n-2)(n-3)} \sum_{i=1}^{n} \left(\frac{R_i - \overline{R}}{s}\right)^4 - 3\frac{(n-1)^2}{(n-2)(n-3)}$$

with symbols defined as above.

The normal distribution serves as a benchmark, and has an (excess) kurtosis of zero. A highly risk-averse investor will dislike leptokurtic, i.e. positive kurtosis, distributions, which are tall and skinny compared to the normal distribution. In such a case, the fat tails depict a higher probability of extreme events, good or bad, than in a normal distribution.

A potential non normality of stock returns is important in at least two respects. First, most of the traditional stock investment risk measures, such as the beta, the correlation, or volatility, are based on second moments of the return distribution. These measures may become inappropriate, or at least insufficient, if higher order moments are of significant importance. Indeed, two stocks with exactly the same volatility and correlations are likely to be perceived as bearing different risks, if they differ greatly in third or fourth moments. For example, investors which are averse to extreme events might be willing to pay a premium for stocks with a low kurtosis. Second, several popular financial models and theories, such as the CAPM (Sharpe, 1964; Lintner, 1965; Mossin, 1966), or Markowitz's portfolio theory (1952), rely on the assumption that stock return distributions are fully determined by their mean and variance. If there is evidence of non-normalities, the validity of those models is to be questioned. By the same token, value-at-risk models calibrated ignoring higher-order moments may fail to deliver the expected outcomes³⁴.

There is a high consensus in the literature, that emerging stock returns significantly depart from normality, due to either, high kurtosis, or, negative or positive skewness.

Mateus, 2004; Bekaert and Harvey, 2002b, 1997; De Santis and Imrohoroglu, 1997; Harvey, 1995b, using a variety of statistical tests³⁵ all reject normality in a majority of the emerging markets. High measures of kurtosis are observed, suggesting that big surprises of either sign are likely to occur. Several authors also point that developed market returns are also highly non-normal³⁶.

 $^{^{34}}$ In the next section, we work with a modified value-at-risk, which takes incorporates the impact of the third and fourth moments.

³⁵Such as Generalized Method of Moments (GMM) test (Hansen 1982), Wald test (Richardson and Smith, 1993; Andrews, 1991), or the standard Bera-Jarque and Kolmogorov-Smirnov.

³⁶Some authors argue that stock returns are more significantly non-normal in emerging markets than in their developed counterparts. However, such results do not seem to be robust across the literature, as the test results on non normality of developed markets vary greatly, depending on the

We perform, on our data, the D'Agostino et al. (1990) test for non-normality based on both estimated skewness and kurtosis³⁷. Table 3.5 summarizes the test results.

	Recent period	Early period	Full period
	96-08	81-96	81-08
Major (median p-value)	0.0016	0.0078	0.0000
Major (nb of normal markets)	6	6	5
Frontier (median p-value)	0.0001	n/a	n/a
Frontier (nb of normal markets)	1	n/a	n/a
MSCI (p-value)	0.0006	0.0000	0.0000
S&P500 (p-value)	0.2966	0.0000	0.0000
FTSE100 (p-value)	0.0147	0.0001	0.0000
TOPIX100 (p-value)	0.0177	0.1757	0.0118
DAX30 (p-value)	0.0000	0.0229	0.0000

Table 3.5: Returns normality - Summary statistics

Note: A low p-value indicates a strong rejection of the null hypothesis of a normal distribution of returns, according to the D'Agostino et al. (1990) test for normality. Detailed data per country are presented in appendix.

We reject normality at the 5% level in most of the markets. Over the recent period, we are unable to reject the null hypothesis of normal returns in only 6 out of 33 Major markets, and 1 out of 20 Frontier indices³⁸, and 1 of our 5 developed market indices (the S&P500). When we consider Major and developed markets over a larger observation period, the evidence of non-normality is even higher, as only 5 Major equity indices appear to be potentially normally distributed. Over that period, which includes the October 1987 crash, normality is also rejected for the S&P500. Overall, our data show that non-normality is a common feature of both developed and emerging markets, and we do not obtain a stronger rejection in emerging versus developed markets. All of the stock markets in our sample display fatter tails than in a normal distribution³⁹. Regarding skewness, one finds across the 58 indices studied in the full period, slightly more negatively (32) than positively (26) skewed distributions.

In conclusion, the literature and our data are unanimous in stating that emerging stock returns and, most of the time, developed markets, are not normally distributed,

markets and the presence of crises in the time window studied. In emerging markets, on the contrary, the consensus is very large that returns are principally not normally distributed.

³⁷Results are qualitatively very similar to those obtained with the Bera-Jarque test for normality. ³⁸Respectively: India, Taiwan, Colombia, Morocco, Bahrain, Oman (the latter two have only 112 observations); and Namibia (which has only 100 observations).

³⁹Except India in the recent period.

as they may exhibit skewness (negative or positive), and most of the time a higher probability of extreme returns. This has important implications, not only for the validity of financial models, but also for the relevance of commonly used measures of risk. Indeed, if higher-order moments matter in emerging countries, then secondmoment related measures, such as volatility or correlation, provide an incomplete characterization of the risk of emerging stock returns.

3.6 The contribution of emerging markets in global portfolio investment: The role of correlations

The correlation in returns, usually measured by the correlation coefficient between return series, is an important variable considered in the investment process. It is also the main input in the calculation of the world beta⁴⁰. Conventional financial theory teaches us that, the less correlation between a particular stock and a portfolio, the more diversification benefits this stock brings to the portfolio. That is, adding a low correlation stock to a portfolio may reduce the portfolio risk without excessively impairing the expected return of the portfolio. This is true, however, as long as correlations are stable across time. This is where the story is a bit different in emerging markets.

Overall, the literature has shown that correlations between emerging equity returns and a world index are low (Estrada and Serra, 2005; Goetzmann, Li and Rouwenhorst, 2005; Bekaert and Harvey; 2002a, b; Harvey, 1995a, b).

Authors generally state that emerging countries offer low correlations with other markets and amongst themselves. For example, Harvey (1995b) draws two distinct statements from the cross-country correlations matrix between 20 EMDB country indices. First, within emerging markets, in contrast to the cross-country correlations of the developed market returns, most of the correlations are low and many are negative. Indeed, the average cross-country correlation of the emerging country returns is only 12% (it amounts to 41% in 17 developed markets, studied in Harvey, 1991). Some countries have close to zero average correlation with the other emerging countries

⁴⁰The single risk factor in the world CAPM, the beta of a security or a portfolio, is defined as the ratio of the covariance of security or portfolio returns with the world returns, to the overall world market variance.
(e.g., Argentina, Venezuela, Korea, India, Pakistan, Jordan, Nigeria and Zimbabwe), and some even have a negative correlation with their neighbors (e.g., Brazil and Argentina, Colombia, Venezuela, and Mexico). Second, between developed and emerging markets, average correlations are also very low. The overall average correlation between emerging and developing countries is only 14%, and some countries (such as Argentina, Colombia, Venezuela, India, Pakistan, Nigeria and Zimbabwe) have effectively zero average correlation with developed markets. Harvey (1995b), along with Derrabi and Leseure (2005), conclude that the low correlations with developed countries' equity markets significantly reduce the unconditional portfolio risk of a world investor.

Li, Sarkar and Wang (2003) specify that international diversification benefits brought by emerging markets to a US investor remain substantial even when they are prohibited from short selling in emerging markets, and even after accounting for investment restrictions on nonnative individuals. De Roon, Nijman and Werker (2001) find that there is evidence of an improved efficiency set to US investors diversifying into emerging markets; yet, this evidence disappears when investors face short-selling constraints or small transaction costs. In turn, Speidell and Krohne (2007) argue that Frontier markets have even lower correlations with established markets and hence offer excellent diversification potential.

Two potential reasons can explain low correlations with the world, namely, a different industry mix, and low integration. As explained by Bekaert and Harvey (1995), even if a financial market is perfectly integrated with the world market, it may still exhibit a low or negative correlation with the world market when its industry mix is much different from the average world mix. As Collins and Abrahamson (2006) illustrate, suppose two perfectly integrated countries, A and B, with for each of them only two negatively correlated sectors (one cyclical and the other counter-cyclical). Suppose then that country A is over-weighted in the cyclical sector and country B in the counter-cyclical sector. In the case of perfect integration, an increase in stock prices in, say, the cyclical industry in country A, will be accompanied by a similar increase in country B. Due to negative sector correlation, the counter-cyclical sector will decrease similarly in both countries. The net result will be an average stock market increase in price for country A and a decrease for country B.

Both countries, in aggregation, exhibit thus a negative correlation, although they are perfectly integrated, only due to their different industry mix⁴¹.

The literature also shows that, over the last decade, cross-country correlations between emerging and developed markets have increased (see, for example, Estrada and Serra, 2005, or Bekaert and Harvey, 2002a). Mateus (2004) confirms this fact on his sample of Central and Eastern European emerging countries. Indeed, he observes an increased correlation among those countries, when adding four years of data to a previous study on the same countries by Pajuste et al. (2000).

Bekaert and Harvey (1995, 2000) show that market integration and financial liberalization change the co-movement of emerging market stock returns with the global market factor. In turn, Obstfeld and Taylor (2003) provide a historical perspective on the increase in capital mobility in the post-Bretton Woods era. Following the end of the peg-system in the majority of the developed world in 1971, industrial country governments did no longer need capital controls to help preserve a fixed exchange rate, hence, international capital flows started to surge. "Peripheral countries" also undertook a series of economic reforms to reduce the transaction costs and risks of foreign investment, which, there as well, triggered increases in cross-border capital flows. As our study of stock exchanges globally shows, this period of rising capital mobility has been paralleled by an increase in the number of stock markets in the world.

In a study about global market correlations, Goetzmann, Li and Rouwenhorst (2005) confirm that correlations vary considerably through time and are highest during periods of economic and financial integration such as the late 19th and 20th centuries. Their analysis suggests that the diversification benefits to global investing are not constant, and that they are currently low compared to the rest of capital market history. Indeed, the structure of global correlations is currently near a historical high. They also show that a portfolio that is equally diversified across all available markets can currently reduce portfolio risk to about 35% of the volatility of a single market and conclude that about half of the total contribution of emerging markets

 $^{^{41}}$ Collins and Abrahamson (2006) show that there is a considerable discrepancy in sector weights between the UK and Africa. For example, the highest weighing in any UK sector is 25% (financials); compared to 81% for Zimbabwe or 61% for Namibia (in financials as well). Even in South Africa, financials and resources considered together constitute 70% of market capitalization. To overcome the industry mix issue, Collins and Abrahamson (2006) propose a sector analysis.

to the current benefits of international diversification occurs through offering lower correlations, and half through expansion of the investment opportunity set.

We now analyze correlations in our data, and then assess the potential diversification benefits brought by various portfolio combinations.

Our data, summarized in table 3.6, reveal interesting differences in the correlation coefficients between, on the one hand, Major markets and MSCI World, and, on the other hand, Frontier markets and MSCI World.

 Table 3.6: Return correlation coefficients with the MSCI World - Summary statistics

	Recent period 96-08	Early period 81-96	Full period 81-08
Major Composite	64.8%	34.3%	48.5%
Major (average)	33.9%	19.8%	25.6%
Major (min)	-1.7%	-8.3%	1.1%
Major (max)	67.3%	55.1%	54.2%
Frontier Composite	27.5%	n/a	n/a
Frontier (average)	11.8%	n/a	n/a
Frontier (min)	-8.5%	n/a	n/a
Frontier (max)	49.5%	n/a	n/a
MSCI	100.0%	100.0%	100.0%
S&P500	92.9%	69.7%	80.0%
FTSE100	84.9%	78.6%	80.7%
TOPIX100	59.2%	79.7%	67.9%
DAX30	81.9%	54.2%	66.8%
Major - MSCI	-66.1%	-80.2%	-74.4%
Frontier - MSCI	-88.2%	n/a	n/a
Major - Frontier	22.0%	n/a	n/a

Note: Correlation coefficients between the indicated index and the MSCI World index (both expressed in log-return). Detailed data per country are presented in appendix.

On average over the most recent period, both Major and Frontier markets display lower correlations with a global index return (such as the MSCI World) than any of the individual developed market indices considered, with the exception of Japan.

The highest correlation with MSCI amongst Major markets is reached by Brazil (67%). 15 out of 33 Major markets have less than a 30% correlation with MSCI, including one negative correlation (Zimbabwe). However, the Major Composite reaches a 65% correlation with the MSCI, which is way above the 14% reported in Harvey (1995b).

Frontier markets, over the recent period, were much less correlated with the MSCI than their Major counterparts. Within Frontier markets, the country index with the highest correlation with the world, Croatia, did not even reach a 50% correlation with MSCI. The Frontier Composite had only a 28% correlation with the world, and 4 countries (Ecuador, Jamaica, Ghana, Tunisia) had a negative relationship with MSCI.

Amongst markets as well, Frontier markets display the lowest average pairwise correlation (10%, versus 23% within Major markets). As the correlation tables 3.14 and 3.13 show, 47 out of 190 pairwise return correlations are negative amongst Frontier indices, compared to only 37 out of 528 amongst Major indices. Finally, the correlation between Major and Frontier markets is also low (49%).

As an illustration of diversification benefits brought by the inclusion of Major and Frontier indices in a global portfolio, we calculate the efficient risk-return frontiers, using historical values of developed and emerging stock market returns. We follow the methodology proposed by Favre and Galeano (2000), who modify the Markowitz (1952) mean-variance framework, in order to incorporate the presence of significant non normalities in the distribution of returns. To do so, they replace the variance as a measure of risk by the modified Value-At-Risk (modified VAR), i.e., the amount that can be lost, expressed in log-return on the investment, with a given probability and over a given time period. The modified Value-At-Risk differs from the Value-At-Risk by incorporating the third and fourth moments of the distribution of returns, in the following way.

The standard Value-At-Risk, denoted by $VAR_{p,\alpha}$, is computed as:

$$VAR_{p,1-\alpha} = E(R_p) - z_{(c,1-\alpha)}\sigma_p$$

where $E(R_p)$ is the expected return of the portfolio over a given period, σ_p is the standard deviation of the returns over the same period, and $z_{(c,1-\alpha)}$ is the critical value of the reduced-centered normal distribution associated with probability $1-\alpha$. (for $\alpha = 99\%$, we have $z_{(c,1-\alpha)} = -2.33$). The Value-At-Risk mesures the loss to be expected, in percentage of the portfolio investment, over the given period with a probability of $1-\alpha$. This holds, however, only when the portfolio returns are normally distributed.

To account for the third and fourth moments in the distribution of returns, the modified Value-At-Risk, denoted by $mVAR_{p,1-\alpha}$ can be computed:

$$mVAR_{p,1-\alpha} = E(R_p) - z_{(CF,1-\alpha)}\sigma_p$$

where $z_{(CF,1-\alpha)}$ is an adjusted critical value, computed analytically by the Cornish-Fisher (1937) expansion:

$$z_{(CF,1-\alpha)} = z_{(c,1-\alpha)} + \frac{1}{6} (z_{(c,1-\alpha)}^2 - 1) S_p + \frac{1}{24} (z_{(c,1-\alpha)}^3 - 3z_{(c,1-\alpha)}) K_p - \frac{1}{36} (2z_{(c,1-\alpha)}^3 - 5z_{(c,1-\alpha)}) S_p^2 - \frac{1}{24} (z_{(c,1-\alpha)}^3 - 3z_{(c,1-\alpha)}) K_p - \frac{1}{36} (2z_{(c,1-\alpha)}^3 - 5z_{(c,1-\alpha)}) S_p^2 - \frac{1}{24} (z_{(c,1-\alpha)}^3 - 3z_{(c,1-\alpha)}) K_p - \frac{1}{36} (2z_{(c,1-\alpha)}^3 - 5z_{(c,1-\alpha)}) S_p^2 - \frac{1}{24} (z_{(c,1-\alpha)}^3 - 3z_{(c,1-\alpha)}) K_p - \frac{1}{36} (2z_{(c,1-\alpha)}^3 - 5z_{(c,1-\alpha)}) S_p^2 - \frac{1}{24} (z_{(c,1-\alpha)}^3 - 3z_{(c,1-\alpha)}) K_p - \frac{1}{36} (2z_{(c,1-\alpha)}^3 - 5z_{(c,1-\alpha)}) S_p^2 - \frac{1}{24} (z_{(c,1-\alpha)}^3 - 3z_{(c,1-\alpha)}) K_p - \frac{1}{36} (z_{(c,1-\alpha)}^3 - 5z_{(c,1-\alpha)}) K_p - \frac{1}{36} (z_{(c,1-\alpha)}) K_p - \frac{1}{$$

where S_p is the skewness and K_p the excess kurtosis⁴² in the distribution of portfolio returns. Note that, when both S_p and K_p are zero (which is the case in the normal distribution), $z_{(CF,1-\alpha)} = z_{(c,1-\alpha)}$.

Thus, we compute the efficient frontiers in a mean - Value-At-Risk framework, on three portfolios, namely, (#1) a portfolio of developed markets only (US S&P500, S&P Europe 350 and Japan's TOPIX100), (#2) a combination of the same developed markets with the Major Composite, and (#3) a combination of the developed, Major and Frontier markets (i.e., including the Frontier Composite). We select a 99% confidence level for the computation of the VARs ($\alpha = 99\%$) over a monthly period. As in Li, Sarkar and Wang (2003), we apply the usual constraint of no short-selling in emerging markets. We also impose a maximum leverage, equal to 1/4 of the investment, in developed markets. Figure 3.1 plots the efficient frontiers reached by those portfolios, using data from the 96-08 period.

The addition of Major emerging markets shifts the possible outcomes towards higher returns for the same risk, or lower risk for the same return (the efficient frontier goes upper left), but in a relatively small way. However, the impact is bigger when we add Frontier indices to the portfolio. In order to compare these portfolios, we compute their modified Sharpe ratios, mS_p :

$$mS_p = \frac{(\overline{R_p} - rf)}{mVAR_{p,\alpha}}$$

where $\overline{R_p}$ is the average portfolio return over the period, rf is the risk-free rate of return, and $mVAR_{p,\alpha}$ is the modified Value-At-Risk at the α confidence level over the period.

⁴²Those concepts are defined in the previous section.



Figure 3.1: Portfolio mean - Value-At-Risk optimization using historical values

Notes: Efficient frontiers computed using the Markowitz (1952) algorithm, adapted to the case of non normal returns by Favre and Galeano (2000).

Developed indices are a combination of US (S&P500), European (S&P Europe 350) and Japanese (TOPIX100) indices. Maj (Fron) represents the Major (Frontier) composite index.

The optimization is done under the constraint of no short-selling in the Major or Frontier indices, and no more than 25% short-selling in any of the developed indices.

The modified Value-At-Risk (99%, monthly) gives the amount that can be lost, expressed in log-return on the investment, over one month with a probability of 1%. It is computed analytically using the Cornish-Fisher (1937) expansion, which adjusts the traditional Value-At-Risk for the skewness and kurtosis in the distribution. Further details are given in the main text.

Considering a zero-risk portfolio return of 5.65% (the prevailing yield-to-maturity of a 10-year US government bond at the beginning of the 96-08 period), the optimal monthly modified Sharpe ratios are, respectively, 0.041, 0.048 and 0.060 for portfolios #1 to #3. The inclusion of Major markets in the portfolio does not greatly increase the modified Sharpe ratio. However, Frontier markets, in spite of a lower average return (compared to Major returns) over the recent period, bring a significant improvement to the efficient frontier, due to their low level of correlations with both developing markets.

Unfortunately, we need to temper the enthusiasm of potential investors in Frontier markets. We computed the five-year rolling correlation coefficients between Major and MSCI, Frontier and MSCI, and S&P500 and MSCI (see graphs 3.2, 3.3 and 3.4). Fitting a linear regression line over time shows a clear upward trend in the correlations for Major, Frontier, as well as S&P500. Noticeably, the quickest growth in correlation over time is in the Frontier Composite. Over the full data period (96-08

for Frontier markets, and 81-08 for other countries), it took 2.5 years for the five-year rolling correlation to increase by 10%, versus 4.5 and 6.9 for, respectively, the Major Composite and the S&P500. Therefore, if correlations continue to rise, diversification benefits from Frontier countries may not be as high in the future than they used to be over the last decade.

In conclusion, correlations between emerging market returns and global returns are still low, but have been rising over the last decade, together with the increase in international capital flows. Over the recent period, Major markets still displayed a lower correlation with the world than many developed markets. The inclusion of Frontier markets in a portfolio, much less correlated with the word, brings the highest diversification impact. However, if the rising correlation trend continues, which is consistent with the globalization scenario, one should probably expect the diversification benefits from emerging markets to decrease going forward.

3.7 Conclusions and suggestions for further research

This paper studies macro-economic and financial return features in 53 emerging markets. It extends the traditional emerging country sample to rarely-covered Frontier countries.

Following definitions of from the World Bank and S&P Emerging Markets Database (EMDB), we propose a typology of emerging markets based on the intensity of emerging market coverage by major information providers such as S&P or MSCI. We distinguish between four categories, namely, in decreasing order of coverage, "Major", "Frontier", "below-the-radar", and "no stock market" countries.

Although there are large differences in recent GDP growth, size and turnover between Major and Frontier markets, stock returns share several common distributional features.

Upon examination of monthly USD returns in 53 emering country stock indices over the period 1981-2008 (1996-2008 for Frontier markets), both Major and Frontier markets confirm the traditional literature consensus areas: International emerging market investors in emerging markets should expect a high volatility, a low correlation with world's returns, and significant return surprises. However, we do not find that emerging market returns are systematically higher than developed markets'. Nor do we find a significant difference between Frontier and Major market realized returns over the last 12 years.

Noticeably, Frontier markets distinguish themselves from their Major counterparts by a lower correlation, both amongst markets are with developed or Major markets.

To wrap-up, this papers warns the international investor against the high risks of stand-alone emerging market investments. It does not support the argument of significantly superior return emerging markets: Even if historical average emerging market returns have generally been attractive, they were also sometimes lower than those of a global porfolio such as the MSCI World, depending on the period or the geographies covered. Rather, we highlight the argument of diversification benefits from the inclusion of Frontier markets in a global portfolio. However, similarly to the evolution of Major markets, Frontier market correlations with the world are found to be rising through time. Therefore, diversification benefits provided by Frontier markets may not be as sizeable in the future as they have been recently.

Starting from three observations about the current state of the emerging equity literature, we believe that the literature would greatly benefit from the following streams of further research.

Firstly, research so far has mainly focused on a minor proportion of emerging stock markets, biased towards the upper-tier income of the emerging world. Hence, the study of emerging stock markets that have stayed so far "below-the-radar" could serve as a test zone to current beliefs on emerging stock returns. It is crucial to know whether key literature results are reproducible from Major and Frontier markets to "below-the-radar" countries: Are emerging stock markets in "below-the-radar", preemerging countries, likely to behave the same way as those in Major or Frontier countries? If any, which factors explain the differences? Can some Frontier or Major countries be a valuable source of inspiration for the future returns of currently preemerging stock markets?

Secondly, in the major part of literature, emerging stock markets are often treated as one cluster and conclusions drawn for the cluster as a whole. However, one can discuss homogeneity amongst emerging stock markets. We see two potential ways to gain insight: (1) studying individual stock markets or selected equity securities in depth (including political and legal context, or microstructure issues); (2) clustering emerging stock markets into alternative relevant sub-groups (e.g., by region, by level of economic development, by culture type).

Thirdly, the vast majority of the literature on emerging stock market takes the perspective of the foreign investor, or even the US investor. For example, prices are often transformed in USD dollars and returns are rarely analyzed in local currency. However, we believe the perspective of the local investor is also an interesting one, though less studied, as local investments also drive stock price behavior.

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3.7.1 Appendix

	Country	GNI per capita	Country classification	Emerging stock markets typology		Stock exchange(s)		
		(USD Atlas method, 2007)	(World Bank, 2007)		Cour	nt Name	Acronym	Year of first trading (per country)
1	Afghanistan	n/a	L	Other Dev, no SE	0	Tirana Stock Exchange	TOE	1006
3	Algeria	3.620	LM	Other Dev, with SE	1	Algeria Stock Exchange	132	1999
4	American Samoa	n/a	UM	Other Dev, no SE	0			
5	Andorra	n/a	Н		0			
6	Angola Aptique and Barbuda	2,540	LM	Other Dev, no SE	0	Eastern Caribbean Securities Exchange	ECSE	
8	Argentina	6.040	ÚM	EMDB Maior	1	Buenos Aires Stock Exchange	BCBA	1822
					2 3 4 5 6 7	Cordoba Stock Exchange Electronic Open Market La Plata Stock Exchange Mendoza Stock Exchange Mercado de Valores del Litoral Porcario Stock Exchange		
9	Armenia	2.630	LM	Other Dev. with SE	1	Armenian Stock Exchange		2000
10	Aruba	n/a	Н		1	Aruba Stock Exchange		
11	Australia	30,760	н		2	Australia Pacific Exchange Australian Stock Exchange Bendigo Stock Exchange	ASX BSX	1860
12	Austria	41.960	н		4	Wiener Börse	USX VSX	1771
13	Azerbaijan	2,640	ĹM	Other Dev, with SE	1	Baku Stock Exchange	BSE	2001
14	Bahamas, The	n/a	Н		1	Bahamas International Securities Exchange	BISX	2000
15	Bahrain	n/a	H	EMDB Major	1	Bahrain Stock Exchange	BSE	1989
16	banyladesn	4/0	L	ENDB Frontier		Dhaka Stock Exchange		1954
17	Barbados	n/a	Н		1	Barbados Stock Exchange	BSE	1987
18	Belarus	4,220	ŬМ	Other Dev, with SE	1	Belarusian Currency and Stock Exchange		2000
19	Belgium	41,110	Ĥ	04	1	Euronext Brussels		1801
20	Benin	3,760	UM	Uther Dev, with SE		I ne Belize International Stock Exchange	BRVM	2002
22	Bermuda	0/0 n/a	<u> </u>	Other Dev, with SE		Bermuda Stock Exchange	BSX	1998
23	Bhutan	1,770	ĹM	Other Dev, with SE	1	The Royal Securities Exchange of Bhutan	RSEB	1993
24	Bolivia	1,260	LM	Other Dev, with SE	1	Bolivia Bolsa Boliviana de Valores		1989
25 26	Bosnia and Herzegovina Botswana	3,790 6 120	UM	Other Dev, with SE EMDB Frontier	1 2 1	Banja Luka Stock Exchange Sarajevo Stock Exchange Botswana Stock Exchange	BLSE SASE	2001
27	Brazil	5,860	ŬM	EMDB Major	1	State of São Paulo Stock Exchange Rio de Janeiro Stock Exchange	Bovespa BVRJ	1845
28	Brunei Darussalam	n/a	H		0	Dulandar Otarla Frakaran		4004
29	Bulgaria Burkina Faso	4,580	UM	Other Dev with SE	1	Bulgarian Stock Exchange Bourse Régionale des Valeurs Mobilières	BRVM	1991
31	Burundi	110	L	Other Dev. no SE	1	Bourse Regionale des Valeurs Mobilieres	DIXVIVI	1990
32	Cambodia	550	L	Other Dev, no SE	1			
33	Cameroon	1,050	LM	Other Dev, with SE	1	Douala Stock Exchange	0110	2003
34	Canada	39,650	н		1 2 3 4 5	Canadia Shew Stock Exchange Canadian Stock Exchange Nasdaq Canada Toronto Stock Exchange TSX Venture Exchange	TSX	1861
35	Cape Verde	2,430	LM	Other Dev, with SE	1	The Cape Verde Stock Exchange	XBVC	2005
36	Cayman Islands	n/a	<u> </u>	Other Dev no SE	1	Cayman Islands Stock Exchange	CSX	1997
37	Chad	540	L	Other Dev. no SE	Ö			
39	Channel Islands	68,640	Ĥ		1	Channel Islands Stock Exchange	CISX	1998
40	Chile	8,190	UM	EMDB Major	1	Bolsa Electrónica de Chile		
41	China	2,370	LM	EMDB Major	2	Santiago Stock Exchange GreTai Securities Market Shandhai Stock Exchange	SSE	1893 1988
					3	Shenzhen Stock Exchange		
42	Colombia	4,100	LM	EMDB Major		Bolsa de Valores de Colombia	BVC	1929
43	Comoros	680	L	Other Dev, no SE				
44	Congo, Dem. Rep.	140	L	Other Dev. no SE				
46	Costa Rica	5,520	ŬM	Other Dev, with SE	1	Bolsa Nacional de Valores	BNV	1976
47	Côte d'Ivoire	10.100			1	Bourse Régionale des Valeurs Mobilières	BRVM	1998
48	Croatia	10,460	UM	EMDB Frontier		Varazdin Stock Exchange	VSE ZSE	1001
49	Cuba	n/a	UM	Other Dev, no SE	Ó		1202	1331
50	Cyprus	24,940	Н		1	Cyprus Stock Exchange	CSE	1996
51	Czech Republic	14,580	Н	EMDB Major		Prague Stock Exchange	PSE	1993
50	Denmark	55.440	Ц		2	Copenhagen Stock Exchange	KEX	1809
53	Djibouti	1,090	LM	Other Dev. no SE	0	Coponingen olden Exchange		1000
54	Dominica	n/a	UM	Other Dev, with SE	1	Eastern Caribbean Securities Exchange	ECSE	2001
55 56	Dominican Republic Ecuador	3,560 3,110	LM LM	Other Dev, with SE EMDB Frontier	1	Bolsa de Valores de la República Dominicana Bolsa de Valores de Guayaquil Bolsa de Valores de Quito	BVRD BVG	1991 1847
57	Egypt, Arab Rep.	1,580	LM	EMDB Maior	1	Cairo & Alexandria Stock Exchange	CASE	1992
58	El Salvador	2,850	LM	Other Dev, with SE	1	Bolsa de Valores de El Salvador	BVES	1992
59	Equatorial Guinea	12,860	Н	Office D (75	0			
60	Entrea	12.830	<u> </u>	EMDB Frontier		Tallinn Stock Exchange		1995
62	Ethiopia	220	L	Other Dev. no SF	6	Talinin Otoer Exchange	1	1333
63	Faeroe Islands	n/a	Ĥ		Ĭ	Faroese Securities Market		2004
64	Fili	3,750	UM	Other Dev, with SE	1	South Pacific Stock Exchange	SPSE	1979
65	Finland	44,300	H			Heisinki Stock Exchange		1912
67	French Polynesia	n/a	n H				-	1020
68	Gabon	7,020	ÚМ	Other Dev, no SE	Ŏ			
69	Gambia, The	320	L	Other Dev, no SE	0		0.01/	10
70	Germany	2,120	LM	Uther Dev, with SE		Georgian Stock Exchange	GSX	1999
	Comany	20,990	רו		23	Börse Düsseldorf Börse Hamburg	BOAG	1558
					4 5 6	Börse München Börse Stuttgart Frankfurt Stock Exchange	нvvв	

 Table 3.7: List of emerging stock markets in the world and typology

	Country	GNI per capita	Country classification	Emerging stock markets typology		Stock exchange(s)		
		(USD Atlas method, 2007)	(World Bank, 2007)		Count	t Name	Acronym	Year of first trading (per country)
73	Greece	25,740	H	EMDB Frontier	1 2	Athens Stock Exchange Thessaloniki Stock Exchange Center		1990
74	Greenland	n/a	H	Other Dev with SE	0	Eastern Caribbean Securities Exchange	ECSE	2001
76	Glam	0.920 n/a	H	Other Dev, with SE	6	Eastern Caribbean Securities Exchange	ECSE	2001
77	Guatemala	2,450	LM	Other Dev, with SE	1	Bolsa Nacional de Valores	BNV	1987
78	Guinea	400	L	Other Dev. no SE	6			
79	Guinea-Bissau	200	L	Other Dev, with SE	1	Bourse Régionale des Valeurs Mobilières	BRVM	1998
80	Guyana Haiti	1,250	LM	Other Dev, with SE	1	Guyana Stock Exchange	GASCI	2003
82	Honduras	1,590	LM	Other Dev, with SE	1	Bolsa Centroamericana de Valores		1993
83	Hong Kong, China	31,560	H	EMDR Major	1	Hong Kong Exchanges and Clearing	HKEX	1891
85	Iceland	57,750	<u>п</u> Н			Iceland Stock Exchange	ICEX	1990
86	India	950	LM	EMDB Major	1	Ahmedabad Stock Exchange	ASE	
					2 3 4 5	Bangalore Stock Exchange Bhubaneswar Stock Exchange Association Bombay Stock Exchange	BGSE	1875
					6	Cochin Stock Exchange	CSE	
					7	Coimbatore Stock Exchange	DES	
					9	Gauhati Stock Exchange	DES	
					10	Hyderabad Stock Exchange		
					11	Inter-connected Stock Exchange of India		
					13	Ludhiana Stock Exchange Association		
					14	Madhya Pradesh Stock Exchange		
					16	Magadh Stock Exchange	MSEA	
					17	Mangalore Stock Exchange		
					18	Meerut Stock Exchange	NSE	
					20	OTC Exchange of India	INCE	
					21	Pune Stock Exchange		
					22	Uttar Pradesh Stock Association		
07		1.050		ENDD Maine	24	Vadodara Stock Exchange	105	1077
87	Indonesia	1,650	LIVI	EMDB Major	$\frac{1}{2}$	Jakana Stock Exchange	ISE	1977
88	Iran, Islamic Rep.	3,540	LM	Other Dev, with SE	1	Tehran Stock Exchange	TSE	1968
89	Iraq	n/a 47.610	LM H	Other Dev, with SE	1	Iraq Stock Exchange	ISX	1992
91	Isle of Man	n/a	H		ò	In on otoci Exchange		1100
92	Israel	22,170	<u> </u>	EMDB Major	1	Tel-Aviv Stock Exchange	TASE	1953
94	Jamaica	3,330	ŮМ	EMDB Frontier	1	Jamaica Stock Exchange	JSE	1968
95	Japan	37,790	н		1	Fukuoka Stock Exchange		
					3	Nagova Stock Exchange		
					4	Nippon New Market Hercules	0.05	4070
					6	Sapporo Stock Exchange	USE	10/0
					7	Tokyo Stock Exchange		
96	Jordan Kazakhstan	2,840		EMDB Major	1	Amman Stock Exchange	ASE KASE	1978
98	Kenya	640	L	EMDB Frontier	1	Nairobi Stock Exchange	TUNCE	1954
99	Kiribati	1,120	LM	Other Dev, no SE	0			
101	Korea, Rep.	19,730	H	EMDB Major	1	Korea Exchange	KRX	1921
102	Kuwait	n/a	H	Other Dev with OF	1	Kuwait Stock Exchange	KSE	1962
103	Lao PDR	630	L L	Other Dev. with SE	0		NOE	1990
105	Latvia	9,920	UM	EMDB Frontier	1	Riga Stock Exchange	RSE	1995
106	Lepanon	5,800 1 030	L M	Other Dev no SE	$\begin{bmatrix} 1\\ 0 \end{bmatrix}$	Beirul Stock Exchange	BSE	1983
108	Liberia	140	L	Other Dev, no SE	Ŏ			
109	LIDVa	9,010 n/a	UM H	Other Dev, no SE			+	
111	Lithuania	9,770	UM	EMDB Frontier		Vilnius Stock Exchange		1994
112	Luxembourg	n/a	H			Luxembourg Stock Exchange		1927
114	Macedonia, FYR	3,470	LM	Other Dev. with SE		Macedonia Stock Exchange		1996
115	Madagascar	320		Other Dev, no SE	0	Malaui Stack Evaluanas		1000
116	Malaysia	6.420	UM	EMDB Maior		Bursa Malaysia	KLSE	1996
	Matura	0.400		0	2	MESDAQ		00000
118	Mali	3,190	LM	Other Dev. with SE	1	Bourse Régionale des Valeurs Mobilières	BRVM	2002
120	Malta	16,680	H		1	Malta Stock Exchange		1992
121	Mauritania	3,240	LM	Other Dev. no SE				
123	Mauritius	5,580	บ้ท	EMDB Frontier	Ĭ	The Stock Exchange of Mauritius	SEM	1989
124	Mayotte	n/a 9.400	UM	Other Dev, no SE EMDB Major	0	Bolsa Mexicana de Valores	BMV	1008
120	Micronesia, Fed. Sts.	2,280	LM	Other Dev, no SE	0			1300
127	Moldova	1,210	LM	Other Dev, with SE		Stock Exchange of Moldova	SEM	1995
128	Mongolia	1,290	LM	Other Dev. with SF		Mongolian Stock Exchange	MSE	1991
130	Morocco	2,290	LM	EMDB Major	1	Casablanca Stock Exchange	CSE	1929
131	I Mozambique	330 n/a	L I	Other Dev, with SE	1	Maputo Stock Exchange Myanmar Securities Exchange Centre	+	1999
133	Namibia	3,450	LM	EMDB Frontier	1 1	Namibian Stock Exchange	NSX	1992
134	Nepal Netherlands	350	L H	Other Dev, with SE		Nepal Stock Exchange	NEPSE	1937
136	Netherlands Antilles	n/a	H		Ó			
137	New Caledonia	n/a	Н		0			

Table 3.7: List of emerging stock markets in the world and typology (con't)

	Country	GNI per capita	Country classification	Emerging stock markets typology		Stock exchange(s)		
		(USD Atlas method, 2007)	(World Bank, 2007)		Count	Name	Acronym	Year of first trading (per country)
138	New Zealand	27,080	Н		1	New Zealand Stock Exchange	NZX	1872
139	Nicaragua	990	LM	Other Dev, with SE		Bolsa de Valores de Nicaragua	BVDN	1994
140	Nigeria	920		EMDB Major		Abuia Stock Exchange		1990
1.41	rigena	520	-		2	Nigerian Stock Exchange	NSE	1960
142	Northern Mariana Islands	n/a	н		0			
143	Norway	77,370	Н		1	Oslo Stock Exchange	OSLO	1881
144	Oman	n/a	н	EMDB Major	1	Muscat Securities Market		1989
145	ransian	000			23	Karachi Stock Exchange	KSE	1947
146	Palau	8,270	UM	Other Dev, no SE	0			
147	Panama	5,500	UM	Other Dev, with SE	1	Bolsa de Valores de Panamá	BVP	1991
140	Papua New Guinea	1 710		Other Dev, with SE		Port Moresby Stock Exchange Bolsa de Valores y Productos de Asunción	POMSOA	1999
150	Peru	3 410		EMDB Major		Bolsa de Valores de Lima		1861
151	Philippines	1,620	LM	EMDB Major	1	Philippine Stock Exchange	_	1927
152	Poland	9,850	UM	EMDB Major	1	Warsaw Stock Exchange	WSE	1991
153	Portugal	18,950	н		1	Euronext Lisbon	ODEX	1901
154	Buerto Biog	n/o			2	OPEX		
155	Oatar	n/a			1	Doba Securities Market	DSM	1997
156	Romania	6,390	ÚМ	EMDB Frontier	1	Bucharest Stock Exchange	BVB	1995
157	Russian Federation	7,530	UM	EMDB Major	1	Moscow Interbank Currency Exchange	MICEX	
					23	Moscow Stock Exchange Russian Trading System Stock Exchange	RTS RTS SDREY	1992
158	Rwanda	320		Other Dev. no. SE	0	Saint Felersburg Slock Exchange		1992
159	Samoa	2,700	LM	Other Dev, no SE	Ŏ			
160	San Marino	46,770	Н		0			
161	São Tomé and Principe				0			
162	Saudi Arabia	15,470	Н	EMDB Major		l adawul Dauraa Dégianala daa Valaura Mahilièrea		1990
164	Serbia and Monteneuro	030 n/a	L na	Other Dev, with SE		Belgrade Stock Exchange		1990
104	Gerbia and Montenegro	IVa	11.a.		2	Montenegro Stock Exchange	MNSE	1505
					3	New Securities Exchange Montenegro	NEX	
165	Seychelles	8,960	UM	Other Dev, no SE	0			
166	Sierra Leone	260		Other Dev, no SE	0	Oir E		4070
167	Singapore Slovak Republic	32,340		EMDR Major	1	Singapore Exchange Bratislava Stock Exchange		1973
169	Slovenia	21 510		EMDB Frontier		Liubliana Stock Exchange		1995
170	Solomon Islands	750	Ľ	Other Dev, no SE	Ċ Ó	Elabilaria otoon Excitango		10000
171	Somalia	n/a	L	Other Dev, no SE	0			
172	South Africa	5,720	UM	EMDB Major	1	Johannesburg Stock Exchange	JSE	1887
173	Spain	29,290	H		1	Bolsas y Mercados Españoles	BME	1831
174	St Kitts and Nevis	9 990		Other Dev. with SE		Eastern Caribbean Securities Exchange	- IECSE	2001
176	St. Lucia	5.520	UM	Other Dev. with SE		Eastern Caribbean Securities Exchange	ECSE	2001
177	St. Vincent and the Grenadines	4,210	UM	Other Dev, with SE	1	Eastern Caribbean Securities Exchange	ECSE	2001
178	Sudan	950	LM	Other Dev, with SE	1	Khartum Stock Exchange	KSE	1995
179	Suriname	4,730	UM	Other Dev, with SE	1	Surinaamse effectenbeurs		1998
180	Swaziland	2,560	LM	Other Dev, with SE	1	Swaziland Stock Exchange	SSX	1990
101	Sweden	47,070			2	Nordic Growth Market		1301
182	Switzerland	60.820	н		1	Bern eXchange	BX	
					2	SWX Swiss Exchange	SWX	1850
183	Syrian Arab Republic	1,780	LM	Other Dev, no SE	0			
184	Tajikistan	460	L	Other Dev, with SE	1	Central Stock Exchange		1992
186	Thailand	410		EMDR Major		Market for Alternative Investment	1000	1990
100	Thailand	3,400		EWDD Widjor	2	Stock Exchange of Thailand	SET	1962
187	Timor-Leste	1,510	LM	Other Dev, no SE	Ō			
188	Togo	360	L	Other Dev, with SE	1	Bourse Régionale des Valeurs Mobilières	BRVM	1998
189	I onga	2,480		Uther Dev, no SE		Trinidad and Tabaga Stack Evaluation		1001
190	Tunisia	3 210		EMDB Frontier		Bourse de Tunis		1969
192	Turkey	8,030	ŪM	EMDB Maior	1	Istanbul Stock Exchange	ІМКВ	1986
193	Turkmenistan	n/a	LM	Other Dev, no SE	0	· · ·		
194	Uganda	370	L.	Other Dev, with SE	1	Uganda Securities Exchange	USE	1998
195	Ukraine	2,560	LM	EMDB Frontier		PETS Ukraine Stock Exchange		1001
196	United Arab Emirates	n/a	н		2 1 2	Abu Dhabi Securities Market Dubai Financial Market	DFM	2000
					3	Dubai International Financial Exchange	DIFX	
197	United Kingdom	n/a	н		1	London Stock Exchange		1698
198	United States	46,040	н			American Stock Exchange	AMEX	
1						Chicago Stock Exchange	Снх	
1					Ă Ă	NASDAQ	NASDAQ	
1					5	National Stock Exchange	NSX	
1.00		0.000		01 0	6	New York Stock Exchange	NYSE	1792
199	Uruguay	6,390	UM	Uther Dev, with SE		Bolsa de Valores de Montevideo	IRAW	1867
200	Uzbekistan	730	1	Other Dev. with SE		Tashkent Republican Stock Exchange		1993
200	Vanuatu	1.840	LM	Other Dev. no SF	l ö	Tashkont Nopublican Otock Exchange		1335
202	Venezuela, RB	7,550	ŪM.	EMDB Major	1	Bolsa de Valores de Caracas	BVC	1947
203	Vietnam	770	L	Other Dev, with SE	1	Hanoi Stock Exchange	HOTSC	
	Virgin Jalanda (U. C.)				2	Vietnam Stock Exchange	VSE	2000
204	Virgin Islands (U.S.) West Bank and Gaza	n/a		Other Dev with SE		Palestine Securities Evolution		1006
205	Yemen, Rep.	870	L	Other Dev. no SF	l ö	accure occurres Exchange		1330
207	Zambia	770	ī	Other Dev, with SE	ĹĨ	Lusaka Stock Exchange	LuSE	1994
208	Zimbabwe	n/a	L	EMDB Major	1	Zimbabwe Stock Exchange	ZSE	1993
extra	Taiwan	n/a	н	EMDB Maior	1	Taiwan Stock Exchange	TWSE	1962
Mater								

Table 3.7: List of emerging stock markets in the world and typology (con't)

Notes: Stock exchanges are listed when they belong to one of the global sources below and we could confirm the activity in January 2007 (by a website active, or a recent press clipping). We also checked, through a web search, whether countries without a stock exchange in our global sources, did have an active stock market (e.g., recently set-up). However, most of the active stock exchanges were already referenced across the global sources we used.

Sources: Global sources: World Bank Country Classification (2009), S&P (2007), Rutgers University 2007 Webguide on "Stock and Commodity Exchanges", Wall-Street.com, stock exchanges associations (World Federation of Exchanges, Federation of Euro-Asian Stock Exchanges), The University of Chicago Library, Wikipedia, The Numa Directory of Exchanges. Complementary global sources: O'Conner & Smith (1992), Park & Van Agtmael (1993), Goetzmann & Jorion (1999), S&P Global Stock Market Factbooks. Other sources: local regulators or stock exchanges websites, press clippings.

Region	$\mathbf{N}\mathbf{b}$	Market	${}^{ m Nb}_{ m obs}$	Starting date	Mean ret.	St. Dev.	Skew- ness	Exc. kur- tosis	Norm. (p- value) ^a	Corr. with MSCI	$egin{array}{c} \mathbf{Modif.} \\ \mathbf{VAR}^b \end{array}$	Modif. Sharpe ratio ^c
Major mark	ets)			
Asia	1	China	149	Jan-96	1.5%	7.6%	0.34	1.42	0.01	26.3%	16%	0.09
	2	India	149	Jan-96	1.3%	8.2%	-0.30	-0.52	0.09	38.6%	18%	0.07
	3	Indonesia	149	Jan-96	0.3%	14.4%	-0.62	2.30	0.00	35.2%	45%	0.01
	4	Korea	149	Jan-96	0.6%	12.4%	0.20	2.71	0.00	50.3%	34%	0.02
	5	Malaysia	149	Jan-96	0.2%	9.8%	0.06	4.63	0.00	38.4%	33%	0.01
	6	Pakistan	149	Jan-96	1.0%	11.2%	-0.41	2.11	0.00	17.7%	33%	0.03
	7	Philippines	149	Jan-96	-0.2%	9.0%	-0.02	2.92	0.00	43.1%	27%	-0.01
	8	Sri Lanka	149	Jan-96	0.7%	8.5%	0.42	2.21	0.00	19.7%	20%	0.04
	9	Taiwan	149	Jan-96	0.4%	8.8%	0.05	0.57	0.32	47.5%	21%	0.02
-	10	Thailand	149	Jan-96	-0.3%	12.5%	-0.28	1.43	0.02	46.3%	36%	-0.01
Eur.	11	Czech Republic	149	Jan-96	1.6%	7.5%	-0.59	1.24	0.00	36.0%	20%	0.08
	12	Hungary	149	Jan-96	1.8%	9.7%	-0.83	4.25	0.00	54.8%	34%	0.05
	13	Poland	149	Jan-96	1.2%	9.7%	-0.80	3.32	0.00	53.0% 49.207	32%	0.04
	14	Russia Slovelsie	130	Feb-97 Feb-07	1.8%	10.9% 0.107	-1.90	9.03	0.00	48.3%	1070	0.02
	10	Turka	140	Len 06	1.470	0.170	0.32	1.40	0.00	10.370 E9.007	1070	0.09
I Am	10	Argontino	149	Jan-90	0.8%	10.270	-0.50	1.00	0.01	33.070 47.0%	4070 200%	0.03
L. AIII.	18	Brazil	149	Jan-96	1.8%	11.7%	-0.03	2 79	0.00	67.3%	37%	0.05
	19	Chile	149	Jan-96	0.8%	6.4%	-0.92	3.60	0.00	56.6%	22%	0.03
	20	Colombia	149	Jan-96	1.2%	8.5%	-0.33	0.52	0.09	26.3%	21%	0.06
	21	Mexico	149	Jan-96	1.4%	7.9%	-1.33	4.66	0.00	67.0%	28%	0.05
	22	Peru	149	Jan-96	1.6%	7.0%	-0.92	3.27	0.00	26.3%	23%	0.07
	23	Venezuela	135	Jan-96	1.0%	13.3%	-0.53	2.56	0.00	27.4%	41%	0.02
ME-Af.	24	Bahrain	112	Feb-99	1.2%	3.9%	0.22	1.08	0.07	22.0%	8%	0.15
	25	Egypt	136	Feb-97	1.3%	8.1%	0.65	1.38	0.00	23.0%	15%	0.08
	26	Israel	136	Feb-97	1.0%	6.7%	-0.81	0.75	0.00	44.6%	18%	0.06
	27	Jordania	149	Jan-96	1.4%	5.9%	1.10	3.10	0.00	5.7%	9%	0.15
	28	Morocco	136	Feb-97	1.5%	5.4%	0.17	1.05	0.07	7.8%	12%	0.13
	29	Nigeria	149	Jan-96	2.1%	7.0%	0.25	1.12	0.04	11.8%	15%	0.14
	30	Oman	112	Feb-99	1.8%	5.6%	0.52	0.05	0.07	5.3%	9%	0.20
	31	Saudi Arabia	124	Feb-98	1.5%	7.5%	-0.60	0.78	0.01	8.1%	20%	0.07
	32	South Africa	149	Jan-96	0.9%	8.2%	-1.08	3.34	0.00	54.2%	28%	0.03
	33	Zimbabwe	149	Jan-96	0.0%	43.3%	-4.71	32.02	0.00	-1.7%	213%	0.00
		Major Composite	149	Jan-96	1.1%	5.2%	-1.44	4.95	0.00	64.8%	19%	0.06
Frontier ma	rkets	5	1.40	7 00	0.001	11.007	1.05	= = =	0.00	0.007	0.201	0.00
Asia	34	Bangladesh	149	Jan-96	0.8%	11.0%	1.05	7.95	0.00	9.9%	32%	0.03
Eur.	35	Bulgaria	149	Jan-96	-0.9%	14.8%	-1.66	7.62	0.00	3.2%	64%	-0.01
	30	Croatia	121	May-98	1.0%	9.0%	-2.13	2.10	0.00	49.5%	42%	0.02
	31	Estonia Lotrio	124	Feb-98	0.9%	9.2%	-1.11	3.19 0 E 0	0.00	18.8%	31% 4507	0.03
	20	Latvia	124	Tep-98	0.770	9.070	-1.00	0.00	0.00	29.470	4070	0.01
	39 40	Bomonio	149	Jan-90 Fob 08	0.7%	10.8%	1.09	2.00	0.00	24.370	280%	0.08
	40	Slovenie	140	Iop 06	1 70%	7 50%	-1.02	2.20	0.00	12 70%	14%	0.02
	41 49	Ukraine	194	Feb-98	1.770	12.2%	0.03	5.47	0.00	7.9%	41%	0.12
L Am	43	Ecuador	149	Ian-96	0.3%	11.4%	-1 71	14 46	0.00	-8.5%	67%	0.00
13. 11111.	44	Jamaica	149	Jan-96	1.5%	8.6%	1.71	4.06	0.00	-7.4%	14%	0.11
	45	Trinidad & Tobago	149	Jan-96	1.6%	4 9%	0.10	3.34	0.00	7 7%	13%	0.12
ME-Af.	46	Botswana	149	Jan-96	2.1%	6.1%	1.27	6.41	0.00	12.2%	12%	0.18
	47	Cote d'Ivoire	149	Jan-96	1.9%	6.9%	0.26	1.97	0.01	1.4%	16%	0.12
	48	Ghana	149	Jan-96	-0.1%	5.6%	0.13	1.95	0.01	-8.4%	15%	0.00
	49	Kenya	149	Jan-96	1.7%	7.1%	-0.01	2.35	0.00	17.1%	19%	0.09
	50	Lebanon	100	Feb-00	1.3%	9.4%	0.69	2.28	0.00	23.2%	19%	0.07
	51	Mauritius	149	Jan-96	1.4%	4.8%	0.18	3.22	0.00	4.5%	13%	0.11
	52	Namibia	100	Feb-00	1.0%	6.6%	-0.28	0.27	0.32	25.8%	16%	0.07
	53	Tunisia	149	Jan-96	0.3%	4.9%	-0.19	3.21	0.00	-8.2%	15%	0.02
		Frontier Composite	149	Jan-96	0.9%	$\mathbf{3.2\%}$	-0.69	0.91	0.00	27.5%	8%	0.11
Developed r	narkets				-	-	-	-	-	-	-	
	54	DAX30	149	Jan-96	0.8%	6.3%	-0.84	2.26	0.00	81.9%	20%	0.04
	55	FTSE100	149	Jan-96	0.8%	4.0%	-0.53	0.63	0.01	84.9%	10%	0.07
	56	S&P500	149	Jan-96	0.8%	4.1%	-0.27	0.17	0.30	92.9%	10%	0.08
	57	TOPIX100	149	Jan-96	0.1%	5.7%	0.47	0.81	0.02	59.2%	12%	0.01
	58	MSCI World	149	Jan-96	0.6%	4.0%	-0.78	1.05	0.00	100.0%	11%	0.06

Table 3.8: Stock returns summary statistics (monthly log-returns) - Recent period (96-08)

³⁸ MSCI world 149 Jan-96 0.6% 4.0% -0.78 1.05 0.00 100.0% 11% 0.06 ^a A low p-value indicates a strong rejection of the null hypothesis of a normal distribution of returns, according to the D'Agostino et al. (1990) test for normality. ^b The modified Value-At-Risk (99%, monthly) gives the amount of loss, expressed in log-return, that can be lost over one month with a probability of 1%. It is computed analytically using the Cornish-Fisher (1937) expansion, which adjusts the traditional Value-At-Risk for the skewness and kurtosis in the distribution. Further details are given in the main text. ^c The modified Sharpe Ratio is obtained by dividing the return in excess of the risk-free investment, by the modified Value-At-Risk. We assume a 0% monthly risk-free rate of return.

Region	Nb	Market	Nb obs	Starting date	Mean ret.	St. Dev.	Skew- ness	Exc. kur- tosis	Norm. (p- value) ^a	Corr. with MSCI	$\begin{array}{l} \mathbf{Modif.}\\ \mathbf{VAR}^{b} \end{array}$	${f Modif.}\ {f Sharpe}\ {f ratio}^c$
Major mark	ets								,			
Asia	1	China	26	Nov-93	-2.1%	17.8%	2.53	8.03	0.00	-1.6%	0.01	-1.86
	2	India	180	Jan-81	0.8%	8.5%	0.24	1.08	0.03	-6.7%	0.19	0.04
	3	Indonesia	72	Jan-90	0.2%	8.9%	-0.10	-0.06	0.91	17.5%	0.21	0.01
	4	Korea	180	Jan-81	1.3%	8.1%	0.50	0.20	0.03	23.8%	0.14	0.10
	5	Malaysia	132	Jan-85	1.0%	7.9%	-0.89	3.03	0.00	43.7%	0.26	0.04
	6	Pakistan	132	Jan-85	1.1%	6.8%	0.96	4.29	0.00	0.8%	0.14	0.08
	7	Philippines	132	Jan-85	2.8%	10.1%	0.04	2.30	0.01	33.6%	0.26	0.11
	8	Sri Lanka	27	Oct-93	-0.7%	9.7%	0.17	-0.55	0.85	-5.6%	0.21	-0.03
	9	Taiwan	132	Jan-85	1.6%	14.0%	-0.14	1.52	0.03	26.2%	0.37	0.04
	10	Thailand	180	Jan-81	1.7%	7.9%	-0.74	5.17	0.00	32.8%	0.29	0.06
Eur.	11	Czech Republic	24	Jan-94	-1.8%	11.2%	1.54	4.20	0.00	41.2%	0.16	-0.11
	12	Hungary	24	Jan-94	-2.0%	11.1%	1.36	4.83	0.00	52.4%	0.22	-0.09
	13	Poland	24	Jan-94	-2.6%	18.3%	0.09	-0.24	0.95	46.1%	0.43	-0.06
	14	Russia	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	15	Slovakia	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	16	Turkey	108	Jan-87	1.3%	19.1%	0.37	-0.10	0.25	7.0%	0.36	0.04
L. Am.	17	Argentina	180	Jan-81	0.8%	23.3%	0.12	5.18	0.00	2.6%	0.79	0.01
	18	Brazil	180	Jan-81	1.4%	18.2%	-0.46	2.27	0.00	11.1%	0.55	0.02
	19	Chile	180	Jan-81	1.2%	9.0%	-0.41	0.38	0.04	15.6%	0.23	0.05
	20	Colombia	132	Jan-85	2.5%	8.3%	1.07	2.29	0.00	6.1%	0.11	0.23
	21	Mexico	180	Jan-81	0.9%	15.1%	-2.05	9.05	0.00	24.2%	0.65	0.01
	22	Peru	27	Oct-93	2.4%	11.3%	0.25	0.23	0.56	49.8%	0.22	0.11
	23	Venezuela	132	Mar-86	0.7%	14.5%	-1.29	5.76	0.00	-8.3%	0.57	0.01
ME-Af.	24	Bahrain	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	25	Egypt	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	26	Israel	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	27	Jordania	180	Jan-81	0.6%	4.9%	0.16	0.84	0.08	11.5%	0.11	0.05
	28	Morocco	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	29	Nigeria	132	Jan-85	0.2%	17.5%	-3.01	22.01	0.00	5.0%	1.10	0.00
	30	Oman	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	31	Saudi Arabia	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	32	South Africa	23	Feb-94	2.2%	6.3%	-0.82	2.80	0.02	55.1%	0.19	0.11
	33	Zimbabwe	180	Jan-81	0.5%	10.1%	-0.28	1.49	0.01	11.2%	0.28	0.02
		Major Composite	180	Jan-81	0.9%	4.4%	-0.27	0.53	0.10	34.3%	0.11	0.08
Developed n	narkets			_								
	54	DAX30	180	Jan-81	1.0%	5.8%	-0.29	1.06	0.02	54.2%	15%	0.07
	55	FTSE100	120	Jan-86	1.2%	5.9%	-0.73	3.23	0.00	78.6%	19%	0.07
	56	S&P500	180	Jan-81	1.3%	4.1%	-1.27	7.77	0.00	69.7%	17%	0.07
	57	TOPIX100	96	Jan-88	0.2%	7.3%	0.03	0.95	0.18	79.7%	18%	0.01
	58	MSCI World	180	Jan-81	1.1%	4.2%	-0.62	2.41	0.00	100.0%	12%	0.09

Table 3.9: Stock returns summary statistics (monthly log-returns) - Early period (81-96)

¹¹¹ ¹¹² ¹¹² ¹¹¹ ¹¹² ¹¹² ¹¹¹ ¹¹² ¹¹²

We assume a 0% monthly risk-free rate of return.

Region	Nb	\mathbf{Market}	Nb obs	Starting date	Mean ret.	St. Dev.	Skew- ness	Exc. kur-	Norm. (p-	Corr. with	$egin{array}{c} \mathbf{Modif.} \\ \mathbf{VAR}^b \end{array}$	Modif. Sharpe
								\mathbf{tosis}	$value)^a$	MSCI		$ratio^{c}$
Major mark	ets											
Asia	1	China	175	Nov-93	1.0%	9.8%	1.88	12.41	0.00	17.2%	24%	0.04
	2	India	329	Jan-81	1.0%	8.3%	0.01	0.39	0.34	12.6%	19%	0.05
	3	Indonesia	221	Jan-90	0.2%	12.8%	-0.59	2.81	0.00	30.4%	42%	0.01
	4	Korea	329	Jan-81	1.0%	10.3%	0.25	3.12	0.00	37.4%	28%	0.04
	5	Malaysia	281	Jan-85	0.6%	9.0%	-0.27	4.44	0.00	40.4%	31%	0.02
	5	Pakistan	281	Jan-85	1.1%	9.3%	-0.21	3.43	0.00	11.1%	29%	0.04
	6	Philippines	281	Jan-85 Oct 02	1.2%	9.0%	0.00	2.00	0.00	38.1% 15.0%	20%	0.05
	0	Toimon	281	Jap 85	0.0%	0.170	0.55	1.02	0.00	10.970	2070	0.03
	10	Theiland	201	Jan-81	0.970	10.20%	-0.04	2.22	0.00	394.270	3270	0.03
Eur	10	Czech Bepublic	173	Jan-04	1.1%	8.9%	-0.04	2.02	0.00	39.470	99 %	0.02
Dui.	12	Hungary	173	Jan-94	1.170	10.0%	-0.45	3.84	0.00	53.0%	34%	0.03
	13	Poland	173	Jan-94 Jan-94	0.7%	11.3%	-0.40	2 46	0.00	47.7%	36%	0.02
	14	Russia	136	Feb-97	1.8%	16.9%	-1.96	9.63	0.00	48.3%	75%	0.02
	15	Slovakia	136	Feb-97	1.4%	8.1%	0.52	1.46	0.00	10.3%	16%	0.09
	16	Turkey	257	Jan-87	1.3%	17.4%	0.07	0.73	0.10	30.6%	41%	0.03
L. Am.	17	Argentina	329	Jan-81	0.8%	18.7%	0.07	7.99	0.00	13.8%	76%	0.01
	18	Brazil	329	Jan-81	1.6%	15.6%	-0.61	3.18	0.00	29.4%	51%	0.03
	19	Chile	329	Jan-81	1.0%	7.9%	-0.52	1.34	0.00	30.0%	22%	0.05
	20	Colombia	281	Jan-85	1.8%	8.4%	0.31	1.53	0.00	17.0%	19%	0.10
	21	Mexico	329	Jan-81	1.1%	12.3%	-2.23	12.32	0.00	35.2%	60%	0.02
	22	Peru	176	Oct-93	1.7%	7.8%	-0.41	2.64	0.00	29.6%	23%	0.08
	23	Venezuela	267	Mar-86	0.9%	13.8%	-0.96	4.50	0.00	8.3%	51%	0.02
ME-Af.	24	Bahrain	112	Feb-99	1.2%	3.9%	0.22	1.08	0.07	22.0%	8%	0.15
	25	Egypt	136	Feb-97	1.3%	8.1%	0.65	1.38	0.00	23.0%	15%	0.08
	26	Israel	136	Feb-97	1.0%	6.7%	-0.81	0.75	0.00	44.6%	18%	0.06
	27	Jordania	329	Jan-81	0.9%	5.4%	0.75	2.59	0.00	8.2%	11%	0.09
	28	Morocco	136	Feb-97	1.5%	5.4%	0.17	1.05	0.07	7.8%	12%	0.13
	29	Nigeria	281	Jan-85	1.2%	13.0%	-3.52	35.90	0.00	6.0%	111%	0.01
	30	Oman	112	Feb-99	1.8%	5.6%	0.52	0.05	0.07	5.3%	9%	0.20
	31	Saudi Arabia	124	Feb-98	1.5%	7.5%	-0.60	0.78	0.01	8.1%	20%	0.07
	32	South Africa	172	Feb-94	1.0%	8.0%	-1.09	3.51	0.00	54.2%	27%	0.04
	33	Zimbabwe	329	Jan-81	0.3%	30.1%	-6.39	65.30	0.00	1.1%	208%	0.00
		Major Composite	329	Jan-81	1.0%	4.8%	-0.95	3.37	0.00	48.5%	16%	0.06
Frontier ma	rkets										2201	
Asia	34	Bangladesh	149	Jan-96	0.8%	11.0%	1.05	7.95	0.00	9.9%	32%	0.03
Eur.	35	Bulgaria	149	Jan-96	-0.9%	14.8%	-1.66	7.62	0.00	3.2%	64%	-0.01
	36	Croatia	121	May-98	1.0%	9.0%	-2.13	11.10	0.00	49.5%	42%	0.02
	37	Estonia	124	Feb-98	0.9%	9.2%	-1.11	3.19	0.00	18.8%	31%	0.03
	38	Latvia	124	Feb-98	0.7%	9.8%	-1.00	8.58	0.00	29.4%	45%	0.01
	39	Lithuania	149	Jan-96	1.2%	10.907	0.38	2.00	0.00	24.3%	10%	0.08
	40	Romania	124	Feb-98	0.7%	10.8%	-1.02	0.90	0.00	20.9%	38% 1407	0.02
	41	Slovenia	149	Jan-96 Eab 08	1.7%	1.0%	0.69	2.29	0.00	13.1%	14%	0.12
I Am	42	Equador	124	Lep 06	1.470	12.270	1.71	0.47 14.46	0.00	1.270 8 50Z	4170 67%	0.03
L. AIII.	40	Lamaica	149	Jan-90	1 5 %	8 6%	-1.71	4.06	0.00	7 40%	140%	0.01
	44	Tripidad & Tobago	149	Jan-96	1.5%	4.0%	0.10	3 34	0.00	7 7%	13%	0.11
ME-Af	46	Rotewana	140	Jan-96	2.1%	6.1%	1.97	6.41	0.00	19.9%	19%	0.12
MIL III.	47	Cote d'Ivoire	149	Jan-96	1.9%	6.9%	0.26	1.97	0.00	1 4%	16%	0.12
	48	Ghana	149	Jan-96	-0.1%	5.6%	0.13	1.01	0.01	-8.4%	15%	0.00
	49	Kenya	149	Jan-96	1.7%	7.1%	-0.01	2.35	0.00	17.1%	19%	0.09
	50	Lebanon	100	Feb-00	1.3%	9.4%	0.69	2.28	0.00	23.2%	19%	0.07
	51	Mauritius	149	Jan-96	1.4%	4.8%	0.18	3.22	0.00	4.5%	13%	0.11
	52	Namibia	100	Feb-00	1.0%	6.6%	-0.28	0.27	0.32	25.8%	16%	0.07
	53	Tunisia	149	Jan-96	0.3%	4.9%	-0.19	3.21	0.00	-8.2%	15%	0.02
		Frontier Composite	149	Jan-81	0.9%	3.2%	-0.69	0.91	0.00	27.5%	8%	0.11
Developed r	narkets	•										
	54	DAX30	329	Jan-81	0.9%	6.1%	-0.58	1.77	0.00	66.8%	17%	0.05
	55	FTSE100	269	Jan-86	1.0%	4.9%	-0.65	3.37	0.00	80.7%	16%	0.06
	56	S&P500	329	Jan-81	1.0%	4.1%	-0.81	4.11	0.00	80.0%	14%	0.07
	57	TOPIX100	245	Jan-88	0.2%	6.4%	0.22	1.15	0.01	67.9%	15%	0.01
	58	MSCI world	329	Jan-81	0.9%	4.1%	-0.68	1.87	0.00	100.0%	12%	0.08

Table 3.10: Stock returns summary statistics (monthly log-returns) - Full period (81-08)

³²⁹ A low p-value indicates a strong rejection of the null hypothesis of a normal distribution of returns, according to the D'Agostino et al. (1990) test for normality. ^b The modified Value-At-Risk (99%, monthly) gives the amount of loss, expressed in log-return, that can be lost over one month with a probability of 1%. It is computed analytically using the Cornish-Fisher (1937) expansion, which adjusts the traditional Value-At-Risk for the skewness and kurtosis in the distribution. Further details are given in the main text. ^c The modified Sharpe Ratio is obtained by dividing the return in excess of the risk-free investment, by the modified Value-At-Risk. We assume a 0% monthly risk-free rate of return.

	Nb mar- kets	Nb Fron- tier	Mean ret.	St. Dev.	Skew- ness	Exc. kur- tosis	$egin{array}{c} {f Norm.}\ (p-\ value)^a \end{array}$	Corr. with MSCI	$\begin{array}{l} \mathbf{Modif.}\\ \mathbf{VAR}^{b} \end{array}$	$egin{array}{c} \mathbf{Modif.} \\ \mathbf{Sharpe} \\ \mathbf{ratio}^c \end{array}$
Percent period (06.08)										
Acia	11	1	0.6%	10.20%	0.05	0.59	0.00	22.00%	20.02	0.02
Asia Lotin Amonico	10	1 9	1.007	0.007	0.05	4.11	0.00	33.970 21.007	2970	0.03
Eatin America	10	0 0	1.270	9.070	-0.59	4.11	0.00	31.070 20.907	3070 2707	0.00
Europe	14	8	1.1%	10.0%	-0.69	4.70	0.00	30.2%	31%	0.04
M-East & Africa	18	8	1.2%	8.5%	-0.12	3.69	0.00	13.8%	26%	0.09
All emerging	53	20	1.1%	9.5%	-0.33	3.79	0.00	25.5%	30%	0.06
MSCI	1	0	0.6%	4.0%	-0.78	1.05	0.00	100.0%	11%	0.04
Early period (81-96)										
Asia	10	0	0.8%	10.0%	0.26	2.50	0.02	16.4%	21%	-0.14
Latin America	7	0	1.4%	14.2%	-0.40	3.59	0.00	14.4%	45%	0.06
Europe	4	0	-1.3%	14.9%	0.84	2.17	0.13	36.7%	29%	-0.06
M-East & Africa	4	0	0.9%	9.7%	-0.98	6.79	0.01	20.7%	42%	0.05
All emerging	25	0	0.6%	11.9%	-0.03	3.44	0.01	19.8%	32%	-0.04
MSCI	1	0	1.1%	4.2%	-0.62	2.41	0.00	100.0%	12%	0.09
Full period (81-08)										
Asia	11	1	0.8%	10.1%	0.18	3.99	0.00	26.1%	29%	0.03
Latin America	10	8	1.2%	10.9%	-0.47	5.54	0.00	15.5%	40%	0.05
Europe	14	3	1.0%	10.9%	-0.58	4.61	0.00	28.0%	37%	0.04
M-East & Africa	18	8	1.2%	8.1%	-0.45	7.45	0.00	13.8%	31%	0.08
All emerging	53	20	1.1%	9.8%	-0.36	5.62	0.00	20.4%	34%	0.05
MSCI	1	0	0.9%	4.1%	-0.68	1.87	0.00	100.0%	12%	0.08

Table 3.11: Stock returns summary statistics (monthly log-returns) - Region averages

Note: Data on each variable are computed as the arithmetic average of each country in the region (see previous tables), except for

the normality test, where the median value across countries in each region is given.

^a A low p-value indicates a strong rejection of the null hypothesis of a normal distribution of returns, according to the D'Agostino

et al. (1990) test for normality. ^b The modified Value-At-Risk (99%, monthly) gives the amount of loss, expressed in log-return, that can be lost over one month with a probability of 1%. It is computed analytically using the Cornish-Fisher (1937) expansion, which adjusts the traditional Value-At-Risk for the skewness and kurtosis in the distribution. Further details are given in the main text.

^c The modified Sharpe Ratio is obtained by dividing the return in excess of the risk-free investment, by the modified Value-At-Risk. We assume a 0% monthly risk-free rate of return.

_	_		Idole oli	Eliterature re	Jien Sjiieptie	table
		l and fourth moments (normality) Observations and methodology	Normality is rejected in all but 6 Major and 1 Frontist over all bot 6 Major the D'Agestino test of normality based to robit skowness and kurtasis. The same test rejects normality in the MSC1 World, FTSE100, TOPEX00, DAX30, but not in the S&P500 over 96-08.	11 out of 19 mukets show positive skewness. As a result most countries index returns deviate significantly from normity as messate by a Jurgue-Bera test (eccept Lebanor and Maniba, for which there are only 66 monthly observations).	ħŶâ	The degree of deviation from a normal distribution is significant.
		Thire Result	NON NORMAL	NON NORMAL	D/a	NON NORMAL
		Correlations Observations and methodology	In general, emerging markets still have a lower correlation with the world than the majority of developed markets (except Japon) Jargo futterence barween Frontier (Jow correlation, 27.5% on worrage over 56.0%) and Major correlations are found to fest through time (higher speed for Frontier than Major).	Each country is weakly correlated with the fronter marker index and pooly correlated with the major blocks. However, the emerging market index ("Major") is highly correlated with EAFE, NA, and World indexes	u,u	The correlation between emerging markes, and with break-oped markes is low, typically less than 10% except for some cases, and sometimes negative The highest corrulations are observed the highest corrulations are observed between Indonesia / Singapore, Malaysia / Singapore
	- findings	Result	LOW (Front) and HIGH (Major)	LOW (Front) and HIGH (Major Com- posite)	n/a	TOW
turns, Selected Papers (1/3)	Major	Volatilities Observations and methodology	High volatility in both Major and Frontier markets (on avenge, 35.4% and 29.1% versus 15.6% in the MSCI and 22% in the MSCI and across both types of emerging countries	All return series show high standard deviation.	Substantially higher volatility in Substantially higher volatility in a 25.24% for Lain America. 20.0% for Asia (vs. 14.57% for the US). Heterogenetity acress regions. Asia has performed worse.	Returns are highly volatile in emerging matters (week) standard dowintion flucturates from 1.8% in Morecoo to 7.3% in Tuteey, against 1.7% in the US and 4% in Hong Kong).
ional Re		Result	нсн	HIGH	HIGH	HIGH
ng Stock Markets Uncondi		Realized returns Observations and methodology	No significant difference in mean return- between Major, Frontier and developed markes (statust) tess). Over 56-68, the Major Composite hald be highest average rutum (12.7%), followed by Frontier (10.9%), and by developed markets (7.8%). Developed rutums we higher than Majors (ver 81-96.	 out of 19 murkets show a positive dedited transf. The Fronter index returned 8.42% (nonthilty), which is significantly greater than IFCO (2.57%), EAFE (1.84%), and the world index (4.35%). 	Average annual USD stock returns. Average annual USD stock returns. andreas cover the past 30 yeans have been markets over the past 30 yeans have been 7.78% (sr. 7.69% on the USB market). 7.8% for 1.41m America, 6.62% for Significant hortexensity, areas for Significant hortexensity, areas for 10.8% for 1.41m America, 6.62% for call (6% sec and 9.53%).	The mean of returns in emerging markets and developed markets are usually similar, and somedimes higher in emerging markets.
Emergi		Result	AVGE to HIGH	HIGH	AVGE	AVGE to HIGH
idence or		Data source(s)	EMBD (Måjor + Frontier)	EMBD (Frontier + 1 Major composite)	EMBD (Major)	EMBD (Major)
mpirical Ev		Data	Monthly value- weighted country indices (USD, log-returns)	Ammal averages of monthly value- weighted stocks and country induces (US) arithmetic returns)	Monthly value- weighted country indices (local USD, log- returns)	Weekly value- weighted outtry indices (USD, log-returns)
F		Number of observations **	10,900	2,200	5,600	3,700
	Input description	List of emerging markets studied	33 EMJD3 + 20 Fromier countries (see table)	Bangladeth, Bostswara, Bangladeth, Bostswara, Cuota, Ecudor, Essona, Ghana, Jamaus, Kenya, Larvia, Lebunon, Lihuania, Narmiba, Kennaria, Shvernia, Timidad & Tokago, Tunaia,	Agentina, Bazal, Chile, China, Colombia, India, Indonesa, Jordan, Korea, Malaysia, Mesico, Nigeria. Pakistan, Philippines, South Africe, Tawan, Thaliand, Turkey, Verezanda, Zarhabwe.	Argentina, Brazil, Colombia, Argentina, Brazil, Colombia, Indonesia, Israel, Korea, Morocco-Manyaia, Mexico, Morocco-Manyaia, Mexico, Philippues, South Africa, Tauwan, Thuland, Turkey
		Number of emerging markets studied*	33	61	50	20
		Geogra- phical scope	Global	Global	Global	Global
		Time coverage	1981-1861	1995-2004	1976-2005	1997-2001
	Author		Gherraert, 2009	Girard, Sinha, 2008	Henry, Kaman, 2007	Derrabi and Lescure (2005)
	_					

 Table 3.12: Literature review - Synoptic table

						(1)	
		l and fourth moments (normality) Observations and methodology	Jarque-Bern test: normality is rejected interaction (to countrise) and annext rejected for the three other countries) regreted for the three other countries) regreted for the three other countries is 61.1 for "emerging markets", and 4.3 for emerging markets composite emerging markets composite.	Both post and pre-liberalization returns are not normally distributed, emerging returns are skewed and have fit tails	n'a	12/a	The standard tests of normality (e.g., press-larque, Konsprov-Sammov) Beet the hypothesis of normality in more than half the emerging countries (at the ordinates) knoreover, there is time-variation in skewness and kurtosis (significant difference between the 90s, and the 90s)
		Thira Result	NON	NON NORMAL	n,a	n/a	NON NORMAL
		Correlations Observations and methodology	Correlations for most EU accession contrates are low, very cyclicial, and exhibit a small upward trend.	Beta with respect to the world market increases after threat/aztion. Correlations of errorging market returns are still stillisently low to provide important portfolio diversification.	u,a	ų	Low orrelations with developed markets and within the emerging
	findings	Result	LOW	TOW	nja	n/a	TOW
turns, Selected Papers (2/3)	Major	Volatilities Observations and methodology	Higher volatility in EU accession antrest (cryportal 2.2%) somehies standard deviation for "menging markets" and 10% for "frantier markets") than in developed countries (reported 4.9%), Trankets to volatility in the transitional markets to decline.	No significant impact of liberalization on volatility.	The 16 2% volatility of the US market is not particularly high when compared with other markets.	Argentina has a standard deviation of almost 20% and 10 ft sources to the almost 20% and 10% per anothic which the historical standard deviation exceeds 10% per month.	High volatility.
ional Re		Result	НІСН	HIGH	HOIFI	HIGH	HIGH
ng Stock Markets Uncondit		Realized returns Observations and methodology	amintar (RU mean (hthroan sitemitin (RU mean (RU mean (hthroan sitemitin (RD m (RSM) a (RC m (n mean) (RSM) a (T n (a ground I RSM) a (RC m (RC mean) (RC mean) (RC m (RC m) (RC mean) (RC mean) (RC mean) (RC mean) (RC mean) (RC mean) (RC mean) (RC mean) (RC mean) (RC	Shurp drop in average returns after liberatization.	Over the long run, the 4.3% real applial appreciation science for the US has been unusually high (median returns for all 39 countries: 0.75%).	USD average returns range from 0.17% in Jordan to 5.3% per month in Argentina. Avvege USD returns ecceed 2% per month in 11 of the 20 sample countries.	Hgh long-horizon returns.
Emergi		Result	row	HIGH to AVGE	LOW	HOIH	HÐIH
vidence on		Data source(s)	Datastream, local indices	EMBD (Major)	EMBD (major), IFS, various local sources	EMBD (Major)	EMBD (Major)
mpirical Ev		Data	Monthly value- weighted country indices (local currency and USD, arithmetic returns)	Monthly value- weighted country indices (local USD, log- returns)	Monthly value- weighted indices (local eurency, real price index, and USD, arithmetic and log-returns)+ global GDP- weighted index	Monthly value weighted country indices (local currency and USD, arithmetic returns)	Monthly value- weighted country indices (USD, arithmetic and log-returns)
E		Number of observations **	1,400	5,000	8,200	3,900	2,300
	Input description	List of emerging markets studied	Balgaria, Cyptus, Czech Republic, Estonia, Hungary, Lavia, Lithmania, Mala, Lavia, Lithmania, Mala, Romania, Ruseia, Stovenia, Romania, Turkey	Agentina, Brazil, Chile, Colombia, Greece, India, Indonesa, Jodan, Kree, Malaysia, Mesico, Nigeria, Pakistan, Philippines, Pakistan, Philippines, Forugal, Tawan, Taniand, Tukey, Venzeala,	Argentina, Breal, Chile, Argentina, Czechosłovakia, Egyt, Grece, Hurgary, Bakata, Breal, Mecco, Pakisan, Peur, Philippine, Poland, South Africa, Urugun, Venezuela	Argentina, Brazil, Chile, Colombia, Greece, India, Edonaci, Jordan, Korea, Malayaia, Mexico, Nigeria, Pakistan, Philippines, Pentigal, Turkey, Venezuela, Zimbabwa	Agentina, Brazil, Chile, Colombia, Greece, India, Jodan, Kreon, Majayai, Meetoo, Nigeri, Pakiston, Philippnes, Portugal, Tawan, Thailand, Turkey, Venezuela, Zimbalwe
		Number of emerging markets studied*	7	50	6[50	6
		Geogra- phical scope	Eastern Europe + some developed countries	Global	Global	Global	Global
		Time coverage	1986-2002	1976-2001	1996	1961-2861	8661-2861
	Author		Mateus (2004)	Bekaert and Harvey (2002b)	Jorion and Goetzmann, 1999	Rouwenhorst (1999)	Bekaert, Erb, Harvey and Viskanta (1998)

Table 3.12: Literature review - Synoptic table (con't)

					Eı	mpirical Ev	idence on	Emergi	ng Stock Markets Unconditio	onal Re	turns, Selected Papers (3/3)				
Author				Input description							Major	Indings			
	Time coverage	Geogra- phical scope	Number of emerging markets studied®	List of emerging markets studied	Number of observations **	Data	Data source(s)	Result	Realized returns Observations and methodology	Result	Volatilities Observations and methodology	Result	Correlations Observations and methodology	Thire Result	and fourth moments (normality) Observations and methodology
Erb, Harvey and Viskanta (1998)	8661-1861	Global	E.	Agentina, Brazil, Chile, Czech Republic, Chim, Czech Republic, Chim, Colombia, Egya, Greece, Hungary, India, Indonesia, Jordan, Kerea, Majarsia, Mesico, Morocco, Nigenia, Pakistan, Peru, Philippines, Pakistan, Perugal, Kassia, Shovaka, South Africa, St Landa, Yuenzuela, Tudory, Venezuela, Zimbiore	3,900	Monthly value- weighted country indices (return in USD, in mh T-Bill mh T-Bill return, arithmetic returns)	EMBD (Major)	AVGE to LOW	Over the entire sample, the world and the emerging markets composite index in a composite index overage returns are average trumus. Over the last five years, the emegine markets average returns are much lower, reflecting the impact of the tow regional crises (Mexae crisis in 1997).	НІСН	Over the entire sample, there is only one only with a lower standard downtaion than the emerging matkets composite (Jordan) 9 countries had more than double the volatility of the IFC	TOW	The most notable contrast (between emeging and developed markets) is in the correlations. The oureflation between the correlations is a modest 42%. Over the last five years, the correlation is much higher, 61%.	NON NORMAL	Non-normality in emerging markets (the mage of estimates for succovers and knursus contrast sharply with developed markets). There are persistent deviations from what is expected with a normal distribution.
De Santis and Inrohoroglu (1997)	1988-1996	Global	15	Argentina, Brazil, Chile, Colombia, Greece, India, Iordan, Storea, Malsyasia, Mesico, Philippines, Taiwan, Thailand, Turkey, Venezuela	5,800	Weekly value- weighted country indices (local currency and USD, arithmetic returns)	EMBD (Major)	HOH	Higher average returns appears to be associated with a higher level of volatility.	HOIH	Evidence of time-varying volatility, which exhibits statering, ingh persistence and predictability.	n/a	n'a	NON NORMAL	Index of kurtosis is considerably higher in emerging markets.
Bekaert and Harvey (1997)	1976-1992	Global	50	Argentina, Brazil, Chile, Colombi, Inda, Indonesia, Jordan, Mahysia, Mexico, Nigerta, Nakstan, Philippins, Taiwan, Philippins, Taiwan, Thailand, Turkey, Venezuela,	2,800	Monthly value- weighted country indices (local currency and USD, arithmetic returns)	EMBD (Major)	B/II	stashum guigaona sol smutra tullob CRU all contenting with solver the solver the solver all sett much some on av v. (aisenobut) 2001 transkel to an solver on solver solver solver solvers of the solver solver the solver solver all solver and solver and solver and solver solvers of the solver solver and solver solver and solver and solver and solver and solver solver and solver and solver and solver and solver solver and solver and solver and solver and solver and solver solver and solver and solver and solver and solver and solver solver and solve	HIGH	High volatily. I out of 20 countries with volatily. I out of 20 countries targe: from 18% (fordun) 10.4% for the set of Harvey. (193) at range between 15% (US) and 33% (Hong Kong) for MSCI countries (average: 23%).	n/a	n'a	NON NORMAL	Wald test: H of unconditional normality rejected at the 5% level in 15 of the 20 emerging countries (measued in USD).
Harvey (1995a)	1976-1992	Global	20	Argentina, Brazil, Chile, Colombia, Greece, India, Indonesa, Jordan, Korea, Malayasa, Aiscion, Nigeria, Pakistan, Philipinas, Portugal, Taiwa, Thaliand, Turkoy, Venezzetia, Zimbabwe	2,700	Monthly value- weighted country indices (local USD, arithmetic and geometric returns)	EMBD (Major)	₽/U	nia	HIGH	Standard deviations range from 18.9% (Jotdan) to 105.3% (Augentina). Same measure for MSC1: 14.5%; for US: 16.3% (as of Harvey, 1991).	n/a	n'a	n/a	n'a
Harvey (1995b)				Idem Harvey (1995a)				HIGH	High wornge USD returns (2), 4%, authinetic for emerging markets IOSM via 13.9% for the MIC of the theory of the courd comparise mices). In local returney, even higher average areas wide mage across countries.	HOH	High standard deviation of USD returns (24.9% for emeging markets composite vs. 14.4% for MSCI).	TOW	Average correlation between emerging and developed markets is only 14% (15% value-weighted). Within emerging countries: 12% (vs. 41% within developed markets, as of Harvey 1991).	NON NORMAL	Test based on Himsen's GMM + multivariate tests on skewness and structures. Hot monthy rejeted at the Swie level in 14 of the 20 structures multicate however, normality not rejected in the 3 developed multien reported

Table 3.12: Literature review - Synoptic table (con't)

* Emerging markets at the time of each research, as defined by each author.
** When not mentioned in the original paper, the number is approximated using data on frequency, historical and market coverage. Rounded-up to the hundreds

Sources: Beim and Calomiris (2001), Emerging Markets Review, SSRN, JSTOR, Science Direct, authors' homepages.

Notes: n/a stands for "not available"

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TOPIX		1.00
FTSE		0.50
S&P500		0.77 0.49
ISCI 8		1.00 0.55 0.55 0.55
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o Peru	$\begin{array}{c} 1.00\\ 0.22\\ 0.22\\ 0.02\\ 0.02\\ 0.02\\ 0.02\\ 0.03\\$	0.62 0.43 0.15 0.15 0.18 0.18 0.18
Mexic	1,000 1,0000 1,0000 1,0000 1,0000 1,00000000	0.71 0.23 0.67 0.59 0.54 0.54
Col.	$\begin{array}{c} 1100\\ 1100\\ 0.37\\ 0.38\\ 0.38\\ 0.38\\ 0.38\\ 0.38\\ 0.38\\ 0.38\\ 0.38\\ 0.23\\ 0.22\\ 0.03\\ 0.00\\$	0.51 0.38 0.26 0.26 0.20 0.13 0.13
Chile	$\begin{array}{c} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 $	0.75 0.36 0.36 0.48 0.48 0.43 0.43
Brazil	$\begin{array}{c} 1 \\ 1 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\$	0.72 0.31 0.67 0.55 0.58 0.40
Arg.	$\begin{array}{c} 1.00\\ 0.056\\ 0.056\\ 0.038\\ 0.049\\ 0.049\\ 0.046\\ 0.021\\ 0.046\\ 0.0$	0.61 0.25 0.47 0.40 0.37 0.37
a Turkey	$\begin{array}{c} 1.100\\ 0.43\\ 0.54\\ 0.54\\ 0.54\\ 0.54\\ 0.54\\ 0.54\\ 0.54\\ 0.54\\ 0.54\\ 0.54\\ 0.54\\ 0.54\\ 0.54\\ 0.54\\ 0.54\\ 0.55$	0.59 0.30 0.53 0.48 0.42 0.42
Slovaki	0.11 0.05 0.05 0.05 0.05 0.05 0.01 0.01	$\begin{array}{c} 0.19\\ 0.36\\ 0.10\\ 0.03\\$
Russia	$\begin{array}{c} 1.00\\ 0.01\\ 0.02\\ 0.02\\ 0.02\\ 0.04\\ 0.04\\ 0.04\\ 0.04\\ 0.04\\ 0.05\\$	0.70 0.48 0.43 0.43 0.37 2.37
Poland	$\begin{array}{c} 1.00\\ 0.045\\ 0.016\\ 0.028\\ 0.017\\ 0.017\\ 0.016\\ 0.018\\ 0.016\\ 0.016\\ 0.016\\ 0.016\\ 0.016\\ 0.010\\ 0.00\\$	0.65 0.36 0.43 0.43 0.43
Hung.	$\begin{array}{c} 0.028\\ 0.$	0.66 0.33 0.48 0.48 0.48 0.48
Cz. Rep.	0.01 0.04 0.04 0.04 0.04 0.04 0.04 0.04	0.61 0.43 0.36 0.22 0.17
Thail.	0.02 0.02 0.02 0.02 0.02 0.02 0.02 0.02	0.65 0.26 0.37 0.37 0.41
Taiwan	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Sri L.	0.110 0.12 0.12 0.12 0.12 0.12 0.12 0.12	0.38
Phil.	1,00 0.041 0.0280 0.0280 0.0280 0.0280 0.0280 0.0280 0.0280 0.0280 0.0280 0.0280000000000	0.60 0.24 0.28 0.28 0.29 0.29
Pak.	0.12 0.12	0.42 0.18 0.11 0.09 0.09
Mal.	0.10 0.27 0.27 0.28 0.28 0.28 0.03	0.02 0.28 0.28 0.29 0.17
orea	1,10 1	8 8 8 9 9 9 9 8 8
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hina. L	1 1	55888578
U		
	China Diana Marki Santa Santa Santa Marki Santa Marki	Maj Comp. Fron Comp. MSCI S&P500 FTSE TOPIX DAY

 Table 3.13: Correlation table - Major markets (96-08)

	ngl.	dg.	oatia	t.	tvia	th.	om.	ovenia	kr.	cu.	um.	rin. & T.	ots.	. Iv.	hana	enya	eb.	laur.	am.	un.	on Comp.	ai Comp.	ISCI	$k_{\rm F} F 500$	TSE	OPIX	AX
Bangl.	1.00	0.03	0.03	-0.08	-0.05	-0.03	0.03	0.13	0.02	0.02	0.02	-0.15	-0.13	0.24	-0.09	0.09	0.01	-0.03	-0.04	0.12	0.27	0.01	0.10	0.07	0.08	0.08	0.08
. Bulg.		1.00	0.18	0.14	0.17	-0.01	0.23	-0.05	-0.01	0.19	-0.06	0.06	0.06	0.11	0.18	0.09	-0.03	0.07	0.12	0.11	0.45	0.10	0.03	-0.11	0.05	0.14	0.05
Croati			1.00	0.10	0.38	0.30	0.42	0.28	0.21	0.08	-0.06	-0.14	0.17	0.05	-0.06	0.10	0.03	0.08	0.15	-0.03	0.47	0.55	0.49	0.42	0.41	0.21	0.43
ı Est.				1.00	0.27	0.57	0.23	0.19	0.40	0.11	0.13	0.10	0.14	-0.09	0.07	0.10	-0.03	0.13	0.11	0.18	0.52	0.32	0.19	0.16	0.25	0.16	0.15
Latvia					1.00	0.47	0.38	0.22	0.24	0.05	0.08	-0.06	0.17	0.02	-0.08	0.07	-0.01	0.05	0.11	0.08	0.52	0.50	0.29	0.21	0.21	0.08	0.21
Lith.						1.00	0.42	0.42	0.41	0.06	0.23	-0.03	0.17	-0.05	0.10	0.21	0.01	0.17	0.17	-0.05	0.54	0.45	0.24	0.22	0.25	0.12	0.23
Rom.							1.00	0.38	0.46	0.04	0.03	-0.02	0.16	0.02	0.13	0.18	0.01	0.25	0.32	0.03	0.66	0.51	0.21	0.14	0.20	0.12	0.17
Sloveni								1.00	0.21	0.14	0.10	-0.13	0.20	0.06	0.07	0.09	0.02	0.09	0.12	-0.02	0.44	0.19	0.14	0.11	0.15	-0.14	0.17
a Ukr.									1.00	0.05	0.23	-0.01	0.06	0.07	0.02	-0.03	0.04	0.24	0.18	0.07	0.57	0.30	0.07	0.04	0.11	0.11	0.09
Ecu.										1.00	0.18	-0.10	0.10	0.09	-0.01	-0.05	0.05	0.02	-0.01	-0.07	0.34	-0.03	-0.08	-0.11	0.00	-0.11	0.00
Jam.											1.00	0.13	-0.04	0.01	0.10	0.00	-0.02	0.10	-0.10	-0.16	0.27	0.01	-0.07	-0.06	-0.08	0.04	0.01
Trin. & T.												1.00	0.00	-0.09	0.12	0.11	-0.01	0.01	0.08	-0.10	0.02	-0.12	0.08	0.06	0.17	0.02	0.08
Bots.													1.00	-0.03	0.10	-0.10	-0.03	0.00	0.44	0.02	0.25	0.14	0.12	0.08	0.17	0.11	0.14
C. Iv.														1.00	0.08	0.08	0.19	0.12	0.09	0.27	0.29	0.12	0.01	-0.09	0.09	0.08	0.00
Ghana															1.00	0.07	-0.07	0.10	0.09	0.10	0.22	-0.02	-0.08	-0.10	-0.04	0.03	-0.08
Kenya																1.00	0.08	0.23	0.15	0.04	0.29	0.17	0.17	0.13	0.20	0.04	0.99
Leb. 1																	1.00	-0.01	0.09	0.07	0.22	0.22	0.23	0.20	0.22	0.18	0.90
Maur. Ì																		1.00	0.27	0.09	0.33	0.19	0.05	0.02	0.07	-0.02	0.16
Vam.																			1.00	0.23).43 (9.42 -	9.26 -	9.15 -(9.27 -(0.32 -(- 06 C
Dun. I																				1.00	1.21	0.01	0.08 (0.17 (0.01 (0.06 (0.03
Fron I tomp. C																					1.00	0.49 1).28 (i	0.14 0).31 0	0.18 0	131 0
Aaj M omp.																						00.	.65 1	.52 0	.52 0	.41 0	53 0
SCI S																							00.	.93 1	.85 0	.59 0	80 0
kP500 F																								00.	.77 1	.49 0	75 0
ISE T(00	50 1.	76 0
PIX DA																										00	30 1 00

 Table 3.14: Correlation table - Frontier markets (96-08)



Figure 3.2: 5-year rolling correlation (Major-MSCI World)

Note: The correlation coefficient computed on a rolling five-year window, using monthly log-return data.



Figure 3.3: 5-year rolling correlation (Frontier-MSCI World)

Note: The correlation coefficient computed on a rolling five-year window, using monthly log-return data.



Note: The correlation coefficient computed on a rolling five-year window, using monthly log-return data.

Table 3.15: List of acronyms

Acronym	Meaning
ADR	American Depositary Receipt
CAPM	Capital Asset Pricing Model (Sharpe, 1964; Lintner, 1965; Mossin, 1966)
DAX30	Deutscher Aktieninde (German stock index, 30 companies)
EAFE	Europe, Australasia, and Far-East (one MSCI index)
EMDB	Emerging Markets Data Base (property of S&P, former property of the IFC)
EU	European Union
FEAS	Federation of Euro-Asian Stock Exchanges
FTSE100	Financial Time Stock Exchange index (UK stock index, 100 stocks)
GDP	Gross National Product
GMM	Generalized Method of Moments
GNI	Gross National Income
IFC	International Finance Corporation (part of the World Bank Group)
MSCI	Morgan Stanley Capital International (stock exchange information, e.g., indices)
n/a	Not applicable / available
S&P	Standard & Poor's (stock exchange information and rating agency)
S&P500	Standar & Poor's 500 (index of 500 US stocks)
S&P Europe 350	Standar & Poor's Europe 350 (index of 350 European stocks)
TOPIX100	Tokyo Stock Price Index (100 stocks)
USD	United States Dollar
VAR	Value-At-Risk
WDI	World Development Indicators (World Bank)
Sources: World E	Bank, IFC, S&P, FTSE, MSCI, local stock exchanges

Part II

On the Importance of Financial System Development for Economic Development

Chapter 4

Remittances and Domestic Investment in Developing Countries: An Analysis of the Role of Financial Sector Development

Remittances and Domestic Investment in Developing Countries: An Analysis of the Role of Financial Sector Development¹

Abstract

This paper addresses the relationship between remittances and home country investment in developing countries. It highlights, through both a theoretical model and an empirical analysis, the role of financial sector development (FSD) in the impact of remittances on home country investment. The key contribution of the paper is to show that different transaction costs traditionally associated with the FSD, namely 'Cost of Bank Depositing' and 'Cost of External Finance', have conflicting effects on the marginal impact of remitances on investment. Our stylized model, which addresses the specificities of remittance flows through the loanable funds market, yields several intuitive results. First, the marginal impacts of remittances on bank-deposits and investment are positive. Second, both marginal impacts increase when the Cost of Bank Depositing declines. Third, a decrease in Cost of External Finance lowers the marginal impact on investment, and does not affect the marginal impact on bank deposits. Hence, since FSD lowers both transaction costs, it has an ambiguous effect on the marginal impact on investment. The empirical analysis on a sample of 100 developing countries, using both cross-section and panel-data methodologies, confirms our model's predictions.

JEL: F24, O16, G2.

Key words: remittances, investment, growth, financial sector development, transaction cost, openness.

¹This paper has been written by Laurent Gheeraert, Ritha Sukadi Mata (Université Libre de Bruxelles), and Daniel Traça (Universidade Nova de Lisboa).

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4.1 Introduction

Remittances, the money sent home by migrants, accounted for more than US\$ 300 billion in 2007, with US\$ 240 billion flowing to developing countries (World Bank Remittances Database, World Bank, 2007). For developing countries, remittances are the second source of external financing, after foreign direct investments (FDIs) and before official aid (McKenzie and Sasin, 2007). This observation has raised interest among policy makers and researchers, on the potential of remittances as a tool for development.

This paper addresses the impact of remittances on domestic investment in developing nations. Like other sources of external finance, remittances allow the economy to invest in human and physical capital (health, education), which contribute to growth (Ziesemer, 2006). Two recent contributions, Mundaca (2009), and Giuliano and Ruiz-Arranz (2009), stress the role of the development of the financial sector. Both find that remittances have a positive impact on investment. However, while the former find that financial intermediation *increases* the responsiveness of growth to remittances, the latter observe that remittances impact is *weaker* at higher levels of financial sector development². Mundaca (2009) argues that a better-developed financial sector helps channeling remittances more efficiently to productive uses. In turn, Giuliano and Ruiz-Arranz (2009) argue that poor households use remittances to finance informal investment in poorly developed financial markets with liquidity constraints. In this sense, remittances substitute for lack of financial sector development.

In this paper, we show that different transaction costs traditionally associated with the financial sector development (FSD) have conflicting effects on the marginal impact of remittances on investment. We focus on two transaction costs, which decline with FSD. The first is the "Cost of Bank Depositing", henceforth **CDEP**, wich measures the difficulties of savers, particularly the less well off, of depositing their savings in the formal banking system. These difficulties are particularly relevant

²While Giuliano and Ruiz-Arranz (2009) include all developing countries in their regressions, Mundaca (2009) focuses on 25 Latin America countries. Giuliano and Ruiz-Arranz (2009) use four proxies of the financial sector development, namely, the ratio of liquid liabilities of the financial system to GDP (M2/GDP), the sum of demand, time, saving and foreign currency deposits to GDP (DEP/GDP), claims on the private sector divided by GDP (LOAN/GDP), and finally, credit provided by the banking sector to GDP (CREDIT/GDP). Mundaca (2009) also uses the latter proxy in her empirical regressions.

for the social groups that include remittance receivers and can be related to physical access, affordability and eligibility (Beck, Demirgüç-Kunt and Martinez Peria, 2008)³. The second transaction cost is the "Cost of External Finance", henceforth **CEXF**, which measures the marginal cost for the banking system of borrowing in global financial markets. This cost is associated with the policy environment in the country, notably in terms of capital mobility, the robustness of the country's financial sector, the regulatory environment and the perception of country risk.

In a stylized model of the loanable funds market, we analyze how both these variables affect the marginal effect of remittances on investment, and establish three intuitive propositions on the marginal impact of remittances. First, the marginal impacts of remittances on (a) bank-deposits and (b) formal investment are positive. Second, both marginal impacts increase when the CDEP declines⁴. Third, a decrease in CEXF lowers the marginal impact on investment, and does not affect the marginal impact on bank deposits. Note that, since FSD lowers both transaction costs, it has an ambiguous effect on the marginal impact on investment.

We test these propositions using country-level data on remittances, investment, banking sector deposit, and proxies for both CDEP and CEXF, on a sample of 100 developing countries. We perform empirical tests using both cross-section and paneldata with country fixed effects, over the period 1975-2004. Our cross-sectional results support the main predictions of our theoretical model regarding the "remittances investment" and the "remittances - deposit" relations. First, we find significant evidence for a stimulating effect of remittances on both investment and bank deposit, for all levels of the two transaction costs considered. Second, the stimulating effect of remittances on investment (or, bank deposit) is significantly smaller at lower levels of CDEP. Third, the stimulating effect of remittances on investment is significantly weakened by a lower level of CEXF. Our panel-data regressions confirm these results,

³In terms of physical access, customers may have to visit remote bank headquarters to open the account, instead of local bank branch offices. They could also face affordability problems as the minimum balances and fees may be high. Finally, the requirements in terms of necessary documents to open a bank account or necessity to have a job in the formal sector can be perceived as eligibility barriers. Beck, Demirgüç-Kunt and Martinez Peria (2008) show that, in general, banks in more financially developed economies impose low barriers, implying that a significant share of the population in countries with less-developed financial systems is excluded from using banking services. Moreover, according to Orozco (2007), the majority of remittance receivers are part of this group. Our working assumption, therefore, is that remittances receivers pay a cost to deposit their savings, and that this cost falls as the country's level of FSD rises.

⁴This is consistent with Aggarwal, Demirgüç-Kunt and Martinez Peria (2006) regarding the contribution of remittances in the supply of loanable funds trough deposits.

with the sole exception of the impact of the CDEP on the "remittances - bank deposit" relationship, for which we do not find a significant effect under most of the specifications tested.

In sum, our model confirms the results in Giuliano and Ruiz-Arranz (2009) that a rise in remittances has a positive effect on informal investment, which increases with CDEP. However, as discussed above, the marginal impact on formal investment, declines with the CDEP. Our model implies that a more nuanced analysis of the role of FSD is required. Possible biases in Giuliano and Ruiz-Arranz (2009) may emerge because the empirical FSD measures used are inappropriate proxies for the "Cost of Bank Depositing" and due to a failure to control for the "Cost of External Finance".

A vast literature has assessed the impact of remittances on development, stressing the specificities of this external flow. Ratha (2003) argues that they are more broad-base distributed (as they flow directly to households), less volatile and more counter-cyclical than other sources of external finance. Amuedo-Dorantes and Pozo (2006) stress the implications for real exchange rate appreciation, which discourages exportations, and hinders output and employment. Chami, Fullenkamp, and Jahjah (2005) highlight the potential for lower productivity and/or labor supply in recipient households, who want to encourage the migrant worker to send more financial help. World Bank (2006) and Giuliano and Ruiz-Arranz (2009) argue that remittances improve country's creditworthiness and enhance its access to international capital market. Empirically, although the majority of the empirical literature finds that remittances have a positive impact on recipient countries' GDP (e.g., Faini, 2007; Glytsos, 2005; Solimano, 2003; Toxopeus and Lensink, 2007), a few studies (e.g. Chami et al, 2005 or Azam and Gubert, 2005) find a negative impact.

A related strand of the literature has argued that remittances may have an impact on FSD, either through demand factors, such as the need for financial inclusion by remittance receivers, or through supply factors, such as the increase in deposits and credits or the creation of niche markets. Aggarwal, Demirgüç-Kunt and Martinez Peria (2006) find that remittances promote financial development by increasing the aggregate level of deposits and credits intermediated by the local banking system (see also Orozco and Fedewa, 2006, and Gupta, Pattillo, and Wagh, 2007). Toxopeus and Lensink (2007) find that remittances affect growth in developing countries trough the improvement of financial inclusion.

4.2 Theory

4.2.1 The model

In this section, we model the loanable funds market, to highlight the effects of remittances on investment. The highly stylized model captures a simple story: an increase in remittances leads to a rise in deposits in the banking sector, which facilitates credit that finances investment. Our goal is to address the role of financial sector development as an enabler of this relationship.

Take a market for loanable funds with two potential types of agents, remittance Receivers (denoted by the subscript R) and Non-receivers (denoted by the subscript N). We assume there is a measure one of agents, of which a share q are receivers. For simplicity, we suppose that consumption decisions are exogenous⁵. Each agent j has savings of s_j , with $s_j = s_R$ for remittance receivers and $s_j = s_N$ for non-receivers. We will capture the effect of a rise in remittances in the loanable funds market through an increase in s_R . Implicitly, we are assuming that the marginal propensity to consume of receivers is constant.

The model unfolds in two stages. In stage one, agents have the option of **depositing** their savings on a bank or keeping them as cash. Later, in stage two, each agent has the opportunity to **invest** in a project. Each project j allows for a maximum investment of $\iota \gg s_j$ and pays a per dollar return of π_j^6 , where π_j is a random variable independent across agents/projects, uniformly distributed in the support $[0, \tilde{\pi}[$, where $\tilde{\pi} \gg 1$. The uncertainty about the return of the investment projects is resolved at the beginning of stage two.

In stage two, to finance their investment, if profitable, agents can use their cash (non-deposited savings) or request an interest-bearing loan from a bank. Banks finance their lending through the deposits of domestic agents or by borrowing internationally. The sector is competitive and the interest rate, r, is the same for deposits and for loans.

 $^{^{5}}$ This assumption is without loss of generality, as long as the marginal propensity to consume is below 100%, on the signs of the expected relations implied by the model.

⁶Financial return variables are expressed in gross terms. Namely, 1 dollar with a π_j return yields π_j at the end of the period.

Non-receivers have no additional transaction costs on depositing or borrowing. For them, the optimal strategy in this setting is straightforward. In stage one, each agent deposits her savings, s_N , to obtain the interest rate r and any non-financial returns. In stage two, if the return to her project compensates borrowing costs, i.e. if $\pi_j > r$, the agent will borrow ι to finance her investment.

4.2.2 Remittance receivers and the banking sector

We now focus on the relationship between remittance receivers and the banking sector. The main assumption here is that remittance receivers have more difficulties in accessing the banking sector, both for deposits and credit. This hypothesis is well-established in the literature, which shows that the majority of remittances receivers are out of the financial system due to economic and physical barriers (see for instance Beck, Demirgüç-Kunt, Martinez Peria, 2008, and Orozco, 2007).

In our model, each receiver j must pay per dollar access costs of $\rho >> 0$ to obtain a loan and of τ_j to make a deposit. τ_j , the Cost of Bank Depositing (CDEP), is a uniformly distributed random variable in the support $[0, 2\tau]$, with $\tau >> 0$. As a result, the actions of receivers vis-à-vis the banks is less straightforward than for non-receivers.

In stage one, each receiver must decide the amount c to keep as cash, with the remaining $s_R - c$ to be deposited in the banking system. We assume that the total per dollar benefits are given by $d \gg r$, which includes financial returns and the non-financial benefits. Consultative Group to Assist the Poor (CGAP, 1998) and Deshpande and Glisovic-Mezieres (2007) stress the role of increased security that deposits provide to the poor, who look for a safe place to keep their savings. Robinson (1994, 2001) and Wright (2003) highlight the liquidity benefits of bank deposits, compared to traditional forms of savings (such as, jewels, land, or livestock). In fact, several researchers (e.g., Deshpande and Glisovic-Mezieres, 2007; Wright; 2003) argue that these non-financial benefits dwarf the financial return in the informal sector, which is rarely positive, and often negative, such as when the poor pay a deposit collector who visits daily to collect savings. Motivated by these results, and for the sake of simplicity, we assume away the role of the interest rate (financial returns) as a component of the benefits from deposits, taking d to be a constant (i.e.

 $\partial d/\partial r = 0)^7$. In this case, the payoff U of receiver j, at the end of stage two, is

$$U_j(c) = \underbrace{(s_R - c)(d - \tau_j)}_{\text{return of deposits}} + \underbrace{\frac{c}{\tilde{\pi}} \int_0^1 d\pi + \frac{c}{\tilde{\pi}} \int_1^{\tilde{\pi}} \pi d\pi + \frac{\iota - c}{\tilde{\pi}} \int_{r+\rho}^{\tilde{\pi}} (\pi - r - \rho) d\pi}_{\tilde{\pi}}$$

where, we can assume, without loss of generality that $\tilde{\pi} > r > 1$. There are two key components. The first component is the payoff from depositing savings in the banking sector, associated with the benefits obtained (d) net of the access costs (τ_j) . The second component is the expected return from the investment project. There are three scenarios: if the return is less than one, the agent will not undertake the project and keep the cash; if the return is larger than one but lower than $r + \rho$, the agent will invest only her cash; if the return is higher than $r + \rho$, the agent will invest her cash and borrow to make the maximum investment.

Taking the first derivative, and assuming that the cost to borrow, ρ , is higher or equal to $\tilde{\pi} - r$, we obtain⁸

$$\partial U_j / \partial c = \tau_j - d + \Pi$$
 (4.1)
where $\Pi \equiv \frac{\tilde{\pi}^2 + 1}{2\tilde{\pi}}$

Since $\partial U_j/\partial c$ does not depend on c, agents will either keep all their savings in cash, if $\partial U_j/\partial c > 0$, or deposit all their savings, if $\partial U_j/\partial c < 0$. A key element of the decision of each receiver is the deposit access cost, τ_j . From (4.1), receivers with $\tau_j < d + \Pi$ will choose to deposit, with the remainder opting to keep their savings as cash. Note that $d - \Pi$ is the net marginal cost of keeping cash, with Π capturing the option value of keeping cash to finance potential profitable ($\tilde{\pi} > 1$) investment projects. Since τ_j is distributed uniformly between 0 and 2τ , a proportion $(d - \Pi)/2\tau$ of receivers deposit their savings.

⁷Note that, although the interest benefits may be included in d, we have simplified the model by assuming away the effects of changes in r on the decision of receivers to deposit. In line with the argument of security benefits for the deposited cash amounts, we assume that total benefits from bank depositing, d, are proportional to the deposited amount.

⁸For simplicity, we focus on the case where the cost of access to borrowing is prohibitive ($\rho \geq \tilde{\pi} - r$), such that receivers do not have access to borrowing. Otherwise, if access to borrowing by receivers is not prohibitive (i.e. $\rho < \tilde{\pi} - r$), an increase in ρ raises the marginal payoff of keeping cash, since it increases the option value of undertaking some productive investments, which would become unprofitable if the agent had to borrow. In this case: $\partial U_j/\partial c = \tau_j - d + \rho + r + \frac{1 - (r + \rho)^2}{2\tilde{\pi}}$. Working with the alternative case would only change the intensity, not the directions, of the key effects.

4.2.3 Equilibrium in the loanable funds market

In stage 2, the loanable funds market, where banks lend funds to investors, clear. Loanable funds include the deposits and the funds obtained in global financial markets. From the previous analysis, total deposits include the savings of non-receivers, as well as those of receivers with a sufficiently low deposit access cost, which can be expressed as

$$D = (1 - q)s_N + qs_R (d - \Pi) / 2\tau$$
(4.2)

For international borrowing, we assume that the per dollar cost of funds is:

$$r^* + \phi + B\psi$$

where r^* is the risk-free international interest rate, *B* denotes agreggate external borrowing, $\phi > 0$ is the country risk premium and $\psi > 0$ is the marginal cost of external finance, CEXF. ϕ and ψ are related to the marginal access cost of domestic banks to global capital markets, and are determined by the robustness of the country's financial system, and the policy environment.

In this context, perfect competition among domestic banks who fail to internalize the impact of their external borrowing on country risk implies that, for any given domestic interest rate, r, the equilibrium amount of external borrowing is

$$B = \frac{r - r^*/\phi}{\psi} \tag{4.3}$$

Note, from (4.3), that $1/\psi$ is the elasticity of external borrowing to the domestic interest rate.

We can obtain the demand for loanable funds to finance formal investment by non-receivers with projects with a return higher than the interest rate, i.e.

$$F = (1 - q) \left(1 - r/\tilde{\pi}\right)\iota \tag{4.4}$$

where F is positive if and only if $r < \tilde{\pi}$. Note that there is also informal (home) investment by remittance receivers who kept their savings as cash, and thus find it worthwhile to finance any investment with a positive return. The total amount of such informal investment is given by

$$H = qs_R(1 - (d - \Pi)/2\tau) \left(1 - \tilde{\pi}^{-1}\right)$$
(4.5)

135

Here, H does not depend on r because we have assumed that, for remittance receivers, borrowing is prohibitive and r has only a negligible effect on the savings decision.

Finally, equilibrium condition in the market for loanable funds is: D + B = F, which implies that external borrowing and deposits are substitutes in financing formal investment. Given (4.2), (4.3) and (4.4), the equilibrium interest rate yields

$$r = \frac{(r^* + \phi)/\psi + (1 - q)(\iota - s_N) - s_R q (d - \Pi)/2\tau}{1/\psi + \iota(1 - q)/\tilde{\pi}}$$
(4.6)

where, since F is positive, $r < \tilde{\pi}$. Three aspects are worth noting. First, an increase in savings, either for receivers (s_r) or non-receivers (s_N) leads to a decline in the interest rate, as some of those savings become bank deposits and thus increase the availability of loanable funds. More important, the impact of increased savings (or, remittances) on the interest rate is stronger (i.e., more negative) when the CEXF (ψ) is higher, because the ability to substitute external finance for domestic savings declines. Finally, a rise in the foreign interest rate (r^*) or in the country risk premium (ϕ) lead to a higher domestic rate.

4.2.4 Deposits and remittances

Now, we can look at the impact of remittances by looking at the effect of an increase in s_R in deposits (*D*). Implicitly, we are assuming that a given proportion of any increase in remittances will be saved by receivers, who will decide whether to deposit or keep as cash. From (4.2) and (4.6), we can easily obtain

$$\frac{dD}{ds_R} = \frac{q\left(d - \Pi\right)}{2\tau} > 0 \tag{4.7}$$

Moreover, the expression shows also that $d(dD/ds_R)/d\tau < 0$, which means that the marginal increase in deposits is higher when CDEP falls, since in this case a higher proportion of receivers are depositers.

4.2.5 Investment and remittances

We can also look at the effect of remittances on formal investment, F. From (4.4), we obtain

$$\frac{dF}{ds_R} = -\frac{(1-q)\iota}{\tilde{\pi}}\frac{dr}{ds_R} = q\frac{d-\Pi}{2\tau}\left(\frac{\tilde{\pi}}{(1-q)\psi\iota} + 1\right)^{-1}$$
(4.8)

which implies three important results. First, $dF/ds_R > 0$, as the increase in remittances raises deposits and the availability of loanable funds, which lowers the interest rate and spurs an increase in formal investment. Note that, as long as external borrowing is possible (i.e., $\psi \neq \infty$), the effect on investment is weaker than the rise in deposits, because the decline in the domestic interest rate lowers external borrowing by the banking sector, which lowers the volume of loanable funds.

Second, the marginal effect of remittances on investment is decreasing in CDEP, $d(dF/ds_R)/d\tau < 0$. A lower CDEP implies that a larger proportion of receivers deposit their increased savings, which implies a stronger rise in deposits and a deeper decline in the interest rate.

Finally, third, this marginal effect of remittances on formal investment is increasing in CEXF, $d(dF/ds_R)/d\psi > 0$. As discussed above, a rise in ψ lowers the elasticity of external borrowing to changes in the domestic interest rate. As the rise in remittances lowers the interest rate and expands investment, the conflicting, investment-reducing effect of declining external borrowing is weaker when ψ is high.

As mentioned before, several authors have stressed the role of rising remittances for informal investment, defined here as H. As shown in (4.5), to the extent that it increases the savings of remittances receivers, a rise in remittances increases informal investment - $dH/ds_R > 0$. This effect is stronger when deposit access costs are higher - $d(dH/ds_R)/d\tau > 0$ - because then, the proportion of receivers opting to keep cash is larger (Giuliano and Ruiz-Arranz, 2009).

Note, from that the previous discussion, that while the effect of an increase in CDEP raises the marginal effect of remittances on formal investment, it lowers the marginal effect on informal investment. The reason for these conflicting effects is straighforward, with a higher CDEP, less savings enter the banking system to finance formal investment, and more stay as cash to finance informal investment. To address this ambiguity, we can obtain the marginal effect on total investment (formal and informal): I = F + H, as follows:

$$\frac{dI}{ds_R} = \frac{dB}{dr}\frac{dr}{ds_R} + q\frac{d-\Pi}{2\tau} + q\left(1 - \frac{d-\Pi}{2\tau}\right)\left(1 - \tilde{\pi}^{-1}\right)$$

$$= \underbrace{-q\frac{d-\Pi}{2\tau}\left(1 + \frac{\iota(1-q)}{\psi\tilde{\pi}}\right)^{-1} + q\frac{d-\Pi}{2\tau}}_{\text{Formal Investment}} + \underbrace{q\left(1 - \frac{d-\Pi}{2\tau}\right)\left(1 - \tilde{\pi}^{-1}\right)}_{\text{Informal Investment}}$$
(4.9)

which, in addition to confirming that the marginal effect of remittances on investment is positive and increasing in $\text{CEXF}(\psi)$, clarifies the ambiguity of the impact of an increase in CDEP. As can be easily seen, (4.9) implies that

$$\frac{d\left(dI/ds_R\right)}{d\tau} < 0 \Leftrightarrow \psi > \frac{\iota(1-q)}{(1-\tilde{\pi})}$$

which can be interpreted as follows. When ψ is small, it is easy to access external borrowing to make up for any shortfall in deposits. Hence, as the rise in CDEP increases the share of remittances allocated to cash, it helps spur informal investment, whereas the easy access to external borrowing helps make up the effect of the shortfall in deposits on formal investment. This is the case where $d \left(\frac{dI}{ds_R} \right) / d\tau > 0$.

In contrast, when ψ is high, the decline in deposits cannot be compensated by an increase in external borrowing. Then, the volume of funds for (formal and informal) investment is not affected by the choice of receivers between depositing versus cash. Here, a second effect becomes dominant: when savings are allocated to deposits they always find a profitable project to finance, provided ι is large, while if they remain as cash, only Receivers with projects where $\pi_j > 1$ invest their savings. Hence, any shift from deposits to cash, due, for example, to an increase in CDEP, implies that fewer projects are being financed, which implies $d(dI/ds_R)/d\tau < 0$.

4.3 Empirical methodology

4.3.1 Specification

The model of the previous sections has helped us gain important insights into the impact of remittances on deposits and investment, and the role of elements of financial sector development, such as the deposit access cost and the cost of external borrowing. Our first order results are straightforward, as the marginal effect of remittances on deposits and on investment (formal, as well as informal) are positive. However, the impact of our financial sector development variables on these marginal effect are much more complex. We summarize the main insights of the model, by showing the expected coefficient signs and relations in the empirical specifications for the investment and deposit equations.

Based on the model, the investment equation takes the following form:

$$INV_{i,t} = \phi_1 REM_{i,t} + \phi_2 REM_{i,t} * CDEP_{i,t} + \phi_3 CDEP_{i,t} + \phi_4 REM_{i,t} * CEXF_{i,t} + \phi_5 CEXF_{i,t} + \phi_6 REM_{i,t} * CDEP_{i,t} * CEXF_{i,t} + \phi_7 CDEP_{i,t} * CEXF_{i,t} + X'_{i,t}\phi_x + \varepsilon_{i,t}$$
(4.10)

where INV denotes total investment, REM remittances (both scaled to country GDP), CDEP and CEXF are defined in the model, X is a vector of controls including a constant, i and t are country- and time-indices, and ϵ is the regression residual. In such a regression specification, the model implies that

$$\frac{dINV}{dREM} = \phi_1 + \phi_2 CDEP_{i,t} + \phi_4 CEXF_{i,t} + \phi_6 CDEP_{i,t} * CEXF_{i,t} > 0 \quad \forall i, t$$

$$(4.11)$$

$$\frac{d(dINV/dREM)}{dCDEP} = \phi_2 + \phi_6 CEXF_{i,t}$$

$$< 0 \text{ when } CEXF \text{ is small}$$

$$> 0 \text{ when } CEXF \text{ is large}$$
(4.12)

$$\frac{d(dINV/dREM)}{dCEXF} = \phi_4 + \phi_6 CDEP_{i,t} < 0 \quad \forall i,t$$
(4.13)

Relation (4.12) implies that

$$\phi_6 > 0 \tag{4.14}$$

Note that the signs are similar for an empirical specification that includes only formal investment, except that ϕ_6 and $\phi_7 = 0$.

The deposit equation is as follows:

$$\Delta DEP_{i,t} = \delta_1 REM_{i,t} + \delta_2 REM_{i,t} * CDEP_{i,t} + \delta_3 CDEP_{i,t} + Z'_{i,t}\delta_x + \eta_{i,t} \quad (4.15)$$

where $\Delta DEP_{i,t}$ is the increase in deposits between period t-1 and t, and Z is a vector of additional controls, including a constant, time dummies, as well as measures for country's level of development, business cycle, and the money creation by the central bank between period t-1 and t. In this specification, our model predicts that

$$\frac{d\Delta DEP}{dREM} = \delta_1 + \delta_2 CDEP_{i,t} > 0 \quad \forall i,t$$
(4.16)

$$\frac{d(d\Delta DEP/dREM)}{dCDEP} = \delta_2 < 0 \tag{4.17}$$

4.3.2 Data

Remittances and dependent variables

Remittances are computed by statistical agencies, such as the International Monetary Fund (IMF), the United Nations (UN), or the World Bank, as the sum of three items in the Balance of Payments, i.e., (1) compensation of non-resident employees, (2), workers' remittances, and (3) migrant transfers. The two first items belong to the current account (through, respectively, income and current transfers), and the last item to the capital account (through capital transfers). All other things being equal, 1 dollar worker's remittance will be reflected in the host country GDP and the home country GNP. Aggarwal, Demirgüç-Kunt, and Martinez Peria (2006), and Alfieri, Havinga and Hvidsten (2005) discuss in depth the definition of remittances.

We use the World Bank newly-constructed database on remittance inflows worldwide, covering 157 countries (122 developing countries), year by year, over the period 1970-2006. This database presents two key concerns. First, although much effort has been done by statistical agencies recently, national statistical sources are still of varying quality, and there can be differences on the way flows are recorded in national balance of payments⁹. Second, informal (i.e., unrecorded) remittance flows are important and may vary along both country and time dimensions.

We address these potentially important sources of measurement errors in our panel-data analysis. First, we include time dummies in order to capture a potential shift from informal to formal remittance channels, as well as other shocks. Second, we control for unobservable heterogeneity amoung countries, through country fixed effects, in order to account for varying relative importance of informal vs. formal channels across countries. The country effects also account for potential omitted variables.

⁹On top of a difficult data collection, there exists a high variety in the measurement methods, bank reporting systems and estimation models used the national statistical agencies.

Regarding our dependent variables, we measure investment using "Gross Fixed Capital Formation" (GFCF) from the National Accounts Main Aggregates Database (United Nations, 2007), and deposits using the variable "deposits from deposit-money banks" provided in the Financial Structure Database (Beck, Demirgüç-Kunt and Levine, 2000, Beck and Demirgüç-Kunt, 2009).

We scale remittances, investment and deposits by the receiving country's GDP. To avoid biases due to the mutiplier effects of remittances on GDP, we scale remittances by a *modified* GDP measure, which takes out short-term fluctuations in GDP^{10} .

Financial Sector Development

The Financial Structure Database, first published by of Beck, Demirgüç-Kunt and Levine (2000) and updated by Beck and Demirgüç-Kunt (2009), provides a widelyused panel dataset of financial sector development indicators, measured yearly over the period 1960-2005 for more than 180 countries. To capture CDEP, we use a measure of the size of the banking sector, "total assets of deposit-money banks", scaled by *modified* GDP¹¹.

With regard to CEXF, Chinn and Ito (2008) define the "Chinn-Ito index of capital openness". They provide yearly data covering 181 countries over 1970-2005. The index is a score measuring a country's degree of capital account openness. It is based on a combination of dummy variables measuring restrictions on cross-border financial transactions, namely the presence of multiple exchange rates, of restrictions on current or capital accounts transactions, and the requirement to surrender export proceeds.

For both empirical proxies, higher values indicate higher levels of financial sector development, i.e., respectively, a lower cost of depositing and a higher international financial openness. Below, we therefore denote our empirical proxies by, respectively,

¹⁰We obtain the yearly *modified* GDP by (1) computing the linear trend in the logarithm of real GDP (expressed in constant USD) over the period 1970-2006, and (2) transforming the modified *real* GDP into a modified *current* GDP, using constant vs. current USD conversion factors. This methodology implies that the yearly real growth rate of *modified* GDP is invariant through time, i.e. independent of business cycle fluctuations. GDP data are from United Nations (2007).

¹¹Beck, Demirgüç-Kunt and Martinez Peria (2007, 2008) develop new indicators of banking sector outreach, such as the number of ATMs or branches per inhabitant, and measures of barriers to banking services around the world, such as minimum account and loan balances, account fees (*affordability* barriers) and documentation requirements (*eligibility* barriers). However, the coverage of developing countries remains small. For the countries for which data is available, these variables are highly correlated with our size indicator.

FSD(DEP) and FSD(EXF).

Additional controls

We include as additional controls, (1) a proxy for the business cycle, computed as the ratio of country GDP over modified GDP (higher values indicate a positive business cycle relative to GDP trend), (2) a measure of the country level of development, GDP per capita in purchasing power parity (PPP), and (3) an interactive term between normalized remittances and GDP per capital PPP. The latter variable is intended to capture the effect of overall country development in mediating the local impact of remittances (beyond the effect of the two FSD transaction costs). Data in constant USD are drawn from the National Accounts Main Aggregates Database (United Nations, 2007), while data in PPP comes from the World Development Indicators database (World Bank, 2008). In the deposit equation, we include an additional control for money creation by the central bank, measured by the change in Reserve Money¹² over modified GDP. Data are drawn from the the International Financial Statistics database (International Monetary Fund, 2008) in local currency, and transformed in USD using IMF-provided exchange rates.

In summary, combining all data requirements and availabilities¹³, we end up with a final maximum sample for panel-data (cross-section) analysis of of 100 (96) developing countries over the period 1975-2004. This compares to the total of 144 countries classified as "developing", using the World Bank 2004 GNI threshold (10,066 USD, international PPP, per capita), implying a coverage of 69 and 67% of the developing countries, respectively, in our panel and cross-section empricial analyses. We consistently work with 3-yearly averaged data¹⁴, over the period 1975 through 2004, in order to capture only medium- and long-term effects.

¹²Reserve money is defined and computed by the IMF Statistics Department as currency in circulation, deposits of the deposit money banks, and deposits of other residents, apart from the central government, with the monetary authorities.

¹³And after eliminating outliers, such as countries with less than 200,000 inhabitants; and Lesotho, of which the ratio of remittances over modified GDP reached a stunning 90% in the 1970's.

¹⁴The sole exception is the Chinn-Ito index of financial openness, for which we use the minimum in each 3-year period, in an attempt to take into account the slow-moving feature of financial openness regulations.

4.4 Empirical results

4.4.1 Cross-section results

In this section, we test empirically the predictions of the theoretical model in a crosscountry empirical setting. We use the data of the last 3-year period of our panel (i.e., we take average data of our indicators over 2002-2004). We first discuss the investment equation, and then the deposit equation.

In order to assess the validity of the model, we test different empirical specifications of the investment equation. Table 4.1 presents the estimated coefficients and heteroskedasticity-robust standard errors. Recall that our two empirical transaction cost measures, FSD(DEP) and FSD(EXF) increase with financial development and proxy, respectively for, the easiness of depositing money in the local banking system, and the degree of financial openness.

In equation (1), we assume that FSD transaction costs do not affect the impact of remittances on domestic investment, i.e., we do not include interaction terms between remittances and FSD measures (we do, however, control for a potential direct effect of our two FSD transaction costs measures on investment). Next, we include interaction terms between remittances and FSD, i.e., we allow FSD to mediate the local impact of remittances. However, in equation (2) and (3), we only control for a single aspect of FSD transaction cost per equation, respectively, Cost of Bank Depositing, and Cost of External Finance. Finally, equation (4) is the specification derived from our model. A triple interaction term is included, in accordance with the model, which shows that barriers to bank depositing have a different impact depending on the level of financial openness.

As expected, the business cycle control enters all specifications significantly and positively. In equation (1), when financial sector transaction costs are included as simple controls but not interacted with remittances, none of the FSD coefficients is significant. This suggests that financial sector transaction costs as such do not influence the level of local investment, at least not through a direct channel. In this specification, we observe, as expected, that remittances have a positive and significant impact on the level of investment: A 1% increase in remittances over GDP implies a 0.3% increase in the ratio of investment over GDP. When FSD, measured by a single

	(1)	(2)	(3)	(4)
Bus cycle	.245**	.225**	.240**	.213**
	(.098)	(.090)	(.100)	(.101)
$\mathrm{GDP}/\mathrm{cap}$	$.005^{*}$.003	.005	.007
	(.003)	(.002)	(.003)	(.005)
Rem	$.293^{*}$	144	.026	-0.252
	(.173)	(.256)	(.262)	(.265)
$\operatorname{Rem}^{*}\operatorname{GDP}/\operatorname{cap}$.063	.072	-0.019
		(.079)	(.079)	(.088)
FSD(DEP)	.006	026		063
	(.036)	(.046)		(.053)
$\operatorname{Rem}^* FSD(DEP)$.477		2.086^{***}
		(.690)		(.806)
FSD(EXF)	010		014	-0.016
	(.009)		(.014)	(.027)
$\operatorname{Rem}^*FSD(EXF)$.068	.279
			(.118)	(.209)
FSD(DEP)*FSD(EXF)				.007
				(.041)
$\operatorname{Rem}^*\operatorname{FSD}(\operatorname{DEP})^*\operatorname{FSD}(\operatorname{EXF})$				711*
				(.393)
cons	067	025	057	-0.022
	(.101)	(.086)	(.106)	(.107)
Nb of countries	96	96	96	96
Joint significance $(p-value)^a$	-	0.894	0.726	0.045^{*}
\mathbb{R}^2	.102	.095	.115	.14
Adjusted \mathbb{R}^2	.052	.034	.056	.039

Table 4.1: Cross-section empirical	results - Investment equation
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Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; ***significant at 1%

 a Joint significance refers to the coefficients of financial sector transaction costs, remittances, and their interaction(s).

factor, is interacted with remittances, be it Cost of Bank Depositing (equation (2)) or Cost of External Finance (equation (3)), we do not find any significant impact of FSD. Additionally, the coefficients of FSD, remittances, and their interaction, are not jointly significant.

The role of FSD in mediating the impact of remittances on investment only appears in our sample when the two aspects of FSD are included in the empirical setting. We henceforth focus on equation (4).

The expected FSD effects cannot be readily checked from the table and have to be analyzed jointly and conditionally on FSD transaction cost values. Consistently with relation 4.11, we compute the first derivative of our empirical investment equation with respect to remittances to analyze the marginal effect of remittances on investment. Table 4.2 displays the empirical effect of remittances on investment for different percentile values of Cost of Bank Depositing and Cost of External Finance. It shows, in harmony with our model, that the effect of remittances on domestic investment, whenever significant, is positive. In a country with median FSD features, a rise in the ratio remittances/GDP of 1% implies an increase of 0.25% in the investment/GDP ratio. This is only slightly lower than the empirical results of Giuliano and Ruiz-Arranz (2009), who obtain, depending on the proxy they use for measuring the development of the local financial system, an average increase of 0.3 to 0.5% in investment/GDP following a rise in remittances/GDP of 1%¹⁵. However, in contrast with the same authors, who conclude that remittances can have a detrimental effect on investment at very high levels of FSD, we do never observe a significant detrimental effect of remittances on investment: For any level of our two FSD indicators, remittances either stimulate investment, or have no significant effect.

Table 4.2: Cross-section results: Conditional marginal effect of remittances on investment

			FSD(DEP)			
$\min(0.03)$	p05 (0.06)	p25 (0.16)	p50 (0.27)	p75 (0.42)	p95~(0.82)	$\max(1.03)$
-0.29	-0.19	0.00	0.25	0.57^{**}	1.39^{***}	1.83^{***}
(0.28)	(0.26)	(0.22)	(0.19)	(0.23)	(0.48)	(0.64)
			FSD(EXF)			
$\min(-1.77)$	p05(-1.11)	p25(-1.11)	p50 (-0.06)	p75(1.44)	p95~(2.60)	$\max(2.60)$
0.11	0.17	0.17	0.25	0.36	0.46	0.46
(0.34)	(0.27)	(0.27)	(0.19)	(0.22)	(0.35)	(0.35)

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; ***significant at 1%

Note: The table includes the marginal effects of remittances on investment, conditional on the FSD transaction cost measures. Each line assumes a median value on the other FSD measure. We calculated the marginal effects for various percentile values in the estimation sample, using the following relation:

$$\frac{dINV}{dREM} = \beta_{Rem} + \beta_{Rem*FSD(DEP)}FSD(DEP) + \beta_{Rem*FSD(EXF)}FSD(EXF) + \beta_{Rem*FSD(DEP)*FSD(EXF)}FSD(DEP) * FSD(EXF)$$

Beyond this median effect, we are interested in the way the above relationship changes with different levels of FSD. First, we state from table 4.2 that the marginal

¹⁵Our coefficient, though, is not significant at the median level of Cost of Bank Depositing. Nevertheless, it becomes significant from values of FSD(DEP) above the 55th percentile in our sample. At this value, the impact of a 1% rise in remittances/GDP entails a significant increase of 0.38% in investment/GDP. The same impact reaches 0.57% when FSD(DEP) is at its 75th percentile value (i.e., when barriers to bank depositing are lower).

effect of remittances on investment increases when bank depositing is easier (the effect changes from non-significant when cost of bank depositing is high, to significant and positive when cost of depositing is low). We cannot conclude from this table on a clear direction for the effect of financial openness, as none of the coefficients is significant conditionally on a median value of Cost of Bank Depositing. To examine the second-order effects more deeply, we compute further derivatives of the obtained relationship with respect to our FSD transaction cost measures. Tables 4.3 and 4.4 show the overall effect of, respectively, Cost of Bank Depositing, and Cost of External Finance on the marginal impact of remittances on investment (in line with theoretical relations 4.12 and 4.13).

Table 4.3 indicates that a lower Cost of Depositing (i.e., a higher FSD(DEP)) leads to a higher stimulating effect of remittances in the domestic economy. Our results are significant on over 75% of the values of Cost of External Finance. This empirical observation corresponds to the case where the openness to external finance is too low to cancel out the positive effect of increased inflow of remittances in the formal banking system following a drop in the Cost of Bank Depositing. Hence, the higher the FSD, the lower the barriers to bank depositing, and, all other things being equal, the higher the effect of remittances on investment. We also note, from the regression results table, that the coefficient of the triple interaction term (between remittances and our two transaction cost measures), has the expected negative and significant sign (from relation 4.14). This confirms that the stimulating role of lower bank depositing barriers is reduced by a too high financial openness.

In turn, table 4.4 analyzes the effect of the Cost of External Finance on the remittances-investment relation (relation 4.13). Although the effect is less clear-cut, when significant, the Cost of External Finance effect is negative, as expected from the model¹⁶. As we see below in our panel regressions, the Chinn-Ito indicator of financial openness seems better at measuring the change in regulatory financial openness within a country, than discriminating between countries.

Results on the investment equation are presented visually in figure 4.1, which displays the marginal impact of remittances on investment at various levels of Cost

¹⁶This statement is robust to eliminating Malaysia, the country with the highest value of FSD(DEP) in our sample.

Table 4.3: Cross-section results: Conditional marginal effect of FSD(DEP) on the remittances - investment relationship

			FSD(EXF)			
$\min(-1.77)$	p05(-1.11)	p25(-1.11)	p50 (-0.06)	p75(1.44)	p95~(2.60)	$\max(2.60)$
3.34^{**}	2.87^{**}	2.87^{**}	2.13^{**}	1.15^{**}	0.23	0.23
(1.41)	(1.17)	(1.17)	(0.82)	(0.53)	(0.66)	(0.66)

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; ***significant at 1%

Note: The table includes the marginal effects of remittances on investment, conditional on the FSD transaction cost measures. We calculated the marginal effects for various percentile values in the estimation sample, using the following relation:

 $\frac{d(dINV/dREM)}{dFSD(DEP)} = \beta_{Rem*FSD(DEP)} + \beta_{Rem*FSD(DEP)*FSD(EXF)}FSD(EXF)$

Table 4.4: Cross-section results: Conditional marginal effect of FSD(EXF) on the remittances - investment relationship

			FSD(DEP))		
$\min(0.03)$	p05 (0.06)	p25 (0.16)	p50 (0.27)	p75 (0.42)	p95~(0.82)	$\max(1.03)$
0.26	0.23	0.16	0.08	-0.03	-0.30	-0.45^{*}
(0.20)	(0.19)	(0.16)	(0.13)	(0.12)	(0.19)	(0.26)

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; ***significant at 1%

Note: The table includes the marginal effects of remittances on investment, conditional on the FSD transaction cost measures. We calculated the marginal effects for various percentile values in the estimation sample, using the following relation:

$$\frac{d(dINV/dREM)}{dFSD(EXF)} = \beta_{Rem*FSD(EXF)}FSD(EXF) + \beta_{Rem*FSD(DEP)*FSD(EXF)}FSD(DEP)$$

of Depositing (given a fixed median Cost of External Finance). It shows that the marginal effect increases by a factor 2.3, from 0.25 to 0.57% between the second and third quartiles of FSD(DEP) values.

We now discuss the deposit equation. Table 4.5 presents regression results under two different equation specifications. In each case, the control for money creation enters the relation significantly and positively. When we fail to interact remittances with FSD (equation (1)), we observe a positive effect of remittances on deposits, but no direct effect of FSD. However, Equation (2), which interacts remittances and FSD, uncovers the expected relations. Table 4.12 (see appendix) confirms relation 4.16, i.e., that remittances have mainly a positive effect on country deposits. Indeed, whenever significant, the marginal impact of remittances is positive. Additionally, as expected from relation 4.17, this impact is higher when Cost of Bank Depositing is lower, as indicated by the significant positive coefficient of the interation term between remittances and Cost of Bank Depositing in the regression results table.

	Dependent variable: A	Δ Deposit over GDP
	(1)	(2)
Bus cycle	.069	.063
	(.054)	(.052)
$\mathrm{GDP/cap}$.002	.002
	(.002)	(.002)
Δ Money	$.496^{***}$	$.543^{***}$
_	(.181)	(.182)
Rem	$.214^{***}$ (.075)	004 (.117)
Rem*GDP/cap		022
		(.044)
FSD(DEP)	.028	013
	(.028)	(.032)
$\operatorname{Rem}^*FSD(\operatorname{DEP})$.903***
		(.246)
cons	073	059
	(.055)	(.052)
Nb of countries	96	96
Joint significance $(p-value)^a$	-	0.000***
\mathbb{R}^2	.177	.219
Adjusted \mathbb{R}^2	.131	.157

 Table 4.5: Cross-section empirical results - Deposit equation

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; ***significant at 1%

 a Joint significance refers to the coefficients of transaction costs, remittances, and their interaction.

Figure 4.2 depicts the cross-section empirical relation in the deposit equation.

In the next section, we turn to panel-data regressions to assess the robustness of our empirical results.

4.4.2 Panel-data results

The panel-data allows to exploit the available data history, which runs over the period 1975 to 2004. We keep using three-year average data points in order to capture long-term effects. This implies a maximum of 10 observations per country.

We estimate equations similar to our cross-section specifications with remittances-FSD interaction terms. Additionally, we take advantage of the larger sample size to test the presence of quadratic effects. The likely correlation of the error terms with the regressors does not allow the use of random-effects (this is confirmed by Hausman tests), hence we rescourse to the fixed effects estimatimators (LSDV, i.e., "Least Squares Dummy Variable" or "within" estimators), which do not suffer from biased or inconsistent parameter estimates. In total, our regressions use a dataset of 100 countries with 6.2 observations on average per country, i.e., 617 observations in total.

Table 4.6 reports panel-data regression results for the investment and deposit equation, under various specifications (with and without quadratic effects).

			Depende	ent variable	9:	
	Invest	ment over	GDP	Δ	Deposit over	r GDP
	(1)	(2)	(3)	(1)	(2)	(3)
Bus cycle	$.376^{***} \\ (.035)$	$.373^{***}$ (.033)	$.381^{***}$ (.037)	$.135^{***}$ (.029)	$.141^{***}$ (.029)	$.130^{***}$ (.029)
GDP/cap	$.005 \\ (.004)$	$.004 \\ (.004)$	$.005 \\ (.004)$	001 $(.005)$	$.0003 \\ (.005)$	0002 (.005)
Δ Money				$.129^{*}$ (.075)	$.132^{*}$ (.076)	$.127^{*}$ (.075)
Rem	$.230 \\ (.191)$	$.220 \\ (.173)$	137 $(.228)$	$.064 \\ (.161)$	$.055 \\ (.172)$	$.045 \\ (.224)$
$\operatorname{Rem}^{*}\operatorname{GDP}/\operatorname{cap}$	001 $(.052)$	$.016 \\ (.052)$	014 $(.051)$	$.089 \\ (.070)$	$.089 \\ (.065)$.083 $(.071)$
FSD(DEP)	024 $(.044)$		112 $(.085)$	$.057^{st}$ $(.033)$		$.117^{*}$ (.065)
$\operatorname{Rem}^*FSD(DEP)$	055 $(.458)$		2.311^{**} (1.054)	068 $(.545)$		$.072 \\ (1.410)$
$FSD(DEP)^2$		006 $(.036)$	$\begin{array}{c} 0.093 \\ (.063) \end{array}$		$.031 \\ (.029)$	063 $(.057)$
$\operatorname{Rem}^* FSD(DEP)^2$		388 $(.478)$	-2.683^{**} (1.079)		049 $(.572)$	137 (1.514)
FSD(EXF)	005 $(.006)$	002 $(.004)$	003 $(.005)$			
$\operatorname{Rem}^*FSD(EXF)$	$.074 \\ (.073)$.014 $(.053)$	$.069 \\ (.068)$			
FSD(DEP)*FSD(EXF)	$.022 \\ (.015)$		$.019 \\ (.015)$			
$\operatorname{Rem}^{*}FSD(DEP)^{*}FSD(EXF)$	338^{**} (.155)		287^{*} (.149)			
$FSD(DEP)^{2*}FSD(EXF)$		$.029^{*}$ (.017)				
$\operatorname{Rem}^{*}FSD(DEP)^{2*}FSD(EXF)$		343^{**} (.168)				
cons	180^{***} (.030)	179^{***} (.033)	169^{***} (.032)	115^{***} (.025)	115^{***} (.026)	123^{***} (.026)
Nb of observations	615	615	615	615	615	615
Nb of countries	100	100	100	100	100	100
Joint significance $(p-value)^a$	0.002^{***}	0.010^{***}	0.004^{***}	0.311	0.694	0.408
$\overline{\mathrm{R}^2}$.386	.387	.392	.228	.223	.230
e(r2-a)	.367	.367	.370	.208	203	.207

Table 4.6: Panel empirical results - Investment and deposit equations

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

 a Joint significance refers to the coefficients of financial sector transaction costs, remittances, and their interaction(s).

Let us first analyze the investment equation.

From all specifications tested, no significant effect of Cost of Bank Depositing appears, unless we include a quadratic term, which makes the overall effect of Cost of Bank Depositing significant. That is, the effect of Cost of Bank Depositing is important, but non-linear¹⁷. Hence, we focus on investment column (3) in our analysis below. In accordance with our expectations, remittances always stimulate domestic investment. Table 4.7 confirms that the effect is positive and significant over a wide range of both transaction cost values. At median FSD level, a 1% increase in remittances/GDP entails a significant 0.24% increase in domestic investment/GDP, a figure very close with our cross-section results.

Table 4.7: Panel-data results: Conditional marginal effect of remittances on investment

			FSD(DEP)			
$\min(0.00)$	p05~(0.06)	p25~(0.15)	p50 (0.25)	p75~(0.37)	p95~(0.66)	$\max(1.24)$
-0.25	-0.10	0.09	0.24^{**}	0.35^{***}	0.30	-1.13
(0.26)	(0.21)	(0.15)	(0.12)	(0.12)	(0.20)	(0.79)
			FSD(EXF)			
$\min(-1.77)$	p05 (-1.77)	p25 (-1.10)	p50 (-1.10)	p75 (-0.06)	p95~(2.60)	$\max(2.60)$
0.24^{*}	0.24^{*}	0.24^{**}	0.24^{**}	0.24^{**}	0.23^{*}	0.23^{*}
(0.14)	(0.14)	(0.12)	(0.12)	(0.09)	(0.12)	(0.12)

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; ***significant at 1%

Note: The table includes the marginal effects of remittances on investment, conditional on the FSD transaction cost measures. We calculated the marginal effects for various percentile values in the estimation sample, using the following relation:

$$\frac{dAIP}{dREM} = \beta_{Rem} + \beta_{Rem*FSD(DEP)}FSD(DEP) + \beta_{Rem*FSD(DEP)^2}FSD(DEP)^2 + \beta_{Rem*FSD(EXF)}FSD(EXF) + \beta_{Rem*FSD(DEP)*FSD(EXF)}FSD(DEP) * FSD(EXF)$$

As in the cross-sectional case, beyond the average remittance effect, the levels of FSD strongly influence the relationship, in the sense predicted by our model. Table 4.13 (see appendix) computes the net effect of Cost of Bank Depositing on the remittances - investment relationship at various levels of FSD. Over most of the range of FSD values, the effect is positive and significant, which corresponds to the cross-section result, and the model prediction when financial openness is low enough. However, the derivative picks up the quadratic effect of Cost of Bank Depositing.

¹⁷Note that this decreasing marginal effect is also consistent with our model, if we derive relation 4.9 with respect to τ .

The marginal impact of FSD(DEP) is decreasing and turns to a negative impact at very high values of transaction cost proxy. Such an impact, though, only appears around maximum values of FSD(DEP) in our sample. This significant negative effect of FSD(DEP) is due to the strong quadratic regression fit and does not hold anymore when highly financially developped countries are excluded from the sample¹⁸. In sum, in a country with median financial openness, from the second to the third quartile of FSD(DEP), the impact of remittances on investment increases by roughly 50% (from 0.24% to 0.35%).

Table 4.14 (see appendix) indicates a strongly negative impact of FSD(EXF) on the remittances - investment relation across the whole range of Cost of Bank Depositing values. This contrasts with the somewhat weaker results obtained in the cross-section regressions, but confirms our previous interpretation of the results. The effect is small, but significant. In particular, in a country with median Cost of Bank Depositing, 1% higher remittances/GDP generate 0.24% higher investment/GDP ratio at the minimum of the Chinn-Ito index (i.e., when Cost of External Finance is high), but the impact is reduced to 0.23%, when financial openness increases to its maximum value.

Figures 4.3 and 4.4 provide a visualisation of panel-data results on the investment equation.

Turning to the deposit equation, we confirm that the effect of remittances on deposits is positive and significant over a wide range of Cost of Depositing values (see table 4.15 in appendix). However, we do not observe, in any of the specification (linear or quadratic), a clear-cut result on the role of FSD (Cost of Bank Depositing) in channelling remittance funds to local deposit banks. The interaction term coefficient between remittances and Cost of Bank Depositing, from table 4.6, is never significant in any of the specifications. This may be due to the imperfection of our proxy for local agents deposits. Indeed, our proxy for deposits might also capture foreign agents deposits in the local economy (vs. local agents deposits only in our model). Also, alternative proxies for the Cost of Bank Depositing would allow for additional robustness checks of the importance of deposit access barriers to the amount of remittances channeled to banking sector. In particular, the analysis would greatly

 $^{^{18}}$ Thailand and Malaysia reach between 4 and 5 times the sample average values of deposit-money bank assets / GDP.

benefit from proxies of Cost of Bank Depositing less directly linked with the asset size of the banking sector, which is itselft highly correlated with the deposit size of the banking sector. Unfortunately, comprehensive datasets are not available for the moment.

4.5 Concluding remarks

This paper complements the literature on the impact of remittances on domestic investment in developing countries. It confirms the important role of financial system development in the relationship, relying on both a theoretical model and empirical findings. In our model, remittance receiving and non-receiving agents face varying depositing and borrowing transaction costs, in an open economy, and act rationally to maximize their payoffs from formal (i.e., loan-financed), as well as informal (i.e., self-financed) investment projets. Empirical regressions test our model's predictions using a total sample of 100 developing countries, in both cross-section and panel set-ups.

The key contribution of this paper is to consider the role of different transaction costs traditionally associated with financial sector development, namely, the cost of holding a bank account and the cost of using international capital. We show that such costs have conflicting effects on the domestic impact of remittances. As both types of transaction costs usually decrease with financial development, the net effect is unclear.

Our results can be summarized as follows. First, the marginal impact of remittances on investment and deposit is positive. Part of remittances indeed become bank deposits, which increases the availability of loanable funds, reduces the interest rate and stimulates investment. Second, lower deposit access costs, usually associated with higher financial development, increase the positive impact of remittances on both domestic deposits and investment. Our model indeed shows that lower barriers to bank depositing allow for an easier channelling of remittance flows into formal loanable funds and increases the participation in the formal banking sector. This, again, decreases the interest rate and stimulates investment. Third, lower capital controls, usually associated with better-developed financial sectors, decrease the positive impact on investment, and have no effect on deposits. Indeed, lower capital controls increase the elasticity of external borrowing to domestic interest rates and reduce the interest rate effect of increased remittances. Hence, an easier access to external borrowing tempers the effect of remittances on the domestic interest rate and investment. In sum, we demonstrate, theoretically and empirically, that remittances and ease of access to the banking sector act as complements to stimulate domestic investment, while remittances and external borrowing are substitutes.

Our findings have important policy implications. First of all, we confirm that remittances flows stimulate local investment. More importantly, we show that enhancing financial sector development is crucial as it allows remittances to better fuel domestic investment. This is even more true when the access to international funds is difficult or costly. Acting to improve the ability of domestic banks to collect deposits is a more straightforward recommendation to policymakers than trying to influencing remittance flows, which are determined in part by international conditions. Several microfinance institutions, for instance, have been successful in fostering financial inclusion and collecting savings from unbanked people, through raising the affordability of bank deposits.

Avenues for further improvements and research are numerous. To begin with, ever improving datasets should make possible to test the robustness of our results using alternative proxies for financial sector development, measuring more directly both costs of bank depositing and costs of external capital. Besides, extending the research framework from investment to long-term growth would be of prime importance in a policy making perspective. Finally, certain financial institutions seem more efficient than other at fostering financial inclusion, such as microfinance or, possibly, Islamic financial institutions. Analyzing the particular role of such institutions in channeling remittances to productive uses certainly remains a promising research area.

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4.6 Appendix

	P		-2004		
Variable	Mean	Median	Std. Dev.	Min.	Max.
Inv/GDP	0.219	0.202	0.09	0.059	0.839
$\mathrm{Dep}/\mathrm{GDP}$	0.324	0.305	0.195	0.060	0.975
$\Delta \ { m Dep}/{ m GDP}$	0.031	0.023	0.051	-0.147	0.166
Bus cycle	1.003	1.014	0.084	0.789	1.245
GDP/cap	4.887	4.037	3.771	0.567	16.867
Money/GDP	0.119	0.111	0.064	0.017	0.346
Δ Money/GDP	0.016	0.012	0.032	-0.106	0.138
$\operatorname{Rem}/\operatorname{GDP}$	0.045	0.018	0.057	0.000	0.261
FSD(DEP)	0.329	0.279	0.215	0.027	1.022
FSD(EXF)	0.130	-0.062	1.461	-1.767	2.602
Nb of countries			96		

Table 4.8: Summary statistics - Cross-section data, 3-year averages over the period 2002-2004

Note: Outliers have been excluded.

Table 4.9: Summary statistics - Panel data, 3-year averages over the period 1975-2004

Variable	Mean	Median	Std. Dev.	Min.	Max.
Inv/GDP	0.209	0.203	0.081	0.024	0.890
$\mathrm{Dep}/\mathrm{GDP}$	0.268	0.226	0.171	0.000	0.935
$\Delta \; { m Dep}/{ m GDP}$	0.021	0.018	0.058	-0.513	0.240
Bus cycle	1.001	0.999	0.093	0.441	1.370
GDP/CAP	3.873	3.196	2.920	0.483	16.867
Money/GDP	0.124	0.097	0.184	0.000	3.102
Δ Money/GDP	0.004	0.004	0.125	-1.745	1.724
$\operatorname{Rem}/\operatorname{GDP}$	0.028	0.011	0.043	0.000	0.311
FSD(DEP)	0.292	0.253	0.190	0.000	1.242
FSD(EXF)	-0.414	-1.105	1.268	-1.767	2.603
Nb of observations			615		
Nb of countries			100		

Note: Outliers have been excluded.

	Inv/GDP	$\Delta ~{ m Dep}/{ m GDP}$	Bus cycle	GDP/cap	$\Delta \text{ Money/GDP}$	${ m Rem/GDP}$	FSD(DEP)	FSD(EXF)
Inv/GDP	1	1	2	1			~	~
Δ Dep/GDP	0.38	1						
Bus cycle	0.22	0.11	1					
GDP/cap	0.10	0.03	-0.11	1				
$\Delta Money/GDP$	-0.15	0.28	-0.04	-0.23	1			
${ m Rem/GDP}$	0.12	0.24	0.13	-0.27	0.05	1		
FSD(DEP)	0.06	0.15	-0.12	0.48	-0.04	0.02	1	
FSD(EXF)	-0.04	-0.04	0.04	0.32	-0.20	0.22	0.19	1

Table 4.10: Correlation table (cross-section sample)

FSD(EXF)								1
FSD(DEP)							1	0.25
${ m Rem/GDP}$						1	0.15	0.11
$\Delta \text{ Money/GDP}$					1	0.00	0.04	0.03
GDP/cap				1	0.00	-0.16	0.33	0.26
Bus cycle			1	0.06	0.04	0.13	0.18	0.07
$\Delta \ { m Dep}/{ m GDP}$		1	0.32	0.08	0.32	0.21	0.28	0.18
Inv/GDP	1	0.30	0.47	0.19	0.00	0.14	0.36	0.09
	Inv/GDP	$\Delta \text{ Dep/GDP}$	Bus cycle	GDP/cap	$\Delta Money/GDP$	${ m Rem/GDP}$	FSD(DEP)	FSD(EXF)

Table 4.11: Correlation table (panel data sample)

Table 4.12: Cross-section results: Conditional marginal effect of remittances on Δ deposit

FSD(DEP)							
min (0.03)	p05 (0.06)	p25 (0.16)	p50 (0.27)	p75 (0.42)	p95~(0.82)	$\max(1.03)$	
-0.07	-0.02	0.05	0.16^{**}	0.29^{***}	0.64^{***}	0.83^{***}	
(0.11)	(0.10)	(0.09)	(0.08)	(0.08)	(0.14)	(0.19)	

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Note: The table includes the marginal effects of remittances on investment, conditional on the FSD transaction cost measures. We calculated the marginal effects for various percentile values in the estimation sample, using the following relation:

$$\frac{d\Delta DEP}{dREM} = \delta_{Rem} + \delta_{Rem*FSD(DEP)}FSD(DEP)$$

Table 4.13: Panel-data results: Conditional marginal effect of FSD(DEP) on the remittances - investment relationship

			FSD(DEP)			
$\min(0.00)$	p05~(0.06)	p25~(0.15)	p50 (0.25)	p75~(0.37)	p95~(0.66)	$\max(1.24)$
2.63^{**}	2.30^{**}	1.80^{**}	1.27^{*}	0.62	-0.94	-4.03**
(1.09)	(0.98)	(0.81)	(0.66)	(0.53)	(0.68)	(1.78)
			FSD(EXF)			
$\min(-1.77)$	p05(-1.77)	p25(-1.10)	p50(-1.10)	p75 (-0.06)	p95~(2.60)	$\max(2.60)$
1.46^{**}	1.46^{**}	1.27^{*}	1.25^{*}	0.97	0.21	0.21
(0.72)	(0.72)	(0.66)	(0.66)	(0.59)	(0.58)	(0.58)

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; ***significant at 1%

Note: The table includes the marginal effects of remittances on investment, conditional on the FSD transaction cost measures. Each line assumes a median value on the other FSD measure. We calculated the marginal effects for various percentile values in the estimation sample, using the following relation:

 $\frac{d(dINV/dREM)}{dFSD(DEP)} = \beta_{Rem*FSD(DEP)} + 2*\beta_{Rem*FSD(DEP)^2}FSD(DEP) + \beta_{Rem*FSD(DEP)*FSD(EXF)}FSD(EXF)$

Table 4.14: Panel-data results: Conditional marginal effect of FSD(EXF) on the remittances - investment relationship

FSD(DEP)							
$\min(0.00)$	p05~(0.06)	p25 (0.15)	p50 (0.25)	p75~(0.37)	p95~(0.66)	$\max(1.24)$	
-2.68**	-2.70^{**}	-2.73**	-2.75^{**}	-2.79^{***}	-2.87***	-3.03***	
(1.08)	(1.08)	(1.08)	(1.08)	(1.08)	(1.08)	1.08	

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; ***
significant at 1%

Note: The table includes the marginal effects of remittances on investment, conditional on the FSD transaction cost measures. We calculated the marginal effects for various percentile values in the estimation sample, using the following relation:

$$\frac{d(dINV/dREM)}{dFSD(EXF)} = \beta_{Rem*FSD(EXF)}FSD(EXF) + \beta_{Rem*FSD(DEP)*FSD(EXF)}FSD(DEP)$$

Table 4.15: Panel-data results: Conditional marginal effect of remittances on Δ deposit

$\mathrm{FSD}(\mathrm{DEP})$							
$\min(0.00)$	p05 (0.06)	p25 (0.15)	p50 (0.25)	p75 (0.37)	p95~(0.66)	$\max(1.24)$	
0.35^{*}	0.34^{**}	0.34^{***}	0.33^{***}	0.32^{***}	0.30	0.27	
(0.19)	(0.16)	(0.12)	(0.09)	(0.10)	(0.22)	(0.52)	

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; ***significant at 1%

Note: The table includes the marginal effects of remittances on investment, conditional on the FSD transaction cost measures. We calculated the marginal effects for various percentile values in the estimation sample, using the following relation:

$$\frac{d\Delta DEP}{dREM} = \delta_{Rem} + \delta_{Rem*FSD(DEP)}FSD(DEP)$$

Figure 4.1: Cross-section results: The impact of remittances on investment as a function of Cost of Bank Depositing



Note: Values implied from regression are computed using the $50^{t}h$ percentile value for FSD(EXF) and GDP/cap

Figure 4.2: Cross-section results: The impact of remittances on deposit as a function of Cost of Bank Depositing



Note: Values implied from regression are computed using the $50^{t}h$ percentile value for GDP/cap
Figure 4.3: Panel-data results: The impact of remittances on investment as a function of Cost of Bank Depositing



Note: Values implied from regression are computed using the $50^{t}h$ percentile value for FSD(EXF) and GDP/cap





Note: Values implied from regression are computed using the $50^{t}h$ percentile value for FSD(DEP) and GDP/cap

Table 4.16: List of acronyms

Acronym	Meaning
CDEP	Cost of Bank Depositing
DEXF	Cost of External Finance
FDI	Foreign Direct Investment
FSD	Financial Sector Development
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
LSDV	Least Squares Dummy Variable
PPP	Purchasing Power Parity
UN	United Nations
US	United States
WDI	World Development Indicators (World Bank database)

Chapter 5

Conclusion

The overall objective of our thesis is to contribute to a better understanding of financial development. We are concerned about both determinants and macro-economic effects of financial systems.

Building on an already extensive and rich literature, we address, through three autonomous essays, focused research questions in relation to recent macro-economic trends in financial development globally.

The two first essays relate to the potential determinants of financial development.

In our first essay, we test for a potential role of culture, in particular, religious beliefs, in shaping financial systems around the world. To do so, we build on the recent phenomenon of Islamic finance. We focus on Islamic retail banking and on countries where Muslims account for at least 5% of the population, and construct an exclusive database of Islamic retail banking globally over the period 2000-2005. Our database also provides the starting year of Islamic banking in each country. We show that the provision of Shariah-compliant financial products – i.e., products that are compatible with Muslim beliefs – through Islamic retail banking institutions has been growing at an extremely rapid pace over the recent years. Using the rich variety of experiences across countries with a minimum Muslim population – from no Islamic finance, to "mixed" systems, or even "fully Islamic" banking systems – we conclude that countries which allowed Islamic banking institutions to operate enjoyed significant positive repercussions on financial development. The positive impact stems from the fact that, most of the time, Islamic finance triggers the development of a new, Shariah-compliant, banking sector, while at the same time not destructing the coexisting conventional banking sector. Moreover, Islamic finance seems to be most beneficial when it co-exists with the conventional banking system, and has a medium penetration. In particular, we find that the positive effects of Islamic finance become insignificant in countries where the penetration of Islamic finance is either negligible, or makes up a too large fraction of the total banking system.

Our second essay starts from the observation of a dramatic increase in emerging stock investments over the recent years. It reviews some important drivers behind international stock investment decisions. We analyze realized risk and return performances over a wide number of emerging market indices and extend the traditionallyused dataset to newly-covered – oftentimes also newly-accessible – "Frontier" markets. Over the observation period (1981 through mid-2008), we do not find evidence of significantly higher returns in emerging versus developed indices. Depending on the period or geographies, emerging market returns have historically sub- or outperformed developed markets'. This is true for "Frontier" as well as "non-Frontier" emerging markets. On the stand-alone risk parameters, we confirm standard literature results in both types of emerging markets, namely, the international investor is subject to highly volatile returns, and to significant return surprises, i.e., extreme events, good or bad (the latter feature is common to emerging and developed areas). On the correlations, the key risk parameter in the context of portfolio investments, we also confirm two well-known facts: Investors enjoy a comparatively lower correlation with the rest of the world in emerging versus developed markets, however, correlations are rising through time. Besides, we observe that correlations are lower, and hence diversification benefits higher, in the "Frontier" markets. We show that, therefore, the inclusion of "Frontier" stocks in a global portfolio allows to reach higher return-to-risk ratios. Finally, we draw the international investor's attention to the fact that average correlations between "Frontier" markets and the rest of the world have been increasing at a more rapid pace than in the "non-Frontier" emerging markets. Therefore, we warn that one may not receive as high diversification benefits from "Frontier" markets in the future as one received in the past.

The last essay relates to the effects of financial systems.

It is dedicated to the impact of remittances in the developing countries that receive them. Given the increasing relative importance of remittances as a source of funds in developing countries, a growing literature studies the domestic impact of remittance flows. Even if the recent findings agree that the financial development matters in the relationship, the empirical literature provides contradictory evidence about the role of financial development in mediating the remittances-growth relationship. We provide a theoretical model that takes into account several aspects of financial system development, such as the easiness to open a bank account, and the openness to international capital – two features usually associated with greater financial development. We show that, depending on the aspect considered, financial development may either accelerate or weaken the transmission mechanism of remittances into higher domestic investment. Our empirical tests confirm the predictions of the model that decreasing hurdles to bank account opening facilitate productive uses of remittances in the economy, whereas a higher international openness of the financial system weakens the domestic impact of remittances.

Through these three essays, our research contributes to the existing literature in three main aspects.

First, we participate in recent improvements on the data front, led by several authors and by departments of international institutions, such as the "Financial and Private Sector" Research Group of the World Bank. Improving the quality and the coverage of data is indeed one of the major ways to push forward our knowledge about financial development. We contribute to this in two ways. One way is to put existing datasets together. In the second essay, we extend the traditional analysis of emerging stock markets to the newly-covered "Frontier" markets, and confront standard literature results across the two groups of markets. A second way is to propose and construct an original database. In the first essay, our analysis of the impact of Islamic banking on financial development requires detailed information on the timing of establishment and size of Islamic retail banking. We therefore construct and use a unique database, the "IFIRST", "Islamic Finance Recording and Sizing Tool", which covers all Islamic retail banking institutions (including the Islamic "windows" of conventional banks) globally over the period 2000-2005. The raw input data include annual reports of Islamic institutions, and other, web- or paper-based, information sources. Information available include timing indicators (such as the starting date, or "conversion" date of each Shariah-compliant institution), size indicators (total assets

or deposits), and others that were not used yet in the context of the present research (for example, efficiency indicators such as the profitability of the institutions, and the number of employees). The content of the database (for example, the list of institutions) was discussed and validated with a series of industry experts. To our knowledge, such a comprehensive and consistent database is unique in the Islamic banking industry.

Second, insofar our data allow us, we make use of several quantitative techniques, in order to establish the robustness of our results across various econometric tools. Our first essay uses cross-section (with and without instrumental variables), panel and differences-in-differences regressions. The last essay resorts to both cross-section and panel regressions to validate the empirical predictions of our theoretical model.

Third, when helpful given the current state of the literature, we propose an original theoretical model before testing its predictions empirically. This is the case in the last essay, where we develop a theoretical two-period model of investment and loanable funds, in the presence of transaction costs and international openness.

As was done in the respective chapters, it is important to highlight some limitations of this work.

A first type of limitations relates to the scope of our research. Throughout our work, we mostly use data aggregated at the country level. Hence, our research does not address issues of within-country inequalities, such as the impact of financial development on inequalities in economic revenues or human development. These questions of crucial importance in an economic development process are addressed in a distinct and quickly growing literature. Nor do we examine, in the present work, how potential changes or reforms in financial systems should be implemented. In particular, the analysis of the consequences of liberalization processes, an equally important question in the financial development literature, is left out of the scope of the present study.

Another important limitation to our empirical work is caused by the limited availability and quality of some data proxies. Even though lots of progress have been made on the data in the recent years, the quality of some data proxies used in the present work may be discussed. They should, and will probably, be further challenged in future research pieces. Finally, we mostly use macro-economic data, and not micro data such as surveybased or experiment-based data on institutions or individuals. The advantage is that we are able to capture spill-over effects of financial development. The drawback is that it may be difficult to identify or disentangle between the channels through which the effects take place.

Ultimately, avenues for further research in the fascinating field of finance and growth are manifold. We focus on three of them here.

As we have tried to show above, the determinants of financial systems are diverse. We believe that better understanding the role of culture (e.g., durable beliefs or values transmitted not only by religious, but also by ethnic traditions) in shaping financial systems is a promising research field. Our study of Islamic finance is one of the first quantitative studies in the topic. Further work is therefore needed to reinforce or challenge our findings and interpretations. In particular, the question of the channels through which Islamic finance affect financial development is still open. Also, very few research is available on the role of Islamic finance in a predominantly non-Muslim environment. Nonetheless, policy-makers are in desperate need of evidence and fact-based recommendations on how to deal with a demand for Shariah-compliant products, in both Muslim or non-Muslim areas. Additionally, the impact of alternative religious or ethnic beliefs, such as the diverse conceptions of risks, on financial systems are nearly unspoiled areas.

Another area which leaves a lot of room for improvement is the adequate measuring of financial development. For instance, although recent papers show that a larger banking system goes hand in hand with lower transaction costs, one would greatly benefit from more direct proxies of transaction costs and its various forms (e.g., the barriers of access, affordability, and eligibility). Such data start to be available over a larger cross-section of countries, but unfortunately nearly always lack a time dimension. The rarity of micro data is another challenge to be overcome. As an illustration, the variable "trust in the banking system" was only recently added to the World Values Survey questionnaires and remains, at this stage, empty for all countries but one. Combined with the very rich individual information already available in the Survey (e.g., on socio-economic, demographic, ethnic, religious, or values-linked features), such a variable, if available over a large panel of countries and individuals, could help reveal interesting mechanisms about financial systems.

Finally, the links between finance and growth can take many forms. Given the recent historical trends, a large part of the literature has analyzed the determinants and consequences of financial development in the context of economic growth and gradual improvements in financial systems on many fronts. The global 2008 financial crisis has modified this paradigm, and suggests that too large financial systems may also become fragile. We believe it is crucial to also understand the effects of a decrease in financial development. It is now too early to conclude about an ongoing crisis and to clearly identify losers and, possibly, winners. Lots of research may be expected going forward on the financial crisis. Let us hope that it will be strong enough to provide additional insights on how to best organize financial systems in the world, and pave the way towards improved financial stability and human prosperity.

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List of Tables

2.1	Cross-section: IF effect on total banking development
2.2	Cross-section: IF effect on conventional banking by country
	group
2.3	Change in the ratio of private credit (deposits) to GDP following a
	change in number of Islamic institutions
2.4	Panel-data: IF effect on total banking development
2.4	Sample description features
2.5	Summary statistics - Cross-section sample
2.6	Summary statistics - Cross-section sample (countries with Islamic fi-
	nance)
2.7	Correlation table
2.8	List of acronyms
3.1	Macro indicators: Developing vs. developed countries
3.2	Macro indicators, per emerging stock market group
3.3	Mean returns - Summary statistics
3.4	Returns volatility - Summary statistics
3.5	Returns normality - Summary statistics
3.6	Return correlation coefficients with the MSCI World - Summary statistics 95
3.7	List of emerging stock markets in the world and typology 109
3.7	List of emerging stock markets in the world and typology (con't) $\ . \ . \ . \ 110$
3.7	List of emerging stock markets in the world and typology (con't) $\ . \ . \ . \ 111$
3.8	Stock returns summary statistics (monthly log-returns) - Recent period
	(96-08)
3.9	Stock returns summary statistics (monthly log-returns) - Early period
	(81-96)

3.10	Stock returns summary statistics (monthly log-returns) - Full period
	(81-08)
3.11	Stock returns summary statistics (monthly log-returns) - Region averages 115 $$
3.12	Literature review - Synoptic table
3.12	Literature review - Synoptic table (con't)
3.12	Literature review - Synoptic table (con't)
3.13	Correlation table - Major markets (96-08) $\ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots 119$
3.14	Correlation table - Frontier markets (96-08) $\ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots 120$
3.15	List of acronyms
4.1	Cross-section empirical results - Investment equation
4.2	Cross-section results: Conditional marginal effect of remittances on
	investment
4.3	Cross-section results: Conditional marginal effect of $FSD(DEP)$ on the
	remittances - investment relationship
4.4	Cross-section results: Conditional marginal effect of $FSD(EXF)$ on the
	remittances - investment relationship
4.5	Cross-section empirical results - Deposit equation
4.6	Panel empirical results - Investment and deposit equations
4.7	Panel-data results: Conditional marginal effect of remittances on in-
	vestment
4.8	Summary statistics - Cross-section data, 3-year averages over the pe-
	riod 2002-2004
4.9	Summary statistics - Panel data, 3-year averages over the period 1975-
	2004
4.10	Correlation table (cross-section sample) $\ldots \ldots \ldots$
4.11	Correlation table (panel data sample) $\ldots \ldots 161$
4.12	Cross-section results: Conditional marginal effect of remittances on Δ
	deposit
4.13	Panel-data results: Conditional marginal effect of FSD(DEP) on the
	remittances - investment relationship
4.14	Panel-data results: Conditional marginal effect of $FSD(EXF)$ on the
	remittances - investment relationship

4.15	Panel-data results:	Condit	ional	mar	ginal	effect	of r	emitta	ances	on Z	7
	${\rm deposit}\ .\ .\ .\ .$										163
4.16	List of acronyms .										166
5.1	List of acronyms .										195
5.1	List of acronyms (co	ont'd)									196

List of Figures

2.1	Islamic finance summary statistics
2.2	Islamic finance summary statistics (con't)
3.1	Portfolio mean - Value-At-Risk optimization using historical values 98
3.2	5-year rolling correlation (Major-MSCI World) $\ldots \ldots \ldots \ldots \ldots \ldots 121$
3.3	5-year rolling correlation (Frontier-MSCI World) $\hfill \ldots \hfill 121$
3.4	5-year rolling correlation (S&P500-MSCI World)
4.1	Cross-section results: The impact of remittances on investment as a
	function of Cost of Bank Depositing
4.2	Cross-section results: The impact of remittances on deposit as a func-
	tion of Cost of Bank Depositing
4.3	Panel-data results: The impact of remittances on investment as a func-
	tion of Cost of Bank Depositing
4.4	Panel-data results: The impact of remittances on investment as a func-
	tion of Cost of External Finance
5.1	Overall trends - GDP per capita, HDI \hdots
5.2	Overall trends - Banking sector, Islamic banking sector, Stock market
	capitalization
5.3	Overall trends - Foreign direct investments (FDI), portfolio invest-
	ments (PI), and remittance inflows

Acronyms

Table 5.1: List of acronyms

Acronym	Meaning
AAOIFI	Accounting and Auditing Organization for Islamic Financial Institutions
ADR	American Depositary Receipt
ARDA	Association of Religious Data Archives
CAPM	Capital Asset Pricing Model (Sharpe, 1964; Lintner, 1965; Mossin, 1966)
CDEP	Cost of Bank Depositing
CEXF	Cost of External Finance
CIBAFI	General Council for Islamic Banks and Islamic Financial Institutions
CIA	Central Intelligence Agency
DAX30	Deutscher Aktien IndeX (German stock index, 30 companies)
EAFE	Europe, Australasia, and Far-East (MSCI index)
EMDB	Emerging Markets Database (S&P database, formerly IFC)
EU	European Union
FDI	Foreign Direct Investment
FEAS	Federation of Euro-Asian Stock Exchanges
FSAP	Financial Sector Assessment Program (IMF and World Bank)
FSD	Financial Sector Development
FTSE100	Financial Time Stock Exchange index (UK stock index, 100 stocks)

Acronym	Meaning
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
GMM	Generalized Method of Moments
GNI	Gross National Income
IF	Islamic Finance
IFIRST	Islamic Finance Recording and Sizing Tool
IFS	International Financial Statistics (IMF database)
HDI	Human Development Index (UNDP)
HDR	Human Development Report (UNDP)
IFC	International Financial Corporation (World Bank Group)
IFS	International Financial Statistics (IMF database)
IMF	International Monetary Fund
LLSV	La Porta, Lopez-de-Silanes, Shleifer and Vishny
LSDV	Least Squares Dummy Variable
MSCI	Morgan Stanley Capital International (stock exchange information, indices)
n/a	not applicable (or, not available)
OIC	Organization of the Islamic Conference
OLS	Ordinary Least Squares
PI	Portfolio Investment
PLS	Profit and Loss Sharing
PPP	Purchasing Power Parity
S&P	Standard & Poor's (stock exchange information and rating agency)
S&P500	Standar & Poor's 500 (index of 500 US stocks)
S&P Europe 350	Standar & Poor's Europe 350 (index of 350 European stocks)
TOPIX100	Tokyo Stock Price Index (100 stocks)
UN	United Nations
UNDP	United Nations Development Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
US	United States
USD	United States Dollar
VAR	Value-At-Risk
WDI	World Development Indicators (World Bank database)

Table 5.1: List of acronyms (cont'd)

Appendix

The present section gives an overview of salient recent macro-economic trends in economic and financial development, over the last two to three decades. We chose to present only a few indicators for the clarity of the global picture. The data presented below are country group aggregates¹– that is, weighted averages – over time, for the world or developing countries as a whole². All graphs are scaled in logarithm, as we are interested in the evolution – the relative growth or decline – in the various indicators over the recent years. We do not expand here on the definitions of the indicators. Further details on the construction of theses measures and a critical look on their content are given in the respective chapters.

Figure 5.1 depicts the recent evolution in economic and human welfare using two indicators, a purely monetary indicator, gross domestic produc (GDP) per capita, and the Human Development Index (HDI), which is a combined measure of monetary wealth, education and life expectancy at birth. GDP per capita data are expressed in constant purchasing power parity (PPP³) dollars, and hence comparable across countries and over time. The HDI, constructed by the United Nations Development Programs (UNDP), is a normalized index ranging from 0 to 1, that is comparable over time.

¹We only include countries with a consistent history of data over the indicated coverage period. This ensures that the changes over time in the presented measures are not due to modifications in the country mix.

 $^{^{2}}$ We define a "developing" country as a "low or middle income" country as per the World Bank's definition. Data presented in the current section use the country classification established in July 2009 by the World Bank. According to that classification, "low or middle income" countries are the ones with a GNI per capita lower or equal to 11,905 USD in 2008. The final list comprises of 144 countries out of a total of 211.

³US dollar PPP data adjust for differences in the prices of products or services from a country to another. One US dollar PPP has the same purchasing power in each economy as one US dollar in the United States. We use the PPP data recently published by the World Bank and available yearly from 1980 (World Bank, 2009). Those are drawn from the 2005 International Comparison Program, which brought significant improvements in the quality of PPP data (World Bank, 2008).

Figure 5.2 presents common indicators of banking sector and stock markets development, respectively, the ratio of deposit-money bank assets to GDP, and the ratio of stock market capitalization to GDP. Additionally, we include an original indicator of the Islamic deposit-money bank assets to GDP. The latter is provided on the subset of countries with at least 5% Muslim population.

Figure 5.3 shows in parallel the evolution over time of key cross-border financial inflows, namely, foreign direct investments, portfolio investments, and remittances flows, all scaled to GDP.



Figure 5.1: Overall trends - GDP per capita, HDI

Sources and coverage: GDP data cover all countries (using World Bank extrapolations on missing data) and are from World Development Indicators (World Bank, 2009); HDI data cover 73 countries (44 developing) and are from the United Nations Development Report (UNDP, 2008).



Figure 5.2: Overall trends - Banking sector, Islamic banking sector, Stock market capitalization

Sources and coverage: deposit-money bank assets to GDP data cover 97 countries (71 developing) and are from Beck, Demirgüç-Kunt and Levine (2000, updated 2009); Islamic banking data are exhaustively collected by the "Islamic Finance Recording and Sizing Tool" (IFIRST, 2006); muslim population data cover nearly all countries and are from the Association of Religion Data Archives (ARDA, 2005); stock market capitalization to GDP data cover all countries (using World Bank extrapolations on missing data) and are from World Development Indicators (World Bank, 2009).

Figure 5.3: Overall trends - Foreign direct investments (FDI), portfolio investments (PI), and remittance inflows



Sources and coverage: foreign direct investment data cover 85 countries (58 developing) and are from the International Financial Statistics (IMF, 2008); portfolio investment data cover 47 countries (23 developing) and are from the International Financial Statistics (IMF, 2008); remittance to GDP data all countries (using World Bank extrapolations on missing data) and are from World Development Indicators (World Bank, 2009).