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## UNIVERSITE LIBRE DE BRUXELLES FACULTE SOLVAY BRUSSELS SCHOOL OF ECONOMICS AND MANAGEMENT

Thèse présentée en vue de l'obtention du grade de Docteur en Sciences Economiques et de Gestion sous la co-direction des Professeurs Marc Labie et Daniel Traça

**Ritha Sukadi Mata** 

## **MICROFINANCE AND REMITTANCES**

#### Jury:

Professeur André Farber, Université libre de Bruxelles Professeur Niels Hermes, University of Groningen Professeur Marc Labie, Université libre de Bruxelles et Université de Mons Professeur Mathias Schmit, Université libre de Bruxelles Professeur Ariane Szafarz, Université libre de Bruxelles Professeur Daniel Traça, NOVA School of Business and Economics Professeur Bruno van Pottelsberghe, Université libre de Bruxelles

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#### 4

#### INTRODUCTION AND SUMMARY OF THESIS

Remittances (money sent home by migrants) to developing countries are estimated to have reached US\$ 325 billion in 2010 (World Bank, 2011). These amounts reflect only officially recorded transfers, transferred through formal channels and calculated as the sum of three items of the Balance of Payments Statistics, namely: compensation of employees, workers' remittances and migrants' transfers (Salomone, 2006; Aggarwal *et al.*, 2011). Unrecorded remittances could represent 50 to 100% of recorded flows (World Bank, 2006; Hagen-Zanker and Siegel, 2007).

Remittances are three times the size of official development assistance (ODA) and the second source of external funds after foreign direct investment (FDI) for developing countries.<sup>1</sup> Given their weight in receiving countries' economies and household livelihood in many developing countries (for instance, remittances flows represent more than 25% of Lesotho' and Moldavia's gross domestic product in 2008), there is increasing policy and research interest in remittances as development resource. Furthermore, unlike FDI and ODA, remittances have the particularity to be directly affected to families, even those in remote areas, where development funds don't arrive (Shaw, 2006). The thesis addresses the relationship between microfinance and the impact remittances have on domestic investment in developing countries.

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; Acosta *et al.*, 2008). However, as remittances may be either directly consumed (remittances allow

<sup>&</sup>lt;sup>1</sup>Since 1997, remittances flows to entire group of developing countries (low and middle income countries) are more important than ODA, and FDI are still the most important inflow for this group of countries. But if we take only low-incomes countries, remittances now constitute the most important inflow, with ODA second in magnitude. For only sub-Saharan countries, we observe that ODA flows are more important than both FDI and workers remittances in the group (Toxopeus and Lensink, 2007).

households to smooth their consumption, see for instance Lucas and Stark, 1985 and Glytsos, 2005) or used to invest in physical and human capital, it appears that their impact on domestic investment is perceived to be low or limited, given the amount of money they represent each year. According to literature, this is due to the small share that is dedicated to the launch or the support of economic activities. Actually, the allocation between consumption and investment, which depends on various factors such as the level of dependence households have with remittances, the migrant gender, and the existence of a credit constraint, varies on average around 10-20% of remittances that are not directly consumed (Salomone, 2006; Sorensen, 2004; Orozco, 2004). In the thesis we focus on the share of remittances that is saved and wonder how to maximize its impact, whatever this share. We are interested in the role of microfinance institutions, as actors of the financial sector, on this issue. Actually, two recent contributions, Mundaca (2009), and Giuliano and Ruiz-Arranz (2009), stress the role of the development of the financial sector. More precisely, the thesis focuses on a set of questions or issues that may be important for the microfinance industry to consider when interested in remittances flows and the deposits they may generate.

Financial development is generally defined as "increasing efficiency of allocating financial resources and monitoring capital projects, through encouraging competition and increasing the importance of the financial system. In other words, the development is about structure, size and efficiency of a financial system" (Huang, 2006). A large line of research work provides evidence that development of a financial system is a key driver of economic growth.

King and Levine (1993) argue that greater financial development increases economic growth. Levine and Zervos (1993) shows that growth is related to stock market activity, among other variables. Levine (1999) finds a significant effect of determinants of financial intermediation on economic growth. Beck *et al.* (2004) find strong evidence in favor of the financial-services view which stresses that financial systems provide key financial services, crucial for firm

creation, industrial expansion, and economic growth. Levine (1997), Levine *et al.* (2000), and Beck *et al.* (2000) also stress the impact of financial development on growth. There is also an empirical literature that argues that the expansion and the deepening of the financial system lead to higher investment (see for instance Rajan and Zingales, 1998; Demirgüç-Kunt and Macksimovic, 1998).

By providing financial services to people whom traditionally do not have access to financial institutions, microfinance institutions (MFIs) may contribute to increasing the size of the financial system in many developing countries. Actually, according to the CFSI's 2011 report, the one thousand-plus MFIs that report to the Microfinance Information eXchange (MIX) have 88 million borrowers and 76 million savers. Total assets of these MFIs amount to US\$ 60 billion (CFSI, 2011).

The quite recent literature on remittances, financial development and growth can be categorized under two main approaches (Brown *et al.*, 2011). One approach explores the relationship between remittances and financial development, with a view to assessing their impact on the level of financial development in receiving countries. The underlying argument is that remittances potentially contribute to financial development through both demand- and supply- side effects: by increasing households' demand for and use of banking services, and by increasing the availability of loanable funds to the financial sector. According to this approach which consider the direct relationship between remittances and financial development, remittances have an impact on both financial outreach and depth in receiving countries, respectively through the fostering of financial literacy among remittances receivers and through the increasing availability of funds (see for instance Gupta *et al.*, 2009, Aggarwal *et al.*, 2011, Brown *et al.*, 2011).

The second approach examines the remittances – financial development relationship indirectly by investigating how the given level of financial development in a country affects the impact of remittances on growth. This growth-focused approach allows for interactions between remittances and financial development in estimating growth equations for remittances receiving countries. Within the set of studies related to this approach, two opposing positions have emerged. The first position hypothesizes that the greater availability of financial services helps channel remittances to better use, thus boosting their overall impact on growth. Remittances are seen as financial flows in search of good investment projects, and good financial institutions are needed to facilitate the channeling of remittances to such investments. In this sense, remittances and financial system are complements. This position is supported by Mundaca (2009) who find that financial intermediation increases the responsiveness of growth to remittances in Latin America and the Caribbean over the 1970-2002 period. Other few studies also argue that channeling remittances through the banking sector enhances their development impact (see for instance Hinojosa Ojeda, 2003 and Terry and Wilson, 2005).

The other position argues that remittances contribute to investment and growth by substituting for inefficiencies in credit and capital markets. Remittances provide an alternative source of funding for profitable investments by alleviating liquidity constraints. In this sense, remittances promote growth more in less financially developed countries by substituting for lack of credits from financial institutions. This hypothesis is supported by Giuliano and Ruiz-Arranz (2009) who argue that poor households use remittances to finance informal investment in poorly developed financial markets with liquidity constraints. In their study, they interact remittances with a measure of financial development in standard growth equations, for a sample of 73 countries over the 1975-2002 period. Ramirez and Sharma (2009) obtain similar results using data from 23 Latin American countries over the 1990-2005 period.

The thesis contributes to existing knowledge on this indirect, growth-focused approach. Given the two existing opposite views on remittances impact on investment and the level of financial intermediation (a high level of financial development implies a high level of financial intermediation), in the thesis we first analyze the relationship that links these variables. We then analyses questions related to microfinance institutions (MFIs), as financial intermediaries.

Our focus on microfinance is made from two different perspectives, leading to different research questions. First, from the demand or microfinance clients' perspective, we question about the interest for them to have MFIs entering the money transfers market (through the money transfer facilities and/or financial products that may be directly linked to remittances). The underlying argument is that MFIs enter the remittances market by providing money transfer services because there is a need for such services (and for other financial services) from their (potential) clients who are remittances receivers and migrants. According to this point of view, MFIs can contribute to recycle remittances flows into the financial system by contributing to the financial inclusion of remittances receivers and migrants thanks to the supply of adapted financial products. The occurrence of this assumption can therefore be measured by considering the involvement of MFIs on the remittances market as a determinant of financial inclusion indicators. Second, from the supply or MFIs' perspective, we question about the rationale for MFIs to enter the remittances market. Here, the underlying argument is that MFIs are interested in operating on the remittances market because working with migrants can potentially contributes to the improvement of their financial and social performances. According to this perspective, remittances market opportunities as well as MFIs' characteristics will determine the offer of money transfer services by MFIs. This supply approach therefore leads to the consideration of money transfers activities in MFIs as depending on remittances market opportunities and institutional variables.

Therefore, our papers related to microfinance will be articulated around these two questions (interest for clients and rationale for MFIs to have MFIs operating on the money transfers industry) by focusing, as argued earlier, on the deposits resulting from remittances flows.

As a matter of facts, by studying the relationship between microfinance and remittances respectively through the demand and the supply perspective, we raise causality issues related to MFIs' money transfer activities and their impacts on MFIs performances. Actually, MFIs' characteristics such as the right to collect public savings, as a potential source of efficiency gains, may significantly determine the supply of a money transfer service (MFIs' perspective), while a money transfer service may itself be the determinant of some MFIs' performance indicators related to financial inclusion, such as the volume of deposits made by clients (demand approach). However, given currently existing data on MFIs' involvement on the remittances market we cannot consider simultaneously both perspectives in order to implement causality treatment techniques. Actually, the indicator of MFIs' involvement we will use in our regressions is time invariant, therefore we are not able to build instrumental variables for instance (such as lagged values of our variable of interest) to eliminate econometric issues in our regressions. Nevertheless, through these two approaches taken separately, we contribute to some extend to the knowledge by putting in perspective different issues at stake for the microfinance industry.

Before we tackle our research questions we have an introductory chapter related to remittances flows: what are their trends, determinants and characteristics? The chapter also includes the definition of money transfer activities that we will use in the thesis, as well as an overview of MFIs' involvement on the money transfers market.

Then, our research framework is divided into 4 sub-questions. The first one, treated in Chapter 2, is about the relationship between our variables of interest. What is the impact of

the financial sector development (FSD) on the remittances' impact on investment? This chapter aims at stressing the relationship existing between financial intermediation and remittances' impacts on investment, which motivated our focus on MFIs (as financial intermediaries between remittances and the formal economy) in the following chapters. We focus on two transaction costs that decline with FSD. The first is the "Cost of Bank Depositing", henceforth CDEP, which measures the difficulties of savers, particularly the less well-off, of depositing their savings in the formal banking system. 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 notably associated with the robustness of the country's financial sector. In a stylized model of the lendable funds market, we analyze how both these variables affect the marginal effect of remittances on investment. We test model's propositions using country-level data on remittances, investment, and proxies for both CDEP and CEXF, on a sample of 100 developing countries. We perform empirical tests using both cross-section and panel-data with country fixed effects, over the period 1975-2004. The results 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. We find that remittances flows stimulate local investment, as a part of remittances indeed become banks' deposits, which increases the availability of lendable funds, reduces the interest rate and stimulates investment. In terms of policy implication, results suggest that enhancing financial sector development is crucial as it allows remittances to better fuel domestic investment. This is even truer when the access to international funds is difficult or costly. Improving the financial inclusion of remittances receivers by developing domestic banks' ability to collect their savings is then a straightforward recommendation to policymakers who want to improve remittances impact on investment.

The second question, developed in Chapter 3 is related to the demand perspective of the relationship between microfinance and remittances. We want to assess whether there is a need from remittances receivers for financial products that may be linked to remittances. We aboard this question by assessing whether the supply of MTA leads to higher volume of deposits mobilized by MFIs, meaning that MFIs actually contribute or succeed in turning remittances into deposits. Using an original database of 114 MFIs -operating in Latin America and the Caribbean (LAC), South Asia (SA), East Asia and the Pacific (EAP), and Africa-, we perform empirical tests to study whether MFIs are able to capture migrants' savings thanks to their money transfer activity. We test the impact of money transfer activity on deposits, using the natural logarithm of deposits as explained variable. Our main result suggests that money transfer activity has a significant positive impact on savings collection. MFIs involved in the remittances market thus attract more savings than MFIs that are not involved in it, probably coming from migrants and remittances receivers who are in need of adapted financial services. This confirms the opportunity MFIs may represent as a tool or a channel to improve remittances impact on investment. In that sense, MFIs should then be encouraged to operate on the remittances market, and to design financial products dedicated to migrants and remittances receivers.

The third question, developed in Chapter 4, is related to the supply approach of the relationship between remittances and microfinance. More precisely, we try to identify factors that seem to explain the availability of such service in the scope of services provided by MFIs. In this chapter, we focus first on potential sources of efficiency gains linked to the money transfer activity as a rationale for diversification (i.e. the expansion of the offer). And second, using an original database of 435 MFIs –operating in Latin America and the Caribbean (LAC), South Asia (SA), East Asia and the Pacific (EAP), and Africa–, we perform empirical tests using cross-section over the year 2006, to identify which environmental and institutional

parameters have an impact on the willingness of a MFI to provide a money transfer service. We test the impact of various variables that are related to one of the rationale for MFIs to enter the money transfer market, namely economies of scale and scope as a source of efficiency gains, on the probability to have a money transfer service provided by a given MFI. Our main result suggests that the size, as well as the fact that an MFI collects savings have a positive and significant impact on this probability, while the level of financial development negatively impact it. This confirms among other things that the ability to realize economies of scale through a potential increase of collected deposits may be a determinant of managers' choice to diversify. Policies that contribute to reduce entry barriers in low financially developed countries should then, among other things, be encouraged to have MFIs fully playing their role of intermediaries between remittances and the (formal) economy.

The chapter 5 questions about the institutional consequences for MFIs to collect migrants' savings. The aim of this chapter is to give an insight on the opportunity migrants' money (including remittances) could represent for the microfinance industry as a source of stable medium- and long-term funds. It is therefore related to the supply approach and the motivation for MFIs to enter the remittances market by analyzing the impact of migrants' deposits (which include remittances) on another potential source of efficiency gains, namely the internal capital market. Through a case study approach, this chapter is devoted to the analysis of funding risk in microfinance, comparing migrants' and locals' time deposits. Migrants' time deposits are expected to be of longer term and more stable (in terms of early withdrawals) than locals' deposits. This assumption had never been tested yet. Based on an original database of 7,828 deposit contracts issued between 2002 and 2008 by 12 village banks belonging to a major Malian rural microfinance network (PASECA-Kayes), we used the Cox proportional hazard model to identify the variables that have an impact on the probability to have early withdrawals, and the technique of re-sampling to calculate

withdrawal rates and deposits at risk. Results from the Cox methodology suggest that the migration status is not a direct determinant for the probability to have an early withdrawal. However, this probability increases with the amount deposited and the term of the contract which are both higher for migrants compared to non-migrants. The re-sampling method results suggest that withdrawal rates are not the same for the two categories of depositors observed. We find higher withdrawal rate distributions for migrants than for locals. The value at risk is also higher on migrants' deposits than on locals' deposits. However, as migrants tend to deposit for longer term than locals, through the calculation of durations we have measured to which extend migrants' deposits still have a positive impact on MFIs' liabilities. It appears that migrants' money has a marginal but positive impact on time deposits durations, either when considering early withdrawals, which impacts are very limited, except in 2007 (the worst year in terms of amount withdrawn early). As our results show that MFIs that receive migrants' deposits are not necessarily better-off than without migrants' money in terms of funding risk - and durations - this paper has stressed the importance of assessing more carefully the role of migrants for the microfinance industry.

# Chapter 1

## Remittances: Definition, Stylized facts and Money transfers in Microfinance

Remittances: Definition, Stylized facts and money transfers in Microfinance

#### I. Introduction

Remittances represent the money that migrants earn working abroad and send back to their home country. They are calculated as the sum of three items of the Balance of Payments Statistics (BOPSY), namely: compensation of employees, workers' remittances and migrants' transfers (Salomone, 2006; Aggarwal *et al.*, 2011).

The first item is included in the subcategory "income" and comprises salaries, wages and other benefits earned by individuals in economies other than those in which they are residents. The second belongs to the subcategory "current transfers" and comprises transfers by migrants who are employed in new economies and are considered as residents there<sup>2</sup>. Finally, the third item is included in "capital transfers". This item is made up of three components: the flow of goods (personal effects) accompanying the migrant, his flow of financial assets and the change in the stock positions due to the change in his residence status.<sup>3</sup>

The data contained in the BOPSY are far from being perfectly estimated. Actually, aggregated data are subject to variations of compilation on a national basis as a consequence of a variety of concept and methodologies across countries.<sup>4</sup> Furthermore, data sourcing and compilation is better in some countries than others, leading to the fact that some countries do not report all items or do not send any data at all. Finally, in most of the cases, data weaknesses and omissions depend on the difficulties in obtaining the necessary data, because many

 $<sup>^{2}</sup>$  "A migrant is a person who comes to an economy and stays there, or is expected to stay, for a year or more". Individuals leaving their country with the intention of living in a new economy for a year or more will be considered residents of the new economy, with a few exceptions, for instance: students, military personnel, medical patients and diplomats (Salomone, 2006).

<sup>&</sup>lt;sup>3</sup> Migrants' remittances are present in the current account (through incomes and current transfers) and the capital account (through capital transfers) of the Balance of Payments.

<sup>&</sup>lt;sup>4</sup> Some countries still consider their nationals working abroad for a year or longer as national residents (and therefore their earnings as compensations of employees) because they maintain strong linkage with their home country (Salomone, 2006).

remittances senders and receivers remain outside the economic mainstream (Orozco, 2007). Actually, remittances can also be transferred through informal channels, from which the flows cannot be collected systematically<sup>5</sup>. Therefore, any data comparison has to be approached with caution.

However, in the absence of other alternatives, researchers use data from the BOPSY to conduct studies on remittances. Based on these data, this chapter gives an overview of what we know about remittances flows, respectively in terms of trends, determinants and characteristics. And the last section is related to microfinance and gives an overview of the involvement of MFIs in the remittances market.

#### II. Stylized facts

Worldwide remittances flows amounted USD 440 billion in 2010, which represents an increase of more than 200% over the last decade (World Bank, 2011). As argued earlier, these amounts reflect only officially recorded transfers (remittances transferred through formal channels and recorded in the items of the BOPSY). Amounts including unrecorded flows through formal and informal channels are believed to be significantly higher. The World Bank states that remittances sent through informal channels could double official statistics (World Bank, 2006). In the same idea, Hagen-Zanker and Siegel (2007) consider that unrecorded remittance flows can be as high as 50% of total remittance flows.

Table 1 gives an overview of remittances inflows and outflows over the last 30 years, by regions. First of all, it is worth mentioning that the importance of money transfers has been revealed 10 years ago, when new methodologies for their estimation have been implemented.

<sup>&</sup>lt;sup>5</sup> In sub-Saharan Africa, in general the use of informal channels is more widespread than the use of formal channels. For instance, in Uganda formal channels are used only in 20% of the cases, while in the Dominican Republic the percentage of cases where formal channels are used is 96% (see Toxopeus and Lensink, 2007).

This has lead to estimations that were, for some countries, up to 50 times higher than previous estimations made by the World Bank and the International Monetary Funds. Therefore, the changes in estimation methodologies explain a part of the growth rates observed in remittances flows. Migration flows also partly explain remittances flows growth rates.

Inflows	1980	1990	2000	2005	2010e	Change 2005- 10
All developing countries	17.7	30.8	81.2	192	325	69%
East Asia and Pacific	1.04	3.08	15.8	50.3	91	82%
Europe and Central Asia	2.07	3.24	10.3	23.2	36.7	58%
Latin America and Caribbean	1.91	5.69	20.1	50.1	58	15%
Middle-East and North Africa	6.04	11.3	13	25	35.4	41%
South Asia	5.29	5.57	17.2	34	82.5	142%
Sub-Saharan Africa	1.4	1.88	4.63	9.4	21.4	127%
High income OECD	18.3	36.4	48.4	77.2	107.2	39%
High income non-OECD	0.6	1.03	1.8	5.53	7.36	33%
World	36.7	68.3	131.5	275	440	60%
Outflows	1980	1990	2000	2005	2009e	Change 2005- 09
All developing countries	5.91	5.17	9.54	33	58.7	78%
High income OECD	17.3	44.3	75.5	127.8	175.4	37%
High income non-OECD	5.67	14.1	23.4	24.5	48.7	98%
World	28.9	63.6	108.4	185.3	282.5	52.4%

Table 1: Remittances inflows and outflows (billion USD)

Source: World Bank remittances database

South Asia is the main remittances receiving region (with India and China respectively the first and the second receiving countries at the world level), followed by Latin America and Caribbean. Mexico, the third receiving country at the global level, has received 22.5 billion USD in 2012, which is more than remittances inflows toward the Sub-Saharan Africa region during the same year. Less that 5% of world remittances go to this region which is at the last position at the global level (Nigeria, the first African receiving country, has received 10

billion USD received in 2010, putting this country among the 10 biggest receiving countries in the world). We should however keep in mind that remittances flows to Africa are mainly informal; therefore, they are not included in official remittances figures we are using.

A near stagnation in remittances flows to Mexico (remittances to Mexico grew by only 1% year-on-year from 2006 to 2007, compared to 20% annual growth during 2002-2006) and a deceleration in some Latin America countries contributed to a slowdown in the rate of growth of remittances over the last decade. This slowdown may indicate that the market has reached a point of stability (Orozco and Ferro, 2008). The recent global crisis also had a negative impact on remittances growth rates (-0.9% at the world level). However, the growth of remittances to developing countries remains robust because of strong growth in Asia.

Regarding remittances outflows, they mainly come from high income OECD countries (the first one being the United States of America). It is however interesting to focus on developing countries. We can observe an increase of outflows from this over the last years (78% between 2005 and 2009). Remittances flows from developing countries accounted for 20% of total remittances outflows in 2009. Unfortunately, it is difficult, with the existing information, to measure the importance of south to north flows phenomenon. An attempt in that sense has been made by Harrison *et al.*(2003)<sup>6</sup>. By matching migration patterns worldwide they have estimated the size of remittances flows for each continent and for selected countries (origin and destination) for the year 2000. Their results are presented in the Table 2. We can for instance see that the continent that contributed the most to remittances received by Africans was the African continent itself.

<sup>&</sup>lt;sup>6</sup> Harrison, A., Britton, T., and A. Swanson (2003). "Working Abroad: The Benefits Flowing from Nationals Working in other Economies". Paper presented at the Round Table on Sustainable Development, 19 November, OECD; in Toxopeus and Lensink (2007).

	Remittance	es going to	0:						
	Africa	Asia	Europe	LAC	North America	Oceania	Total*		
Remittances coming from:		_		-					
Africa	3,7	0,5	0,1	0	0	0	4,2		
Asia	3,4	31,5	3,4	0,5	0,2	0	39		
Europe	2,6	3,2	9,5**	0,4	0,4	0,1	16,2		
Latin America/Caribbean (LAC)		0,1	0,6	1,1	0,1		1,8		
North America	0,7	7,9	5,7	14,2	0,9	0,1	29,6		
Oceania	0	0,2	0,4		0	0,2	0,8		
	10,4	43,4	19,6	16,2	1,6	0,3	91,5		
Notes:	*Total may differ slightly due to rounding								
	**24,1 mil	lion USD	for Europea	an border-w	vorkers excludes				
Source:	Harrison et al. (2003), in Toxopeus and Lensink (2007)								

#### Table 2: Size of remittances flows (billion USD) between continents (2000)

The existence of remittances flows from developing countries illustrates the fact that southsouth migration is important (available data from national censuses suggest that nearly half of the migrants from developing countries reside in other developing countries), but the amounts remitted are generally less high than when considering north-south migration (Sander, 2003; Ratha and Shaw, 2006).

Remittances flows are often compared to foreign direct investments (FDI) and official development aid (ODA) of receiving countries, both in terms of volume and some characteristics such as the volatility. It is important to remind that these flows are not driven by the same dynamics (Salomone, 2006). Actually, while remittances are private and characterised by altruism and solidarity motives that are supposed to remain stable, ODA are transactions between governments (bound to projects to be implemented in the recipient country) and FDI refer to private investments in enterprises (there are therefore linked to investment opportunities). Furthermore, the current state of data on remittances is disadvantaged especially by the large variation in the channels used.

#### III. Determinants and characteristics of remittances flows

Remittances are sent for various reasons. These reasons can be classified in three categories, namely pure altruism, pure self-interest and tempered altruism or enlightened self-interest, which includes contractual arrangements between the migrant and the household left behind (Hagen-Zanker and Siegel, 2007)<sup>7</sup>.

In the case of pure altruism, the migrant send remittances because he cares about the situation of his family in terms of poverty and shocks for instance. There is then a positive relationship between adverse conditions of the receiving household and the total amount of remittances sent.

Remittances may also be sent by pure self-interest, meaning that the migrant send money to have something in exchange: inheritance in the future, a good reputation at home, a good investment at home, and so on. This behaviour is linked with the migrant's intention to return home. According to this theory, remittances might increase with various elements: the household' assets and income, the probability of inheriting, the migrant' wealth and his risk aversion.

A less extreme view of the motivations to remit is tempered altruism. In this case, the migrant and the household left behind mutually benefit from migration, through some kind of implicit contractual arrangement (such as loan reimbursement).

According to the Global Development Finance Database, the average remitted amount was 200 USD in 2003. This amount goes up to 1000 USD for transfers from developed to developing countries. During the same year, the average amount remitted through formal money transfer companies amounted to 320 USD (CFSI, 2003). The frequency at which

<sup>&</sup>lt;sup>7</sup> See also Freund and Spatafora (2008) and Docquier and Rapoport (2005) for an insight on remittances determinants.

migrants send money home decreases with the number of years spent abroad (this number of year is positively correlated with migrant's current expenses in the receiving country and with the probability for him to have been rejoined by his family). Other variables have also been identified as determining the amount and frequencies of money transfers by migrants. We have for instance the age of the migrant, his motive of migration, the economic situation of the home country (especially exchange rates and viability of financial services) and measures taken in the host as well as in the home country in terms of financial services for migrants (CFSI, 2003).

From the motivations to remit, three characteristics related to remittances flows are identified, namely: stability, cyclicality and sustainability (see for instance Salomone, 2006). These features describe remittances behaviour through time and space, from different point of view.

"Stability consists of being less affected by the impact of favourable and unfavourable shocks than other capital flows" (Salomone, 2006). It is often argued that remittances are more stable than other capital flows. According to Ghosh (2006)<sup>8</sup>, from 1998 to 2001, remittances to developing countries have continued to rise when private capital flows declined in the wake of the Asian financial crises. However, Toxopeus and Lensink (2006) have found that when calculating the volatility of remittances flows, ODA and FDI over the period 1979-2003 as the standard deviation divided by the mean, the coefficient of variation of the three capital flows indicate that the least volatile flow is ODA, followed by remittances. Stability is also sometimes tested through the evidence of altruistic motives behind the decision to remit, as the motives may remain fixed (Salomone, 2006). This can be captured for instance through a negative long run correlation of remittances with wage in the home country or a positive correlation between remittances and income in the country of residence.

<sup>&</sup>lt;sup>8</sup> Ghosh, Ed. (2006). Migrants' Remittances and Development: Myths, Rhetoric and Realities. IOM Publication, Geneva, in Salomone (2006).

Remittances are cyclic when they are influenced by the country business cycle. They are counter cyclic when they increase due to a bad economic situation in the receiving country (negative correlation). When the opposite situation occurs (they decrease when the economic situation in the receiving country is bad), they are pro-cyclic (positive correlation). Finally, when there is no significant correlation between remittances flows and business cycles in the receiving country, remittances are acyclic. In the case where migrant remit to help his family to smooth consumption, remittances will certainly be counter cyclic. Remittances will probably be pro-cyclic when migrant remit for investments opportunities because, in such case, he will remit his money when the economic situation in the country of origin is favourable.

Sustainability is about the relationship between migrants' duration of stay in the destination countries and the level of remittances they sent back home. The rationale for a negative relation between these two variables is related to the diminution, and at worse the cease, of remittances sent home as the time goes by. For the International Organisation for Migration (IOM), the sustainability of remittances depends on the changing of the legal status or the acquisition of an open-ended labour contract by the migrant. These elements accelerate the weakening of the bonds with the sending country, through the reunification effect: migrant prefer his family to rejoin him, instead of increasing his remittances when his revenues increases.

#### IV. Money transfers in Microfinance institutions

The last 30 years have seen the development of the microfinance industry, with an evolution in terms of methodologies, products, actors, and economic and politic environment (Labie, 2009). In terms of products, even if the microcredit is always having particular attention, there is no longer an exclusive focus on that product. Now, there is a broader vision on what the targeted individuals may need in terms of financial products. The main products provided by MFIs are microcredit, micro savings and micro insurance (Rossel-Cambier, 2009). Money transfers facilities, sometimes included in micro savings facilities (see for instance Rossel-Cambier, 2009) are now also considered as important for microfinance clients and have recently attract the interest of researchers.

Money transfers activities (MTA) are defined in our thesis as the set of products or facilities implemented by MFIs in order to allow their clients - and potential clients- to receive (send) money from (to) an individual located in the country or abroad. We talk about domestic transfers when the money do not cross country borders, while international money transfers or remittances refers to money coming from abroad (inflows) or going abroad (outflows).

The business model implemented by MFIs in order to offer a MTA may take various form, from a service provided directly by the MFI (transfers between MFI's branches for instances) to a MTA provided thanks to alliances between MFIs and money transfer operators who will, most of the time, provide the necessary equipment to MFIs for them to get access to international money flows. Factors such as the regulatory environment and competition will be determinants in the type of business model, and therefore the MTA, implemented by MFIs.<sup>9</sup>

According to Orozco (2008), the majority of MFIs has started to operate on the remittances market in 2005. A database containing detailed information about the supply of MTA by MFIs to facilitate international money transfers does not exist as such. However, based upon the MIX website we have been able to build a dummy variable relative to the supply of MTA by a sample of 435 MFIs across the world. Basic statistics of our sample appear to be similar

<sup>&</sup>lt;sup>9</sup> See Chapter 4 for a more detailed overview of the remittances market and potential business models (with their consequences) for MFIs.

with the overall MIX database statistics. For instance, the operational self-sufficiency ratio of our sample is 114%, compared to 111% for the larger MIX database. However, in terms of average loan size, the MFIs included in our sample lend on average bigger amounts compared to the overall MIX database (USD 841 compared to USD 725).

Table 3 gives an overview of this sample regarding MTA, based on MFIs geographic location and legal status.

Variable	Description	Obs.	MTA status	Number	% of sample
Bank	Banks	26	0	11	3%
			1	15	3%
Coop	Cooperatives	62	0	46	11%
			1	16	4%
Non-profit	Non-profit	204	0	189	44%
			1	15	3%
NBFI	Non-bank financial institutions	100	0	67	15%
			1	33	8%
Other	Other legal status	43	0	39	9%
			1	4	1%
Africa	Sub-Saharan Africa	101	0	83	19%
			1	18	4%
SA	South Asia	55	0	51	12%
			1	4	1%
LAC	Latin America and Caribbean	195	0	139	32%
			1	56	13%
EAP	East Asia and Pacific	84	0	79	18%
			1	5	1%

Table 3: Overview of MFIs involvement on the money transfer market

The sample is mainly constituted of MFIs from LAC, followed by African MFIs. Regarding their involvement is the money transfers market, 20% of MFIs of the sample that have a MTA (83MFIs). Most of these MFIs are located in LAC. The regional location may be determinant in the offer of MTA by MTA, as it can be seen as a proxy for the regulatory environment faced by MFIs who are willing to enter the money transfer market. Actually, the differences

observed between Africa and LAC in terms of competition on this market can partly be explained by the differences in the regulatory environment which encourages competition in LAC and favors an oligopolistic market in Africa. These aspects are aboard in the chapter 4.

In terms of legal status, Table 3 reveals that is within the status "Bank" that we find the highest ratio (MFIs with a MTA / MFIs without MTA). Again, this result can be interpreted from a regulatory perspective. Actually, banks are expected to fulfill more easily the requirement related to the implementation of MTA, given their implicit higher managerial capacities compared to, for instance, non-profit MFIs which include non-governmental organizations. The legal status as a determinant of MTA is also aboard in chapter 4.

It is important to highlight two main limits of our variable of interest (the dummy MTA). The first one is the impossibility to identify MFIs who are able to realize international money transfers versus the one that are only working with domestic transfers. As a matter of fact, our database is probably overestimating the involvement of MFIs on the remittances market and we do not have any tool to correct for this overestimation.

The second limit is the non time-varying characteristic of the dummy, meaning that we have a cross-section information (for the year at which we have built the dummy), but we don't know when the MFI have started to provide this MTA. This limit has therefore restricted the type of empirical studies we could realize.

# Chapter 2

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 Development<sup>10</sup>

#### Abstract

This paper 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' (CDEP) and 'Cost of External Finance' (CEXF), have conflicting effects on the marginal impact of remittances on investment. The empirical analysis on a sample of 100 developing countries, using cross-section and panel-data methodologies, supports our model's predictions: the marginal impact of remittances of remittances on investment is positive and decreasing with CDEP, while increasing with CEXF.

Keywords: Remittances, Investment, Growth, Financial sector development

JEL codes: F24, O16, G2.

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#### I. Introduction

Remittances, the money sent home by migrants, accounted for more than USD 300 billion in 2007, with USD 240 billion flowing to developing countries (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 development<sup>11</sup>. 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.

<sup>&</sup>lt;sup>11</sup> While 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.

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, which measures the difficulties of savers, particularly the less well off, of depositing their savings in the formal banking system. These difficulties are particularly relevant for the social groups that include remittance receivers and can be related to physical access, affordability and eligibility (Beck *et al.*, 2008)<sup>12</sup>. 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, including the foreign exchange 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 declines<sup>13</sup>. Third, a decrease in CEXF lowers the marginal impact on investment, and does not affect

<sup>&</sup>lt;sup>12</sup> In 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 *et al.* (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.

<sup>&</sup>lt;sup>13</sup> This is consistent with Aggarwal *et al.* (2011) regarding the contribution of remittances in the supply of loanable funds trough deposits.

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 the investment propositions using country-level data on remittances, investment and proxies for both CDEP and CEXF, on a sample of 100 developing countries. We perform empirical tests using both cross-section and panel-data with country fixed effects, over the period 1975-2004. Our cross-sectional results support the main predictions of our theoretical model. First, we find significant evidence for a stimulating effect of remittances on investment, for all levels of the two transaction costs considered. Second, the stimulating effect of remittances on investment 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 also confirm these results.

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 (the higher the cost of deposit, the more remittances will be used to fund informal investments because the more remittances stay out of the banking system). 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 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 broadly 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 *et al.* (2005) highlights 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 *et al.* (2011) 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 *et al.*, 2009). Toxopeus and Lensink (2007) find that remittances affect growth in developing countries through the improvement of financial inclusion.

#### II. Theory

#### 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 exogenous<sup>14</sup>. Each agent j has savings of sj, with  $sj = s_R$  for remittance receivers and  $s_j = s_N$  for nonreceivers. 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  $\pi_j^{15}$ , where  $\pi_j$  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 borrowing

<sup>&</sup>lt;sup>14</sup>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.

<sup>&</sup>lt;sup>15</sup> Financial return variables are expressed in gross terms. Namely, 1 dollar with a  $\pi j$  return yields  $\pi j$  at the end of the period.

internationally. The sector is competitive and the interest rate, r, is the same for deposits and for loans.

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  $\iota$  to finance her investment.

#### Remittances 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 *et al.*, 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  $\tau_j$  to make a deposit.  $\tau_j$ , the Cost of Bank Depositing (CDEP), is a uniformly distributed random variable in the support  $[0;2\tau]$ , with  $\tau >> 0$ . As a result, receivers' actions vis-à-vis the banks are 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.  $\partial d/\partial r = 0$ )<sup>16</sup>. In this case, the payoff U of receiver *j*, at the end of stage two, is

$$U_j(c) = \underbrace{(s_R - c)(d - \tau_j)}_{return of deposits} + \underbrace{\frac{c}{\tilde{\pi}} \int_0^1 d\pi + \frac{c}{\tilde{\pi}} \int_1^{\tilde{\pi}} \pi d\pi + \frac{\iota - c}{\tilde{\pi}} \int_{r+\rho}^{\tilde{\pi}} (\pi - r - \rho) d\pi}_{q = 0}$$

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 ( $\tau_j$ ). 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,  $\rho$ , is higher or

<sup>&</sup>lt;sup>16</sup> Note 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 the total benefits from bank depositing, d, are proportional to the deposited amount.

equal to  $\tilde{n}$  - r, we obtain<sup>17</sup>:

$$\partial U_j / \partial c = \tau_j - d + \Pi$$
 (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,  $\tau_j$ . From (1), receivers with  $\tau_j < d + II$  will choose to deposit, with the remainder opting to keep their savings as cash. Note that *d* - II is the net marginal cost of keeping cash, with II capturing the option value of keeping cash to finance potential profitable ( $\tilde{\pi}$ >1) investment projects. Since  $\tau_j$  is distributed uniformly between 0 and  $2\tau$ , a proportion (*d* - II) /  $2\tau$ of receivers deposit their savings.

#### 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 nonreceivers, as well as those of receivers with a sufficiently low deposit access cost, which can be expressed as

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

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

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

<sup>&</sup>lt;sup>17</sup> For simplicity, we focus on the case where the cost of access to borrowing is prohibitive  $(\rho \ge \tilde{n} - r)$  such that receivers do not have access to borrowing. Otherwise, if access to borrowing by receivers is not prohibitive (i.e.  $\rho < \tilde{n} - r$ ), an increase in 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:  $\partial U_j/\partial c = \tau_j - d + \rho + r + \frac{1 - (r + \rho)^3}{2\tilde{\pi}}$ . Working with the alternative case would only change the intensity, not the directions, of the key effects.

where  $r^*$  is the risk-free international interest rate, B denotes aggregate external borrowing,  $\emptyset > 0$  is the country risk premium and  $\psi > 0$  is the marginal cost of external finance, CEXF.  $\emptyset$  and  $\psi$  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

$$B = \frac{r - r^*/\phi}{\psi} \tag{3}$$

Note, from (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.

$$F = (1-q)\left(1 - r/\tilde{\pi}\right)\iota \tag{4}$$

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

$$H = qs_R(1 - (d - \Pi)/2\tau)(1 - \tilde{\pi}^{-1})$$
(5)

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 (2), (3) and (4), the equilibrium interest rate yields

$$r = \frac{(r^* + \phi)/\psi + (1 - q)(\iota - s_N) - s_R q (d - \Pi)/2\tau}{1/\psi + \iota(1 - q)/\tilde{\pi}}$$
(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 ( $\psi$ ) 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, $\phi$ , lead to a higher domestic rate.

#### 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 (2) and (6), we can easily obtain

$$\frac{dD}{ds_R} = \frac{q\left(d - \Pi\right)}{2\tau} > 0 \tag{7}$$

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

#### Investment and remittances

We can also look at the effect of remittances on formal investment, F. From (4), we obtain

$$\frac{dF}{ds_R} = -\frac{(1-q)\iota}{\hat{\pi}}\frac{dr}{ds_R} = q\frac{d-\Pi}{2\tau}\left(\frac{\hat{\pi}}{(1-q)\psi\iota} + 1\right)^{-1}$$
(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 $(dF / ds_R) / dt < 0$ . 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  $\psi$  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  $\psi$  is high.

As mentioned before, several authors have stressed the role of rising remittances for informal investment, defined here as *H*. As shown in (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 informal investment, it lowers the marginal effect on formal investment. The reason for these conflicting effects is straightforward, 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:

$$\frac{dI}{ds_R} = \frac{dB}{dr}\frac{dr}{ds_R} + q\frac{d-\Pi}{2\tau} + q\left(1 - \frac{d-\Pi}{2\tau}\right)(1 - \tilde{\pi}^{-1}) \qquad (9)$$

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

which, in addition to confirming that the marginal effect of remittances on investment is positive and increasing in CEXF ( $\psi$ ), clarifies the ambiguity of the impact of an increase in CDEP. As it can be easily seen, (9) implies that

$$rac{d\left(dI/ds_R
ight)}{d au} < 0 \Leftrightarrow \psi > rac{\iota(1-q)}{(1- ilde{\pi})}$$

which can be interpreted as follows: when  $\psi$  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  $d(dI/ds_R)/d$ > 0. In contrast, when  $\psi$  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 *i* 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  $d(dI/ds_R) = d\tau < 0$ .

#### III. Empirical methodology

#### III.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. In the empirical part we will focus on the remittances – investment relation and do not run deposit regressions.

Our first order result is straightforward, as the marginal effect of remittances on investment (formal, as well as informal) is positive. However, the impacts of our financial sector development variables on this 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 investment equations.

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

$$INV_{i,t} = \phi_1 REM_{i,t} + \phi_2 REM_{i,t} * CDEP_{i,t} + \phi_3 CDEP_{i,t} + \phi_4 REM_{i,t} * CEXF_{i,t} + \phi_5 CEXF_{i,t} + \phi_6 REM_{i,t} * CDEP_{i,t} * CEXF_{i,t} + \phi_7 CDEP_{i,t} * CEXF_{i,t} + X'_{i,t}\phi_7 + \varepsilon_{i,t}$$
(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  $\varepsilon$  is the regression residual. In such a regression specification, the model implies that

$$\frac{dINV}{dREM} = \phi_1 + \phi_2 CDEP_{i,t} + \phi_4 CEXF_{i,t} + \phi_6 CDEP_{i,t} * CEXF_{i,t} > 0 \quad \forall i, t$$
(11)

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

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

$$> 0 \text{ when } CEXF \text{ is large}$$
(12)

$$\frac{d(dINV/dREM)}{dCEXF} = \phi_4 + \phi_6 CDEP_{i,t} < 0 \quad \forall i,t$$
(13)

Relation (12) implies that

$$\phi_6 > 0 \tag{14}$$

Note that the signs are similar for an empirical specification that includes only formal investment, except that  $\phi_6$  and  $\phi_7 = 0$ .

III.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 *et al.* (2011) and Alfieri *et al.* (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 payments<sup>18</sup>. 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 paneldata 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 among 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.

Regarding our dependent variable, we measure investment using "Gross Fixed

<sup>&</sup>lt;sup>18</sup> On 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.

Capital Formation" (GFCF) from the National Accounts Main Aggregates Database (United Nations, 2007).

We scale remittances and investment by the receiving country's GDP. To avoid biases due to the multiplier effects of remittances on GDP, we scale remittances by a modified GDP measure, which takes out short-term fluctuations in GDP<sup>19</sup>.

#### Financial Sector Development

The Financial Structure Database, first published by of Beck *et al.* (2000) and updated by Beck and Demirgüç-Kunt (2009), provides a widely-used 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 GDP<sup>20</sup>.

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.

<sup>&</sup>lt;sup>19</sup> We 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).

<sup>&</sup>lt;sup>20</sup> Beck *et al.* (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.

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, -CDEP and -CEXF.

#### 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 Money<sup>21</sup> over modified GDP. Data are drawn from 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 availabilities<sup>22</sup>, we end up with a maximum sample for panel-data (cross-section) analysis of 100 (96) developing

<sup>&</sup>lt;sup>21</sup>Reserve 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. <sup>22</sup>And 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.

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 empirical analyses. We consistently work with 3-yearly averaged data<sup>23</sup>, over the period 1975 through 2004, in order to capture only medium- and long-term effects.

#### IV. Empirical results

#### IV.1. Cross-section results

In this section, we test empirically the predictions of the theoretical model in a cross-country 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).

In order to assess the validity of the model, we test different empirical specifications of the investment equation. Table 1 presents the estimated coefficients and heteroskedasticity-robust standard errors. Recall that our two empirical transaction cost measures, -CDEP and -CEXF 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

<sup>&</sup>lt;sup>23</sup>The 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.

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.

	(1)	(2)	(3)	(4)
Bus cycle	.245**	.225**	.240**	.213**
	(.098)	(.090)	(.100)	(.101)
GDP/cap	.005*	.003	.005	.007
	(.003)	(.002)	(.003)	(.005)
Rem	.293*	144	.026	252
	(.173)	(.256)	(.262)	(.265)
Rem*GDP/cap		.063	.072	019
		(.079)	(.079)	(.088)
-CDEP	.006	026		063
	(.036)	(.046)		(.053)
Rem*-CDEP		.477		2.086***
		(.690)		(.806)
-CEXF	010		014	016
	(.009)		(.014)	(.027)
Rem*-CEXF			.068	.279
			(.118)	(.209)
-CDEP*-CEXF				.007
				(.041)
Rem*-CDEP*-CEXF				711*
				(.393)
cons	067	025	057	022
	(.101)	(.086)	(.106)	(.107)
Nb of countries	96	96	96	96
Joint significance (p-value)*		0.894	0.726	0.045
R <sup>2</sup>	.102	.095	.115	.14
Adjusted R <sup>2</sup>	.052	.034	.056	.039

Table 1: Cross-section empiric	ai resu	us
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Robust standard errors in parentheses

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

"Joint significance refers to the coefficients of financial sector transaction costs, remittances, and their interactions

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 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 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 2 displays the empirical effects 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

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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%<sup>24</sup>. 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 2: Cross-section results: Conditional marginal effect of remittances on

#### investment

			-CDEP			
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)
			-CEXF			
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:

 $\frac{dINV}{dREM} = \beta_{Rem} + \beta_{Rem} \cdot c_{DEP}CDEP + \beta_{Rem} \cdot c_{EXF}CEXF + \beta_{Rem} \cdot c_{DEP} \cdot c_{EXF}CDEP * CEXF$ 

Beyond this median effect we are interested in the way the above relationship changes with different levels of FSD. First, we state from Table 2 that the marginal effect of remittances on investment increases when bank depositing is easier (the

<sup>&</sup>lt;sup>24</sup>Our coefficient, though, is not significant at the median level of Cost of Bank Depositing. Nevertheless, it becomes significant from values of -CDEP 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 -CDEP is at its 75th percentile value (i.e., when barriers to bank depositing are lower).

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 3 and 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 12 and 13).

Table 3 indicates that a lower Cost of Depositing (i.e., a higher -CDEP) 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 14). This confirms that the stimulating role of lower bank depositing barriers is reduced by a too high financial openness.

#### Table 3: Cross-section results: Conditional marginal effect of CDEP on the

			-CEXF			
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)

#### remittances - investment relationship

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:

 $\frac{d(dINV/dREM)}{dCDEP} = \beta_{Rem} \cdot cDEP + \beta_{Rem} \cdot cDEP + cEXFCEXF$ 

In turn, table 4 analyzes the effect of the Cost of External Finance on the remittances-investment relation (relation 13). Although the effect is less clear-cut, when significant, the Cost of External Finance effect is negative, as expected from the model<sup>25</sup>. 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.

### Table 4: Cross-section results: Conditional marginal effect of CEXF on the remittances - investment relationship

			-CDEP			
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)

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Robust standard errors in parentheses

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

Results on the investment equation are presented visually in figure 1 (in appendices), which displays the marginal impact of remittances on investment at

<sup>&</sup>lt;sup>25</sup> This statement is robust to eliminating Malaysia, the country with the highest value of FSD (DEP) in our sample.

various levels of Cost 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 -CDEP values.

#### IV.2. Panel-data results

The panel-data allows exploiting 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 recourse to the fixed effects estimators (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 5 reports panel-data regression results for the investment equation, under various specifications (with and without quadratic effects). 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. The effect of Cost of Bank Depositing is important, but non-linear<sup>26</sup>. As expected, remittances always stimulate domestic investment.

<sup>&</sup>lt;sup>26</sup> This decreasing marginal effect is consistent with our model if we derive eq. 9 with respect to  $\tau$ .

### **Table 5: Panel empirical results**

	In	vestment over G	DP
	(1)	(2)	(3)
Bus cycle	.376***	.373***	.381***
	(.035)	(.033)	(.037)
GDP/cap	.005	.004	.005
	(.004)	(.004)	(.004)
Δ Money			
Rem	.230	.220	137
	(.191)	(.173)	(.228)
Rem*GDP/cap	001	.016	014
	(.052)	(.052)	(.051)
-CDEP	024		112
	(.044)		(.085)
Rem*-CDEP	055		2.311**
	(.458)		-1.054
-CDEP <sup>2</sup>		006	.093
		(.036)	(.063)
Rem*-CDEP2		388	-2.683**
		(.478)	-1.079
-CEXF	005	002	003
	(.006)	(.004)	(.005)
Rem*-CEXF	.074	.014	.069
	(.073)	(.053)	(.068)
-CDEP*-CEXF	.022		.019
	(.015)		(.019)
Rem*-CDEP*-CEXF	338**		287*
	(.155)		(.149)
CDEP2*-CEXF		.029*	
		(.017)	
Rem*-CDEP2*-CEXF		343**	
cons	180***	179***	169***
	(.030)	(.033)	(.032)
Nb of observations	615	615	615
Nb of countries	100	100	100
Joint significance (p-value)*	0.002***	0.010***	0.004***
R <sup>2</sup>	.386	.387	.392
e(r2-a)	.367	.367	370

Robust standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\*significant at 1% "Joint significance refers to the coefficients of financial sector transaction costs, remittances, and their interactions

Table 6 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.

			investme	nt		
min (0.00)	p05 (0.06)	p25(0.15)	-CDEP 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)
min (-1.77)	p05 (-1.77)	p25(-1.10)	-CEXF 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)

Table 6: Panel-data results: Conditional marginal effect of remittances on

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:

 $\frac{dINV}{dREM} = \beta_{Rem} + \beta_{Rem} \cdot cdePCDEP + + \beta_{Rem} \cdot cdePCDEP^2 + \beta_{Rem} \cdot cexFCEXF + \beta_{Rem} \cdot cdeP \cdot cexFCDEP * CEXF$ 

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 11 (see appendices) 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. The marginal impact of -CDEP 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 -CDEP in our sample. This significant negative

effect of -CDEP is due to the strong quadratic regression fit and does not old anymore when highly financially developed countries are excluded from the sample<sup>27</sup>. In sum, in a country with median financial openness, from the second to the third quartile of -CDEP, the impact of remittances on investment increases by roughly 50% (from 0.24% to 0.35%).

Table 12 (see appendices) indicates a strongly negative impact of -CEXF on the remittances-investment relation across the whole range of Cost of Bank Depositing values. This contrast 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 2 and 3 (in appendices) provide a visualization of panel-data results on the investment equation.

#### V. Conclusion

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

<sup>&</sup>lt;sup>27</sup> Thailand and Malaysia reach between 4 and 5 times the sample average values of deposit-money bank assets/GDP.

act rationally to maximize their payoffs from formal (i.e., loan-financed), as well as informal (i.e., self-financed) investment projects. Empirical regressions test our model's predictions using a total sample of 100 developing countries, in both crosssection 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 becomes 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 channeling 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 find 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 truer 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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# Appendices

Variable	Mean	Median	Std. Dev.	Min.	Max.
Inv/GDP	0.219	0.202	0.09	0.059	0.839
Dep/GDP	0.324	0.305	0.195	0.060	0.975
$\Delta \text{ Dep/GDP}$	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
$\Delta$ Money/GDP	0.016	0.012	0.032	-0.106	0.138
Rem/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 7: Summary statistics - Cross-section data, 3-year averages (period 2002-2004)

Note: Outliers have been excluded.

Table 8: 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
Dep/GDP	0.268	0.226	0.171	0.000	0.935
$\Delta \text{ Dep/GDP}$	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
$\Delta$ Money/GDP	0.004	0.004	0.125	-1.745	1.724
Rem/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	$\Delta \text{Dep/GDP}$	Bus cycle	GDP/cap	Δ Money/GDP	Rem/GDP	FSD(DEP)	FSD(EXF)
Inv/GDP	1							
$\Delta$ Dep/GDP	0.38	1						
Bus cycle	0.22	0.11	1					
GDP/cap	0.10	0.03	-0.11	1				
Δ Money/GDP	-0.15	0.28	-0.04	-0.23	1			
Rem/GDP	0.12	0.24	0.13	-0.27	0.05	1		
FSD(DEP)	0.06	0.15	-0.1.2	0.48	-0.04	0.02	1	
FSD(EXF)	-0.04	-0.04	0.04	0.32	-0.20	0.22	0.19	1

100 C 10	Inv/GDP	$\Delta$ Dep/GDP	Bus cycle	GDP/cap	Δ Money/GDP	Rem/GDP	FSD(DEP)	FSD(EXF
Inv/GDP	1							
$\Delta$ Dep/GDP	0.30	1						
Bus cycle	0.47	0.32	1					
GDP/cap	0.19	0.08	0.06	1				
Δ Money/GDP	0.00	0.32	0.04	0.00	1			
Rem/GDP	0.14	0.21	0.13	-0.16	0.00	1		
FSD(DEP)	0.36	0.28	0.18	0.33	0.04	0.15	1	
FSD(EXF)	0.09	0.18	0.07	0.26	0.03	0.11	0.25	1

#### Table 11: Panel-data results: Conditional marginal effect of CDEP on the remittances -

min (0.00)	p05 (0.06)	p25(0.15)	-CDEP 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)
	100.00		-CEXF			
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)

#### investment relationship

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: d(dINV / dREM)

$$\frac{dTNV + dREM}{dCDEP} = \beta_{Rem} \cdot cDEP + 2 * \beta_{Rem} \cdot cDEP = CDEP + \beta_{Rem} \cdot cDEP \cdot cEXFCDEXF$$

### Table 12: Panel-data results: Conditional marginal effect of CEXF on the remittances investment relationship

-CDEP							
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:

$$\frac{d(dINV/dREM)}{dCEXF} = \beta_{Rem} \cdot CEXFCEXF + \beta_{Rem} \cdot CDEF \cdot CEXFCDEP$$



### Figure 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<sup>th</sup> percentile value for CEXF and GDP/cap





Note: Values implied from regression are computed using the 50<sup>th</sup> percentile value for CEXF and GDP/cap

# Figure 3: Panel-data results: The impact of remittances on investment as a function of Cost of External Finance



Note: Values implied from regression are computed using the 50<sup>th</sup> percentile value for CDEP and GDP/cap

# Table 13: List of acronyms

Acronyms	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)		

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# Chapter 3

Microfinance Institutions on the Remittances market: Do Money

Transfer Activities Generate Deposits?

Microfinance Institutions on the Remittances Market: Do Money Transfer Activities Generate Deposits?<sup>28</sup>

#### Abstract

Microfinance institutions (MFIs) are expected to succeed in transforming migrants' remittances into deposits. Based on an original database including 114 MFIs from Africa, South Asia, Latin America and the Caribbean, and East Asia and the Pacific, this paper empirically examines the occurrence of this expected success. It tests whether MFIs operating on the remittances market capture more deposits than other MFIs. The results exhibit a positive and significant effect of the money transfer activity on the amounts of deposits in MFIs.

Keywords: remittances, deposits, migrants, microfinance institutions, money transfer activity

JEL: G21, O15, O16, O17

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#### I. Introduction

Officially recorded remittances to developing countries amounted to 325 billion USD in 2010 (World Bank, 2011). They constitute the second largest source of external finance for those countries, after foreign direct investment. Given the increasing importance of remittances in total international capital flows, there is a growing literature on the relationship between remittances and development (see for instance Azam and Gubert, 2005; Amuedo-Dorantes and Pozo, 2006; Faini, 2007). Recent studies have highlighted the role of financial intermediaries as determinants of remittances' impact on long-term growth of the receiving countries (Mundaca, 2009; Giuliano and Ruiz-Arranz, 2009). Despite the majority of migrants and remittances receivers in developing countries are unbanked and (potential) clients of MFIs, the relationship between remittances, microfinance and growth has not been adequately studied. This paper analyses the role of microfinance institutions (MFIs) as financial intermediaries between remittances receivers and the formal economy. Through an empirical analysis, it tests whether MFIs are able to turn remittances into deposits that can be used to fund investment projects and thus contribute to growth.

This paper attempts to fill the gap in the existing literature of financial development as a determinant of the macroeconomic impact of remittances, contributing to the debate of the role of microfinance by analyzing the ability of MFIs to turn remittances inflows into deposits. We are therefore considering the relationship between microfinance and the remittances market through the demand perspective. According to this perspective, there is a need from MFIs (potential) clients for money transfer facilities and other remittances-related financial products such as deposit facilities. The implementation of a money transfer activity (MTA) should therefore lead to an increase in MFIs' deposits, either through new clients attracted by the MTA or through strategies implemented by MFIs to encourage remittances
receivers to put their money in a deposit account (already existing or specially designed for migrants and remittances receivers). Therefore, through a panel regression we look at the impact of MTA on the deposits collected by MFIs.

The relationship between remittances, financial development and growth is ambiguous. Actually, well-functioning financial markets may help direct remittances to projects that yield the highest return and thus enhance growth rates, thanks to low cost of conducting transactions. In this case, remittances impact on growth should increase with the level of financial development. Mundaca (2009) find empirical evidence for remittances and financial development as complements for growth, thanks to remittances recycled into lendable funds. However, remittances may become a substitute for inefficient or nonexistent credit markets by helping local entrepreneurs to reduce their credit constraints, which can play a critical role in determining growth prospects in economies characterized by a high level of income inequality (Aghion et al., 1999)<sup>29</sup>. In this case, remittances impact on formal investment should decrease with the level of financial development. Giuliano and Ruiz-Arranz (2009) find evidence for that. Gheeraerts et al. (2010) find simultaneously these two opposite effects of the financial development on remittances impact on growth: when financial development increases, the cost of holding a deposit account decreases and more remittances can be recycled into the financial system and then be used for investments (complements), while at the same time, the cost of borrowing on external market decreases, which reduces the necessity for remittances to serve as lendable funds (substitutes).

It appears that the ability for remittances to fund formal investments depends on remittances receivers' access to financial institutions. Actually, through their capacity to take deposits,

<sup>&</sup>lt;sup>29</sup> In this case, remittances boost investments in a more limited way, as they only finance migrants and/or receivers projects, while when recycled into the financial system, they can be used to fund any of the projects indentified by financial intermediaries. It is however important to stress that future-flows of workers' remittances have been used by banks in emerging countries such as Turkey and Brazil to raise capital from international market, contributing to avoid credit rationing (Giuliano and Ruiz-Arranz, 2009).

financial institutions raise migrants' ability to save. Furthermore, given their ability to engage in financial intermediation, they increase the likelihood that migrants' deposits are channeled into productive investments (Amuedo-Dorantes and Bansak, 2006). According to Orozco (2007), the majority of migrants are excluded from using banking services. This lack of access is due to various barriers that can be related to physical access, affordability and eligibility (Beck *et al.*, 2008). In 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. MFIs contribute in lowering costs of conducting financial transactions across these three dimensions of barriers, thanks to methodologies such as joint liability or presence in rural areas<sup>30</sup>. Microfinance should then be considered when studying remittances impact on growth in developing countries, as MFIs are financial intermediaries that should be able to provide the majority of migrants and remittances receivers with deposit facilities.

MFIs can get access to remittances flows either by their clients who may be recipients and decide to deposit a share of the amounts received, or by providing a money transfer service (see Isern *et al.*, 2006 for how MFIs can operate on the money transfers market). In the later case, MFIs may attract migrants and recipients savings, thanks to the supply of deposit facilities adapted to the demand<sup>31</sup>. For that matter, literature encourages MFIs to operate on the money transfer market, seeing MTA as source of efficiency gains (see Sukadi Mata (2010) for literature on rationale for MFIs to enter the money transfers market). However, if empirical studies exist on the remittances impact on savings at a macroeconomic level

<sup>&</sup>lt;sup>30</sup> An extended literature exists on microfinance. See for instance Armendariz and Morduch (2009).

<sup>&</sup>lt;sup>31</sup> According to Orozco and Hamilton (2006), on 29 MFIs studied in Latin America, 41.5% of them offered to remittances receivers their typical services and 14% had elaborated tailored packages for remittances receivers.

(Aggarwal *et al.*, 2011; Gupta *et al.*, 2009), as well as on the impact of access to banking services on migrants' savings (Amuedo-Dorantes and Bansak, 2006), to our knowledge, the hypothesis of a positive impact of remittances flows on deposits in MFIs has not been econometrically tested yet<sup>32</sup>.

Using an original database of 114 MFIs operating in Latin America and the Caribbean (LAC), South Asia (SA), East Asia and the Pacific (EAP), and Africa, this paper studies whether MFIs are able to capture migrants' savings thanks to their money transfer activity. We test the impact of a money transfer activity on deposits. The sample is constituted of financial statements reported to the MIX market by MFIs that collect voluntary savings from their clients. The study has been realized on 2004 and 2006's data (2006 being the year at which information on the supply of a money transfer service within the MFI was collected).

Our main result suggests that the money transfer activity has a significant positive impact on deposits. MFIs involved on the remittances market thus attract more deposits than other MFIs, probably coming from migrants and remittances receivers. This positive impact may be explained by an existing need from remittances receivers to get access to deposit facilities, which is met thanks to the MTA which serves as a calling product. Results suggest that increasing the supply of money transfer activities by MFIs should contribute to improve remittances impact on growth.

The rest of the paper is organized as follows. Section II examines what are the potential explanatory variables for deposits. Section III outlines the methodology and data. While section IV provides empirical results. Finally, section V concludes.

<sup>&</sup>lt;sup>32</sup> The relationship between remittances and microfinance has often been studied through case-studies. See for instance Orozco and Hamilton (2006) and Ponsot (2006).

### II. Potential explanatory variables for deposits

Various factors can influence the amount of deposits collected by a MFI. Even if we control for other elements, such as the economy, remittances inflows within the country, and the legal status of the MFI, we particularly test the relevance of an indicator: the money transfer activity.

### Money transfer activity

Migrants and remittances receivers are in need of financial services and are willing to put their savings in a financial institution as long as adapted financial products are available (Acción, 2004; Orozco and Fedewa, 2005). Furthermore, remittances can create not only a need for financial products from receivers, but can also make these persons eligible for any other available financial product. Remittances receivers may then come in a MFI first because of the money transfer service, and then because of other adapted financial services are available to them in this MFI, for instance deposit solutions. In this case, all else equal, the money transfer activity (MTA) should contribute to increasing deposits in the MFI. By providing money transfer services, MFIs may also contribute to increase competition on the market, which should lead to reduced sending fees and allow remitters to realize economies (Orozco, 2007). In this case, the money available for deposits should increase.

**Hypothesis**: the MTA will positively impact the volume of deposits collected by the MFIs that have a MTA, as this activity attracts new depositors among the remitters and the remittances receivers, and because it can increase money available for deposits.

The dummy MTA has been build based on the MIX 2006's online database (one-year observation). The MIX only gives information about the availability of a MTA in the MFI. It does not give information neither on the moment this service was launched or whether the

MFI deals with international and / or domestic money transfers. According to Orozco (2008), the majority of MFIs started to operate on the money transfer market in 2005<sup>33</sup>. We then collected data for the year 2004, in order to see whether the MTA significantly contributed to the volume of deposits collected by MFIs over this period (between 2004 and 2006). In the absence of a time dimension of the MTA variable, we had to consider it as constant over the 2004-2006 period (meaning that MFIs with a MTA in 2006 are considered to have a MTA over the all period).

### Additional controls: MFI's characteristics

We have firstly included a measure of the poverty of the clientele served by MFIs, the average size of loans (*ALS*), which gives an indication on individuals' ability to save.

Secondly, we have also included a measure of the remuneration of the deposits, the financial expense ratio (*FER<sub>i</sub>*), measured as financial expense (or expenses on funding liabilities) / average total assets<sup>34</sup>. A high remuneration should motivate deposits within the institution; however, according to related literature, the poor value the opportunity to have their money kept in a safe place more than the interest rate offered by the institution (see for instance Deshpande and Glisovic-Mezieres, 2007 and Wright, 2003).

We have thirdly included a measure of the interest charged on loans, approximated by MFIs' financial revenue ratio ( $FRR_i$ ), measured as financial revenue (or income generated by loan portfolio) / average total assets<sup>35</sup>. The interest charged directly affects individuals' ability to save, as it has an impact on their revenues.

<sup>&</sup>lt;sup>33</sup> In a subsample of 60MFIs operating in LAC, Africa and Asia and included in a survey realized in 2008, 75% of MFIs started to offer a MTA after 2004 (among which 2/3 started between 2005 and 2006). For the details of the survey, see Orozco (2008).

<sup>&</sup>lt;sup>34</sup> www.mixmarket.org and Microrate and IADB (2003)

<sup>35</sup> www.mixmarket.org and Microrate and IADB (2003)

Finally, we included proxies for the trust toward the institution<sup>36</sup>, namely a dummy for the legal status of the MFI (*Bank, Cooperative, Non-profit, Non-bank financial institution, Rural banks*), and the size of the institution<sup>37</sup> (Assets).

As our sample is constituted only by MFIs which collect voluntary savings, adding an indicator of their regulatory environment as an explanatory variable is not necessary. Indeed, regulation has an impact not on the amount of savings that can be collected by institutions, but on the opportunity to collect savings or not.

### Additional controls: Macroeconomic indicators

Previous studies, such as Aggarwal *et al.* (2011) and Gupta *et al.* (2009), have identified the significant impact of macroeconomic variables to explain the level of deposits collected by banks. These authors have measured the impact of a set of variables, including remittances, on the level of financial development, measured by the level of bank deposits at the country level (expressed as a percentage of the gross domestic product or GDP). As we want to explain the level of deposit collected by MFIs, we add in our specification the same macroeconomic determinants of deposits in banks, as MFIs are part of the country financial system. Therefore, we have included in our specification a measure of remittances flows, remittances inflows to receiving country's GDP (*Rem/GDP*). Remittances inflows are expected to be positively correlated with the amount of deposit collected. We also have a measure of the country level of development, namely the GDP per capita in constant US dollars (*GDPpc*). The GDP captures the standard of living of the country and is therefore expected to positively impact on the level of deposit in financial institutions. Finally, we have a measure of the financial sector

<sup>&</sup>lt;sup>36</sup> See for instance Hossain, M.A., Lab-Oyan, G., Larcombe, K. and K.R. Sapkota (2005), "Developing or strengthening savings operations. What is involved", in Hirschland (2005), who argue that people will deposit their savings in an institution only if they perceive it to be trustworthy.

<sup>&</sup>lt;sup>37</sup> From the client's perspective, the size (measured by the volume of MFI's activities) can be considered as a confidence parameter, while from a managerial point of view, the size is used as a proxy for MFI's efficiency. Both confidence and efficiency increase with size.

openness, the private capital inflows (*KInflows*<sup>38</sup>), and a measure of the inflation, the annual percentage change in the Consumer Price Index ( $\Delta CPI$ ). The financial sector openness is expected to be positively correlated with deposits, as capital private inflows are expected to positively contribute to the economy of the country, and therefore increase habitants' incomes and capacity to save. Finally, according to Aggarwal *et al.*, (2006), studies have shown that inflation distorts economic agent's decision-making regarding nominal magnitudes, discouraging financial intermediation and promoting savings in real assets<sup>39</sup>. The expected impact of inflation on deposits is therefore negative.

We have also included a measure of financial inclusion, which was not in the specification of Aggarwal *et al.*, (2011). Actually, according to Amuedo-Dorantes and Bansak (2006), access to banking services could increase amount remitted and encourage migrants to save. The indicator used is the percentage of the adult population with access to an account with a financial intermediary in the country (*FinInclusion*).

Finally, we included in the regression an interaction term between remittances flows and MTA. We want to see whether the MTA mediates the impact of remittances on deposits in MFIs. Actually, given that remittances flows may be too big compared to microfinance size (in terms of deposits) at the country level, their impact on MFIs may be observable through their interaction with the MTA provided by MFIs. The expected sign of this interaction term is therefore positive.

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,

38 See Huang (2006)

<sup>39</sup> See Aggarwal et al. (2006) for references

income and current transfers), and the last item to the capital account (through capital transfers). Aggarwal *et al.* (2011) and Alfieri *et al.* (2005) discuss in depth the definition of remittances. We use the World Bank database on remittance inflows worldwide. MFIs variables come from the MIX. Other macroeconomic variables come from the World Economic Outlook Database (WEO) of the IMF (*GDPpc*,  $\Delta CPI$ , *KInflows*) and from Beck *et al.* (2008) database<sup>40</sup>.

### III. Methodology and Data

In order to test the hypothesis defined in the previous section and analyze the impact of a MTA on the volume of deposits collected by an MFI over the period 2004-2006, we specify a model, where the dependant variable is the natural logarithm of Deposits  $(logD)^{41}$ . The explanatory variable of interest is the binary variable MTA: it takes value 1 if the MFI has a MTA and 0 otherwise.

Hence, the following model is estimated:

$$D_{i,i} = \alpha_i + \beta_1 MTA_{i,i} + \beta_2 X_{i,i} + \varepsilon_{i,i}$$

Where D is the indicator of the volume of deposits collected by the MFI *i* at time *t*, and it is measured as the natural logarithm of deposits. MTA is the dummy for the occurrence of a money transfer activity in the MFI. X is a vector of macroeconomic and institutional explanatory variables. Institutional variables include: the *ALS* (natural logarithm of the average loan size of the MFI divided by the GDP per capita of the country), the *FER* (which gives an idea of deposits' remuneration), the *FRR* (which gives an indication on interest rates

<sup>40</sup> Data collected between 2004 and 2005.

<sup>&</sup>lt;sup>41</sup> This ratio is positively correlated with the volume of deposits collected by a MFI (significant at 5%).

charged on loans), the size (natural logarithm of the assets) and a set of legal status dummies that show organizational differences.

Macroeconomic variables include: remittances inflows in the country of origin, divided by the GDP, the GDP per capita (the natural logarithm of the GDP per capita which capture the standard of living of the country), the inflation, the volume of financial inflows as an indicator of country's financial openness and the level of financial inclusion in the country.  $\varepsilon$  is the regression residual.

### The data

MFIs voluntarily participate in the MIX Market database and have to enclose documentation that supports the data (such as annual reports and audited financial statements). Therefore, the database probably represents a random sample of best managed MFIs in the world, as they should have an adequate information structure to provide required documentation (Krauss and Walter, 2008). We have included in our sample only the MFIs that collect deposits. Basic statistics obtain from our sample appear to be similar with the overall MIX database statistics. For instance, in 2006, the FER of our sample is 4.7%, compared to 5% for the larger MIX database. The FRR is around 23% for our sample, compared to 24% for the MIX. However, in terms of loan size, MFIs in our sample lend on average bigger amounts compared to the overall MIX database (USD 900 compared to USD 725).

We use observations of 114MFIs from Latin America and the Caribbean (LAC), South Asia (SA), East Asia and the Pacific (EAP), and Africa. The sample is constituted of the 114 MFIs for which all the needed information was available for the years considered, i.e. 2004 and 2006.<sup>42</sup>The sample is divided into 2 groups of MFIs which are: the ones that had a MTA in

<sup>&</sup>lt;sup>42</sup> The list of MFIs of the sample is in the appendix.

2006 (34 MFIs or 30% of the sample) and the ones that did not (80 MFIs, or 70% of the sample).

Table 1 shows 2006's summary statistics of the continuous variables of our sample. Statistics are given for each of the 2 groups of the sample. The difference in the averages between groups are significant for the dependant variable  $\log D$  (at 1%), the inflation (at 5%), the regional level of financial inclusion (at 5%), the standard of living measured by the *GDPpc* (at 10%) and the size (at 1%). The average level of D is significantly higher for MFIs with a MTA than for the others. They operate in regions with higher levels of financial inclusion compared to other MFIs. Regarding the inflation, MFIs that have a MTA are located in countries which have experienced a lower level of inflation on average (4.55%), compared to other MFIs (6.23%). Finally, regarding the size, MFIs that have a MTA are on average bigger in terms of assets, compared to other MFIs.

Variable	Description	MTA status	Mean	Std. Dev	Min	Max
D***	Natural logarithm of Deposits	0	6.23	1.02	4	8
		1	7.11	1.34	2	10
REM/GDP	Remittances inflows/	0	5	2.7	0.22	8
	Gross Domestic Product (%)	1	4	2.25	1	7
GDPpc*	Gross Domestic Product per capita	0	2701	1380	700	4580
	(USD)	1	2894	1341	942	4580
∆CPI(-1)**	Annual percentage change in the	0	5	2.43	0.05	10
	consumer price index (CPI)	1	4	1.84	2	8
KInflows	(Foreign direct investment + Portfolio	0	11	9.65	0.08	27
	investment + other investment)/GDP	1	13	9.63	0.08	27
Country FinIncl.	Adult population with access to an account with a financial intermediary in	0	26.7	7.12	12	40
	the country (%)	1	26.7	6.19	12	40
ALS	Loan portfolio/Borrowers (USD)	0	1114	1005	77	6621
		1	1250	967	102	5403
FER	Financial expenses ratio (%)	0	4.52	2.91	0	14
		1	5.14	2.92	0	16
FRR	Financial revenues ratio (%)	0	22	8.96	8	52
		1	22.23	9.31	11	54
Size***	Natural logarithm of Assets	0	6.8	0.76	5	8
		1	7.55	0.92	6	10

### Table 1: Explanatory continuous variables descriptive statistics

Level of significance of the difference in averages: \*\*\* if P-value =< 0.01; \*\* if P-value=<0.05; \*if P-value=<0.10 Note: Outliers have been excluded

Table 2 shows statistics of our sample for binary variables. Regarding the legal status, the sample is dominated by rural banks and cooperatives. When we consider only institutions that have a MTA, cooperatives still dominate the sample, followed by non-bank financial institutions. In terms of regional location, the sample is dominated by EAP MFIs, followed by LAC and African MFIs. LAC MFIs provide the majority of MFIs that have a MTA.

Variable	Description	Obs.		MTA status	Number	Percentage of the sample
Bank	Banks		12	0	6	5.2%
				1	6	5.2%
Соор	Cooperatives		30	0	18	15.7%
				1	12	10.5%
NBFI	Non-bank financial institutions		28	0	18	15.7%
				1	10	8.7%
Non-profit	Non-profit		13	0	12	10.5%
				1	1	0%
Rural banks	Rural banks		31	0	26	22.8%
				1	5	4.3%
Africa	Sub-Saharan Africa		31	0	25	22%
				1	6	5.2%
SA	South Asia		12	0	10	8.7%
				1	2	1.7%
LAC	Latin America and Caribbean		32	0	11	10%
				1	21	18.5%
EAP	East Asia and Pacific		39	0	34	30%
				1	5	4.4%

### Table 2: Explanatory binary variables contingency table

### IV. Estimations and results

We start the analysis by examining the multicollinearity dimension. Correlations between the continuous explanatory variables are shown in Table 3. The table stresses that many variables are significantly correlated. However, except for the variations of the GDP, correlation coefficients remain all under 0.8, the level at which multicollinearity problems appears (Kennedy, 2008). We have then kept only the one-year variation of the GDP in our regression.

#### Table 3: Correlation coefficient among the explanatory continuous variables

	logDeposits	Rem/GDP	GDPpc	Inflation	FinInfl.
logDeposits	1				
Rem/GDP	-0.17***	1			
GDPpc	0.30***	-0.03	1		
Inflation	-0.09	0.24***	0.15**	1	
FinInflows	0.25***	0.05	0.37***	0.07	1
FinIncl.	0.27***	-0.21***	0.52***	0.11*	-0.05
Size	0.75***	-0.07	0.13**	-0.09	0.11*
ALS	0.35***	-0.21***	-0.22***	-0.11*	-0.10
FER	0.15**	-0.14**	0.41***	0.27***	0.2***
FRR	-0.05	-0.02	0.10	0.17***	0.44***

Level of significance: \*\*\* if P-value =< 0.01; \*\* if P-value=<0.05; \*if P-value=<0.10

### Table 3 (cont.): Correlation coefficient among the explanatory continuous variables

	Country FinIncl.	Size	ALS	FER	FRR
Country FinIncl.	1				
Size	0.06	1			
ALS	0.09	0.20***	1		
FER	0.27***	0.06	-0.02	1	
FRR	-0.24***	0.005	-0.23	0.23***	1

Level of significance: \*\*\* if P-value =< 0.01; \*\* if P-value=<0.05; \*if P-value=<0.10

Given Hausman test' results, we have recourse to random effect estimators. Actually, given the limited temporal dimension of our database, random effect estimators give better results than fixed effect models. Furthermore, we have included time invariant variables (regional dummies, legal status), as we have reasons to believe that they have some influence on the dependent variable. Table 4 reports panel-data regression results for the deposit equation<sup>43</sup>.

<sup>&</sup>lt;sup>43</sup> In order to overcome the one-year observation issue of the MTA, we have tried alternative models. We have first replaced all the variables by the differences over the period, to see to which extend the MTA explain the variation of deposits. However, this model was not significant. One of the reasons could be the low variations observed for many of the explaining variables. Second, we have run two separated regressions (one for 2004 and the other for 2006). The objective was to see whether MFIs offering a MTA in 2006 already had a significantly higher level of deposit than other MFIs before they implement their MTA. The MTA was not significant in 2004 and positive and significant in 2006. This means that, all else equal, both categories of MFIs had the same level of deposits in 2004, while in 2006, the offer of a MTA significantly contributes to the level of the deposits.

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	(1)	(2)	(3)
MTA	0.23** (0.108)	0.23** (0.110)	0.439*** (0.169)
Africa	0.24 (0.161)	1.046*** (0.212)	1.144*** (0.237)
South Asia	-0.503*** (0.183)		
East Asia and P.	-0.012 (0.131)	0.486*** (0.170)	0.543*** (0.177)
Latin America and C.		0.693*** (0.210)	0.768*** (0.218)
Соор		-0.364 (0.451)	-0.425 (0.456)
NBFI		-0.139 (0.436)	-0.156 (0.448)
Bank		0.064 (0.410)	-0.004 (0.423)
Others		0.002 (0.442)	-0.046 (0.449)
ALS	0.33*** (0.90)	0.261*** (0.098)	0.275*** (0.1)
FRR	-0.012*** (0.004)	-0.015*** (0.005)	-0.017*** (0.005)
FER		0.013 (0.017)	0.012 (0.018)
Size	0.892*** (0.056)	0.864*** (0.063)	0.844*** (0.065)
Rem/GDP			0.010 (0.012)
MTA*Rem/GDP			-0.029 (0.018)
K Inflows	0.013*** (0.004)	0.012*** (0.004)	0.011** (0.004)
FinInclusion	0.019*** (0.007)	0.018** (0.007)	0.017** (0.007)
GDPpc	0.363** (0.156)	0.358** (0.171)	0.373** (0.178)
ΔCPI			0.009 (0.015)
Constant	-1.346** (0.651)	-1.568** (0.730)	-1.571** (0.783)
Nb of obs	228	228	228
R <sup>2</sup>	0.74	0.75	0.76

### Table 4: Regression results

Robust standard errors in parentheses; \*\*\* if P-value =< 0.01; \*\* if P-value=<0.05; \*if P-value=<0.10

In order to assess the validity of our model, we test different empirical specifications of the equation. In Equation (1), we have a benchmark specification with includes only the significant parameters. In equations (2) and (3) we include respectively additional MFI parameters (legal status and FER) and macroeconomic variables (GDP related variables, remittances and inflation), plus the interaction term.

In accordance to our expectations, MTA always positively contribute to the volume of deposits in MFIs. The coefficient related to our variable of interest is positive and significant at 5% level in all the specifications. This means that MFIs providing money transfer services have a significantly higher level of deposits that the ones who do not. Additional deposits may come from remittances flows that have transited through MFIs thanks to these services. This result confirms the hypothesis that MFIs can contribute to turn remittances into deposits, which increases remittances impact on long term growth through the funding of productive investments.

The region matters when we consider the level of deposits mobilized by MFIs. Actually, regarding regional dummies, it appears that south Asian MFIs have a significantly lower level of deposit compared to MFIs from any other region.

The ALS's coefficient is always positive and strongly significant, meaning the richer the client, the higher his ability to save money. The *FRR*'s coefficient is always significant at 1% and negative, as expected. The higher the interest paid on credits, the lesser MFIs' clients will be able to save money.

Regarding confidence towards the institution, it appears that bigger MFIs attract more deposits that smaller institutions, as they are certainly perceived to be better managed that the later. Legal status dummies are never significant in our regressions.

Turning to macroeconomic variables, the coefficient of financial inclusion is always positive and significant. Actually, as it is measured as the percentage of adult population with access to a financial intermediary in the country, the amount of deposits collected by MFIs, as financial intermediaries, increases with this percentage. Regarding the level of financial openness, the coefficient is always positive and strongly significant. This means that private capital inflows in a country increase its habitants' revenues, which contribute to increase their deposits in financial institutions. Finally, the coefficient of GDP per capita, which capture the standard of living of the country, is also positive and significant, as expected.

The coefficients of the remaining variables are not significant. It is worth mentioning that the non significance of the *FER*'s coefficient is in line with the literature arguing that the interest rate paid on deposits by financial institutions is not, for the majority of poor people, the main determinant of their decision to put the money on an account in a financial institution. Remittances flows' coefficient also is not significant. This means that we do not find a direct impact of remittances flows within the country on the volume of deposits collected by MFIs. This may be because remittances flows are too big compared to microfinance at the country level. Remittances' impact on MFIs' deposits may therefore come from the interaction between remittances flows and the provision of money transfer services by MFIs. However, the interaction term's coefficient is not significant in our regression. The absence of a direct (and indirect, through interaction term) impact of remittances receivers do not save the money they receive. The data we have did not allow us to go further on this issue.

To sum it all, our empirical results confirm our hypothesis: operating on the money transfer market contribute to increase the volume of deposits mobilized by MFIs, because these institutions contribute to the financial inclusion of remittances receivers who mainly lack of bank access. Results also confirm some previous results related to remittances and to deposits in microfinance, such as the importance of the trust in the MFIs and the fact that remuneration of deposits do not matter for the majority of depositors.

#### V. Conclusion

By measuring the impact of money transfer activities on deposits in MFIs, this paper analyses the potential role of microfinance as a channel to improve the growth impact of remittances in developing countries. Actually, given the majority of remittances senders and receivers are excluded from traditional banks in developing countries, MFIs may be the only formal financial intermediaries able to recycle remittances flows into the economy, improving their growth impact.

The results suggest a positive and significant effect of MTA on the level of deposits mobilized by the MFIs of our sample, which goes in the scheme of a role for microfinance when thinking about improving remittances' growth impact. However, this result should be taken carefully, given the limited size of the database both in terms of year and number of observation. Furthermore, it could have been interesting to instrument our variable of interest (MTA), in order to assess the occurrence of a causality problem between the volume of deposit and the supply of a money transfer service. However, we were not able to find an instrument for MTA. Finally, given the one-year dimension of MTA, replacing variables by their variation over the period could have allow us to really capture the impact of MTA on the deposits collected by MFIs. However, as highlighted in the paper, this alternative model was not significant. Working on the database issues in order to be able to run a significant model based on the differences should therefore contribute to improve the robustness of our conclusions. Nevertheless, the main implication of our result is that policies dedicated to the improvement of remittances on investment should consider the provision of MTA by MFIs, in

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order to meet the demand from remittances receivers who are willing to save in financial institutions.

From the microfinance industry perspective, more than the technical aspects to be considered by MFIs that are willing to enter the remittances market, other issues need to be carefully assessed. One of the main potential consequences of MTA of MFIs is the additional available financial resources through migrants and remittances receivers' deposits. However, these deposits may have specific characteristics, especially in terms of volatility, as depositors' behavior may differ from 'traditional' depositors' behavior (higher average amount deposited and longer term deposits for instance, which may lead to a highest sensitivity to interest rates on deposits). Using migrants' money as a source of funding may then imply that MFIs acquire additional management capacity, to be able to overcome this induced higher liquidity risk. Managers should be able to determine whether migrants' money only increase their liquidities or short term funds or are longer term resources. This question is studied in chapter 5.

Another issue to be considered is that the MTA may penalize microfinance clients who are not remittances receivers. Actually, literature suggests that remittances can be used as collateral for loans. There may be a danger that, with too much emphasis on remittances as a source of funding for MFIs, clients that do not receive remittances may be weeded out of MFIs' portfolios.

Finally, the impact of microfinance on remitting costs can be ambiguous. Actually, MFIs are expected to contribute to increase competition on the money transfer market, which should lead to lower sending charges for remitters. Furthermore, MFIs social objectives may also prevent them from charging high commissions compared to other operators of money transfers. All else equal, lower sending charges will increase the amount of money available for deposits. However, offering competitively low commission rates on money transfers may

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be hard for MFIs than for the other formal and informal institutions that currently operate in the money transfer market, because MFIs face high transaction costs in their activities (lending, savings collection), and they should be able to cover these costs with resources resulting from their activities. Furthermore, remitters' transaction and financial costs will depend on the business model implemented by MFIs in order to enter the remittances market, and on their negotiation power. In the case of operating as sub-agents of money transfer operators (MTOs)<sup>44</sup>, transaction costs for the remitter will depend on MTO's network in the country of migration. Regarding financial costs, MFIs are not really in a position to do anything about the level of commission charges paid by remitters. Not only do MTOs offer their services at a higher cost compared to the other actors on the market, but, in this business model MFIs are an additional intermediary between the remittances senders and the receivers. The more intermediaries there are between the remitter and the recipient of the remittance, the higher the level of commission charges. In the cases when MFIs are owners of a remittances product, remitting costs will be - at least in principle- lower, since there are less intermediaries involved in the transaction and also due to the fact that, given the social concerns of the MFIs, they are less likely to apply commission charges designed to generate an excess level of profit. The impact of MFIs on remitting costs has not been empirically studied yet.

<sup>&</sup>lt;sup>44</sup> The formal money transfers market is dominated by MTOs, with Western Union being the main one. Sending money through large MTOs is the most expensive channel for remitters compared to other formal actors. See Sukadi Mata (2006) and the chapter 4.

## Appendices

Appendix 1: The sample, by country<sup>45</sup>

MFI ID (MIX Market)	Country	MFI ID (MIX Market)	Country
Banco Los Andes ProCredit	Bolivia	Banco Santiago de Libon	Philippines
BancoSol	Bolivia	Bangko Kabayan	Philippines
Eco Futuro	Bolivia	RB Digos	Philippines
FIE	Bolivia	CMEDFI	Philippines
PRODEM	Bolivia	Valiant RB	Philippines
Finamerica	Colombia	RB Solano	Philippines
ProCredit - ECU	Ecuador	New RB of Victorias	Philippines
Banco Solidario	Ecuador	Bangko Mabuhay	Philippines
COAC Mushuc Runa	Ecuador	RB Sto. Tomas	Philippines
COAC Acción Rural	Ecuador	Partner RB Cotabato	Philippines
COAC San José	Ecuador	SPBD	Samoa
COAC Jardín Azuayo	Ecuador	CEP	Vietnam
COAC Maquita Cushunchic	Ecuador	ТҮМ	Vietnam
COAC Sac Aiet	Ecuador	Binhminh CDC	Vietnam
FINCA - ECU	Ecuador	Nirdhan	Nepal
ACCOVI	El Salvador	SB Bank	Nepal
Fonkoze	Haiti	MGBB	Nepal
FINSOL	Honduras	PGBB	Nepal
ODEF OPDF	Honduras	СВВ	Nepal
Caja Popular Mexicana	Mexico	DD Bank	Nepal
FINCOMUN	Mexico	CSD NGO	Nepal
CMAC Arequipa	Peru	JSCCS	Nepal
CMAC Huancayo	Реги	Kashf	Pakistan
CMAC Maynas	Peru	FMFB - Pakistan	Pakistan
CMAC Sullana	Peru	Sabaragamuwa	Sri Lanka
CMAC Tacna	Peru	SEEDS	Sri Lanka
CMAC Trujillo	Peru	FECECAM	Benin

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CMAC Del Santa	Peru	CBDIBA/RENACA	Benin
CRAC Caja Nor	Peru	MDB	Benin
COOPAC Santo Cristo	Peru	CODES	Benin
COOPAC San Martin	Peru	Kafo	Mali
MiBanco	Peru	Nyesigiso	Mali
ACLEDA	Cambodia	Miselini	Mali
AMRET	Cambodia	Kondo Jigima	Mali
АМК	Cambodia	CVECA Kita/Bafoulabé	Mali
HKL	Cambodia	PASECA - Kayes	Mali
CREDIT	Cambodia	Réseau KARABARA	Mali
Maxima	Cambodia	CACOEC SUDUDIAWDI	Mali
BRI	Indonesia	NovoBanco - MOZ	Mozambique
BPR AK	Indonesia	SOCREMO	Mozambique
LPD Kuta	Indonesia	MECREF	Niger
LPD Pecatu	Indonesia	CFE	Rwanda
LPD Panjer	Indonesia	CMS	Senegal
LPD Ketewel	Indonesia	PAMECAS	Senegal
LPD Bedha	Indonesia	ACEP	Senegal
LPD Kukuh	Indonesia	U-IMCEC	Senegal
BPR Eka Ayu	Indonesia	DJOMEC	Senegal
BPR PKT	Indonesia	MECBAS	Senegal
LPD Celuk	Indonesia	FUCEC Togo	Togo
LPD Buahan	Indonesia	WAGES	Togo
NWTF	Philippines	MICROFUND	Togo
Life Bank	Philippines	Centenary Bank	Uganda
CARD Bank	Philippines	FINCA - UGA	Uganda
st Valley Bank	Philippines	UML	Uganda
Cantilan Bank	Philippines	U-Trust / UWFT	Uganda
СВМО	Philippines	CML	Uganda
3CB	Philippines	KYAPS	Uganda

### Appendix 2: Sample, by legal status

	MFI ID (MIX Market)	Money transfer activity- MTA (1) or not (0)
-		

### Legal status: Bank

BancoSol1ProCredit – ECU0Banco Solidario1MiBanco1ACLEDA0BRI1Nirdhan0Sabaragamuwa0NovoBanco - MOZ1SOCREMO0Centenary Bank0Sub-total: 12 observations6 with a MTA	Banco Los Andes ProCredit	1
ProCredit – ECU0Banco Solidario1MiBanco1ACLEDA0BRI1Nirdhan0Sabaragamuwa0NovoBanco - MOZ1SOCREMO0Centenary Bank0Sub-total: 12 observations6 with a MTA	BancoSol	1
Banco Solidario1MiBanco1ACLEDA0BRI1Nirdhan0Sabaragamuwa0NovoBanco - MOZ1SOCREMO0Centenary Bank0Sub-total: 12 observations6 with a MTA	ProCredit – ECU	0
MiBanco1ACLEDA0BRI1Nirdhan0Sabaragamuwa0NovoBanco - MOZ1SOCREMO0Centenary Bank0Sub-total: 12 observations6 with a MTA	Banco Solidario	1
ACLEDA 0 BRI 1 Nirdhan 0 Sabaragamuwa 0 NovoBanco - MOZ 1 SOCREMO 0 Centenary Bank 0 Sub-total: 12 observations 6 with a MTA	MiBanco	1
BRI       1         Nirdhan       0         Sabaragamuwa       0         NovoBanco - MOZ       1         SOCREMO       0         Centenary Bank       0         Sub-total: 12 observations       6 with a MTA	ACLEDA	0
Nirdhan0Sabaragamuwa0NovoBanco - MOZ1SOCREMO0Centenary Bank0Sub-total: 12 observations6 with a MTA	BRI	1
Sabaragamuwa0NovoBanco - MOZ1SOCREMO0Centenary Bank0Sub-total: 12 observations6 with a MTA	Nirdhan	0
NovoBanco - MOZ1SOCREMO0Centenary Bank0Sub-total: 12 observations6 with a MTA	Sabaragamuwa	0
SOCREMO0Centenary Bank0Sub-total: 12 observations6 with a MTA	NovoBanco - MOZ	1
Centenary Bank 0 Sub-total: 12 observations 6 with a MTA	SOCREMO	0
Sub-total: 12 observations 6 with a MTA	Centenary Bank	0
	Sub-total: 12 observations	6 with a MTA

### Legal status: Cooperative

COAC Mushuc Runa	1	
COAC Acción Rural	1	
COAC San José	1	
COAC Jardin Azuayo	1	
COAC Maquita Cushunchic	0	
COAC Sac Aiet	0	
Caja Popular Mexicana	1	
COOPAC Santo Cristo	1	
COOPAC San Martin	1	
JSCCS	0	
FECECAM	1	
MDB	0	

Sub-total: 30 observations	12 with a MTA
KYAPS	0
MICROFUND	0
FUCEC Togo	0
MECBAS	0
DJOMEC	0
U-IMCEC	1
ACEP	1
PAMECAS	0
CMS	0
MECREF	0
CACOEC SUDUDIAWDI	0
Réscau KARABARA	0
PASECA - Kayes	0
CVECA Kita/Bafoulabé	1
Kondo Jigima	0
Nyesigiso	1
Kafo	0
CODES	0

Legal status: Non-bank financial institution

0	
1	
1	
0	
0	
1	
1	
1	
0	
1	
1	
1	
	0 1 1 0 0 1 1 1 1 0 1 1 1 1 1 1 1

Sub-total: 28 observations	10 with a MTA
CML	0
U-Trust / UWFT	0
FINCA - UGA	0
CFE	0
SEEDS	0
FMFB - Pakistan	1
ТҮМ	0
Maxima	0
CREDIT	0
HKL	0
АМК	0
AMRET	0
CRAC Caja Nor	1
CMAC Del Santa	0
CMAC Trujillo	0
CMAC Tacna	0

### Legal status: Rural bank

0	
0	
0	
0	
0	
0	
0	
0	
0	
0	
0	
0	
1	

Sub-total: 31 observations	5 with a MTA
DD Bank	0
СВВ	1
PGBB	0
MGBB	0
SB Bank	0
Partner RB Cotabato	1
RB Sto. Tomas	1
Bangko Mabuhay	0
New RB of Victorias	1
RB Solano	0
Valiant RB	0
CMEDFI	0
RB Digos	0
Bangko Kabayan	0
Banco Santiago de Libon	0
BCB	0
СВМО	0
Cantilan Bank	0

### Legal status: Non-profit institution

1	
0	
0	
0	
0	
0	
0	
0	
0	
0	
0	
0	
	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

WAGES

0

Sub-total: 13 observations

l with a MTA

Total: 114 observations

34 with a MTA

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Chapter 4

# Determinants of Money Transfer Activities in Microfinance

Institutions

Determinants of money transfer activities in microfinance institutions<sup>46</sup>

### Abstract

As financial intermediaries, microfinance institutions (MFIs) can contribute to integrate remittances into the formal financial system. Thanks to a database on 435 MFIs from Africa, Latin America and the Caribbean, East-Asia and Pacific, and South-Asia, this paper investigates the environmental and institutional factors that determine the occurrence of a money transfer service in MFIs. Results exhibit that large Latin American MFIs, located in countries with the lowest levels of financial inclusion, operating under the status of bank, and collecting savings are the ones that have the highest probability to offer a money transfer service to their clients.

Key words: microfinance, remittances, money transfers, diversification

JEL classifications: G21, L25, O15, O16

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### I. Introduction

According to World Bank (2011), the remittances (money sent home by migrants) towards developing countries amounted to 325 billion USD in 2010, representing a 300% growth over the last ten years. Remittances are the second largest source of foreign capital flows, after foreign direct investments and before official development aid. Given their magnitude and weight in receiving countries' economies<sup>47</sup>, remittances represent a strong tool for economic development. By focusing on the share of remittances dedicated to savings<sup>48</sup>, we are interested in the relationship between remittances and microfinance from the supply side perspective. This paper identifies the factors that may determine the occurrence of a money transfer activity in MFIs.

Like other sources of external finance, remittances allow the economy to invest in human and physical capital, which contribute to growth (Ziesemer, 2006). Recent literature has stressed the role of the development of the financial sector on the remittances impact on growth. Mundaca (2009) find that financial intermediation increases the responsiveness of growth to remittances and argues that a better-developed financial sector helps channeling remittances more efficiently to productive uses. 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 then substitute for lack of financial sector development. Gheeraert *et al.* (2010) demonstrates, theoretically and empirically, that remittances and ease of access to the banking sector act as complements to stimulate domestic investment. Their findings confirm that remittances flows stimulate domestic investment. Their findings confirm that remittances flows stimulate domestic investment, as a part of remittances indeed become banks' deposits, which increases the

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<sup>&</sup>lt;sup>47</sup> 25% of the 2009's GDP for Lesotho and 35% for Tajikistan (World Bank, 2011)

<sup>&</sup>lt;sup>48</sup> The share of remittances that is saved (not spent directly) varies among studies. According to Sorensen (2004), around 10% is saved. In a study conducted in 1998 among various migrants' communities, on average 51% of remittances where dedicated to direct consumption, while the remaining 49% were used to finance investments (Penent, 2003).

availability of lendable funds, reduces the interest rate and stimulates investment. In terms of policy implication, results suggest that enhancing financial sector development is crucial as it allows remittances to better stimulate domestic investment. The debate on the role of remittances as a development tool is then related to the issue of financial inclusion of the remitters and of the remittances receivers.

According to CGAP (2010), around 50% of the households in the world do not have access to banking services. This lack of access is due to various barriers that can be related to physical access, affordability and eligibility (Beck et al., 2008). In 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 et al. (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. According to Orozco (2007), the majority of remittances receivers are part of this group. However, migrants and remittances receivers are in need of financial services and are willing to put their savings in a financial institution as long as adapted financial products are available (Acción, 2004; Orozco and Fedewa, 2005). Microfinance institutions (MFIs) have succeeded in providing financial services to traditionally financially excluded people, thanks to methodologies such as joint liability or presence in rural areas, which reduce barriers access previously quoted<sup>49</sup>. Currently, the number of people served by the MFIs that report their data to the Microfinance Information eXchange (MIX) is around 91 millions<sup>50</sup>.

<sup>&</sup>lt;sup>49</sup> An extended literature exists on microfinance. See for instance Armendariz and Morduch (2009).

<sup>50</sup> www.mixmarket.org

The money transfer market is made of formal actors (money transfer operators<sup>51</sup>, commercial banks, post offices, and credit unions) and informal ones (*hawalas*<sup>52</sup>, friends, and family members). In terms of financial inclusion of remittances receivers, MTOs, who dominates the formal market, do not, by themselves, offer financial services other than the money transfer activity. However, when they have partnerships with banks or MFIs, account-to-account or cash-to-account transfers (the recipients receive money on their accounts in the financial institution) can be possible. Informal actors are neither able to offer additional financial services. It is however easily conceivable to have *hawalas* operators also operating as moneylenders or savings keepers. The market actors that can contribute to integrate remittances into the financial system and the economy are thus the actors that already operate on the financial market with the provision of financial services other than money transfer. We then come to the issue of financial inclusion and accessibility to financial services for people. This is directly related to the ability of MFIs, unlike other financial institutions, to develop methodologies that enable the financial inclusion of people excluded from traditional banks.

By September 2008, around 20% of the MFIs from Latin America and Caribbean, South Asia, Africa and East Asia and Pacific and registered on the MIX were offering a money transfer service to their clients, with disparities among the regions<sup>53</sup>. Given their role in the issue of having more remittances recycled into the financial system, we are interested in the determinants of a money transfer service and we identify those that have an impact on the probability to find this service in a MFI. We focus both on institutional and environment factors.

<sup>&</sup>lt;sup>51</sup> The main MTO at the world level is the company Western Union (WU). According to their website, 17% of remittances in 2006 were transferred through the WU network.

<sup>&</sup>lt;sup>52</sup> Hawalas are systems in which the operator receives money from the remitter and authorizes his partner in the receiving country to give a counterpart of equivalent value (not necessarily money) to the beneficiary (Mahamoud, 2006).

<sup>&</sup>lt;sup>53</sup> Whether it is about domestic and/or international money transfers is not indicated. See the descriptive table in section V.

To our knowledge, while literature exists on determinants of banks' growth and diversification strategies (see for instance Cyree *et al.*, 2000; Landi and Venturelli, 2001; Wilson *et al.*, 2010), the literature has not analyzed, so far, the institutional and environmental factors that drive the MFIs' decision to diversify by entering the remittances market. This paper aims to fill this gap. Using an original database of 435 MFIs –operating in Latin America and the Caribbean (LAC), South Asia (SA), East Asia and the Pacific (EAP), and Africa–, we perform empirical tests using cross-section over the year 2006, to identify which environmental and institutional parameters have an impact on the willingness of a MFI to provide a money transfer service. Despite its potential significant impact on this willingness, the costs of implementing and maintaining a MTA incurred by MFIs is not involved in our study as we do not have any information on this parameter. Our main result suggests that the fact that an MFI collects savings have a positive and significant impact on this probability, while the level of financial development negatively impacts it.

The rest of the paper is organized as follows. Section II examines what are the stakes for microfinance. Section III analyses market opportunities for MFIs, while section IV describes potential explanatory variables of a money transfer service. Section V describes the data and methodology used. Section VI presents and comments the empirical results. Section VII concludes.

### II. Stakes for the microfinance sector: Efficiency gains

According to literature on diversification, the decision to diversify by entering the remittances market can be motivated by managers' preferences or efficiency gains that will lead to more value added creation (Besanko *et al.*, 2007; Singh *et al.*, 2003; Goddart *et al.*, 2008). Santomero and Eckles (2000) suggest that the rationale for banks' diversification in the

financial services market is to grow, realize efficiency gains via economies of scale and scope, and reduce idiosyncratic risk. In this paper we focus on potential sources of efficiency gains linked to the money transfer activity.

Efficiency gains may come from economies of scale and scope from the new activity, economies on transaction costs, and internal capital markets which imply reducing the need of external funds (Besanko *et al.*, 2007; Goddart *et al.*, 2008; Singh *et al.*, 2003).

### Economies of scale and scope

Economies of scale and scope can exist because the institution that diversifies its offer may be able to reduce its costs, either because the new product or service use managerial capacities that are already present in the institution, or because this new activity mobilize the same resources than already existing activities and these resources are indivisible. In the context of microfinance and money transfers, economies of scale and scope may come from the capacity of this activity to attract new clients. Actually, money transfers can both create a need for financial products from remittances receivers and make these persons eligible for any other financial product available in the MFI. So, remittances receivers will come in a MFI first because of the money transfer service, and then because of other adapted financial services are available to them in this MFI (deposit solutions, credits, etc.). This increase of the number of clients could then lead to economies of scale, thanks to an increase of the « production » (size of loan portfolio, volume of deposits) which reduce the cost per unit produced (loan, opening of a deposit account). In the same idea, the enlargement of the supply of services to a clientele that is already targeted by traditional MFIs activities allows a better use of MFIs' resources, as for instance the employees already have an expertise in providing financial services to bank excluded people.

#### Economies on transaction costs

Regarding economies on transaction costs, MFIs can have access to information on their potential new clients thanks to the money transfer activity. For instance, regarding potential borrowers, MFIs have information on the amounts received, and the frequency at which they receive them from the remitters. This can be useful when considering to which extend remittances can guaranty a loan. This information can also be determinant in the design of adapted deposits accounts. A money transfer service may then lead to economies on screening costs and to an increase of the number (and maybe the size) of loans and deposits thanks to adapted products and the consideration of remittances as collateral for loans.

### Internal capital market

Finally, money transfers lead to new financial resources for MFIs, which may enable them to fund by themselves their other activities (cross-subsidization), and then limit external funding. Money transfers may then be a strategic activity when access to external funds is costly or limited for MFIs<sup>54</sup>. More than the additional deposits coming from migrants and/or remittances receivers, the money transfer activity provide additional revenues through commission perceived on each transfer operation.

Factors may however limit the willingness or the ability of the MFIs to provide money transfer services. For instance, MFIs that are willing to operate on the money transfer market should comply with their country's regulation on money transfers, as well as international requirements in case of international transfers. For instance, as argued by Isern *et al.* (2006), MFIs must comply with clients' identification procedures imposed by anti money laundering and terrorism measures. However, these requirements may be difficult to fulfill in some developing countries where majority of the population do not have identity documents or

<sup>&</sup>lt;sup>54</sup> See Sukadi Mata, R. (2011) for the issue of using remittances as a source of funds for MFIs.
formal addresses. MFIs must also be able to provide all the information required by regulatory entities. The regulatory framework then plays a role on MFIs' access on the money transfer market as it can favor structural entry barriers such as limiting access to a given type of institutions. This may explain why, in some African countries, the number of MFIs that operate on the market is limited while they could contribute to reduce the prices charged to migrants to remit their money.<sup>55</sup> Furthermore, the money transfer activity can have a negative impact on MFIs' health if the implied risks, such as the liquidity and operational risks, are not well managed.<sup>56</sup> MFIs must then ensure that they have at their disposal the necessary managerial, financial and operational capacities to manage these risks. MFIs must also implement management information systems that allows managing money transfer orders and ensures security of the transactions.

### III. Market opportunities for MFIs

## Overview of the money transfers market

The formal market is dominated by money transfer operators (MTOs), even if sending money through large MTOs is the most expensive channel for remitters compared to other formal actors<sup>57</sup>. This is because they are the most able to fulfill customers' election criteria: speed, accessibility, security, financial costs and transaction costs (Isern *et al.*, 2005; WOCCU, 2004; Sander, 2003).

<sup>&</sup>lt;sup>55</sup> The African market records one of the highest price per transfer compare to other regions: the cost of sending 200 USD to Africa represents 8 to 12% of the remitted amount, while it is only 6 to 8% when remitting to Latin America One of the reason of this situation is the regulatory framework which favors monopolies (Orozco, 2007). As a consequence, the informal market is highly developed in Africa (especially for intra-African countries money transfers).

<sup>56</sup> See Isern et al. (2006)

<sup>&</sup>lt;sup>57</sup> See examples of commissions paid by remitters in Sukadi Mata (2006).

In terms of speed, MTOs provide a nearly instantaneous cash-to-cash money transfer service, while account-to-account transfers through commercial banks and credit unions take more time (some days). In terms of accessibility, MTOs offer a money transfer service that does not require the remitter and/or the receiver to hold a bank account, as it may be the case with other formal actors. Administrative formalities are also simplified and limited in MTOs. The security criterion is reflected by the fact that migrants look for institutions that have an established reputation in the industry and that they can trust (whenever they have a choice, there is always a tendency to prefer institutions that belong to a well-known international network over other money transfer companies). Finally, transaction costs refer for instance to the distance receivers have to travel to collect their money, and also to travel expenses incurred by the receivers.

Other formal actors provide the opportunity to send money through electronic transfer mechanisms (SWIFT, Giro), or paper-based mechanisms (cheque, postal orders)<sup>58</sup>. In both cases, at least the senders must hold an account in the financial institution providing the money transfer service. This requirement limits the use of these mechanisms by migrants, as migrants and the majority of remittances receivers do not hold accounts in financial institutions. However, banks and credit unions are implementing transfer services that are accessible to migrants and remittances receivers. It is for instance now possible for migrants to remit around the world through a network of 200 credit unions (*International Remittance Network* or *IRnet*) without holding an account in these credit unions (Gupta *et al.*, 2009).

New systems, such as transfers through mobile phones (mobile-banking), are also growing (Ponsot, 2007). They enable the reduction of significant infrastructures (such as physical agencies) by working with non-banking commercial partners (mobile companies, groceries,

<sup>58</sup> See Isern et al. (2005)

etc.). They also enable the reduction of cash transfers and a better traceability of operations. All these elements lead to lower transaction costs per operation and more affordable and easily accessible services for clients.

Informal remittances systems are all remittances operators working outside the regulated financial sector (Freund and Spatafora, 2008). According to Buencamino and Gorbunov (2002), political instability and the desire to bypass market controls are factors that can help to explain why informal systems still exist today. However, other elements such as the high cost of sending remittances due to market structures<sup>59</sup>, a high degree of flexibility, and their presence in remote areas not served by formal operators are also relevant factors.

According to each market player's characteristics described above, it appears that none of the actors operating on the remittances market fulfill simultaneously all the demand's evaluation criteria (Table 1 gives an overview of the criteria fulfilled by each actor). We then discuss the case of MFIs.

Table 1: Clients'	' election criteria fulfilled by remittance	s market actors (Author based
	on the characteristics of each mar	ket actor)

	Speed	Accessibility	Security	Financial costs	Transaction costs
Formal					
MTOs	x	x	x		х
Commercial banks			x	x	
Post offices		x	x	x	x
Cooperatives			x	x	x
Informal				1	
Hawalas	x	x		x	x
Individuals		x		x	x
MFIs	?	x	x	?	x

<sup>59</sup> See for instance Alberola and Salvado (2006).

## MFIs positioning and competitive advantages

Because of the nature of their activity, MFIs are able to provide a money transfer service of proximity, limiting receivers' transaction costs. In the same idea, their service might be easily accessible, thanks to their expertise in providing financial services to targeted clients. Finally, the service should be safe. However, remitters' financial costs as well as the speed of the transaction will depend on the business model implemented by MFIs in order to enter the remittances market, which justifies the question marks in Table 1 regarding the case of MFIs and these two criteria (speed and financial cost).

MFIs operate on the remittances market through a direct approach (without business alliances, by moving funds between their own locations or through their bank accounts) or through alliances with MTOs, banks, or consortiums of partners. An MFI's choice of business models is usually limited by country regulations and market realities (see Table 2).





In many countries, an MFI without a banking license can act only as agent or subagent of a MTO, or establish a correspondent relation with a commercial bank or another type of licensed financial institution. Market structure will also affect an MFI's choice of business model. The market is often oligopolistic (and monopolistic in some regions like Western

Africa where 70% of official payments are handled by one large MTO demanding exclusivity to its partners) and segmented (Orozco, 2007; Alberola and Salvado, 2006).

In order to cope with regulation restrictions and gain a presence in the market, many MFIs choose to offer money transfer services through partnerships with MTOs or commercial banks. Well-established MTOs offer reliable products with the potential to generate a large volume of transactions and a growing number of MFIs have established alliances to become agent or subagent with MTOs such as Western Union or Money Gram. Part of the attraction of a partnership is simplicity (Isern *et al.*, 2006): in fact, many companies provide a preset package of well-tested products, a technology platform, limited training, and marketing materials for the MFIs to begin operations. Agents benefit from an established agent network and existing marketing campaigns in other countries, both of which help to generate a larger volume of transfers.

From the customers' perspective, the main advantage is the reduction of transaction costs, since the service is now available at the local level (especially in rural areas). However, there are a larger number of partners involved in the transaction, compared to the direct approach, and the more intermediaries there are between the remitter and the recipient of remittances, the higher the commission charged may be.

Although commercial banks and MFIs complement each other regarding money transfers and work as partners in business models, in terms of financial inclusion they are, to some extent, substitutes or competitors. Actually, both are financial institutions able to provide financial products linked to remittances, and the money transfer activity could allow them to identify potential clients. Banks may then be interested by the receivers of large transfers as well as by frequent receivers of small amounts. In this case, they compete with MFIs in trying to turn remittances receivers into clients of their range of financial products. If we focus for instance

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on deposits products, in commercial banks, unlike in MFIs, one of the access barriers is the minimum capital requested to open an account. However, this barrier could be overcome by remittances flows. If commercial banks take this opportunity to design products adapted to receivers in terms of accessibility (simplified procedures for instance for financially illiterate people), the competitive advantages of MFIs relative to commercial banks can be significantly reduced. However, MFIs still have a geographic advantage as they are present in areas underserved by commercial banks, and an expertise advantage in providing financial services to financially excluded people. MFIs are thus important actors in the perspective of including remittances flows in the financial system in order to support local economies.

## IV. Potential explanatory variables of the money transfer service

Various factors can influence the likelihood to find a money transfer service in the scope of services provided by a MFI. Even if we control for other elements, such as the economy, the geographic location of the MFI, as well as its legal status, we particularly test the relevance of three indicators: the market size (remittances inflows and outflows), the level of financial inclusion (financial sector development) and the ability of the MFI to turn remittances into deposits (deposits facilities). By having an impact on the number of potential new clients as well as on the volume of deposits collected, these three indicators are related to economies of scale and scope as a source of efficiency gains. Given the available data, we do not have measures for the occurrence of economies on screening costs and of an internal capital market. Therefore, our approach will do not cover these two other aspects of the rationale for MFIs to provide money transfer services.

### Market size

Focusing on the scale and scope economies perspective, Remittances flows will give an insight on the volume of potential new clients for the MFI, as well as on the size of its operations (high inflows may mean a high number of receivers and/or a few number of richer (potential) clients, leading to bigger deposits and bigger loans). However, remittances flows also give an idea of the money transfers market size and will help determine the expected revenues and costs of the money transfer activity (Isern *et al.*, 2006). Actually, all else equal, the more a country receives remittances, the more money transfer service providers will be solicited and/or the more the revenues from each transaction will be high. The same occurs for outflows. Therefore, to some extent, the market size can be considered as a measure of the internal market involved by the MTA.

**Hypothesis 1**: remittances inflows and outflows positively influence the probability to have a MFI providing a money transfer service, as larger remittances flows increase potential scale and scope economies from the activity.

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). Aggarwal *et al.* (2011) and Alfieri *et al.* (2005) discuss in depth the definition of remittances. We use the World Bank database on remittance inflows and outflows worldwide, covering 157 countries (122 developing countries), year by year. We scale remittances by the receiving country's GDP.

## Financial inclusion

As argued earlier, microfinance competitive advantage comes from their ability to reduce accessibility barriers to financial services in terms of geographic location, administrative procedures and so on. Furthermore, migrants and remittances receivers are willing to put their savings into a financial institution if adapted products are proposed to them. A high level of financial inclusion, which implies that a high proportion of potential clients from the money transfer activity (MTA) hold bank accounts, will then reduce the competitive advantage of MFIs and thus reduce the value creation from the MTA (see Besanko *et al.*, 2007).

**Hypothesis 2**: The level of financial inclusion or the level of financial sector development will negatively impact the willingness to have a MFI providing a MTA, as remitters and remittances receivers who hold bank accounts will not go through MFIs to receive or send money. This limits the number of potential new clients and therefore the opportunity for the MFI to beneficiate of scale and scope economies.

The Financial Structure Database, first published by of Beck, Demirgüç-Kunt and Levine (2000) and updated by Beck and Demirgüç-Kunt (2009), provides a widely-used panel dataset of financial sector development indicators, measured yearly over the period 1960-2005 for more than 180 countries. To capture financial inclusion, we use a measure of the size of the banking sector, total deposit-money banks assets / (Deposit Money Bank+ Central Bank) assets. Beck *et al.* (2007 and 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.

## Deposit facilities

As argued earlier, the motivation for MFIs to enter the remittances market increases with the opportunity to turn migrants and remittances receivers' savings into deposits, given implied efficiency gains. MFIs that can mobilize savings from the public will then be more willing than the others to enter the money transfer market.

**Hypothesis 3**: the availability of deposit facilities in a MFI will have a positive impact on the willingness of this MFI to provide a MTA as the MTA increases the opportunity to realize economies of scale and scope.

From the MIX database, we have created a binary variable regarding the availability of deposit facilities (the dummy is equal to 1 when the MFI collect voluntary savings).

## Additional controls

Performance variables<sup>60</sup> are included in the model. They are intended to capture the effect of MFI's internal capacities in managing its activities. According to Worthington (2004), financial and managerial factors determine financial institutions' growth strategies, and diversification is one of them (Besanko *et al.*, 2007). Performance indicators include a measure of MFI's managerial performances, the return on assets (*ROA*), calculated by dividing net income (after taxes and excluding any grants or donations) by average assets over a certain period of time; a measure of MFI's financial performances, the debt over equity ratio (*D/E*), calculated by dividing total debt by total equity; a measure of MFI's operational performances, operational self-sufficiency (*OSS*) not adjusted to subsidies, calculated by dividing operating income (from loans and investments) by the sum of operating costs, loan loss provisions, and financing costs.

<sup>&</sup>lt;sup>60</sup> See Microrate and IADB (2003) for the categories of performance indicators we use.

The size of the MFI, measured by the number of borrowers (Borrowers), is also included in the model. The costs related to money transfer activities are mainly fixed costs such as rent fees and the necessary equipment (the variable part depends on the time spent by employees on money transfers, and are mainly employees' remunerations). Larger MFIs may then be more willing to provide a money transfer service (source of economies of scope) compared to smaller MFIs that will have a higher average cost due to their smaller size<sup>61</sup>.

A dummy for the legal status of the MFI (Bank, Cooperative, Non-profit, Non-bank financial institution, other) is also included in the model as it could facilitate or complicate (barrier of entry) the process of entering the money transfer market.

Due to the lack of database on regulatory frameworks faced by MFIs regarding international money transfers, we do not have a specific variable for this parameter. However, the geographic location of the MFI may capture an aspect of the regulatory environment (as argued earlier, the regulatory environment varies significantly between LAC and Africa for instance, implying difference on the remittances market). Therefore, we have a dummy for the geographic location of the MFI (Latin America and Caribbean, Africa, South Asia, East Asia and Pacific).

Finally we include a measure of the country level of development, the Gross National Income per capita in purchasing power parity (GNIpc), as it may have an impact on the operations of country's financial institutions, and a measure of the poverty of the clientele, the average size of loans (ALS)<sup>62</sup>. This later variable also gives an idea of the environment in which the MFI evolves.

MFIs variables come from the MIX. GNIpc comes from the World Development Indicators database (World Bank, 2008).

<sup>&</sup>lt;sup>61</sup> See Sukadi Mata (2006) for an example of the cost structure of a MTA provided by an African MFI.,
<sup>62</sup> Hudon and Périlleux (2010)

#### V. Methodology and data

In order to test the hypothesis defined in the previous section and analyze the factors that influence the occurrence of a MTA in a MFI, we specify a cross-section logit model, where the dependant variable is the binary variable MTA: it takes value 1 if the MFI has a MTA and 0 otherwise. The explanatory variables of interest are the market size (related to hypothesis 1), the level of financial inclusion (hypothesis 2) and deposit mobilization (hypothesis 3). We also control for additional variables: the country's level of performance, the MFI geographic provenance, the MFI's size, the poverty of clients, and MFI's managerial, financial and operational performances.

Hence, the following model is estimated, to determine the occurrence of the dependant variable (probability to have MTA = 1, conditional to **X**, all the explaining variables):

$$\ln \frac{P(MTA = 1 \text{ I X})}{P(MTA = 0 \text{ I X})} = \beta_0 + \beta_1 REMin + \beta_2 REMout + \beta_3 FSD + \beta_4 Dep + \beta_x X$$

*REMin* are remittances inflows in the country of activity, divided by the GDP. *REMout* are remittances outflows in the country of origin, divided by the GDP. *FSD* is the measure of financial development, is equal to deposit money banks assets divided by (deposit money bank + Central bank assets). *Dep* is the dummy for the mobilization of voluntary savings by the MFI or not. *X* is a vector of explanatory variables including: a set of regional dummies that capture regional differences, a set of legal status dummies that show organizational differences, a set of performance indicators, the *ALS* (natural logarithm of the average loan size of the MFI divided by the GNI per capita of the country), the size (*Borrowers*, the natural logarithm of the number of clients in the MFI), the *GNIpc* (the natural logarithm of the GNI per capita which capture the standard of living of the country).

Coefficients cannot be interpreted as a marginal effect of explaining variables on the MTA; only their signs can be interpreted. Variables with positive coefficients positively influence the probability of entering the remittances market, while variables with negative coefficients negatively affect this probability.

## The data

MFIs voluntarily participate in the MIX Market database and have to enclose documentation that supports the data (such as annual reports and audited financial statements). Therefore, the database probably represents a random sample of best managed MFIs in the world, as they should have an adequate information structure to provide required documentation (Krauss and Walter, 2008). We have included in our sample only the MFIs for which all the needed information was available. Basic statistics obtain from our sample appear to be similar with the overall MIX database statistics. The OSS of our sample is 114%, compared to 111% for the larger MIX database. The ROA is around 1% for our sample, compared to around 0% for the MIX. However, in terms of loan size, MFIs of our sample lend on average bigger amounts compared to the overall MIX database (USD 841 compared to USD 725).

We use observations of 435MFIs from Latin America and the Caribbean (LAC), South Asia (SA), East Asia and the Pacific (EAP), and Africa. The sample is divided into 2 groups of MFIs which are: the ones that had a MTA in 2006 (83 MFIs, or 20% of the sample) and the ones that did not (352 MFIs, or 80% of the sample). The dummy MTA has been build based on the MIX database.

Table 3 shows the summary statistics of the continuous variables of our sample. Statistics are given for each of the 2 groups of the sample. Table 4 shows the t-test results for the average differences between both groups. Regarding the market, remittances inflows represent on average 5.5% of country's GDP for the MFIs that have a MTA, while this average is 5.1% for

the MFIs that do not have one. Remittances outflows represent on average 0.3% of the GDP for both group of MFIs. The differences in averages are not significant for these two variables. Regarding financial development, the difference between group averages is significant: MFIs that have a MTA are located in countries which have a significantly lower level of *FSD* than countries where the other MFIs are located. Regarding other continuous variables, the averages between both groups of MFIs are not significant, except for the number of borrowers: MFIs that have a MTA are significantly larger than the other ones. They have on average around 116 000 clients, versus around 50 000 for the other group.

		MTA				
Variable	Description	status	Mean	Std. Dev	Min	Max
REMin	Remittances inflows/	0	5.54	26.41	0	20
	Gross Domestic Product (%)	1	5.1	26.23	0	20
REMout	Remittances outflows/	0	0.3	0.49	0	4
	Gross Domestic Product (%)	1	0.36	0.71	0	4
GNIpc	Gross National Income per capita	0	3593	2372	640	9630
	(USD)	1	4202	2245	650	9380
FSD	Deposit Money Bank Assets /	0	86.92	0.02	41	100
	(Deposit Money + Central) Bank					
	Assets (%)	1	83.36	0.03	41	100
ROA	Net income/Assets (%)	0	2	8.42	-36	32
		1	2	4.05	-17	14
OSS	Operating income/(Operating costs +	0	113	29.3	16	196
	loan loss provisions + financing					
	costs) (%)	1	115	23.8	35	194
D/E	Debt/Equity (%)	0	487	712	0	5205
		1	514	478	18	3707
ALS	Loan portfolio/Borrowers (USD)	0	594	870	28	7921
		1	1279	1474	41	9739
Borrowers	Number of borrowers	0	36328	82930	144	826517
		1	75436	159370	545	972212

Table 3: Explanatory continuous variables descriptive statistics

Note: Outliers have been excluded

Variable	t value
REMin	0.66
REMout	-0.56
GNIpc	-2.21**
FSD	1.73**
ROA	-0.58
OSS	-0.78
D/E	1.11
ALS	-0.27
Borrowers	-3.91***

Table 4: T-test of means differences between groups

Level of significance: \*\*\* if P-value =< 0.01; \*\* if P-value=<0.05; \*if P-value=<0.10

Table 5 shows statistics of our sample for binary variables. Regarding deposits, 46.5% of the MFIs of our sample (202 MFIs) mobilize savings. The sample is dominated by Non-profit and LAC MFIs. This domination also occurs when we consider only institutions that have a MTA.

Variable	Description	Obs.	MTA status	Number	% of sample
Bank	Banks	26	0	11	3%
			1	15	3%
Соор	Cooperatives	62	0	46	11%
			. 1	16	4%
Non-profit	Non-profit	204	0	189	44%
			1	15	3%
NBFI	Non-bank financial institutions	100	0	67	15%
			1	33	8%
Other	Other legal status	43	0	39	9%
			1	4	1%
Africa	Sub-Saharan Africa	101	0	83	19%
			1	18	4%
SA	South Asia	55	0	51	12%
			1	4	1%
LAC	Latin America and Caribbean	195	0	139	32%
			1	56	13%
EAP	East Asia and Pacific	84	0	79	18%
			1	5	1%
Dep	Deposit activity	202	0	139	69%
			1	63	31%

Table 5: Explanatory binary variables contingency table

## VI. Estimations and results

We start the analysis by examining the multicollinearity dimension. Correlations between the continuous explanatory variables are shown in Table 6. The table stressed that some variables are significantly correlated, especially *ROA* and *OSS*. However, correlation coefficients remain relatively low. They are all under 0.8, the level at which multicollinearity problems appear according to Kennedy (2008).

	REMin	REMout	GNIpc	FSD	ROA	OSS	D/E	ALS	Borrowers
REMin	1	_							
REMout	-0.03	1							
GNIpc	0.06	-0.36	1						
FSD	-0.05	-0.1*	0.28*	1					
ROA	0.09*	0.03	0.21*	0.02	1				
OSS	0.03	0	0.15*	-0.03	0.66*	1			
D/E	-0.03	-0.03	-0.01	0.07	0.02	0.04	1		
ALS	-0.08	0.07	-0.16*	0.01	-0.03	0.04	-0.01	1	
Borrowers	-0.01	-0.03	-0.01	0.04	0.02	0.01	0.08	-0.28*	1

Table 6: Correlation coefficient among the explanatory continuous variables

Level of significance: \*\*\* if P-value =< 0.01; \*\* if P-value=<0.05; \*if P-value=<0.10

In the previous section, we formulated a model of the determinants of MTA in MFIs in 2006. Table 7 shows the estimated coefficients of logit regressions<sup>63</sup>. We have estimated 4 equations, namely equation (1) to equation (4), increasing in the number of variables included in the regression. The results of a prediction success table based upon equation (4) estimates are found in Table 8. Regarding the status in equation (4), 4 sets of estimated coefficients are obtained, in this case for cooperatives, non-profits, NBFI and others. Thus, the estimated coefficients for the status are relative to banks.

<sup>&</sup>lt;sup>63</sup> We have also run probit regressions, which results, not reported here, give the same conclusions as logit regressions.

	(1)	(2)	(3) <sup>64</sup>	(4)
REMin	- 0.008	- 0.011	0.024	0.023
	(0.024)	(0.024)	(0.028)	(0.033)
REMout	- 0.088	- 0.105	0.078	0.075
	(0.151)	(0.152)	(0.175)	(0.185)
FSD	-0.015*	-0.015*	-0.021**	-0.02**
	(0.009)	(0.009)	(0.01)	(0.01)
Dep	1.579***	1.612***	1.573***	1.574***
	(0.281)	(0.289)	(0.451)	(0.431)
GNIpc				-0.051
				(0.383)
ROA		0.019	-0.005	-0.005
		(0.022)	(0.022)	(0.026)
oss		-0.003	-0.004	-0.004
		(0.005)	(0.007)	(0.007)
D/E		0	-1.57e-06	-1.88e-06
		(0)	(0)	(0)
ALS			0.11	0.1
			(0.089)	(0.15)
Borrowers			0.207*	0.2*
			(0.11)	(0.114)
Соор			-0.318*	-1.076*
			(0.761)	(0.654)
Non-profit			-1.008**	-1.775**
			(0.632)	(0.703)
NBFI			0.429	-0.333
			(0.685)	(0.571)
Others				0.749
				(0.882)
LAC			1.467***	1.832***
			(0.572)	(0.715)
SA				0.328
				(0.781)
EAP			-1.363	-1.048
			(0.821)	(0.696)
Nb of obs.	435	435	435	435
Pseudo R <sup>2</sup>	0.09	0.09	0.27	0.27

# **Table 7: Determinants of MTA**

Level of significance: \*\*\* if P-value =< 0.01; \*\* if P-value=<0.05; \*if P-value=<0.10

<sup>&</sup>lt;sup>64</sup> In equation (3), regional dummies are given relative to South Asia, and legal status dummies are relative to "Other".

Regarding the regional dummy for the same equation, the estimated coefficients are relative to African MFIs. The estimated model is highly significant, with LR test of the hypothesis that all of the slope coefficients are zero rejected at the 1% level using the chi-square statistic. The model correctly predicts 83.91% of the sample.

Observed	Predicted		
	-		Percentage
	MTA=0	MTA=1	correct
352	334	18	95%
83	52	31	37%
	Observed 352 83	Observed         Predicted           MTA=0         352         334           83         52         52	Observed         Predicted           MTA=0         MTA=1           352         334         18           83         52         31

Table 8: Prediction success table

To start with, the coefficients related to the size of the market are not significant in determining the MTA in a MFI. This result may be related to the relatively low weight of microfinance at the country level compared to remittances flows, as we do not control for that in our model.

Regarding the level of financial sector development, the coefficient is negative and significant at 5% level. This means that MFIs that are more likely to offer a money transfer service are located in countries with low levels of financial inclusion, as market opportunities are higher than in countries more financially developed, in terms of financial inclusion of remittances receivers.

Turning to deposit facilities, the coefficient is positive and significant at 1% level. MFIs that have the ability to turn remittances into deposits are more willing to enter the remittances market and offer a money transfer service than those that do not mobilize savings. This confirms that realizing scale and economies is a determinant of managers' choice to diversify.

Regarding the size of the MFI, the coefficient of *Borrowers* is positive and significant at 10%. The bigger the MFI, the higher the probability it offers a money transfer service. Since the costs related to the MTA are mainly fixed costs, larger MFIs have an advantage in terms of scale economies compared to smaller MFIs. Large MFIs are therefore more willing to enter the money transfer market.

Finally, it appears that LAC MFIs are significantly more willing to provide a MTA than MFIs from Africa. This can be related to the regulation in Africa which favors monopolies and thus the world's highest cost of transfer for the remitters, compared to LAC where this cost is among the lowest (Orozco, 2007). Cooperatives and Non-profit MFIs are significantly less willing to provide a MTA than banks. Again this can be related to regulation requirements which we do not control for in the model due to lack of data. Performance indicators coefficients are not significant. This is consistent with Cyree *et al.* (2000) who finds that the *ROA* is nor determinant of banks' growth decision, neither of the decision to growth through product expansion.

Marginal effects have also been calculated. It appears for instance that when financial development increases at the margin, the probability to have an MFI offering a money transfer service decreases by 0.979%. A discrete change of the binary variable related to deposit mobilization from 0 to 1 increase this probability by 4.827%.

To sum it all, our empirical results do not confirm the first hypothesis: remittances flows do not influence the probability to have a MFI offering a MTA. This may be linked to the small weight of microfinance sector in the economy compared to remittances flows. Our results confirm the second hypothesis: the level of financial inclusion has a negative influence on the probability to have a MTA in a MFI's scope of activities. This may be related to MFIs' willingness to take opportunities of a market that is not covered by other financial intermediaries. The third hypothesis is also verified, as the MFIs that mobilize savings are the ones that are more willing to provide a MTA. As argued, efficiency gains from the MTA come from increased deposits it may imply. MFIs that do not collect deposits have then fewer benefits in providing a money transfer than the other ones.

### VII. Conclusion

The present study uses a logit model to investigate the influence of environment and institutional factors on the probability of having a MFI providing a money transfer service in 2006. The current paper extends empirical work in this area in at least one way. Actually, as far as we are aware, it represents the first attempt to test these factors in microfinance. The study then allows an examination of the role of various variables on the occurrence of a MTA in MFIs.

The paper has identified several significant influences on MTA in MFIs' range of services provided to clients. These include the level of financial inclusion, measured by an indicator of financial sector development. These also include the fact that a MFI has the right to mobilize savings from the public. These results are a matter of some importance to policy makers. Actually, they confirm that MFIs are willing to enter the remittances market when market opportunities and potential efficiency gains exist. Given the role played by financial inclusion on the development impact of remittances, MFIs should then be encouraged to do so, for instance through a regulatory environment that allows a high level of institutions to comply with the requirements (while not degrading customers protection). MFIs operating in migration zone should also be encouraged to operate on the remittances market by being financially supported at the initial stage of the new activity, in case these MFIs have a limited access to liabilities. It may also be a necessity to provide technical support in order to limit the negative impacts of the diversification on MFIs' performances.

There are at least three ways in which this research may be improved or extended. First, it would be useful to add a time dimension in our study, in order to integrate the evolution of the involvement of MFIs in the remittances market in the study. A database providing information on the year at which the MTA is launched (and perhaps withdrawn) by MFIs is then needed. Second, better indicators of financial inclusion, such as the number of bank accounts in a country, should be used in the model for the market opportunity dimension. Again, the data are mainly missing for developing countries. Finally, qualitative information could be used to extend and improve the study. For instance, interviews with MFIs' managers about the motivations of entering the market can provide useful information about additional variables that should be included in the model, in order to improve its predictions, at least in regards to MFIs that offer a MTA.

The topic is widely understudied, being from the perspective of diversification motivations (what do MFIs expect from the money transfer activity), or from the decision making process perspective (do MFIs have the necessary resources to enter the market, what are the resources to be considered), or finally from the consequences of the diversification perspective (do the observed effects correspond to expectations). In order to further study all these potential questions that are important both for the microfinance industry and for developing countries' growth, given strategic implications remittances flows may have on MFIs activities and given the effect MFIs may have on the remittances impact on domestic investment, microfinance industry stakeholders should put more interest in collecting data related to money transfer activities.

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# Chapter 5

# Migrants' deposits and microfinance institutions' funding liquidity

# risk: the case of PASECA-Kayes in Mali

Migrants' deposits and microfinance institutions' funding liquidity risk: the case of PASECA-Kayes in Mali<sup>65</sup>

### Abstract

This paper is devoted to the analysis of funding liquidity risk in microfinance. Using both the Cox proportional hazard model and a re-sampling method on an original database of 7,828 deposit contracts issued between 2002 and 2008 by 12 village banks belonging to the Malian rural microfinance network (PASECA-Kayes), we found that the risk for a contract to experience an early withdrawal increases both with the amount deposited and the term of the contract which are, on average, higher for migrants compared to locals. We also found that deposits at risk are higher when considering migrants' time deposit compared to locals' time deposits.

Keywords: Funding liquidity risk, deposits withdrawals, migrants, microfinance

JEL: F24; G21; G32; O16

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## I. Introduction

The notion of liquidity in the economic literature relates to the ability of an economic agent to exchange his or her existing wealth for goods and services or for other assets. The risk relates to the probability of having a realization of a random variable different to the realization preferred by the economic agent. In our context the agent would have a preference over liquidity and the probability of not being liquid would suggest that there is liquidity risk (see Nikolaou, 2009). Liquidity risk is divided into two types (Garcia, 2009): the funding liquidity risk (on which we focus here) and the market liquidity risk.

Funding liquidity can be understood in terms of budget constraint: an entity is liquid as long as inflows are bigger or at least equal to outflows (Nikolaou, 2009). The funding liquidity risk captures the inability of a financial intermediary to service their liabilities as they fall due (IMF, 2008). The funding liquidity risk can also be defined by including a time dimension, as the probability of becoming illiquid is typically measured for a given period and can differ according to the length of this period (Nikolaou, 2009). Therefore, the funding liquidity risk depends on the availability of liquidity sources and the ability to satisfy the budget constraint over the respective period of time.

The dramatic drying-up of liquidities observed during the 2007-2009 financial crisis highlighted the importance of improving funding liquidity risk management (see for instance Cornett *et al.*, 2011; Ackermann, 2008). Banks that relied more heavily on core deposits (i.e. deposits that are unlikely to be withdrawn, even in response to market interest rates and seasonal swings<sup>66</sup>) and equity capital financing, which are stable sources of financing, continued to lend relative to banks with higher liquidity risk exposure. As microfinance

institutions (MFIs)'s assets are mainly illiquid<sup>67</sup>, in case these institutions find themselves in the same situation as traditional banks during the crisis (scarcity of funds), they should be able to rely on stable sources of funding such as core deposits. Otherwise, as any other financial institution, they may have to deal with a liquidity crisis consequences such as lost of trust from their clients, which may lead, in extreme cases to bank run and collapse of the institution (see for instance Diamond and Dybvig, 2000; Markel Biety, 2005; Carmona, 2007). This paper focuses on migrants' deposits as a source of core deposit for MFIs or a factor that could reduce their funding liquidity risk, defined as the danger that a MFI will not meet its obligations: its cash inflows will not meet the demand for cash outflows represented by deposit withdrawals, new loans demand and operating expenses (Markel Biety, 2005). Actually, many studies have shown that migrants' money flows have a positive impact on savings, especially in Developing countries (see for instance Baldé, 2011). In this paper we are going a step further by focusing on how the share of these savings that turns to be deposited in MFIs can help those institutions in terms of stable source of funding.

This paper is related to one aspect of the rationale for MFIs to enter the remittances market developed in the previous chapter, namely the internal capital market. Actually, it is about assessing the risk of using additional funding resources that result from MFIs activities on the remittances market to finance other activities (lending activities for instance). Is the risk associated to migrants' deposits higher (as suggested by banking literature) or lower (as suggested by microfinance and remittances literature) compared to non-migrants' deposits?

The contribution of the paper is twofold. Firstly, thanks to our original database from a Malian microfinance network which give information on migrants and locals time deposits, we are able to empirically test hypothesis related to the impact of migrants' deposits on MFIs'

<sup>&</sup>lt;sup>67</sup>According to the Micro banking bulletin, in 2008 the ratio Portfolio/Assets = 71.6% for Banks, 78.8% for Credit Unions (CU) and 65.9% for Rural Banks (MIX, 2010).

performances, which is relatively rare in literature on microfinance and remittances (see for instance Orozco, 2008 and Sukadi Mata, 2009 on the links between money transfer activities and deposits mobilized by MFIs). Our approach is to assess which assumption on withdrawals behavior is observed in reality. Secondly, we use for the first time the Cox proportional hazard model to identify the variables that have an impact on the probability to have early withdrawals, and we apply for the first time the technique of re-sampling, similar to the one used by Carey (1998), Schmit (2004), and Marrez and Schmit (2009) to estimate credit losses respectively in private debt, in the leasing industry, and in a microcredit portfolio, to a portfolio of time deposits to calculate withdrawal rates and deposits at risk.

Results from the hazard model suggest that the migration status is not a direct determinant for the probability to have an early withdrawal. However, this probability increases with the amount deposited and the term of the contract which are both higher for migrants compared to non-migrants. The re-sampling method results suggest that withdrawal rates are not the same for the two categories of depositors observed, namely migrants and locals. We find higher withdrawal rate distributions for migrants than for locals. The value at risk is also higher on migrants' deposits than on locals' deposits. All things equal, migrants' deposits variability is then higher than of locals' deposits. These results are opposite to what we expected from microfinance literature, as migrants' deposits tend to increase MFIs' funding liquidity risk compared to locals' deposits.

The rest of the paper is organized as follows. Literature review is presented in section 2. Section 3 describes the database. Section 4 outlines the methodology. Section 5 provides empirical results while section 6 discusses them. Finally section 7 concludes.

## II. Literature review

Banks provide liquidity to borrowers in the form of loans and to depositors by making funds available on demand (Cornett *et al.*, 2011). These functions leave them vulnerable to increases in demand for liquidity from borrowers as the loans are relatively illiquid assets and demands from depositors may occur at undesirable times (Diamond and Rajan, 2001). Banks should then set up management tools to prevent themselves against funding liquidity problems that can, at the extreme, result in runs on banks by depositors. Cornett *et al.* (2011) suggests four key drivers of liquidity risk management for banks, namely, composition of the asset portfolio or the market liquidity of the assets, core deposits as a fraction of total financial structure, equity capital as a fraction of total financial structure and funding liquidity exposure stemming from loan commitments. We focus on core deposits, as deposits are main the source of funding of the MFIs allowed to collect them<sup>68</sup>.

Depositors in MFIs are local people (living exclusively in MFI's country of operations), but also, for MFIs operating in migration zones, migrants (people who also live abroad) who are mainly excluded from the banking system in developing countries and may still not get access to banks in their country of migration.

According to recent literature in microfinance, migrants<sup>69</sup> are expected to behave differently from locals. First, they could be more willing to save at longer term than locals (Ponsot, 2007) and less willing to withdraw their money before the term of their contract. Actually, as unbanked, they valorize the opportunity to have their money stored in a safe place, but the valorize even more this opportunity as they are abroad, because it helps them preparing their

<sup>&</sup>lt;sup>68</sup> According to the MBB, in 2008 the ratio Deposits/Assets = 51% for Banks, 61% for CUs and 63.9% for Rural Banks. The ratio Deposits/Loans = 66.3% for Banks, 75.9% for CUs and 86% for Rural Banks.

<sup>&</sup>lt;sup>69</sup> We define Migrants' deposits as the money migrants put on their own deposit account in MFIs. They include remittances but also money they may have earned in their origin country. They do not include remittances migrants may have sent to a family member.

return, which is one motivation to remit<sup>70</sup>. This allows MFIs to get access to more resources to fund their loan portfolios. Actually, MFIs manage their liquidity risk by funding their loans activities only with time deposits<sup>71</sup> (see for instance Markel Biety, 2005). And second, the average balance of their deposit accounts is expected to be higher compared to local depositors' accounts. Actually, differentials of real or expected incomes are the main determinants of migration in most cases. Migrants are then expected to be richer than local depositors<sup>72</sup> and this should then provides to MFIs, all things equal, more cash inflows than locals. One implication of that are efficiency gains for MFIs (see Sukadi Mata, 2010). Migrants' deposits should then contribute to reduce MFIs' funding liquidity risk. Actually, as time deposits variability, which we measure through early withdrawals (time deposits withdrawn before their maturity)<sup>73</sup>, may be the main source of MFIs' liquidity problems, by providing MFIs with expected core deposits migrants contribute to reduce funding liquidity risk.

This hypothesis may not be verified, given what founded in bank literature on deposits withdrawals motives. According to Stanhouse and Stock (2004), depositors' propensity to withdraw funds is positively related to the level of market interest rates: at higher interest rates, depositors become more willing to withdraw their deposits because they compare market interest rates to the interest offered by their banks as remuneration for their deposits. If various other studies also consider the market interest rates as a factor affecting demand deposits (see Gilkeson *et al.*, 1999, for more references), it should however be highlighted that depositors can be willing to accept "lower-than-market" rates for many reasons, e.g.,

<sup>&</sup>lt;sup>70</sup> See for instance Freund and Spatafora (2008) for an insight on remittances determinants

<sup>&</sup>lt;sup>71</sup> With a time deposit, the depositor makes a single deposit that cannot be withdrawn for a specified period of time, while demand deposit products allow deposits and withdrawals whenever needed. Time deposits are remunerated, while demand deposits are not (see for instance Hirschland, 2005).

 <sup>&</sup>lt;sup>72</sup> See Mansoor and Quillin (2007) for literature on migration's determinants. See De Vreyer *et al.* (2010), Naudé (2010) and Ajakaiye *et al.* (2006) for determinants in Africa.
 <sup>73</sup> Time deposits are considered as stable until their maturity if their remuneration is competitive and if early

<sup>&</sup>quot;Time deposits are considered as stable until their maturity if their remuneration is competitive and if early withdrawals are not allowed or are severely penalized (Markel Biety, 2005).

switching costs and the value of non-interest services bundled with deposits (see for instance Neumark and Sharpe, 1992; Zephirin, 1994; Ledgerwood, 1999). Gilkeson and Ruff (1996) posit four factors that should influence early withdrawal decisions related to time deposits, namely the reinvestment incentive (a function of the remaining maturity of the deposits, the contractual rate and current market interest rate), the size of the deposits, whether the deposits serve as loan collateral, and the idiosyncratic liquidity needs of the depositor. Gilkeson *et al.* (1999) show that early deposits withdrawals are motivated in part by the level of reinvestment incentive and by liquidity needs, as, on average, time depositors that withdraw funds early pay a substantial net penalty.

The motives related to traditional banks clients' behavior could be applicable to microfinance clients, as their motivations to save are quite similar (business opportunities and remuneration for large depositors, valuation of non-financial services such as having their money in a safe place for the poorest clients<sup>74</sup>). Taking into account the higher average deposit size of migrants, as well as the fact that the sensitivity to interest or investment opportunities increases with the deposit size, migrants' deposits may then be more volatile than local deposits, which implies a higher liquidity risk in using these funds. A higher average balance also implies a higher volatility of deposits, because, all things equal, migrants can withdraw bigger amounts of money, compared to local depositors.

Additional parameters should also explain migrants' behavior in terms of deposits withdrawals in microfinance. For instance, as migrants deposits to prepare their return, early withdrawals may be due to the fact that they return home early unexpectedly. Furthermore, parameters that determine the volume of remittances, such as migrants' age, marital status, or country of migration can also have an impact on migrants' deposit behavior. These are assumptions that have not been formally tested yet in literature. In our empirical part, we will

<sup>&</sup>lt;sup>74</sup>See Ledgerwood (1999) for literature on why the poor save.

use the individual parameters we have at our disposal to test whether they have an impact on early withdrawal rates.

## III. Data

Our database consists of time deposits that were collected by 12 Malian CVECAs<sup>75</sup> belonging to the PASECA-Kayes microfinance network.

The PASECA (« Programme d'Appui aux Systèmes d'Epargne et de Crédit Autogérés ») started in 1998 and is managed by the CAMIDE (« Centre d'Appui à la microfinance et au Développement »). The CAMIDE has been initiated by 3 associations of rural development, managed by Malian migrants who came back in Mali after spending years in France. As a matter of fact, migration issues, especially remittances flows, have been early taken into consideration by the managers of the program, especially remittances between France and Mali. More than giving the opportunity to migrants to open bank accounts in their village bank, the CAMIDE has also open an office in Bamako, and since 2009 a national program of money transfers has been launched between this office and the urban office in Kayes. The objective of this program is to allow transfers between Bamako and all the village banks, and to develop international transfers with France.

The PASECA-Kayes consists in providing technical support to 2 associations of village banks from PASECA region, namely Jombougou and Jamanou. Those village banks, developed under the model of CVECAs, are referred to as belonging to the PASECA-Kayes microfinance network. It is one of the main microfinance networks in Mali, in terms of presence in rural areas (CAMIDE, 2009).

<sup>75</sup> Caisses Villageoises d'Epargne et de Crédit Autogérées

The CVECAs included in the sample (see Table 1) were created between 1999 and 2001. We have only analyzed data from 2002 to 2008 in order to have complete datasets for all the 12 village banks. Time deposits accounted for 74% of total deposits in the CVECAs in 2008. They represented on average 42% of the 12 CVECAs' liabilities, with a minimum of 10% for Dar-salam and a maximum of 65% for Gouméra. The data do not separate voluntary time deposits from mandatory time deposits (i.e. guaranties for loans and the mandatory 1000 XOF that all the members should have at minimum as time deposits in the CVECA). A high ratio (time deposits / liabilities) may be interpreted as the result of a real policy from the CVECA to motivate voluntary time deposit. In such case, voluntary deposits should then constitute a high part of the total time deposits compared to a CVECA that has a low ratio. In other word, the proportion of voluntary time deposits in the entire portfolio of time deposits is expected to be higher in Gouméra than in Dar-salam.

Over the period considered, flows of time deposits in the 12 CVECAs amounted to 519,790 Euros.<sup>76</sup>The majority of flows of time deposits (85%) are local deposits, while migrants' deposits represent the remaining 15%. The distinction between locals' deposits and migrants' deposits is based on the domiciliation status of the depositor. It is then important to stress that a share of the local deposits is constituted by migrants' remittances. Actually, not all migrants have an account in the CVECA, and some migrants' families report that they receive, either formally or informally, money from abroad, which they put on an account not related to the migrant. However, we cannot correct for this in our database.

The interest rate paid on deposits is 5% per year<sup>77</sup> and the average amount per deposit in 2008 varies from 30 (Dar-salam Plantation) to 955 Euros (Gouméra)<sup>78</sup>. For migrants only, the average amount per deposit in 2008 is 233 Euros, and each migrant has deposited on average

<sup>&</sup>lt;sup>76</sup> The amounts refer to annual flows of deposits, not to the stock of deposits in the village banks' accounts.

<sup>77</sup> The network charges 25% per year on loans

<sup>&</sup>lt;sup>78</sup> Conversion of XOF to Euros based on the exchange rate on 27 September 2010.

440 Euros over that year. As detailed in Table 1, the sample is constituted of 12 heterogeneous village banks, especially in terms of size (number of members and total assets), migrants' deposits (ratio "migrants' time deposits over total time deposits"), and age (in months). Gouméra and Dramané are the villages where we find the highest concentration of migrants, with respectively 18% and 17% of members reported as migrants in 2008. They are also the villages with the highest contribution of migrants' deposits to total time deposits of the village bank.

CVECA	Age	Number of	Total Assets	Deposits at term /	Migrants' time deposits /Total time
	(in months)	members	(in Euros)	Total Liabilities	deposits
Bangassi	88	588	39,600	37%	2%
Dar-salam	90	432	12,285	10%	0%
Koumarefara	90	680	24,163	45%	12%
Gouméra	90	728	169,253	65%	63%
Bougoutinti	102	557	56,009	51%	0%
Gouthioube	102	456	35,021	32%	0%
Lany mody	102	930	153,462	52%	0%
Same	102	383	51,385	47%	5%
Koussane	102	783	90,416	52%	17%
Moussala	113	495	57,213	38%	2%
Gory gopela	113	1,040	129,367	39%	5%
Dramané	113	1,064	114,608	38%	35%

Table 1: Overview of the sample, by the end of 2008

The information about time deposits in the database can be divided into 3 categories. The first category consists of the client's details: their gender (male, female, group), their identification code, and their migration status. The second category consists of the *ex ante* deposit variables: the origination date of the contract, the amount deposited, and the term of the contract. Finally, the third category contains the *ex post* variable: the date of withdrawal. Following

these categories, contracts are given the status "before term" or "at term", for migrants and non migrants clients<sup>79</sup>.

Table 2a shows that 9,136 contracts of time deposits have been issued between 2002 and 2008, with 3.75% made by migrants (while the amount of deposits made by migrants account for 15% of the total amount deposited during the period). The number of migrants' deposits is increasing with time, while the number decreases by 15% after 2007 for locals. These figures let us suppose that migrants' remittances will gain in importance in the total of the deposits received by the CVECAs of the network, supporting the idea that having a better knowledge of migrants' behavior is in the interest of these banks in order to better evaluate the funding liquidity risk their deposits may imply.

Year of	Number of deposits			% of total	Cumulative
deposit	made by Migrants	Number of deposits made by Locals	Total	(%)	(%)
2002	16	712	728	7.97%	7.97%
2003	18	958	976	10.68%	18.65%
2004	26	1,244	1,270	13.90%	32.55%
2005	49	1,502	1,551	16.98%	49.53%
2006	68	1,472	1,540	16.86%	66.39%
2007	72	1,575	1,647	18.03%	84.41%
2008	81	1,343	1,424	15.59%	100.00%
Total	330	8,806	9,136	100.00%	

Table 2a: Frequency distribution by depositor's migration status and year of deposit

Regarding deposits' terms, Table 2b shows that most of the contracts issued (around 55%) are of 4 to 6 months, followed by 10 to 12 months contracts (30.65%). The major part of the amounts considered (99%) have a term of 12 months at the maximum. Deposits with terms of 4 to 6 months constitute the main part of total deposits (58%), followed by deposits of 10 to 12 months (33%). The main part of migrants' deposits is of 10 to 12 months (58%) and the

<sup>&</sup>lt;sup>79</sup> Deposits withdrawn after term are considered as being at term, as from their maturity to the moment they are withdrawn, the institution considers them as demand deposits.

remaining part is mainly of 4 to 6 months (40%). The proportions are opposite for local deposits (60% are of 4 to 6 months and 30% are of 10 to 12 months). All else equal, a higher proportion of migrants' deposits could then be dedicated to fund 10 to 12 months loans, compared to local deposits (58% versus 30%), which justify the interest on migrants' remittances as a source of long-term funds for microfinance industry (Ponsot, 2007). Table 2a also shows that nearly 60% of the deposits are of maximum 6 months, which illustrates the lack of long term resources for the CVECAs.

	١	lumber of Depo	sits	Amounts deposited (Euros)		
Terms	Migrants	Locals	% of total	Migrants	Locals	% of total
$\leq$ 3 months	1	19	0.21%	27.5	830.74	0%
4-6 months	173	4,845	54.94%	30,662.48	268,242.83	58%
7-9 months	7	1,189	13.09%	1,269.04	38,410.67	8%
10-12 months	141	2,659	30.65%	44,252.64	128,413.52	33%
> 12 months	8	94	1.12%	20.86	7,659.55	1%
Total	330	8,806	100%	76,232.51	443,557.31	100%

Table 2b: Frequency distribution of deposits by term and migration status

Finally, in terms of early withdrawals, tables 3a and 3b give an overview of these operations, relative to, respectively, the total of contracts issued between 2002 and 2008 (by migration status) and the total of contracts issued each year over the period (with the amounts withdrawn).

Table 3a shows that early withdrawals represented 2% of the 9,136 deposits. According to Table 3b, we have an average of 20 withdrawals before term each year. Between 2002 and 2006, the average amount withdrawn early is 518 Euros (only locals have made early withdrawal within this period). This average goes up to 1,137 Euros when we include the last two years (migrants' and locals' early withdrawals).
	Locals	Migrants	Total	Percent of total (%)
Before term	132	6	138	2%
At term	8,674	324	8,998	98%
Total	8,806	330	9,136	100%

#### Table 3a: Frequency distribution per contract status between 2002 and 2008

#### Table 3b: Frequency distribution of withdrawals before term and amounts (in Euros), per year

Year of deposit	Number	Amount (Euros)	Percent of total issued the year
2002	11	438.54	21.14%
2003	16	552.15	21.18%
2004	20	685.37	20.15%
2005	16	122.92	1.74%
2006	18	791.09	11.58%
2007	23	10,686.05	38.54%
2008	34	2,453.54	8.16%
Total	138	15,729.66	

For migrants, withdrawals before term appear only after 2006 (1 in 2007 and 5 in 2008) and the average amount for 2007 and 2008 is 3,885 Euros. From those 6 early withdrawals, 2 were contracts with a 12 months maturity (including the biggest withdrawal which amounted nearly 6,500 Euros), while the remaining 4 contracts had respectively 4, 5, 6 and 7 months maturity. Two of these early withdrawals were made by the same migrant who didn't make an early withdrawal on the previous contract he had in 2006. Another early withdrawal was made by a migrant who again didn't make an early withdrawal on its previous contract in 2006. Among the migrants who an early withdrawal, the one with the biggest deposit account had an ongoing 12 months contract of 12,110 Euros on which an early withdrawal didn't occur (this contract arrived at maturity one month after the early withdrawal he made on his 6,500 Euros time deposit contract). Migrants' withdrawals can be seen as a consequence of the ongoing crisis. Actually, remittances to Mali, which accounted for 305 million Euros in 2008 (World Bank, 2010), have registered a lower growth rate between 2007 and 2008 (25%), compared to

the growth registered between 2006 and 2007 (62%). In 2007, early withdrawals accounted for nearly 40% of the deposits made during the year (a migrant had withdrawn 6,357 Euros in a single operation), while they accounted for 17.5% on average between 2002 and 2008. Globally speaking, the amount withdrawn before term by migrants for the period considered represents 10% of the total of their deposits, while it represents only 2% for non migrants' deposits.

To sum up, the descriptive analysis of data shows that migrants have deposits of longer term than non migrants (the main part of their deposits are of 10 to 12 months, while the main part of locals' deposits are of 4 to 6 months), and the average amount deposited by migrants is higher than the average of locals (231 Euros for migrants, versus 50 Euros for locals). These results correspond to what is expected from migrants' deposits (higher average amounts and terms compared to non migrants), which is attractive for MFIs in terms of economies of scale. Regarding funding resources and variability the descriptive analysis remains the question open, as migrants' early withdrawals appear only in the last two years of our database but their average withdrawal is higher than locals' average withdrawal.

#### IV. Methodology

Our objective is to study the impact of migrants' deposits on two parameters of funding liquidity risk, namely, early withdrawals on time deposits contracts and the deposit at risk (the volume of deposit which is at risk and therefore should not be dedicated to loan funding).

Given the type of information we have, namely, a dummy dependant variable ("early withdrawal" or not) and a set of time deposit contracts issued between 2002 and 2008, with each contract starting at a different time over this period, we cannot use a classical logistic model to identify the determinant of the probability of a contract to end before its contractual

term. However, we can use the Cox proportional hazard model. This model studies the lifetime of an individual (in our case, a contract) before the occurrence of an event (the withdrawal). It allows measuring the risk for a withdrawal to be considered as an early withdrawal at time t, the moment at which the withdrawal occurs.

Regarding the measure of the deposits at risk, again given the database, we cannot run a panel data regression to explain the size of withdrawals. Actually, the contracts are not observed from 2002 to 2008, but from the moment it starts (at anytime over the period) to the moment it ends. An alternative that could have been applied is to consider each village bank as an individual, instead of each contract. In this case, we only have 64 observations (12 banks and 7 years of observations), which is really limited. We will then use the technique of resampling to calculate withdrawal rates and deposits at risk. This technique was used by Schmit (2004) to estimate credit losses in the leasing industry, and by Marrez and Schmit (2009) to estimate credit losses in a microfinance portfolio.

### Cox proportional hazard model

The Cox model<sup>80</sup>, also known as the semi-parametric proportional hazard model, is a survival model that relates the time that passes before some event occurs as a function of a linear combination of explaining variables (covariates). Our explained variable is a dummy variable taking the value 1 when the withdrawal occurs before the contractual date ("default") and 0 when the withdrawal occurs at or after the contractual date.

We then estimate the following model:

$$h(t) = h_0(t) \exp(\sum_{i=1}^n \beta_i X_i)$$

<sup>80</sup> See for instance Li et al. (2007)

h(t) is the hazard function or the probability that a time deposit contract will experience an event (a withdrawal) within a small time interval  $t + \Delta t$  (or right after the observed lifetime of the contract), given that the contract didn't experience a withdrawal at the beginning of the interval. It can therefore be interpreted as the risk of a contract to end at time t (and therefore be considered as an "early withdrawal" contract or not).

 $h_0(t)$  is the baseline hazard or the hazard function when all the covariates are zero (the nonparametric part of the model). It is a function of time and is analogous to the intercept in a linear or a logistic regression.

Because the baseline hazard function is not restricted to a specific form, what it is interesting is the association between the set of explaining variables Xi and the occurrence of the event. We are then interested in estimating the B. As explaining variables we use all the information available: client's details (the migration status, our main variable of interest, and the gender of the depositor) and *ex ante* deposit variables (the amount deposited, the origination and the term of the contract). The *ex post* variable (date of withdrawal) is used to build the dummy of the event's occurrence for each contract. Coefficients are estimated by the method of maximum likelihood.

Given the literature, we expect the amount deposited to increase the risk of a contract to default, while the migration status may have a positive impact (migrants are more sensitive to market changes, which increases the risk) or a negative impact (migrants valorize the opportunity to have their money stored in a safe place, which reduces the risk of default). By controlling for the year of contracts' origination and end, we want to take into account exceptional events related to each year (for instance contracts issued in 2007 and 2008 may have a higher risk of default than other contracts, all else equal, due to the crisis).

The basic assumption of Cox's model is that the relative hazard or the ratio between hazard rates of the 2 groups of individuals (in our case, default and non default contracts) is constant over the period of observation (as both groups have the same baseline hazard rate). This assumption of a constant relationship between the dependent variable and the explanatory variables is called proportional hazards. This means that the hazard functions for any two individuals at any point in time are proportional. In our model we do not have time-variant variables such as depositors' age, however, we will run a test to assess the respect of the proportional hazard assumption.

#### Bootstrap calculation of withdrawal distribution

To implement this methodology, the sample is divided into two sub-portfolios: one of time deposits made by migrants, and another one of time deposits made by locals, or non migrant clients. The withdrawal rate for a given sub-portfolio is calculated first as the sum of all the contracts that have failed, divided by the sum of all the contracts issued (first case), and second as the sum of all the amounts withdrawn before the term of the contract<sup>81</sup> divided by the total amount deposited (second case). Sub-portfolio withdrawal distributions are then estimated with a non-parametric re-sampling technique, also known as 'bootstrapping' (Schmit, 2004). The basic process consists in choosing randomly, with replacement, a portfolio of *n* deposit contracts for a randomly chosen year. When a contract that didn't experience an early withdrawal is drawn, the associated withdrawal is zero in both cases, whereas when the draw is related to a withdrawal before the contractual term, the withdrawal is counted in the first case, and the amount withdrawn is indicated in the second case. By dividing the sum of all contracts that have failed to arrive at their maturity with all the contracts issued in the first case, and the sum of all withdrawals with the sum of the amounts

<sup>&</sup>lt;sup>81</sup> Before term = at least one month (30 days) before the contractual date of withdrawal, because, according to the data we have, the CVECAs do not make any difference in terms of remuneration between deposits withdrawn before term (up to 30 days before) and deposits withdrawn at term.

deposited in the second case, we obtain the withdrawal rate of that particular bootstrap portfolio. The assumption is that each year has the same probability of being drawn. The process is iterated i times. A single iteration i of the procedure yields a withdrawal rate for a given state of the economy (or a given year). The process is iterated 100,000 times (i =100,000) in order to obtain 100,000 bootstrap samples and thus 100,000 corresponding withdrawal rates. Using a large number of iterations enables us to obtain a probability distribution of withdrawal rates as a percentage of the total of contracts issued and of the total deposits. By performing the draw procedure in two stages (i.e., drawing first a year, then a portfolio of n deposit contracts), we avoid the understating of withdrawal rates. Otherwise, the combination of withdrawal experiences from different years would lead to a mixture of the underlying systematic factors and hence to over-diversification. The advantage of this method is that it is non-parametric and relies only on observed data (no parametric assumptions need to be made). The final step is the calculation of the average withdrawal rate and the percentiles at 95%, 99.5%, 99.9%, and 99.99% in order to obtain in the first case the contracts which are at risk, and in the second case the corresponding percentage of time deposits which is at risk and thus should not be used to finance loans.

#### V. Results

As the majority of deposits contracts have a maximum term of 12 months (98.88% of the contracts), we have excluded from the analysis contracts with maturity of more than 12 months (102 contracts), in order to have a situation close to reality. As our temporal horizon goes from January 1<sup>st</sup>, 2002, to December 31<sup>st</sup>, 2008, contracts that end after 2008 are also withdrawn from the database. The database that has been used for simulations includes 7,828 deposit contracts, from which 276 are related to migrants and 3% of deposits are withdrawn before term.

IV.1. Results from the proportional hazard model

As our dataset only include the contracts for which we have the origination and the withdrawal date, we do not have censored data. We have run 4 regressions, increasing in the number of covariates, in order to select the one with the best goodness of fit (the highest c-statistic). Hazard ratios are reported in Table 4.

The equation (4), with all the covariates included, have the best goodness of fit. Actually, the Harrell's concordance statistic is 0.7, which is the lower end of the  $0.7 \le c$ -statistic < 0.8 range for "acceptable discrimination", using the Hosmer and Lemeshow (2000) rule-of-thumb.

Before interpreting the results, we have tested for the proportional hazard (PH) assumption for the selected model. The PH assumption was met for the model overall, except for the predictor "Bank = Koussane".<sup>82</sup> To correct for this violation we have stratified the Cox model on this predictor. The assumption was then met both globally (the overall model) and individually for each explaining variable. This model, with a set of explaining variables and one stratification variable, is the final model we will comment (Table 5).

<sup>&</sup>lt;sup>82</sup> Koussane has the third highest Migrants time deposits/Total time deposits ratio of the sample, and the second one in terms of Deposits at term/Total liabilities.

	(1)	(2)	(3)	(4)
Migration	0.893	0.886	0.771	0.804
	(0.414)	(0.408)	(0.381)	(0.392)
Term	1.134***	1.135***	1.108***	1.109***
	(0.033)	(0.033)	(0.038)	(0.044)
logAmount	1.326***	1.344***	1.309***	1.29**
	(0.104)	(0.111)	(0.01)	(0.132)
Gender:M		1.229	1.352	1.135
		(0.492)	(0.567)	(0.563)
Gender:F		1.199	1.234	1.236
		(0.501)	(0.537)	(0.537)
Gender:G				
Bankl			0.338**	0.363**
			(0.147)	(0.164)
Bank2			0.368**	0.371**
			(0.154)	(0.16)
Bank3			0.039***	0.039***
			(0.042)	(0.042)
Bank4			0.189***	0.19***
			(0.095)	(0.1)
Bank5			0.379**	0.398**
			(0.149)	(0.164)
Bank6			0.555	0.58
			(0.233)	(0.247)
Bank7			0.297**	0.302**
			(0.155)	(0.161)
Bank8			0.371*	0.369*
			(0.198)	(0.211)
Bank9			0.327**	0.342**
			(0.161)	(0.171)
Bank10			0.175***	0.189***
			(0.087)	(0.096)
Bank11			0.203***	0.210***
			(0.1)	(0.105)
Bank12				
Year of start				Never significant
Year of end				Never significant
Nb of obs.	7828	7828	7828	7828
c-stat	0.63	0.635	0.678	0.703

# Table 4: Regression results<sup>83</sup>

Level of significance: \*\*\* if P-value =< 0.01; \*\* if =< 0.05; \*if =< 0.10; Standard error in brackets.

<sup>&</sup>lt;sup>83</sup> Bank1=Bangassi; Bank2=Bougoutinti; Bank3=Dar Salam plantation; Bank4=Dramané; Bank5=Gory gopela; Bank6= Gouméra; Bank7=Gouthioube; Bank8= Koumarefara; Bank9=Koussane; Bank10=Lany Mody; Bank11=Moussala; Bank12=Same.

Gender-G	(0.507)
Gandar G	(0.507)
Bankl	3.496
	(3.716)
Bank2	3.591
	(3.749)
Bank3	0.382
Bank4	1.842
	(2.053)
Bank5	3.918
	(4.144)
Bank6	5.648*
	(5.923)
Bank7	2.977
	(3.274)
Bank8	3.658
	(3.964)
Bank9	
Bank10	1.839
	(2.019)
Bank 11	2.035
	(2.211)
Bank12	9.835**
	(10.49)
Year of start	Non significant
Year of end	Non significant
Nb of obs.	7828
	0.707

# Table 5: Regression results (with stratification)

Level of significance: \*\*\* if P-value =< 0.01; \*\* if P-value=<0.05; \*if P-value=<0.10; Standard error in brackets.

Our variable of interest, migration status, is positive but not significant. According to the proportional hazard model, being a migrant does not significantly increase the risk of timedeposit contract to end before its contractual maturity. However, the amount deposited and the terms of the contract significantly increase the risk of the occurrence of an early withdrawal. As migrants deposit, on average, higher amount and for longer term than non-migrants, the migration status may be considered has a determinant of the early withdrawal risk, but in an indirect way. Furthermore, the non significance of the migration status parameter may also be due to the small number of migrants contracts (especially contracts experiencing an early withdrawal) compared to the total whole sample. The calculation of default contracts distribution through the bootstrap method may contribute to give a better idea of the contribution of migrants to the risk of early withdrawals faced by the MFI.

Being a member of a given village bank does not seem to have an impact on the risk of early withdrawal, except for the village bank Gouthioube and Dramané: being a member in one of these banks significantly increases the risk of early withdrawals relative to the members of the bank Koussane. The gender does not significantly impact the risk.

Finally, it is worth mentioning that the year of issuance as well as the year at which the contract is suppose to end does not significantly affect the early withdrawal risk. In other words, it seems that a contract issued in 2007 does not face a higher risk to experience an early withdrawal compared to the contracts issued the other years, all else equal. In the same idea, contracts that were supposed to end in 2008 apparently do not face a higher risk compared to those that end another year, all else equal. Therefore, the extraordinary event that occurred over the period 2007 and 2008 (the crisis) does not seem to have a direct impact on the risk of early withdrawals. This is an argument for the bootstrap, as it assumes a stationary process across all the years.

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#### Comparing contracts at risk

Table 6 provides summary statistics on the distributions of the contracts that experienced an early withdrawal, for each category of depositor. We show the results obtained by running simulations (i = 100,000 iterations) on sub-portfolios of 2,000 contracts overall (n = 2,000).

Table 6: Summar	y statistics on ear	ly withdrawals co	ontracts rate	distributions

		Simulated portfolio early withdrawals rates at distribution per				
	Mean	95	99.5	99.9	99.99	
Migrants	2.24%	14.6%	15.7%	16.2%	16.75%	
Locals	1.46%	2.25%	2.6%	2.8%	3.1%	

The average expected percentage of contracts that will end before the contractual term is higher for migrants than for locals: 2.24% versus 1.46%. The rate at the 99.99<sup>th</sup> percentile is 16.75% versus 3.1%. In other words, migrants tend to withdraw before maturity more than locals, which increase the liquidity risk of the MFIs that use migrants' deposits to funds their loans portfolio compared to MFIs that do not, all things equal. It is important to highlight that on average the rates are higher for simulated portfolios than for the actual contracts portfolio. Regarding migrants for instance, 6 contracts over 330 have defaulted or 1.81% of migrants' contracts, while simulated portfolios give 2.24% of defaulted contracts on average. The underlying risk coming from time deposits to be considered by managers is then actually higher than what is suggested by the descriptive analysis of the data.

This result can be explained by the higher average deposit size of migrants compared to locals, implying that migrants may be more sensitive to the interest rate that is offered by the market than the later, and then more willing to withdraw before term, to take the opportunity of the market. If this argument of deposits volatility has been highlighted in literature on deposits in microfinance (see for instance Markel Biety, 2005), it seems like it has not been

analyzed yet in the literature on microfinance and remittances that only highlight the opportunity of migrants' deposits (more specifically remittances) as a stable resource for MFIs because migrants tend to save for longer terms than locals.

## Comparing values at risk

Table 7 provides summary statistics on withdrawal distributions for each category of depositor. We show the results obtained by running simulations (i = 100,000 iterations) on sub-portfolios of 2,000 contracts overall (n = 2,000). The average expected percentage of deposits withdrawn early is higher for migrant clients than for locals: 3.84% versus 1.66%. The withdrawal rate at the 99.99<sup>th</sup> percentile is 29.05% versus 14.19%, demonstrating that the value at risk is higher for migrants' than for locals' deposits. In other words, migrants tend to withdraw a higher proportion of their time deposits before their maturity compared to locals, which increases the liquidity risk of the MFIs that use migrants' deposits to funds their loans portfolio compared to MFIs that do not, all things equal.

Table 7. Summary statistics on withur awar rate distribution	T	ab	le	7:	S	ummary	ł	statistics	on	withdrawal	ra	te	distributions
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		Simulated portfolic	withdrawals distribu	distribution percentiles	
	Mean	95	99.5	99.9	99.99
Migrants	3.84%	19.25%	24.33%	26.75%	29.05%
Locals	1.66%	5.95%	9.93%	11.84%	14.19%

If we focus on 10 to 12 months contracts, which represent 58% of migrants' time deposits, we come to the same conclusion (Table 8): values at risk are higher for migrants' deposits than for locals' deposits. The average expected percentage of deposits withdrawn early is 4.85% for migrant clients versus 1.68% for non migrants, and the value at risk at the 99.99<sup>th</sup> percentile is 40.74% versus 5.37%.

#### Table 8: Summary statistics on withdrawal rate distributions, for 10 to 12 months time

	1.	Simulated portfolio	withdrawal rates at	withdrawals distribu	tion percentiles
	Mean	95	99.5	99.9	99.99
Migrants	4.85%	30.59%	35.21%	37.62%	40.74%
Locals	1.68%	3.13%	4.08%	4.66%	5.37%

deposits

The risk on migrants' deposits can be up to 8 times higher than the risk on locals' deposits. In other words, the proportion of migrant deposits that can be used to finance loans, compared to the total of their deposits, is smaller than the one of non migrants, even if MFIs face less early withdrawals from migrants compared to non migrants. Again, this result can be explained by the higher average deposit for migrants compared to locals, implying that migrants may be more sensitive to the interest rate that is offered by the market compared to non migrants, but also by the limited diversification of migrants' deposits compared to non migrants. Actually, in 2007 for instance, through a single operation, a migrant has withdrawn around 60% of the total of early withdrawals of the year (migrants and locals together). When the simulations are run without this big withdrawal, the average value at risk on migrants' deposits decrease to 1.26%, which is smaller than on locals' deposits (the value at risk at the 99.99<sup>th</sup> percentile becomes 11.21%). However, we think that it is better to keep this withdrawal in the analysis, as this kind of situation is encountered in reality and should then be considered when evaluating MFIs' risk.

### VI. Discussion regarding bootstrap results

From the previous section it appears that migrants' deposits are likely to increase MFIs' liquidity risk when they are used to fund loans, compared to locals' deposits, all things equal. However, given that migrants' deposits are likely to be of longer term than locals' deposits,

we can wonder whether migrants' deposits do not provide simultaneously a positive effect on MFIs' liabilities. We then test the impact of migrants' longer term deposits on time deposits' durations of the CVECAs in our database. We want to determine whether the long term of migrants' deposits compensate the negative effect of their early withdrawals on time deposits' duration.

The duration of a financial asset with fixed interest rate is the weighted average maturity of its cash flows. It gives an average time of use of the funds. Each time deposit can be viewed as a zero-coupon bond, which duration is equal to its maturity. The duration of the whole portfolio of time deposit is then the weighted average of the maturity of each deposit contract.

If C is the deposit made by the client, r the interest rate paid monthly by the institution, m the maturity of the contract (in month), then:

$$P(portfolio \ of \ deposits's \ value) = \sum_{i=1}^{N} PV\{C_i \ (1+rm_i)\}$$

P, the value of the portfolio of deposit contracts is equal to the sum of the present values (PV) of the cash flows (capital plus interest) of each contract. N = number of contracts issued during the year considered and PV { $C_i$  (1 +  $rm_i$ )} the *i*th contract's cash flows present value (at the 1<sup>st</sup> of January of the contract's issuance year; the discount factor is  $\frac{1}{1+rmi}$ ).

And:

D (portfolio's duration for a given year) = 
$$\sum_{i=1}^{N} \left( \frac{PV \{C_i (1 + rm_i)\}}{P} \right) m_i$$

The duration (D) of the portfolio is the sum of each contract maturity, weighted by the contribution of each contract cash flows on the portfolio value P. Table 9 gives the durations (in months) of time deposits portfolios for each year available in our database. We have

calculated both theoretical and real durations. The theoretical durations consider that no contract has defaulted while to calculate real durations we have use the observed maturity (i.e. the contractual maturity is replaced by the maturity at which the deposits have been withdrawn). Finally, we have calculated both theoretical and real durations first without migrants' contracts and second, with migrants' contracts included. This allows us to measure the marginal impact of migrants' deposits on portfolios' durations.

	2002	2003	2004	2005	2006	2007	2008
Theoretical durations							
Locals only (1)	8.31	7.92	7.67	7.60	7.65	7.50	5.6
Locals and Migrants (2)	8.33	7.92	7.71	7.76	7.67	8.25	5.6
(2)-(1)	0.02	0	0.04	0.16	0.02	0.75	0
A	.76.191	1.014/-4	(auch)				
Real durations	: 7.0 ; (2)-(	1): 0.14 ( - 4	(days)				
Real durations Locals only (1)	8.30	7.9	7.64	7.60	7.65	7.50	5.6
Averages : (1) : 7.46 ; (2)         Real durations         Locals only (1)         Locals and Migrants (2)	8.30 8.33	7.9	7.64 7.68	7.60	7.65	7.50 8.09	5.6 5.6

Table 9: Theoretical and real durations (in months)

From Table 9 we can first say that migrants' deposits have a quite limited marginal impact on deposits durations, either theoretical or real durations. Nevertheless, this impact is positive on average (migrants' deposits add a few days – respectively 3 and 4 days - to deposits' durations). And second, the strongest impact of migrants' deposits occurs in 2007, when these deposits accounted for 27% of time deposits received by the CVECAs. Due to the big migrant's withdrawal which occurred in 2007, the highest difference between the theoretical and the real duration is also observed in 2007 (8 days). In other words, the average longer term of migrants' deposits compared to locals has a positive but quite limited effect on deposits durations and the impact of early withdrawals on the duration exist but it is also

limited. However, even when we consider early withdrawals, the marginal impact of migrants' deposits on the duration still positive on average.

It is worth stressing that, as durations consider the weight of each contract in the portfolio's value (the present value of the whole contracts), the overall impact of migrants' deposits on durations could certainly be higher than what observed if we had more migrants' contracts in our database.

#### VII. Conclusion

The role of migrants' money, especially remittances, in the microfinance industry has not been fully studied. Existing literature highlights a potential positive effect on the availability of funding resources through more deposits. Migrants' time deposits are expected to be of longer term and more stable (in terms of early withdrawals) than locals' deposits. This assumption had never been tested yet. Using the Cox proportional hazard model and the nonparametric re-sampling technique, we first find that higher the amount deposited and the term of the contract, the higher the risk for the contract to experience an early withdrawal. And second we find that using migrants' deposits to fund loans actually increase MFIs liquidity risk, compared to using only locals' deposits, all things equal.

We have shown that migrants' tend to withdraw before term more than locals, which implies a higher percentage of their deposits which is at risk. This result is consistent with the banking literature on motivations to withdraw deposit. However, as migrants tend to deposit for longer term than locals, through the calculation of durations we have measured to which extend migrants' deposits had anyway a positive impact on MFIs' liabilities. It appears that migrants' money has a marginal but positive impact on time deposits durations, either when

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considering early withdrawals, which impacts on durations are very limited, except in 2007 (the worst year in terms of amount withdrawn early).

We are aware that data we used in our research originates from a single microfinance network, and this prevents us to generalize our findings. Furthermore, the PASECA-Kayes network has the particularity to be located in a region of extensive migration, especially toward France. This has implications both on the attitude of the network managers towards (future) migrants and on migrants' behavior in terms of deposits. Actually, given their own migration history, the managers have soon been interested in working with migrants by implementing adapted specific products (deposits and credits). Furthermore, as they were themselves migrants, the managers are well known among Malian migrants associations in France, which contribute to have those migrants involved in the CVECAs of their home villages. From migrants' perspective, as they know that they will come back in Mali after a certain period of time, their behavior in terms of making deposits in Mali is of a certain importance. Our case cannot be considered as a representative case for the whole microfinance sector but, to some extent, for MFIs operating in rural areas and facing high and non definitive migration movements towards developed countries.

We do not want remittances to be perceived as negative for MFIs, given our results. Actually, remittances constitute a real opportunity for microfinance institutions in terms of beneficiating of efficiency gains coming from an increase in the number of clients, in the volume of deposits mobilized, or portfolio size. Furthermore, the descriptive analysis shows that migrants' deposits are attractive for MFIs in terms of average size and term compared to non migrants' deposits. However, the results suggest that there is a real need to assess the opportunity migrants' money represents as a source of (long term) funds for microfinance. According to the CFSI survey on microfinance risk, even if concerns about liquidity have eased considerably (especially compared to 2009 and its financial crisis), many MFIs

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contributing to the study in Africa and Asia have reported liquidity problems (CFSI, 2011). Actually, the availability of funds varies among regions and migrants' money, especially remittances, can significantly help MFIs with a limited access to external funds to ease their liquidity constraints. In terms of funding liquidity risk management, our study suggests that the optimal loans to deposits ratio should be smaller when talking about migrants' deposits compared to locals' deposits. Furthermore, in terms of long term resources, our study suggest that migrants' deposits only increase by a few days in the better case the duration of time deposits' portfolio. The idea that migrants' money may contribute to help MFIs that are facing lack of medium and long term resources is then questionable.

Beyond the study of migrants' deposits impact on MFIs' liquidity risk, this paper raises the issue of the diversification of funding resources. Actually, the high values at risk associated to migrants' deposits compared to locals' deposits can be explained through the high concentration of migrants' deposits into a small number of depositors. The same problems may then occur if we compare MFIs with their larger part of funds coming from a limited number of funders, to MFIs that have a more diversified base of funders.

By demonstrating that MFIs that receive migrants' deposits are not necessarily better-off than without migrants' money in terms of liquidity risk - and durations - this paper has stressed the importance of assessing more carefully the role of migrants for the microfinance industry, as our results do not confirm what was expected from the literature on this issue.

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#### CONCLUSION

A relatively small but growing literature on the relationship between migrants' remittances, financial development and economic growth in developing countries has emerged in recent years. One set of studies examines the direct relationship between remittances and financial development, with the underlying argument that remittances contribute to financial development in the recipient country through both demand- and supply- side effects, by respectively fostering financial literacy among remittances receivers and increasing the availability of loanable funds to the financial sector. The other set of studies explores the indirect relationship between remittances on growth. Our thesis contributes to this indirect or growth-focused approach.

By focusing on the share of remittances that is not directly spent by the receivers, we are interested in the role of financial intermediation on improving remittances' impact on long term growth. Actually, the literature has highlighted that the impact of remittances on investment (as an indicator of long term growth) varies with the level of financial development. However, two opposite hypotheses have emerged, both supported by empirical studies. The first hypothesis states that remittances impact on growth will be higher in countries with the highest levels of financial development, as good financial institutions contribute to channel optimally remittances to productive investments. The second hypothesis however states that remittances substitute to the lack of credits from the financial system. By reducing liquidity constraints, remittances then boost countries' investment more than if financial institutions could provide credits to people in need of funds for their projects. According to this view, remittances impact on growth is then higher in countries with less developed financial sector.

Our research question has emerged from this apparent contradiction on how the level of financial intermediation (a high level of financial development implies a high level of financial intermediation) affects the remittances' impact on investments, and thus long-term growth. Given the ability of microfinance to provide financial services to people who traditionally do not have access to banks, and given the majority of remittances receivers in developing countries are part of this people, we question about the opportunity microfinance could represent as an intermediary between remittances and investment.

Our approach consisted first in understanding the occurrence of the two opposite effects of the level of financial development on the investment's impact of remittances. We then focused on the role of microfinance institutions as financial intermediaries able to provide financial services to the majority of remittances receivers in developing countries.

After a chapter dedicated to the descriptive of remittances flows, we have aboard the research question which was divided into 4 sub-questions. The first one, treated in Chapter 3, is about the relationship between our variables of interest, namely: remittances, financial sector development, and investment. Through a stylized model of the loanable funds market and empirical tests, we intended to better understand the impact of the financial development on the remittances' impact on investment. Our approach is original regarding existing literature as we focused on two transactions costs which decline with the development of the financial sector. The first one is the "Cost of Bank Depositing" (CDEP), which measures the difficulties of savers, particularly the less well-off, of depositing their savings in the formal banking system. The second transaction cost is the "Cost of External Finance" (CEXF), which measures the marginal cost for the banking system of borrowing in global financial markets. Our model suggests that a nuanced analysis of the role of the financial sector development is required, as the marginal impact of remittances on formal investment decreases with CDEP while the marginal impact on informal investment increases with CDEP.

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We tested model's propositions using cross-country level data on remittances, investment and proxies for both CDEP and CEXF, on a sample of 100 developing countries, over the period 1975-2004. The results demonstrate that remittances and an easy access to the banking sector act as complements to stimulate domestic investment, while remittances and external borrowing are substitutes.

The second question, developed in Chapter 3 is related to the demand perspective of the relationship between microfinance and remittances. We want to assess whether there is a need from remittances receivers for financial products that may be linked to remittances. We aboard this question by assessing whether the supply of MTA leads to higher volume of deposits mobilized by MFIs. Our approach consisted in performing empirical tests to study whether MFIs offering money transfer facilities to their clients have a significantly higher level of deposits than the ones that do not. Using an original database of 114 MFIs operating in developing countries, we tested through a panel analysis over the period 2004-2006 the impact of the offer of a money transfer service on the volume of deposits in MFIs, using the natural logarithm of Deposits as explained variable. Our main result suggests that MFIs involved on the money transfer market have a significantly higher level of deposits compared to other MFIs, with these deposits probably coming from migrants and remittances receivers. MFIs could therefore be considered as a channel or a tool to improve remittances' impact on receiving countries' investment.

The third question, developed in Chapter 4, is related to the supply approach of the relationship between remittances and microfinance. More precisely, we try to identify factors that seem to explain the availability of such service in the scope of services provided by MFIs. In this chapter, we focus first on potential sources of efficiency gains linked to the money transfer activity as a rationale for diversification (i.e. the expansion of the offer). More precisely, we intend to identify factors that seem to explain the probability to have a MFI

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offering money transfer services to its clients. Our approach consisted in performing empirical tests to identify which environmental and institutional parameters have an impact on the willingness of a MFI to provide a money transfer service. Using an original database of 435 MFIs operating in developing countries, we tested through a cross-section analysis over the year 2006 the impact of environmental (such as the weight of remittances in the economy and the level of financial development in the country) and institutional variables (such as the MFI's legal status and size) on the probability to have a money transfer service provided by a given MFI. Our main results suggest that the size, as well as the fact that a MFI collects savings have a positive and significant impact on this probability, while the level of financial development it. The ability to realize economies of scale and scope, as well as taking opportunities of a market that is not covered by other financial intermediaries may be the determinants of MFIs' managers' choice to diversify.

Finally, the fourth sub-question, tackled in Chapter 5, is about the consequences for MFIs to collect migrants' savings. The aim of this chapter is to give an insight on the opportunity migrants' money (including remittances) could represent for the microfinance industry as a source of stable medium- and long-term funds. We precisely question about the funding liquidity risk involved by migrants' money. Actually, migrants' time deposits are expected to be of longer term and more stable (in terms of early withdrawals) than locals' deposits. However, this assumption had never been tested yet. Using the Cox proportional hazard model and the non-parametric re-sampling technique over a sample of more than 7 thousands deposit contracts issued between 2002 and 2008 by 12 village banks belonging to the PASECA-Kayes Malian microfinance network, we respectively identify parameters that increases the risk of the occurrence of early withdrawals, and we estimate withdrawal rate distributions for migrants' and locals' deposits. Our main results suggest first that the higher the amount deposited and the term of the contract, the higher the risk of the occurrence of an

early withdrawal. And second, results suggest that using migrants' deposits to fund loans may actually increase MFIs' funding liquidity risk, as we observe a higher rate of early withdrawals with migrants contracts compared to non migrants.

As migrants tend to deposit for longer term than locals we also calculated durations of MFIs liabilities, in order to determine to which extend migrants' deposits had anyway a positive impact on MFIs' liabilities. It appears that migrants' money has a marginal but positive impact on time deposits durations, even when considering early withdrawals. The results stress the importance of assessing carefully the role of migrants' money (which includes remittances) for the microfinance industry, as expectations about the provision of stable medium and long-term funds to MFIs by migrants are not straightforward based on our Malian case which is, however, not representative of the whole microfinance industry.

The conclusions of each chapter bring some insights on the thesis' research question. Actually, it appears that financial intermediation is a key issue when considering remittances' impact on investment, as by giving the opportunity to remittances receivers to put their savings on a deposit account we can increase the amount of remittances that can be used to fund investment. In fact, when remittances receivers do not hold deposit accounts, their savings can either finance their own projects in the best case, or nothing if they do not have (or find) in a near future projects to invest in. In this last case, we therefore have an "unused" part of their savings which is lost for the economy. While when deposit facilities are available to remittances receivers, the "unused" part of savings can be deposited in financial institutions that will play their role of financial intermediary between available money and people in need of money to finance investment projects.

It also appears that remittances receivers are willing to put their money on deposit account when they have the opportunity to do so. MFIs provide deposit facilities that are more

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accessible to remittances receivers in developing countries than the products proposed by traditional banks. Our results show that they can be considered as a valuable intermediary between remittances receivers and the economy by mobilizing migrants' savings and using them as loanable funds. MFIs could therefore be considered as a tool to improve remittances impact on investment. However, from a microfinance industry perspective, using migrants' deposits (which include remittances) as loanable funds may imply additional risks for MFIs. In our thesis we have focused on one of them, the funding liquidity risk which is involved by higher contracts and deposits at risk when considering migrants depositors versus non migrants.

From these insights it is worth considering the involvement of MFIs on the money transfer market and how it should or could be promoted. As presented in Chapter 4, MFIs can enter this market either by providing directly their own service, or through alliances with other actors of the market such as money transfer operators. If their choice will depend on key factors such as the regulatory framework or existing infrastructures, other issues related to their involvement on the money transfer market need to be considered. First, regarding the impact of MFIs' involvement on the money transfer market on the commissions paid by senders to remit their money. Actually, given the oligopolistic structure observed on many corridors of money transfer activities (especially from the rest of the world to sub-Saharan Africa), MFIs may contribute to increasing the competition on the market and thus reducing the commissions paid by migrants to remit their money. However, by establishing alliances with money transfer operators such as Western union who dominates the market, MFIs can hardly contribute to a decrease of the commissions as they do not increase competition on the market, moreover they can be responsible of an increase of the commissions by being an additional intermediary between senders and receivers. However, it may be hard, if not impossible, for MFIs to provide international money transfer services without partnering with

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a company that already operates at an international level and provides the needed technology and equipment. For this reason, we should question not only about the role of MFIs on the financial inclusion of remittances receivers, but also how to avoid the possible negative impact for migrants in terms of remitting costs when MFIs enter the market, as additional remitting costs may imply lower remittances flows (and therefore lower amount of money saved by the receivers).

A second issue to be considered is the impact of money transfer activities on a potential mission drift<sup>84</sup> of MFIs. Actually, it can be argued that MFIs that count among their clients remittances receivers may be tempted to focus on them. As loans may be guaranteed by remittances flows (provided the MFI have enough information on remittances flows, for instance the average amount and the frequency of the transfers), remittances receivers will be perceived as less risky than non-receivers, and therefore receive more loans than non-receivers, all else equal. Furthermore, migrants and remittances receivers are expected to deposit higher amounts compared to non-receivers. For MFIs that pursue the objective to become or to stay profitable, developing strategies to attract remittances receivers and migrants may lead to shifting from lending to all their clients to lending as a priority to remittances receivers. The promotion of money transfer activities in microfinance should therefore be linked to the question of the risks involved in terms of mission drift.

Much work remains to be done in analyzing the effects of remittances on investment and their interaction with the financial sector in general and microfinance in particular. Actually, in terms of academic literature, if there is a young but growing literature on remittances and financial development, we were confronted to a quasi- inexistent academic literature on the relations between remittances and microfinance, and the lack of adequate databases prevented us to realize macroeconomic studies on the relationship between microfinance and

<sup>&</sup>lt;sup>84</sup> See Armendariz and Szafarz (2011) for an insight on mission drift in microfinance.

investment. As a matter of fact, our thesis suffers from the substantial difficulty to confront our results to previous studies on the same topics. While there exists an extensive literature on why do the poor save and on the benefits for MFIs to mobilize savings, academic literature on microfinance hardly covers issues related to the determinants of the amount of savings deposited on a MFI's account, or the behavior of depositors in terms of early withdrawals related to time deposit contracts. We have tried to overcome this lack of information by borrowing ideas on traditional literature on deposit and depositors' behavior. However, even for traditional banking sector, research on money transfer activities and deposits is limited, which did not allow us to make valuable comparisons with our microfinance-related results.

Focusing on microfinance itself, quantitative studies often suffer from the lack of valuable databases, which leaded us to use proxies to approach our questions. This was especially the case for the relation between remittances flows and the volume of deposits in MFIs (Chapter 3). If a database providing information on the volume of deposit collected by MFIs at a country level was available (for one year or more), we would have been able to run a regression related to the deposit equation derived from our model in Chapter 2, in order to measure directly the impact of remittances on deposits in microfinance industry. Furthermore, given the lack of detailed information on money transfer activities in microfinance, such as the year of starting the activity, the business model implemented and the level of commissions charged to clients, we could not go deeper on analyzing the impact of MFIs involvement on the money transfer market for the clients and for the market structure. Regarding the impact on MFIs, except through case studies it is not possible, given publicly available data, to realize studies on liquidity risk or other variables. Our results cannot therefore be generalized.

As argued earlier, much work remains to be done in analyzing the relationship between remittances, microfinance and investment or growth. In the small existing academic literature on remittances and microfinance, general statements on the role of microfinance in improving the development impact of remittances and on the positive impact on MFIs profitability (through increased scale economies for instance) are often made without being tested. Our contribution to existing knowledge is therefore to bring an academic insight to the topic, by using empirical approaches and a case-study to test some of these general statements. After making a contribution to the literature on the role of financial development on the impact of remittances on investment, we first attempted to give insights on the role of MFIs as intermediaries between remittances flows and investment by analyzing their capacity to turn remittances into deposits. We then tried to identify the factors that can be determinants in the decision made by MFIs to enter the money transfer market. And finally, through a case-study related to the liquidity risk involved by migrants' deposits we have approached the question of the impact of remittances on MFIs activities. Our results show that some general statements are verified, while the issue of the impacts for microfinance industry remains open, as our case-study does not confirm what is expected from existing literature.

Given the topic is currently widely unexplored, subjects for further researches are numerous. We are especially interested in exploring issues related to the business model chosen by MFIs when entering the remittances market, which is uncovered in this thesis. Actually, the business model will be determinant in various aspects of the relation between our variables of interest (remittances, microfinance, and investment): first, it will influence the profitability of the money transfer activity, as working alone or through partnership will imply a repartition of the commissions with the partners or not. Furthermore, depending on the partner chosen by a MFI, its negotiation power will not be the same and the MFI may be unable to cover the costs of the new activity with the revenues the activity generates. The business model may then influence the decision of MFIs to enter the market or not. Second, depending on the business model, the contribution of microfinance in reducing money transfer charges for migrants will vary. Major money transfer operators for instance often ask for exclusivity

when they enter in partnership with other actors such as MFIs. In this case, MFIs do not contribute to increase competition on the market but contribute in increasing market shares of this single operator. As the level of commissions has an impact on remittances flows, the business model chosen by MFIs could therefore influence the development impact of remittances. Finally, the possibility to link the money transfer activity with deposit facilities may be determined by the business model. When the MFI implements its own mechanism to realize money transfers, it is responsible of the entire strategy related to remittances; however, when providing money transfers through a partnership, it may not be able to define specific strategies around this new activity. Actually, sometimes the technology of the partner is not compatible with the technology used by the MFI for its other activities, which complicates the opportunity to provide remittances-linked products to the clients. The business model has therefore a potential impact on the opportunity for MFIs to turn remittances into deposits, as providing the opportunity to migrants to send their money directly on a deposit account, or giving the opportunity to remittances receivers to receive the money directly on an account may imply higher amount of remittances turned into deposits compared to cash-to-cash money transfers. However, the difference between cash-to-cash and cash-to-account money transfer facilities in terms of recycling remittances into the financial sector has not been tested in the thesis and according to us, is worth considering when questioning the role of MFIs as a tool to improve remittances impact on investment. This is another area of research where, again, much remains to be done.

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