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Mobile payment services in developing countries

Firm capabilities and financial development

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Mobile payment services in developing countries: firm capabilities and financial development

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Abstract

Mobile money represents a potentially significant innovation to improve the provision of financial services in developing countries. We concentrate in this paper on an understudied aspect of this new phenomenon, the “supply side" of mobile payment provision and in particular how companies reconfigure their capabilities to lead to new innovations in the mobile payment space. We examine the relationship between firm capabilities and the growth of mobile payment systems (MPS) as well as between firms' organizational architecture and performance. We have collected primary data at the firm level, via two country surveys in Bangladesh and Tanzania respectively. We focus on three principal areas: the support and information agent receive from their distributor; agents’ human capital; and their business model. We find that agents’ business performance was improved by all three elements. Moreover, we identify strong positive effects on performance from agent motivations associated with the congruence of interests between the agent and the master agents.

Keywords: mobile payment systems, development economics, Tanzania, Bangladesh, organizational design

JEL codes: L23, L25, O13

Introduction

In developed economies, consumer and firm access to financial services such as security in transactions and savings is typically provided through the banking system. However, access to banking services is severely limited in developing economies so the capacity of consumers and employers to reduce financial costs and risks is much more restricted. Estimates suggest that nearly half the world's population, many of whom live in poverty, have no access to reliable, efficient, and affordable financial services, therefore not being integrated into the financial system (Beck, Demirgüç-Kunt and Martinez Peria, 2008; Beck and Cull, 2013). Moreover, lack of access to finance and affordable loans is a crucial impediment for the entrepreneurship and the growth of small and middle sized enterprises (SMEs) in both the formal and especially the informal sector (Estrin, Korosteleva and Mickeiwicz, 2013). Moreover, when people are "unbanked", they cannot smooth their income and spending over time, which is not only costly but also makes them vulnerable if their personal or market circumstances deteriorate (Azam and Imai, 2009; Collins, Morduch, Rutherford and Ruthven, 2009). Banks in developing countries have tended to avoid the low returns and high risks involved in serving the segment of the market living in poverty so the lack of financial provision impacts disproportionately on the poor (Banerjee and Duflo, 2011). For the unbanked, cash is costly to store and expensive and dangerous to transport, which pushes them towards costly informal financial mechanisms, such as money lenders, or cash transfers carried by family and friends, to bridge gaps in their ability to finance transactions.

Recently, information and communication technology has developed in such a way that market failures in the provision of financial services in developing countries may begin to be addressed. By developing transaction and loans products that can be accessed directly through mobile phones (e.g. MShwari loan products in Kenya), mobile payment systems may alleviate the constraints on the market of provision of banking services. The breakthrough has been via innovations that reduce the transactions costs in the supply of financial services (Rochet and Tirole, 2006; Evans and Schmalansee 2016; Estrin and Khavul, 2016) through the development of mobile payment systems (MPS), commonly known as mobile money (Boor and Braguinsky, 2013; Dodgson et al., 2015). MPS products include the widely-reported M-Pesa in Kenya, and by putting financial services on mobile phones have put them into the hands of the wider population (Jack and Suri, 2014; Mbiti and Weil, 2011). Mobile payment services may also foster financial inclusion in developing countries by providing a cheap and secure way of transferring, and, in certain cases, storing money. This is especially the case in economies

where the demand for secure and cheap money transfer services is high, for example where remittance flows are important.

Mobile payments were introduced first in the Philippines in 2000 with Smart Money, and have also quickly become popular in a number of emerging markets such as Kenya and Pakistan. The value and volume of mobile payments transactions have grown rapidly over the last 5 years, and according to RBS/Capgemini (2014), the cumulative annual growth rates 2011-2015F of mobile payment transactions in the world was 82.7% for non-banks and 58.1% for banks. Mobile money penetration now outstrips bank accounts in several emerging countries (Ernst and Young, 2013). However, this dynamic uptake has created many challenges and academic work has not kept up with the fast growth of the sector. Previous research by Jack and Suri (2011, 2014) has shown that the reduction of transaction costs brought by mobile payment systems have improved the sharing of risks between individuals via the transfer of remittances through mobile technology. Thus M-Pesa offers a cheap and efficient way to transfer money and make payments, and its large networks of agents make payment facilities accessible to more than 70 percent of the country's adult population. Our research builds on this to examine more closely the drivers of success in mobile payment systems. The emphasis is on firms' capabilities, regulatory policy, and models for mobile cash transfers that allow for fast and wide diffusion of the service.

Previous research (Pelletier, Khavul and Estrin, 2016) has examined the global development and diffusion of mobile technologies and the heterogeneity of experiences in bringing mobile money solutions to those without access to financial services. In fact, several forms of mobile money have grown up simultaneously and rapidly in a variety of developing financial markets. Based on a country level dataset with information on all the different MPS for the unbanked in 90 developing countries, this research found that low-corruption economies were more likely to see the launch of MPS by banks countries with weaker legal rights and more limited availability of credit information were more likely to be served by telecom-led MPS. However, the analyses also suggested that banks, rather than telecoms, had a greater impact on the local economy because they offered a large variety of products associated with their mobile payment services perhaps because these products helped formalize previously informal transactions and thereby increase the velocity of money.

Thus, despite the considerable potential of this innovation for economic growth, especially in economies where financial services are underdeveloped or largely exclude the poorest members of society, relatively limited research has been undertaken so far on the firms

providing these services[1].For example, the factors facilitating the provision and spread of these services within a given host economy, as well as the organizational design and incentives favorable to the performance and growth of firms providing MPS are not yet well understood. In particular, there is a need for more research at the firm level to understand better which firm capabilities lead to operational performance as well as the organizational structure firms put in place to provide such services. As such, our concern in this paper is with the "supply side" of mobile payment provision and, in particular, how companies reconfigure their structures and capabilities to accelerate the roll out of new innovations in the mobile payment space. This requires the collection of primary data at the firm level, which we undertook via two country level surveys of the agents involved in the provision of MPS. We conducted our research in Bangladesh and Tanzania, each representing a different case of mobile payment diffusion (Yin, 1994). Bangladesh has facilitated a bank-led approach to MPS while Tanzania, one of the world's fastest growing mobile markets with 31.8 million accounts, has followed a telecom-led approach like its neighbor Kenya.

Offering mobile payment services may require additional resources and capabilities that neither banks nor Mobile Network Operators (MNOs) previously needed. For instance, for banks, operating in the mobile payment space may represent a challenge in that it targets a type of consumers that they do not traditionally serve, especially in developing countries. Mobile payment services are based on a high volume/low value transaction model which differs from the traditional banking business model of intermediation.

Moreover, central to the business model but unlike either banking or MNOs, mobile payment providers use an intermediary, called a *distributor or master agent*, to help the retail *agents* with their liquidity management (rebalancing cash and e-float) (see the Appendix on the MPS providers' organizational structure). Managing and expanding the agent network is critical for the successful performance and growth of the mobile payment system (Cobert, Helms and Parker, 2012). Retail agents (henceforth agents) are the customer facing side of the company, conducting all the cash-in and cash-out operations. From the perspective of the company, if there are too many agents, some of them will be unable to generate enough business to cover the cost of liquidity management. On the other hand, if there are too few agents, customers may not be served adequately and business growth may be limited. Previous research on agents' performance has shown that elements such as high levels of trust and customer loyalty, strong

[1] Important research however has been undertaken on the impact of the introduction of MPS on consumers and on the financial behaviour of the poor (Jack and Suri (2011, 2014); Mbiti and Weil (2011)).

relationships with the master agent or distributor and social network matters for agents' success, in particular in rural areas (GSMA, 2015).

This leads us to use the data from our agent level survey to address the following research question: What are the key factors determining the performance of mobile payment agents? We analyse success both in terms of volume of transactions and the rate of expansion of the business (new clients). We examine three competing groups of factors that might explain the agent's commercial success: the support that they receive from their distributor; the level of agent's human capital; and the level of specialization of the business model that they have adopted (for instance, whether the mobile payment activity is their main activity, or if it is only an additional resource channel). We find that business performance was improved by all three elements. Moreover, we identify strong positive effects on performance from agent motivations associated with the congruence of interests between the agent and their "principals", the distributor or master agent.

Previous research on mobile payments

Academic research on mobile payment is incipient and has primarily examined the demand-side aspect, and especially the positive impact of these services on the financial lives of the poor. Jack and Suri (2011, 2014) in particular have shown that the reduction of transaction costs brought about by mobile payment systems have improved the sharing of risks between individuals via the transfer of remittances through mobile technology. Mbiti and Weil (2011), examining the economic impact of M-Pesa, have found that the use of M-Pesa lowers the propensity of people to use informal savings mechanisms and raises the probability of being banked. In addition, the authors find that M-Pesa causes declines in the prices of competing money transfer services, such as Western Union. Some academic research has also been carried out to examine the important regulatory aspect of mobile banking (Parikh, Rindler, Konstantinov, Garcia-Monterde, and Bruck, 2013). At the same time, academic research on the supply side of MPS has been more or less non-existent, especially when it comes to understanding the key organizational and firm capabilities to develop mobile payment services. One of the important factors underlying the expansion of mobile payment systems, as emphasized in the literature written by practitioners (e.g. Cobert, Helms and Parker, 2012), is the interaction and integration between banking, telecommunications operators (MNOs)), the agent network managers (master agents) and the agents themselves as well as how these configure different models of mobile payment services. As such, understanding better the

relationship between these actors in particular mobile payment ecosystems will advance research on MPS by examining in detail the supply side factors of economic success in this emerging sector.

Furthermore, it is likely that the organizational structure of the agency network will be a key determinant of retail agents' performance but to the best of our knowledge, this has not been researched yet in the academic sphere. However, surveys carried out by consultancy firms have provided valuable insights. For instance, the GSMA (2015) survey conducted in rural areas of Chad and Mali showed that while access to financial institutions is an important factor of success, a significant proportion of agents were able to operate effectively despite not having direct access to a bank account. This represents an example of a situation in which the role of the distributor (or master agent) is critical for the management of the agents' liquidity by rebalancing their cash and providing a float as well as in providing support in technical issues and training. In addition, the study showed that agents had often a strong personal relationship with their master agents before they had launched their mobile payment business. The resulting strong social network meant that master agents could be effective collaborators and thereby greatly enable agents' success. At the same time, an ineffective master agent could have damaging effects on agents' performance by failing to provide the necessary support and financial backing.[2]

Context of study: Banking and telecom expansion, agent networks and regulations in Bangladesh and Tanzania

We conducted our research in two different developing countries, each representing a different case of mobile payment diffusion (Yin, 1994). The two countries are: (1) Tanzania and (2) Bangladesh. Each country can constitute a self-contained project but the two together provide a comparative dimension to specific national experiences. Both Bangladesh and Tanzania have relatively established mobile payment systems. The first product was launched in 2006 in Bangladesh (MobiCash/Grameenphone) and in 2008 in Tanzania with M-Pesa (Vodacom).

These countries have been chosen because they represent different organizational orientations of the provision of mobile payment services. Bangladesh, following the Central

[2] There has also been some limited work on the regulatory aspects of mobile money. Porteous (2006) noted that mobile banking overlaps several regulatory domains; those of banking, telecom and payment supervisors, as well as anti-money laundering agencies. The GSMA (see Di Castri, 2013) has also underlined the importance of an enabling regulatory environment.

Bank's "Guidelines on Mobile Financial Services (MFS) for the Banks" (September 2011), has favoured a bank-led approach to mobile money through partnership models led by banks with organizations such as BRAC and DBBL. While banks dominate the financial services sector, microfinance institutions have larger networks in terms of numbers of participants, with 25.17 clients in June 2014, which is the most recent data (Bangladesh Microcredit Regulation Authority).Tanzania has instead followed a telecom-led approach driven by telecom companies such as Tigo, Airtel and Vodacom. Tanzania is a very fast growing mobile market according to the GSMA, by mid-2014 four mobile money providers had deployed 153,369 agents that have registered 31.8 million accounts. These providers are processing more than 99 million transactions per month valued at over 3 trillion TZS (US$1.8 billion). Importantly, the Bank of Tanzania has taken a progressive approach to designing a regulatory framework that has enabled mobile network operators to contribute to the development and diffusion of mobile payments. The Bank of Tanzania, while it does not have a specific regulation, has nevertheless provided the industry with regulatory guidance through the prudential and market conduct requirements listed in the "letters of no objection" released to authorize the MNOs and their partner banks to provide these services.

Bangladesh

Overview

While banks dominate the sector in Bangladesh, their nation-wide outreach is actually rather limited with only 8.2 bank branches for 100,000 habitants in 2014 (on par with the South Asia average of 8.9) and 591 depositors for 1000 habitants (higher than the regional average of 295) (World Bank, Financial Access Survey). In 2014, according to World Bank's Global Findex, 31% of Bangladeshi had an account at a financial institution, against 45.5% for the region as a whole. However mobile phone penetration has increased fast, with 131 million subscribers as of March 2016, (Bangladesh Telecommunications Regulatory Commission) from 86.5 million in January 2012, for a population of 159 million habitants in 2014 (World Bank, World Development Indicators). Bangladesh receives important flows of worker remittances, which totaled USD 14.9 billion in 2014, averaging 9% of GDP over the last ten years, against 4% on average for the South Asia region (World Bank, World Development Indicators).

Regulation

The Department of Currency Management and Payment Systems of Bangladesh Bank issued "Guidelines on Mobile Financial Services (MFS) for the Banks" on 22 September 2011, which were subsequently amended on 20 December 2011. This firmly established the bank-led

approach to mobile payment systems followed by the Bangladesh Bank. All customer accounts ("Mobile Account") must be held with a bank and made accessible through customers' mobile devices. The current regulations allow the disbursement of inward foreign remittances, cash-in and cash-out using a mobile account through agents, ATMs, bank branches and mobile operator outlets, business-to-person payments, government-to-person payments, person-to-government payments, person-to-person payments and other payments such as microfinance, insurance premiums, overdraft facilities, etc. There are transaction limits for individual account holders of a maximum of BDT 10,000 daily and BDT 25,000 monthly. Agents are not allowed to conduct transactions with other agents. To date Bangladesh Bank has allowed 28 banks to offer MFS but only 18 of them have started to operate.

In addition, the regulators allowed banks to set up subsidiaries specifically for the purpose of offering mobile financial services. This allowed banks to establish partnership with funders that are more versed in the business of mobile payments than more traditional bankers. This was the approach followed by bKash, which is majority-owned by BRAC banks (51%), the rest being shared between Money in Motion LLC, the International Finance Corporation and the Bill & Melinda Gates Foundation (CGAP, 2014). This subsidiary structure, which has yet to be replicated by the other banks, gave bKash the flexibility and know-how needed to expand fast and to impose itself as the key provider of mobile money in Bangladesh.

The system of agents

One important characteristic of MPS in Bangladesh is that over-the-counter (OTC) transactions are predominant. In an OTC transaction, the customer gives cash to an agent instead of using an account to send money, or receive cash from the sender through an agent. Agents using their personal accounts to conduct transactions on behalf of a client therefore have the transaction recorded as being emitted from the agent's personal account when in reality it is conducted on behalf of a third party. There are two types of OTC transactions; pure OTC transaction, which takes place between two agents, and partial OTC transactions, which take place between an agent and a customer. While transactions between agents are not allowed, the regulator is silent on whether an agent can transact with a customer (partial OTC). As an indication of the scale of the OTC sector, the Financial Inclusion Insights program led by InterMedia[3] revealed that while around 23% of Bangladeshis use mobile money, registered users represent only one

[3] InterMedia Bangladesh FII Tracker survey (N=6,000, 15+) September-November 2013; June-August 2014. http://finclusion.org/wp-content/uploads/2014/12/InterMedia-FII-Bangladesh-6-things-to-know-about-MM-and-OTC.pdf

quarter of all mobile money users. Several reasons explain the importance of OTC transactions in Bangladesh, among which one can include the lack of financial literacy and the perception that using electronic transfers may be risky generating a fear among customers of losing the money.

Concerning the organisation of the retail agents' network, the MPS providers tend to operate with master agents who are reputed businessmen in their local area and these may also act as distributors of other companies or mobile payment providers. The distributors then hire their own retail sales agents. The master agents/distributors are provided by the MPS providers with an account and start-up capital in their account (i.e. prepaid), but have to invest their own resources in setting up an office, etc. Each master agent/distributor controls a specific area determined by the MPS provider.

Tanzania

While Bangladesh has adopted a bank-led approach, Tanzania has allowed MNOs to operate in the mobile payment segment. The Bank of Tanzania adopted a "test and learn" approach to test the deployment of MPS. In particular, the Bank of Tanzania Act in 2006 was amended to give the Central Bank the authority to regulate and oversee non-bank entities in offering payment services (di Castri and Gidvani, 2014). The Guidelines for Electronic Payment Schemes was issued in 2007 to allow Mobile Network Operators to offer payment services. The Bank of Tanzania has also worked on a draft of Mobile Payment Regulations (MPR) and recently signed an interoperability agreement between three of the major Mobile Network Operators in June 2014.

Vodacom launched M-Pesa in 2008 and Zantel launched Z-Pesa that same year. Airtel launched Airtel money in 2009 and Tigo launched Tigo Pesa in 2010. Vodacom started to use aggregators in 2009. In December 2014, the national market shares in terms of number of active subscribers of mobile money service were the following: 47% Vodacom; 21% Airtel; 29% Tigo; 3% Zantel (di Castri and Gidvani, 2014). Milicom International Cellular, that trades as Tigo acquired an 85% in Zanzibar Telecom (Zantel) from Etisalat group in June 2015.

As such, contrary to Bangladesh, the Tanzanian market does not have a dominant player and competition is intense between the three main providers. Full inter-operability between the providers was achieved in February 2016. There are roughly 17,000 M-Pesa agents, which represent 87% of the access points that Tanzanians use for financial services. M-Pesa agents also have the greatest potential for outreach: agents are in 29% of the wards where 40% of the population resides. In comparison, automated teller machines (ATMs), brick-and-mortar bank

branches, and microfinance institutions (MFI) together reach only 17% of wards and 25% of the population (GSMA, 2014). Finally, contrary to Bangladesh, OTC transactions are relatively uncommon and actively discouraged.

Survey Methodology

Development of the questionnaire, pilot and method of data collection

The development of the survey questionnaire followed several steps. The questionnaire was first developed through literature reviews and theory development. It was subsequently reviewed by academicians with specific experience in the topic. We then conducted a pilot in each of the two study countries and adjusted the questionnaires to the local circumstances.
We adopted a purposive sampling approach by focusing on regions that were relevant to our survey and where we expected the local populations to use the mobile payment services. We focused on the administrative or economic capital cities of each country (Dar es Salaam and Dhaka) and a balance of other cities including large provincial cities and smaller rural towns.

Bangladesh

The data collection took place in April-May 2016. We collected information on 700 retail agents in four different administrative divisions (Dhaka, Rajshahi, Barisal, Chittagong) covering different rural and urban areas. More information on these administrative divisions can be found in the Appendix. We conducted a pilot survey in the four different divisions and modified our questionnaire based on the pilot results. In particular, we simplified some questions to make them easier to understand by retail agents. We also changed some words and used the local terminology, for instance using the term distributors, called "master-agents" in the literature. The questionnaire was translated into Bangla. We supplemented the data we collected with three open-ended interviews with managers of mobile payment providers to gather information on their strategy with regards to product development, organisation of the retail networks and an independent expert on mobile payment services in Bangladesh.

We faced two specific issues during the data collection. First, the retail agents tend to be extremely busy, and it is not uncommon that they have 5-10 customers in their shop at the same time. As a consequence, it requires a certain dose of patience from the enumerators (as well as from the agent being interviewed) to conduct the interview. Second, given that many

agents are conducting over-the counter transactions using their personal wallet, they are reluctant to divulge any information related to their revenues from their mobile payment business.

Tanzania

We conducted the data collection in Tanzania in May-June 2016. In total, we obtained a sample of 400 interviews, in 3 different locations: Dar es Salaam, Morogoro, and the coastal region (Pwani). More information on these administrative divisions can be found in the Appendix. We had to adjust the questionnaire to the local context of Tanzania, and in particular to the fact that many agents are employees; in Bangladesh, the majority of the agents are the owners of their own business.

We also supplemented this data with two open-ended interviews with managers of mobile payment providers to gather information on their strategy with regards to product development, organisation of the retail networks and an independent expert on mobile payment services in Bangladesh. In addition, we conducted two open-ended interviews with bank managers in charge of mobile banking to gather their views on the penetration of telecoms in the mobile payment space in Tanzania.

While OTC transactions are quite frequent in Bangladesh, this is not the case in Tanzania where most of the population that use mobile payment is registered. However, given that most of the agents are employees, with the business owners often not being present, it was sometimes difficult to obtain information that could be more easily obtained from the owner.

Empirical Methodology and Summary statistics

Configuring organisational capabilities for MPS

We are interested in how different ways of configuring the supply side of the provision of MPS may affect the performance and growth of the mobile payment providers. Our survey is designed to delve deeply into the organizational arrangements within the suppliers with additional heterogeneity being provided across countries and form of provider (banks versus telecom companies). The decision to provide MPS may require new resources and capabilities for both banks and telecom companies. Banks operating in this market may need to target a type of consumers that they do not traditionally serve, while telecom companies (telcos) lack experience in the banking business model of intermediation. We centre attention

in our work on the intermediary for both types of provider in the supply of MPS; the *distributor or master agent* and their relationship with the actual supplier, *the agent*. Retail agents are typically shop or stall owners, selling a variety of mobile payment services directly to the customer, typically as only one element of their business, while the MPS provider, be it a bank or a telco, contracts only with the master agent. The central MPS functions are largely undertaken between these actors, as indicated in the Appendix.

We rely on the organizational economics literature to examine how the organizational structure of the retail agents' network and the relationship between the retail agent and the master agent impacts the agents' performance. While the theoretical model and empirical evidence in this stream of research typically focuses on the vertical allocation of authority and the interaction between local headquarters and plant managers (or plant managers and their subordinates) (Aghion and Tirole, 1997; Baker, Gibbons and Murphy, 1999; Bloom, Sadun and Van Reenen, 2012; Acemoglu, Aghion, Lelarge, Van Reenen and Zilibotti, 2007; Bresnahan, Brynjolfsson, and Hitt, 2002), which differs from our setting, the issues raised by this literature inform our exploratory empirical analysis.

The organizational structure of mobile payment companies has evolved as they grew in size, with hierarchical layers being added as the number of agents increased. For instance, Safaricom's (Vodaphone's) M-Pesa has gone through three major phases of growth during which the agent network has evolved from being directly managed by Safaricom to a three-tier structure with aggregators each targeted to manage 2,000 to 4,000 retail (sub-) agents and master agents (also called agent Head Offices) in charge of managing liquidity and distributed commissions to the retail (sub-) agents (Chopra, Wright and Shivshankar, 2012). This decentralized organization should improve the monitoring of and support to the lower tier, the retail (sub-) agents.

The organizational economics literature highlights as an important problem for all firms the incentive effects of delegation. This would likely be exacerbated in the MPS context when there are three levels of delegation; from MPS provider to master agent to agent. The MPS provider is seeking access to (better) local information and this is problematic when the congruence of objectives between MPS providers and the master agents, and between the master agents and the agents is low and the master agents (and behind them, the MPS providers) are ill-informed about the business at the level of the customer. One example of a situation when the retail agent's and the MPS provider's incentives are not aligned is when retail agents take over-the-counter commissions to perform a transaction on behalf of the

client. This might increase the retail agents' commissions but it may damage the efficiency and reputation of the MPS service. In this situation, incentives are a problem for the higher agency levels, especially when access to customer and local business environment information is low and monitoring is difficult.

The organizational economics literature can help us assess the conditions under which delegation of authority to the master agent and to the retail agent will be optimal. Aghion and Tirole (1997) provide a first analysis of the appropriate degree of centralization by using the existence of asymmetric information between layers of agency to contrast formal authority and real authority; "effective control over decisions on its holder" (1997:2). They propose two views of how formal authority should be delegated to the agent. In the "incentive view", delegation increases agent's initiative (thereby increasing information acquisition by the agent), but decreases the control exercised by the principal. According to the "participation view", limited delegation of minor decisions raises participation. The implication of both is that formal authority should be delegated to the agent (decentralized) for relatively unimportant decisions (from the principal's perspective). However, authority should remain centralized (taken by the principal) when the principal is well-informed, or when he is experienced in the specific decision area, as initiative becomes a minor consideration.

Aghion and Tirole (1997) assume that communication between the principal and the agent takes an extreme form: when uninformed, a principal with formal authority should delegate the decision to the agent. Dessein (2002) assumes that the agent is better informed than the principal. He studies the trade-off between the loss of control under delegation (informed but biased decisions) and the loss of information under centralization (noisy but unbiased decisions). In this model, information is soft (i.e. unverifiable) and the objectives of the agent and the principal may differ in a systematic way. The question then centres on the impact of allocation of authority on the use of this private information, providing a purely informational rationale for delegation. He considers two cases, with different degrees of uncertainty about the environment. The principal has to choose between fully delegating a task to a better informed agent or to ordering the latter what to do, after consultation. Dessein shows that, in the case of a uniform distribution of the state of nature, delegation of control is optimal as long as the divergence in preferences is not too large relative to the principal's uncertainty about the environment, the amount of private information of the agent is large and the principal is more risk-averse.

Similarly, in the literature on capital allocation, Stein (2002) also examines the best organizational structure for the performance of the capital allocation activity under different types and quality of information on the projects. He argues that a decentralized approach is most likely to be attractive when information about projects is "soft" and cannot be credibly transmitted. In contrast, when information can be costlessly "hardened" and passed along inside the firm, hierarchies perform better. When information is soft, such as in small business lending, decentralization should be a better organizational structure because it strengthens the incentives of local managers who receive direct rewards from their research. However, when information can be hardened and passed over easily to superiors, line managers can increase their capital budgets by producing verifiable positive information. Managers then become advocates for their units.

Finally, Dessein and Santos (2006) and Alonso, Dessein and Matouschek (2008) incorporate coordination costs to the analysis of delegation or decentralization inside an organization. More specifically, they examine the three-way trade-off between coordination, specialization, and adaptation. The performance of an organization is determined by its adaptation to the environment and the quality of coordination among tasks. Decentralization economizes on the costly communication, red tape, and costly bureaucracy that management of multiple agents' actions entails under a centralized command. In a volatile environment, the organization must be able to adapt to new circumstances, redefining agents' tasks and requiring coordination, which can be costly under a decentralized organization. Dessein and Santos (2006) show that mis-coordination costs can be reduced under centralization, given that a single individual commands the actions taken by all the agents. The authors show that the desire for adaptation will generate coordination problems when agents are specialized. As such, higher uncertainty or higher mis-adaptation costs will raise the benefits of adaptiveness (which in turn raises the benefit of communication), and therefore favor a centralized (but high communication cost) structure, with ex-post coordination between agents. Thus, decentralization is associated with high specialization, little communication, little responsiveness to the environment and ex-ante coordination. Centralization is associated with high communication, little specialization, high responsiveness to the environment, and ex-post coordination. Addressing one of the limits of the Dessein and Santos (2006) model, namely the assuming away of incentives, Alonso, Dessein and Matouschek (2008) show that centralization will outperform decentralization when agents are very biased and coordination is important.

This literature only partially fits the MPS setup; it is a multi-level agency relationship because the retail agent owns the relationship with the customer, and the master agent with the MPS provider. Moreover, developing countries tend to provide relatively volatile business environments and asymmetries of information between the various levels in the agency structure are likely to be exacerbated in new industries such as MPS where the technologies and customer practices are evolving rapidly. Even so, the literature does point to a number of variables likely to be relevant in understanding the organizational determinants of retail agent performance, and we draw on these in the empirical work that follows. Our work focuses on the relationship between the master agent and the local retail agents but behind this stands the relationship between the MPS providers and the master agents. In particular, our empirical work will draw on:

1. The degree of *congruence* between master agent and retail agents' objectives and the level of *trust* between principal and agent. This captures the agency cost for the organization related to the retail agents' biases and self-interest. Decentralization should be more effective when congruence of goals and trust between the master agent and the retail agent is high.
2. Whether the agent is *well informed* about the local environment. Decentralization performs better when the amount of private information of the retail agent is large.
3. The degree of *specialization* of the agent. Decentralization should be more effective when the retail agent is specialized.

Our model and empirical methodology

We have collected survey data on 1,100 agents located in Bangladesh and in Tanzania. There is only one wave so the data represent a cross-agent, cross-country dataset. We use our dataset to explore the relationship between firm capabilities and the diffusion of MPS service, as well as between firms' organizational architecture and performance. In particular, we wish to understand the factors determining the performance of mobile payment agents. In the architecture of MPS delivery, the organizational structure is highly decentralized, so we are exploring the factors which facilitate such arrangements delivering good performance at the agent level. We focus on three principal areas, each of which are linked to one or more of the five factors outlined above, namely:

- the support that they receive from their distributor;
- the level of agent's human capital; and

- the business model that they have adopted (for instance, whether the mobile payment activity is their main activity, or if it is only an added resource channel).

Our first group of variables concerns the relationship between the master agent and the retail agent. We propose that:

- The frequency of meetings (*well informed*) between the master agent and the agent should be associated with a higher volume of transaction.
- The agent's satisfaction (*trust)* concerning the business relationship with the distributor should be associated with a higher volume of transaction.
- The frequency of mobile payment training (*congruence and trust*) should be associated with a higher volume of transactions.
- The adequacy of mobile payment training (*congruence and trust*) should be associated with a higher volume of transactions.

We are also interested to explore the relationship between the skills, education and therefore human capital of the retail agent and their performance. We therefore expect that:

- The agent's formal education should be associated with a higher volume of transactions (*well informed*).

Finally, we are concerned with the relationship between the retail agent's business model and the performance of their organisation. We expect that:

- The retail agent's business specialization will be associated with a higher volume of transaction (*specialization).*
- The range of mobile payment providers served by the retail agent will be associated with a higher volume of transaction (*specialization).*

We examine the determinants of the retail agents' (i) performance by estimating the following model:

$$performance\ agent_i = relatdistrib_i + HC_i + BusinessModel_i + Controls + \partial_e + \beta_n + \delta_d + \varepsilon_i \quad (1)$$

We employ two different measures for the dependent variable; the performance of the agent ($performance\ agent_i$). These are the volume of transactions on a daily basis (for a slow day, an average day and a busy day) and the number of customers who visited the agent on a weekly

basis (regular customers and new customers). This allows us to examine two different dimensions of the business's performance: the regular volume of business and the expansion of the business via the number of new customers on a weekly basis.

We consider our independent variables in three clusters. The first concerns the relationship between the MPS provider and the master agent/distributor ($relatdistrib_i$). To specify this empirically, we use data about the frequency of meeting with the master agent; a dummy variable denoted *satisfied* which indicates whether the agent is satisfied or not with his/her business relation with the master agent; the frequency of training and a dummy variable indicating whether the agent considered that the training received from the master agent (provider) was adequate.

In terms of the agent's human capital (HC_i), we use data about the education of the agent. Finally, to analyse the impact of different business models on agents' performance ($BusinessModel_i$) we examine two separate aspects: the range of mobile payment services offered (number of providers) and the degree of specialization of the retail agent's business. This latter variable measures the percentage of total revenues coming from the mobile payment business. When agents only conduct mobile payment activities, it is 100%. Often retail agents operate this business alongside other business, such as a stationary shop or a grocery store.

We add a series of variable to further control for agents' characteristics, shop characteristics and environmental characteristics. In terms of agents' control variables, we add a dummy "*male*" to control for the gender of the agent, a dummy "*owner*" to control for whether the retail agent being interviewed is an employee or owner of the shop, as well as the *age* of the agent. Concerning variables controlling for the characteristics of the shop we have a dummy "*agent_stationed*" that controls for the type of shop that the agent is operating (either the agent is mobile, without a brick and mortar shop); the *number of employees* in the shop, which captures the size of the business, the *age of the mobile payment business* to consider the experience in this business of the retail agent, the *number of days that the shop is opened* a week and the *number of hours that it is opened*. This controls for the difference in opening hours which can translate into differences in number of clients. The age of the business controls for the fact that more established businesses may have a higher number of clients than recently established ones. We also add a variable capturing the *number of transaction denied* to customer in a week due to lack of cash or e-float, which captures liquidity constraints faced by the agency.

In terms of environmental control variables, we add two variables capturing the *intensity of competition*. The first one is a subjective measure of competition, as we asked the

agents to rate the intensity of competition on a scale of 1 to 5. We also asked them to estimate the distance (in time) to the nearest retail agent serving a similar provider. In addition, we included the variable "*travel cash time*" capturing the time it takes to go to the nearest cashpoint. This captures liquidity constraints that can affect a mobile payment business as well as the quality of financial infrastructure in the area in which the agent is operating. Finally, we include two variables capturing the *degree of security threat* to the business (either through theft or robbery), one directly asking retail agents if they have experience of a *security* issue in the last year and one asking agents to rate their perception of *security risk* to their business in the current environment.

We add three groups of dummy variables to the regressions: enumerators' dummies (∂_e) to take into account potential systematic bias in the way enumerators interviewed the agents, and two geographic divisions: the regional level (β_n) and the district level (δ_d). The district level refers to different administrative classifications in Bangladeshi and Tanzania. For instance, Upazila (formerly called "Thanas") in Bangladesh is our district level, while in Tanzania they have district administrative classification at the sub-regional level. That said, these correspond to relatively similar administrative levels.

Finally, standard errors are double-clustered at the enumerator and regional level (administrative division) to take into account the fact that standard errors may be correlated within enumerator or administrative division clusters. ε_i is an error term.

Descriptive statistics

Sampling

In Bangladesh, we see from Figure 1 that 57% of the agents were located in Dhaka, and the rest were split evenly between the districts of Barisal, Chittagong and Rajshahi. We found that 92% of the retail agents were located in an urban area, 94% of them were stationed in a fixed spot (in opposition to mobile) and only one agent was female (see Table 5).

In Tanzania, Figure 2 reveals that 50% of the retail agents in the sample were located in Dar es Salaam, the capital city, while the rest were divided evenly between Morogoro and the Coastal area. We found that 84% of the agents were located in an urban area, 99% of them were stationed in a fixed spot (in opposition to mobile) and 55% were male (Table 5).

The agents' business characteristics

In Bangladesh, we note from Table 3 that Bkash clearly dominates the market with 91% of the agents offering its services, followed by DBBL (66%) and Mcash (19%), Mycash (15%)

and Ucash (22%). As the Table makes clear, agents usually serve more than one provider; indeed, they serve two providers on average, with a maximum of nine.

There are fewer providers in Tanzania, as can be seen in Table 4. There are three key players, each served by almost all the retail agents. Indeed, 93% of the agents offer Vodacom MPS, 76% of them offer Airtel services, and 96% Tigo services. We note that Zantel is very marginal, with only 3% of the agents interviewed offering its mobile payment service. On average, agents in Bangladesh serve more providers than those in Tanzania. Thus, the average is that each agent serves three providers (Tigo, Vodacom and Airtel), with a maximum of five.

Table 5 summarises the descriptive statistics for the sample as a whole and for each of the two country sub-samples. Commencing with descriptive statistics for retail agents in the MPS sectors across the two countries, we find they are predominantly young (under 30 years old), male, and moderately educated. Around 70% own their own business, which are usually small (less than two employees) and the vast majority are stationed rather than mobile in their location. Their mobile business is typically very young, less than five years old, and the agents work very hard – they are on average open 6.6 days per week, and six hours per day. These agents usually serve more than two providers, and the MPS activity on average represents only a moderate share of their revenue. The sector is highly competitive, with agents perceiving high levels of local competition in the supply of MPS services. Perceptions of risk are also typically rather high though only a minority has faced a security issue. Turning to the relationship with the master agent/distributor, most retail agents meet their distributor relatively frequently and are relatively satisfied with their relationship. Most have received some, but not much, training, but the vast majority consider this nonetheless to be adequate. Agents are usually very close to their sources of liquidity via the master agent (around seven minutes) though the average travel time for additional cash is longer, nearly 35 minutes. The number of denied transactions is also quite large- more than 10- though there is a wide variance. The main objective of the retail agents in supplying MPS is to increase their business (89%) though some of them were responding also to client requests (34%) The role of the MPS provider and the master agent in extending the network seems to have been minimal. This suggests that the congruence in objectives between the three levels might be quite high.

Table 5 also reveals that there are relatively important differences between Bangladesh and Tanzania in terms of the characteristics of the retail agents, their relationship with the master agents, the business model and the external context of activity. Interestingly, there are

no significant differences between samples in terms of agents' satisfaction with their master agent, their perception of the competition and of the security risk to their business.

Agents in Tanzania meet their master agent less frequently, while serving more MPS providers than those in Bangladesh. This may reflect differences resulting from the bank as against telco based MPS system in each country. MPS also represent a higher share of retail agents' revenues in Tanzania than in Bangladesh, though firms have fewer employees on average. It is important to note that 86% of the agents in total reported having another business alongside the MPS activity (95% in Bangladesh and 71% in Tanzania). Generally, this other line of activity is a grocery store, airtime distribution, stationary shop or other type of shop (beauty salon, clothing, cosmetics, laundry etc.). This may indicate that the business model of agents in Bangladesh is much more geared towards diversification of revenues than in Tanzania. However, interviewed agents are also much more likely to be the owners of their shop in Bangladesh, while in Tanzania it is more often an employee (86% were owner in Bangladesh, against 42% in Tanzania). This might suggest two distinct diversification models: on the one hand, a mobile payment activity added to an existing shop in Bangladesh (for instance operating a mobile payment desk inside a grocery shop premises); on the other a diversification of revenues via the operation of various activities located in different premises, operated by employees and periodically visited by a monitoring owner.

The characteristics of the agents vary also significantly between the countries. First of all, as mentioned before, agents are almost exclusively male in Bangladesh while it is much more balanced in Tanzania, with 45% of agents being female. Retail agents are also significantly younger and less educated in Tanzania than in Bangladesh, but this might be related to the fact that the interviewed agents tended to be the employees in Tanzania, while they most frequently were the owner of the shop in Bangladesh.

Agents were also asked their motivation for starting their mobile payment agency business. The number of observations for this question is reduced due to the fact that this it is only applicable to owners, and therefore was not asked to interviewees who were employees. Agents could choose more than one reason. As noted above, the vast majority said that they did so in order to increase their business, reflecting the fact that the MPS activity is generally not the only business operated by the agent. While very few agents declared that they were chosen by the provider or by the distributor in both countries (around 2%-3%), 42% of the agents in Bangladesh also said that one of the reasons they decided to launch this activity was that their clients asked for it, while only 5% said so in Tanzania. This suggests a much more demand-driven approach to mobile payment in Bangladesh.

Results

We report in Table 6 the correlation matrix for the independent variables for the whole sample (Bangladesh and Tanzania). This allows us to consider the issue of potential collinearity. For the most part, the correlation coefficients are low, less than 0.3. However, *frequency of meeting distributor* and *male* agents have a correlation of 0.45 – probably related to the fact that agents meet their distributor more frequently in Bangladesh and that almost all the Bangladeshi agents are male- and agent's *age* and the *owner* dummy also have a correlation of 0.44 – owners tend to be older than employees-. We experimented with specifications excluding these variables alternatively and the results were qualitatively similar. We also estimated the Variance Inflation Factor (VIF) values of our different models, which were all below 3, indicating that there is no serious multi-collinearity issue in our estimating sample.

Our estimates of equation 1 are reported in Table 7. As discussed above we have two measures of the agent's performance: the regular volume of business and the expansion of the business via the number of new customers. For the former we use as dependent variable the volume of transactions on a daily basis for a *slow day* (column 1), an *average day* (column 2) and a *busy day* (column 3). For the latter, we use the number of customers who visited the agent on a weekly basis; regular customers (column (4) and new customers (column 5).

Our results largely conform to expectations, with predicted effects on the retail agents' performance from all three clusters of independent variables, though different independent variables have different effects on different dependent variables. The first cluster concerns the relationship between the retail and master agent, specified empirically in terms of the frequency of meetings; the level of the agents' satisfaction with their relationship with the master agent; as well as the frequency and perceived adequacy of training. Commencing with frequency of meetings, which indicate the level of information flows between the master and retail agent, we find a positive relation with turnover, which increases as the scale of the agent's activity rises. This implies that this decentralized organizational structure does perform better with higher goal congruence within the agency chain between master and retail agent and with greater mutual information flows as business activity rises. These benefits are also significantly more marked for business expansion through new customers than for expansion by regular customers.

One finds a very similar relationship with respect to the quantity and quality of training. The quantity of training increases the volume of transactions and the effect is greater as the volume of transactions rises. Thus, undertaking training is especially important for agents that

experience faster rates of expansion. The perceived adequacy of training however is found to have a very limited impact; it does not have a significant effect on the volume of transactions and only has a positive significant effect on business expansion for existing (but not new) customers. This may be because levels of satisfaction are almost uniformly high at 94% (see Table 5). However, the findings concerning our indicator of trust, the perceived satisfaction (by the agent) of the relationship with the master agent, has a negative and frequently significant effect on business performance. This runs counter to our expectations, where we proposed that higher levels of trust in a decentralized structure would improve performance. One possible explanation is that the variable does not represent a good proxy for trust, consistent with the surprisingly high observed levels of satisfaction (77%) and low variance across countries noted in Table 5. An alternative explanation is that the causality is reversed for this variable. When the volume of transactions is higher or growing faster, this places greater strain on the relationship between the agent and distributor. In robustness tests (non-reported) we re-estimated the equations taking out the satisfaction variable and the results were not significantly affected. In particular, the signs of our variables of interest were unchanged and the magnitude of their coefficients was qualitatively similar.

We proposed that higher levels of goal congruence and information flows might be associated with human capital, and therefore act to improve agents' business performance. We find partial evidence for this relationship. Human capital is not found to have a positive significant effect on transactions on a slow day, but it does on average days, and even more so on busy days, at the 10% level. However, it does not have a significant effect on the second performance measure; business expansion.

Finally, we examine the degree of specialization of the agent's business, measured by the percentage of total revenues coming from the mobile payment business. Decentralization should perform better when agents are more specialized. We confirm this to be the case in Table 7, where the coefficient is always positive and significantly related to the level of transactions with a larger coefficient as the volume of transactions increases. Moreover, while the share of revenue from MPS does not significantly influence business growth from existing customers, it is positively and significantly associated with business expansion via new customers.

Turning to the control variables, many of these also have the predicted effects. There are strong positive effects from the male gender to performance, perhaps reflecting enduring cultural and social values even in this new business activity. There is evidence of a positive significant relationship between firm size and growth, with the positive coefficient on the

number of employees rising and always significantly positively related to the level of transactions and to business expansion. The same applies to the broader soundness of the business, indicated by whether it is mobile or stationary. Stationary businesses have a greater positive effect on transactions and on the expansion to new customers. We get close to the issues driving the rise of MPS when we observe that the level and growth of transactions is positively and significantly associated with the perceived level of the security threat, though this variable has no significant influence on business expansion. Similarly, expansion is positively and significantly associated with the retail agent's effort, measured by the hours open. Finally, though this is a new type of business activity, more established firms, indicated by their age, have higher levels of transactions and have faster business expansion through new customers. This may be a local network externality effect.

We next consider the motivations of the agent, which relate to the congruence of interests between the master and retail agents as well as perhaps the trust between them. In Table 9, we report re-estimates of the regressions of Table 8 to include the two principal motivations, each entered as dummy variables. It can be seen that their inclusion does not greatly affect our main finding, though some of the independent variables lose some statistical significance. However, the motivation variables themselves are positive and strongly significant in all five models. Thus retail agents with a motivation of entering the MPS sector to increase their business have greater transactions, increasingly so as transaction volumes increase. They also have faster business expansion, both with regular and new customers but most markedly with regular ones. There are also positive effects for agents who entered the sector following their customers, especially in terms of business expansion though surprisingly more markedly for existing customers.

Conclusions

We undertook research at the firm level to explore for the MPS sector in developing countries which firm capabilities and organizational structures lead to better operational performance. This led us to examine the relationship between agent capabilities, organizational architecture and the growth of MPS services. Our research question required the collection of primary data at the agent level, which we undertook via two integrated country level surveys. We conducted our research in Bangladesh and Tanzania, each representing a different case of MPS expansion.

We found that retail agents' performance in terms of business volumes and growth were enhanced by three key aspects of the relationship with the master agents (and behind that the MPS provider). In particular, in a decentralized organizational structure such as MPS provision, the benefits of goal congruence and mutual information flows between the master and retail agent, indicated by the frequency of meetings and the quantity of training provided, is found to be positively associated with all aspects of performance. The quality of human capital of the agent, also likely associated with goal congruence and information flows, has some positive significant effects on transactions but not significantly on business expansion. Thirdly the specialization of the retail agent's business, indicated by the share of MPS in total revenue, was also expected to improve the efficiency of decentralization as an organizational structure and be positively related to performance. We confirm this proposition to be empirically valid. Finally, we also identify strong positive effects on performance from agent motivations associated with the congruence of interests between the agent and the principals.

Our study points to the need for further work to understand better the dynamics of the expansion of MPS provision, especially in areas of financial exclusion. Except indirectly through the comparison of Bangladesh and Tanzania, we have not investigated the relative strengths and weaknesses of bank versus telco led MPS provision, notably with respect to policy goals such as rate of expansion, financial inclusion and alleviating problems arising from poverty. This might be facilitated by adding to our database additional surveys for economies where bank and telco based MPS provision co-exist.

Our study has important implications both for policy makers and for business people in the MPS sector. There is some evidence from our study that MPS may address some of the issues for the process of economic development caused by deficiencies in the institutional environment. Thus security risks in a location increase the demand for mobile money, and more permanent and longer established businesses provide a sounder basis for expansion of the sector. For MPS providers, the key lessons concern information exchange and trust. The development of the MPS business at the retail agent level is driven partly by agents' motivation, but also by the architecture into which the agent is placed. There is a payoff in terms of performance from frequent meetings with the master agent, as well as via the provision of quality training. Careful screening of retail agents to ensure that educational standards are met and that MPS is an important element of the agents' business model can also help to improve business performance in this growing and significant sector.

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Figure 1: Geographic coverage - Bangladesh

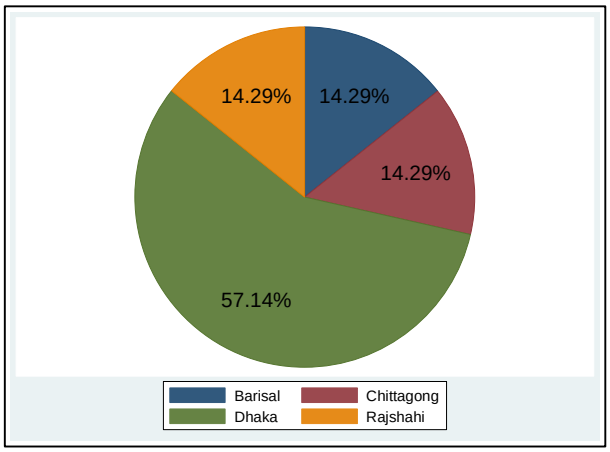


Figure 2: Geographic coverage - Tanzania

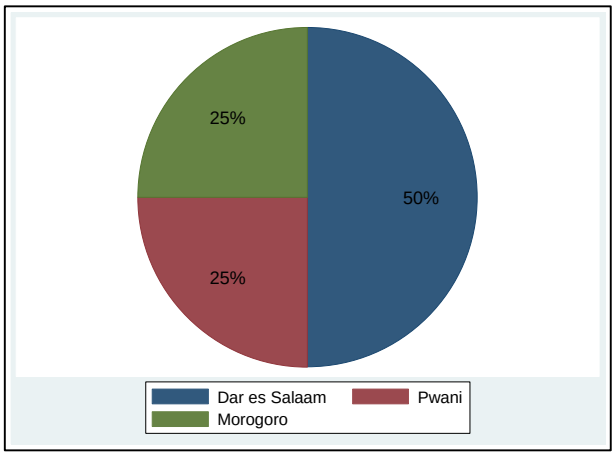


Table 1 - Mobile Financial Services (MFS) comparative summary statement of May, 2014 and May, 2016 in Bangladesh

1USD=79BDT	**Amount (in May, 2014)**	**Amount (in May, 2016)**	**% Change (May 2014 to May, 2016)**
No. of approved Banks	28	29	4%
No. of Banks started to convey the service	20	19	-5%
No. of agents	325,756	592,432	82%
No. of registered clients in Lac	153.42	354.9	131%
No. of active accounts in Lac	57.66	128.48	123%
No. of total transaction	35,774,770	120,077,594	236%
Total transaction in taka (in crore BDT)	8,095.72	18,481.56	128%
No. of daily average transaction	1,192,492	4,002,586	236%
Average daily transaction (in crore BDT)	269.86	616.05	128%
Inward Remittance	3.08	4.37	42%
Cash In transaction	3,496.19	7,870.82	125%
Cash Out Transaction	3,027.44	7,182.71	137%
P2P transaction	1,372.22	2,772.26	102%
Salary Disbursement (B2P)	49.52	150.01	203%
Utility Bill Payment (P2B)	114.13	181.49	59%
Others	28.15	319.89	1036%

Source: Bank of Bangladesh. https://www.bb.org.bd/fnansys/paymentsys/mfsdata.php. Accessed 03/07/2016

Table 2 – Internet Banking and Mobile Payment Schemes/Services in Tanzania

1USD=2,206TZS	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**Jan - June 2013**
Internet Banking								
Volume	164,470	1,483,278	3,138,990	4,989,752	1,311,242	1,482,709	1,377,016	770,089
Value (TZS Billions)	0.32	1.45	9.38	8.13	10.42	12.04	17,768	11,040
Mobile (SMS) Banking								
Volume	140,327	259,931	442,954	7,011,852	20,132,285	33,037,328	33,162,408	17,751,000
Value (TZS Millions)	-	-	56.73	123.63	154.54	224.07	302.04	243.47
Mobile Payment Systems								
Number of registered customers/accounts	-	-	112,000	4,192,683	10,663,623	21,184,808	26,871,176	29,126,517
Active Customers	-	-					7,872,749	9,253,237
Number of agents	-	-	2,757	14,469	29,095	83,795	97,613	119,719
Volume	-	-	408,216	3,272,422	18,430,256	134,922,457	546,732,134	449,933,143
Value (TZS Millions)	-	-	25,208	158,538	1,006,430	5,563,281	17,407.72.34	12,389

Source: Bank of Tanzania. https://www.bot-tz.org/PaymentSystem/statistics.asp . Accessed 04/07/2016

Table 3 - Bangladesh Mobile payment services – Availability (% of agents offering each service)

Variable	Obs	Mean	Std. Dev.	Min	Max
bkash	700	91%	28%	0%	100%
dbbl	700	66%	47%	0%	100%
Mcash	700	19%	39%	0%	100%
Mycash	700	15%	36%	0%	100%
Ucash	700	22%	41%	0%	100%
Ific	700	4%	19%	0%	100%
Trustbank	700	1%	9%	0%	100%
Okbanking	700	2%	14%	0%	100%
Fsibl	700	3%	18%	0%	100%
Hello	700	0%	0%	0%	0%
Others services	700	0%	0%	0%	0%

Table 4 – Tanzania Mobile payment services – Availability (% of agents offering each service)

Variable	Obs	Mean	Std. Dev.	Min	Max
Vodacom	400	93%	26%	0%	100%
Airtel	400	76%	43%	0%	100%
Tigo	400	96%	19%	0%	100%
Zantel	400	3%	18%	0%	100%
Others	400	2%	13%	0%	100%

Table 5 – Summary statistics

	Whole sample					Bangladesh		Tanzania		Means diffe
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Obs	Mean	Banglade Tanzan
Variable										*t-stat*
Frequency meeting distributor	1077	5.22	1.94	1	7	700	6.22	377	3.36	-32.46
Satisfied relation with distributor	1084	0.77	0.42	0	1	693	0.78	391	0.74	-1.48
Nb of training received	1100	1.48	1.46	0	15	700	1.27	400	1.85	6.38
Adequate training	973	0.94	0.24	0	1	646	0.96	327	0.89	-4.35
Male	1100	0.83	0.37	0	1	700	1.00	400	0.55	-23.96
Owner dummy	1100	0.70	0.46	0	1	700	0.86	400	0.42	-17.38
Age	1098	29.90	7.48	14	67	699	31.29	399	27.47	-8.39
Level of education	1057	2.47	1.16	1	6	658	2.71	399	2.07	-8.94
# providers served	1100	2.41	1.14	1	9	700	2.24	400	2.70	6.68
MPS revenues, share of total[4]	1080	2.83	1.58	1	6	687	2.29	393	3.77	16.54
Stationed	1100	0.96	0.21	0	1	700	0.94	400	0.99	3.92
Nb of employees	1100	1.67	0.95	1	12	700	1.84	400	1.36	-8.33
Intensity of competition[5]	1100	3.53	0.85	1	5	700	3.54	400	3.51	-0.59
Security is an issue	1100	0.29	0.46	0	1	700	0.20	400	0.45	9.06
Perception security risk[6]	1100	3.28	0.93	1	5	700	3.32	400	3.22	-1.81
Time nearest provider (min)	1100	6.20	19.49	0	360	700	4.12	400	9.85	4.74
Travel time to get cash (min)	1086	34.56	82.68	0	1440	700	6.79	386	84.92	16.71
Nb of transaction denied/week	1090	10.41	25.45	0	700	697	8.39	393	13.99	3.51
Age mobile money business	1063	4.90	1.69	1	8	695	5.07	368	4.59	-4.40
Days open/week	1100	6.56	0.57	4	7	700	6.59	400	6.51	-2.27
Hours open/day	1099	6.15	0.93	2	8	700	6.13	399	6.19	0.97
	Agent's motivation for starting their Mobile Payment Agency business									
To increase my business	768	0.89	0.32	0	1	602	0.89	166	0.88	-0.27
My clients asked for it	768	0.34	0.47	0	1	602	0.42	166	0.05	-9.53
Chosen by the provider	768	0.01	0.08	0	1	602	0.00	166	0.02	2.10
Chosen by the distributor	768	0.03	0.16	0	1	602	0.03	166	0.02	-0.29

[4] From 1 "A very small part of total revenues" to 5 "A very large part of total revenues".
[5] From 1 "Very Low competition" to 5 "Very high competition".
[6] From 1 "Very low risk" to 5 "Very high risk".

Table 6 - Correlation matrix. Obs.=855

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	Frequency meeting distributor	1.00																				
2	Satisfied relation with distributor	0.06	1.00																			
3	Nb of training received	-0.21	0.06	1.00																		
4	Adequate training	0.22	0.04	0.06	1.00																	
5	Male	0.45	0.00	-0.15	0.12	1.00																
6	Owner dummy	0.33	0.02	-0.07	0.09	0.34	1.00															
7	Age	0.15	0.07	-0.05	0.09	0.15	0.44	1.00														
8	Level of education	0.22	0.03	0.03	0.04	0.10	0.18	0.14	1.00													
9	# providers served	-0.22	-0.07	0.04	-0.05	-0.11	-0.18	-0.07	0.03	1.00												
10	MPS revenues, % total	-0.23	-0.03	0.17	0.02	-0.19	-0.19	-0.15	-0.12	0.09	1.00											
11	Stationed	-0.03	0.03	0.02	-0.06	-0.07	-0.10	0.05	0.06	-0.03	-0.22	1.00										
12	Nb of employees	0.21	0.07	0.01	0.04	0.15	-0.03	0.06	0.15	0.03	-0.17	0.09	1.00									
13	Intensity of competition	0.01	0.12	0.00	-0.01	-0.01	-0.10	-0.02	0.05	0.04	0.10	-0.01	0.02	1.00								
14	Security is an issue	-0.15	-0.05	0.09	-0.04	-0.17	-0.12	-0.01	0.02	0.07	0.12	-0.01	-0.06	0.15	1.00							
15	Perception security risk	0.01	-0.09	0.11	-0.01	0.00	0.04	0.09	0.01	0.01	0.03	0.01	-0.02	0.19	0.20	1.00						
16	Time nearest provider	-0.09	-0.16	0.00	0.01	-0.04	-0.02	-0.04	-0.04	0.03	-0.02	0.03	-0.04	-0.06	0.06	0.03	1.00					
17	Travel time to get cash	-0.36	0.05	0.04	-0.14	-0.20	-0.13	-0.08	-0.07	0.10	0.10	0.05	-0.12	0.02	0.08	-0.02	0.12	1.00				
18	Nb of transaction denied	-0.06	-0.03	0.02	-0.03	-0.03	0.01	-0.01	-0.05	0.02	0.03	0.01	-0.02	0.05	0.03	-0.03	0.02	0.05	1.00			
19	Age mobile money business	0.14	0.07	0.13	0.09	0.10	0.12	0.16	0.11	0.07	-0.03	0.04	0.13	0.07	0.06	0.07	-0.03	0.03	-0.04	1.00		
20	Days open	0.05	-0.09	-0.05	0.01	0.15	0.10	0.06	0.01	-0.01	-0.03	-0.03	0.08	0.00	-0.01	-0.05	-0.05	0.00	0.05	0.08	1.00	
21	Hours open	0.01	0.03	0.12	-0.07	0.01	-0.01	-0.04	0.00	-0.02	0.05	0.06	0.08	0.01	-0.02	0.02	0.05	0.00	0.08	0.16	0.16	1

Table 7 – Comparing factors of success: relation with distributor, agent's human capital and business model

VARIABLES	Volume of transactions			Business Expansion	
	(1) Transactions slow day	(2) Transactions average day	(3) Transactions busy day	(4) Regular customers	(5) New customers
Relation with the distributor					
Frequency meeting distributor	1.031***	1.201**	2.210***	3.803	2.666*
	(0.336)	(0.576)	(0.856)	(2.365)	(1.512)
Satisfied relation with distributor	-2.582***	-3.788**	-5.363*	-16.230**	-6.501***
	(0.936)	(1.876)	(2.876)	(7.709)	(1.368)
Nb of training received	1.346*	1.794*	2.743**	3.789	1.999
	(0.713)	(0.998)	(1.188)	(4.858)	(1.966)
Adequate training received (dum)	-0.085	1.049	3.698	13.072***	2.084
	(1.552)	(2.543)	(3.637)	(4.775)	(3.761)
Agent's human capital					
Level of education	0.401	1.014*	1.556**	3.529	1.708
	(0.322)	(0.581)	(0.707)	(2.424)	(1.576)
Business model					
# providers served by agent	0.788	1.427*	1.519	3.696***	2.022
	(0.673)	(0.774)	(1.525)	(1.422)	(1.841)
MPS revenues, % total	2.284***	3.567***	4.506***	6.068	3.275***
	(0.599)	(0.919)	(1.287)	(3.789)	(1.105)
Controls					
Male	2.653**	4.059***	5.211*	11.950**	3.511
	(1.033)	(1.242)	(2.771)	(5.336)	(3.144)
Age of the agent	0.013	0.042	-0.117	-0.103	-0.308***
	(0.063)	(0.093)	(0.136)	(0.376)	(0.117)
Owner dummy	-0.130	-0.424	-0.184	-3.572	-3.182
	(1.539)	(1.754)	(3.318)	(6.421)	(2.157)
Nb of employees	2.457***	3.613***	4.752***	1.947	2.463***
	(0.399)	(0.694)	(0.749)	(1.740)	(0.894)
Stationed	3.626	7.422*	16.080**	30.231	4.999*
	(2.618)	(4.067)	(7.357)	(20.672)	(2.871)
Intensity of competition	1.236*	1.620	1.907	7.093	5.703*
	(0.728)	(1.025)	(1.264)	(5.317)	(3.127)
Security is an issue (dum)	3.155***	4.692***	7.007***	-3.574	-0.003
	(1.146)	(1.554)	(2.411)	(4.264)	(3.054)
Perception security risk	0.722	0.724	0.800	0.119	5.061
	(1.106)	(1.305)	(1.984)	(4.444)	(4.090)
Time nearest provider (adjusted)	0.018	0.009	-0.041	0.021	-0.118**
	(0.014)	(0.021)	(0.031)	(0.081)	(0.055)
Travel time to get cash (adjusted)	0.005	0.009	0.029	0.002	0.047***
	(0.008)	(0.011)	(0.022)	(0.045)	(0.015)
Nb of transaction denied	0.008	0.020	0.021	-0.145	0.005
	(0.035)	(0.045)	(0.067)	(0.161)	(0.051)
Age of the mobile money business	1.185*	1.706**	2.088*	3.672	1.118**
	(0.640)	(0.861)	(1.172)	(2.455)	(0.556)
Days open	1.339	1.175	3.133	1.280	-1.003
	(1.967)	(2.878)	(3.851)	(10.160)	(4.024)
Hours open	0.776	1.366	1.780	9.630**	4.674***
	(0.654)	(0.948)	(1.309)	(3.932)	(1.430)
Observations	849	850	851	843	843
R-squared	0.419	0.421	0.408	0.433	0.464

All regressions include enumerators' dummies, regional division dummies, and district dummies.
Standard errors are double-clustered at the enumerator and regional level.
Robust standard errors are in parentheses*** p<0.01, ** p<0.05, * p<0.1.

Table 8 – The role of motivation

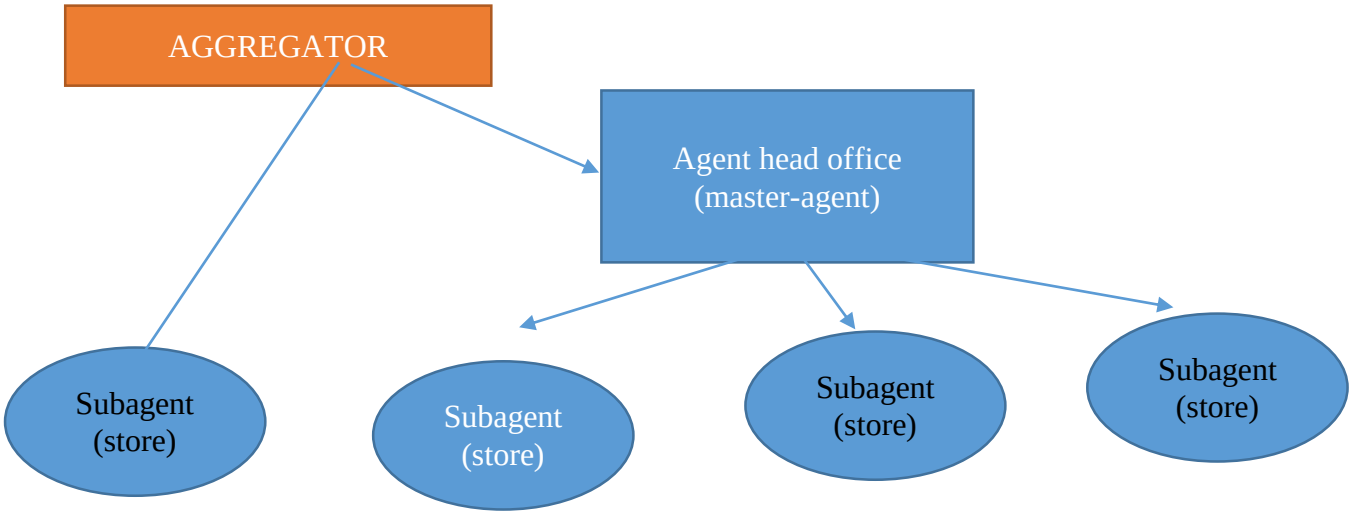
VARIABLES	Volume of transactions (1) Transactions slow day	(2) Transactions average day	(3) Transactions busy day	Business Expansion (4) Regular customers	(5) New customers
Relation with the distributor					
Frequency meeting distributor	1.475**	2.088***	3.332***	1.892	3.089
	(0.573)	(0.688)	(1.023)	(3.092)	(2.540)
Satisfied relation with distributor	-3.047***	-4.871***	-7.123***	-21.170**	-7.162***
	(0.648)	(1.467)	(2.669)	(8.700)	(1.734)
Nb of training received	0.921	1.582	2.152	5.782	2.902
	(1.140)	(1.732)	(1.917)	(7.732)	(3.333)
Adequate training received (dum)	0.698	0.989	3.672	17.932	1.945
	(3.355)	(4.234)	(4.358)	(13.866)	(6.214)
Agent's human capital					
Level of education	0.817*	1.350*	2.282**	4.751**	2.362
	(0.417)	(0.748)	(0.947)	(1.860)	(2.357)
Agent's motivation					
Motivation increase my business	5.914***	9.996***	14.910***	40.725***	12.296***
	(1.265)	(1.852)	(2.816)	(12.671)	(3.701)
Motivation clients asked for it	4.893**	7.854*	7.146	23.356**	9.630***
	(2.289)	(4.125)	(4.586)	(11.422)	(1.590)
Business model					
# providers served by agent	0.537	0.965***	0.436	1.948**	1.126
	(0.458)	(0.336)	(1.004)	(0.896)	(2.093)
MPS revenues, % total	3.184***	5.088***	6.298***	9.459*	3.442*
	(0.560)	(0.874)	(1.203)	(5.126)	(1.926)
Controls					
Male	1.403	2.522	5.340	10.045	8.143
	(2.299)	(3.171)	(5.502)	(10.587)	(5.035)
Age	0.046	0.092	-0.053	-0.214	-0.368***
	(0.065)	(0.091)	(0.122)	(0.435)	(0.121)
Nb of employees	1.392***	2.394***	3.374***	2.757*	2.426*
	(0.328)	(0.448)	(0.915)	(1.635)	(1.275)
Stationed	5.640**	10.882**	20.330***	35.200	5.317
	(2.418)	(4.450)	(6.391)	(24.434)	(4.257)
Intensity of competition	1.977***	2.663***	3.381***	9.737**	7.921***
	(0.472)	(0.707)	(1.049)	(3.949)	(2.461)
Security is an issue (dum)	3.254***	5.367***	7.223***	-1.883	0.065
	(1.202)	(1.800)	(2.160)	(4.718)	(3.307)
Perception security risk	1.864***	1.932***	2.746***	2.372	6.521*
	(0.604)	(0.590)	(0.811)	(2.234)	(3.511)
Time nearest provider (adjusted)	0.034***	0.033	-0.006	0.089	-0.098
	(0.013)	(0.023)	(0.044)	(0.071)	(0.073)
Travel time to get cash (adjusted)	0.005	0.006	0.011	0.007	0.032*
	(0.007)	(0.008)	(0.016)	(0.043)	(0.017)
Nb of transaction denied	0.001	0.015	0.010	-0.095	0.009
	(0.017)	(0.023)	(0.026)	(0.140)	(0.035)
Age mobile money business	0.674	0.938	1.185	1.231	0.521
	(0.496)	(0.811)	(0.971)	(2.044)	(0.802)
Days open	-0.167	-1.524	-0.040	-3.483	-0.393
	(2.036)	(2.918)	(3.405)	(12.353)	(6.228)
Hours open	0.449	0.985	0.682	9.454***	4.014***
	(0.442)	(0.856)	(0.910)	(3.584)	(1.348)
Observations	619	619	619	614	615
R-squared	0.518	0.496	0.486	0.474	0.468

All regressions include enumerators' dummies, regional division dummies, and district dummies.
Standard errors are double-clustered at the enumerator and divisional level.
Robust standard errors are in parentheses*** p<0.01, ** p<0.05, * p<0.1.

APPENDIX

Organizational structure – the example of Vodacom in Tanzania

Vodacom operates a two-tier structure with individual stores (subagents, in Vodacom's parlance) depending on master agents (or agent Head Offices (HOs)). Agent HOs maintain contact with Vodacom, and perform two key functions: liquidity management and distributing agent commissions. Individual stores may be directly owned by an agent HO or may be working for one under contract. In the latter case, Vodacom does not prescribe the terms of agent HO–store contracts, so they are free to work out their own liquidity management arrangements and split of agent commissions. Stores are free to switch between agent HOs. This also allowed Vodacom to use informal 'mom-and-pop' stores as sub-agents, while Vodacom's contract was with the HO.



Source:
Based on the case of Safaricom in Kenya (owned by Vodafone, same group as Vodacom).
Chopra, P. Wright, G., Shivshankar, V. (2012) MicroSave Briefing Note 136 Structuring and Managing Agent Network – I. November 2012.

Bangladesh:

Dhaka is the capital city of Bangladesh. Savar, which is part of the Dhaka administrative division is an interesting area for its Bangladesh Export processing zone and its garments industry, foot ware, jute mills, textile mills, printing and dying factory, transformer industry, automobile industry, biscuit and bread factory, pharmaceutical industry, soap factory, brick field, cold storage, welding, plant nursery. Many factory workers use mobile payment facilities to transfer money to their village home, and some also receive their salary through mobile payment.

Barisal is a major city that lies on the bank of Kirtankhola river in south-central Bangladesh. It is one of the oldest municipalities and river ports of the country. Barisal is mainly surrounded by rivers and the most popular mode of transport to the city is waterways. Therefore MPS should be a convenient form of money transfer for the local population.

Chittagong is a major hub of trade and industry. The Port of Chittagong is the largest international seaport on the Bay of Bengal. The city is home to many of Bangladesh's oldest

and largest companies. Chittagong generates for 40% of Bangladesh's industrial output, 80% of its international trade and 50% of its governmental revenue. In addition, the Chittagong area is characterized by its high hills as well as beach area, making mobile money a convenient transfer and payment option for the local population.

Repartition of surveyed thanas by administrative division in Bangladesh

Barisal	Freq.	Percent
Babuganj	11	11
Bakerganj	20	20
Barisal	52	52
Mehendiganj	8	8
Muladi	9	9
Total	100	100
Chittagong	Freq.	Percent
Chandgaon	19	19
Halishahar	1	1
Kotwali	27	27
Khulsi	1	1
Panchlaish	14	14
Chawkbazar	38	38
Total	100	100
Dhaka	Freq.	Percent
Badda	11	2.75
Dhanmondi, Azampur, Puran Daka	50	12.5
Banani, Gulshan	34	8.5
Mirpur	50	12.5
Mohammadpur	50	12.5
Motijheel	15	3.75
Magibagh Paltan	40	10
Savar	100	25
Uttara, Bashundahra	50	12.5
Total	400	100
Rajshahi	Freq.	Percent
Bogra	40	40
Dhupchanchia	20	20
Gabtali	10	10
Sherpur	20	20
Shibganj	10	10
Total	100	100

Tanzania

In Dar es Salaam, country's largest city and capital centre (Dodoma is Tanzania's capital city), the survey focused on the two districts of Kinondoni and Ilala.
For practicality reasons we chose towns and cities outside of the capital city that were still relatively close.
Pwani Region is located west of Dar es Salaam region, and the region capital is Kibaha. Bagamoyo, the capital city of the Bagamoyo district used to be an important trading port along the East African coast.

Morogoro is a city with a population of 315,866 (2012 census) in the eastern part of Tanzania, 196 kilometres west of Dar es Salaam and 260 kilometres (160 mi) east of Dodoma, the country's capital city.
We chose Bagamoyo as the rural town one hour trip from capital and Morogoro as the larger provincial market town.

Region	District	Freq.	%
Dar es Salaam	Kinondoni	80	20%
	Ilala	60	15%
Pwani	Temeke	61	15.25%
	Bagamoyo	49	12.25%
	Kibaha TC	50	12.50%
Morogoro	Morogoro Municipal	50	12.50%
	Morogoro DC	50	12.50%

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