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Innovation and Diffusion from South to North: Evidence from Mobile Banking

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Abstract

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Existing state-of-the-art:

Traditional growth theory has assumed that innovations are first introduced in advanced countries (North) and later diffuse through imitation to the developing world (South) (see e.g., Krugman [1979], Grossman and Helpman [1991]). The situation may have started changing with the advent of the digital technology age. Comin, Hobijn and Rovito [2008] found that many developing countries lag the U.S. and other advanced countries much less in the use of ?digital age? recent technologies, such as cell phones or the internet than in older technologies such as electricity or cars.

Research gap:

Endogenous growth theory offers at least two major reasons that would in principle lead us to expect innovations to often happen first in the South and subsequently diffuse to the North rather than vice versa. First, many developing countries have large and diverse populations, which should trigger the well-known scale effect on the supply side (Romer [1990], Jones [1995]). Second, consumers? needs (and hence, other things equal, their willingness to pay) are often more urgent than in developed countries.

Main theoretical arguments:

A string of recent literature suggests that larger market size should also lead to more innovations (e.g., Acemoglu and

Lin [2004], Desmet and Parente [2010]). Our model is in the spirit of this latter strand of the literature as it also focuses on the role played by demand. More specifically, we start from the assumption that digital-age knowledge capital is more or less equally accessible to developed and at least some developing countries. Large potential market size (including willingness to pay more) for alternatives to traditional products and services then makes it more profitable to introduce important innovations in developing markets first.

Method and Data:

In this paper, we offer a stylized endogenous growth model designed to conceptualize this new possibility, and we examine the mobile banking industry to see if newly emerging empirical patterns are consistent with the theory.

In the model, developing countries play the role of ground-breakers whose accumulated know-how leads to global adoption of innovation, reversing the roles traditionally assigned in the literature to "Northern" and "Southern" countries.

We take the theory to the data, employing a unique hand-collected data set on the history of mobile banking worldwide. The data include all firm entry into mobile banking since the beginning of the industry. We use data on firm entry and firm growth, tracking subscriber numbers and total volume transacted in dollars over time as well as firm histories and service deployments. This led to a rich dataset that is comprised of 138 firm entries by 93 different firms in 76 different countries. The list includes the first mobile banking product that was launched in 1997 and goes until May 2012. During this period, firm entry happened with 20 unique mobile banking products which were classified using GSMA data; these services were introduced the total of 412 times. The mobile banking data was complemented with financial access indicators which were used to get a proxy for latent demand. We also used firm histories to supplement the data. As a measure of the significance of the mobile banking innovations originating in emerging countries, we looked at whether they diffused to OECD countries.

Preliminary results:

We find patterns that are consistent with the theory and suggesting that "South" could play even more the role of global leader in digital-age innovations in the future. We found that at least 13 of the 16 innovations that originated in the developing world have already diffused to one or more OECD countries.

Not only did most of the services in our sample emerge in non-OECD countries, they diffused primarily to developing regions. Market demand appears to play an important role on innovation and firm entry. We find a negative correlation, that is, the less the fraction of populations with accounts in formal institutions, the greater the number of services in mobile banking service providers' portfolios.

Innovation and Diffusion from South to North: The Case of Mobile Banking

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Abstract

Digital-age technology makes key knowledge capital accessible to both developing and developed countries. Higher intensity of demand makes it more profitable to introduce important innovations in some developing countries first. Investments by original producers lead to accumulation of more knowledge capital, which spills over globally to eventually make it profitable for producers to enter also in developed countries. Thus, developing countries play the role of ground-breakers whose accumulated know-how leads to global adoption of innovation, reversing the roles traditionally assigned in the literature to “Northern” and “Southern” countries. In the empirical part we use a comprehensive, hand-collected data set to examine the case of mobile banking and we find patterns that are consistent with the theory and suggesting that “South” could play an important role in digital-age innovations in the future.

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1. Introduction

Traditional growth theory has assumed that innovations are first introduced in advanced countries (North) and later diffuse through imitation to the developing world (South) (see e.g., Krugman, 1979; Grossman and Helpman, 1991). Accordingly, the focus of the “North-South” technology diffusion literature has almost exclusively been on the conditions that could make this process smoother and allow developing countries to catch up faster with developed countries (e.g., Chen and Puttitanun, 2005; Gustaffson and Segerstrom, 2009).

The situation may have started changing with the advent of the digital technology age. Comin, Hobijn and Rovito (2008) found that many developing countries lag the U.S. and other advanced countries much less in the use of “digital age” recent technologies, such as cell phones or the internet than in older technologies such as electricity or cars. In several cases (such as the case of mobile banking examined below) it appears that developing countries are starting to lead the world in terms of introducing globally important innovations.

At the turn of the century, mobile banking schemes such as Simpay and MovilPago were tried in Europe (Spain, France) with basic services such as mobile payments and bank account management but these failed due to lack of market uptake. Soon thereafter, however, mobile banking initiatives spawned in countries with much less-developed financial service markets such as the Philippines and Kenya. Both local and multinational firms in those countries soon developed an array of new financial services for the mobile phone. Today, over 20 financial products are offered as part of the mobile banking portfolio; those include mobile insurance, merchant payment, international remittances, bill payment and mobile savings accounts. Eighty percent or more of these innovative products originated in the South. Of the total of 113 global firm entries registered by the GSMA, 100 occurred in emerging economies, and many of those firms originated there.¹ Higher latent demand in developing countries made these novel financial products diffuse rapidly

¹ As classified by the GSM Association via their Mobile Money Deployment Tracker available at

<http://www.wirelessintelligence.com/mobile-money/>. Accessed October 2011.

and in some cases leapfrog technologies that were prevalent in the ‘North’ such as ATM cards and conventional bank accounts. A recent report estimated that \$170 billion will soon pass through mobile banking products, and the number of mobile money² transactions in Kenya alone outnumber Western Union’s transactions globally. The industry’s center of mass lies in emerging markets, and mobile banking products are now proliferating in industrialized nations too. This makes the mobile banking industry an important case in the emerging new pattern of the South-North diffusion.

In this paper, we examine the mobile banking industry to see if newly emerging empirical patterns are consistent with the theory. Endogenous growth theory offers at least two major reasons that would in principle lead us to expect innovations to often happen first in the South and subsequently diffuse to the North rather than vice versa. First, many developing countries have large and diverse populations, which should trigger the well-known scale effect on the supply side (Romer, 1990; Jones, 1995). Second, consumers’ needs (and hence, other things equal, their willingness to pay) are often more urgent than in developed countries. A string of recent literature suggests that larger market size should also lead to more innovations (e.g., Acemoglu and Lin, 2004; Desmet and Parente, 2010).

Mobile banking represents one of the first instances where the balance of larger market size versus technological and institutional barriers to growth in the developing world seems to have decisively shifted in favor of the former. Mobile phone technology itself as well as the more specific technology that made feasible the commercial launch of secure peer-to-peer money transfers through mobile phones were developed by IT firms (technology vendors) that operated in the developed world. Nevertheless, mobile network operators (MNO) and other firms in developing countries that launched mobile banking services for the first time, had at the very least implemented an important “new combination,” which according to Schumpeter (1912), lies at the heart of entrepreneurial innovation.

Furthermore, our analysis of the mobile banking industry shows that large potential

² Mobile money = money that is stored on the mobile wallet.

market size (including willingness to pay more) for alternatives to traditional products and services (such as banking) can make it more profitable to introduce important innovations (e.g., mobile banking) in developing markets first. Investments by original innovating firms leads to accumulation of more knowledge capital, which spills over globally and eventually makes it profitable for producers to enter also in developed countries. Thus, developing countries play the role of ground-breakers whose accumulated know-how leads to global adoption of innovation, making possible a genuine “South to North” diffusion process.

The rest of the paper is organized as follows. In the next section we briefly discuss the theoretical framework with propositions. We then describe the data and describe important representative cases in the evolution of the mobile banking industry. The following section analyses the observations in the industry, and in particular we distinguish between efforts conducted by the South and North respectively and evaluate the entry and growth process in the mobile banking industry that show the relevance of South-North diffusion. In this section we link the empirical observations with existing theoretical concepts. The paper concludes with findings and discussion.

2. Theoretical Framework

Previous papers (Stoneman & Diederer, 1994; Caselli & Coleman, 2001) have found that industries spawn largely in the North before diffusing through trade and imitation to the South. In this paper we will discuss conditions that can enable important innovations to be developed in the South and can cause a subsequent shift in the industry’s center of gravity to the South. We proceed to elaborate on the mechanism that enables this pattern.

The literature suggests that (firms in) developing countries should focus on imitation rather than invention because they lack resources and depart from a lower technological base with knowledge that is not at the global frontier. Attempts to innovate will therefore yield lower quality products that can be imitated at a lower cost. This assumption changes when the technological lag decreases and levels the playing field for invention.

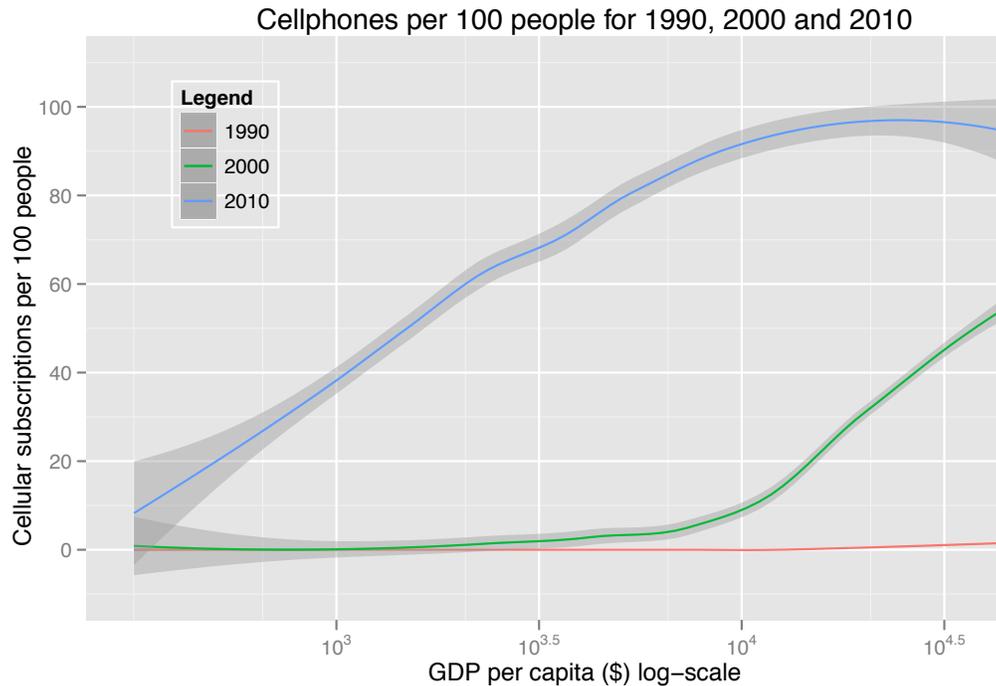


Figure 1: Cellphones/100 people plotted against GDP/capita. The grey band is the 95% confidence interval.

Mobile phones for example, saw an exceptionally rapid worldwide adoption, with 75% of mobile phone subscriptions currently in developing countries, up from almost none barely a decade ago. In 2000 only a few countries in Europe and North America had substantial cell-phone penetration. By 2010 many countries that in 2000 had zero penetration levels, in particular developing countries in Africa and Asia, are close to or above 50% penetration. Several countries like South Africa have higher levels of mobile phone subscriptions than the United States. As a consequence, firms in countries such as South-Africa can experiment with new products and services at the same time as firms in industrialized countries.

Proposition 1: When technological lag in the South is small, Southern firms experiment at a level that is competitive to the North.

Experimentation at a competitive level, instead of with outdated knowledge and resources, can yield frontier innovations.

Given Proposition 1, we can deduce that the expected reward of innovation for

Southern firms increases because innovations can be more novel. At the same time markets in the South are still less diversified and have a high demand for improved products and services. Therefore, when an innovation becomes available in the South, its marginal utility is higher than in the North, and thus follows that there is also a greater willingness to pay. Firms in the South see a higher expected reward and will be more likely to experiment. Once a successful innovation takes place, other firms in the South will be the first to imitate and diffuse the innovation.

Proposition 2: High latent demand in the South increases the rewards for innovation and entry. As a result Southern firms experiment more and entry first increases in the South.

The second proposition is largely driven by the profit-seeking behavior of firms. The literature on economics of innovation has established that a larger expected benefit for innovation increases the chance that a firm invests in innovation (Mansfield and Naven, 1968; Schmookler, 1966). The secondary effect is that once firms innovate or enter in the South, they are also more likely to be profitable due to large demand. Those firms that are profitable continue to offer services and reinvest part of their profits in improvement and expansion of their products, which in turn leads to knowledge capital accumulation and more innovation in the South. The industry's center of gravity shifts to the South, first in terms of innovation and then with respect to firm entry. The first-movers will enjoy the traditional first mover advantages, but will also have to deal with technological risk (Anderson & Tushman, 1990), legitimacy (Singh, Tucker & House, 1986), and the risks associated with viability of business models (Markides, 2005)

Proposition 3: Early growth and innovation in the South leads to frontier knowledge accumulation in the South.

In the mobile banking industry we observe that a specific innovation known as “the mobile wallet”, led to rapid adoption and firm-entry which subsequently spawned a lot more Southern innovations. This process will be discussed in more detail in the coming sections.

3. Mobile Banking Industry

Mobile phones diffused so rapidly in the developing world that they leap-frogged landlines. Today, of the nearly 6 billion mobile phone subscriptions worldwide, more than 4.5 billion live in developing countries.³ At the same time, 2.5 billion people are unbanked (i.e. do not have access to a bank account) of which approximately 1.7 billion people have access to a mobile phone; this means that more than half of the unbanked population has access to a mobile phone. As a result of this access-to-financial-services deficit, latent demand for exploring the functionalities of the mobile phone for the purpose of financial transactions has been strong. Thus, not surprisingly, a plethora of innovations centered around mobile phones appeared in the past decade, creating enormous benefits for producers and consumers alike (Aker and Mbiti, 2010; Porteous, 2006). Mobile financial services, for example, had a widespread impact as a consequence of their rapid diffusion. Whereas it took the regular banking sector in Kenya 115 years to provide customers with over 40 licensed banks and little over 1000 bank branches and ATM's, it took M-Pesa — the country's most prominent mobile banking initiative — 4 years to have 30,000 mobile money agents⁴ who can transfer e-money into cash and visa versa.⁵ A further contrast is that in 2011 42% of Kenyans above the age of 15 had access to a formal bank account, whereas, in the same year, over 60% of Kenyan adults used M-Pesa.

In the following section we describe the data and highlight several representative firms, with regards to their innovations and firm entry. We use the term “mobile banking” in a broad sense, encompassing mobile money, mobile commerce and other financial services executed with a mobile phone. In the data we equate countries in the ‘North’ with OECD-member countries, and ‘South’ with non-members.

³ ITU World Telecommunication /ICT Indicators database. See <http://www.itu.int/ict/statistics> accessed February 2012

⁴ mobile money agent definition

⁵ Data from World Bank and Safaricom

3.1 Data

To analyze the innovation and diffusion patterns we use data from the mobile banking industry, building on the GSM Association's (GSMA) records of firms in the industry. This includes data from the early players in the industry, starting in the mid nineties and goes until 2012. In total the industry comprises of approximately 150 firm entries by 95 different firms in 74 different countries. During this period, the 20 services were introduced the total of 412 times.

	≤ '00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	TOTAL
Countries, firm entry > 0	2	1	3	0	2	1	4	2	7	10	20	14	7	73
Countries firm entry = 0	193	192	189	189	187	186	182	180	173	163	143	129	122	122
														195
Firm Entry, OECD	2	1	3	2	1	0	1	1	2	1	6	1	2	23
Firm Entry, Non-OECD	2	0	1	0	2	3	4	5	8	17	31	30	18	121
														144

Table 1: Summary Statistics on Firm Entry

We use the GSMA's data as a starting point for identifying the different services available today, and then conduct a detailed investigation of the origins of these services, to better understand the key decision factors for early firm-entry. We identified the date and location of first commercialization, based on analysis of the detailed developmental histories of the firms and the service innovation process. To uncover these histories, we used primary and secondary sources including company reports, news articles, case studies, documents by vendors, and interviews with experts and researchers from the Consultative Group to Assist the Poor (CGAP) and GSMA. Additionally, we visited global trade conferences organized by GSMA on mobile banking and mobile money transfer services, and interviewed the creators of some of these services from the original firms. Interviews were held with industry leaders and researchers to better understand how the industry emerged. Through this process, we identified the histories of the firms and services and understood the source of the innovation, in addition to where and when it had been pioneered. We supplemented the GSMA's list of mobile banking firms with information on

firm entry and firm growth.

3.2 Early entry in the North

The first financial services available through the mobile phone emerged in the late 1990s in Finland. At that time Finnish banks, with Merita Bank at the lead, started offering basic information services such as checking bank account balance alert's through SMS⁶ as well as telephone banking, which allowed banking customers to perform basic banking operations through the phone. Soon thereafter the first services in the area of m-commerce (short for mobile commerce) were launched by telecom provider Sonera. The earliest example was 'Dial-a-Coke' which was launched in 1997 by Sonera in partnership with Coca-Cola Drink. The beverage producer initially incorporated mobile phones into their vending machines so the machines could call the distributor when the machine was nearly empty. However, that functionality alone wasn't worth the investment and Coca-Cola Drink tried to expand the range of applications of its mobile-phone-equipped vending machines and partnered with Sonera to allow customers to buy from their vending machines and have the purchase charged to their phone bill. They hereby pioneered the service 'Automated Service Payment'.⁷

By 2000 firms had begun introducing more creative uses of mobile phones for financial services and payments such as paying with phones at Norwegian parking meters, paying for passes at Finnish ski-slopes, buying train ticketing in Austria and mobile purchasing of airline tickets in Japan.

In 2002, when Sonera had over 800 mobile payment-enabled vending machines in Finland, the company announced it would stop marketing this service in favor of its new SMS-based Shopper service which expanded its presence in m-commerce.⁸

Contemporaneously Paybox, an independent mobile payments provider funded by

⁶ SMS = Short Message Service

⁷ Automated Service Payment is defined as 'using the mobile phone for services such as vending machines, public transport or parking'.

⁸ http://www.themultichannelretailer.com/item.php?news_id=1535

Deutsche Bank that launched in 2001 in Austria, Germany, Spain, UK and Sweden offered processing of direct debits for consumers when they want to pay for e-commerce, person-to-person transactions, payments to bank accounts via their mobile phones. Using the Paybox service was possible for mobile phone owners with a bank account that registered for the Paybox service. While Paybox was one of the most successful schemes (with 700,000 active users in Germany and 200,000 in the other four countries), Deutsche Bank withdrew its support in 2003 and Paybox was disbanded in all countries except Austria.

The examples above were some of the most successful and creative initiatives in the North. However none saw sufficient adoption and most failed to reach scale. Other following initiatives in the North saw a smaller uptake than the examples given above, with many initiatives ending up in failure. In particular, following the Finnish were several high-profile attempts at launching more widespread mobile payment schemes, like MovilPago (launched in Spain in 2002) and SimPay (launched in 2003). MovilPago was an initiative between Telefonica and BBVA, two large multinational firms active in Spain. In the first year the service took up 17,000 users and after six years only had a total of 400,000 registered customers, many of which were not active (Mas, 2008). This dismal performance was largely attributed to Spain's high penetration of banking services. Simpay, an alliance between four major MNO's (Orange, Telefonica Moviles, Vodaphone and T-Mobile), who jointly represented 280 million customers across Europe, suffered a similar fate. Its original plan was to enable low-priced purchases through a person's mobile phone bill. Nonetheless, the initiative never took off and the alliance was disbanded in 2005. These stories of failure were not exceptions; adoption of early mobile services was modest and many early initiatives in Europe were abandoned (Rotman, 2008).

3.3 Innovators in the South and the Mobile Wallet

While most of the aforementioned early mobile banking pioneers in developed countries were struggling to reach scale, some mobile operators in emerging markets had already started introducing their own mobile financial services. In 1999 SMART, a Filipino mobile operator and Banco de Oro, the largest private bank in the Philippines, created a

partnership that would lead to one of the most successful mobile money products in the industry.

SMART, one of Philippines' leading wireless providers, launched SMART Money in 2000, the world's first reloadable e-wallet account, later known as the mobile wallet. The chief difference with attempts in developed countries was that SMART Money was accessible to the unbanked (although initially it was just for people with accounts at Banco de Oro, but was changed later), that is, individuals without accounts in formal banking institutions. The system gave such individuals an opportunity to open a surrogate banking 'account' using their mobile phone, which allowed for retail payments as well as 'over-the-air' transfer of airtime credit and mobile money between mobile wallets.⁹ Globe, another leading Filipino telecom provider followed suit in 2004 and launched G-Cash. Globe also introduced a range of new and innovative services such as international remittances and salary disbursement into the mobile wallet called "Text-a-Sueldo". Any voice subscriber who had an account with either Globe or SMART could make use of these services, and many did.

Another pioneer in mobile banking was the firm called Celpay. Launched in 2001 in Zambia and subsequently in 2004 in the Democratic Republic of Congo, Celpay is a third-party firm (neither a bank or a MNO) based out of the Netherlands that partners with African banks and MNO's.

Celtel's CFO, Kamiel Koot reportedly got the idea for Celpay when visiting Zambia and seeing two people exchange a lump of cash, with one of them on the phone. Upon asking his driver what these men were doing the driver told him that they were on the phone with two other people in the capital, where a reverse exchange was taking place. The two men were executing a long-distance money transfer using mobile phones, to coordinate the transfer and circumvent the broken banking system. Celtel decided to invest \$10 million in the creation of Celpay.

⁹ A mobile wallet is a virtual wallet, or electronic account, associated with a mobile phone number, which can hold a monetary value. It is similar to a bank account but is associated with the mobile phone number. It can be accessed through the phone and can be used to store and transfer value.

Once Celpay introduced the new service, it faced difficulty with initial uptake of peer-to-peer transfers because the Zambian central bank required mobile banking customers to own a regular banking account due to Know-Your-Customer (KYC) regulations. Additionally, the service offering was payment at supermarkets, restaurants and for satellite service which were transactions largely limited to expats and rich Zambians. These people already had credit cards and saw little added value to another payment product.

Therefore those who would have really benefited, the unbanked, had no access to the mobile money transfer product as a consequence of regulatory requirements. Celpay became successful by offering business-to-business transactions with customers such as Zambian Breweries Plc, Zambia Bottlers Ltd. (Coca Cola), Heineken, Total, BP, MNO's for token-less airtime, etc. Early adoption was not by the unbanked population but by businesses such as Heineken, Coca Cola and other breweries, whose truck drivers were continuously robbed and/or misplacing cash¹⁰. These firms faced a large need for mobile banking services due to the lack of more reliable and safe ways to pay for goods. Celpay's role was particularly useful in bringing previously unbanked informal traders into the banking system, mostly for use of cash collection and payouts from business-to-business and person-to-business (B2B and P2B).¹¹ Allowing these instantaneous payments, removed the risks and time associated with cash. Only later did individual consumers adopt Celpay for money transfer services. Celpay was also the first firm to employ government-to-person (G2P) payments by using its payment platform to pay out approximately \$45 million in cash to 75,000 demobilized combatants in the Democratic Republic of Congo.

Celpay was developed and launched in by Celtel, one of Zambia's telecom providers and in partnership with six major banks, but was later sold to a South-African banking group First Rand. The technology handling the mobile payment system of Celpay is powered by Fundamo, a technology provider from South Africa, which was recently acquired by VISA. Since its inception Celpay has transferred over \$2 billion in payments. Its story shows that the road to adoption of these novel services is not usually smooth, yet

¹⁰ Kamiel Koot, former CEO at Celpay Holding.

¹¹ Miyanda Mulambo, General Manager: Sales & Marketing at Celpay

when they are matched to serve unmet demand, they can substitute a broken banking system.

The mobile wallet also saw success in North. Especially in Japan, where it was introduced in 2004 by NTT DoCoMo, under the name Osaifu-Keitai (Japanese for "Wallet Mobile"). This comprehensive mobile wallet used Sony's Felica chips for near-field communication (NFC) and is not only used for mobile payments but also for loyalty cards, as a credit card, for identification purposes, and other functions of 'conventional wallets'. Because it is supported across operators its uptake has been quite large, with many businesses, including airlines accepting it as a form of payment as well as identification.

3.4 Expansion of the Industry

After the initial firms experimented, with trial-and-error, a time of high entry followed in developing countries, largely triggered by M-Pesa's blockbuster success. M-Pesa, probably the most widely publicized mobile money platform, although definitely not the first one, was conceived in Kenya in 2005 and launched in 2007 by Safaricom (part of the Vodafone Group). The two people at the helm of the initiative were Susie Lonie and Nick Hughes, both Vodafone employees who were dispatched to Kenya to spearhead the project. When Safaricom designed M-Pesa the challenge was not a technological one, as stated by Hughes: *"This wasn't about new technology, it was about a new application of existing technology."* Funding for M-Pesa came from the UK, with a £1million DFID grant, matched equally by Vodafone.¹² Contrary to the Philippines' case, the initial resources and know-how used to set up M-Pesa came from the North, through heavy involvement of Vodafone as Sagentia, the Cambridge (UK) based firm that provided the technology. M-Pesa's early services are largely African innovations, even although the technology came from the United Kingdom with human resources from Vodafone, "the concept was tested, honed and commercialized in Kenya and has succeeded like nowhere else" (Omwansa & Sullivan, 2012).

¹² DFID = UK's Department for International Development.

“Within the first month Safaricom had registered over 20,000 M-PESA customers, well ahead of the targeted business plan. This rapid take-up is a clear sign that M-PESA fills a gap in the market. The product concept is very simple: an M-PESA customer can use his or her mobile phone to move money quickly, securely, and across great distances, directly to another mobile phone user. The customer does not need to have a bank account, but registers with Safaricom for an M-PESA account.” (Hughes and Lonie, 2007) M-Pesa’s earliest adopters were better educated, higher-income males (a typical profile for early technology adopters) living in the urban areas who wanted to send money to their less-wealthy unbanked family members in the rural areas, and forced them to learn how to use M-Pesa. Its mobile remittance service offered a much improved alternative to two-day bus trips previous required to deliver money to their relatives in the provinces, and was the biggest reason for the success of M-Pesa soon after its launch.

M-Pesa’s success exceeded Safaricom’s expectations, mostly because there was large unmet demand in the market, especially by those who owned mobile phones but had no access to formal bank accounts. The market needs were so large that in some cases new uses were pioneered by the users themselves (van der Boor & Oliveira & Veloso, 2012). In fact, Safaricom initially planned M-Pesa as a tool to enable microfinance payments and loan disbursement through mobile phones, but realized during the pilot that users were sending each other money instead. M-Pesa was therefore launched as its domestic money transfer product with the slogan “*Send Money Home*”.

While initially M-Pesa was merely an attempt to improve financial inclusion in a developing country, it had reached 6.5 million subscribers within two years. Safaricom then proceeded to add several innovative services to the M-Pesa platform, such as M-Kesho which allows emergency loans and includes a mobile savings account, as well as bill payment which substitutes expensive and wasteful travel as well as long lines. Through these services M-Pesa has become the blockbuster example of successful firm entry into mobile banking (Jack and Suri, 2011). Today M-Pesa has approximately 15 million subscribers, moves \$24 million a day, and processes more transactions within Kenya than Western Union does globally, and provides mobile banking services to more than 70% of the adult population nationally (IMF, 2011).

4. Analysis

The observations in this industry lead us to believe that under certain conditions, firms in the South can innovate and lead the industry. Although the industry is still expanding, we can divide the industry evolution thus far into three phases.

4.1 Phase I: Simultaneous experimentation in the North & South.

In the period between 1997 and 2005 firms in both the North and the South were simultaneously experimenting with new services for the mobile phone. The result of this experimentation were almost two dozen new services. There was however a sharp distinction in which firms came up with what innovations, and how they subsequently evolved in the market. Firms in the North focused primarily on one of two things: extending existing banking services through the mobile phone (such as Merita Bank in Finland) or various types of m-commerce that allowed payments for goods using the mobile phone (such as Paybox in Austria). Firms in the South however, pioneered a breakthrough concept: the mobile wallet. The invention of the mobile wallet by Smart in the Philippines precipitated a large number of new functionalities for the mobile wallet: from domestic money transfer to mobile savings accounts. Because the mobile wallet was a substitute of a regular bank account, it offered financial services to the unbanked which were often excluded from the formal banking systems because of stringent requirements (regular income, identification barriers, formal paperwork, etc).

On the other hand, the focus of early mobile financial services in North was largely on extending service delivery of existing banking customers, or to let them use their accounts for purchases via the mobile phone, i.e. m-commerce applications. Table 2 shows all novel services in the industry, introduced since the beginning until early 2012. In particular it shows that most innovations in the South were related to the mobile wallet.

	Service	Producer		Firm Name	Type	Mobile Wallet based
		Introduction by Producer	Country			
	<i>Category: Mobile Banking</i>				Bank/MNO/3rd	Yes/No
1	Bank Account Balance Alert	1995	Finland	Merita Bank	Bank	No
2	Bank Account Deposit	Sep-06	Philippines	Globe Telecom	MNO	No
3	Bank Account Withdrawal	Dec-00	Philippines	Smart + Banco de Oro	MNO + Bank	No
4	Bank Transfer	1997	Finland	Merita Bank	Bank	No
5	Storage of Savings	Mar-10	Kenya	Safaricom + Equity Bank	MNO + Bank	
	<i>Category: Mobile Commerce</i>					
6	Automated Service Payment	1997	Finland	Sonera	MNO	No
7	Merchant Payment	Sep-01	South Korea	SKT + 9 big banks	MNO + Bank	No (initially)
8	Mobile Insurance	2009	Kenya	Safaricom + Syngenta Foundation	MNO (+ insurance)	Yes
	<i>Category: Mobile Money</i>					
9	Authorized Cash Collection	2003	Zambia	Celpay	MNO	Yes
10	Bill Payment	1999	Finland	Sonera	MNO	No
11	Domestic Money Transfer (P2P)	Dec-00	Philippines	Smart	MNO	Yes
12	Emergency Credit	Mar-10	Kenya	Safaricom	MNO	Yes
13	G2P (Government to Person)	2006	DCR	Celpay	MNO	Yes
14	International Money Transfer	Aug-04	Philippines	Smart	MNO	Yes
15	Microfinance Loan Disbursement	Oct-05	Kenya	Safaricom + Faulu Kenya	MNO + Bank	Yes
16	Microfinance Loan Repayment	Nov-04	Philippines	Globe	MNO	Yes
17	Salary Disbursement	Jul-07	Philippines	Globe	MNO	Yes
	<i>Category: Telecom</i>					
18	Ask a Load	8-Oct-04	Philippines	Globe	MNO	Yes
19	Domestic Airtime Transfer (P2P)	Dec-00	Philippines	Smart	MNO	Yes
20	International Airtime Transfer (P2P)	Jul-04	Philippines	Globe	MNO	Yes

Table 2: Table of Services and their origin

We then proceed to analyze the effect of latent demand on innovation and entry. We use lack of access to financial services as a proxy for demand for mobile financial services. For this, we use country-level data from the 2011 Financial Access Survey (IMF) and looked at the countries in which innovations were first introduced.

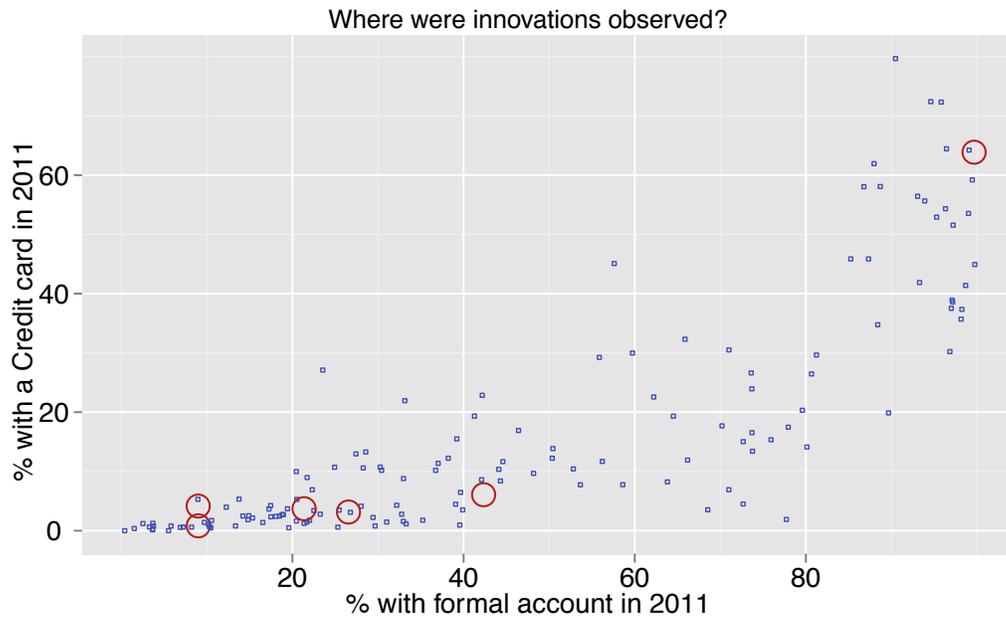


Figure 2: 148 countries plotted against two indicators for financial access; large red circles are countries where innovation took place.

Figure 2 shows that most innovations came from countries with a lower access to formal financial services, as indicated by *% of population with access to a formal bank account* and *% of population with access to a credit card*.

4.2 Phase II: Adoption and Diffusion in the South

The second phase in the mobile banking industry is marked largely by an increase of entry and diffusion, after M-Pesa made headlines with its unmatched success and rapid adoption following its launch in 2007. Safaricom's success with M-pesa was evident to its competitors: Safaricom was the most profitable firm in East-Africa in 2009 with M-Pesa accounting for 10% of its revenues and 20% of its profit.

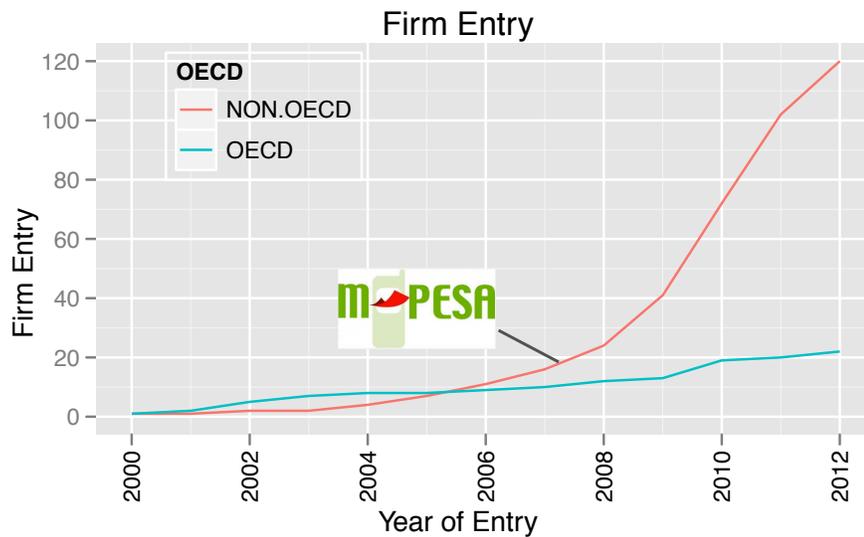


Figure 3: Diffusion of mobile banking services, separated by OECD and non-OECD countries.

The alluring idea of profits in combination with low entry costs spurred a wave of industry entry, especially in the South. Many of the large multinational operators tried to replicate M-Pesa success by implementing a similar model; among these were some large African players such as Vodafone/Vodacom (who were closely involved with M-Pesa's creation), MTN (South Africa), Bharti Airtel (India), Orange (France). These firms already had a large customer base and market presence through wireless voice and data services and simultaneously added mobile money to a multitude of existing markets.

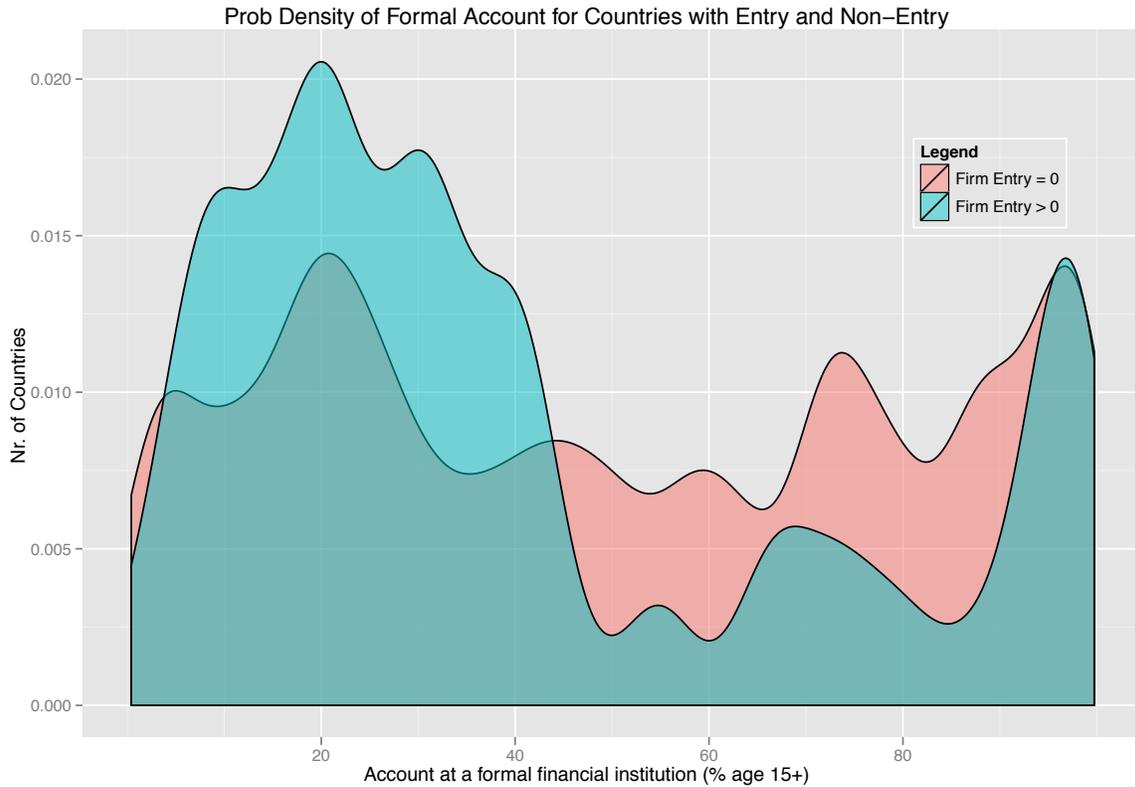


Figure 4: Distribution of countries with- and without firm entry compared to their levels of financial access.

Figure 4 shows that firm entry, like innovation (as was shown in Figure 2) predominantly occurred in markets with low access to financial services. Yet, entry itself does not guarantee a firm’s success in terms of adoption or growth of the mobile banking products. Once a firm has entered a country, it may choose to expand its service offering by investing into adding new services. Therefore, as a proxy for success after entry, we look at the number of services a firm introduced per country in 2012, conditional on its entry. Figure 5 shows a negative relationship between the number of services offered and the percent of people with a formal bank account. This result holds when controlling for age of the firm.

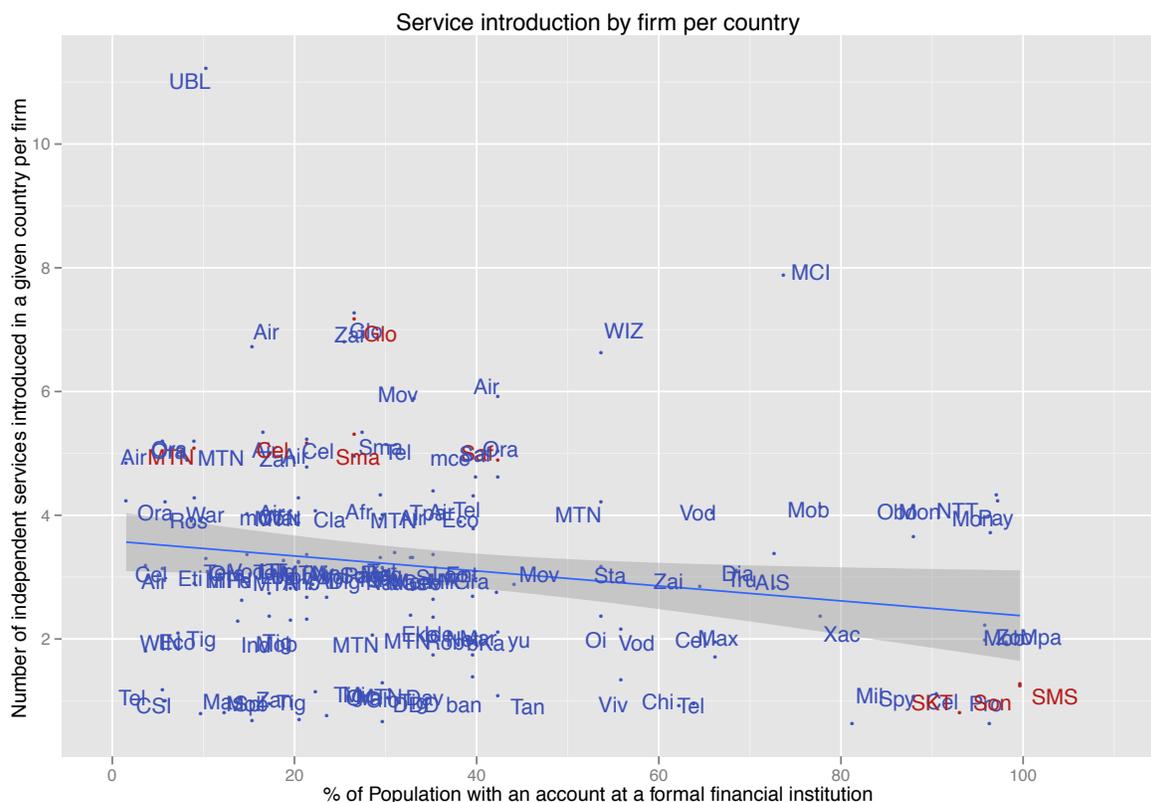


Figure 5: firm country-level innovation with respect to access to financial services in the country of entry. Number of mobile banking services introduced and the fraction of population with an account at a formal financial institutions (innovating countries are highlighted in red). The grey area is the 95% confidence interval.

Given that most mobile banking services use existing network infrastructure and can leverage an firm’s (whether its MNO or a Bank) existing capabilities; i.e. the monetary costs of adding mobile banking were not that high. Industry sources estimate the initial implementation costs to be between \$5-30 million, which is within range of most MNO’s and banks, given that annual revenues are usually in the order of billions of dollars. For example, Safaricom’s investment in M-Pesa was estimated at \$30 million (Omwansa & Sullivan, 2012) while its revenue is just over a billion dollars. Furthermore, intellectual property is not a prominent barrier to entry in this industry, since most services are not patentable and the technology can easily be bought or licensed.

More important than entry costs are other, non-technical, barriers to entry such as

regulatory hurdles. Once the first firm offered mobile banking services in a country and cleared the regulatory requirements, it was very easy for followers to do the same.

During this expansion phase, the most successful services became Domestic Money Transfer, Airtime Top up and Bill Payment, with 113, 109 and 92 firms that adopted the innovation by 2012, respectively. The first two originate from the Philippines whereas Bill Payment was pioneered in Finland.

During this large wave of entry some of the original Southern pioneers were reaching scale and came up with several more innovations, often adding functionality to the ‘mobile wallet’. At the same time, many of the Northern pioneers never reached scale and were either abandoned or in the case of banks, continued to be pushed to reduce service costs. The lack of adoption in the North also resulted in a lack of further innovations during this period of the industry and as a consequence, the South began taking the lead in number of firm entries, innovations, customer adoption and also industry knowledge.

4.3 Phase III: Major Initiatives in the North and Industry Leaders

The current phase in the mobile banking industry started in approximately 2010, with the conceptualization of new large scale mobile banking initiatives in the North such as Google Wallet, Square and Isis (a joint-venture between AT&T, T-Mobile and Verizon in partnership with Visa, MasterCard and American Express). The dust has not yet begun to settle as these large-scale initiatives try to conquer the market.

Yet we see this phase is distinct in the sense that there is a renewed interest by firms in the North to enter the mobile banking and mobile payment’s space, and these firms are doing this using a new generation of smart phones. Many of these efforts emulate the mobile wallet model pioneered in the South.

The choice of technology — NFC, SMS, USSD, WAP, Bluetooth, cellular technologies (GPRS, EDGE, LTE)¹³ or other means — plays a role in this phase but the

¹³ GPRS = General Packet Radio Service; EDGE = Enhanced Data Rates for GSM Evolution; LTE = Long Term Evolution; NFC = Near Field Communication; WAP = Wireless Application Protocol; USSD = Unstructured Supplementary Service Data.

important dimension of differentiation appears to be primarily the business model. There are however, some differences in the technologies used compared with the earlier innovations. The mobile wallet was pioneered in the South by SMART, using simple phones and a debit card associated with the mobile wallet account. The technological services in the North are more integrated and made primarily for smart phones; nonetheless, the services delivered remain the same.

Although data on growth by number of registered customers is not readily available for all firms, we are able to find some of this data for the most successful firms. It was estimated that in 2009 there were 45 million unbanked people using mobile money (GSMA), and about 100 million active users of mobile money services worldwide, in February of 2011.¹⁴ In 2011 there were approximately two dozen providers with more than a million subscribers; the ones with the largest number of subscribers are shown in Table 3. The table shows there are a handful of hugely successful firms that were able to scale to several millions of subscribers. Most firms however, are still trying to move beyond 1 million subscribers. Noteworthy is that most of the early innovators in the South are in the list of high achievers.

¹⁴ This measurement is not perfect as there is a difference in number of active and registered mobile money customers. In a survey done by Mobile Money for the Unbanked (MMU) active accounts are defined as “ones that had been used to perform at least one P2P payment, bill payment, bulk payment, cash in, cash out, or airtime top up from account in the last 90 days”.

	Firm Name	Product Name	Country	Entry	Leading Firm	Innovations	Subscribers 2011 (mln)
1	Safaricom	M-Pesa	Kenya	2007	MNO	MFI Loan Disbursement M-Insurance	14
2	NTT DoCoMo	EDY (via Felica)	Japan	2001	MNO	-	12.5
3	SMART	SMART Money	Philippines	2000	MNO	Airtime Top Up Domestic Money Transfer Text-a-withdrawal	8.5
4	True	True Money	Thailand	2005	MNO	-	6
5	NTT DoCoMo	Suica (via Felica)	Japan	2004	MNO	-	2.3
6	Vodacom	M-Pesa	Tanzania	2008	MNO	-	2
7	MTN	MobileMoney	Uganda	2009	MNO	-	1.5
8	Telenor	EasyPaisa	Pakistan	2005	MNO	-	1-2
9	Globe Telecom	G-Cash	Philippines	2004	MNO	International Money Transfer Text-a-Deposit International Airtime Transfer MFI Payment Salary Disbursement	1 active (~2 total)
10	MTN	MTN Banking	South Africa	2003	MNO	-	n.a.
11	Telenor	EasyPaisa	Pakistan	2005	MNO	-	Several
12	Celpay	Celpay	Zambia	2001	MNO	Bill Payment Corporate Cash Collection	n.a.
13	Vodacom	M-Pesa	South-Africa	2010	MNO	-	1 (includes inactive)
	WIZZIT	WIZZIT	South Africa	2004	3 rd party	-	0.75

Table 3: Firms with largest adoption rates (MNO = Mobile Network Operator).

It is clear that mobile banking solutions in emerging markets are leading the industry and the industry's most successful firms operate in emerging markets. As a result the technology and the features are also much richer. Some the firms in this list were aimed specifically at providing the unbanked with a mobile phone. For example MTN joined forces with Standard Bank to introduce MTN Banking; where the rationale behind this joint venture was to bring a large number of the previously unbanked population into the formal banking sector (Ernst & Young). Wizzit, a startup mobile banking provider in South Africa, similarly also targets rural low-income consumers by offering low-cost transactional bank account to unbanked people.

In contrast to botched attempts in Europe, mobile banking services in the Philippines were an instantaneous success. By the end of 2005 SMART Money had approximately 2.5 million users and Globe had 1 million; this was multiple times more what Simpay or MovilPago were able to reach over their entire product life. Most importantly, both these systems introduced a large variety of new financial services using mobile phones,

something that contributed to both their success and to subsequent development of the industry, including more recent entry in developed countries. Both SMART Money and Globe still keep growing at a very high rate: for example, SMART reported a 61% growth in 2011 and currently boasts 10 million SMART Money accounts.¹⁵ Both Globe and SMART are local Filipino network operators, even though Globe's G-Cash was supported through USAID's RBAP-MABS¹⁶ program, which focuses on improving access to finance.

The story of early and continued success of mobile banking services in the Philippines contains a lot of suggestive facts. First, the precondition was the fact that mobile phones were ubiquitous in the country; by 2008, 75% of the population had a mobile subscription.¹⁷ Indeed, the country has been referred to as the "*Texting Capital of the World*" (Mendes, 2007). Since the introduction of SMS in 1994, the Filipinos were among the first nation to fully embrace the service and, by 2002, a total of 120 million SMS's were already been sent each day (Celdran, 2002). The financial infrastructure in the Philippines, on the other hand, is not well developed at all and traditional financial services were not available to a lot of people, especially the poor. The fact that the country is made up of a 7,100 small islands made physical movement of cash very difficult and created a huge demand for mobile money transfers which were much safer and faster than the existing alternatives. While many developing countries had initially rather high such costs, the Philippines were in a more favorable position as the country had rather lenient regulatory policies (Lyman and Ivatury, 2006). Additionally, the country had a developed retail network and a prevalent pre-paid system, as well as low cost-ratio of SMS to voice tariffs (Mendes et al., 2007), which together provided a fruitful landscape for entry and innovation in this industry.

M-Pesa is still growing with revenues growing at 32% yearly, and is expected to

¹⁵ <http://www.philstar.com/Article.aspx?articleId=784164&publicationSubCategoryId=74>

¹⁶ RBAP-MABS = Rural Bankers Association of the Philippines - Microenterprise Access to Banking Services

¹⁷ Source: International Telecommunication Union, World Telecommunication/ICT Development Report and database, and World Bank estimates.

constitute almost a fifth of Safaricom's entire revenue by early 2013, this would be more than SMS and data combined. In Tanzania the service contributed 12.6% to Vodacom Tanzania's service revenue in 2012.

For the remaining, not-so-successful operators, profitability is difficult to obtain. Most mobile money initiatives are not yet profitable, yet firms keep investing in them for various reasons. First of all there is still the hope that the mobile banking scheme can reach scale. Furthermore MNO's see that mobile money customers are more loyal and therefore it reduces the firm's churn. Banks on the other hand, see mobile banking as a way to reach the new market of the unbanked, but also to reduce their overall service delivery costs.

The North's most successful mobile banking initiative to date is NTT DoCoMo's Osaifu-Ketai. While its mobile wallet is not only focused on money and payments, but includes a diverse set of other functions, it has seen large adoption numbers. EDY and Suica, two mobile money products that were launched and make use of NTT DoCoMo's Felica chip, have 12.5 and 2.3 million users respectively (Amoroso & Magnier-Watanabe, 2012). Nonetheless their development trajectory was different, since both these products were available earlier using a cards that were reloadable with e-money, and then leveraged the Felica NFC chip to also access that stored value; this was several years after similar services had taken off in the Philippines.

The experience of introducing and improving the quality of mobile banking services in pioneering developing countries played a key role in the accumulation of global know-how and triggering wide-spread entry in other developing and developed countries alike. Safaricom for example, in the process of expanding, meeting anti-money laundering requirements and maintaining high quality and reliable service delivery, created one of the most advanced back-end systems to support M-Pesa's payments and transactions. Other firms such as Monetise in the United Kingdom, upon realizing there was no market uptake in the North, decided to enter in markets in Asia. Paybox shared its technology with Nigeria's Moneybox Africa in a partnership model.

5. Conclusions & Discussion

This paper uses existing theory to suggest three propositions and uses the mobile banking industry to illustrate them and describe their underlying mechanism. We find that the conditions in the mobile banking industry were conducive to new patterns of innovation and industry leadership in the South. We explain how two conditions, namely the recent trend in increasingly rapid diffusion of technology in combination with high latent demand, may cause this pattern of shifting geography to be repeated in the future. Our observations are limited to a single industry, which is still developing at the time of writing and therefore further studies will be needed.

The implications of the propositions are profound for management practices. First of all they imply that innovations may increasingly originate from emerging markets, which increases competition. On the other hand they also imply that market opportunities are opening up in South, in particular with respect to information and communication technologies that can be leveraged to solve a plethora of market needs.

For the research community, the observations seen in the mobile banking industry open up new areas of inquiry. The economic growth literature may need to adjust the conditions under which some of the important assumptions regarding the origin of technology and recommendations with regard to imitation or innovation still hold. The innovation and technology diffusion literature may need to be extended to include a better understanding of the role of geography, market need and available technology and their role of technological advances.

Appendix

List of Definitions

Airtime - prepaid cell-phone credit to be used for text and voice.

Load - prepaid cell-phone credit to be used for text and voice.

M-Commerce - Electronic commerce conducted on cellular phones

MFI - Microfinance Institution

Microfinance - Lending small sums of money to the poor so they can work their way out of poverty.

MNO - mobile network operator (MNO), also known as mobile phone operator

Mobile Wallet - An electronic account that is associated to a specific mobile phone number. It can be accessed through the phone and can be used to store, and transfer value.

Mobile Money - money that is stored on the mobile wallet.

P2P - Person to Person

POS - Point of Sale

SMS - Short message (or messaging) service, a system that enables cellular phone users to send and receive text messages.

Top-up - to reload one's airtime credit level

	Service
<i>Category: Mobile Banking</i>	
1	Bank Account Balance Alert
2	Bank Account Deposit
3	Bank Account Withdrawal
4	Bank Transfer
5	Storage of Savings
<i>Category: Mobile Commerce</i>	
6	Automated Service Payment
7	Merchant Payment
8	Mobile Insurance
<i>Category: Mobile Money</i>	
9	Authorized Cash Collection
10	Bill Payment
11	Domestic Money Transfer (P2P)
12	Emergency Credit
13	G2P (Government to Person)
14	International Money Transfer
15	Microfinance Loan Disbursement
16	Microfinance Loan Repayment
17	Salary Disbursement
<i>Category: Telecom</i>	
18	Ask a Load
19	Domestic Airtime Transfer (P2P)
20	International Airtime Transfer (P2P)

Figure 6: List of Services

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