Analysing Slow Growth of Mobile Money Market in India Using A Market Separation Perspective

Since the application of mobile technology for financial services can contribute to the economic development of developing countries, it is critical to examine the inhibitors to using mobile money service in countries like India, which have an exceptionally low uptake of this service. Mobile money service enables the customer to carry out financial transactions over a mobile phone without requiring them to own a bank account. By adopting a market separation perspective, this theory-driven, exploratory study proposes and tests a rare event logistic regression model for using mobile money services in India. The analysis of 45,036 responses shows that the ownership of a SIM card (temporal separation), income and ownership of a bank account (financial separations), awareness of mobile money services (information separation), age and gender (social separations), and location of residence (spatial separation) significantly inhibit the use of mobile money services. Implications are discussed at the end.

Keywords: Financial inclusion; use of mobile money services; market separation perspective; SIM card; bank account; awareness of mobile money services; India

Introduction

Mobile technology is the most widely used information and communication technology (ICT) for achieving financial inclusion of millions of poor in developing countries (GSMA 2018). Financial inclusion can be defined as affordable and timely access to and use of formal financial services (e.g., savings, credit) and products (e.g., crop insurance, health insurance) (Demirguc-Kunt et al., 2018). Mobile phones make finance faster, cheaper, and safer for millions of poor. For instance, mobile banking, the first

application of mobile devices for finance, makes it easier for the unbanked poor to save money and buy health and crop insurance (Alampay & Moshi, 2018; Allen et al., 2014). The poor can access money immediately when needed over mobile devices, which is useful in dealing with different types of emergencies (Ochara & Mawela, 2015). As a result, they can get prompt treatment during any medical emergency, which means that their health conditions do not deteriorate and they can join the workforce more quickly (Wall Street Journal, 2018). Finance over mobile technology can lead to the socioeconomic development of the unbanked poor in developing countries (Roztocki et al., 2019).

Past research has already confirmed the linkage between the uptake of mobile devices and gross domestic product (GDP) of developing countries (Bollou & Ngwenyama, 2008; Potnis & Demissie, 2009; Qureshi, 2012; Qureshi & Najjar, 2017; Samoilenko & Osei-Bryson, 2011; Waverman et al., 2005). Financial inclusion of the poor achieved using mobile devices can also contribute to the economic development of developing countries (Ilavarasan, 2017; Kemal, 2018; Ochara & Mawela, 2015; Wall Street Journal, 2018; Wenner et al., 2017). For instance, the World Bank estimates that efficiency created by government-to-person financial payments over mobile phones can save India one percent of its GDP, or about USD 20 billion (Wall Street Journal, 2018). Increasingly, governments in developing countries engage in government-to-person payments over mobile phones, which indirectly helps reduce poverty (Kemal, 2018). Salaries, daily wages, and pension payments made through mobile phones increase financial transparency in the system and make it impossible for the receiver to evade paying taxes. All these benefits of using mobile technology for finance suggest the need to grow this market in developing countries.

Types of Uses of Mobile Technology for Finance in Developing Countries

Two major applications of mobile technology for finance include mobile banking and mobile money service. Mobile banking refers to the use of a mobile device to remotely access one's bank account (Alalwan et al., 2017; Ernst & Young, 2016; GSMA, 2017). It serves as an extension of banking service over mobile devices and requires the customer to open a bank account (Kemal, 2018). The customer might experience major challenges such as paperwork involved in opening a bank account, psychological barriers to owning and operating a bank account, the learning curve involved in using a bank account on a regular basis, and cumbersome, tedious banking transactions processes (Gupta et al., 2017). Traditionally, bank customers in rural areas end up investing their scarce resources such as time and money in visiting bank branches located in urban areas and subsequently miss out on daily wages. To overcome this problem, bank agents visit the customer at their doorstep to carry out financial transactions, or customers are required to visit a bank agent in the neighborhood (Mohan & Potnis, 2015; Mohan et al., 2013a). This agent-led doorstep-banking still does not address all of the above-mentioned barriers to owning and operating a bank account on a regular basis.

In contrast, mobile money service does not require the customer to own a bank account (Consultative Group to Assist the Poor, 2013; GSMA, 2017). A mobile money account is associated with a mobile phone number. In the conventional business model of mobile money, the customer can deposit and withdraw money from their account, also known as an E-money Wallet, without any human assistance from the service provider. The customer can perform cash-free transactions, such as peer-to-peer transfers, using short message service (SMS) over a mobile phone (Foster & Heeks, 2013). As part of the over-the-counter business model, a network of local agents serving as "human automated teller machines (ATMs)" help the customer at their

doorstep to carry out financial transactions, which is convenient for the poor in remote rural areas of developing countries. This agent-led mobile money service typically does not require customers to initiate the transactions on their mobile phone; the mobile phone serves as a means to identify the customer and authorize their financial transactions through a one-time password (Gaur & Avison, 2015).

Table 1 summarizes the different types of uses of mobile technology for finance.

[Insert Table 1 Here]

Table 1. Mobile technology for finance

This study focuses on both business models of mobile money services – E-money Wallet and Over-the-Counter.

Research Question

Mobile money market has experienced an explosive growth in Bangladesh, Cote D'Ivoire, Kenya, Rwanda, Tanzania, Uganda, and Zimbabwe, which are developing countries in Africa and Asia (Evans & Pirchio, 2015). As of 2017, most mobile money services globally were located in Africa (Gahigi, 2017) with a market share of over 277 million customers. Bangladesh, the leader in Asia, had reported over 13 million registered accounts within three years after the launch of the first mobile money service in the country in 2011; Pakistan and Sri Lanka had also witnessed an exponential growth of their mobile money markets after the introduction of mobile money in 2009 and 2008 respectively (Evans & Pirchio, 2015). In fact, Pakistan is touted globally for having a highly conducive business environment for a scalable and sustainable mobile money market (GSMA, 2018).

In contrast, the mobile money market failed to grow explosively in India (Evans & Pirchio, 2015). This lack of growth comes despite the fact that over 90% of

adults own mobile phones and have access to affordable, pan-India mobile money services provided by the fourteen mobile network operators. Despite innovations in mobile money service operations at the network level, the Indian market has been an anomaly in the mobile money industry. For instance, in January 2017, only 106 million mobile-based financial transactions occurred in the entire country (Reserve Bank of India, 2017). In contrast, Kenya, a country with a population of 40 million and only half as many mobile money customers as India, experienced over 140 million transactions in the same month (Central Bank of Kenya, 2017). This consistent low usage of mobile money services warrants an investigation to identify the factors slowing down the adoption of mobile money services in India.

This pan-Indian econometrics study adopts a customer-centric approach and focuses on the *use* of mobile money services, since access to affordable finance does not necessarily translate into use by the poor (Mohan et al., 2013a). Little to no use of mobile money services can slow down the growth of mobile money market in the country, depriving it of economic benefits and development. Hence, the research question is: *Which factors do influence the use of mobile money services in India?*

To examine this research question, we draw from the stream of marketing literature that views the poor as consumers (Prahalad & Hammond, 2002) with a primary assumption that this community lacks resources to buy or use products and services. The opposite viewpoint treats the poor as producers, wherein they produce goods (e.g., traditional handicraft and art pieces) and services (e.g., regularly contributing milk to local business cooperatives which are in turn collecting, refining, distributing, and selling milk to consumers in urban areas). However, to study the factors influencing the use of mobile money services in India, it is logical to treat the

poor as buyers of mobile money services, since currently, they do not have the resources and infrastructure needed to produce or offer mobile money services.

The poor-as-consumers research stream argues that service providers (i.e., mobile money service providers, in this study) must proactively develop the markets in developing countries. This is to be accomplished by engaging with the poor in order to better align with and therefore meet their contextual and individual needs (Blocker et al., 2012). Market development refers to the efficient and sustained exchanges between buyers (i.e., people earning less than USD 2 a day without timely access to affordable financial services and products) and sellers (i.e., mobile money service providers and their partners), which brings buyers in the mainstream economy (i.e., affordable and timely access to financial services and products), generating economic activity and development (Prahalad & Hammond, 2002).

However, the process of market development in developing countries can be hindered by various factors, including the flow of information; remote rural locations of geographically dispersed communities of consumers; and the education level of consumers (Best & Kumar, 2008; Vachani & Smith, 2008). Physical distance, lack of financial ability, and information asymmetry often separate consumers and producers, thereby challenging the process of market development in developing countries, especially in the field of services enabled by ICT (Tarafdar, Singh, & Anekal, 2013).

To study the factors that influence the use of mobile money services and therefore affect the growth of the mobile money market in India, we adopt a "market separation" perspective from the marketing literature (Bartels, 1968). We test the effects of 18 financial, technological, cognitive, and demographic factors, representing five types of market separations between mobile money service providers and their customers.

Unique Contribution

A majority of studies on the factors influencing the use of mobile technology for finance focus on mobile banking (Dahlberg et al., 2008; Gupta et al., 2017; Mallat et al., 2004; Mothobi & Grzybowski, 2017; Shaikh & Karjaluoto, 2015). In contrast, this study focuses on mobile money services and their use by customers.

Studies analysing the growth of the mobile money market in developing countries conclude that contextual factors such as the lack of coordination between the telecommunications and formal financial institutions (LePoutre & Oguntoye, 2018), the socio-political environment in a given market (Heyer & Mas 2011), politics surrounding the bank-led business model of mobile money services (Suárez, 2016), and lack of a mass distribution network to link mobile network operators to customers (Shrivastava, 2015) slow down the adoption of mobile money services in developing countries. After analysing 94 academic publications analysing the use of mobile phones for financial transactions, Slade et al. (2013) conclude that there should be more empirical research on under-represented groups in diverse cultural settings in developing countries. Our study fills in this gap.

This study also informs customer-centric studies on the use of mobile money services by showing that disadvantages created by pre-existing inequalities such as age, gender, and location of residence (rural vs. urban) significantly deter the use of mobile money services in India, which is a major contribution to the sparse literature on the effect of demographics on the use of mobile phones for carrying out financial transactions (Gupta et al., 2017). Our findings show that the ownership of bank accounts and subscriber identity module (SIM) cards, and awareness of mobile money services, further declines the usage of mobile money services. To our knowledge, none of the past research has shown the effect of the ownership of bank accounts and SIM

cards on the use of mobile money, which is a novel contribution to what we already

know about the uptake of mobile money services in developing countries. We also

found that education, ownership of mobile phone, and proficiency in reading English do

not have any significant effect on the use of mobile money services, which

contradicts the past literature. Formal and informal financial services offered by

microfinance institutions, moneylenders, etc. do not affect one's use of mobile money.

The effect of the use of other financial services on one's use of mobile money was

rarely tested by any past research.

    The rest of the paper is organized as follows. The next section presents the

theoretical foundation of this exploratory study, including the rationale for drawing

from the past research on mobile banking for studying the use of mobile money

services. The next section on research methodology provides details of the study

context, and data collection and analysis. The next section showcases and interprets

findings in an appropriate context. The next section on implications highlights the way

in which this study creates value for theory and practice. The concluding section

acknowledges limitations of this study and proposes a research trajectory for advancing

this body of knowledge.

Theoretical Lens

Market Separation Perspective for Studying Use of Mobile Money Services in Developing Countries

The market separation perspective proposes four types of separations between

producers and consumers: spatial, temporal, information, and financial separation

(Bartels, 1968). Spatial separation refers to the geographical distances between

consumers and producers. The time difference between consumers and producers leads

to temporal separation. Information asymmetry, such as lack of awareness about

products and services among consumers or the inability of products and services to meet information needs of consumers, leads to information separation between producers and consumers. The inability of consumers to purchase products or services due to their financial status creates financial separation in the market.

A majority of both consumers and producers in developing countries live in remote, rural areas with little or no access to reliable, accurate, and current information, and likewise few affordable financial products and services for carrying out transactions when needed (Hammond et al., 2007; Mohan et al., 2013b; Potnis, 2015). A combination of Bartel's four separations keep such markets underdeveloped (Prahalad, 2005). After conducting interviews with 32 small business owners and consumers in India, Tarafdar and Singh (2011) concluded that markets in developing countries could be developed by reducing these four separations between producers and consumers.

Customers of mobile money services are likely to be affected by a combination of market separations both in the use of mobile phones generally and in access to financial services. We propose an exploratory theoretical model (see Equation 1 below in Research Methodology) to test the effects of the market separations, with variables contributed by the existing literature on barriers to using mobile money in developing countries. This literature is drawn from the past research in business, communication, development, information science, information systems, marketing, and social science.

Rationale for Employing Research on Mobile Banking

Some of the past studies (e.g., Bamoria & Singh, 2012; Gupta et al., 2017; Kemal, 2018; Mohan & Potnis, 2015) we referred to did not focus exclusively on mobile money services. However, findings from these studies are still applicable and relevant to studying the use of mobile money services, and are hence, employed in this paper. For instance, barriers to owning and using mobile phones for banking, which are

reported by the past studies cited in this paper, are also applicable to using mobile money services in developing countries.

The sample common barriers to using mobile banking and mobile money services are as follows. Customers of mobile banking and mobile money services who live in the same village are likely going to experience the same types of technical barriers (e.g., lack of network signals, power outages) to using these financial services over mobile phones. Lack of awareness about mobile banking and mobile money services among customers is likely going to adversely affect the uptake of both types of uses of mobile technology for finance. Customers are also likely going to experience similar psychological barriers to using mobile phones for carrying out financial transactions as part of mobile banking and mobile money services.

Spatial Separation

Over 70% of Indians live in rural parts of the country (World Bank, 2015). The rural, remote locations of customers make it costly and unattractive for businesses to serve them (Prahalad & Hart, 2002). Formal financial institutions have not preferred to serve rural India either due to these justifications (Gupta et al., 2017). A pre-existing digital divide in rural parts of India hampers the growth of formal financial institutions that are interested in serving the poor in rural areas using sophisticated software solutions deployed over the Internet (Kannabiran & Narayan, 2005), just as it does in other developing countries (Ochara & Mawela, 2015). As a result, only 19% of rural Indians had access to formal financial institutions like banks by 2010 (Gupta, 2010). A majority of rural Indians traditionally relied on easily accessible but informal financial service providers like local moneylenders, even if they charged usurious interest rates of more than 300% a year (Mohan et al., 2013a). Due to a lack of exposure to formal financial

service providers, the rural poor are less likely to use mobile money, a form of formal finance.

Rural parts of developing countries are weak in terms of the infrastructure needed to use mobile phones for finance (Gupta et al., 2017). For instance, network issues and power outages in rural areas make it challenging to using mobile phones whenever and wherever needed (Kemal, 2018; Potnis, 2011), taking away the key advantage of ubiquity associated with mobile phones. Intermittent electrical power and maintenance difficulties worsen the problem of using mobile phones for financial transactions in rural India (De' & Ratan, 2009). We explore the effect of "location of residence" (i.e., urban vs rural) (variable name: Area) on the use of mobile money services.

Temporal Separation

Mobile phone ownership is not necessarily a prerequisite condition for using mobile phones in developing countries, as the sharing of a single phone among a group of family members is often observed as means to reduce costs (Dissanayeke & Wanigasundera, 2014; James, 2011). A shared mobile phone may not be available when needed by all family members, leading to temporal separation. We test the effect of "ownership of a mobile phone," a variable representing temporal separation, (variable name: Owns_Mobile) on the use of mobile money services.

The more adults there are in a household with a shared device, the more difficult it may be for users to access a shared mobile phone when needed (Potnis, 2010), which can also lead to temporal separation. We considered the effect of the "number of adults per household" (variable name: NumofAdults) on the use of mobile money services. Multiple mobile phones in a household would increase the probability of household

members gaining access to a mobile phone to use mobile money services as needed. Due to technological advances in recent years, however, a single mobile phone can now possess multiple SIM cards, reducing the need of a single household to own multiple mobile phones in order to access financial services over mobile phones (Gaur et al., 2014). We used the "number of mobile phones per household" (variable name: NumofMobile) to study this variable's effect on the use of mobile money services.

It has traditionally been common practice among the poor in rural India, who cannot afford to own a mobile phone of their own, to purchase SIM cards and use them in borrowed mobile phones (Gaur & Avison, 2015). SIM cards may be inserted into any mobile phone, allowing consumers to insert their personal SIM cards into a borrowed mobile phone in order to access mobile money services. The poor have preferred to own only a SIM card, which is more than 100 times cheaper than a basic mobile phone. The ownership of a SIM card reduces the poor's dependence on personally owned mobile devices for carrying out financial transactions (Munyegera & Matsumoto, 2016). We test the effect of the ownership of a SIM card (variable name: Owns_SIM) on the use of mobile money services.

Information Separation

Asymmetrical access to information (i.e., lack of timely access to accurate and relevant information) is a chronic problem experienced by the poor in developing countries (Prahalad & Hammond, 2002). Information illiteracy, which can be defined as the inability of the poor to evaluate and process information, exacerbates this problem, thereby creating further barriers to using a mobile phone as an instrument of financial transaction (Bisht & Mishra, 2016; Morawczynski & Pickens, 2009). Adults in Africa have reported lack of information and an absence of knowledge about mobile money as

barriers to their use of mobile money services (Fanta et al., 2016). Researchers have noted that despite a widespread information illiteracy of using mobile phones for financial transactions that exists in developing countries, a majority of the studies on barriers to using mobile phones for finance have been conducted in developed countries (Mwangi & Brown, 2015). Our study reduces this gap.

If customers are not aware of how financial services are accessed and used over mobile phones, they often perceive less control over the transactions carried over mobile phones, leading to little or no use of mobile phones for finance (Gupta et al., 2017). Thus, lack of knowledge or lack of awareness can significantly influence the use of mobile phones for finance (Safeena et al., 2012; Luo et al., 2012). We test the effect of "awareness about mobile money services" (variable name: Awareness_MM) on its use.

The use of mobile phones for carrying out financial transactions requires the poor to be knowledgeable of the multiple technical features of mobile phones (i.e., digital literacy), and to be aware of the financial jargon used by mobile money services (i.e., financial literacy) (Potnis & Gala, 2019). All mobile money services require customers to use SMS, unstructured supplementary service data (USSD), or mobile applications for completing financial transactions (Chandan, 2016). It can be challenging for customers to issue different financial transactions, which require the use of specific syntax to be successfully completed on mobile phones. The USSD system solves this issue to a certain extent, as it presents an interactive menu and is much faster than SMS. The USSD system has also implemented the National Unified USSD Platform through the National Payments Corporation of India, which utilizes a single short code (*99#) to signify the common USSD channel for mobile money services (National Payments Corporation of India, 2016).

Another barrier is that although customers are not required to write or compose messages in English to use mobile money, user instructions; commands for using SMS, USSD, and mobile applications; and the financial jargons used by mobile money services are often in English. Literacy levels in different states in India range from 63% to 91%. Individuals with low literacy levels in their native language, exacerbated by unfamiliarity with English, are less likely to use mobile money services (Kamel, 2018). After studying the use of mobile phones by micro-entrepreneurs in India, Chew et al. (2015) found that education is positively related to the use of mobile phones for business purposes. We expect that digital illiteracy and financial illiteracy could deter the use of mobile money services by the poor. For these reasons, we assess the effect of "proficiency in reading English" (variable name: Eng_Prof) and "education" (variable name: Education) on the use of mobile money services.

Financial Separation

Financial barriers to using mobile money stem from the low income levels of the poor (Mohan & Potnis, 2015; Qureshi, 2013). The high cost of owning and maintaining a mobile phone can preclude its use for finance (Bamoria & Singh, 2012; Massoud & Gupta, 2003; Vrechoupoulos et al., 2003). To assess the effect of economic status on the use of mobile money by respondents, we developed a Poverty Score guided by Schreiner's (2012) scoring method that involves asking participants to complete a ten-question "scorecard" of household expenditure-related questions. The scorecard results are analysed using national expenditure surveys in order to estimate the likelihood that the participant's household falls below the poverty line. Using Schreiner's scoring method as a foundation, Poverty Scores were calculated in this study to indicate the economic status of participants. The study focuses on the effect of the "poverty level" (represented by the Poverty Score) (variable name: Poverty_Score) of the participants.

Since "occupation" can be used as a proxy for income (Conlisk, 1971; Gardner & Mills, 1989), we also studied its effect (variable name: Work) on the use of mobile money services.

Some scholarship suggests that prior experience with formal financial services, such as banks, will increase the use of mobile money services (Safeena et al., 2012). After surveying over 51,000 respondents in eleven countries of the Southern African Development Community, however, Fanta et al. (2016) found that bank account ownership and the subsequent access to ATMs, mobile banking, and internet banking actually decreased mobile money service participation. We test the effect of "ownership of accounts with banks" (variable name: Owns_BankAccount), "ownership of accounts with microfinance institutions" (variable name: Owns_Account_MFI), "ownership of accounts with post offices" (variable name: Owns_Account_Postoffice), "ownership of accounts with moneylenders" (variable name: Owns_Account_MoneyLender), "ownership of accounts with government-sponsored digital cards" (variable name: Owns_Account_GovtDigCard), and "ownership of accounts with savings/lending groups" (variable name: Owns_Account_SaveLendGrp) on the use of mobile money services in India.

Social Separation

Singh, Agarwal, and Modi (2015) proposed social market separation as the fifth type of market separation after studying market development for weavers in India. Their contribution advances the application of the market separation perspective to study underdeveloped markets in developing countries. This new type of market separation considers the role of demographic factors such as gender, culture, and age in shaping the poor's ability to participate in market development in lower-income countries. This

fifth separation is necessarily predicated upon treating the poor as producers. Our study tests the utility of this new market separation by viewing the poor as consumers, which is consistent with the original market separation perspective proposed by Bartels (1968) and its subsequent application to the markets of developing countries by Prahalad and Hammond (2002).

Indian society is still largely male-dominated, built upon cultural factors like the long power distance between men and women, the gender role defined for women by society, and the practice of collectivism. These cultural barriers translate to economic barriers from mobile phone ownership, even for financially independent women (Mohan et al., 2013b; Potnis, 2016a). With existing scholarship suggesting that only 30% of women owned mobile phones in 2014 (GSMA, 2014), it is likely that women experience a similar resistance to using mobile money services because of their gender. As was discussed previously, shared mobile phones are not necessarily available when needed; this barrier is especially prohibitive to female members of a household (Potnis, 2010; Potnis, 2016a). In the traditionally patriarchal Indian society, women from lower economic classes experience more barriers to owning mobile phones and accessing financial services than men in their families (Mohan & Potnis, 2015; Potnis, 2016b). Even women who have achieved financial independence in their professional lives might not be able to own a SIM card since they do not have true "financial freedom" in their households (Potnis, 2016a). We studied the role of "gender" (variable name: Gender) in shaping the use of mobile money services in India.

Youths possess relatively higher levels of digital literacy than the older population in India (Potnis & Gala, 2017). The older generation is less tech savvy than the younger generation in the country, and hence is reluctant to use mobile phones for finance (Gupta et al., 2017). We therefore test the effect of "age" (variable name: Age)

on the use of mobile money services.

Our choice of variables is guided by the research question, the theoretical lens, and the relevant literature. A brief description of the independent variables employed in this study is depicted in Table 2.

[Insert Table 2 Here]

Table 2. Description of independent variables

Research Methodology

Study Context: The Mobile Money Market in India

Evolution of the Market

The bank-led approach to the introduction of mobile money services instituted by the Reserve Bank of India, the centralized banking institution in the country, influenced the growth of the country's mobile money market (Chakrabarty, 2012). From 2008 to 2013, the Reserve Bank of India's regulations required mobile network operators to work with banks to offer a full range of financial services (Chakrabarty, 2012). Due to the impact of these regulations, mobile phones were used for mobile banking alone in India for a number of years, which required customers to own a bank account for financial services. As a result, mobile money, i.e., the use of mobile devices for carrying out financial transactions without owning a bank account, could not exist in India for a long time.

As was discussed above, formal financial institutions like banks have traditionally preferred not to serve rural Indians since it has not been an economically feasible proposition for them. As late as 2010, urban parts of India enjoyed banking penetration levels of 100%. Although rural India possessed 70% of the country's

population at the time of the studies, banking penetration in rural areas was only 19% (Gupta, 2010; World Bank, 2015). With no physical banking infrastructure or plans for geographical outreach in the majority of the country, it became increasingly difficult for mobile network operators to work with banks to offer financial services to rural Indians.

Taking both the physical limitations of formal financial institutions like banks and the technological advances of mobile network operators into consideration, finally, the Reserve Bank of India relaxed its requirement of owning a bank account for carrying financial transactions over a mobile phone in 2013. This change in policy spurred the growth of mobile money in the country. Mobile network operators, which had by then realized seamless, secure technology platforms and pre-existing agent networks, received the opportunity to apply for the newly conceived "Pre-Paid Instruments License" (Reserve Bank of India, 2014). These licenses allow mobile network operators to carry out semi-closed prepaid transactions; in other words, mobile phone users registered within the network operator's framework may purchase goods, products, and services from merchants who have also registered with the network. The transactions occur through mobile money transfer and payment services facilitated by the network operators (Gaur et al., 2014).

Mobile network operators were also allowed to deploy "business correspondents" in return for minor surcharges to customers. Mobile network operators had not previously been permitted to offer cash-out facilities for their users. These regulations eliminated the possibility of other mobile money service applications, such as remittances, bill payments, and airtime purchases, and therefore served to undermine the overall utility of mobile money services in India.

By 2017, fourteen mobile network operators in India were offering mobile money services as a value-added service to their customers (see Table 3). Customers

must first subscribe to a mobile-based service and/or download a mobile application, but are then able to access peer-to-peer mobile money services for remittances, purchases, sales (either remotely or on-site), and promotions.

[Insert Table 3 Here]

Table 3. Snapshot of mobile money market in India

Fierce competition among the fourteen mobile network operators has led to fragmented market conditions (Gupta & Tahilyani, 2013), making large-scale interoperability between mobile money solutions a major issue. An example of the barriers created by current market conditions is the difficulty in transferring currency between mobile networks, which currently requires users to establish partnerships with multiple mobile network operators and banks. Utilizing mobile money to transfer funds between an Airtel account and a Vodafone account would be challenging, for instance.

Interoperability has not been an issue in the development of mobile money markets in other countries. In Kenya, for example, a single mobile network operator has dominated the mobile money market, holding over 80% of the market share since the launch of its mobile money services product (Mas & Radcliffe, 2010). Customers can use this single product, M-Pesa, to carry out a wide range of financial transactions without the presence of the economic barriers created by market competition in the Indian case.

Thus, in several developing countries, mobile money emerged as a solution for financial inclusion of the poor. Due to the extensive pre-existing digital infrastructure established by 14 mobile network operators, over 90% of Indians already had access to mobile phones before being introduced to mobile money services. Mobile money was introduced as a value-added service for several of mobile network operators. In contrast, in developing countries like Kenya and Tanzania, which witnessed the explosive growth

of mobile money services, there was an oligopoly with only three mobile network operators, making mobile money one of the most affordable means to access and use formal financial services.

A Typical Business Model

Most mobile network operators deploy a customer-centric "doorstep" model in which human agents serve customers at their own residences and convenience. This business model is common across India due to several factors, including proximity between the customer and agent, ease of transaction, and conveniences of service hours (Sharma et al., 2016).

To demonstrate the operations of a typical mobile money service in India, we will here summarize a sample procedure similar to that utilized by Aircel Mobile Money, a pan-India mobile money service (Aircel, 2017). Prior to accessing mobile money services, a potential customer must complete and submit the requisite paperwork, which includes forms to open a mobile money account. The customer also submits a copy of their photographic identification at the nearest mobile phone outlet store to complete the mobile money account registration process. The customer is required to deposit a minimum amount of INR 100 (i.e., USD 1.35) into the account.

The customer can start using their new account immediately upon its activation at no charge. The mobile network operator is responsible for verifying all information submitted by the customer. Upon completion of the verification process, the customer's account is upgraded to a "Full Account," unlocking access to all financial services associated with the account within seven working days. The customer can deposit a maximum of INR 50,000 a month into their mobile money account. The customer will likely require some level of English proficiency to operate the mobile money services;

for example, they may be prompted to select the appropriate option from a drop-down menu written in English. If the receiver of mobile funds has a mobile money account with a different mobile network operator, the customer may be required to enter the amount and a four-digit personal identification number.

To transfer money from a mobile money services account to another account, the customer may be required to enter information such as amount, account number, Indian Financial Service Code (uniquely assigned to each bank branch), and four-digit personal identification number. A customer with a feature phone (not a smartphone) can use a mobile money account to transfer and withdraw money, make payments, or pay bills, by sending text messages with a long string of numbers representing the following: (a) type of transaction to be carried out, (b) name of the beneficiary, (c) amount involved, and (d) signature of the customer.

Data Sources and Sampling Techniques

Most of the existing research on the factors influencing the use of mobile money services is grounded in data generated from small samples, which underlines the need for undertaking future research "with a large sample size" (Gupta et al., 2017). This pan-India study with over 45,000 responses bridges the methodological gap in this area.

This study sources data from the Intermedia Financial Inclusion Insights (FII) Program. Intermedia is a global research consultancy firm that employs qualitative and quantitative tools to research global issues such as financial inclusion. InterMedia's FII Program, launched in partnership with the Bill and Melinda Gates Foundation, generates rigorous country-level data, analysis, and practical insights into how financial services are used. The FII Program has gathered demand-side knowledge about the financial landscape in eight countries across Africa and Asia, including India. The

dataset employed in this study is from the most recent survey conducted from June to October 2015 in partnership with IMRB International, a market research firm based in India (Intermedia, 2016).

Intermedia collaborated with the national statistics bureaus and local fielding partners in India to ensure an accurate and representative survey, which adopted a multi-level, stratified, and randomized sampling. The main objective was to include a proportional distribution of the sample across all 29 states of India, as well as the seven union territories and eight stratified urban and rural classes based on the 2011 Indian census. The stratification in the sample was done in five levels. The overall sample size was allocated and selected from the following groups: states; urban/rural classes; town/villages in each state; households; and respondents.

Face-to-face interviews were conducted as part of the semi-structured survey, with each interview lasting for an average of 49 minutes. Quantitative and qualitative responses were collected from adults aged 15 or older. Appropriate sample sizes were selected, which allowed statistically significant analysis of population segments (such as by region, gender, age groups, poverty level, and digital financial consumer type) (Intermedia, 2016). Data was collected by several teams across the country, possibly introducing an inconsistency in recording qualitative responses, thereby affecting the quality of qualitative data. This potential limitation of this secondary data did not affect our study since we relied only on the quantitative data recorded by these teams.

The survey elicited data for more than 300 variables related to financial inclusion and mobile money. Questions focused on the following areas: (a) demographics and poverty, (b) access and use of mobile devices, (c) access and use of mobile money, (d) access and use of formal financial services, (e) financial literacy and preparedness, and (f) general financial behavior of respondents. We identified and

focused on only 18 variables that are germane to exploring our research question. Our choice of variables was also guided by the theoretical lens and the relevant literature.

Intermedia adopted rigorous procedures for ensuring the reliability and validity of data. Survey data does not come from a simple random sample but instead comes from a complex survey data. We made corrections to the dataset by applying appropriate weighting, clustering, and stratification, using the svy sub-command in Stata. We also rechecked data for internal consistency among respondents. The standard margin of error for the FII survey was within the allowable statistical range, as reported by Intermedia. We also incorporated other checks for multicollinearity and model misspecification.

Data Analysis Estimation Procedure

To examine respondents' likelihood of being a mobile money user we conceptualized the model using Equation 1 below.

$$\text{Use\_MM} = \alpha + \beta_1 \text{ Age} + \beta_2 \text{ Area} + \beta_3 \text{ Gender} + \beta_4 \text{ Awareness \_MM} + \beta_5 \text{ NumofAdults} + \beta_6 \text{ NumofMobile} + \beta_7 \text{ Owns\_SIM} + \beta_8 \text{ Owns\_Mobile} + \beta_9 \text{ Owns\_BankAccount} + \beta_{10} \text{ Poverty\_Score} + \beta_{11} \text{ Education} + \beta_{12} \text{Work} + \beta_{13} \text{ Eng\_Prof} + \beta_{14} \text{ Owns\_Account\_MFI} + \beta_{15} \text{ Owns\_Account\_Postoffice} + \beta_{16} \text{ Owns\_Account\_SaveLendGrp} + \beta_{17} \text{ Owns\_Account\_GovtDigCard} + \beta_{18} \text{ Owns\_Account\_MoneyLender} + \varepsilon \; \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{ (Equation 1)}$$

Use_MM is the dependent variable, which represents the usage of mobile money services in the ninety days prior to taking this survey. Customers can benefit from access to finance only if they use financial services. We therefore selected the dependent variable that elicited the response for the following question: "Have you ever

used any mobile money service for any financial activity using an account registered in your name or using someone else's account or using an agent's account?" The dependent variable is a binary variable that takes two values: "0" (if a respondent never used mobile money) and "1" (if a respondent used mobile money).

Since our dependent variable is a binary variable, we adopted a logistic regression technique to test our model. A binomial or binary logistic regression has been used to model the outcome of using mobile money versus not using mobile money. A binomial logistic regression (often referred to simply as logistic regression) predicts the probability that an observation falls into one of the two categories of a dichotomous dependent variable based on independent variables that can be either continuous or categorical. In our study, only 0.4% of the individuals reported using mobile money and the rest 99.6% are non-users of mobile money, making the use of mobile money a rare event in the Indian market.

Linear regression models remain unaffected by the occurrence of rare events. However, binary logistic regression models sharply underestimate the probability of rare events and provide a biased interpretation of the drivers of the binary outcome of interest (Sridhar et al., 2015). Therefore, we used a bias-corrected estimate and robust standard error, as prescribed by King and Zeng (2001) for rare event logit models, to assess the likelihood of usage of mobile money. The basic intuition behind this bias correction is to correct for finite sample and rare event biases and standard error inconsistency (Clercq & Arenius, 2006). We used the "relogit" command in STATA, which generates approximately unbiased and lower-variance estimates of logit coefficients by correcting for small samples and rare events (Zhou & Guillén, 2015; King & Zeng, 2001).

Findings & Discussion

Table 4 presents the results of the rare event logistic regression. We introduced checks for multicollinearity and proper model specification. Multicollinearity is not a concern, as the mean VIF for the full model is 1.63, well below the recommended thresholds (IDRE, 2017). We examined the model specification using the command linktest. The variable _hat is statistically significant and the variable _hatsq is statistically insignificant, which indicates that our model is properly specified (IDRE, 2017).

[Insert Table 4 Here]

Table 4. Relogit corrected estimates

The odds ratio (i.e., the ratio of the likelihood of an event happening over not happening) in Table 5 indicates the likelihood of someone using mobile money in terms of percentages. For instance, the odds ratio of 0.57 for owning a bank account suggests that someone who owns a bank account is 43% more likely to use mobile money provided other conditions remain the same. Recurring changes in the government's position and policies towards mobile money paired with strict financial regulations created ambiguity among potential customers with regard to mobile money accounts, possibly preventing the explosive growth of the mobile money market in the country (Evans & Pirchio, 2015).

[Insert Table 5 Here]

Table 5. Odds ratio

Table 6 helps readers interpret odds ratio values of statistically significant variables, which influence the use of mobile money services in India.

[Insert Table 6 Here]

Table 6. Interpretation of odds ratio of significant variables

The following sub-sections present the roles of spatial, temporal, information, financial, and social separations in influencing the use of mobile money services in India. We help readers interpret the results of our quantitative analyses in the Indian context and against the existing literature.

Role of Spatial Separation

This study corroborates the existing evidence on the effect of location of residence of the use of mobile money services. Our findings show that a resident of urban India is likely to use mobile money services by more than 50% than someone living in rural India. Lack of exposure to formal financial services (Mohan et al., 2013a) and subsequent psychological inhibitions such as lack of confidence for using formal financial services, and technological barriers in the form of lack of mobile network connectivity and power outages (De' & Ratan, 2009; Gupta et al., 2017; Kemal, 2018; Potnis, 2011)) seem to be making it challenging to use mobile money services in rural areas. Individuals migrating from rural to urban areas in search of livelihood are also more likely to use mobile money services to send remittances back home (Kikulwe et al., 2014), which also explains the higher utilization of mobile money services in urban India.

Role of Temporal Separation

We found that mobile phone ownership does not affect mobile money usage, which contradicts past studies (e.g., Kikulwe et al., 2014); instead, someone who does not own a SIM card is 43% less likely to use a mobile money service. As was discussed previously, it is a common practice in developing countries to share and/or borrow mobile phones owned by family members, friends, and relatives (James, 2011). Munyegera and Matsumoto (2016) argue that individuals without a mobile phone often use mobile money services through shared phones or other family members. They may

also own SIM cards that they can use to make financial transactions using mobile devices owned by family members.

A valid identification is required to purchase SIM cards in India; however, in the early years of mobile money proliferation, the country did not yet have a national identification system in place. This lack of a nationwide identity verification system posed challenges to facilitating the growth of mobile money services in India. Kenya's nationwide identification system, on the other hand, helped mobile network operators verify the identity of customers in that country, creating efficiency in the business process and facilitating financial transactions carried out over mobile money services.

A national identification system is therefore a critical component for verifying the identity of customers, especially when some members of the public may not have any credit history. This issue is being tackled in part by the Aadhar Project, an initiative to provide "identity infrastructure" with the intent of financial inclusion in India (Mehrotra & George, 2015). Moreover, since SIM cards are much less expensive than mobile phones, some individuals may choose to invest in a SIM card and forego the mobile phone altogether (Munyegera & Matsumoto, 2016). The evolving national identification system in India will also facilitate the process of purchasing or obtaining SIM cards for free from mobile network operators.

Several mobile money services deliver passwords, which serve as unique identifiers or transaction confirmations to users' registered mobile phone numbers. These mobile phone numbers are mapped to a specific SIM card; however, as was described previously, multiple SIM cards (including cards from multiple mobile network operators) can operate from a single mobile phone unit. This creates freedom of choice and increases convenience for customers to access and use the mobile money services. It is easy for illiterate or semi-literate customers to acquire and master the

basic hardware skills necessary to insert a SIM card into a mobile phone.

Role of Information Separation

Education level and English reading proficiency were determined to have a statistically insignificant effect on the use of mobile money services. Such services tend to rely on numerical rather than verbal literacy and requiring minimal effort on the part of the customer during the transactional process. Additionally, many mobile money transactions are conducted on the premises of a "human agent" who may facilitate the transaction (Gaur et al., 2014).

As may have been expected, awareness about mobile money services increases the likelihood of mobile money services usage by 98%. Marketing campaigns and related educational activities highlighting the (a) fact that mobile money services do not require the customer to own a bank account, (b) availability of different business models of mobile money, and (c) ease of using mobile money services, could increase their usage in older, female, and/or rural segments of the Indian population.

Role of Financial Separation

While ownership of a bank account is not a prerequisite for mobile money services usage in India, we found that customers who did not have a bank account are less likely to use mobile money services than their banked counterparts. This finding suggests that mobile money services can reinforce the pre-existing financial divide in the Indian market rather than bridging it.

The use of financial services and products offered by microfinance institutions, government-sponsored programs, or moneylenders does not affect one's use of mobile money, which suggests that prior experience of owning and possibly using banking services is more strongly correlated with using mobile money services than other types of formal financial services. For a long time, the Government of India limited the

application of mobile technology for finance to mobile banking alone. As a result, anybody who wished to use a mobile phone for finance had to own a bank account. Although the government has relaxed the condition it still seems to be dictating the perception of potential customers toward mobile money, and hence, its uptake in the country. Creating more awareness about the change in the government's policies could possibly address this problem.

Our analysis found income measured in terms of our Poverty Score to be a strong predictor of the use of mobile money services, which can be partly explained by the service fees charged by mobile money service in India. In Kenya, on the other hand, M-Pesa, the most popular mobile money service in the world, does not charge any fees to open and operate an account. No fees are charged for withdrawals or deposits, either; only remittance transactions are associated with a separate charge, and the charge per transaction is far lower than that found at traditional financial institutions (Ngugi et al., 2010). Since mobile money services are cheaper and include less fees for services rendered, the poor are more likely to use mobile money. As a result, the existing research reports no effect of income of the customer on their use of mobile money services in Kenya (Mothobi & Grzybowski, 2017).

Role of Social Separation

Inequalities created by social separations like gender and age also affect respondents' use of mobile money services in India. For instance, being male increases one's chances of using mobile money services by 37%, which is understandable in the male-dominated Indian society where 70% of mobile phones are owned by men (Potnis, 2016b). As age increases by one year, the odds of using mobile money services decreases by 4%. Our research therefore demonstrates that younger customers are more likely to be using mobile money services than their older counterparts.

Implications

This study informs research and practice in ICT for development in the following ways.

Theoretical Implications

Studies that approach the problem of slow growth of mobile money market from the customer side focus mainly on the psychological factors of customers (Al-Jabri & Sohail, 2012; Gupta et al., 2017; Yu, 2012) by relying on a combination of variables used by the technology acceptance model (TAM) (Venkatesh & Davis, 2000), the diffusion of innovation theory (DoI) (Rogers, 1995), or the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2003), which undermines the role of contextual factors (Andrade & Urquhart, 2010). Since psychological factors do not represent and fully engage with the complex dynamics surrounding the use of ICT, they often ignore the influence of sociocultural and demographic factors. Thus, analysis of the use of ICT using psychological factors comes at the expense of a social lens (Adaba & Ayoung, 2017). This study illustrates the utility of understanding the problem of low usage of ICT by employing a combination of individual and contextual factors, rather than studying individual or contextual factors in silos. This approach informs ICT for development research, and can inspire researchers to propose myriad of combinations of individual and contextual factors and to explore their roles in influencing ICT usage for human, social, and economic development.

Study findings also contribute to the information systems (IS) research on the post-adoption or continued usage of ICT artefacts. IS research defines continued usage of ICT as a ''myriad of feature adoption decisions, feature use behaviours, and feature extension behaviours made by an individual user after an IT application has been installed, made accessible to the user, and applied by the user in accomplishing his/her

work activities" (Jasperson et al., 2005, p. 531). The main stream IS adoption research published by the Association of Information Systems' basket of 8 journals, including Information Systems Research, MIS Quarterly, and Journal of Association for Information Systems, heavily relies on cognitive variables from psychology and communication for studying the post-adoption or continued usage of ICT by individuals (Potnis, 2015). This overly intensive focus on cognition-oriented behavioural theories like TAM, Theory of Reasoned Action (Fishbein & Ajzen, 1975) and Theory of Planned Behaviour (Ajzen, 1985) is being criticized as lacking innovation in the continued usage of ICT research (Benbasat & Barki, 2007; Venkatesh et al., 2007). The existing understanding of the ICT adoption process is far from being complete and exhaustive (Hung & Cho, 2008). Hence, to understand, explain, and interpret continued usage of ICT phenomenon, critical research is always in search of theories from other disciplines (Myers & Klein, 2011; Potnis, 2015). There is hardly any theoretical framework capable of weaving in a common thread among all the individual and contextual factors influencing the adoption or use of ICT.

This study employs the market separation perspective as an umbrella theoretical framework for organizing 18 financial, technological, cognitive, demographic, and cultural factors into five market separations, and for understanding their roles in influencing the use of mobile money services across India, which is a major theoretical contribution of this study to ICT for development research. Future studies can benefit from this novel organization of variables for better postulating, justifying, and testing theoretical arguments related to ICT for development.

A majority of research applying the market separation perspective for studying developing markets focuses on buying behavior representing the adoption of products and services (Tarafdar et al., 2012). We advance this body of knowledge by assessing

the use (i.e., post-adoption) of mobile money services to illustrate the ways in which various market separations impact the growth of the mobile money market in India. Future research can employ and inform the market separation perspective for studying adoption and post-adoption of ICT for the development of individuals, communities, and organizations in developing countries.

Informing Practice

Study findings show that despite having access to mobile money services a significant percentage of respondents do not use them, suggesting a "limited financial inclusion," similar to what was found by Kemal (2018) when studying government-to-person mobile payments in Pakistan. The range of inhibitors to using mobile money identified in this study suggests that mobile money does not necessarily bridge the financial divide for all in India. The findings further highlight the need to mediate the effects of pre-existing inequalities that prevent certain groups such as women, the poor, older adults, and rural residents from experiencing a "full financial inclusion" where all can use and benefit from mobile money. We strongly recommend government agencies in India to address the disadvantages created by pre-existing inequalities as part of their Digital India initiative (Digital India, 2019), in which all citizens are expected to use mobile phones for building a cashless society. India cannot experience maximum economic benefits from mobile money services, as predicted by the World Bank (Wall Street Journal, 2018), unless it attains the full financial inclusion of all its citizens.

Despite having access, the inability of a majority of the older generation, poor, women, and rural residents in our study to using mobile money suggests the reinforcement of financial divide by mobile money services in India. The diffusion of technology-enabled applications, such as mobile money is influenced by policy and infrastructure (Qureshi, 2014). Government policies, regulations, and programs

therefore need to focus on developing the training material and programs for increasing information literacy, digital literacy, and financial literacy of the older generation, the poor, women, and rural residents. Existing financial information literacy programs in India do not reach, and hence, cannot serve over 200 million illiterate and semi-literate poor who earn less USD 2 a day, since these programs (a) are run mainly through websites that are not accessible or useful to a large majority of population whose native language is not English or is illiterate, and (b) require potential beneficiaries to be affiliates of institutions like banks, schools, colleges, and local government agencies (Potnis & Gala, 2019; Raina, 2014).

Rangaswamy and Nair (2012) advocate for treating "the poor not as passive consumers but … innovative producers of ICT products and services (p. 163)," which suggests that the poor in developing countries are not just passive receivers of mobile money, but can inform the business model of mobile money services, especially for reducing the barriers to using mobile money. For instance, mobile money services and their partners can involve their customers in designing new marketing campaigns to create more awareness among potential customers, thereby reducing information separation for using mobile money services.

Conclusion, Limitations, and Future Research

Study findings make it clear that it would be impossible for popular IT adoption models such as TAM, DoI, and UTAUT with predominantly psychological variables to comprehensively explain the slow growth of mobile money market in developing countries, highlighting the significance of the five market separations proposed and tested in this study. The barriers created by a combination of (a) pre-existing inequalities spawned by social separations like age and gender, a financial separation like poverty, and a spatial separation like rural residency, and (b) a temporal separation

such as the ownership of a SIM card, a financial separation like the ownership of a bank account, and an information separation such as the awareness of mobile money services, partly explain why mobile money, a means to achieve financial inclusion for millions of poor in several developing countries, fails to keep its promise in India. Equal access to mobile money services does not result in their use by all the survey participants in this study, reinforcing the gap between haves and have-nots in India. This study also confirms that innovative applications of IT alone cannot necessarily reduce market separations as proposed by past research (e.g., Tarafdar et al., 2012), unless pre-existing inequalities and their causes are addressed.

Some of the limitations are as follows. This study relies on secondary data. The original survey questionnaire developed by InterMedia's FII Program did not focus on factors related to policy, the psychological status of mobile money services customers, and their interaction with financial service interfaces over mobile phones (i.e., human-computer interaction). Security, degree of personalization, and convenience of devices, among others, were also not part of the survey. The caste system, the social stratification of Hindu society, is unique to the Indian sociocultural context, limiting the outreach and impact of mobile money services in rural India. For instance, past studies (e.g., Potnis, 2016b) show that women from lower castes experience more barriers to using mobile phones than those from higher castes. Guérin et al. (2016) found that in several parts of rural India, agents from higher castes cannot visit to serve customers from lower castes and vice versa. Caste, a social separation variable, could have enriched our analysis of the use of mobile money services in India but the original survey questionnaire did not capture it.

Since human agents represent the prime touchpoint between mobile money services and their customers (Foster & Heeks, 2013), in the future it would be useful to

study the role of trust and relationship between the customers and the agents in shaping the uptake of mobile money services in India. As discussed earlier, certain policies and regulations create barriers to using mobile money services in the country. Most mobile money services require customers to visit a local mobile network operator branch to register their mobile phone number. The process of creating customers' four-digit personal identification numbers is different among financial institutions and sometimes requires customers to visit the bank branch (Chandan, 2016). It would be useful to study the effect of demonetization policies (Knowledge @ Wharton, 2017) on the use of mobile money services in India. In 2015, the government of India launched the most ambitious financial inclusion program in the world by opening bank accounts for over 111 million poor (Consultative Group to Assist the Poor, 2015). This initiative was in collaboration with the State Bank of India, the largest lending institution in the country, the Bill and Melinda Gates Foundation, and several international financial consulting firms. Since our study found that the ownership of a bank account is likely to increase the use mobile money services, it would be useful to examine the effect of the poor's access to banking on their use of mobile money services in the country.

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Table 1. Mobile technology for finance

#	Description of Sample Uses	Type of Service
1a	Conventional Mobile Banking: A facility extended by banks to their customers for carrying out financial transactions over mobile devices (Morawczynski & Pickens, 2009)	Mobile banking: A financial service extended to the bank customer using mobile technology
1b	Agent-led Mobile Banking: A combination of mobile devices (e.g., biometrics cards, personal digital assistants, near-field-communication, handheld printers, etc.) used by bank agents to serve the customer at their doorstep, or the customer visits the bank agent in their neighborhood to carry out financial transactions (Mohan & Potnis, 2015)	
2a	E-money Wallet: This account is accessible over mobile phones, which enable the customer to carry out financial transactions without any human assistance (Consultative Group to Assist the Poor, 2013)	Mobile money: A financial service over mobile devices, which does not require the customer to own a bank account
2b	Agent-led Over-the-Counter: A combination of mobile devices used by agents of mobile money service providers to serve the customer at their doorstep (Consultative Group to Assist the Poor, 2013)	

Table 2. Description of independent variables

#	Variable	Description	Value
Spatial Separation			
1	Area	Area of residence (Towns are, by definition, urban areas and make up 32 percent of the overall Indian population, according to the 2011 census data. Villages are, by definition, rural and make up 68 percent of the population (Intermedia, 2016))	1: Rural 2: Urban
Temporal Separation			
2	NumofMobile	Total number of mobiles in the household	Numeric
3	NumofAdults	Adults in household	Numeric
4	Owns_SIM	Owns a working SIM card	1: Yes 2: No
5	Owns_Mobile	Owns a mobile phone	1: Yes 2: No
Information Separation			
6	Awareness_MM	Awareness about mobile money	1: Yes 2: No
7	Education	A categorical variable for educational profile	1: Illiterate 2: Schooling up to 8th grade 3: 9-12 grade 4: Diploma 5: Bachelor's degree and above
8	Eng_Prof	A categorical variable representing proficiency in reading English	1: Cannot read at all 2: Very bad 3: Somewhat bad 4: Good 5: Excellent
Financial Separation			
9	Poverty_Score	A numeric score Low scores imply poorer	Numeric

			household
10	Work	Occupation as a proxy for income	1: Working full-time for a regular salary 2: Working part-time for a regular salary or Working occasionally, irregular pay, or Per season (e.g., only during the harvest season) 3: Self-employed, working for yourself 4: Housewife or stay-at-home husband, doing household chores 5: Full-time student 6: Not working but looking for a job, Not working because of retirement, or Not working because of sickness, disability, etc.
11	Owns_BankAccount	Owns a bank account	1: Yes 2: No
12	Owns_Account_MFI	Ownership of an account with any microfinance institution	1: Yes 2: No
13	Owns_Account_Postoffice	Ownership of an account with post office (for financial services)	1: Yes 2: No
14	Owns_Account_SaveLendGrp	Ownership of an account with savings or lending group	1: Yes 2: No
15	Owns_Account_GovtDigCard	Ownership of an account with government-sponsored digital ID card (for financial service)	1: Yes 2: No
16	Owns_Account_MoneyLender	Ownership of an account with any local moneylender	1: Yes 2: No
Social Separation			
17	Age	Age of the customer	Numeric
18	Gender	Gender of the customer	1: Male 2: Female

Table 3. Snapshot of mobile money market in India

#	Mobile Money Services	Key Features
1	Aircel Money	• Money transfer, recharge, payments, and withdraw money • Android app on Google • Customized prepaid plan • Pan-India service centers
2	Airtel Money	• Over 1.5 million outlets across 400,000 villages covering 87% of India • First mobile money service in India • Pay bill, recharge, add money using prepaid and postpaid services
3	Alpha Money	• Bill payment, prepaid recharge, person-to-person payments/money transfer, balance enquiry, cashless shopping, and person-to-merchant payment services • Account opening, cash deposit, and cash withdrawal at the location of agents
4	Beam Money	• Collaboration with the Indian Railways - allowing Beam customers to sell tickets • Advanced payment vouchers for purchasing goods and services from Beam • Beam Money Beta App over Google Android
5	EkoCounter	• Real-time money transfer dashboard for customers
6	Idea Mycash	• Basic financial services like cash deposit, withdrawal, and balance inquiry • No frill savings accounts • India's largest immediate payment service processor • Over one million small business customers • Human ATMs serving the customer at their doorstep
7	Money on Mobile	• Semi-closed payment system, enabling registered customers to buy goods, products and services from registered merchants • SMS-based financial transactions

8	MRupee	- Owned by MMP Mobi Wallet Payment Systems Ltd. - Safe and secure money transfer using one time code - No documents required for opening an account - Mobile number, name and address required for registration with agents
9	Oxicash	- Offers a prepaid credit card to customers - Aadhar card (i.e., electronic verification) as part of Know-Your-Customer policies
10	Samsung Pay Inc.	- Over 10 million businesses accept SamsungPay - Patented magnetic secure transmission technology turns in-store payment terminals into contactless readers - SamsungPay service for Samsung mobile device owners
11	State Bank Mobicash	- USSD-based mobile money transfer - No need of the Internet connection - Mini bank account statements - Asia Award for its innovative technology platform and best socio-economic business model - Prepaid recharge, bill payment, and bill management services
12	Suvidhaa money	- A network of over 80,000 franchise outlets 28 million customers across 2,800 cities 22,000 human ATMs
13	Vodafone M-Pesa	- Prepaid and postpaid money transfer services - Person-to-person and person-to-merchant money transfer - Modes of operation: Mobile app, website, USSD, M-Pesa interactive voice response call center, and agent outlets
14	Union Bank Money	- All financial services available online - Operates through mobile app and mobile site

Table 4. Relogit corrected estimates

Corrected logit estimates   Number of observations = 45,036

Use_MM	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf. Interval]	
Age	-.0368121	.010472	-3.52	0.000	-.057337	-.0162872
Area	.4062548	.178616	2.27	0.023	.0561735	.7563361
Gender	-.8310052	.261483	-3.18	0.001	-1.34350	-.3185075
NumofAdults	.0540457	.066950	0.81	0.420	-.077175	.1852664
NumofMobile	.1208509	.075341	1.60	0.109	-.026816	.2685183
Owns_Mobile	-1.210062	.757484	-1.60	0.110	-2.69470	.2745798
Owns_SIM	-.5628781	.235607	-2.39	0.017	-1.02465	-.1010967
Owns_BankAccount	-.5513834	.281245	-1.96	0.030	-1.10261	-.000153
Awareness_MM	-3.810306	.353094	-10.8	0.000	-4.50235	-3.118254
Poverty_Score	.0205925	.006666	3.09	0.002	.0075266	.0336584
Education_2	-.8908971	1.11672	-0.08	0.425	-3.07962	1.297835
Education_3	-.2609841	1.17342	-0.22	0.824	-2.56085	2.03889
Education_4	-.3296327	1.21322	-0.27	0.786	-2.70751	2.048247
Education_5	-.4635008	1.20622	-0.38	0.701	-2.82765	1.900654
Eng_Prof_2	.8846922	.561835	1.57	0.115	-.216484	1.985869
Eng_Prof_3	.4071048	.584188	0.70	0.486	-.737883	1.552094
Eng_Prof_4	.3578805	.584548	0.61	0.540	-.787814	1.503575
Eng_Prof_5	1.087297	.595992	1.82	0.068	-.080826	2.255421
Work_2	.2836661	.310048	0.91	0.360	-.324017	.8913496
Work_3	.0203777	.255515	0.08	0.936	-.480423	.5211789
Work_4	-.1282155	.369611	-0.35	0.729	-.852639	.5962086
Work_5	.0448224	.243747	0.18	0.854	-.432914	.5225589
Work_6	-.2775404	.346256	-0.80	0.423	-.956191	.4011102
Owns_Account_MFI	-.2729174	.525504	-0.52	0.604	-1.30288	.7570519
Owns_Account_Postoffice	-.5940886	.291792	-2.04	0.042	-1.16599	-.0221858
Owns_Account_SaveLendGrp	-.1339659	.480395	-0.28	0.780	-1.07552	.8075916
Owns_Account_GovtDigCard	-1.009646	.879029	-1.15	0.251	-2.732512	.7132189
Owns_Account_MoneyLender	.0379053	.415253	0.09	0.927	-.775977	.8517876
_cons	7.409451	2.56756	2.89	0.004	2.377111	12.44179

Table 5. Odds ratio

Variables	MMoney
Age	.96385723
Area	1.501185
Gender	.43561119
NumofAdults	1.0555328
NumofMobile	1.1284566
Owns_Mobile	.29817889
Owns_SIM	.56956744
Owns_BankA~t	.57615223
Awareness_MM	.0221414
Poverty_Sc~e	1.020806
Education_2	.41028752
Education_3	.77029318
Education_4	.71918787
Education_5	.62907752
Eng_Prof_2	2.4222388
Eng_Prof_3	1.5024616
Eng_Prof_4	1.4302947
Eng_Prof_5	2.9662458
Work_2	1.3279894
Work_3	1.0205867
Work_4	.87966376
Work_5	1.0458421
Work_6	.75764496

Owns_Accou~I	.76115566
Owns_Accou~e	.5520655
Owns_Accou~p	.87461988
Owns_Accou~d	.36434782
Owns_Accou~r	1.0386328
_cons	1651.5202

Table 6. Interpretation of odds ratio of significant variables

Variables	MMoney	Interpretation
Spatial Separation		
Area	1.501185	The reference category is rural (i.e., 1: Rural in Table 1). Hence, the likelihood of using mobile money services for someone living in the urban area is 1.5 times more than that of a rural resident. In other words, a resident of urban India is likely to use mobile money services by more than 50% than someone living in rural India.
Temporal Separation		
Owns_SIM	.56956744	The reference category is "owns a working SIM card." Hence, someone who does not own a SIM card is 43% less likely to use mobile money services.
Information Separation		
Awareness_MM	.0221414	The reference category is "awareness about mobile money." Hence, someone who is not aware about mobile money services is 98% less likely to use them.
Financial Separation		
Owns_BankA~t	.57615223	The reference category is "owns a bank account." Hence, someone who does not own a bank account is 43% less likely to use a mobile money service.
Owns_Accou~p	.87461988	The reference category is the "ownership of an account with post office (for financial services)." Hence, someone who does not own a post office account is 13% less likely to use mobile money services.
Poverty_Sc~e	1.020806	As mentioned in Table 1, low poverty score implies poorer household. Hence, as the poverty score increases by one unit, the likelihood of using mobile money services increases by 2%.
Social Separation		
Age	.96385723	As age increases by one year, the likelihood of someone using mobile money services decreases by 4%.
Gender	.43561119	The reference category is male. Hence, males are 43% more likely going to use mobile money services than females.