

A Decision Tree for Digital Financial Inclusion Policymaking

Stijn Claessens and Liliana Rojas-Suarez

Abstract

In recent years, a large number of countries have implemented policy changes to advance financial inclusion, especially by using digital financial services (DFS). However, results are mixed. While some countries are achieving impressive inclusion gains, others continue to fall short of expectations. How to properly diagnose the country-specific root causes of this shortfall and prioritize needed actions is a pressing question for policymakers in charge of designing and implementing financial inclusion strategies. Building on the Growth Diagnostic work by Hausmann and others, this paper provides an analytical framework (a decision tree) to identify country-specific constraints blocking progress with financial inclusion; that is, binding constraints. Using a deductive top-down approach and dividing constraints between supply and demand factors, the tree analyzes various potential causes (branches in the tree). To identify the most relevant constraints, the methodology calls for analysis of the markets for financial services (particularly DFS) using observed (or shadow) prices and quantities. For its benchmarking approach, it proposes a wide-ranging set of indicators, including aggregate and micro-level statistics as well as survey data to reflect providers' and consumers' perceptions. For ease of exposition and illustrative purposes, the discussion of the tree uses many country examples. Recognizing constraints differ by financial service, trees are presented for payments and transfers, store of value, and credit services.

Keywords: Financial inclusion, digital financial inclusion, financial regulation, financial system, decision tree, policy making

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Glossary¹

An asterisk indicates that the definition was taken or adapted from AFI (2016), Claessens and Rojas-Suarez (2016), GSMA's glossary,² or the Center for Financial Inclusion glossary.³

Agent.* Any third party acting on behalf of a bank, a financial institution, or a non-bank institution (including an E-Money issuer or other payment services provider) to deal directly with customers, under contractual agreement. The term “agent” is commonly used even if a principal-agent relationship does not exist under the regulatory framework in place.

Agent network.* A collection of independent business, such as retailers, with which a bank or other financial services provider contracts to serve as points of interaction with the provider's customers.

Anti-Money Laundering/Combating the Financing of Terrorism.* The term usually refers to the international standards on AML/CFT set up by the Financial Action Task Force (FATF), an intergovernmental body. While each country can choose how to adapt these international standards, in most countries, financial institutions are required to apply certain know-your-customer (KYC) regulations to all customers, strengthen internal controls, and watch for suspicious transactions. These regulations, while important, can sometimes create barriers to financial inclusion.

ATM card.* A plastic card that can be used with an ATM for deposits or withdrawal of funds in a bank account.

Bank-based model.* A digital financial services business model, in which (i) the customer has a contractual relationship with the bank, and (ii) the bank is licensed or otherwise permitted by the regulator to provide mobile financial services.

Bank-led model.* A digital financial services business model, bank-based or non-bank-based, in which the bank is the primary driver of the product or service, typically taking the lead in marketing, branding, and managing the customer relationship.

Biometric identification system.* A system that facilitates the identification of a person through biometric verification or by evaluating one or more distinguishing biological traits, such as fingerprints, hand geometry, earlobe geometry, retina and iris patterns, and voice waves.

Branchless banking.* The delivery of financial services outside conventional bank branches. Banking beyond branches uses agents or other third-party intermediaries as the

¹ For a Glossary with further terms, see <https://www.bis.org/cpmi/publ/d00b.htm?m=3%7C16%7C266>

² See <https://www.gsma.com/mobilefordevelopment/mobile-money/glossary/>

³ See <https://www.centerforfinancialinclusion.org/financial-inclusion-glossary>

primary point of contact with customers and relies on technologies such as card-reading point of sale (POS) terminals and mobile phones to transmit transaction details.

Cash-in, cash-out.* Transaction to convert a balance in a transaction account into cash, or incrementing a balance by paying in cash, often structured as a transfer between an agent's account and a customer's account, with the payer compensated in cash.

Chip card.* A plastic card in which is embedded a computer chip containing information about the cardholder's identity and account.

Customer due diligence.* Often used synonymously with know-your-customer (KYC) measures, CDD generally refers more broadly to the policies and procedures used by a financial services provider to obtain customer information and assess the risks of money laundering and terrorist financing posed by a customer, including detecting, monitoring, and reporting suspicious activities.

Digital financial inclusion.* The use and promotion of digital financial services (DFS) to advance financial inclusion.

Digital financial services (DFS).* The broad range of financial services accessed and delivered through digital channels, including payments, credit, savings, remittances, and insurance. The digital financial services (DFS) concept includes mobile financial services (MFS).

Digital financial service provider.* A mobile network operator or other nonbank entity that offers various financial services but only by electronic means, for example, using a mobile phone or the Internet.

Electronic money (e-money).* A record of funds or value available to consumers that is stored on a payments device, such as a chip, a prepaid card, or a mobile phone, or on a computer system as a nontraditional account with a banking or a nonbanking entity. E-money products can be further differentiated into network money, mobile money, electronic purse, and electronic wallet (e-wallet).

Electronic money float (e-money float).* The total outstanding value of e-money issued by an e-money issuer.

Electronic money account (e-money account).* An account held with an e-money issuer. In some jurisdictions, e-money accounts may have similar characteristics as conventional bank accounts but are treated differently under the regulatory framework due to the nature of their purpose (i.e., surrogate for cash, or stored value to facilitate transactional services).

Electronic money issuer (e-money issuer).* The entity that initially issues e-money against receipt of funds. Some countries only permit banks to issue e-money (see bank-based and bank-led models), while other countries permit non-banks to issue e-money (see non-bank-based and non-bank-led models).

Electronic payment (e-payment).* Any payment made through an electronic funds transfer.

Electronic wallet (e-wallet). An e-money product for which the record of funds is stored on a specific device, typically a chip on a card or in a mobile phone.

Financial education.* The provision of education on the use of financial services.

Financial institution account. Definition taken from Findex (2017): “includes respondents who report having an account at a bank or at another type of financial institution, such as a credit union, a microfinance institution, a cooperative, or the post office (if applicable), or having a debit card in their own name. It includes an additional 3.93 percent of respondents in 2017 who report receiving wages, government transfers, a public sector pension (included in 2017 data), or payments for agricultural products into a financial institution account in the past 12 months; paying utility bills or school fees from a financial institution account in the past 12 months; or receiving wages or government transfers into a card in the past 12 months”.

Financial literacy.* The ability to understand how to use financial products and services and how to manage personal, household, or micro-enterprise finances over time.

Fintech (or financial technology).* The use of technology and innovative business models in the provision of financial services.

Know Your Customer (KYC).* A set of due diligence measures undertaken by a financial institution, including policies and procedures, to identify a customer and the motivations behind their financial activities. KYC is a key component of AML/CFT regimes.

Interchange fee.* A fee charged by one provider of payment services to another—for example, the fee charged by a merchant’s bank (acquirer) to a cardholder’s bank (issuer) to compensate the issuer for the benefits that merchants receive when they accept electronic payments.

Interoperability.* A situation in which instruments belonging to a given scheme may be used in platforms developed by other schemes. Interoperability requires technical compatibility between systems, but it can take effect only when agreements have been concluded between the schemes concerned. In mobile money markets, interoperability implies the ability of users of one network to transact with users of another network, which can be achieved at different levels: at the customer level, at the agent level, or at the platform level.

Levelling the playing field. When rules and regulations (or the lack of) allow the development of fair competition between providers of the same or functionally equivalent services.

Mobile banking.* The use of a mobile phone to access banking services and execute financial transactions. This covers both transactional services, such as transferring funds, and non-transactional services, such as viewing financial information on a mobile phone.

Mobile financial services (MFS).* The use of a mobile phone to access financial services and execute financial transactions. This includes both transactional services, such as transferring funds to make a mobile payment, and non-transactional services, such as viewing financial information.

Mobile money.* A type of electronic money (e-money) that is transferred electronically using mobile networks and SIM-enabled devices, primarily mobile phones.

Mobile network operator (MNO).* A company that has a government-issued license to provide telecommunications services through mobile devices. An MNO is also known as a telco.

Mobile payment.* An e-payment made through a mobile phone, tablet, or phablet.

Non-bank financial institution.* An institution, different from a bank, that is allowed to provide certain financial services by virtue of the regulatory framework in place.

Risk-based approach.* The method for complying with AML/CFT standards based on the general principle that, where there are higher risks, countries should require digital financial services providers to take enhanced measures to manage and mitigate those risks. Where risks are lower, and there is no suspicion of money laundering or terrorist financing activities, simplified measures may be permitted.

Payment.* The transfer of an item of value from one party (such as a person or company) to another in exchange for the provision of goods, services, or both, and to fulfill a legal obligation.

Payment services provider.* An entity that provides services enabling funds to be deposited and withdrawn from an account; payment transactions involving transfers of funds; the issuance and/or acquisition of payment instruments such as checks, e-money, credit cards and debit cards; and remittances and other services central to the transfer of funds.

Point of sale (POS). * The time and place at which a retail transaction is completed by the customer making a payment to the merchant, using traditional or digital means, in exchange for goods or services.

SIM card.* The removable chip within a smartphone or similar device that contains information about the phone, the user's identity, and possibly financial and other information.

Store-of-value instrument.* An account such as a deposit account, or an account on a device such as a magnetic card, that contains negotiable monetary value for a period longer than is necessary to complete a transaction.

Subscriber.* Role carried out by a company (usually represented by an administrator) or a person (or a group), which pays for the services offered by the operator.

Third-party provider.* Agents and others acting on behalf of a DFS provider, whether pursuant to a services agreement, joint venture agreement, or other contractual arrangement.

Unbanked.* Customers, usually the very poor, who do not have a bank account or a transaction account at a formal financial institution.

Abbreviations

AML/CFT	Anti-money laundering/combating the financing of terrorism
ATM	Automatic teller machine
BCBS	Basel Committee on Banking Supervision
CGAP	Consultative Group to Assist the Poor
CNBV	Comisión Nacional Bancaria y de Valores
CPMI	Committee on Payments and Market Infrastructure
DPCS	Digital provision of credit services
DSP	Digital service provider (non-banks)
EMDEs	Emerging market and developing economies
FATF	Financial Action Task Force
FII	Financial Inclusion Insights Program
FSB	Financial Stability Board
FTT	Financial transaction tax
GPFI	Global Partnership for Financial Inclusion
GSMA	GSM Association
ICT	Information and communications technology
ID4D	Identification for Development
IFC	International Finance Corporation
ILO	International Labor Organization
IPA	Innovations for Poverty Action
ITU	International Telecommunication Union
KYC	Know your customer
MNO	Mobile network operator
NFIS	National financial inclusion strategies

POS	Point of sale
RCT	Randomized controlled trial
SIM	Subscriber identity module
SMEs	Small and medium-sized enterprises
VAT	Value added tax

Also, note that ISO3 country codes are used as abbreviations in the graphs.

I. Introduction

Over the last decade, efforts to improve financial inclusion have greatly increased, driven by two important factors. First, there has been a greater realization that financial inclusion increases the poor's well-being; this has led to national and global initiatives, such as the Maya Declaration,⁴ under which a large number of emerging markets and developing economies (EMDEs) are making public quantifiable financial inclusion commitments. Second, the digital revolution has spurred the emergence of new business models that can financially include poor populations profitably. Progress has manifested itself in significant increases in the percentage of adult populations with access to financial services. However, advances remain uneven and many people still lack access. This is clear from the World Bank Global Findex Report (2017): for a number of countries, indicators of financial inclusion show only very small improvements in recent years; for some, inclusion has actually worsened. Most importantly, for most countries, the benefits from digital financial technologies are far from being fully exploited.

There are principles and guidelines on how to design a regulatory framework that can improve financial inclusion, including those set out by the G-20 (2010); Basel Committee on Banking Supervision (2016); the Committee on Payments and Market Infrastructure (2016); Global Partnership for Financial Inclusion (2016, 2018); and Claessens and Rojas-Suarez (2016). Although these efforts show a consensus about the general principles, by their very nature, general guides are not tailored to the specific circumstances of individual countries. The exact design, prioritization, and sequencing of reforms are left to the authorities' discretion.

Around the world, there is large demand from policymakers and their advisors for tools to support country-specific diagnosis of the constraints to financial inclusion, especially using digital means. While there is no shortage of studies identifying obstacles to inclusion, policymakers currently lack a tool to systematically prioritize their actions and assess whether a specific policy or reform that achieved success elsewhere could have similar results in their own country. A tool is needed that supports the formulation of financial inclusion strategies tailored to the unique circumstances of each individual country. Country characteristics—market structure, economic, regulatory, institutional, geographical, and demographic, among others—differ significantly. A binding constraint in one country might therefore not bind in another. Without such a framework, policymakers may not correctly identify the key factors—regulatory, infrastructure, or market-determined—that impede rapid improvements in financial inclusion, especially digital. Weaknesses in existing frameworks may remain unidentified, or policymakers may focus on constraints that are non-binding, that is, those that will not deliver significant improvements unless first-order impediments are addressed first.

This paper fills this vacuum by constructing a simple, yet comprehensive analytical framework based on sound economic principles that can serve as a valuable decision-making

⁴ See, AFI (2018a).

tool for authorities tasked with improving financial inclusion, especially through digital means. The framework, which we call *A Decision Tree for Digital Financial Inclusion Policymaking* (“tree” for short), is designed to help identify constraints to inclusion that are binding. To achieve this, the framework divides constraints (branches of the tree) into those affecting the providers of financial services (the supply side of the tree) and those affecting the customers of those services (the demand side of the tree), though it is recognized that some constraints affect both sides of the tree. The methodology shows how evaluating a financial service in terms of its observed (or shadow) price and its usage (quantity) can help identify whether the most important constraints are on the supply or the demand side. To further assess alternative supply or demand constraints, the methodology suggests benchmarking with a wide-ranging set of indicators, including aggregate and micro-level statistics as well as survey data to reflect providers’ and consumers’ perceptions. Through a process of eliminating alternative constraints based on the evidence, country-specific analysis can identify which one or more constraints are truly binding obstacles.

To help navigate the tree, country examples are used throughout the paper. These examples, however, are for illustrative purposes only. In addition, graphs using cross-country comparisons are never intended to prove a causal relationship between the variable under consideration and financial inclusion (all else given). As reiterated in the paper, conclusions can only be reached after a thorough analysis of the individual country under study.

In developing the framework of the tree, we make extensive use of the existing literature, reports, and datasets that directly or indirectly deal with digital financial inclusion. The paper also builds upon previous work on the subject, particularly Claessens and Rojas-Suarez (2016). The data sources used to illustrate ways to assess constraints under the methodology are listed at the end of the paper.

The rest of the paper is organized as follows: section II presents the general framework of the tree and describes the methodology used to assess which of the branches in the tree may bind. Since constraints may differ for different financial services, sections III to V present the methodology as applied to three services, all with an emphasis on digital provision. Payment services are discussed in section III, store-of-value services in section IV, and credit services in section V. Since many of the same constraints may affect all three services discussed in these sections, the paper tries to avoid unnecessary repetition. Thus, the first section, on payments services, is the most extensive and includes analyses for the most possible constraints. The constraints also applicable for the store-of-value and credit trees are not discussed again in the next sections; instead, only additional constraints specific to the provision and use of these services are presented. To limit the length of an already extensive document, the paper does not discuss the application of the decision tree to other types of services relevant to financial inclusion, such as insurance services. Section VI concludes the paper.

II. The Framework

Conceptually, the decision tree, follows a modified version of the growth diagnostic methodology first proposed by Hausmann, Rodrick and Velasco (2005) and expanded in

Hausmann et al. (2008). The authors used their methodology to address policymakers' interest in identifying the constraints to economic growth. Starting from a basic model that establishes the fundamental determinants of growth, the authors asked which of these determinants is the most relevant for each individual country. Specifically, among all possible determinants, which is the binding constraint? By answering this question, they hoped that policymakers would focus their actions and allocate their limited resources on those reforms that stand the best chance of helping achieve their growth objectives.

The methodology in this paper is called a decision tree because of its top-down approach to understanding the importance of relative constraints. It starts from documenting a very aggregate outcome (low economic growth in Hausmann et al. (2008), low financial inclusion here) and then turns to its potential causes (the upper branches of the tree). Each of the potential causes, in turn, can be explained by additional causes (the next set of branches), and so on—hence the resemblance to a tree. The analysis seeks to assess what (set of) branches is the most relevant for the country under study and to descend the branches to find the binding root of the problem.

Like in Hausmann et al. (2008), the value in using the decision tree methodology is in identifying the most pressing country-specific characteristics that constrain improvements in financial inclusion, especially digital. By not relying on cross-country econometric exercises, the decision tree methodology avoids the usual problems associated with assuming linear relationships and separability between the explanatory variables (constraints) that are present in typical cross-country regressions. It also reduces problems with parameter estimations in the presence of data limitations. Rather, the decision tree methodology treats financial inclusion constraints as complements (relaxing one constraint can help to relax another one) rather than as substitutes.⁵

By definition, concerns about financial inclusion indicate a perception that the provision and use of financial services is inadequate for some segments of the population. Because of important differences in the nature and risk characteristics of each financial service, and because of the multiple constraints affecting each market for these services, existing theoretical models tend to focus on a specific service, and sometimes on a specific constraint (market friction) affecting the service.⁶ We borrow from the abundant literature on financial inclusion to identify and classify the factors that could result in an inadequate supply of or demand for a service as follows:

⁵ A possible alternative is the use of nonlinear programming methods, including machine learning techniques. Further research is needed to analyze the value of these techniques for the purpose of identifying binding constraints to financial inclusion.

⁶ For example, when dealing with credit, Greenwood and Jovanovic (1990) analyzed the effects of transaction costs, while Stiglitz and Weiss (1981) developed a model to explain how the presence of moral hazard and adverse selection problems can explain credit rationing, which predicts nonlinear effects. More recently, Dabla-Norris et al. (2020) developed a general equilibrium model to explain the behavior of credit under three financial market constraints: borrowers' costs to enter the market, collateral constraints, and financial intermediation cost. Again, nonlinear effects can result.

- financial market imperfections (e.g., lack of competition and information asymmetries)
- coordination failures (a bad equilibrium—there is low supply because suppliers of complementary services do not coordinate, or there is insufficient exploitation of positive network effects, e.g., due to not meeting a minimum market size to take advantage of economies of scale for providers and/or positive externalities for consumers)
- distorted regulations and other government failures (e.g., distortionary taxes)
- high transaction costs resulting from, among others, adverse socioeconomic or institutional characteristics

If the framework suggests that none of these types of obstacles are present, then the actual usage of financial services would reflect the needs of all segments of the population; that is, there would be an adequate provision of financial services.

Since available data reflect actual behavior of suppliers and users of financial services rather than the desired level of financial services, the challenge is how to use the data to identify whether or not each of these types of obstacles is a constraint for financial inclusion.

1. The Decision Tree in a Nutshell

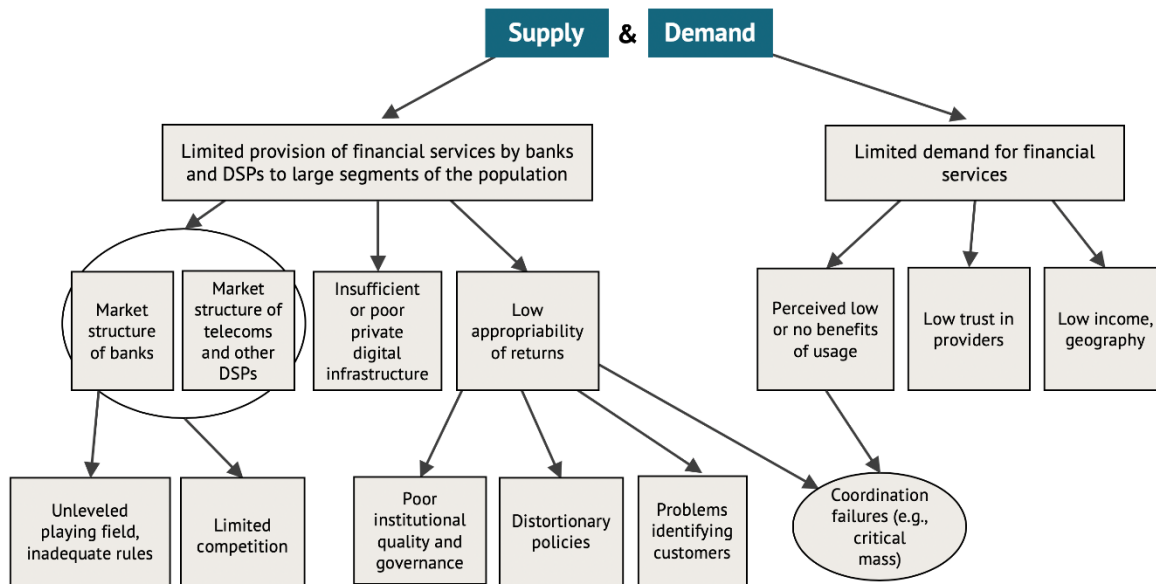
Figure II.1 provides a summary picture of the decision tree. The branches shown are relevant for all digital financial services. The complete trees for the three specific financial products, including the relationships among branches, are presented in sections III through V.

Following basic economic analysis, the tree starts with the assumption that actual usage of financial services, including digital, is determined by both supply and demand factors.⁷ Based on the existing theoretical and empirical literature on the subject,⁸ three factors (top branches in the tree) are identified that could constrain the supply of digital financial services by banks or other digital service providers (DSPs) to large segments of the population: constraints related to the market structure of the providers, insufficient provision of private digital infrastructure, and problems in appropriating returns from the provision of financial services.

⁷ Beck and de la Torre (2006) also analyze the problem of insufficient financial inclusion in terms of supply and demand constraints.

⁸ It could be argued that the *generic* decision tree presented in Figure II.1, as well as the trees for specific financial services presented in sections III to V, may not include all possible causes (branches) of inadequate financial inclusion. Although in designing the trees we have undertaken a comprehensive review of the literature (theoretical and empirical) on the subject, we recognize this limitation. In addition, there are variations in the financial services provided across countries. For example, the nuances of Islamic finance are not taken into account in the tree for credit services.

Figure II.1. Determinants of inadequate financial inclusion using digital services



We follow the FSB (2019) to define market structure as “the interrelation of companies in a market that impacts their behavior and their ability to make profits. Market structure is characterized by such factors as the number and size of market participants, barriers to entry and exit, and accessibility of information and technologies to all participants.” Two major determinants (branches) of market structure are, therefore, the degree of competition between providers and the rules under which these providers operate.

First, limited competition between providers can not only reduce the efficiency of the delivery of the service, but also discourage financial inclusion. By constraining the entry of new players, limited competition disincentivizes the industry’s efforts to identify the needs of the underserved, which may differ from those of the currently served. Second, market structure is affected by the legal and regulatory treatment of alternative providers. A playing field that is unlevel means a regulatory environment in which functionally equivalent financial services are not treated equally, and where the restrictiveness of regulation for different providers is not commensurate to the risk that the activities of the financial providers pose to consumers and to the overall financial system.

Regarding insufficient provision of private digital infrastructure, two major reasons could explain this outcome: either provision is not sufficiently profitable for the private sector given the degree of competition, or the barriers—either imposed by the public sector or due to the market characteristics of the digital infrastructure industry—are too high. These are the type of second-tier branches that are discussed in section III.

The third major branch on the supply-side of the tree is low appropriability of returns. It reflects that even if the social return from offering digital financial services is high, the

private sector encounters problems in appropriating these returns. There are four potential reasons for this outcome and, therefore, four second-tier branches:

1. *Poor institutional quality and governance* lead to concerns about appropriation of the private sector's returns, thereby hindering the entry of new providers and the scope of financial services offered.
2. *Distortionary policies*, such as taxes on payment services, reduce the net profits to providers, discouraging supply.
3. *Problems identifying consumers* for the purpose of satisfying internal (to the provider) and government-imposed know-your-customer and other requirements can limit the provision of the service, including digital, to poorer segments of the population, especially those in the informal sector.
4. *Coordination failures*, especially when a lack of a critical mass of customers does not allow providers to reach the economies of scale necessary to make a digital financial service profitable, is likely extremely important for digital financial inclusion. In this case, demand and supply constraints interact and a low uptake (low demand) becomes a supply constraint. Box II.1 exemplifies this coordination issue for mobile payment platforms.

Box II.1. Coordination failures between suppliers and consumers of digital payment services

As discussed by Bourreau and Valletti (2015), in mobile payment platforms there are interactions between the demand and the supply sides. The higher the number of potential recipients for money transfers (other consumers, merchants) or the higher the number of agents, the higher the benefits for a given consumer to join the platform. Conversely, the more consumers adopt the mobile payment system, the higher the incentives for merchants, potential recipients, and agents to join. Because of this two-sided nature, mobile payment platforms exhibit barriers to adoption on both sides. If the users on one side of the platform (say, merchants) do not expect the users on the other side (say, consumers) to join, the platform will be unable to attract many users. Similar barriers to adoption exist on the supply side of mobile payment platforms. Because of the sunk costs of infrastructure, mobile payment and mobile money systems are characterized by economies of scale, meaning the platform must reach a large enough scale to be able to offer affordable services to users. To be successful and to overcome this “chicken-and-egg” problem, an externality, it is critical that the platform convinces at least one side of the market to join.

Turning to branches on the demand side, theory and evidence suggest at least three factors can constrain the demand for any type of digital financial services. First, customers perceive low or no benefits from using the product. As explained in the box above, this could reflect a coordination failure affecting demand and supply (a chicken-and-egg problem). Low demand for a digital financial service restricts the efficient provision of that service (given the presence of economies of scale). At the same time, insufficient provision of the service—for example, in the form of a small network of providers (say, DSP agents)—reduces the perceived benefits for consumers of signing up to the service.

Second, low demand can reflect lack of trust in the financial service providers, which can arise from past fraud or lack of customer security.

Third, the social and geographical characteristics of important segments of the population, such as large populations with very low income and/or located far from the service providers (including agents' networks), can translate into high transaction costs and result in low demand for the service.

These potential supply and demand constraints are further discussed in the next sections of the paper, which provide decision trees for specific digital financial products.

2. Searching for Binding Constraints: The Role of Indicators

How can we tell whether supply or demand constraints dominate? How can we identify which constraints are binding? To answer these questions, the paper advances an approach and indicators to assess the importance of alternative constraints. The discussion of the specific questions and indicators, and the use of examples to guide the analysis, constitute the bulk of the paper. It builds on the two central principles for evaluating constraints suggested by Hausmann et al. (2008).⁹

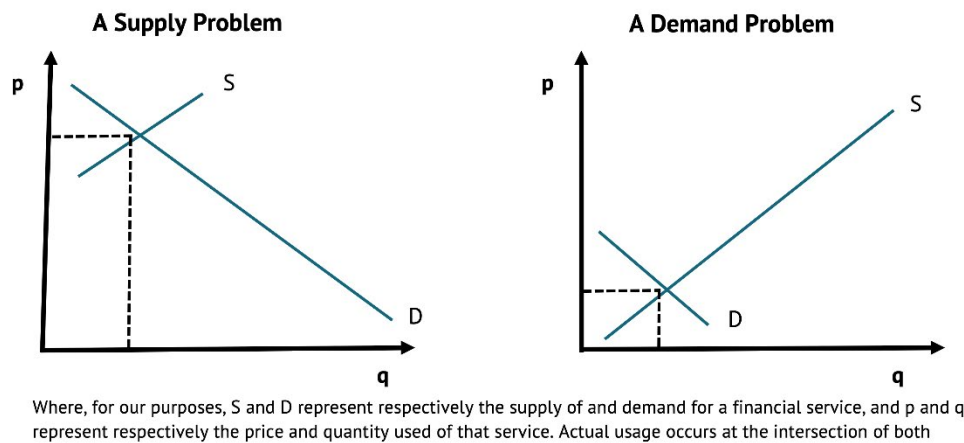
a. Prices of Financial Services Can Distinguish Supply Versus Demand Constraints

Following Hausmann et al. (2008), the basic way to distinguish between demand and supply constraints is to examine the market (or shadow) price of the service analyzed. Quantities, such as the number of adults with access to a service, help analysts and policymakers to establish the presence (or not) of a problem. They do not, however, provide sufficient information to determine whether the problem is related to obstacles in the provision of the service (supply constraints) or in obstacles preventing consumers from acquiring the service (demand constraints). In other words, low quantities indicate low usage of a given financial service but can be consistent with either low supply or low demand.

⁹ There are two additional principles discussed in Hausmann et al. (2008) to help identify binding constraints. First, if a constraint is binding, users of financial services affected by the constraint might attempt to bypass it. For example, as discussed in section V, a situation where creditors in the formal sector do not offer credit to certain borrowers, even if the latter offer to pay high interest rates, might lead rationed borrowers to seek credit in the informal markets. In this situation, the lending interest rate in the formal market may be low, but that rate is irrelevant to the excluded borrowers; the relevant shadow price is the rate charged in informal credit markets. Thailand is a case in point: although the formal market's real lending rate is low (relative to the majority of EMDEs), indicators of rationing in the formal market combine with a significant presence of money/pay lenders, especially in rural Thailand, charging very high rates. This signals that the factors leading to credit rationing in the formal market might play a role in identifying the binding constraints for specific segments of the population in Thailand, including rural. Second, if a constraint is binding for some segments of the population, those agents or sectors that are less affected by the constraint are also more likely to thrive. For example, in countries where institutional quality and governance is low and financial and regulatory supervision is weak, access to financial services depends on factors other than those driving the sound conduct of businesses, such as political connections. If so, one should observe that those with privilege to access do better than what is expected given their capacities.

One can relate the low usage of a financial service with constraints on the supply side if the price of the financial service (shadow or market price) is very high relative to either a similar service or the (properly adjusted) customary price charged in other countries with similar financial development. Likewise, the low usage of a financial service can be related to constraints arising from the demand side if the price of the service is low, as it signals that suppliers can only charge a low price because demand for their service is low. Figure II.2, replicated from Hausmann et al. (2008), illustrates this.¹⁰

Figure II.2. Distinguishing between supply and demand problems



Source: Hausmann et al. (2008)

As an example, consider a country where the use of digital payment services is very low. Very high fees and commissions charged for this service would signal supply-side constraints; that is, providers of payment services are only willing to offer small amounts of the service and at a high price. As discussed in section III, a number of reasons could explain this outcome (branches of the tree on the supply side), including monopoly powers or problems with appropriating the net returns from providing the service. On the other hand, if the low usage of payments services is associated with a low price for obtaining the service (low fees and commissions), then the price and quantity combination signals low demand: the aggregate amount of payments services demanded is low and clients are only willing to

¹⁰ Sometimes there is confusion between a *shift* of the demand or supply curves and a movement *along the curve(s)*. For example, facing high prices and low quantities of a service, one might conclude that the problem is on the demand side because consumers would demand more at lower prices. While it is, generally, correct to assert that demand would increase if the price were to decrease, it is important to notice that such *movement along the demand curve* will only occur if there is a *shift* to the right of the supply curve. Thus, the constraint is on the supply side as indicated in the graph on the left.

satisfy that demand if the price for the service is low. Again, several factors (branches of the tree) can explain a low demand.

b. An Additional Signal of a Binding Constraint Is If Its Relaxation Produces Significant Improvements in Financial Inclusion

A clear indication that a constraint is binding is if relaxing it results in a significant increase in the use of the service. Take a country where the use of credit services by small firms is low and the analysis leads to the preliminary conclusion that the binding constraint arises from the supply side. Say the authorities have embarked on a major effort to complement the provision of digital infrastructure, including by extending guarantees to the private sector, to help close the gap between existing digital infrastructure and that required for the provision of credit by digital means. Are these efforts leading to an increase in credit to small firms? One obvious way to verify that infrastructure shortages were not the binding constraint is that the removal of these obstacles did not lead providers to significantly expand their credit services (over a relevant period). If so, the analysis would need to continue searching among other alternative plausible causes, such as competition and unlevel playing field problems.

Ghana provides a real-world example. In 2013, the authorities enacted a law allowing MNOs and other DSPs to offer electronic money, leveling the playing field between traditional and new players. Following the regulation, a sharp and sustained increase in the provision of mobile money services ensued. Thus, one cannot rule out that the lack of an inclusive e-money regulation might have been a binding constraint in Ghana, at least up to 2013. As discussed below, other countries enacting e-money laws have not seen the same result, signaling that obstacles, other than lack of e-money regulations, might be the binding constraints.

3. Additional Issues When Navigating the Tree

There are four additional issues to consider when navigating the decision tree, as will be evident from the discussion of specific financial services.

First, removing a nonbinding constraint might be necessary to help to expose the truly binding constraints. Continuing with the example above, in countries where the provision of mobile money was initially not allowed by law, enacting a law could remove a constraint. But its removal might not solve the inclusion problem; instead it might expose other constraints that are truly binding, like the absence of a critical mass of willing users of the new product needed to allow providers' business models to become viable (coordination problems). These truly binding constraints can sometimes be identified in advance (say, before the enactment of an e-mobile law) by using the indicators suggested here and others that the analyst may propose for the specific country.

Conversely, removing a binding constraint may help to ease another one. For example, resolving the constraint of perceived low benefits from using digital payment services might allow for an increase in the uptake of these products, generating the critical mass necessary

to attract additional supply of the product. In that case, the constraint of low appropriability of returns could also be eased.

Second, binding constraints can, and usually do, change over time. Throughout the paper, we show examples of variables that acted as binding constraints for a particular period. But these constraints change over time. The case of Uganda, where the imposition of taxes on mobile money transactions drastically reduced the value of mobile money transactions until the tax was reversed, is a case in point.

Third, several of the branches of the tree are interrelated, and sometimes, analyzing one requires analyzing another. Thus, separately analyzing each branch involves a certain degree of arbitrariness, done here for the purpose of simplicity and to help the analyst navigate the tree. Some interrelations between some branches are obvious, as when discussing coordination failures, but that is not the only case. Along the same lines, some branches might affect both the demand and supply sides of the tree. For example, very low population density, which might involve high transaction costs for a group of customers to reach providers (a demand-side constraint), can also result in high costs for the provision of private digital infrastructure (a supply-side constraint).

Fourth, and extremely important, to reach definite conclusions about the identification of binding constraints, an in-depth case study of the country is necessary. Country-specific characteristics can require the use of additional indicators to those suggested here. Moreover, since reaching conclusions relies on a process of excluding alternative obstacles, no single indicator or test suffices to discriminate among potential binding constraints. It is the job of the analyst to exploit all available information in her/his assessment of constraints.

As previously mentioned, the tree presented above is a general one, in the sense that it applies to the entire spectrum of digital financial services. However, different financial services have additional branches. We now turn to the discussions of the trees for payments, store of value, and credit services respectively.

III. Payment Services

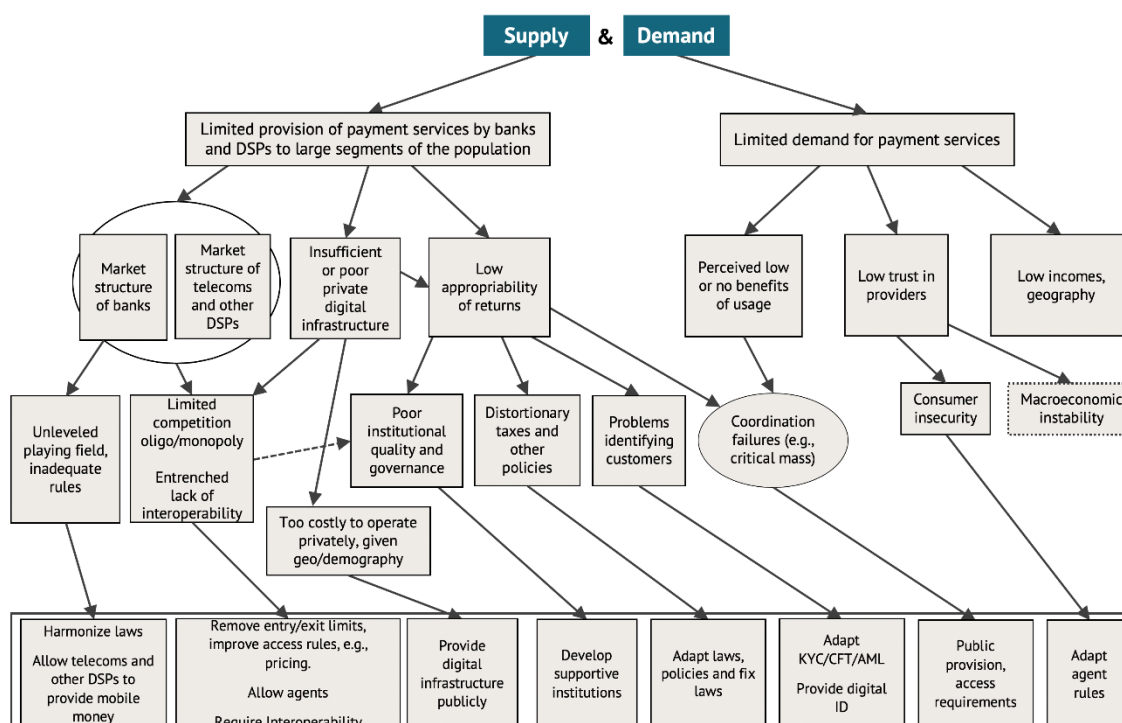
1. The Tree for Payment Services

Figure III.1 presents the decision tree for digital payment and transfer services. Most of the tree resembles that of Figure II.1. The bottom boxes in the tree below present possible regulatory solutions for dealing with identified binding constraints. They are presented for illustrative purposes only and are not discussed in this paper, which focuses on diagnosis, not recommendations. This is also the case for the decision trees presented in sections IV and V.

This section guides the analyst in navigating the payment services tree. It identifies indicators to assess whether a potential constraint is present in the country under study, and whether that constraint is binding. Ample data and country examples are provided to further guide analysis. These are illustrative only. In particular, graphs in the paper are never intended to

prove a causality relationship between the variable under consideration and financial inclusion (all else given). As discussed, an in-depth country-specific analysis is necessary to accurately identify binding constraints. The section first deals with supply-side constraints and then turns to constraints on the demand side.

Figure III.1. Determinants of inadequate financial inclusion using digital payment/transfer services and regulatory solutions



2. Indicators Signaling Supply-Side Constraints

At the most general level, a low usage of digital payments and transfers services may result from constraints on the supply side (i.e., faced by providers) if the price paid (fees and commissions) for using these services is very high.

Because there is a variety of formal providers of digital payment services, the analyst needs information on prices charged by diverse types of providers. Since the specific set of providers varies across countries, we assume here for simplicity that there are two types of providers: banks and non-bank digital service providers (DSPs), where the latter is assumed to include mobile network operators (MNOs) and other digital service suppliers. In addition, charges for the provision of payment services arise for two groups of participants: fees and charges charged to consumers for the use of the service (such as for the use of ATMs or for making transfers using DSPs' and/or banks' agents' networks), and interchange fees charged to retailers and other intermediaries for the use of payment systems (card switch fees, for

example) and networks (ATM, POS, and mobile networks, for example). Table III.1 provides examples of the different prices charged by banks and DSPs.

Table III.1. Examples of fees and commissions charged by banks and DSPs

	Banks	DSP
Consumers	ATM fees, payments and transfer charges, fees charged by banking correspondents	Fees for making mobile payments and transfers
Retailers and other intermediaries	Interchange fees for the use of card switches, ATMs, POS, etc.	Interchange fees for the use of mobile networks

In the case of banks, indicators that can help to identify the presence of a high price charged for the provision of payments and transfers include:

- Fees for using ATM cards (percent of US\$100 dollars or percentage of minimum wage or GNI per capita)
- Fees charged to retailers using POS and other established digital networks
- Cost to transfer funds domestically (percentage of US\$ 100 or percentage of minimum wage or GNI per capita)
 - Using a branch
 - By digital means (through the internet or mobile banking)
- Cost to transfer funds internationally (percentage of US \$100 or percentage of minimum wage or GNI per capita)
 - Using a branch
 - By digital means (through the internet or mobile banking)
- Fee charged by a banking correspondent for the provision of payments (making a payment using a debit card, invoice payments, collection services and payment orders, including government benefits and pension receipts, as well as pre-paid cellphone cards and smart cards).¹¹ (As percentage of US \$100 or percentage of minimum wage or percentage of GNI per capita)
- Fees charged by a banking correspondent for making transfers (which might involve three types of fees: deposit, transfer, and withdrawal of funds); (percentage of US \$100 or percentage of minimum wage or percentage of GNI per capita)

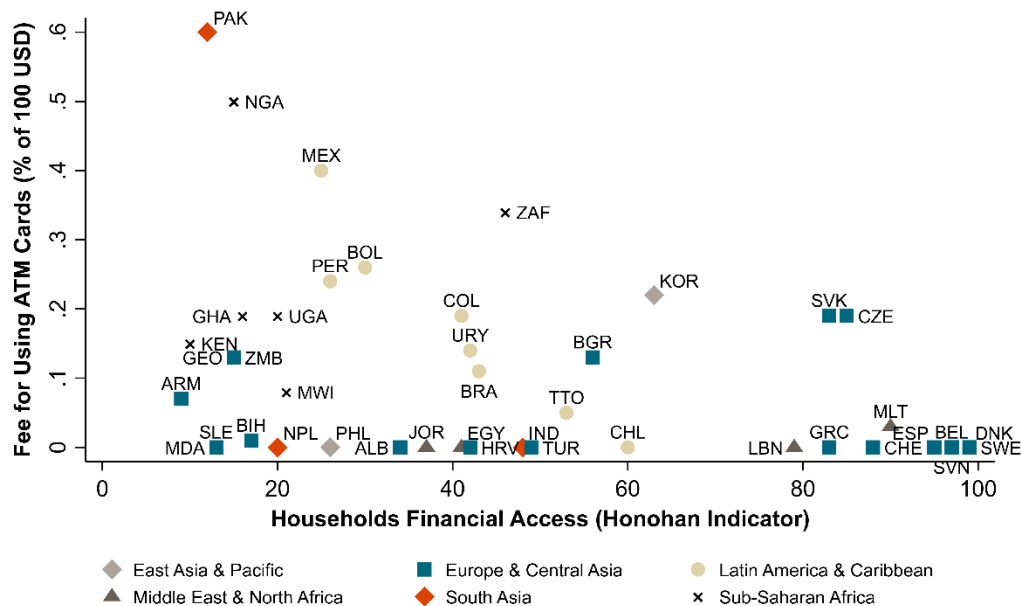
¹¹ In a number of countries, correspondents are remunerated on a fee-for-service basis, deducted, in turn, from the fee charged to the ultimate client. For every new client or every transaction made, or every product sold, the correspondent receives a fee—see the case of Brazil in Kumar et al. (2006).

For DSPs (including MNOs), indicators signaling a high price charged for the provision of payments and transfers include:

- Fees charged by DSPs' agents for payment services (percentage of US \$100 or percentage of minimum wage or percentage of GNI per capita)
- Fees charge by DSPs for making transfers (percentage of US \$100 or percentage of minimum wage or percentage of GNI per capita)

Figure III. 2 shows the cross-country relationship between ATM fees charged by banks (as percent of US \$100) and an indicator of households' access to financial services. The sample includes 62 EMDEs. The data for ATM fees is from 2006 (from Beck et al. (2008), to our knowledge, the most recent publicly available data set). Data on fees and other costs charged by banks across countries are extremely scarce, in part because the variation in characteristics and quality of services offered across countries is quite large (Beck et al. (2008) notes that products offered are not standardized). This reaffirms the need for specific country analysis. Because Findex data, for the proportion of the population who use financial services, is only available since 2011, Figure III. 2 uses an earlier indicator proposed by Honohan (2008) as the measurement of financial inclusion.¹²

Figure III.2. ATMs fees and household financial access, 2006



Sources: Honohan (2008) and Beck, Demirguc-Kunt, and Martinez Peria (2008)

¹² The estimates were constructed by combining information on banking and microfinance institutions account numbers (with banking depth and GDP data) with estimates from household surveys.

As shown in Figure III.2, in 2006, banks in Pakistan, Nigeria, and Mexico charged the highest ATM fees among countries in the sample. These countries also had low financial inclusion, indicating that supply constraints might have been binding in the provision of payment services in these three countries. This contrasts with countries such as the Philippines and Nepal, where, although the financial inclusion indicator was also very low in 2006, banks did not charge any ATM fees. Thus, any supply constraints in the Philippines and Nepal did not come from high ATM fees.

This is, of course, only one (dated) indicator. To the extent possible, it is desirable to collect and analyze the most recent information on as many of the fees and commissions as possible. Some or all of these fees may be very high relative to those charged for other financial services in the country, or relative to (properly adjusted) fees in countries with similar degrees of development or similar practices for offering payments services. The analyst can then seek more proof that the binding constraint is on the supply side by taking two steps. First, the analyst can assess whether the indicators on the demand side, discussed below, can be discarded as binding constraints. Second, if data are available, the analyst can check whether decreases (or increases) in one or more of the indicators in the past have produced significant increases (or decreases) in the provision of payment services. A positive answer would be consistent with these constraints being potentially binding.

It is important to assess the two types of providers we are considering (banks and DSPs) separately; the fees and other costs charged by one may be adequate, while those charged by the other may be high. It is also possible that a supply constraint will be revealed for both types of providers.

Annex 1 highlights the importance of incorporating country-specific characteristics when assessing the presence of binding constraints by briefly discussing different pricing practices for mobile money services among providers. The main message is that simply comparing published payments and transfer fees between countries or even between providers within a given country might not deliver enough information to assess the final cost faced by the consumer.

It is also important to know whether DSPs can offer payment services *only* in partnership with banks. If this is the case, the analyst should look at the regulations constraining DSPs' activities (by jumping to the "level the playing field" branch of the tree) since these regulations could explain the lack of activity by MNOs as providers of payment services in a given country.

If the analyst finds that the problem of low usage of digital payments services comes from the supply side (either from one or both types of providers), the next task is to determine the reasons for this outcome. For both banks and MNOs, there are three potential reasons: (a) there is insufficient private provision of digital infrastructure; or, even if adequate infrastructure is in place, (b) there are factors related to the market structure of the providers (such as the degree of competition), and/or (c) problems with appropriability of the returns generated from offering payment services.

a. Indicators of Low Private Provision of Digital Infrastructure

Digital infrastructure is a central input for the provision of digital financial services. Suppliers of digital infrastructure are multiple, and services can take many forms, running from provision of internet and mobile services to provision of POS systems (hardware and software). Countries' degree of provision is reflected in quantities and prices:

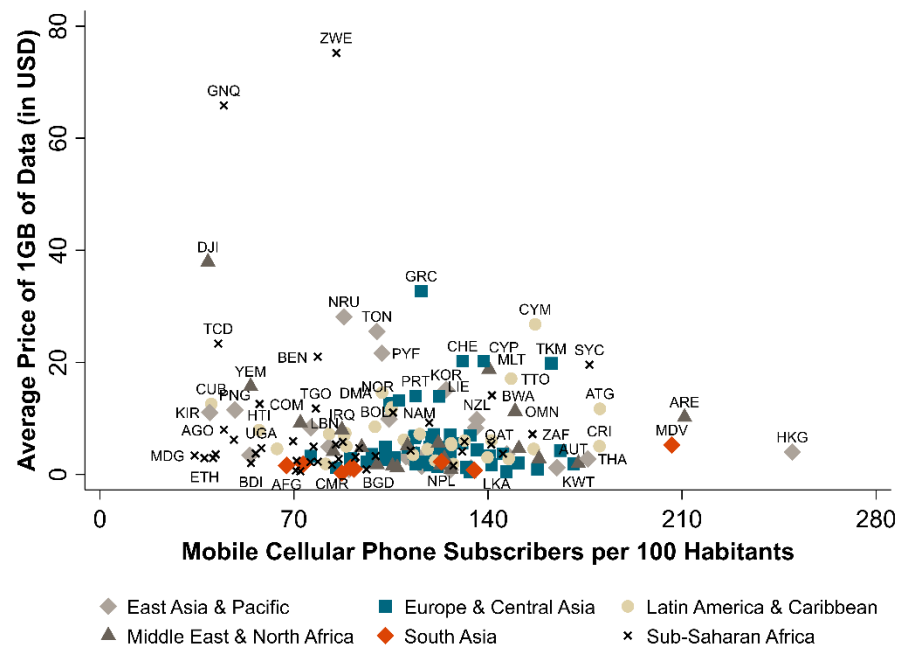
- Geographic and population spread of mobile coverage (e.g., percent of population with mobile phones)
- Indicators of reliability of mobile networks (to avoid the problem of dropped payments)
- Spread of the internet (percentage of population with access)
- Spread of points of sales (POS) (number of POS scaled by population, GDP, volume of payments, density, etc.)
- Spread of ATMs scaled by population, GDP, volume of payments, density, etc.
- Costs of internet/mobile (e.g., costs per gigabyte of data); differentiating between urban and rural areas

Figures III.3 and III.4 provide insights that can be obtained from using some of these indicators.

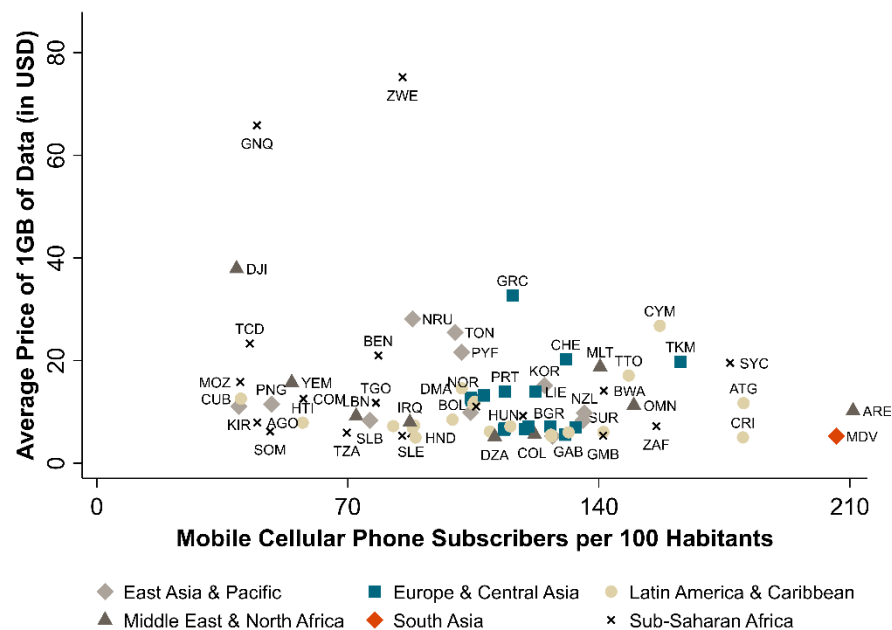
As shown in Figure III.3, panel A, usage of cellphones is quite expanded throughout the world. In most countries the number of subscribers per 100 habitants exceeds 100, implying that there are subscribers that hold more than one cellphone. Of course, this says nothing about the distribution of subscribers. It could still be that a proportion of low-income inhabitants do not use a cell phone even in countries where the relative number of subscribers is large.

Figure III.3. Mobile phones: Usage and cost of mobile data, 2018

A. All countries



B. Countries with the highest cost of mobile data



Sources: Cable Company – Worldwide Data Pricing (2018) and ITU World Telecommunication/ICT Indicators Database (2018)

However, available data do not distinguish between the usage of simple cellphones that do not require access to the internet (basic and featured cellphones) and smartphones. This difference is important since it reflects the capabilities of alternative providers of payment services to reach the population. Banks have been expanding their provision of digital financial services through the development of apps for smartphones. There are many examples of this form of mobile banking around the world.¹³ In all, individuals and firms need to have a bank account in order to undertake payments and transfer transactions. In contrast, MNOs and other DSPs can facilitate payments and transfers by using any type of cellphone, without the need for a bank account. This service is known as mobile money.^{14,15} The distinction is important since the infrastructure requirements are different. While the provision of mobile banking typically requires smartphones with at least 3G capabilities, the provision of mobile money services only requires simple cellphones. Kenya's M-Pesa is the best example of the latter.¹⁶

Figure III.3 panel B provides information on pricing of data collected by Cable Company for those countries with the highest price (a price for 1 gigabyte of data equal or greater than US\$15).¹⁷ As expected, there is a large variation in prices. For our purposes, the important insight is that when the costs of data and internet usage are high, we can expect the provision of digital financial services to the poor through mobile banking to be low. This makes mobile money services that only require simple cellphones a more plausible alternative.

Exploring data on access to the internet, Figure III.4, panel A shows an important country variation in households' costs for accessing internet services. The proportion of monthly gross national income per capita (GNIPC) needed to have a fixed-line broadband ranges from less than 1 percent in most advanced countries and less than 2 percent in some EMDEs (such as Sri Lanka, Tunisia and Ukraine), to over 140 percent in Niger and Rwanda. Panel B zooms in on countries where the percentage of households with access to internet is low (equal or less than 30 percent). In addition to Niger and Rwanda, the low access appears to have supply-side causes in a number of African countries (like Nigeria, Angola, Mali, Zambia, Ethiopia, and Cameroon) where, on a per capita basis, accessing the internet costs 15 percent or more of GNI. Of course, using per capita income disguises important distributional considerations. In countries with large income inequality, including most African countries, the proportion of GNI used for accessing the internet is much lower for

¹³ Some examples are Yandex.Money in Russia, Wizzit in South Africa, UOB Mighty in Singapore, and GloMo in Uruguay.

¹⁴ See, GSMA <https://www.gsma.com/mobilemoneymetrics/#deployment-tracker>

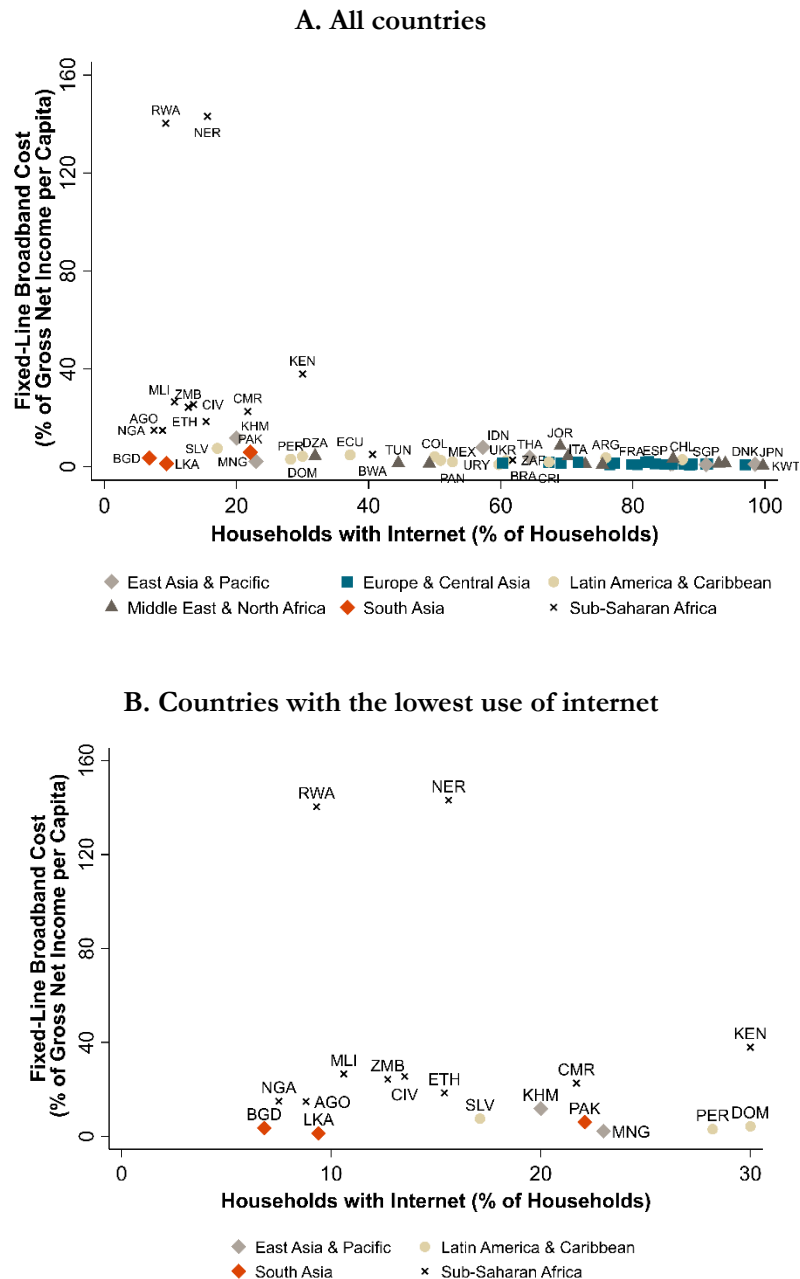
¹⁵ However, in a number of countries (and reports), the concept of mobile money is used in a more general fashion to incorporate the digital payments and transfers services provided by both MNOs and banks (including mobile banking).

¹⁶ In Kenya, with the approval of the central bank and the telecom authority, Safaricom, a mobile network operator (MNO), used its extensive mobile phones network to offer electronic payment and transfer services. The product, called M-Pesa, does not require individuals to have individual bank accounts; instead cash received by M-Pesa agents (to be converted into electronic money) is pooled and deposited as a single account in trust banks.

¹⁷ See <https://www.cable.co.uk/mobiles/worldwide-data-pricing/#resources>

the high-income population than for the poorest segment of the population. Obtaining data on cost of accessing the internet by income groups or even by rural versus urban populations can be useful to better gauge the extent of supply constraints at the country level.

Figure III.4. Cost and usage of internet, 2018



Sources: The Economist Intelligence Unit – Inclusive Internet Index (2019) and ITU World Telecommunication/ICT Indicators Database (2018)

Combining information from Figures III.3 and III.4 shows that several countries in Africa and in East Asia and the Pacific have high internet and data plan costs. For example, in

countries like Benin, Mozambique, and Namibia,¹⁸ the high cost of using the internet (equal to or greater than 5 percent of GNI) combined with high data costs (greater than US\$10 per gigabyte), mean digital infrastructure constraints can be a binding constraint for mobile banking. Further data on availability and usage of simple cellphones is needed, however, to assess whether the provision of this type of device can be a constraint for mobile money. This requires the analyst to undertake a study at the country level.

If the available digital infrastructure is low and its usage expensive (at least for some of the population), it signals either that expanding this business line is not profitable for the private sector under competitive conditions or that there are market or government-imposed barriers. These low private returns (or profitability) can arise because (1) expanding the provision of digital infrastructure services is too costly given the geographic and social/demographic characteristics of the population; (2) there are constraints imposed by high barriers to entry due to monopoly/oligopoly powers; or (3) while the social returns from expanding infrastructure are high, the private returns are low because of problems with appropriating these returns due to government failures (Box III.1).

Box III.1. Indicators of low private returns in the digital infrastructure sector

Costly operation of digital infrastructure

To assess whether the cost of operating digital financial infrastructure (hardware and software) is too high, information is needed about populations' geographic and demographic characteristics, as well as the net costs relative to the number of potential users. Some potential indicators are:

- Costs to install and operate an ATM per number of potential users
- Cost to operate a POS per number of potential users
- Cost of internet towers per number of potential users
- Cost of mobile phone towers per number of potential users
- Urban vs rural populations (composition; degree of population density in rural areas)
- Indicators of non-digital connectivity in rural populations, such as roads

Competition problems in the telecom industry and providers of other digital networks (ATMs, POS)

Assessing competition in the provision of digital infrastructure requires evaluating how concentrated those systems and how competitive the existing providers are. Indicators include:

- H-indices
- Measures of excess profits in the existing telecom firms
- Measures of market valuation of telecom operators
- Indicators of pricing/marketing strategies by dominant players to prevent entrance of new competitors¹⁹

¹⁸ The reader will not be able to find these three countries in Figure III.4 since the ITU does not provide information on the percentage of households with access to the internet. There is, however, data on costs.

¹⁹ See Vives (2019) for examples of such, often subtle, barriers

- Measures of excess profits in the production/commercialization of ATMs and POS

Problems with appropriability of returns in the telecom industry and providers of other digital networks

- General taxes on the mobile industry, which can affect the provision and use of mobile money. GSMA provides a summary of these type of taxes (Rogers and Pedros, 2017), which can be applied to:
 - The handset, through VAT, custom duties and/or luxury taxes;
 - The activation and connection process, through VAT and activation and/or connection specific fees; and
 - Usage, through VAT and/or excise duties
- Constraints for importing necessary equipment for providing internet/mobile money services
- Distorted or lack of regulations determining the rules of the game for the provision of infrastructure

b. Indicators of Constraints Imposed by the Characteristics of the Market Structure where Providers of Payments Services Operate

As noted in section II, the market structure of alternative providers of financial services is one of the “top branches” of the tree. The degree of competition between providers, and the rules under which these providers operate, determine a country’s financial market structure.

While general indicators of the degree of competition and the pitch of the playing field affect all services, there are additional indicators specific to the provision of retail payments, highlighted next.

i. Indicators of Limited Competition

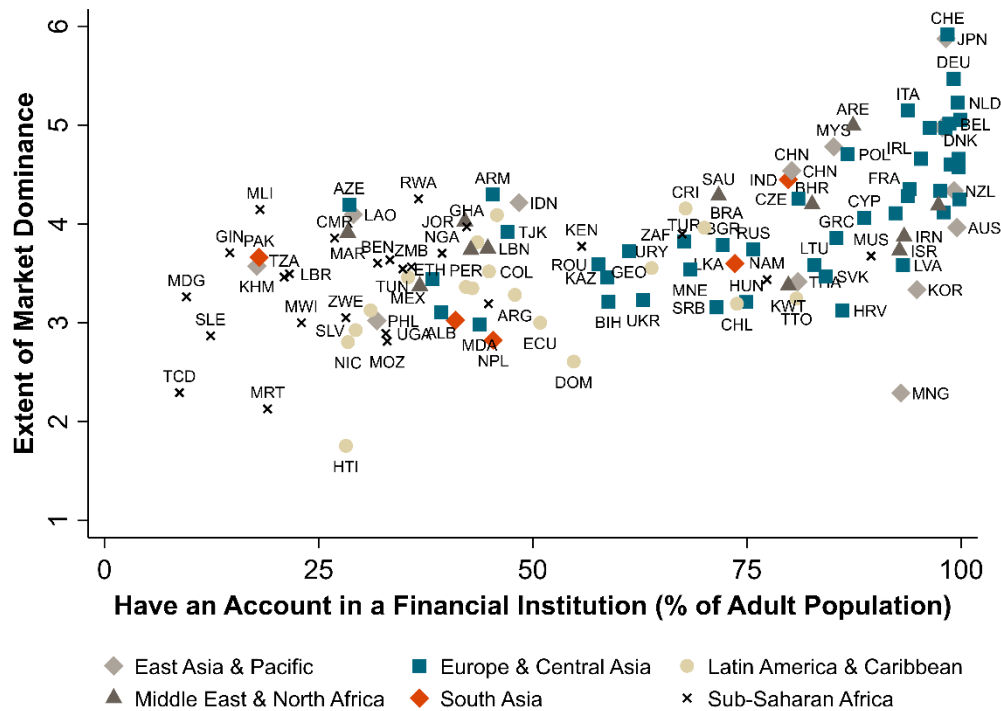
A first step is to capture the degree of competitiveness of the overall economy; that is, the country’s private sector orientation. This is why the limited competition box in the tree is linked through a dotted line with the box for poor institutional quality and governance. Policies and reforms to encourage further competition are easier to implement in economies where the private sector is pro-market oriented (i.e., competitive), and where the authorities are not captured by existing interest powers. This type of indicators can be obtained from global surveys, such as the World Bank’s Doing Business rankings and the World Economic Forum’s Global Competitiveness Reports. Figure III.5 illustrates this by showing the global distribution of the variable “extent of market dominance” produced by the Global Competitiveness Report. It reflects answers to the question, “In your country, how would you characterize corporate activity?” by attaching values that rank from 1 (“dominated by a few business groups”) to 7 (“spread among many firms”).

Not surprisingly, when all countries are included (Figure II.5 A), the upper right-hand-side of the graph is largely populated by advanced economies since greater competition, among many other factors, characterizes this group of countries. Since our interest in using this indicator is to help assess whether insufficient overall competition can be a constraint for

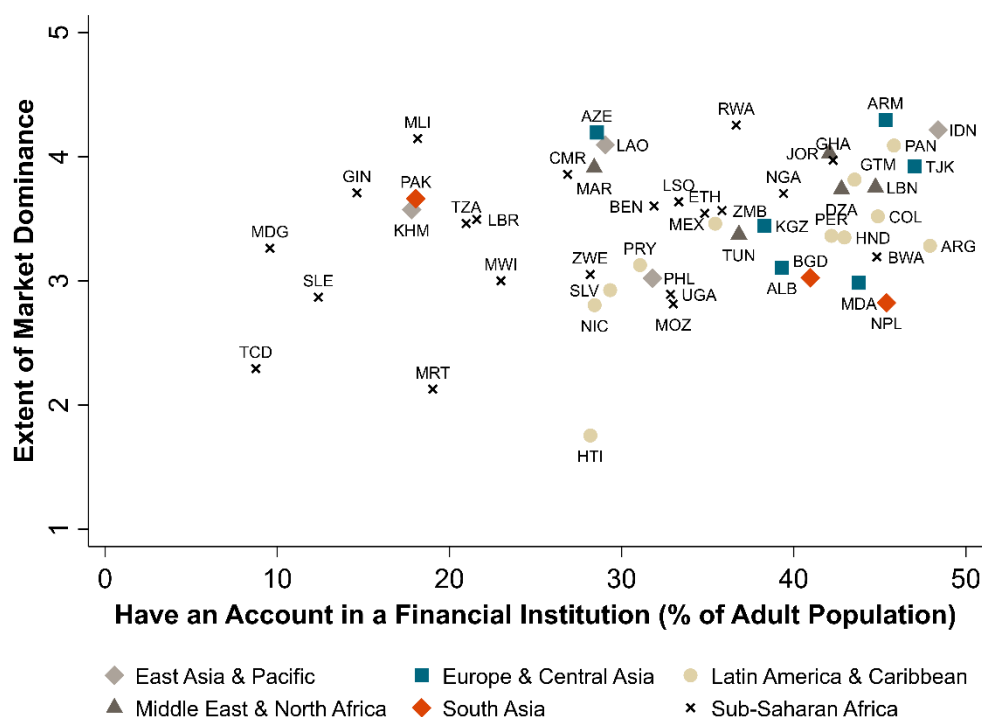
countries with low levels of financial inclusion, Figure II.5 B displays countries where the percentage of the adult population that has an account in a financial institution is equal or less than 50 percent. From the figure, relative to other countries with low financial inclusion, market dominance is quite high in countries like Chad, Haiti and Mauritania; signaling that lack of market competition should not be discarded as a potential binding constraint.

Figure III.5. Market competition, 2017

A. All countries



B. Countries with low financial inclusion



Sources: World Economic Forum – The Global Competitiveness Report (2018) and Findex (2017)

A second step is to gauge the competitiveness of the financial sector in the provision of payment systems. Considerations include the following:

First, while all banks provide financial services, particularly payment services, nontraditional providers such as MNOs and other digital service providers may not. Many nontraditional providers originally built their networks for purposes other than financial transactions. Thus, it is important to differentiate between these two groups when assessing relevant indicators of competition.

Second, to the extent possible, and when relevant, it is important to assess competition not only between banks and DSPs as sectors that provide payment services, but also among individual entities in each sector (banks and DSPs).

Third, it is important to recognize that the entrance of new providers opens opportunities for collaboration between traditional and nontraditional providers, which, in turn, can promote financial inclusion. Indeed, as recent studies show (e.g., FSB, 2019), traditional institutions and fintech companies appear to have complemented their individual business lines through cooperative relationships (this is less the case between banks and MNOs).

Thus, an adequate assessment of competition in the provision of payment services needs to consider cooperative relationships that can benefit financial inclusion.

In addition, the degree of interoperability of payment systems and networks needs to be assessed. Interoperability means that services developed and provided by one scheme may be used in platforms developed by other schemes. In mobile payments markets, interoperability implies that users of one network can transact with users of another network. This can be achieved at the customer, agent, or platform levels.

Greater interoperability among networks benefits consumers. However, as discussed in Claessens and Rojas-Suarez (2016), the developmental stage of the different payment markets should be gauged when assessing interoperability. For example, for traditional providers, such as banks, interoperability in ATMs can reasonably be expected in a competitive market. In contrast, assessing interoperability of mobile payments offered by new providers requires further considerations. If the market is at its early stage, lack of interoperability may be needed to induce providers to invest; without the ability to appropriate some returns from the exclusive usage of their networks, new providers may not enter the market. However, with the passing of time, increased competition can be expected and should be encouraged as the lack of interoperability over time can reflect a dominant player accumulating too much market power.

With these considerations in mind, the following are indicators of competitiveness:

- Indicators of bank concentration, such as the proportion of assets held by the three largest banks, or the H-statistic (or other commonly used measures of concentration)
- Assessment of interoperability in banks' ATM, POS, and network of agents (correspondent banking)
- Assessment of interoperability in mobile payments offered by traditional and nontraditional providers, taking into account the stage of market development. A central question is whether a dominant player imposes exclusive usage of its networks for making payments and transfers for a considerable period, limiting the ability of other players to serve customers.

Since international comparisons for some of these indicators are scarce, the analyst often will need to focus on the behavior over time within the individual country. Also, as implied above, international comparisons using simple numerical indicators may not be appropriate in some markets (such as interoperability in mobile payment markets) if the degree of market development is not taken into account.

Complementing Figure III.1 on fees for using ATM cards, Figure III.6 illustrates the extent of banking competition in EMDEs using two alternative indicators: the percentage of total

banking system assets held by the three largest banks and the H-statistic.²⁰ Before discussing results, an important caveat is needed. These indicators of concentration are measured as aggregates for the overall banking system, without distinguishing between business lines, even though competition varies across business areas (e.g., banks' competition for payment services differs from competition for extending credit²¹). Thus, while the discussion above serves for illustrative purposes, an appropriate assessment requires the collection of data at the level of the relevant business/activity line.

Not surprisingly, no banking system operates under perfect competition (no one reaches H-statistic value of 1). While there is large variation across countries, this indicator suggests that some degree of monopolistic competition characterizes almost all banking systems.

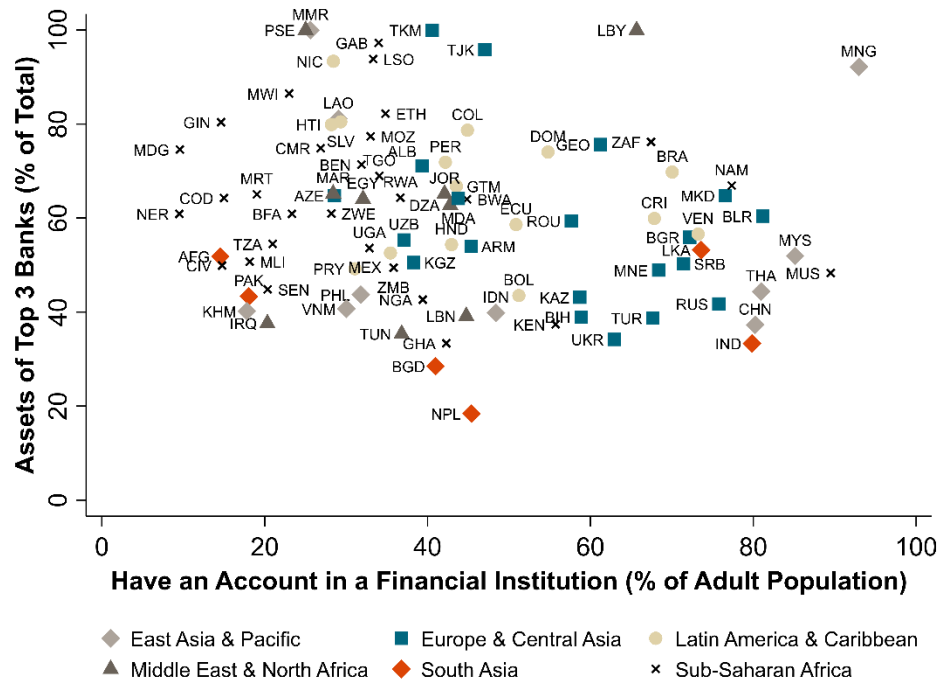
Combining information from the two indicators, among countries with low financial inclusion, insufficient competition in the banking sector is a candidate for being a binding constraint in a number of African countries; Ethiopia and Malawi are among the clearest examples.

²⁰ The H-statistic is a measure of the degree of competition in the banking market. It measures the elasticity of banks' revenues relative to input prices. Under perfect competition, an increase in input prices raises both marginal costs and total revenues by the same amount, and hence the H-statistic equals 1. Under a monopoly, an increase in input prices results in a rise in marginal costs, a fall in output, and a decline in revenues, leading to an H-statistic less than or equal to 0. When the H-statistic is between 0 and 1, the system operates under monopolistic competition. However, it is possible for the H-statistic to be greater than 1 in some oligopolistic markets. (*Source: Financial Development Database* based on the paper by Cihak et al. (2012))

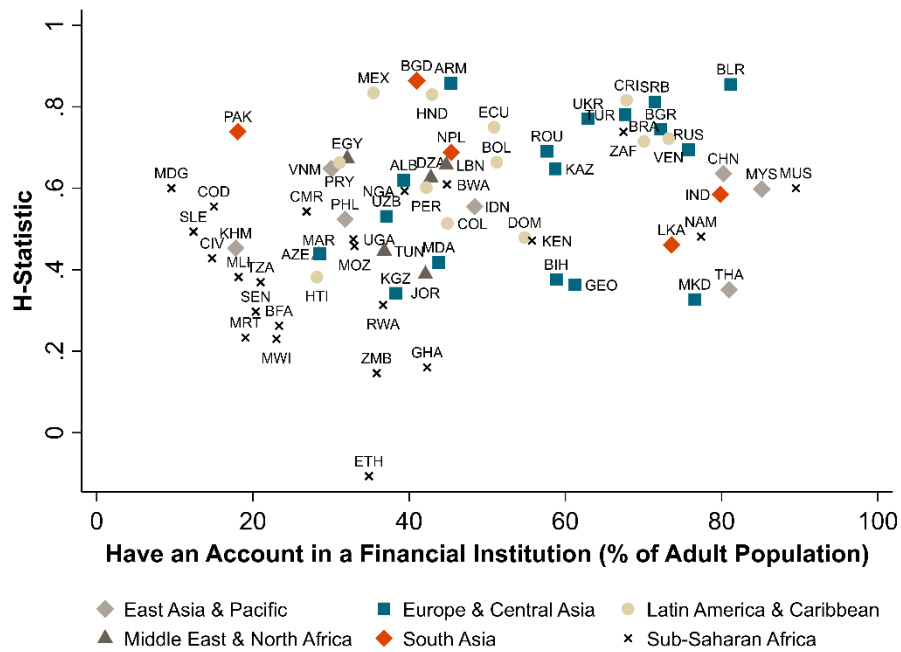
²¹ And competition to provide credit to blue chip companies differs significantly from competition to serve small business.

Figure III.6. Banking concentration and financial access in low- and middle-income countries

A. Three largest asset concentration, 2016



B. H-statistic, 2014



Sources: Financial Development Database (2016) and Findex (2017)

To guide the work of the country analyst, we can compare indicators on banking concentration with information displayed in Figure III.2. (This comparison is, of course, only for illustration since the data in Figure III.2 is from 2006.) Data on ATM fees suggest that supply constraints might be binding for Pakistan, Nigeria, and Mexico. However, competition problems do not seem to be the source of the supply constraints: the three countries are located either in the middle or in the low range of countries according to assets held by the three largest banks, and the values of the H-statistic are high (Mexico and Pakistan) or relatively high (Nigeria). Thus, based on this indicative information, other drivers of supply constraints may be more relevant for these three countries.

Likewise, for the Philippines and Nepal, where Figure III.2 does not signal supply-side constraints, the ratio of assets held by the three largest banks supports this insight: in both countries this ratio is not high relative to most emerging and developing economies. The value of the H-statistic provides somewhat different information in the case of the Philippines (the H-value equals 0.52) and there is no data for Nepal.

Interoperability

Assessing whether the lack of interoperability in payments is a binding constraint is difficult for at least two reasons. First, there are several levels at which interoperability can take place (customer, agent, and platform levels).²² Moreover, interoperability between providers can be achieved through multiple types of arrangements (multilateral arrangements involving more than two DFS providers; bilateral arrangements; and third-party solutions involving an arrangement between one or more DFS providers and a third-party solution provider, such as switch or aggregator; see Arabehty et al. (2016)). In a number of countries, interoperability has been achieved at one level, but not at others, complicating the assessment of whether the level/model of interoperability could be a binding constraint. Second, the effects of adopting interoperability on the volume of transactions can take long time to manifest (years according to Arabehty et al. (2016)).²³

Despite these limitations, the analyst can gain insights by asking whether the implementation (or lack) of interoperability in a specific country had, or is having, an effect on digital payments transactions over time. The examples in Box III.2 can guide the analysis.

Box III.2. Assessing interoperability as a binding constraint in Kenya and Tanzania

Kenya is known as a success story for improving financial inclusion through M-Pesa, the leading mobile money service, offered by Safaricom, the dominant player in the market. There was no interoperability between Safaricom and its (smaller) competitors between 2007

²² Bourreau and Valletti (2015) define interoperability at (i) the mobile network level, with customers accessing their mobile money service through any SIM card; (ii) the agent level, where agents from one service can serve consumers of another service, and (iii) the platform level, with money transfers being sent both on-net and off-net (users of one service can send electronic money to a user of another service).

²³ Regressions and other statistical analyses may help identify the effects of interoperability, especially to account for the presence of lags.

(M-Pesa's inception) and July 2014 (when agent interoperability was mandated). However, during that period the usage of mobile payment and transfer services grew rapidly. By 2014, the percentage of the adult population who had used a mobile money service over the previous 12 months reached 58 percent, the highest ratio among developing countries.²⁴ Thus, lack of interoperability was unlikely a binding constraint for Kenya. In July 2014, forced by pressures from its competitors (which were supported by the Competition Authority of Kenya) Safaricom opened up its M-Pesa agent network to its rivals.²⁵ In April 2018, interoperability of mobile phone financial services between the three registered MNOs providers was full.²⁶

Although not a binding constraint, achieving interoperability has reduced the costs of making transfers since now the sender can send money directly from his/her wallet to the receiver's wallet in real time, without having to pay higher fees for sending money to anyone outside the sender's network and by cutting out intermediary steps (previously, the receiver had to cash-out the received transfer at the sender's agent network). Consistent with the recommendations in Claessens and Rojas-Suarez (2016), interoperability took place when the mobile money market had achieved a significant degree of maturity.²⁷

Evidence from the IFC (2015) about the Tanzanian market for mobile financial services in 2013 (pre-interoperability) points to three indicators that the lack of interoperability between the four MNO providers had become a binding constraint. First, there were clear indicators that the market was reaching saturation from a customer acquisition perspective (although volumes and values of transactions remained high in absolute terms). Second, the initial requests for interoperability came from the industry itself, particularly from one of the major providers (Tigo). These indicators also suggested a mature market, which boded well for the implementation of interoperability.²⁸ Third, survey data revealed that 90 percent of customers would use mobile payments to send and receive money across networks if that were possible, and the majority of survey respondents were willing to pay to send money across networks. On the back of these conditions, the operators initiated an industrywide process for achieving interoperability (facilitated by the IFC). In 2014, three of the country's operators, Airtel, Tigo and Zantel, agreed to interoperate and went live in September 2014. Vodacom (M-Pesa) came on board in early 2016. Data on interoperable transactions over

²⁴ Also, in 2014, the percentage of the adult population that had an account with a financial institution or through a mobile money service reached 73 percent. See Findex (2017)

²⁵ Before July 2014, agent exclusivity in Kenya was the highest in East Africa: 96 percent of agents were serving one provider exclusively.

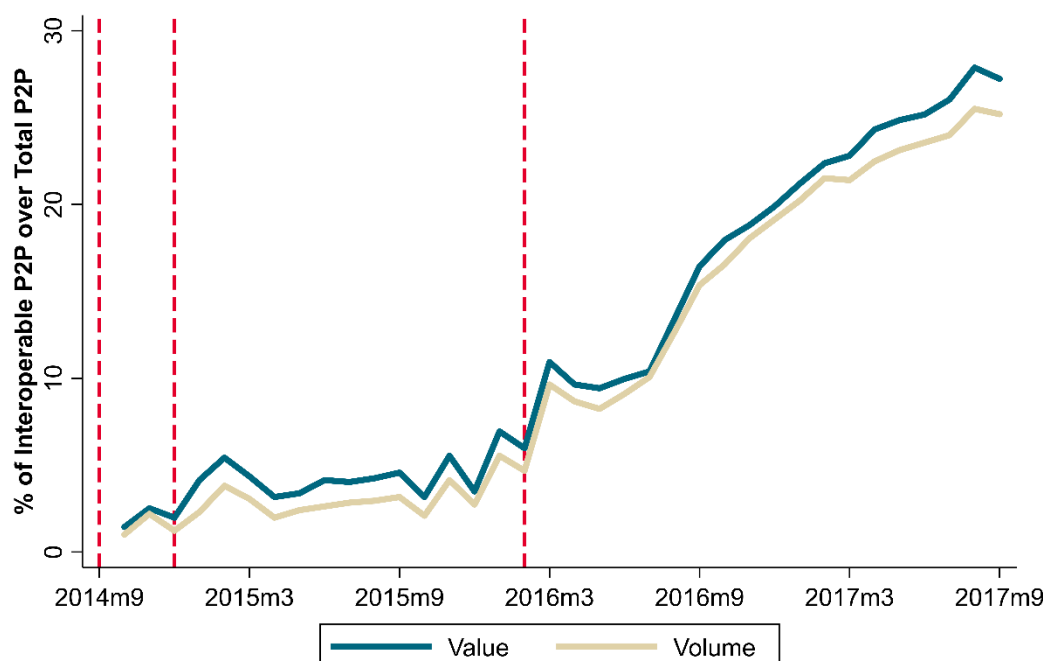
²⁶ See https://www.centralbank.go.ke/uploads/press_releases/1648360391_Press%20Release%20-%20Mobile%20Money%20Interoperability.pdf

²⁷ By 2017, 73 percent of the adult population in Kenya had used a mobile money in the past 12 months and 82 percent had an account with a financial institution or through a mobile money service (Findex 2017).

²⁸ Also, according to FinScope Tanzania (2013), by that year, half of the adult population in Tanzania had used mobile financial services. See, <http://www.fsd.or.tz/wp-content/uploads/2016/04/FinScope-Brochure-2013-Summary-1.pdf>

time show a significant increase after each of the two agreements, but especially after the incorporation of Vodacom, the largest provider.²⁹

Figure III.7 Interoperable person-to-person (P2P) transactions in Tanzania



Note: the first red line indicates when Airtel and Tigo Mou became interoperable, the second when Zantel and Tigo Mou did, and the third when Vodacom's MOU, Airtel and Tigo did.

Source: Bank of Tanzania (2017)³⁰

Moreover, according to FinScope Tanzania 2017,³¹ the number of adults using mobile money services reached 60 percent that year. Taken together, the information signals that by 2013 lack of interoperability may have been a binding constraint for the growth in mobile financial services.

ii. Indicators of an Unlevel Playing Field

An unlevel playing field arises when, even inadvertently, rules and regulations (or the lack thereof) prevent the development of fair competition between providers of the same or functionally equivalent services. As for other financial services, a level playing field for payment services is present when rules and policy actions do not prevent MNOs and other DSPs from competing with banks in digital money. Likewise, contestability of market

²⁹ See, BFA and CGAP (2018)

³⁰ See, https://www.findevgateway.org/sites/default/files/publication_files/tanzania_interoperability_post-implementation_review_21_feb_2018_wdisclaimer.pdf

³¹ See www.fsdt.or.tz/wp-content/uploads/2017/09/FinScope-Tanzania-2017-Insights-that-Drive-Innovation.pdf

infrastructure is important; that is, rules should not prevent new players from tapping into a payment system built by existing players.

The analyst needs, therefore, to search for country-specific rules that may be distorting the playing field. Examples of indicators are:

- Absence of a law allowing for the provision of electronic money by MNOs and other providers of digital services in countries where such a law is needed for permitting the entry of nontraditional institutions into the market
- Explicit restrictions preventing access to private retail payment systems by nontraditional providers
- Restrictions preventing merchants from freely choosing which payment channel or channels they will accept—cash, checks, debit cards, store-of-value cards, or Internet or other platform-based products, such as electronic money/wallets.

If one or more indicators of rules distorting the playing field are identified, the next question is whether they may be binding constraints. The cases of Ghana and Peru, Box III.3, illustrate the challenges of assessing whether the issuance of an e-money law allowing MNOs to participate as financial services providers significantly affects the expansion of digital payment services.

Box III.3. Assessing electronic money laws as a binding constraint in Ghana and Peru

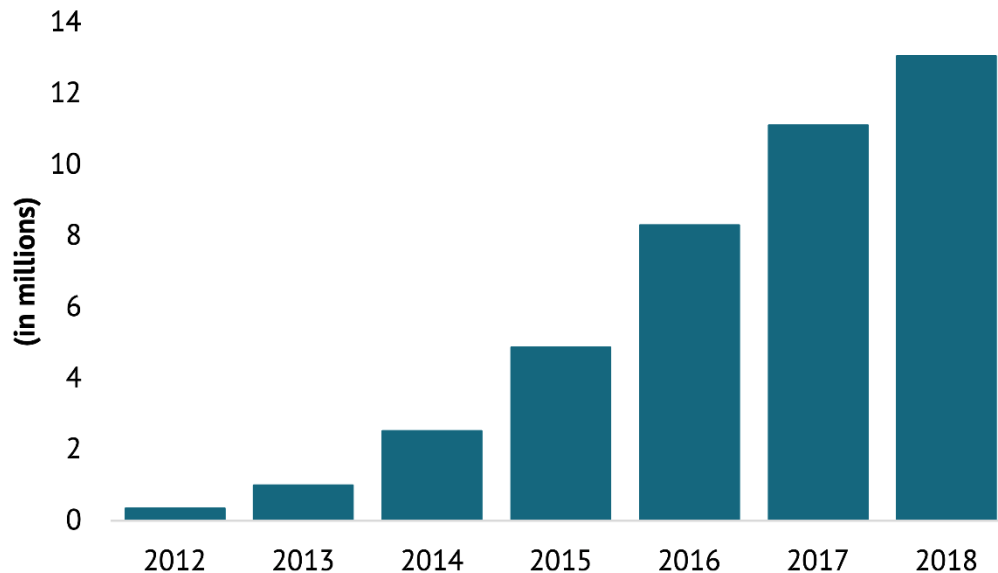
In Ghana, by 2012, mobile phone penetration³² was among the highest in sub-Saharan Africa,³³ but despite the initial mobile money deployments in 2008, the provision of digital financial services was very low (see Figure III.8). As discussed in Mattern and McKay (2018), although the 2008 branchless banking regulation enabled the use of agents and required systems to be interoperable, it also severely constrained the expansion of the mobile money market by restricting the issuance of electronic money and agent recruitment to consortiums of at least three licensed banks. This not only created a free rider problem that discouraged banks from undertaking investments that would benefit others in the consortium, but also discouraged MNOs from launching new products or recruiting agents that were, according to the regulations, ultimately the property of the banks. A revision of these regulations by the Bank of Ghana, with a first draft of the reform in 2013 and the final issuance of new agent and e-money guidelines in 2015, allowed MNOs to own and operate mobile money networks under the supervision of the central bank. This regulatory reform led to a sharp increase in the provision of mobile money services. According to Findex, between 2014 and

³² Mobile phone penetration is defined here as the ratio of unique cell phone subscribers to total population.

³³ GSMA reports that mobile cellular penetration rate in 2012 was about 50 percent in Ghana. This compared to 31 percent in Kenya. By that year, Ghana's mobile phone penetration was among the highest in South Saharan Africa. (https://www.gsma.com/mobileeconomy/archive/GSMA_ME_SubSaharanAfrica_2013.pdf). By 2017, the penetration rate in Ghana reached 67 percent. (<https://www.gsmaintelligence.com/research/?file=7bf3592e6d750144c58d9dcfac6adfab&download>).

2017 the percentage of the population who had used a mobile money account in the last year increased from 13 percent in 2014 to 39 percent in 2017.³⁴ This evolution signals that up to 2015, the lack of an inclusive e-money regulation that leveled the playing field between banks and MNOs might have been a binding constraint.

Figure III.8. Active mobile money users in Ghana



Source: Bank of Ghana – Payment System Annual Reports (2019)

In Peru, a law on electronic money was issued in 2013, allowing banks and non-banks to issue e-money. At that time, only 29 percent of the adult population had an account in a financial institution, well below the average for Latin America (51 percent). Like in Ghana, existing regulations on branchless banking had not produced significantly improved financial inclusion. By contrast, also like in Ghana, the mobile phone penetration rate was relatively high, 66 percent, surpassing the Latin American average.³⁵ Establishing the legal framework for issuing electronic money (the 2013 Electronic Money Law) was, therefore, perceived by the authorities as a key tool. As a complement, in 2015 the authorities launched the National Strategy for Financial Inclusion, allowing cooperation between financial institutions, MNOs, the regulator, and other government agencies. The private sector response came from the Banking Association, which launched *Pagos Digitales Peruanos*, a company in charge of designing, maintaining, and managing an interoperable platform that allowed for the participation of any entity authorized by the supervisory authority to issue e-money.³⁶ The platform named BIM (Billetera Movil) was launched in early 2016 with the main purpose of connecting banks and MNOs with the unbanked population.

³⁴ For further discussion, see <https://phys.org/news/2019-07-ghana-acing-transition-mobile-financial.html>

³⁵ See, <https://www.gsmainelligence.com/research/2014/05/measuring-mobile-penetration/430/>

³⁶ Further details and discussion can be found in Del Carpio Ponce (2018)

Even though progress is being made, by end-2019, the number of BIM's registered users remained low³⁷ (about 3 percent of the adult population).³⁸ Although it is too early for a full assessment of a platform that has been operating for less than four years, it is not clear whether the electronic money law removed the most pressing constraint in Peru. It could have, but at the same time, new constraints prevented better outcomes from the law, such as the lack of sufficient channels for cash-in/cash-out transactions (agents, ATMs, etc.). Or, instead, deeper, root causes preventing the use of e-money remained unaddressed, such as the strong preference for cash in an economy where a large segment of the population operates in the informal sector (59 percent of the population). More analysis is needed to reach conclusions.

c. Indicators of Problems with Appropriability of Returns (Wedge between Social and Private Returns)

i. Coordination Failures

As in other digital financial services, payment services involve crucial externalities on the supply and demand sides: the value of these services to any given user or provider depends on the number of other users and providers participating in the network with whom they can transact. As discussed in Bourreau and Valletti (2015), because of the sunk costs of infrastructure, mobile payment and mobile money systems are characterized by the presence of economies of scale. Mobile payment platforms must, therefore, reach a large enough scale to be able to offer affordable services to users on both sides of the transaction. Indeed, in some countries, private sector efforts have had limited success precisely because they failed to reach the critical mass of users participating in the platform needed to make the endeavor profitable.

Because of the two-side nature of mobile payment platforms, coordination failures can constrain both the supply and the demand sides of the decision tree. Moreover, some indicators in other branches of the tree can also indicate coordination problems. For example, on the supply side, the dependence of digital payments platforms on the adequate provision of digital financial infrastructure implies that one also needs to consider the set of indicators proposed for the latter when assessing whether coordination problems may be a binding constraint. Likewise, on the demand side, if consumers perceive low or no benefits from using digital payment services, or their confidence in the providers is low, *and* the suppliers of these services are aware of this problem, the platform will face problems in attracting suppliers.

Indicators of coordination problems, therefore, include:

- The indicators of low provision of digital infrastructure for payment services

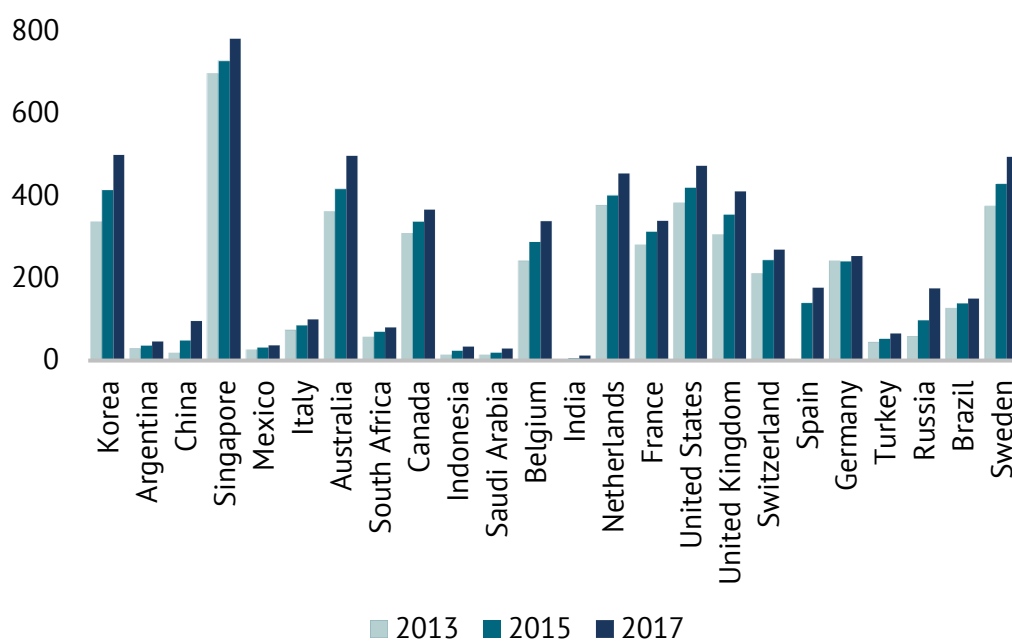
³⁷ By end-2019, Asociación de Bancos de Perú reported about 700 thousand registered users of BIM. The adult population reached 23.3 million by 2018

³⁸ Data from Findex indicates that by 2017, only 3 percent of the adult population had used a mobile money account in the past 12 months.

- The indicators of low consumer confidence in the new digital forms for payment services
- The indicators of perceived low or no benefits from using digital payment services
- Indicator(s) of cash uses versus electronic uses for payments; that is, a measurement of the cashless economy. As the use of electronic payments increases, the probability of reaching the critical mass necessary for alternative platforms to be profitable also increases. This indicator, therefore, complements the first two.

The data using a CPMI (2017) methodology for a sample of countries on the recent evolution of cashless payments, per inhabitant, provides some insights (Figure III.9).

Figure III.9. Average number of cashless payments per inhabitant



Source: CPMI, Red Book (2017)

As expected, on average, cashless payments per person have been consistently increasing in most advanced economies. While still at low levels, the number of cashless payments has risen in some of the largest EMEs, notably Brazil, China, and Russia, but is stagnant in others, like Mexico and Argentina. Can the observed high usage of cash be a binding constraint for reaching the critical mass necessary for the provision of digital financial services that can reach the poor? Or is it just a symptom of insufficient supply? Contrasting China and Mexico provides useful leads to this question.

In China, the percentage of the financially included population is high (80 percent of the adult population according to Findex (2017)). High bank account ownership has made it easy to link bank cards to mobile wallets. In 2014, the ratio of bank account ownership (79 percent) was twice the ratio of smartphone ownership (39 percent), but these two ratios had converged by 2017. This paved the way for a high uptake of apps supplied by non-bank

mobile payments providers, such as Alipay and WeChat Pay (both bank account and smartphone are required to use these apps). The high use of cash in China signals that achieving a critical mass of consumers does not constitute a binding constraint for the success of mobile payments platforms. But alternative factors can still explain the remaining 20 percent financially excluded.

The case of Mexico is quite different. In this country the volume of cashless payments per person has remained extremely low and practically unchanged in the period 2013-2017.³⁹ The percentage of the adult population who owned an account in a formal financial institution actually decreased in recent years, from 39 percent in 2013 to 35 percent in 2017 (Findex (2018)). The use of mobile money accounts, while increasing, has remained very low (6 percent of the adult population in 2017). Thus, in Mexico, the high observed preference for cash may be an obstacle to reaching the critical mass of consumers necessary for payment platforms to be profitable and reach the poor. An entrenched preference for cash cannot be discarded as a binding constraint and the analysis needs to investigate further reasons; for example, low confidence in financial services provided by the formal sector may be among the causes to consider (see section III.3).

ii. Distortionary Taxes and Other Policies

As is well documented, taxing digital payments incentivizes the use of cash and informal financial services. It can also be regressive, harming those who need to be included the most. Ndung'u (2019) shows that distorted taxation may affect the use of digital payment systems, even in a country with a consolidated mobile money system, such as Kenya. The excise tax on fees charged on mobile money transfers increased from 10 percent to 12 percent in 2018 and has been associated with a decrease in use.⁴⁰

Taxing the usage of payment services has a long history in EMDEs and was very common in the 1990s in numerous countries, with taxes on banks' debit (and, often, credit) transactions set at high rates. Governments' reliance on this type of taxes as a source of revenue is explained by the presence of a large tax base (the volume and value of financial transactions) combined with the ease to enforce and collect them. Given the increasing scope and depth of digital payments through the provision of mobile money, governments may be tempted to see the digital payment industries as a source to increase their fiscal revenues. As a result, specific taxation of the mobile industry has also become more popular, especially in sub-Saharan Africa (Rogers and Pedros, 2017).

Taxes on financial transactions increase prices and generate a supply-side constraint, even when levied directly on the consumers, as their effect is to raise the price of the service.⁴¹

³⁹ The extremely high usage of cash for payment transactions is reported in CNBV and INEGI (2018).

⁴⁰ For a further and earlier discussion of the negative effects of taxes in Kenya and their regressive effect, see Rojas-Suarez (2012).

⁴¹ In technical terms, *from the consumers' point of view*, the tax involves an upward shift in the supply curve of the service, which would result in an increase in price paid for the service and a decline in the usage of the service. The extent of the decline in usage would depend on the elasticity of the demand curve.

Moreover, the imposition of this type of taxes can be a barrier of entry for firms, as expected profits are less as consumers respond to the tax. Since taxing the usage of payment services is, by itself, distortionary, the presence of any form of these taxes is an indicator of a constraint to financial inclusion. Various alternative taxes need to be considered:

- Taxes on financial transactions' fees tax the payment service, that is, the fee that mobile money providers charge their costumers for using their service. They are generally a small portion of the transaction amount.⁴² They can be composed of a regular VAT tax and/or an excise duty. These taxes are common in countries where mobile money is popular.
- Taxes on financial transactions are direct taxes on the transaction amount itself, and, therefore, substantially larger and more distortionary than transaction fees' taxes.⁴³
- General taxes on the mobile industry can affect the provision and use of mobile money, as summarized above on constraints to the provision of digital infrastructure.

How to assess whether these distortionary taxes are a binding constraint? Once again, examples from previous episodes can help. Uganda and Colombia have a history of taxing financial transactions rather than fees. One can explore whether there were major changes in the use of payment services following the imposition of these taxes (Box III.4). The case of Uganda is particularly telling, since authorities had to quickly react and remove the tax on mobile money transactions because of its significant impact. This suggests that, while transitory, the tax might have acted as a binding constraint.

Box III.4. Assessing taxation on financial transactions as a binding constraint in Uganda and Colombia

Attempting to meet its revenue target, the Ugandan government proposed a 1 percent tax on mobile money deposits, withdrawals, transfers, and payments in 2018. The act was approved by the parliament on May 30 and came into effect on July 1. After controversy and protests, on July 19, the government replaced the tax and stipulated a 0.5 percent tax on withdrawals only (Ferracuti and Wardak, 2018).

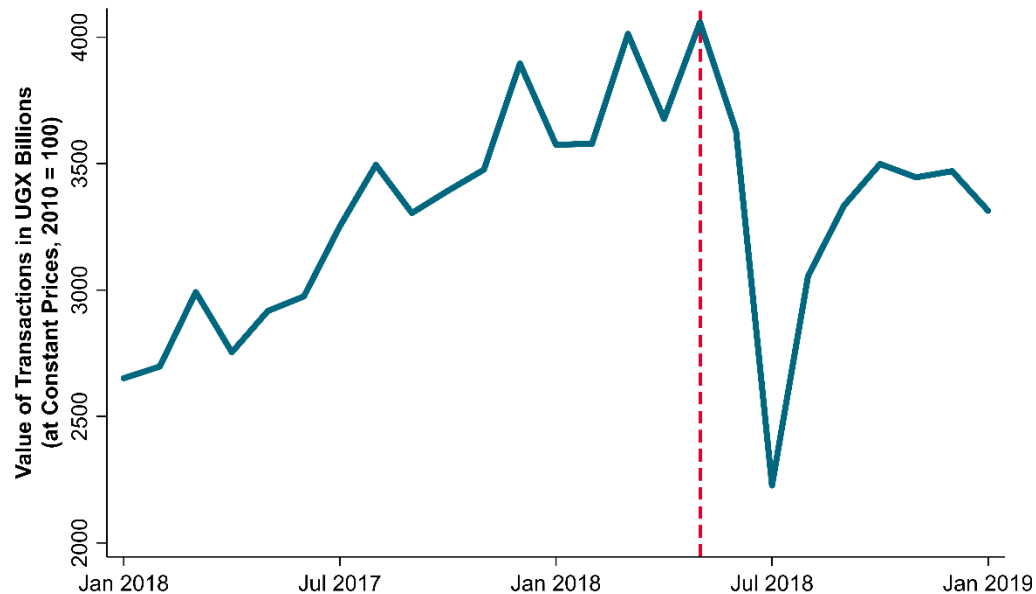
Although the comprehensive and high transaction tax was short-lived, the impact on mobile money transactions was substantial. As shown in Figure III.10, transaction values decreased from 4,059 UGX billions in May (when the tax was announced) to 3,629 UGX billions in June and to 2,227 UGX billions in July. This implies a 10.59 percent decrease from May to June and by 45.13 percent from May to July. Indeed, the value reached 2016 levels and was 31.52 percent lower than in the same month the previous year. This effect and the campaign

⁴² The discussion above about Kenya concerns this type of taxes.

⁴³ The country cases of Uganda and Colombia in the box below are examples of this type of taxes, which have been introduced in other countries as well, such as Zimbabwe (see, <https://qz.com/africa/1416072/zimbabwe-mobile-money-tax-hike-will-hurt-the-economy/>).

against the tax led to its revision and adjustment to exclusively 0.5 percent on withdrawals. Although there was a quick recovery after July, the value of transactions has not yet returned to its 2018 levels. This suggests that the tax might have been a binding constraint for the expansion of mobile money.

Figure III.10. Mobile money taxes in Uganda



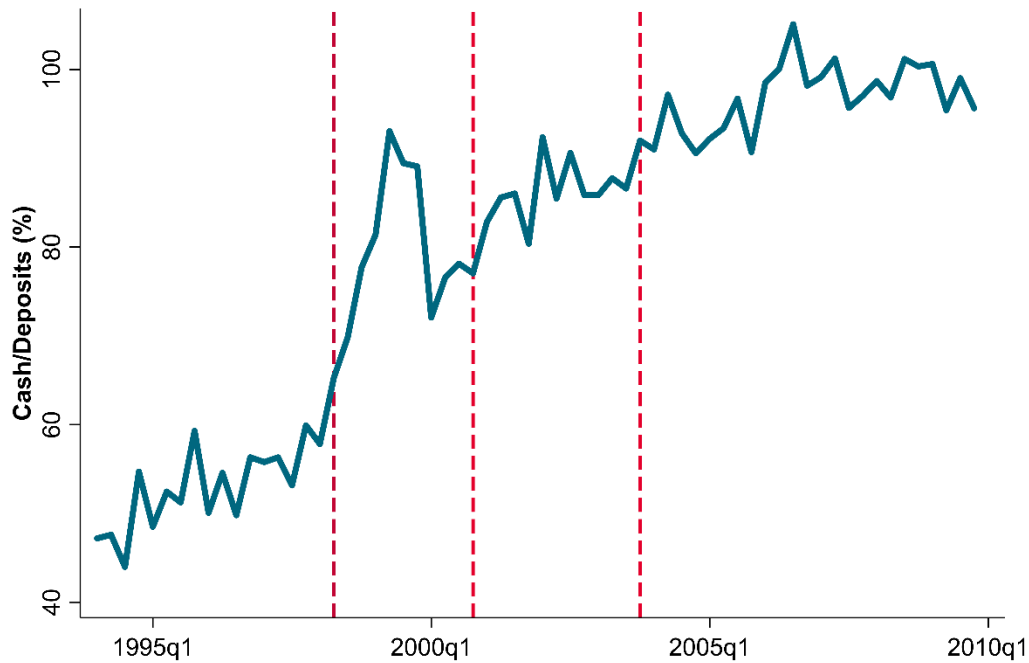
Source: Bank of Uganda (2019)

Colombia enacted a 0.2 percent financial transaction tax⁴⁴ (FTT) in 1998, increased to 0.3 percent in 2001 and 0.4 percent in 2004. There is consensus that the tax resulted in increasing cash holdings and lower bank deposits.⁴⁵ Figure III.11 shows a clear increase in the cash-to-deposit ratio at the quarterly level, with the first red line indicating the 1998 tax and the following two the increases of the tax in 2001 and 2004.

⁴⁴ “Gravamen a los Movimientos Financieros” in Spanish

⁴⁵ Several authors have studied the impact of this tax. See Arbeláez, Burman and Zuluaga (2004); Giraldo and Buckles (2011); and Restrepo (2013)

Figure III.11. Financial transaction taxes in Colombia



Source: Banco de la República – Central Bank of Colombia (2019)

The main increase in the cash-to-deposit ratio took place in 1998, when the tax was first established. The ratio rose from about 60 percent in early 1998 to a peak of over 90 percent in 1999.⁴⁶ Subsequent increases in the FTT were associated with further increases in the ratio, and it remained high, suggesting pervasive and long-lasting effects. Higher ratios of cash to deposits do not imply that tax is a binding constraint, especially since other major events took place in Colombia in the late 1990s, notably a severe banking crisis. Most likely, both financial instability and the high costs of transactions discouraged the use of the formal financial system. However, recent developments point to the FTT as a constraint. Financial stability has been restored in Colombia for at least a decade now and, recently, the government announced that the tax would be lowered gradually (to 0.3 percent in 2019, 0.2 percent in 2020, and 0.1 percent in 2021) until disappearing in 2022.⁴⁷ This measure has been approved, despite persistent fiscal deficits, which may signal that the government now perceives the FTT as a major constraint for further financial inclusion. But further analysis needs to assess whether it is binding.

In addition to distortionary taxes, other policy distortions can indirectly constrain the provision of digital payment services by deterring the entry of non-banks DSPs. These include interest rate controls (interest rate *floors* affecting the supply of store-of-value services

⁴⁶ Giraldo and Buckles (2011) show the decline in checking account balances in real terms when the tax was enacted

⁴⁷ Dirección de Impuestos y Aduanas Nacionales (DIAN). See, <https://www.dian.gov.co/impuestos/reformatributaria/aspectosdelareforma/Paginas/gravamentofinanciero.aspx>

and interest rate *ceilings* affecting the supply of credit) and directed lending, which impact the supply of credit services.

iii. Poor Governance and Weak Institutions

The importance of institutional quality for the provision of all types of financial services is discussed extensively in the literature.⁴⁸ The institutional quality can hinder or encourage entry of new providers and the scope of financial services they are willing to offer. As discussed below, the quality of institutions also affects the demand for financial services. Studies have demonstrated that the financial system will develop more fully in countries that observe the law and fairly and efficiently enforce the rule of law.

Several useful indicators help assess the quality of a country's governance and institutions:

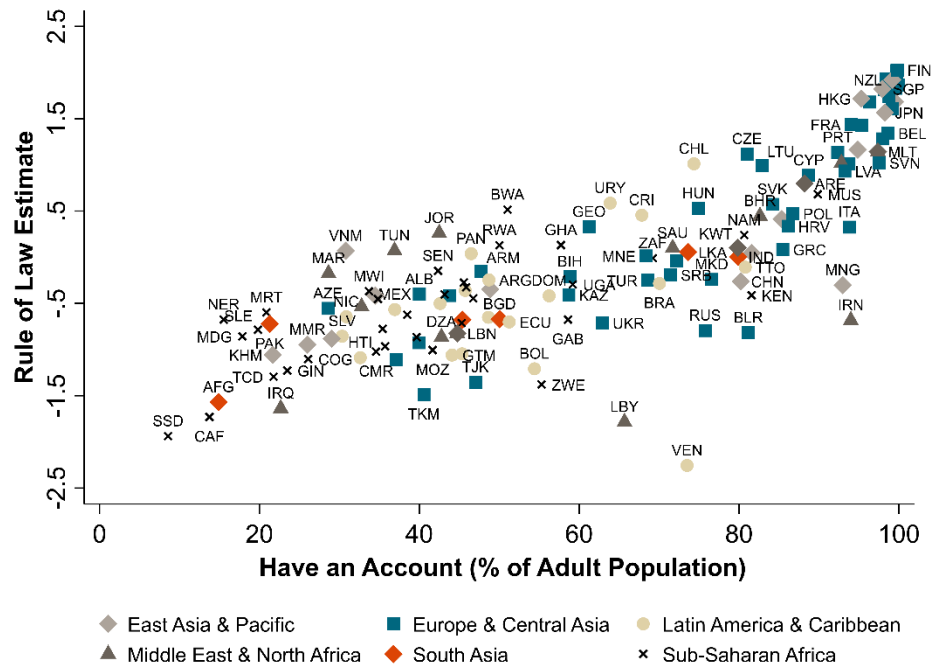
- The World Bank's Governance Indicators
- The World Bank's Doing Business Indicators
- The World Economic Forum's World Competitiveness Report
- The political risk rating from the PRS Group's International Country Risk Guide

Figure III.12A relates institutional quality and financial inclusion using the Rule of Law component of the World Bank's Governance Indicators, which measure agents' confidence in and commitment to abiding by the rules of society, the quality of contract enforcement, the police, the courts, and the likelihood of crime and violence. The figure shows a clear positive relationship between adherence to the rule of law and the percentage of the adult population who have an account in either a formal financial institution or a mobile money account. As discussed above, however, this relationship by no means should be interpreted as a causal relationship running from institutional quality to financial inclusion. Instead, the message is that, in countries with weak institutions and low financial inclusion, the former needs to be further analyzed to assess whether it may be a binding constraint to the latter.

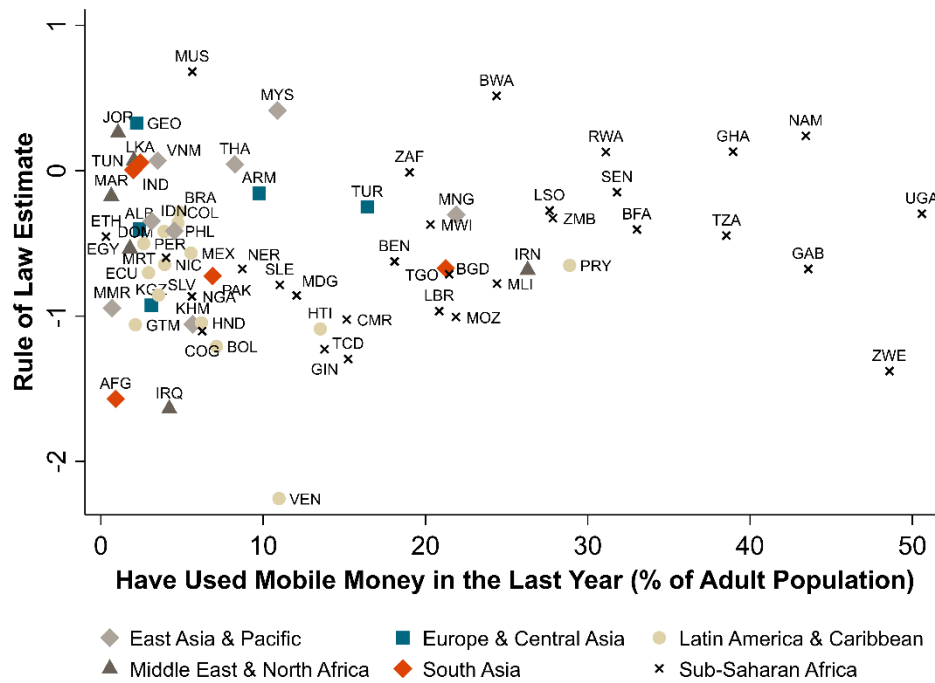
⁴⁸ An analysis of the effect of institutional quality on access to bank services is found in Beck et al. (2003)

Figure III.12. Governance indicators – rule of law, 2017

A. All countries



B. Low and middle income countries



Source: World Governance Indicators (2019) and Findex (2017)

Useful insights can be gleaned from exploring data in countries where there is separate information on the use of mobile money accounts (using Findex 2017, the Financial Access Survey of the IMF, and other databases). As shown in Figure III.12B, there is no obvious relationship between this variable and measurement of institutional quality. For example, in Singapore, with very high institutional quality, the percentage of the adult population who have used a mobile money account in the last year is similar to that in Guinea, where the quality of institutions is very low. The main reason behind Singapore's observation is that the country has a developed financial system, where the majority of the population is already financially included through the use of bank (and other traditional intermediaries) accounts (as shown in Figure III.12B). Thus, it is reasonable to conclude that the low usage of mobile money accounts in Singapore should be attributed to factors other than institutional quality. In contrast, in Guinea, ownership and usage of all types of accounts is very low (23 percent by 2017, as shown in Figure III.12A). In this country, low institutional quality may thus be a binding constraint to financial inclusion.

Next, we compare countries like South Sudan, Central African Republic (in the left corner of Figure III.12A), or even Niger and Mauritania, with Kenya. In the first four countries, ownership of any type of account is very low (less than 25 percent of adults) and use of mobile money accounts is either nonexistent (South Sudan and Central African Republic) or very low (less than 10 percent of adults in Niger and Mauritania, see Figure III.12B). The indicator of institutional quality is also low in these cases. Before concluding that low institutional quality should remain as a candidate for a binding constraint, it would be helpful to investigate whether other indicators confirm that institutional quality is low. In contrast, in Kenya, financial inclusion (both through bank accounts and mobile money) is high, despite weak institutional quality (Kenya ranks in the bottom third in terms of adherence to the rule of law among countries in the Findex (2017) sample). Moreover, the indicator for rule of law declined in the period 2007-2010, when M-Pesa was initially launched and reached a significant proportion of the population very quickly. This suggests that deficiencies in institutional quality were not a constraint for Kenya's rapid improvement in financial inclusion.

In addition to indicators of the overall quality of a country's institutions and governance, it is important to search for indicators specific to the financial system to identify the scope for misuse in the financial sector. This can be proxied by variables such as:

- The quality of financial supervisors' accountability and the degree of their independence from political pressures
- The remuneration of supervisors and their staff (in real terms) relative to other sectors of the economy

International comparisons for this type data are scarce; thus, it would be useful to collect local information through surveys and from government information to better assess whether deficiencies in the governance and supervisory quality of the financial system may

impose a serious barrier to the offering of products and services, especially digital, to the financially excluded.

Despite data limitations, the evidence collected by Barth et al. (2005) and updated in the World Bank Regulation and Supervisory Surveys can provide some insights.⁴⁹ Figure III.13 presents two indicators that, combined, provide some understanding of the actual capacity of financial supervisors to conduct an adequate oversight of financial institutions. The first indicator, *supervisory powers*, measures the scope of actions that supervisors can undertake to contain excessive risk taking by financial institutions. The second indicator, *independence of the supervisory authority*, measures the extent to which supervisors can indeed enforce their allocated powers free from political pressures. The first indicator ranges from 4 to 14, with higher numbers signaling stronger mandates and enforcement capacity for oversight.⁵⁰ The second indicator ranges from 0 to 3, with 0 signaling lack of independence and 3 full independence.⁵¹ Only countries with low ownership of accounts (defined here as countries where less than 50 percent of the adult population have an account) are included in the figure.

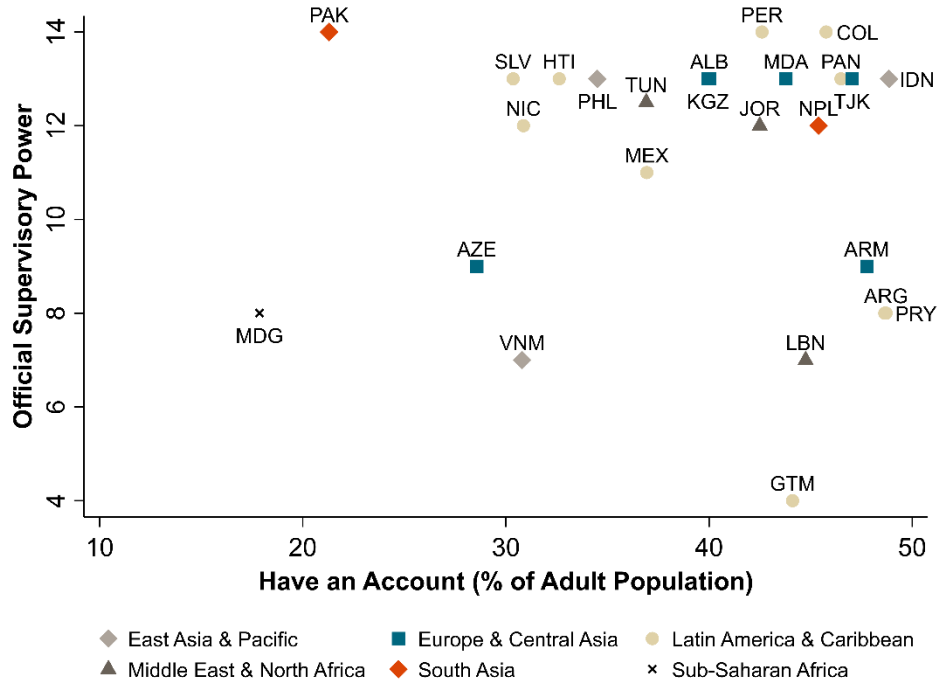
⁴⁹ The surveys collect information from regulatory officials in 180 countries See, <https://www.worldbank.org/en/research/brief/BRSS>. The latest version of the survey is from 2019.

⁵⁰ The indicator measures whether supervisors have the authority to take specific actions to prevent and correct problems. It is composed of components such as the relationship of the banking supervisor and external auditors, the ability of the supervisory authority to remove and replace troubled banks' management and directors, and its capacity to supersede bank shareholder rights and declare bank insolvency.

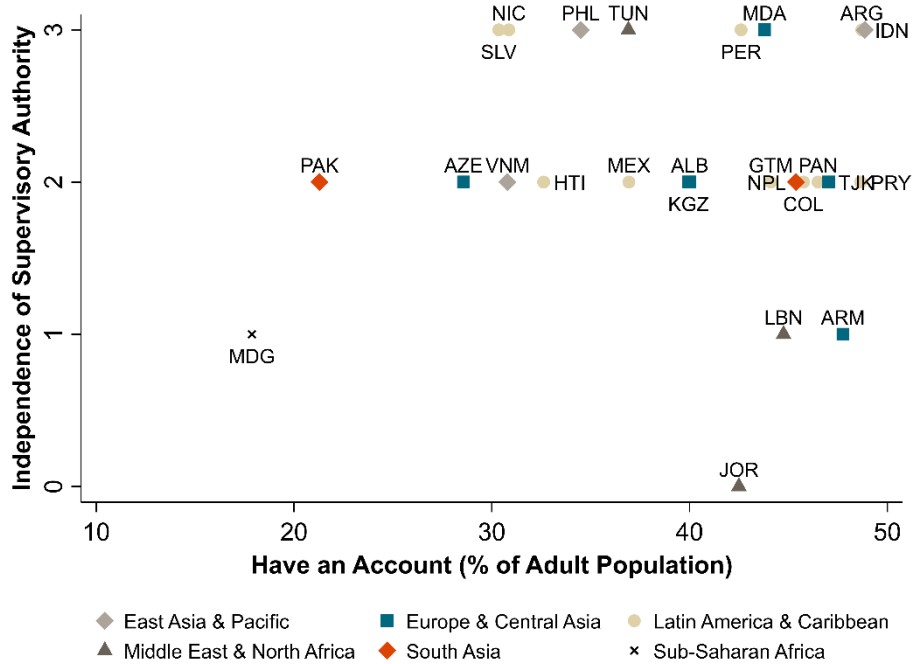
⁵¹ This indicator measures the degree to which the supervisory authority is independent from the government and legally protected from the banking industry. It is the sum of three components: (a) the degree to which the supervisory authority is independent within the government from political influence (1 if the supervisory authority is accountable to a legislative body, such as parliament or congress, and 0 otherwise); (b) the degree to which the supervisory authority is protected by the legal system from the banking industry (1 if an individual supervisory staff can be held personally liable for damages to a bank caused by their actions or omissions committed in the good faith exercise of their duties, 0 otherwise); and (c) the degree to which the supervisory authority is able to make decisions independent of political considerations (1 if the head of the supervisory agency and other directors have a fixed term of years or greater, 0 otherwise).

Figure III.13. Indicators of financial supervisory powers and independence in countries with low financial inclusion, 2017

A. Official supervisory power



B. Independence of supervisory authority



Sources: World Bank Regulation and Supervision Survey (2019) and Findex (2017)

From the figure, it does not seem plausible to attribute low financial inclusion to weak supervisory quality or the lack of strong independence in countries like Indonesia, Peru, and the Philippines. In these countries, supervisors can freely use their strong mandate and powers to control excessive risk taking by financial institutions. In contrast, in Armenia, Lebanon, and Madagascar, supervisory powers are not strong and supervisory authorities have little independence. Supervisors in Jordan and Malawi have a relatively strong mandate but lack independence to enforce it. In these countries, among others, supervisory quality should remain as a possible binding constraint.

iv. Problems Identifying Customers⁵²

In the financial sector, knowing your customer (KYC) is essential for doing business, with the amount of necessary information increasing with the sophistication of the financial product or service. From a business perspective, very little information is needed to allow a customer to make payments or transfers, while more information about a borrower (and her/his project) is needed for providing credit. However, KYC requirements do not simply reflect the commercial interests of financial institutions; they reflect regulatory concerns for systemic financial integrity (for instance, AML/CFT guidelines issued by the Financial Action Task Force (FATF)); how these are interpreted by national regulators; and whether (possibly risk averse) financial institutions choose to conform to regulatory requirements or even to exceed them.

Conforming to KYC requirements, including recordkeeping and updating, can be costly for financial institutions, especially in relation to the profits expected from small customers. In that sense, they can be seen as a supply-side constraint.⁵³ However, onerous documentation requirements can also impose costs on potential customers and discourage them from using financial services. Thus, they can also act on the demand side.⁵⁴

In response to concerns about the possible impact of KYC requirements on financial inclusion, FATF (2012) endorsed a tiered, risk-based approach with simplified requirements for low-risk accounts, such as those restricted to tight limits on balances and transaction size. These “restricted” accounts can, therefore, offer less demanding regulatory KYC requirements. But, as reported by FATF (2017), tiered KYC was still a work in progress; some countries had not implemented tiering and, in practice, some financial institutions preferred not to take advantage of tiering opportunities. A second possible approach may be

⁵² This subsection is largely based on Gelb and Castrillon (2019)

⁵³ The supply-side impact of high KYC costs could be evidenced in other ways, in addition to high fees and charges. Banks may refrain from opening branches in areas likely to draw in large numbers of low-income customers, and they may be less eager to develop services and products that appeal to them. Costs will also be higher if the financial service providers are required to verify credentials without having the infrastructure to do so easily. E-KYC, as in India using Aadhaar, offers the promise of reducing costs associated with managing documentation. One Ministry of Finance official estimated that moving from paper-based KYC to e-KYC in India reduced the average cost of verifying customers from roughly \$15 to \$0.50, and Indian banks that made the shift could lessen the time spent on verifying customers from more than five days to seconds.

⁵⁴ As noted by AFI (2018b), documentation requirements can often disproportionately affect women and worsen financial access gender gaps.

provided by mobile money accounts (offered by non-banks and, in some cases, banks) to the extent that they are subject to less constraining regulatory KYC requirements than bank accounts.

Documentary requirements for identifying banks' customers can usefully be divided into two types. The first comprises basic identifying information or "ID," usually in the form of a national ID card or similar credential. The second group, which we term "ID+," includes a potentially wide range of supplementary evidence, such as proof of address, proof of employment or income, proof of nationality, or evidence of other attributes. For historical reasons, such requirements are commonplace, although FATF does not call for them formally.

This discussion suggests that indicators about the costs associated with customers' identification can include:

- Presence and coverage of a national ID, especially digital (the latter to capture whether a ready source of clients can easily be on-boarded digitally)
- Cost to providers of acquiring customers. This includes the cost of meeting KYC requirements
 - Documentary requirements beyond IDs (ID+)
 - Presence of restricted or simplified accounts with lower KYC requirements.
- Individuals' perceptions about documentation requirements as a constraint to open accounts in financial institutions⁵⁵

International comparison for some of these indicators can be undertaken using data from Findex 2017, which reports the percentage of adult populations with ID, and the World Bank's Global Financial Inclusion and Consumer Protection Survey (2017), which covers documentary requirements (ID and ID+) at country level for financial institutions (it also indicates whether countries permit some form of simplified KYC).⁵⁶

While far from complete, ID coverage is considerably higher in most countries than financial inclusion, as shown in Figure III.14 with data from the 2017 Findex survey.⁵⁷ Indeed, financial inclusion is quite modest even in some countries that have almost universal ID coverage and where identification is routinely required to access virtually all government

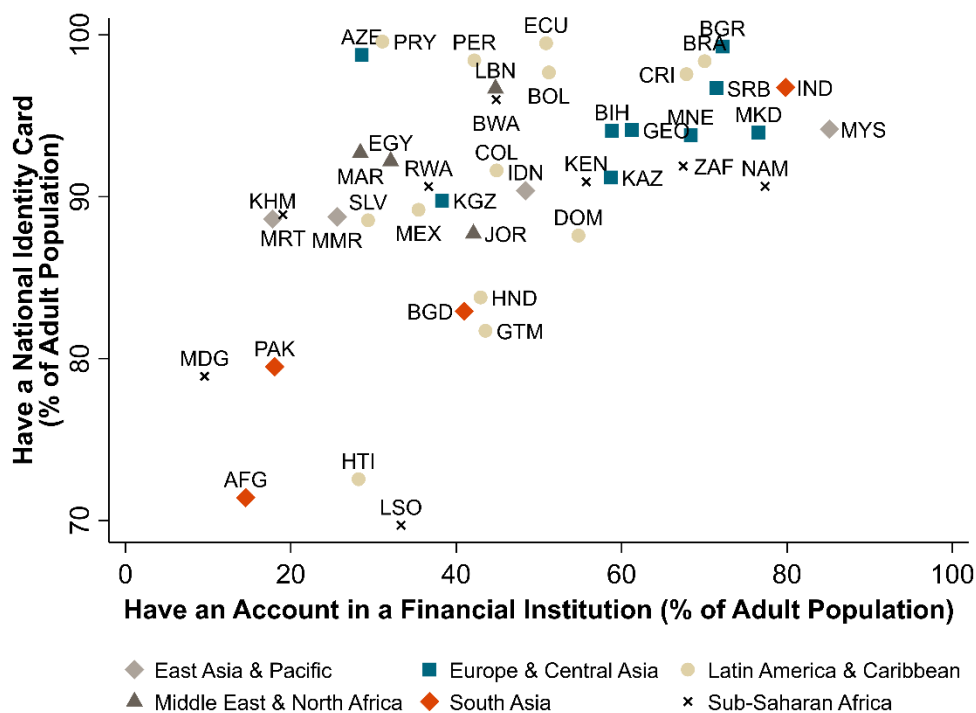
⁵⁵ Findex 2017 surveys asked individuals about their perception of constraints to opening an account, including documentation requirements.

⁵⁶ All but 5 of the 51 low- and middle-income countries covered by the Global Financial Inclusion and Consumer Protection Survey report that they require some type of ID+ to open an account. Around 50 percent of the jurisdictions reported some form of simplified customer due diligence.

⁵⁷ As estimated by the World Bank Identification for Development dataset (ID4D Global Dataset), a combination of self-reported and publicly available data to produce estimates of the ID gap, some 1 billion people are likely to lack identification. Half of these will be children under the age of 16 whose births have not been registered, and many of the remaining ones will be concentrated in a relatively few countries. It is therefore possible that ID is often less of a barrier than ID+, which warrants a separate examination of these requirements.

programs and services, like Peru. It is thus unlikely that simple identification will be a major barrier in such a case.

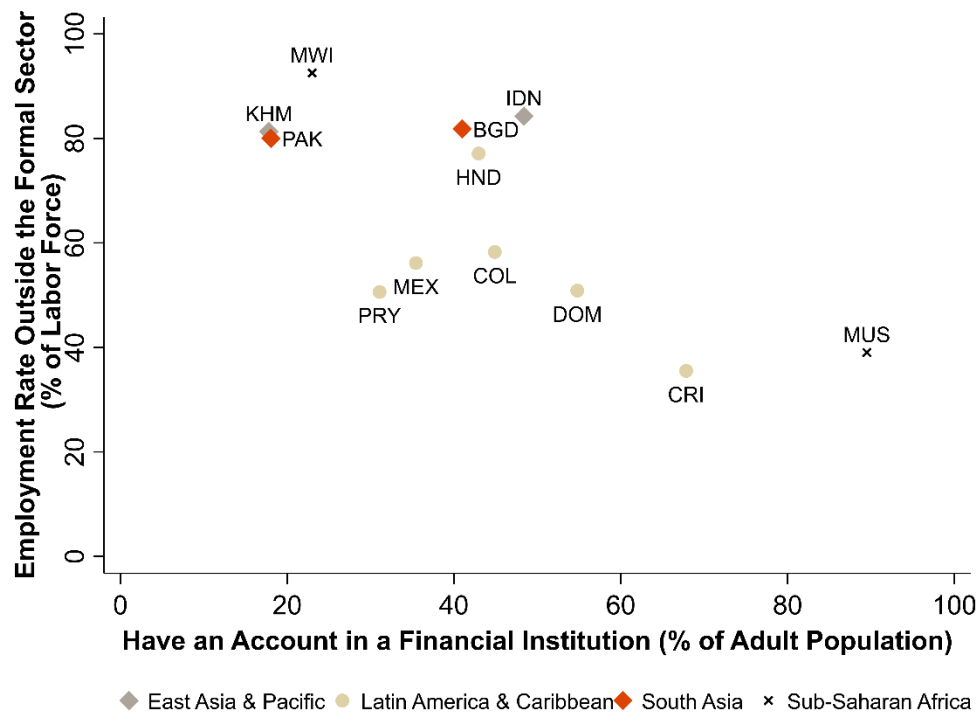
Figure III.14. ID card coverage, 2017



Source: Findex (2017)

The picture changes significantly when assessing the role of ID+ requirements. Studies suggest that in some countries, especially those with high levels of informality, providing proof of address or employment may be more problematic for most people than simply furnishing an ID card. Corroborating evidence can be obtained by analyzing data from the World Bank's Global Financial Inclusion and Consumer Protection Survey (2017) and the International Labor Organization (ILO). The former provides information about ID+ requirements to open a bank account stipulated by regulation. The latter provides information about informality, measured as the employment rate outside the formal sector. From countries with available information from both databases, we select those where showing *proof of address* or *proof of income* are regulatory requirements to open an account. For those countries, Figure III.15 shows the ratio of informality against the percentage of the population who have an account in a financial institution.

Figure III.15. Informality in countries that require ID+, 2017⁵⁸



Sources: World Bank – Global Financial Inclusion and Consumer Protection Survey (2017), ILO (2019) and Findex (2017)

The clear pattern is that countries with high levels of informality and stringent documentary requirements are associated with lower levels of account ownership. In Cambodia, Malawi, and Pakistan, the requirements for identifying customers *combined* with high levels of informality may well be binding constraints.

However, a caveat is important here. In general, we would expect ID+ requirements to be more prevalent for opening “full” bank accounts than for opening simplified accounts and mobile money accounts, although this may not always be the case.⁵⁹ Therefore, when considering whether customers’ identification through documentation requirements are likely to pose a binding constraint for bank account ownership, it is necessary to consider all market segments. This involves a two-stage analysis. The first question is whether simplified bank accounts (with simplified KYC norms) and mobile money accounts are permitted. If not, the analysis focuses on traditional bank accounts. If they are permitted, one needs to assess whether other potential constraints on the supply side (such as insufficient competition or an unlevelled playing field between banks and DSPs) may prevent new providers from taking advantage of lower customer identification requirements. In Figure

⁵⁸ ID+ in this case implies a requirement to show proof of address and income.

⁵⁹ For example, Mexico’s 2011 four-tier simplified KYC schema requires an address for all but level 1 accounts, which have a transactional limit of \$280.

III.15, Cambodia does not offer simplified bank accounts. Pakistan does, but requires proof of income and address to open accounts. In Malawi, briefly discussed in Box III.5, simplified bank accounts are not offered, but mobile money accounts with *de facto* lower KYC requirements are. This has eased the severity of KYC constraints for financial inclusion significantly.

Box III.5. Easing KYC constraints in Malawi through mobile money

As explained by Finmark Trust (2015), lack of documentation has been a serious constraint given the absence of a national ID (until 2017⁶⁰) and a system for registering physical addresses. Although substitute documents, such as passports or driver licenses, could be used, not many people have them (few travel formally across borders or possess cars). While banks and MNOs have accepted voter ID cards, not all Malawians have access to these. In some cases, financial inclusion has been further limited by a proof-of-income requirement. Between 2014 and 2017, bank financial inclusion increased from only 16 percent to just 23 percent. For mobile money, however, the situation appears better. MNOs reportedly ask for similar documents, but copies are not made, and they are not verified; neither is proof of address required. Between 2014 and 2017, mobile money coverage increased from 4 percent to 20 percent, substantially relaxing the impact of KYC constraints on inclusion.

3. Indicators Signaling Demand Side Constraints for Payment Services

The relevant price determining the demand for payment services includes not only the market price but also all costs incurred in obtaining the service (such as completing required documentation or the cost of traveling to reach a provider).

When considering market prices, a signal that low usage of digital financial services can be attributed to low demand is that the price charged for the service is low or decreasing. In other words, if the constraint is lack of demand, suppliers of digital payments services (and of other digital financial products) might attempt to increase the number of users by charging lower prices. Without a critical mass of users, suppliers might not be able to exploit the positive network externalities associated with the provision of digital payments services, which will discourage the entrance of new providers. Thus, demand-side constraints would often mean a coordination problem, as discussed previously.

Unfortunately, data on fees and commissions charged for the usage of digital financial services are very scarce, preventing cross-country comparisons. To guide country-specific analysis, however, we can go back to Figure III.2, which shows that by 2006, available information did not point to supply constraints arising from high ATM fees in Nepal and the Philippines (banks did not charge fees for ATM usage). Two possibilities should then be

⁶⁰ Malawi rolled out a national ID shortly after the Findex 2017 survey. For that reason, it is not included in Figure III.15

considered: either other supply-side constraints were manifested (through high prices (fees and commissions) charged for the provision of other digital payment products or high shadow prices for the provision of these services (in the absence of market prices)), or demand constraints were binding. If an evaluation of (market or shadow) prices for digital payments services shows that the problem of low usage of digital payments mainly relates to demand-side constraints, then the next step is to investigate why.

Generally, there are three main (and often interrelated) reasons why the uptake of financial products may be low even when offered at low prices and fees: (a) consumers' income level is so low that they do not have sufficient funds to undertake financial transactions (an indicator related to poverty); (b) consumers do not trust the financial service providers; and (c) consumers perceive low or no benefits from using the financial products, even if they have sufficient income to undertake transactions and trusts the financial services provider. These reasons are presented separately for analytical purposes, but they can easily interrelate. For example, a consumer who does not perceive a benefit to using the services might also distrust the service providers. As we discuss below, while surveys are the starting point, hard data is needed to distinguish between constraints.

Findex (2017) provides a rich database at the individual level for initially assessing whether consumers' lack of funds, perception of low benefits, or lack of trust in formal providers of financial services might be binding constraints. Findex survey questions ask respondents without an account in a formal financial institution for reasons explaining that behavior. The survey, however, does not ask respondents to identify the most important reason and, instead, allows respondents to choose as many of the listed reasons as they wish.⁶¹ Moreover, the survey does not ask for reasons for not having a mobile money account (not linked to a bank account). Still, the data is useful; for example, it can reveal that lack of confidence in financial institutions can act as a deterrent to using mobile money services through banking correspondents (agents). To gain a better understanding of the potential presence of demand-side constraints, Findex data would need to be complemented by other country-specific sources and surveys.

In what follows, data from Findex and other sources are used to obtain insights regarding the three types of potential demand-side constraints. The indicators presented are just a subset of those that can be constructed based on the specific characteristics of the country analyzed.

a. Indicators of Low Income

Not having enough income to undertake transactions can certainly be a binding constraint for very low-income populations. However, even individuals with very low incomes can benefit from a mobile money account, for example, if they receive *transfers*. And this holds

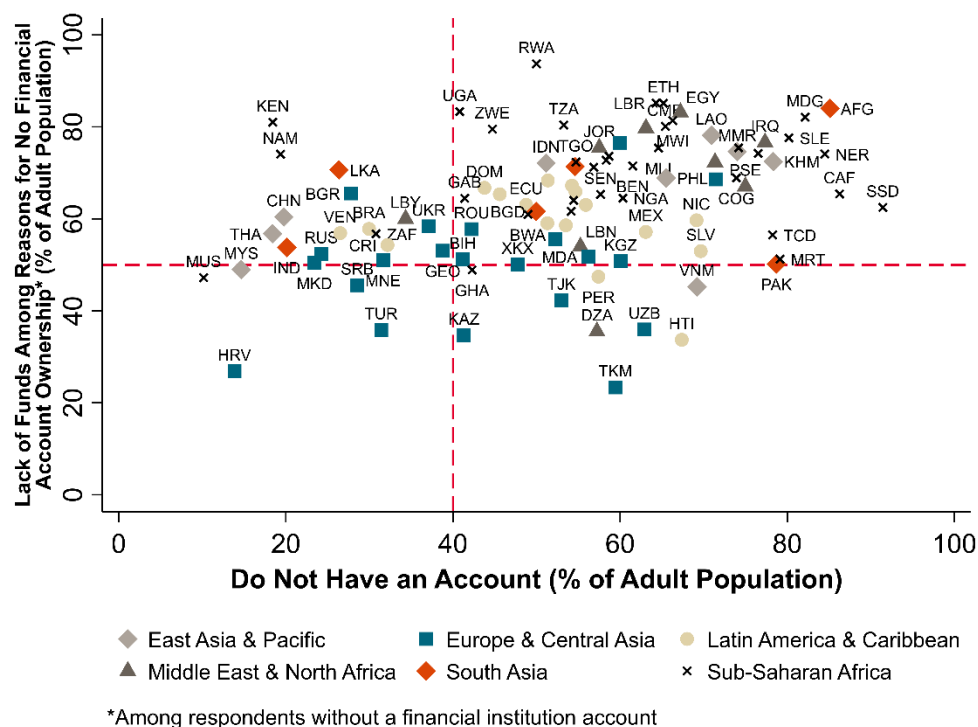
⁶¹ The listed reasons in the Findex survey are (a) lack of trust in financial institutions; (b) distance (the financial institution is too far away); (c) financial services are too expensive; (d) lack of documentation to open an account; (e) religious reasons; (f) insufficient funds to open an account; (g) someone else in the family already has an account; and (h) no need for having an account.

true even when the pricing model of a mobile money provider relies heavily on withdrawal fees (cash-out fees) since the monetary value of these fees can be included in the sender's transfer.⁶²

The Findex survey data identify the percentage of adults who report not having a financial institution account because they do not have enough money to use one. The survey, however, does not ask whether lack of funds is a reason for not using a mobile money service among the unbanked population; that is, people who do not have access to a formal account at a financial institution. While limited, some insights on the relationship between usage of mobile money and having sufficient funds can be found using data from InterMedia (Financial Inclusion Insights (FII))⁶³ for a small number of countries. We first explore Findex data and then move to InterMedia information.

Using Findex data, Figure III.16 relates the percentage of the adult population who do not have an account and the percentage of the population who report lack of funds as a reason for not owning an account.

Figure III.16 Lack of funds, 2017



Source: Findex (2017)

⁶² See the discussion on pricing structures for mobile money services in Annex 1.

⁶³ See, <http://finclusion.org/>

There is a significant number of countries in the world where a large proportion of the population (say, more than 40 percent) do not have an account, and over 50 percent of that group lists lack of funds as a reason for their behavior. These countries are shown in the upper right quadrant of the figure.

Because the Findex survey does not differentiate between having an account for the sole purpose of making payments and using the account as a *store of value* (savings), its results provide limited insights into identifying binding constraints for *payment services*. It may well be that individuals decide that they do not have enough funds to use an account as a store of value, and at the same time, strongly prefer using cash for payments. For these individuals, lack of funds might not be a constraint for having an account for *payment* purposes;⁶⁴ instead, the constraint might be their strong preference for cash (a source for a coordination problem, as discussed above). Thus, the analysis needs to dig deeper into the country-specific characteristics to assess whether indeed lack of funds is a candidate for a binding constraint for the use of payments services. For example, knowledge on behavioral characteristics of low-income populations as well as market studies can help answer the following question. If electronic money services were offered in some countries, such as Lao PDR or Central African Republic, (where Findex (2017) reports the absence of such services and where the percentage of adults without an account is over 70 percent), would many low-income individuals choose to use the new form to make payments? This would show that lack of funds is not a binding constraint for the use of electronic money accounts (while perhaps still a constraint for opening accounts in financial institutions). Or would one find that lack of funds is indeed a binding constraint preventing the formation of the critical mass needed to ensure the uptake of these new forms? If the former is the answer, then the problem of low digital financial inclusion is a supply-side constraint. If the latter, it suggests the presence of demand-side constraints.

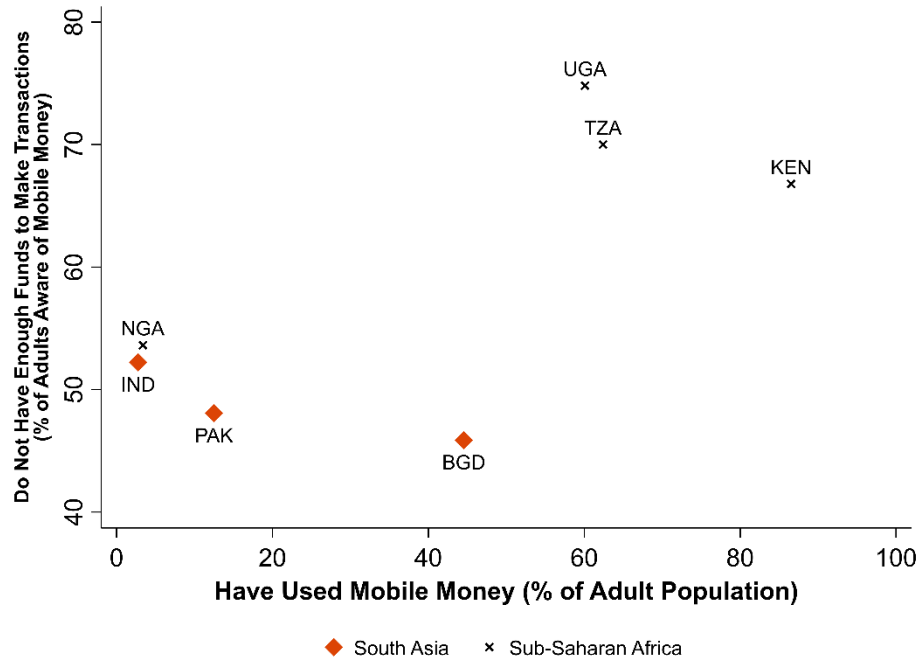
As mentioned above, survey data on reasons for not using mobile money are very scarce. However, individual-level data from the 2017 FII survey conducted for a set of seven countries—Bangladesh, India, Kenya, Nigeria, Pakistan, Tanzania, and Uganda—are useful. The survey provides data on the percentage of adults that have ever used mobile money services and asks why people decide not to use mobile money services, with not having enough money for transactions as a possible answer.

Figure III.17 shows the relationship between the percentage of adults that have used mobile money services and the percentage of adults that have used these services but identify insufficient funds as a reason why others might not use them.⁶⁵

⁶⁴ In that case, lack of funds can potentially be a binding constraint for the expansion of *store of value* services.

⁶⁵ The FII survey asks to agree or disagree with “I do not have enough money to make any transactions with mobile money” as a reason for why people may decide to not use mobile money services. The Figure shows the percentage of people that agree or strongly agree with that statement.

Figure III.17. Lack of funds and mobile money usage, 2017



Source: InterMedia – Financial Inclusion Insights (2017)

The figure shows that in all countries in the sample, the percentage of adults who, having used mobile money, agree that insufficient funds is a reason for not using the service is quite high—more than 45 percent in all countries. This percentage is the highest (from 67 percent to 75 percent) in countries with high penetration of mobile money. This suggests that in this set of countries, pockets of poverty are perceived as constraints to further improving mobile money usage.

Can poverty be a binding constraint in countries with low mobile money penetration, such as India, Pakistan, and Nigeria? Unfortunately, the data presented in Figure III.17 are not sufficient to answer this question. As discussed below, a high preference for cash can also be a constraint on the use of mobile money services. Moreover, and as stressed throughout this paper, the analysis needs to discard supply-side constraints to reach definite conclusions.

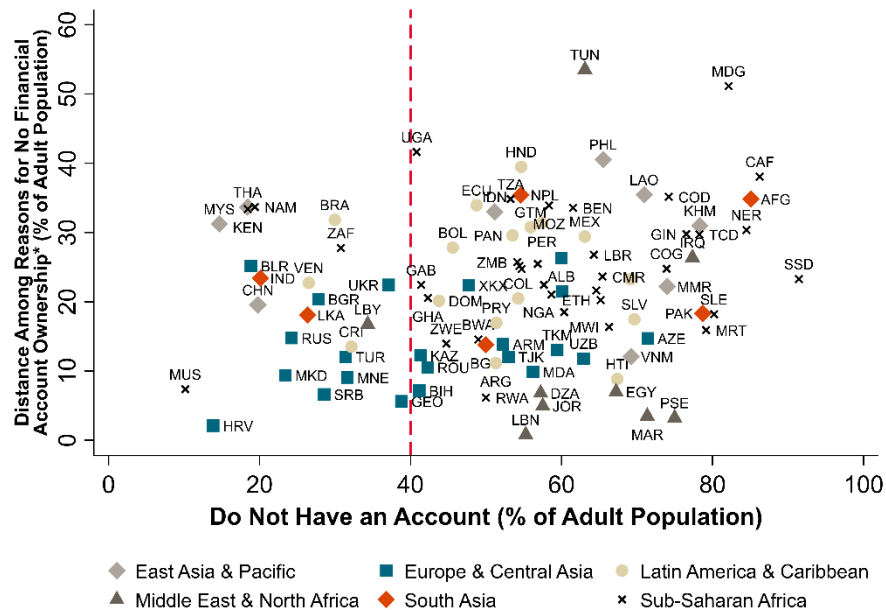
Another indicator of poverty relates to the geographical distribution of low-income populations. In rural areas, populations are more disperse, making it harder for them to travel to a financial service provider (or its agents' network) and for providers to reach the scale of consumers necessary to make their business model profitable. Thus, high population dispersion in low-income communities can be at the root of a coordination failure, impinging on both the demand and the supply side of the market.

For the respondents without an account in a financial institution, Findex data allow the identification of those who report their distance from a financial institution as a reason (among others) for not owning an account. This percentage is shown in Figure III.18A. One

can also identify the percentage of the adult population who report long distance *and* lack of funds as the reasons for not having an account. This is shown in Figure III.18B.

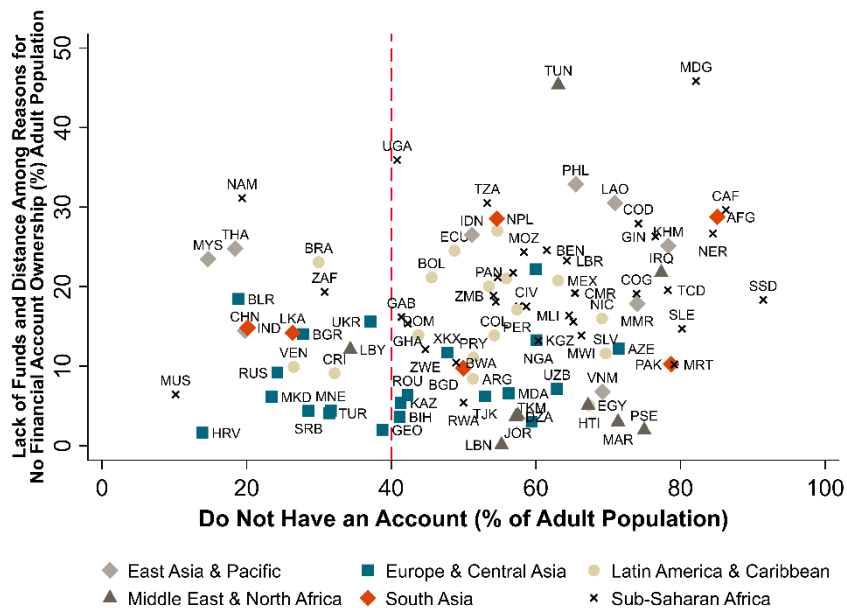
Figure III.18. Distance, 2017

A. All constraints are included



*Among respondents without a financial institution account

B. Distance and lack of funds as constraints



*Among respondents without a financial institution account

Source: Findex (2017)

Among countries with high ratios of financial exclusion (measured by more than 40 percent of adults lacking an account), the percent of respondents citing *distance* as a reason for not owning an account varies widely (Figure III.18A). For example, in countries like Madagascar and Tunisia, over 50 percent of the unbanked population report distance as a reason for not having an account. In Mexico, where there is information about the cost associated with reaching a bank branch, the percentage of the unbanked population reporting distance as a problem is about 30 percent. Box III.6 briefly discusses these costs and their differences in urban and rural populations.

In contrast, in countries like Lebanon and Morocco, Figure III.18A shows that less than 5 percent of the unbanked population report distance as a reason, suggesting that for this set of countries, distance is not a binding constraint for the large majority of unbanked population. In countries where distance is reported as an issue, further analysis is needed to assess whether supply-side constraints dominate (or not). For instance, it is important to analyze whether lack of infrastructure, lack of competition among providers, or other supply-side constraints impede the provision of digital payment services to populations located in distant areas. Alternatively, geographical dispersion of important segments of the population may not allow for a critical mass for supplying digital payment services. In this case geographical dispersion could mean a coordination problem constraining supply.

Figure III.18B, which shows the percentage of respondents without an account who attribute that choice to their distance from a financial institution and their lack of funds, does not change the distribution of countries significantly.

The FII survey does not ask questions regarding distance, meaning we cannot gain general insights on distance as a factor constraining the demand for mobile money services.

Box III.6. Distance as a constraint in Mexico's urban and rural populations

In its household survey of 2018, Mexico's ENIF (Encuesta Nacional de Inclusion Financiera)⁶⁶ reports the time and transport cost spent by individuals to reach a bank branch or an ATM. As shown in the table below, the time needed to reach a bank branch is higher for the rural than the urban population: close to 40 percent of the rural population spend over half an hour traveling (with 11 percent requiring over an hour) while about 95 percent of the urban population spend less than half an hour (with 26 percent requiring less than 10 minutes).

⁶⁶ See, https://www.gob.mx/cms/uploads/attachment/file/414832/Libro_Tabulados_ENIF2018.pdf

Table III.2. Average time to get to a bank branch and an ATM, 2018

Time to get to	Bank Branches		ATMs	
	Urban	Rural	Urban	Rural
Less than 10 minutes	26.0	9.5	29.0	14.0
Between 10 and 20 minutes	68.6	51.9	67.8	61.1
Between 30 and 60 minutes	4.7	27.6	2.8	19.6
More than 1 hour	0.7	10.6	0.4	5.1
Don't know	0.0	0.4	0.1	0.2
Total	100	100	100	100

Source: ENIF (2018)

The table below shows costs for roundtrip travel to a bank branch and to an ATM relative to Mexico's daily minimum wage (DMW) in 2018 (from CONASAMI (2018)⁶⁷). A quarter of the rural population would spend from 57 percent to 114 percent of the DMW on roundtrip travel to a bank branch, with 10 percent of the rural population spending even larger amounts. In contrast, only 5 percent of the urban population spend more than 57 percent of the DMW traveling roundtrip to a bank branch, with over 90 percent spending much less (and 34 percent of the urban population incurring no cost). Similar discrepancies, although less pronounced, are shown when considering the transport cost for reaching an ATM.

⁶⁷ See, <https://www.gob.mx/cms/uploads/attachment/file/285013/TablaSalariosMinimos-01ene2018.pdf>

Table III.3. Average round trip cost to arrive to a bank branch and an ATM as % of DMW, 2018

Round trip cost to arrive to	Bank Branches		ATMs	
	Urban	Rural	Urban	Rural
Doesn't expend	33.7	16.5	41.0	22.7
From 1 to 50 Pesos (56% of DMW)	60.3	45.0	54.8	49.8
From 51 to 100 Pesos (114% of DMW)	4.3	25.6	2.8	17.9
More than 100 Pesos (114% of DMW)	0.4	9.7	0.2	7.8
Don't know	1.4	3.3	1.2	1.7
Total	100	100	100	100

Sources: ENIF (2018) and CONASAMI (2018)

This information suggests that, for the rural population in Mexico, the cost of reaching providers needs to be included as a potential binding constraint.

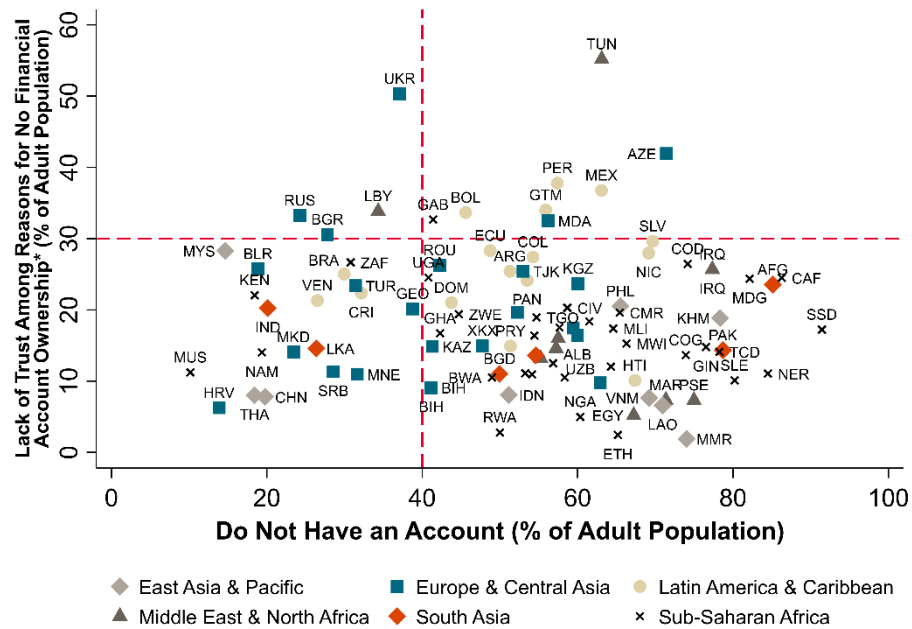
b. Indicators of Low Trust in Providers of Financial Services

For a first assessment of whether *lack of trust* might be a binding constraint, we filtered Findex's survey data to answer the following two questions: (1) "Among respondents without a financial institution account, what percentage list lack of trust as a reason for not having an account?" and (2) "Among respondents without a financial institution account *and* that do not report lack of funds as one of the reasons for not having an account, what percentage list lack of trust as a reason for not having an account?" With the caveat mentioned above when discussing indicators for low income as a binding constraint, this second question is used as a proxy to exclude populations with high levels of poverty; that is, populations that simply cannot afford to own an account. In those cases, many other reasons, such as lack of trust, are unlikely to be a binding constraint.

Figure III.19 presents scatter plots relating the percentage of the adult population who do not own an account with the calculated percentages of the population resulting from answering question (1) in Figure III.19A and question (2) in Figure III.19B.

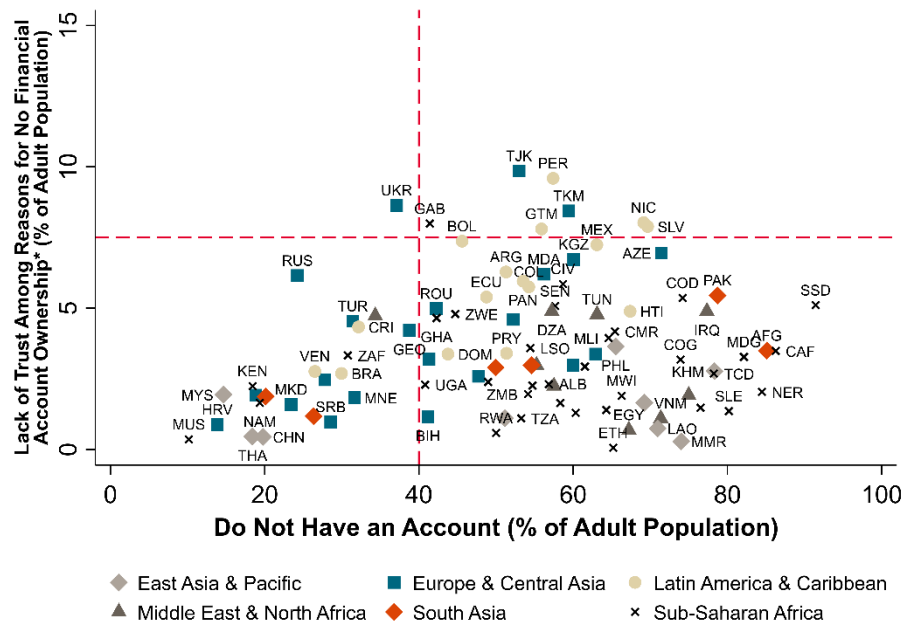
Figure III.19. Lack of trust, 2017

A. All constraints are included



*Among respondents without a financial institution account

B. Lack of funds is not reported as a constraint



*Given sufficient funds

Source: Findex (2017)

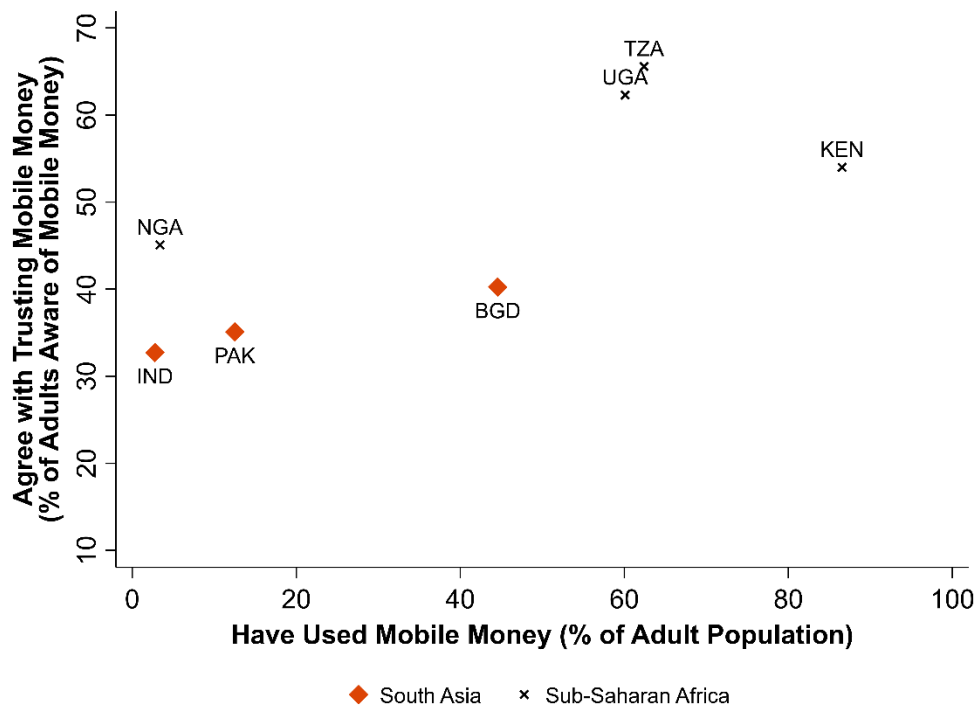
Countries located in the upper right quadrant of Figure III.19A—that is, countries with a large percentage of the population not owning a financial account (40 percent or more) and where a significant proportion (30 percent or more) reported lack of trust as a reason for not having an account—are mainly in Latin America (Bolivia, Mexico, Peru, Guatemala, and El Salvador) or in Central Europe (Azerbaijan and Moldova). Tunisia has the highest percentage of the adult population without an account reporting lack of trust (about 55 percent); and Gabon is also included.

However, when we exclude adults who did not report insufficient funds among their reasons for not having an account (Figure III.19B), no country satisfies the condition of at least 30 percent of the population reporting lack of trust as a reason for not having an account. When we set the bar at 10 percent of the population, only two countries—Peru and Tajikistan—are included, and at 7.5 percent, Turkmenistan, Guatemala, Nicaragua, El Salvador, and Gabon are also included. Thus, at least at first sight, it is unclear whether lack of trust can remain on the list of candidates for a binding constraint even in a few countries. Moreover, if we only include populations that report lack of trust as *the only reason* for not having an account (not shown here), there are no countries above the 3 percent mark. Only when we lower the bar to 2 percent, we find countries where the financially excluded population reports not having an account because of lack of trust in financial institutions (Gabon, Ghana, Tunisia, Tajikistan and Zimbabwe). Whether 2 percent of the population (or 7.5 percent) is a large enough number to keep *lack of trust* among the candidates for a binding constraint requires more specific knowledge of a country conditions.

Individual-level data from the FII survey can be used to gather information regarding trust in mobile money services. Using this data, Figure III.20 shows the relationship between the percentage of adults that use or have used mobile money and the percentage of adults that, having used it, indicate they trust these services.⁶⁸

⁶⁸ The FII survey asks to agree or disagree with “I do not trust mobile money” as a reason why people may decide to not use such services. The Figure shows the percentage of people that disagree or strongly disagree with that statement.

Figure III.20. Trust and usage of mobile money, 2017



Source: InterMedia – Financial Inclusion Insights (2017)

In countries where mobile money services have as of yet little penetration, such as India, Nigeria, and Pakistan, the indicator of trust is much lower than in countries with high mobile money penetration (Tanzania, Uganda, and Kenya). Survey results in the first set of countries suggest that *between 30 and 40 percent of adults who have ever used mobile money state that lack of trust may be a deciding factor for not using these services*, while similar percentages disagree with the statement (with the rest not having a definite view). These results do not provide enough information to decide whether *lack of trust* could be a binding constraint in these countries. Further exploration on individual country circumstances would be needed.

Nevertheless, as discussed in section II, it is important to keep in mind that, in countries where a significant proportion of the population indicates lack of trust in the providers of any digital financial product, such distrust could be the root cause of a coordination problem; that is, distrust might severely limit the uptake of the product, which in turn would prevent suppliers from offering of the product (due to the absence of a critical mass to make the offering profitable).

Generally, two major, interrelated factors can explain lack of trust in financial services: consumer insecurity and low quality of institutions and governance. Indicators of institutional quality have already been discussed since they also affect the supply of all types of financial services. In addition, macroeconomic instability is a third factor that, although it affects the demand for store-of-value services more, can also adversely affect the demand for payment services.

i. Consumer Insecurity

Low levels of consumer safety and security in conducting financial transactions can be an important factor explaining lack of trust in financial services providers (traditional and otherwise). This applies to the whole range of financial services. Indicators of lack of consumer safety/security include:

- Reported (or surveyed) number of users that have been subject to theft or robbery at financial institutions' branches/agents/ATMs or DSPs' agents (either by individuals associated with the provider or by people external to the provider's business) as a proportion of total users of digital financial services.
- Reported (or surveyed) number of users that have been subject to fraud or misuse of information by financial institutions or DSPs providers (and their agents) as a proportion of total users of digital financial services.

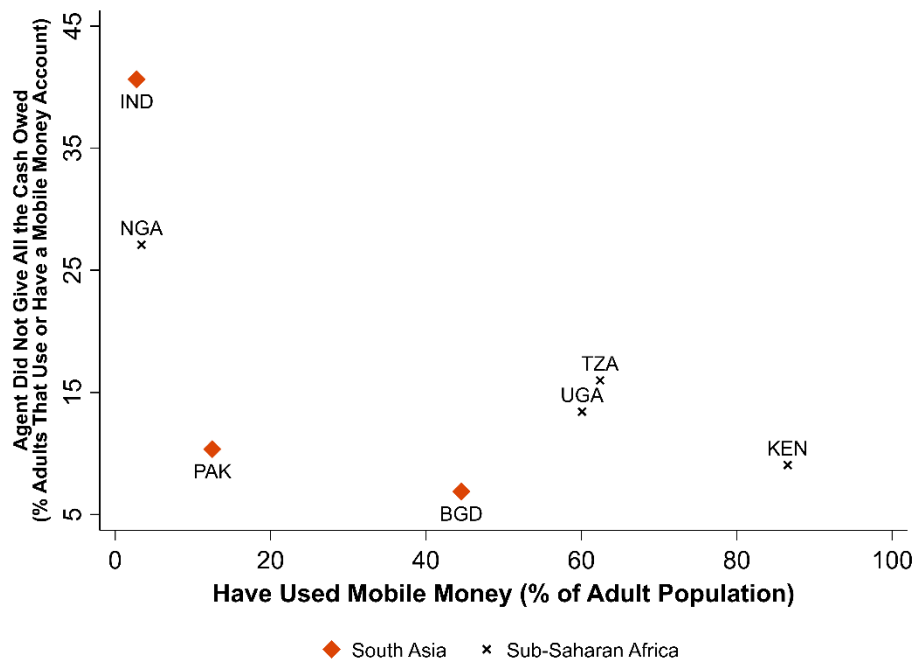
Survey data from FII for their seven countries helps to exemplify how these indicators can be used. Figure III.21 shows the relationship between the percentage of adults who use or have used mobile money and the percentage of adults who, having used it, report two forms of fraud: receiving less money than owed by agents⁶⁹ (Figure III.21A) and agents sharing their information/account without their permission⁷⁰ (Figure III.21B).

⁶⁹ The survey asks individuals who report using or having used mobile money how often mobile money agents did not give them all the cash that was owed. Possible answers include (a) never; (b) once or twice; (c) sometimes; (d) often and (e) always. Figure III.21A reflects positive responses to (c), (d), and (e).

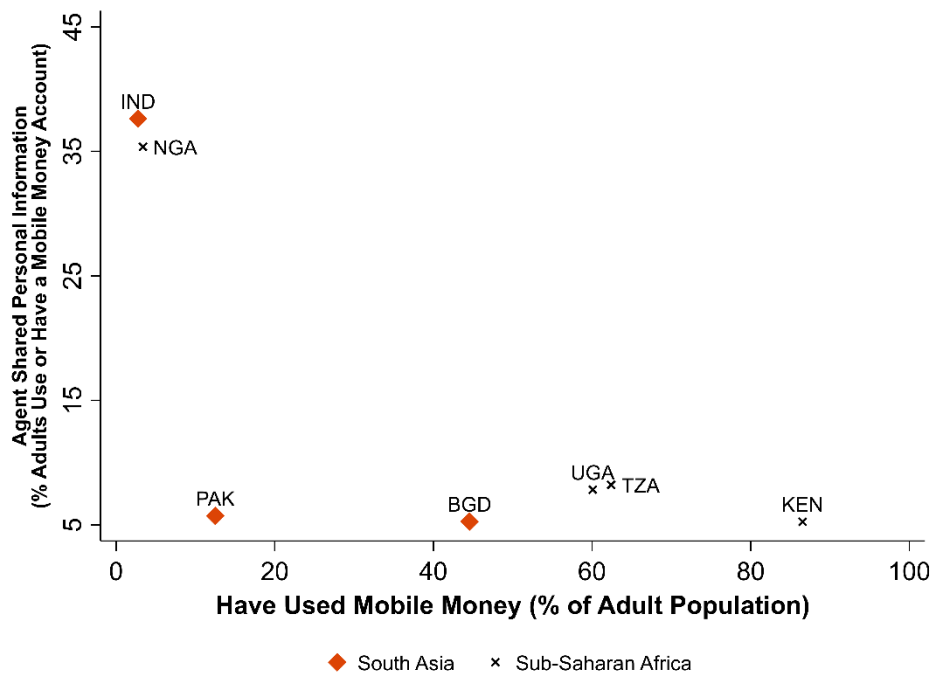
⁷⁰ The survey asks individuals who report using or having used mobile money how often mobile money agents "shared your personal/account information with other people without your knowledge/permission." Possible answers include (a) never; (b) once or twice; (c) sometimes; (d) often; and (e) always. Figure III.21B reflects positive responses to (c), (d), and (e).

Figure III.21. Fraud to users of mobile money services

A. Agent did not give all the cash owed



B. Agent shared personal information



Source: InterMedia – Financial Inclusion Insights (2017)

The percentage of the adult population that reported the presence of fraud was significantly higher in India and Nigeria, two countries in the sample with low penetration of mobile money usage. In these cases, consumer safety issues could be behind the reported low trust in mobile money services. Once again, the results shown above should guide the work of county-specific analysis rather than present definite conclusions.

ii. Macroeconomic Instability

Macroeconomic instability has played a major role in reducing the willingness of individuals and firms to trust their funds to formal financial institutions. This problem, however, affects the demand for store-of-value services (such as deposits either in banks or e-wallets offered by nontraditional suppliers) more than payments and transfer services. Therefore, it will be discussed in more detail in section IV.

However, there is one aspect of macroeconomic problems that directly impacts mobile money.⁷¹ Although for most digital payment transactions the risks that arise during completion of the transaction are small, there is still a risk as settlement does not occur at the same time the transaction is made, exposing the user to the provider's potential failure. An established⁷² way to cover this risk inherent in the intraday flow of payment services that also applies to new providers, like MNOs and other non-bank DSPs, is to require each DSP to open a dedicated trust account at a bank while its customers maintain individual records with the DSP, but not with a bank. The DSP would hold a single aggregate account at a bank for the total amount of individual net exposures (that is, netting out gross exposures). The regulator may require the funds to be distributed across multiple banks to diversify the risk of problems in any particular bank. However, often in developing countries, if severe macroeconomic problems materialize, a systemic banking crisis ensues, putting at risk many banks' capacities to make good on their existing obligations. Doubts about banks' ability to make good on the MNOs trust accounts could debilitate mobile money schemes and reduce customers' willingness to increase demand for these services. Evaluating macroeconomic indicators is, therefore, necessary to assess whether they might pose demand-side constraints on mobile money services.

c. Indicators of Perceived Low or No Benefits from Using Digital Financial Products

Once again, Findex data permit an initial assessment regarding *low perceptions of benefits from using financial products* as a binding constraint. This time, we filter the data to answer the following question: "Among respondents without a financial institution account, what percentage reports that they do not need an account as the *only* reason for not having one?" We follow this procedure because there are, of course, many reasons why people perceive that they do not need an account: having a family member that has an account or religious reasons are two that are included as possible responses in the Findex survey. Thus, by

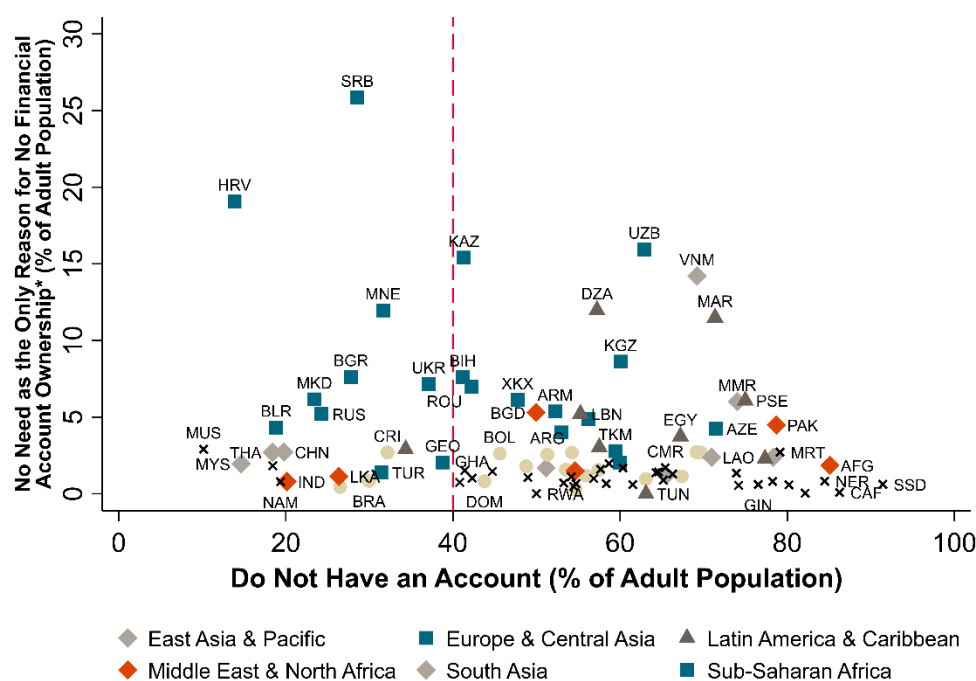
⁷¹ Dots for the box in the decision tree for *macroeconomic instability* to imply that the branch is a *softer* constraint on payments than on store of value.

⁷² Kenya M-Pesa, for example, follows this model.

filtering out these factors, we can try to get a proxy for a perception of *low benefits from having an account*.

Figure III.22 relates the percentage of the population who do not have an account with those that report they do not need one as the only reason for their behavior.

Figure III.22. No need for an account, 2017



*Among respondents without a financial institution account

Source: Findex (2017)

In only a few countries with large segments of financially excluded adults (again, above 40 percent) do significant segments of the population without accounts report not having one because they do not need it (as the only reason). Indeed, only in Algeria, Morocco, Kazakhstan, Uzbekistan, and Vietnam do more than 10 percent provide this response.⁷³ A perception of low benefits from having an account is thus highly unlikely to be a binding constraint for the observed low ratios of account ownership.

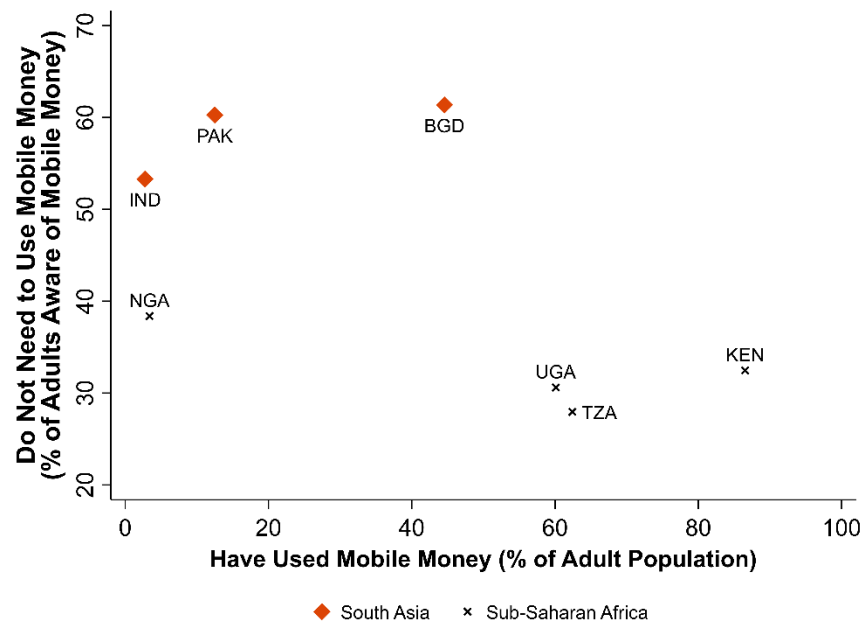
With respect to mobile money accounts, data from FII indicate the extent to which populations perceive low benefits from the use of mobile money. Figure III.23 relates the percentage of the adult population who have ever used mobile money with the percentage of

⁷³ In these same countries, large segments of the adult population report not having an account because other family members have one. For example, in Kazakhstan, over 35 percent without an account report this reason.

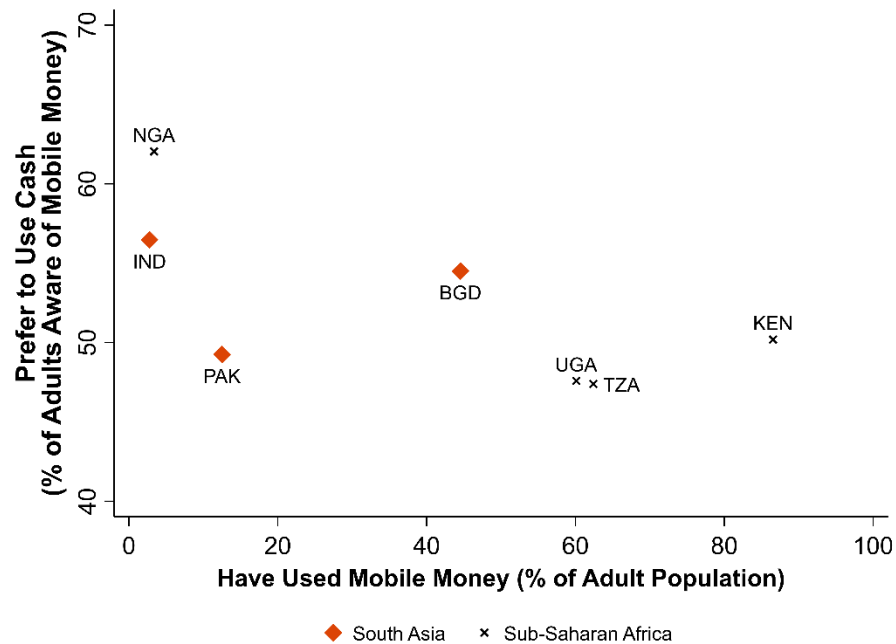
the population who, having used mobile money, perceive that those who don't have no need for it (Figure III.23A) and/or have a strong preference for cash. (Figure III.23B)

Figure III.23. Perceptions of low benefits and mobile money usage

A. No need to use mobile money



B. Prefer cash to mobile money



Source: InterMedia – Financial Inclusion Insights (2017)

The percentage that perceive lack of need or a strong preference for cash as reasons for people not to use mobile money is quite high in countries with low mobile money penetration. In India, for example, both indicators reach over 50 percent. It is notable, however, that in all countries in the sample, a significant share of the population who have ever used mobile money state a preference for cash is a reason for not using the digital services (over 45 percent).⁷⁴ This is quite telling since, as discussed before, a strong preference for cash could be at the core of coordination problems preventing enough supply of mobile payment services at affordable prices. In searching for binding constraints, the country-specific analysis, therefore, needs to further explore (a) whether there is indeed an entrenched preference for cash in the country, and (b) if such a preference is found, reasons that explain it.

Lack of financial literacy is commonly advanced as a reason for a low uptake of digital financial products in a number of countries. Studies about the effects of low financial literacy, however, relate more to the ownership of a store-of-value account than to a payments account. We will, therefore, discuss this issue in section IV.

IV. Store-of-Value Services

1. The Tree for Store-of-Value Services

The decision tree for digital store-of-value services resembles that for digital payment services. All potential constraints in both the supply and demand sides of the digital payment services tree are relevant to the store-of-value services tree. However, there is an important difference in the risks associated with the provision of digital payment services and those with digital store of value. This implies that the decision tree for store of value needs to have a few more branches than the tree for payments. Specifically, as long as the provision of payment services is limited to small transactions—whether payments, remittances, or transfers—the risks involved are also small and can largely be dealt with through standard payment or money transfer regulation only. Notably, intraday settlement risks can be addressed within the payment system framework so that the provision of small digital payments and transfers pose little risks to customers and to the overall financial system. The provision of digital store-of-value services pose additional risks to the consumer related to the safety of the stored value.⁷⁵ In focusing only on safety issues, we assume that DSPs do not use their store-of-value accounts to fund credit or to provide other forms of intermediation. If they did, the riskiness of the DSP's balance sheet would increase, and other type of constraints would need to be taken into account. The decision tree for the provision of credit services is discussed in section V.

⁷⁴ However, in countries with high mobile money penetration, not having enough funds is perceived by the large majority of adults that have ever used mobile money as the reason for individuals not using the services (see Figure III.17)

⁷⁵ The World Bank (2012) defines e-wallet as an e-money product for which the record of funds is stores on a specific device, typically a chip on a card or in a mobile phone

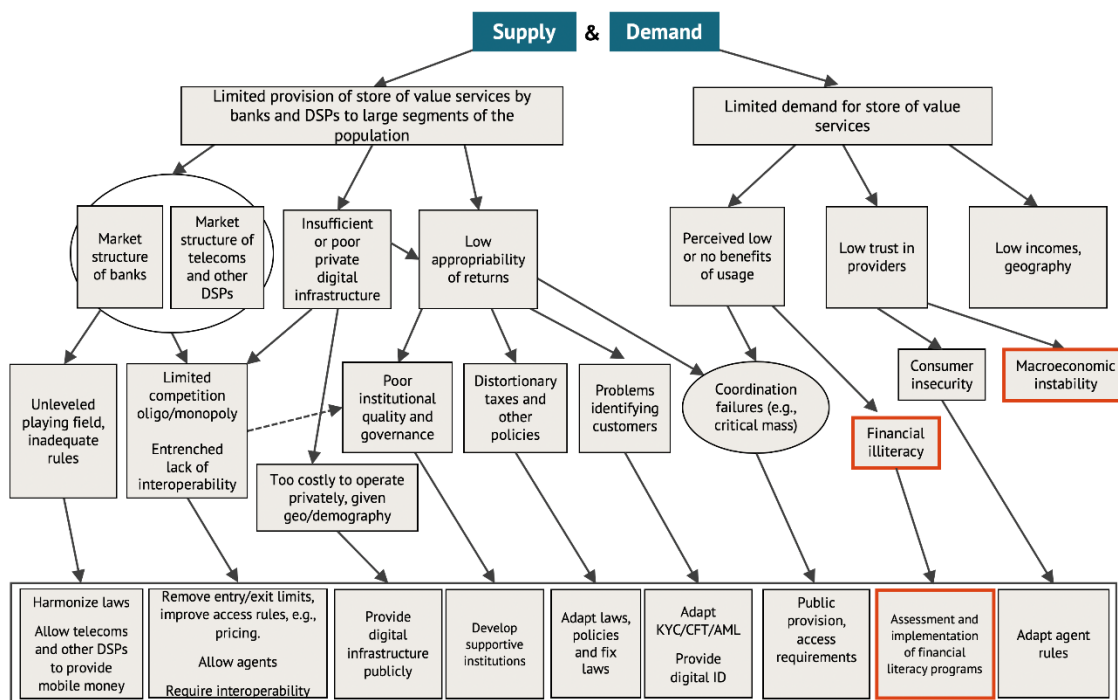
Rather than repeating the common branches of the tree discussed in section III, we focus on those *additional* constraints that particularly affect the usage of store-of-value services.⁷⁶

These constraints are largely on the demand side. But they can also affect the supply side if the constraints impede the formation of a critical mass of consumers and, therefore, limit the offering of store-of-value services (that is, a coordination problem emerges). The additional constraints to consider are (a) macroeconomic instability, and (b) lack of financial literacy.

Figure IV.1 shows the decision tree for digital store-of-value services. The **orange** boxes are the additional branches relative to the digital payments tree. The procedure to *navigate* the tree is the same as for the payments tree. One needs to assess whether there are indicators signaling supply-side or demand-side constraints. There are signals of the former if the low provision of digital store-of-value services such as e-wallets, debit cards (pre-paid or linked to a bank account, etc.) combines with a high (market or shadow) price charged for the provision of these services. As discussed in section III, the relevant price for customers is not necessarily the market price since there could be a number of other costs associated with the usage of the financial service.

⁷⁶ Although, they could also affect the usage of other financial services, as discussed in section III.

Figure IV.1. Determinants of inadequate financial inclusion using digital store-of-value services and regulatory solutions



2. Indicators Signaling Supply-Side Constraints for Store-of-Value Services

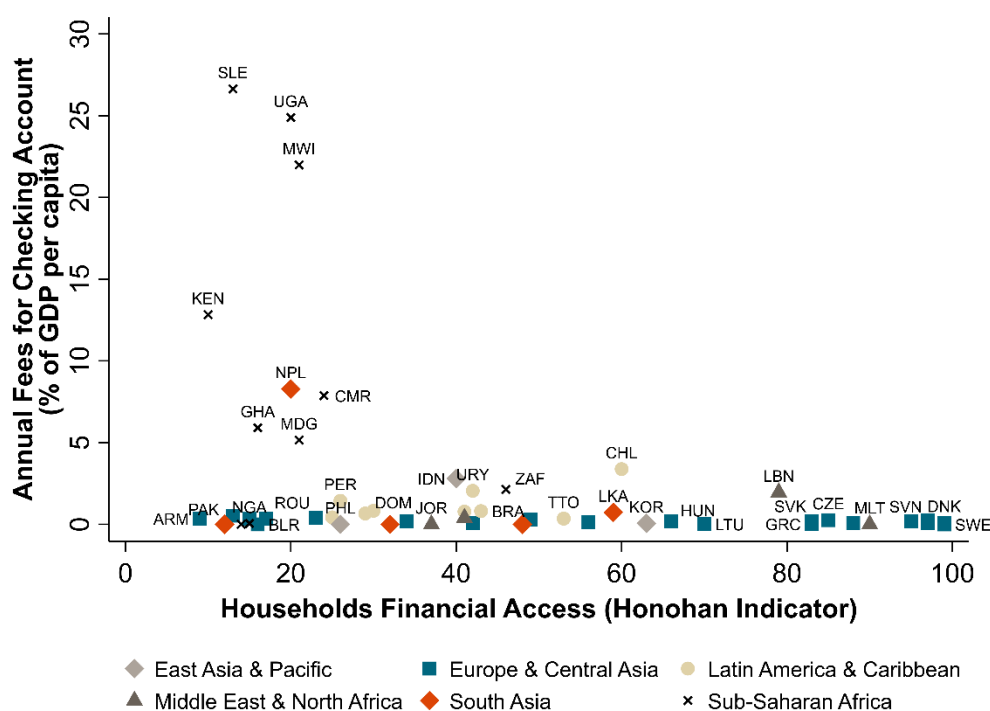
Indicators signaling a high (market) price for the provision of deposits (checking and savings accounts), e-wallets, and other stores of value include:⁷⁷

- Fees for opening an account (as percentage of GNI per capita)
- Fees for maintaining an account (as percentage of GNI per capita)
- Withdrawal fees from e-money accounts

Since available cross-country data on fees and other costs charged by banks and other providers of store-of-value services are scarce, for illustrative purposes only, we use data from the 2000s to show the relationship between annual fees for maintaining a checking account (as percentage of GDP per capita) and an indicator of financial inclusion constructed by Honohan (2008). Thus, we present a similar exercise as the one presented in Figure III.2, which illustrates the potential presence of supply-side constraints in payment services.

⁷⁷ In addition, some of the fees discussed in the payments tree, such as fees for ATM withdrawals, are also relevant.

Figure IV.2. Fees for maintaining an account and household financial access, 2006



Source: Honohan (2008), Beck, Demirguc-Kunt and Martinez Peria (2008)

As shown in the Figure IV.2, in 2006 banks in countries like Sierra Leone, Uganda, and Malawi charged the highest fees for maintaining an account. At the same time, these countries showed very low ratios of household financial inclusion (less than 30 percent according to the Honohan indicator). This signals that supply constraints might have been binding for the provision of deposits in these three countries. This contrast with countries like Belarus and the Philippines, where, although financial inclusion was very low in 2006, banks did not charge any fees for maintaining a checking account. Notice, however, that one cannot conclude that there were no supply constraints in these two countries. It is possible that banks were charging high fees for maintaining a *savings* account or for opening or maintaining other store-of-value services.

As with the payments tree, to reach more definite conclusions in the store-of-value trees, it is important to collect and analyze the latest information on as many of the fees and commission for store-of-value products as possible. If the analysis shows that some of the fees are high relative to those charged for other financial services in the country or relative to properly adjusted fees in countries with similar degree of development, there are signals of supply-side constraints and the next step is to try to explain this outcome by navigating the branches of the tree on the supply side. However, before concluding that the problem is on the supply side, the analysis needs to also assess whether the indicators on the demand side of the tree can be discarded as binding constraints.

3. Indicators Signaling Demand-Side Constraints for Store-of-Value Services

In addition to the indicators discussed in the payments tree, there are two indicators to consider on the demand side of the store-of-value tree: financial illiteracy, which can be a factor explaining perceived or low benefits from using store-of-value services; and macroeconomic instabilities, which may be an important factor behind the presence of low trust in these services.⁷⁸

a. Low Financial Literacy

The number of countries worldwide that are including financial literacy programs as part of their strategies to improve financial inclusion has increased in recent years. Assessing whether lack of financial literacy is a binding constraint, however, faces two important challenges. First, there is no agreed definition of “financial literacy,” and second, evaluating results from financial literacy programs involves detailed and long-term studies, often through randomized controlled trials (RCTs), which may take different approaches, making them not fully comparable.

Traditionally, the focus has been on financial numeracy skills as proxies for financial literacy, assessed by using questions about interest rates, inflation, and risk diversification. Some cross-country evidence points to a causal link between these skills and owning a bank account.⁷⁹ However, recent work at the World Bank (Carpena et al. (2011) and Carpena and Zia (2018) has proposed an approach that goes beyond these measurements, positing that financial awareness and attitudes are key additional dimensions of financial literacy. “Financial awareness” refers to a fundamental understanding of financial planning and financial products and services. “Financial attitudes” refers to the individual’s perception about the benefits of using financial services. Xu and Zia (2012) indicate that evidence from FinScope surveys suggests that awareness is “a major barrier to take-up financial products,” providing support for the broader concept of financial literacy.

Not only are there important differences in definitions of financial literacy, but also in the programs implemented to improve financial literacy in different countries. Programs differ significantly in terms of content (i.e., focusing on numeracy, awareness, attitudes, or a combination of all three) and modes of operation (classrooms or online, to adults or students, including economic incentives or not, etc.). These marked differences imply that conclusions derived about what works and what does not in one country (or even state or community) cannot be easily transferred to other countries or locations.⁸⁰

⁷⁸ The lack of a well-designed and credible safety net (including through a deposit insurance scheme) protecting funds kept in e-wallets can also be a factor affecting the demand for these products.

⁷⁹ See, for example Grohmann, Klühs and Menkhoff (2018).

⁸⁰ Partly because of the differences in defining financial literacy and in the methods used to assess it, the literature does not provide clear results on its effects on inclusion (see Kaiser and Menkhoff (2016) and Fernandes, Lynch and Netemeyer (2014)).

Thus, a proper evaluation of financial literacy as a binding constraint is complex. It is likely that in many countries with low levels of bank account ownership, large segments of the population score low on most of the suggested indicators for financial literacy. The *decision tree* can guide the analysis by reminding us that it is first necessary to eliminate supply-side constraints before concluding that a binding constraint is on the demand-side of the tree. If the analyst is convinced that the binding constraint is on the demand side *and* the indications of insufficient financial literacy are strong, then this variable may be a candidate for a binding constraint. The next step is to determine through a serious study the extent to which public resources should be allocated to lessen the severity of the constraint *for the purpose of improving financial inclusion*.

Indicators of financial literacy can be assessed using the three dimensions suggested by Carpena and Zia (2018): financial numeracy skills, awareness, and attitudes.⁸¹ Box IV.I reports on a study in India that uses the RCT methodology to conclude that for the city of Ahmedabad, attitude was the most relevant dimension to focus on in order to achieve significant gains in savings through opening accounts in formal financial institutions.

Box IV.I. Defining financial literacy matters when assessing whether it is a constraint: A lesson from India

There is an increasing number of studies analyzing the impact of financial literacy on savings and account ownership in different areas in India. Generally, these works (mostly RCTs) differ in their methodologies and are, therefore, not directly comparable or generalizable to the aggregate level of a country. However, a lesson from several studies is that improving financial literacy defined only as increased financial education falls short of the goal. For example, an assessment of alternative programs in the metropolitan area of Ahmedabad in Gujarat, undertaken by Carpena and Zia (2018), shows that the group that received only financial education did not increase its savings behavior, while individuals who also received goal-setting assistance were 8.2 percent more likely to open a savings account, and those who combined financial education and counselling were 16.7 percent more likely. Carpena and Zia conclude that complementing financial education with additional work that reinforces financial awareness and attitudes yields stronger results. In other words, financial illiteracy, defined narrowly as education in financial matters, did not seem to be a binding constraint in this study; a broader concept capturing awareness and attitudes might have been.

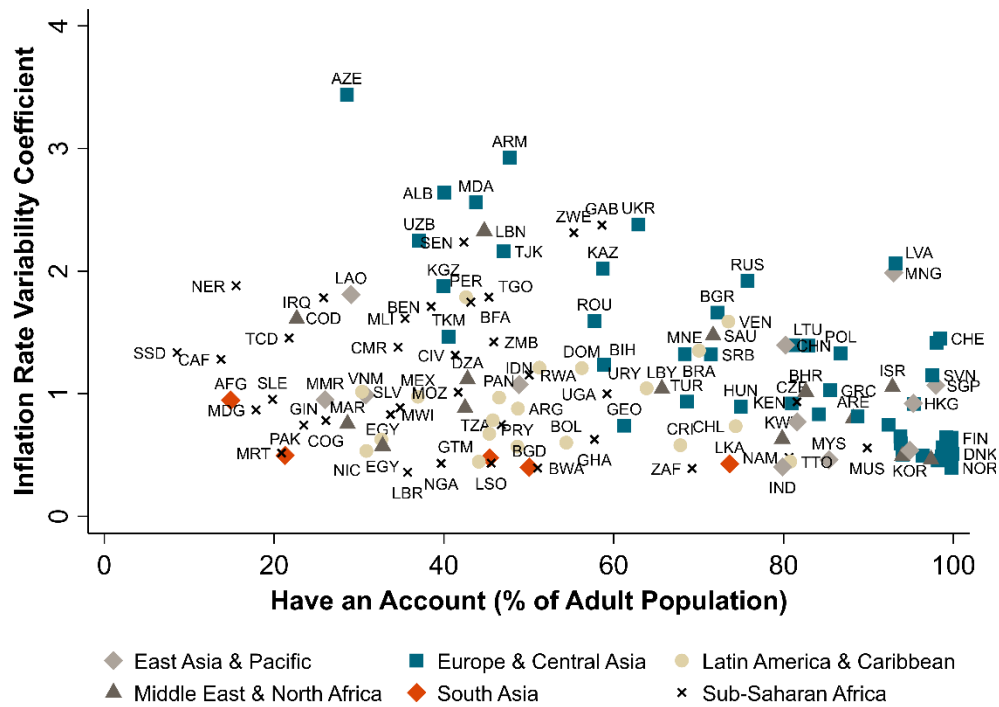
⁸¹ Following Carpena and Zia (2018), financial literacy can be divided into three different dimensions that provide different indicators: (1) *Financial numeracy skills*, which includes questions from Lusardi and Mitchell (2011) named as the “Big Three” about interest rates, inflation, and risk diversification. The S&P Global FINLIT Survey (Klapper et al. (2014)) provides a global database on these type of questions; (2) *Financial awareness*, which includes questions about the conditions necessary to open a bank account, knowledge on deposit insurance regulation, and differences between productive and unproductive investments; and (3) *Financial attitudes*, which include questions about willingness to take insurance or increase savings and about the usefulness of making budgets.

b. A Central Indicator of Lack of Trust: Macroeconomic Instability

The adverse effects of macroeconomic instability on all aspects of finance (development, depth, and inclusion) are well documented. Large macroeconomic imbalances are associated with financial crises, sharply slowing the provision of credit. But the problems go well beyond credit supply. The adverse effects on the demand for financial services, especially those related to savings, are usually severe and may last well after the end of a financial crisis. The reason is that the demand for savings products offered by the formal financial system depends largely on the people's trust in the soundness of the system. The economic and financial crises in emerging/developing countries in the last four decades have resulted in significant losses for depositors. Deposit freezes, interest rate ceilings, forced conversion of deposits in foreign currency into local currency using undervalued exchange rates, and hyperinflation that destroys the value of savings in the financial system were among the causes. Many emerging/developing countries around the world have experienced enormous real interest rate fluctuations, in some periods taking on negative values. Figure IV.2 relates the volatility of inflation (approximated by the variability coefficient in the period 1992–2017⁸²) and the percentage of the adult population that owned a bank account in 2017 for a sample of countries worldwide.

⁸² The sample starts in 1992 to exclude the hyperinflation period in the early 1990s in some countries, like Brazil and Peru.

Figure IV.3. Inflation rate volatility, 1992-2017



Sources: IMF – World Economic Outlook (2019) and Findex (2017)

Among EMDEs with low levels of financial inclusion (less than 50 percent), countries like Azerbaijan, Albania, and Cambodia show high ratios of inflation rate volatility and low account ownership. In these countries, it is important to analyze whether volatile inflation has generated an important constraint for accumulating store of value in the formal financial system (since customers, for example, might not trust that the real value of their savings will be preserved).

V. Credit Services

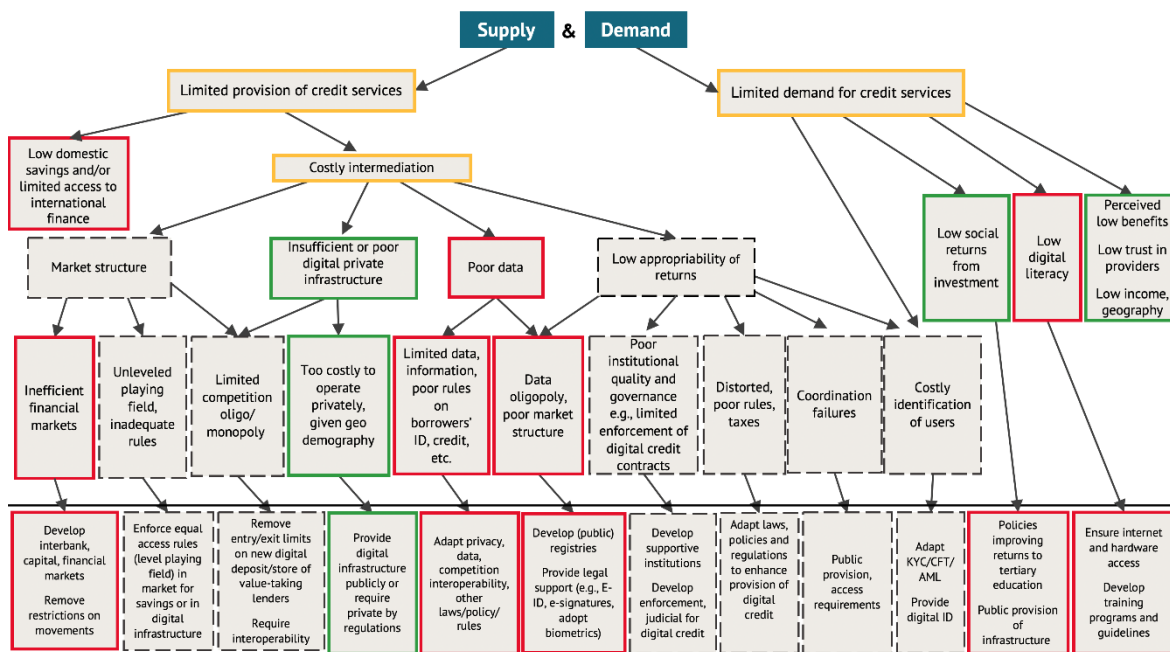
1. The Tree for Credit Services

Credit services, including digitally provided credit services (DPCS), differ significantly from payments or store-of-value services in terms of their risk and complexity characteristics. Thus, although the tree for credit services shares many common factors with the trees for payments and store of value, it also has a number of additional features, namely, possible constraints specifically affecting the supply and the demand sides.

Figure V.1 introduces the complete tree for credit services. To help readers understand the credit tree and its comparison with the trees for other digital financial services, branches are presented in color. Branches in **green** denote factors that are *generic*; that is, they are not *specific* to the credit tree but can apply also to other financial services trees. Branches outlined with dashed-black lines denote factors that are also present in other trees but use different

indicators to represent constraints to credit (*adapted* factors). Branches in **red** represent constraints that are *specific* to the credit tree. Finally, branches in **yellow** reflect the combination of a mix of factors: generic, specific, and adapted. As in previous trees, the last row shows the areas of recommendations.

Figure V.1. Determinants of inadequate financial inclusion using digital credit services and regulatory solutions

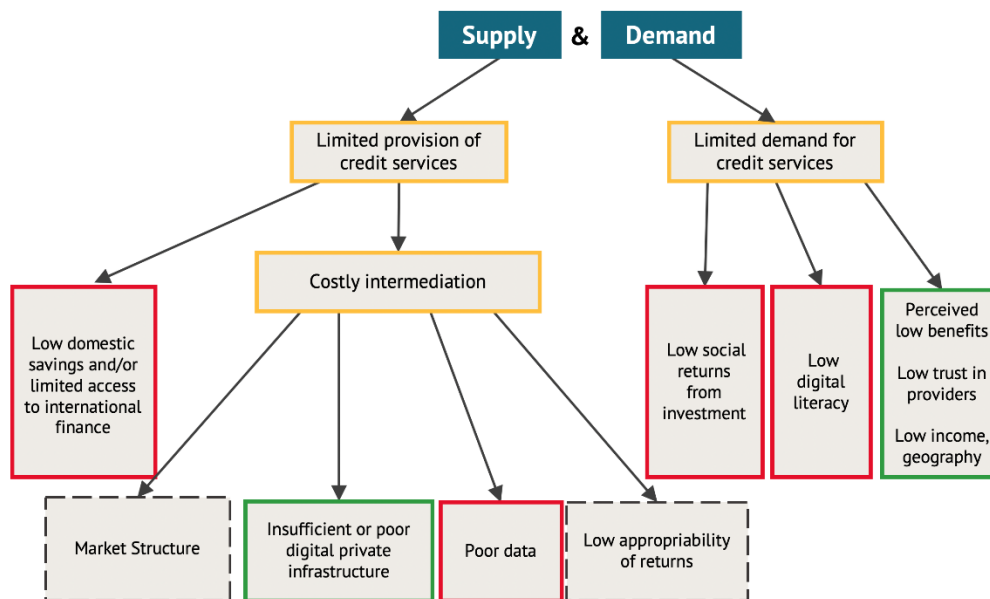


A reduced version of the tree with just the upper branches is presented in Figure V.2. The *demand* part (on the right) refers to the inability or unwillingness of many final users to pay the price charged for credit services, even if the price is low. Low demand for credit services can have financial services' *generic* and *adapted* causes as well as *credit-specific* causes. The *generic causes*, depicted in **green**, are typically the same as those for the demand-side of the store of value: lack of income, lack of trust in providers, and perceptions of low or no benefits from using the service. To avoid repetition, this is not discussed further. The *adapted factor* relates to the *cost of identifying* consumers (depicted in **dashed-black**); although discussed in previous trees, mostly on the supply side, this branch is important on the demand side since the identification requirements (and associated costs to customers) are significantly higher for credit services than for other financial services. The demand factors *specific* to credit services can be: (a) *low social returns from investments*, i.e., a lack of profitable projects to seek financing for; and (b) *low digital literacy*, which limits the capacity of potential borrowers to express their demand for digital credit.⁸³ It is important to note that while digital literacy may also be a

⁸³ As discussed in the tree for store-of-value services, financial and digital literacy are not the same. It could well be that a group of potential customers, say in the older generation, may understand and be aware of the benefits

constraint for demanding other digital financial services, we discuss it here because of the larger complexities involved in applying for a loan digitally. These two factors are depicted in **red**, indicating that they are elements that will be discussed for the first time in this section. Overall demand constraints are then depicted in **yellow**, to indicate its mix of generic, adapted, and specific factors.

Figure V.2. Reduced version of the tree for digital credit services



The other part of the tree refers to the constraints on the *supply* side, i.e., *limited provision of digital credit*, depicted in **yellow**. There are two potential causes limiting suppliers' provision of credit, including DPCS: insufficient availability of *savings* at the country level and high *costs of financial intermediation*. For credit to reach large segments of the population, there need to be enough savings collected by the financial system (incumbent and new players), and the costs incurred by suppliers in intermediating those savings cannot be too high. Low savings is shown in **red** since this factor has not been discussed in the previous trees. Notice that here

of financial services, but not be digitally advanced enough to use the new services. For DPCS one would need both literacies.

we are referring to the overall availability of savings for the economy (domestic and external sources) that can be used to provide credit.⁸⁴

Regarding *costly intermediation*, there are four factors that can potentially explain this outcome (four branches, all with sub-branches themselves, shown on Figure V.1). Three of these are similar to branches for all types of financial services—they borrow mostly the same factors as in the trees for payments and store-of-value products and are largely as described in section III. The three factors are *market structure*, *poor digital private infrastructure*, and *low appropriability of returns*. The indicators for *poor digital private infrastructure* are the same (generic) as those in the other trees and therefore, this branch is shown in **green**. For *market infrastructure* and *low appropriability*, there are adjustments in terms of the indicators to be used to identify the presence of a constraint in credit services. These two branches are therefore depicted in **dashed-black** to indicate the similarity, albeit with adjustments (*adapted* factors), to previous trees. There is one branch, depicted in **red**, *poor data*, for which new analysis is needed for DPCS. To indicate a mix of generic, adapted, and new factors, the costly intermediation branch is depicted in **yellow**. We next discuss these branches, and the methodology and indicators, starting on the demand side.

2. Indicators Signaling Demand-Side Constraints for Credit Services

For expositional purposes, the discussion of this tree starts on the demand side. The analysis can, of course, instead start on the supply side; the important point is that, regardless where it starts, the analysis needs to include both sides to reach definite conclusions.

Consistent with the discussion in previous sections, observing a low usage of credit does not indicate whether the main cause of this outcome is limited demand for credit or a low supply of credit. As for other trees, prices help to distinguish between supply and demand constraints: absent credit rationing (discussed below), low prices and low usage indicate a demand constraint, while high prices and low usage are associated with a supply-side constraint. The first case means low-income users (households and firms) are unable or unwilling to obtain credit even though the charged price is low. The second case means that low-income users (households and firms) are willing to obtain credit but are unable to pay as the price is too high.

Before proceeding, two caveats are needed. First, as for other financial services, the relevant price determining consumer demand for credit includes not only the *market price*, but also all the costs incurred in obtaining credit (including costs associated with completing documentation or traveled distance to reach a provider). These additional costs, which will be further discussed below, are often hard to measure, especially for cross-country comparisons. Thus, for expositional purposes, we focus first on the market price component

⁸⁴ The store-of-value tree refers to the individual savings of the population at the bottom of the pyramid and not to the economy-wide (aggregate) savings.

of the cost to identify the presence of supply—or demand-side constraints. The second caveat relates to the potential presence of *credit rationing*; that is, a situation where suppliers in the formal sector do not offer credit to a segment of borrowers even at high interest rates because of the creditors' assessment that the probability of loan default would increase with the interest rate, reducing the creditors' expected profits. In this case, credit is often offered mostly to *traditional* customers—those with a history of being low-risk borrowers. With credit rationing, there is no price for credit in the formal credit markets to the excluded population (although the shadow price must be high); therefore, observable market prices do not provide enough information to differentiate between demand and supply constraints faced by low-income households and firms, which usually belong to the rationed set of borrowers. We expand on this issue below in Box V.I.

Turning back to the task of assessing the presence of demand-side constraints for credit, using market prices in the formal sector, the following indicators may be considered:

- Interest rates charged by banks and other traditional financial institutions (adjusted by the change in prices, as measured by an index).
- Marginal lending rate for providing DFCS (adjusted by the change in prices)
- Fees for obtaining bank credit (adjusted to percentage of GNI per capita)
- Fees charged by DSP for providing DFCS (adjusted to percentage of GNI per capita)

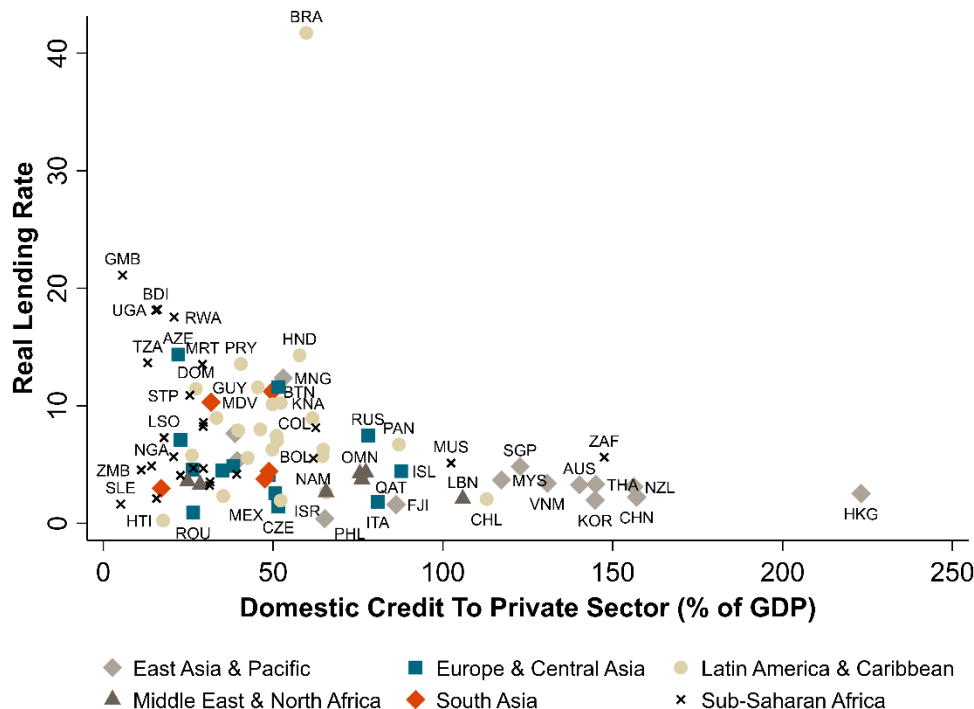
The market price of credit services is the interest rate. The relevant interest rate is the real lending rate—the rate that borrowers would need to pay (this would have to include the fees and other pecuniary costs the borrowers would need to incur). Since interest rates vary significantly across borrowers, obtaining the lending rate that applies to alternative classes of borrowers imply that the rate would have to be adjusted for the risk of default of the borrower and considering the fraction of the loan that can be recovered upon default, net of costs.⁸⁵ Note also that the demand for financing refers to the demand for *formal* financing; it can well be that there is significant demand for financing that is being met by informal means.

Lending rates charged by banks and other traditional financial institutions are easily available. However, when considering DPCS extended by non-banks DSPs, there are no readily available data sources on the marginal lending rate and volume of DPCS. At best, survey data can be used to tell if users have taken out a DCPS. For example, data from Financial Inclusion Survey Insights suggest that in Bangladesh, hardly any households took a loan through their mobile account in 2017, whereas in Kenya, about 46 percent of households held a loan. This data combined with the interest rate charged can help identify the nature of the constraint, that is, whether in the case of Bangladesh, users were unwilling or unable to take out a loan.

⁸⁵ In practice, it is not easy to adjust for risks and the recovery rate. Typically, the analysis will have to be done for the more creditworthy borrower.

Figure V.3 provides the lending rate (adjusted by inflation⁸⁶) charged by financial institutions and a measure of actual credit usage, showing a wide diversity among countries.

Figure V.3. Real lending interest rate and domestic credit to the private sector, 2017



Source: IMF – International Financial Statistics (2019)

Given the very limited availability of cross-country data regarding the percentage of the population that use credit services, we use the ratio of credit to GDP as a proxy.⁸⁷ While some advanced economies display high credit ratios and low real interest rates, a significant number of developing countries show low credit and high real lending rates, suggesting that

⁸⁶ In the figure, data is provided for 2017. The real lending rate equals the nominal lending rate minus expected inflation, where the latter is assumed to equal the observed inflation in the following year (2018).

⁸⁷ The ratio of credit to GDP directly assesses financial *depth* rather than financial *inclusion*. We use this ratio because (a) reportedly, there is a significant correlation between financial depth and access (see Cihak et al. (2012)) and (b) there are important limitations in the data on usage of credit services provided by Findex, the only comprehensive source of cross-country information for this variable. Findex (2017) only reports the percentage of adults *that have borrowed in the past 12 months*. Thus, it does not include, for example, individuals that borrowed in the past 24 or 36 months and have an outstanding loan at the time of the survey. As a result, some advanced economies with high rates of financial inclusion show lower ratios of credit usage than non-advanced economies, known by their low levels of inclusion. For example, data for Japan show that only 6 percent of the adult population borrowed from a financial provider in the past 12 months, while the percentages for Myanmar and Peru are 19 and 15 percent respectively.

supply-side constraints dominate.⁸⁸ Brazil is the clearest case, with very high real interest rates and modest amounts of credit relative to GDP, but countries like Uganda and Rwanda also belong in this category. In countries like Niger, Sierra Leone, and Zambia, the credit ratio is very low, and the real lending rate is also low (between 2 and 5 percent). Does this information signal a demand-side constraint? Not necessarily, because of the two caveats mentioned above: the potential presence of credit rationing and the nonpecuniary costs of getting credit.

Credit Rationing and Non-Pecuniary Costs

Box V.1 briefly explains the nature and characteristics of credit rationing. Empirically, however, it is not easy to determine whether a borrower self-excluded from the formal financial sector (as in cases when borrowers do not trust traditional lenders) or was rationed out.

Box V.I. Credit rationing: Low interest rates and low credit volumes may not always signal a demand-side constraint

Credit rationing occurs when creditors do not offer credit to certain borrowers, even if the latter offer to pay high interest rates. As discussed in Stiglitz and Weiss (1981), at high values, the interest rate charged by creditors may affect the riskiness of their overall loan portfolio through two channels: adverse selection and moral hazard. Adverse selection means that high interest rates may attract high-risk borrowers—those with higher probability of default on loans. Moral hazard implies that higher interest rates may affect the behavior of borrowers by inducing them to attempt to finance riskier projects: those with higher probability of failure (thus, default on loans) but higher payoffs if they succeed. Either because of adverse selection or moral hazard problems, a higher probability of default associated with high interest rates might reduce the creditor's expected return from lending.

Since creditors lack complete information about borrowers (including about the value of potential loans' collateral), creditors might not be able to assess whether a loan applicant reflects the presence of moral hazard or adverse selection. Thus, creditors might maximize expected returns by rationing out borrowers rather than by charging higher interest rates. Therefore, there will not be an observed market price for credit for the rationed segment of the population, although the shadow price would likely be quite high (as indicated, for example, by the rates charged in the informal credit markets), reflecting an unfulfilled demand for credit in the formal markets. Thus, in the presence of credit rationing, an observed low lending rate in the formal credit market does not signal a demand-side constraint.

⁸⁸ China represents an important exception, as it is a developing country with high credit and a low interest rate. But this largely reflects the repressed interest rate in the country, which allows some privileged firms (state-owned enterprises) to borrow at low interest rates but excludes many SMEs. It does suggest that the overall interest rate is not necessarily the right rate to use and that more micro-based studies can be necessary.

To proxy the presence of credit rationing, the most used indicators are surveys that directly ask households and firms whether they have been denied credit. A limitation of these indicators is that they do not identify whether a denial of credit simply reflected that a borrower truly lacked creditworthiness at any interest rate (as in cases of extreme poverty); in these cases, the applicant was not rationed out in the Stiglitz-Weiss meaning of the term.

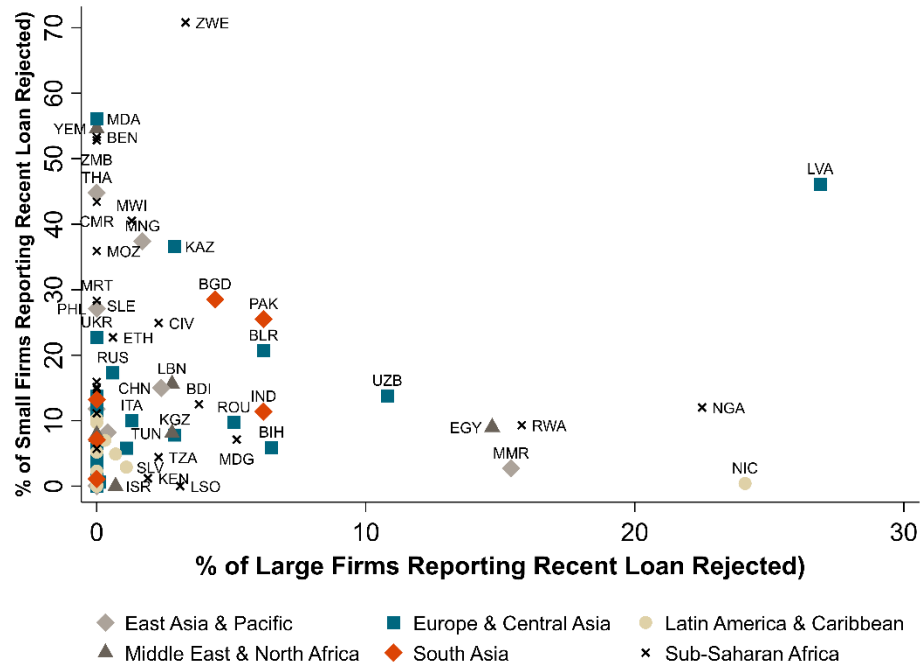
Notwithstanding this limitation, data for EMDEs from the World Bank Enterprise Surveys⁸⁹ provide some insights. Figure V.4 compares the percentage of loans applications by small enterprises that were rejected with the equivalent percentages for large firms (Figure V.4A) and medium-size firms (Figure V.4B).⁹⁰ Not surprisingly, in the large majority of countries the percentage of loan rejections to small firms is larger than those to large firms. While, as previously noted, this observation does not necessarily imply the presence of credit rationing, in some countries the difference in rejection rates between small and large firms was huge at the time of the survey. For example, in Cameroon, Thailand, and Yemen, the rejection rate for small firms ranged between 50 and 60 percent while that for large and medium firms was zero. Also, in Moldova and Zambia, the rejection rate for small firms was over 50 percent, while that for large firms was zero and that for medium firms was less than 20 percent. In these countries, the presence of credit rationing cannot be excluded.

⁸⁹ <https://www.enterprisesurveys.org/en/graphing-tool>

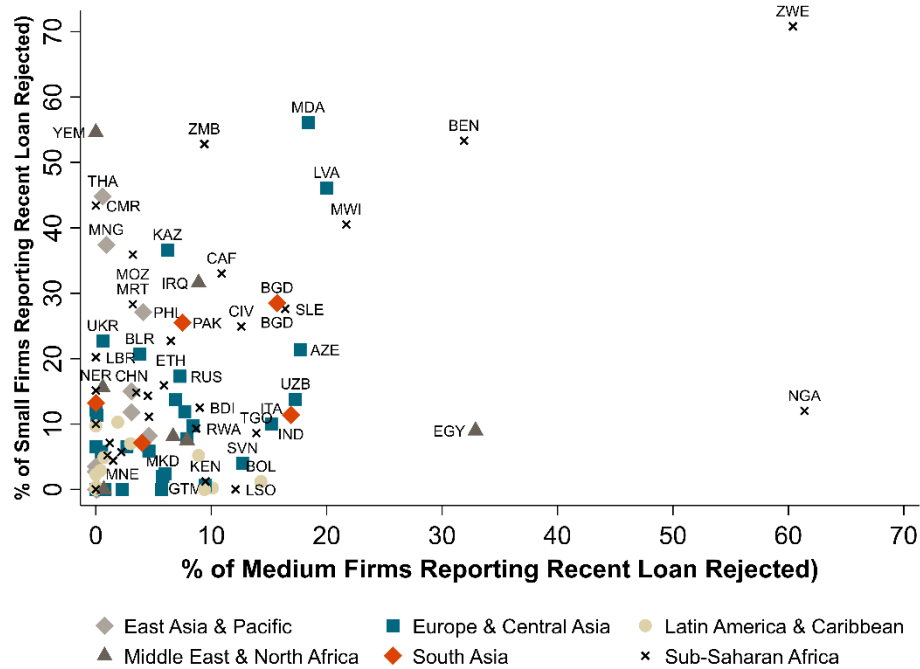
⁹⁰ Large firms are defined as those with 100 employees or more. Medium-sized firms are those with 20 to 99 employees, and small firms are those with 5 to 19 employees. The surveys were conducted between 2013 and 2019.

Figure V.4. Loan rejection rate by firm size, various years

A. Small vs. large firms



B. Small vs. medium-size firms



Note: years range from 2011 to 2019 depending on data availability.

Source: World Bank – Enterprise Surveys (2019)

Thailand emerges as an interesting case when results from Figure V.3 and Figure V.4 are combined. Given the large rejection ratio of credit to small firms (the seventh largest rejection ratio among the countries in the sample), the observed high ratio of credit (extended by the formal sector) to GDP (150 percent) reflects a concentration of lending to large and medium-size firms and suggests the presence of credit rationing to at least some segments of small firms.

In countries where credit rationing by banks and other institutions in the formal sector is present, there is a tendency for the expansion of informal lenders, the so-called money/payday lenders.⁹¹ Thus, although there is not a price for credit to the rationed borrowers in the formal sector, the shadow price is often reflected in the informal markets. Thus, in credit-rationed contexts, a suggested indicator of prices is:

- Interest rates on informal financial arrangements, such as those charged by money/payday lenders, or other such equivalents.

For borrowers that are rationed out in the formal financial sector but obtain credit in the informal sector, the interest rate charged by the informal sector is the relevant price. Lending rates in the informal sector are generally very high, exceeding 100 percent in some cases. Low volume of lending and high interest rates in the informal sector signal the presence of a supply-side constraint (even if the lending rate in the formal sector is low).

Turning to the second caveat about the relevant price that consumers face when demanding credit, there are a number of additional costs that affect their decisions, including:

- The value of time spent providing the necessary documentation and information to apply for credit. Documentation requirements are more stringent for accessing credit than for other financial services.
- The (opportunity) costs of getting to a branch or ATM if needed, or to an agent of a DSP—a cost that can relate to low income (poverty) and distance (geography). Box III.6 exemplifies these types of costs for the case of Mexico.

In countries where, after taking all relevant costs into account, the low use of credit services appears to reflect a low demand, the next step is to explore which of the four potential causes listed above (generic factors affecting the demand for all financial services, costly identification of users, low social returns, and low digital literacy) explain this outcome. The *generic* causes have already been discussed in the tree for store-of-value services and the branch for costly identification of users will be discussed in the supply side of the credit tree

⁹¹ For example, in rural Thailand, the presence of money/payday lenders is well documented, as are government efforts to meet the demand for credit at lower rates than those charged in the informal markets (see, for example Wang, 2019).

(as noted in Figure V.1, this factor affects both the demand and the supply sides). Therefore, we focus below on the indicators for low social returns and low digital literacy.

a. Indicators for Low Social Returns

A primary suspect of low demand for credit is social returns that are too low, meaning that the overall return on most investment projects is too low to justify external financing. If household and firms do not expect positive social returns from becoming indebted, they might not demand credit. This can be due to many factors, but here we refer the reader to those analyzed by Hausmann et al. (2008) to avoid a lengthy explanation of constraints. Suffice to say that, following the conventional literature on capital accumulation, the profitability of investment is related to the availability/scarcity of inputs of production. In other words, low social returns can reflect limited human capital or problems with the existing overall infrastructure, or insufficient raw materials. While these factors are relevant for all investors, they are particularly important for the poor. For example, in rural areas, inadequate provision of public infrastructure or other public capital may not allow (or make it very costly for) the private sector to, say, bring goods to the market, reducing or eliminating the potential return from an investment project.

Moreover, factors such as an unstable macroeconomic environment or weak institutions affecting other branches of the credit tree (and other financial services) also impact the expected returns from investment. Institutional weaknesses may be crucial for low-income segments of the population since their property rights might be too poorly defined and protected to be effectively used as collateral for borrowing. Or while returns from projects needing funding may, overall, be sufficiently high, poor people do not have access to these opportunities. These are all demand constraints, but of course, the solution for dealing with each potential constraint can be quite different.

b. Indicators of Low Digital Literacy

Low digital exposure of potential borrowers can specifically hinder the demand for digital credit services; even if the general demand for credit is high among the lower-income segment, their demand for DPCS may still be low. This can be because their low digital literacy makes potential borrowers reluctant to use DPCS. Unfortunately, this lack of expertise is hard to assess. General insights can be obtained from indexes such as:

- The World Bank Digital Adoption Index
- The Networked Readiness Index (from the World Economic Forum)
- The Information and Computer Literacy assessment (prepared by the International Association for the Evaluation of Educational Achievement. See Fraillon et al. 2014).

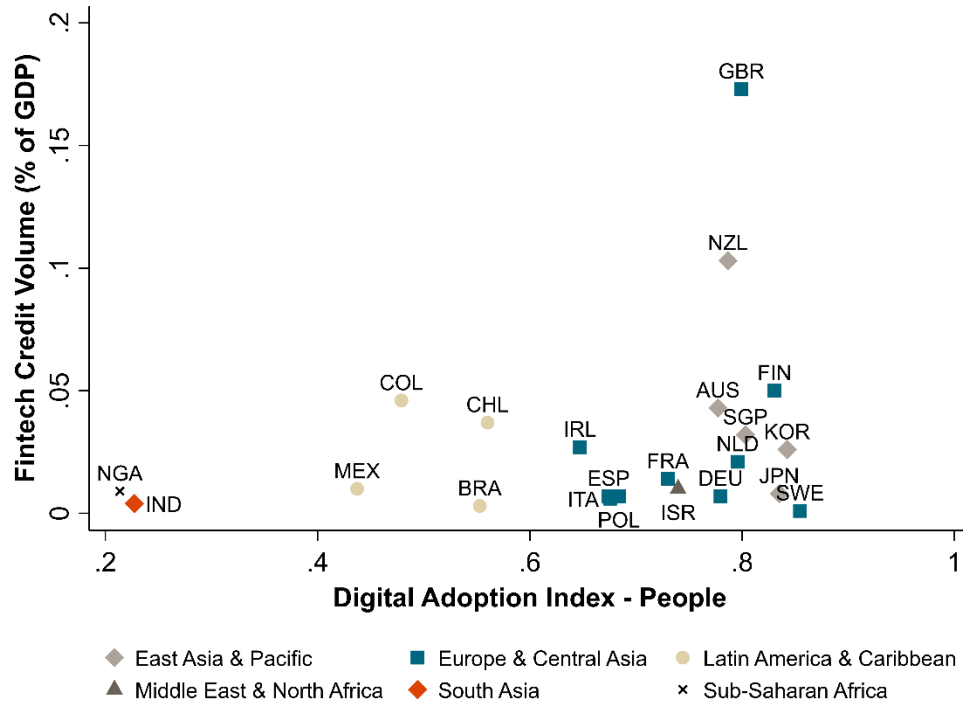
To exemplify, Figure V.5 shows the positive relationship between the World Bank Digital

Adoption Index (DAI)⁹² as a proxy for digital literacy and the amount of financing through fintech credit (as a share of GDP). This is not surprising, of course, since a general greater ability of people across all segments of a society to make effective use of telecommunications and internet should positively correlate with the amount of fintech credit. Conversely, lacking such skills, households and firms, including those from low income segments, will be less likely to benefit from DPCS.⁹³ To find out whether digital literacy is possibly a binding constraint, one would identify which specific combination of the two variables depicted in Figure V.5 is present in the country. If digital literacy is high and fintech credit/GDP is low, then digital literacy is less likely to be the binding constraint (e.g., Sweden). In case where both indicators are low, digital literacy cannot be excluded as a constraint (e.g., Nigeria).

⁹² The DAI measures countries' digital adoption across three dimensions of the economy (each one captured in one sub-index): people, government, and business. The index and each of the three sub-indices cover 180 countries on a 0–1 scale. "Each sub-index comprises technologies necessary for the respective agent to promote development in the digital era: increasing productivity and accelerating broad-based growth for business, expanding opportunities and improving welfare for people, and increasing the efficiency and accountability of service delivery for government." See <http://pubdocs.worldbank.org/en/587221475074960682/WDR16-BP-DAI-methodology.pdf>. Figure V.5 use the DAI for people which combines two indicators from the Gallup World Poll: mobile access at home and internet access at home.

⁹³ Note that, in most countries, the degree of digital literacy correlates closely to the basic skills typically provided by the education system and captured in such variables as the level of adult literacy and the rate of secondary education enrolment. Indeed, there is a very high correlation (0.82) between the Digital Adoption Index and the *skills* component of Networked Readiness Index, where the latter "gauges the ability of a society to make an effective use of ICT thanks to the existence of basic educational skills" (in https://reports.weforum.org/global-information-technology-report-2016/networked-readiness-index/?doing_wp_cron=1579996552.0561149120330810546875)

Figure V.5. Digital literacy and fintech credit, 2016 and 2018



Sources: World Bank – Digital Adoption Index (2016) and BIS (2018)

However, this and other such comparisons do not represent a definitive test. Although low information and communication technology (ICT) literacy and low DPCS will often be correlated, this could still mean that this constraint can be overcome and that other factors are the (more) binding constraint. For example, if households are already active users of cash cards and related payments products, ICT literacy is less likely a constraint. Or it could be that by modifying the product offering, ICT literacy constraints could be overcome.⁹⁴ Nevertheless, DPCS can have its own ICT requirements. More work will then be needed, and much more micro-based evidence. For example, to help identify whether the presence of DPCS products is low because of low ICT literacy, household surveys can be useful. The case of Rwanda provides an interesting diagnostic. It shows that households often do not understand the terms of the DPCS that is being offered to them by mobile operators.⁹⁵ An even better way to identify the binding constraint would be experimental tests. For example, identical offers of credit could be extended to consumers who had randomly received (or

⁹⁴ It can be that products are offered in a poor way given the presence of low ICT literacy, which is more of a supply-side issue, since if offered the right way demand would be higher.

⁹⁵ For example, for many, the likely loan size is not clear from the marketing material and there is potential for clients to spend time applying who have no chance of getting the loan size they desire. In addition, most did not understand why they were rejected. See Laterite et al. (2019)

not) some training in relevant technology; if the take-up materially differed, digital literacy could be a constraint.

3. Indicators Signaling Supply-Side Constraints for Credit Services

Having assessed constraints on the demand side, the next step is to analyze those on the supply side. Even if the initial tests show that there are some binding demand constraints for DPCS, there is still a need to do tests on the supply side.⁹⁶ This means we need to analyze whether an observed high cost of obtaining DPCS in the economy—a sign of supply-side problems—can be explained by either low formally intermediated savings (domestic and external) in the aggregate or by inefficient financial intermediation.

a. Indicators of Savings as a Constraint on Digital Credit Supply

To assess whether lack of aggregate savings from the population might constraint the supply of credit products, it is necessary to examine the supply of and the demand for savings.⁹⁷ Individuals and firms supply savings, and financial intermediaries demand them to provide credit. The question here is whether the availability of formally intermediated savings in the local markets is low in general, and for that reason, the supply of credit is limited.⁹⁸ The method to differentiate between supply and demand causes for saving is similar to the one used above, recognizing that the relevant interest rate is the return on formally intermediated savings that is *safe*. Safe assets can be defined as those claims that are guaranteed to return the full principal on demand, and that may provide a rate of return.

A combination of a high real interest rate on safe assets and a low quantity of safe assets suggests that the supply of savings may be a binding constraint for intermediation to happen in the first place. Put differently, people are not willing to put their savings into the formal financial system, preventing intermediation from happening in general, including for DPCS. If the real interest rate on safe assets is low and the quantity of savings is also low, then the constraint may not be the willingness of agents to save. And, of course, when the interest rate on safe assets is low, even when the quantity of savings is high, savings is certainly not the constraint.

It should be understood that, in contrast to the analysis in Hausmann, Rodrick, and Velasco (2005), which focuses on constraints to investment and economic growth, the real interest

⁹⁶ The analysis on the supply side needs to be done even if the tests on the demand side finds that there are potential binding constraints on the demand side for three reasons: (a) reinforcing the findings that the binding constraint is on the demand side; (b) discarding that there could also be supply side constraints interacting with those on the demand side; (c) assuring that the data, notably prices, the analyst was using to assess demand constraints, which were only proxies, did not lead to the wrong conclusion.

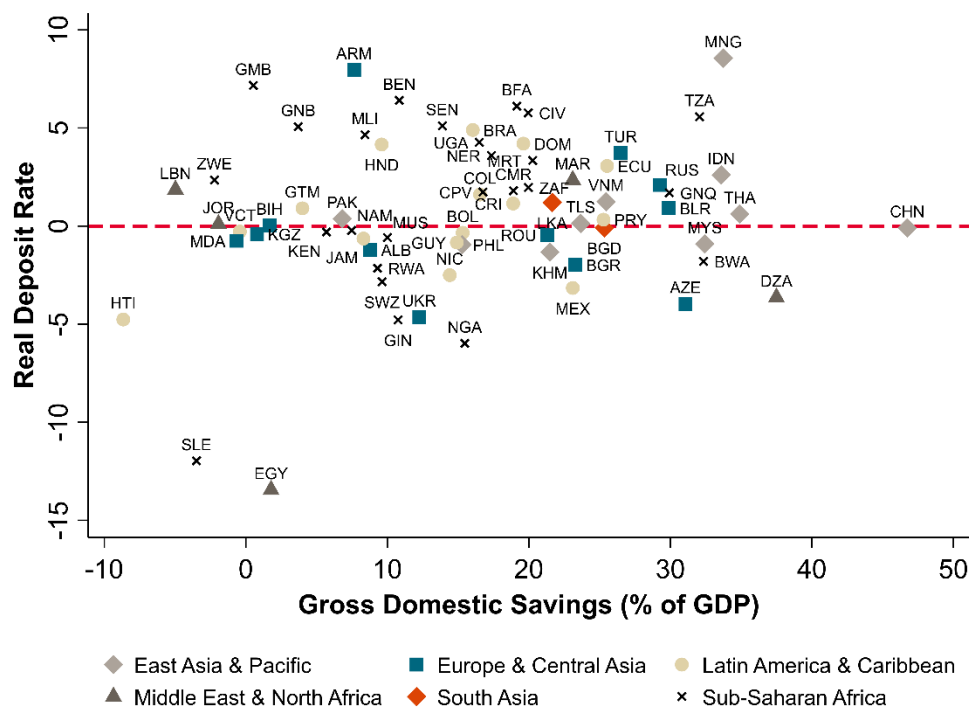
⁹⁷ The concept that low aggregate savings may be a constraint to the availability of finance is discussed in HRV (2005) and Hausmann et al. (2008).

⁹⁸ It is important to note that the relevant measure of savings is the one that indicates those resources that remain in the country and are, therefore, available to be intermediated domestically. It can well be the case that there is a great deal of savings going on in the economy (by firms and individuals), but much goes abroad through capital outflows.

rate here is not the return on investment in real assets (e.g., plants, factories), but the return on safe financial assets (e.g., government bonds or insured bank deposits). It thus also happens to be a proxy for the cost of financing for the safest borrower in the country (typically the government). But it does not represent the average costs of funds for a typical borrower.

There are many measurement issues of course, but nevertheless, international comparisons of the real interest rate on safe assets can provide a benchmark here (Figure V.6). As shown, among low—and middle-income countries, there are a number of Asian countries (e.g., China, Malaysia, and Thailand) where the real interest rate on the safest assets (bank deposits in the figure) is low and the savings ratio is high. This is a clear sign that the supply of overall formally intermediated savings in the real economy is not a constraint to overall credit in those countries. In contrast, for many developing countries, the real interest rate is quite high (e.g., close to 10 percent in Armenia, Gambia, and Togo) while savings are low. In those countries, the possibility that the low supply of savings is a constraint to overall credit whose causes need to be further investigated cannot be discounted.

Figure V.6. Real deposit interest rate and savings savings in low and middle income countries, 2017



Sources: IMF – International Financial Statistics (2019) and World Bank – World Development Indicators (2019)

If the low supply of savings is identified as a constraint, there are various factors that can explain this result. The literature on savings in EMDEs associates low savings rates with, among others, macroeconomic factors (e.g., high inflation, which erodes the value of savings); weak institutions; poor regulation and supervision (reflecting earlier cases of

expropriation of savings or the lack of reliable deposit insurance); demographic factors (high young and/ old-age dependency rates); and underdeveloped financial systems. In Figure V.6 there are countries where the real interest rate is negative due to high inflation and where savings is low (e.g., Egypt). For such cases, macroeconomic conditions are a likely binding constraint. This lack of savings can also include limited financing from international sources, due to similar and related factors (e.g., a history of past defaults on external debt, large exchange rate volatility, etc.). The papers by Loayza et al. (2000) and Horioka and Terada-Hagiwara (2011) provide good summaries of determinants of savings in EMDEs and should guide the work of the analyst.

b. Indicators Signaling a High Cost of Financial Intermediation

If the analysis above finds that the overall demand for DPCS or the supply of savings are not the binding constraints, the analyst needs to explore whether providers' cost for intermediating funds between savers and borrowers is high, leading to a lower offering of DPCS. Empirically, as indicated by Calice and Zhou (2018), the cost of intermediation can be proxied by an ex-ante or an ex-post net intermediation margin. The ex-ante measure is the difference between the rate at which the provider lends out funds and the rate at which it obtains funds (the contractual rates) after the provider makes adjustment for the *expected* loan losses. The ex-post measure is the difference between banks' *actual* interest revenue and their actual interest expense, usually divided by total earning assets. It is the task of the analyst to assess what measure is more appropriate, including because of availability of information, in an specific country context.⁹⁹ The next step is to analyze the four constraints that could make the cost of financial intermediation in general, and for DPCS specifically, the binding constraint: *market structure*, *poor infrastructure*, *low appropriability of returns*, and *data*.

The first three factors have many parallels with those for other DFS, and the processes to identify which of these is binding will have many similarities.¹⁰⁰ However, even with the many overlaps—for example, with the branches as described for digitally provided payments services—there is a need for adaption to account for the specific constraints for DPCS, which are discussed next. The new and very specific factor affecting the supply of DPCS, is *data*, in **red**, discussed in the last sub-section.

⁹⁹ There are pros and cons to both measures. As noted by Calice and Zhou (2018), ex-post intermediation margins permit a broader analysis of financial intermediation since they take into account all operations of a financial sector provider (all the interest-earning assets and interest-paying liabilities); this allows for an overall analysis of efficiency by providers. On the other hand, ex-ante intermediation margins allow for the analysis of a specific financial product.

¹⁰⁰ A good general starting point is the benchmarking exercise of Cihak, Demirguc-Kunt, Feyen, and Levine (2012) as it helps to identify the outliers in the cost of financial intermediation (with the caveat that they use linear regression techniques, and as result do not necessarily identify the binding constraints). Their annex provides examples of benchmarking across countries, showing where some countries are relatively weak or strong. Another starting point is the benchmarking of Calice and Zhou (2018). They provide evidence-based guidance on key areas of (structural) reforms to reduce the costs of financial intermediation. Annex 2 provides one example of their attribution of the costs of financial intermediation across countries, which can be also done for an individual country.

i. Market Structure

One similarity with other DFS is that there needs to be a contestable market structure, in this case for allocating savings to the purpose of DPCS. There are three lower branches here, one specific to DPCS and two that are shared with the other trees, but all three need specific indicators. The first, specific branch asks if there are barriers originated by inefficiencies in or lack of development of financial markets that limit the ability of funds already in the formal financial system to flow to (new) digital lenders and the degree of competition for such sources of funding.¹⁰¹ The second asks if there are market-imposed limits to the entry (and exit) for entities engaged in DPCS or whether there are barriers for new funds to be raised by providers of DPCS directly, which, in turn, restrict the development of DPCS. The third branch asks the standard level playing field questions: whether the regulatory framework treats the new providers of DPCS and traditional providers of credit equally.¹⁰² Thus, three sub-questions deal with contestability issues: the first with access to the funding that is being generated in other parts of the formal financial system; the second with assessing the presence of a contestable market for entry of DPCS entities and activities; the third with assessing the presence of a level playing field for DPCS entities and activities.

i.1. Inefficiencies in Financial Markets

The first branch asks whether the funds *already being* mobilized in the existing financial system (by banks as well as other types of financial intermediaries) are available in principle for the (new) providers of DPCS.¹⁰³ Constraints in this dimension can be due to various factors, here grouped in three.

One factor can be the limited general development of the markets for transferring funds from the primary sources to DPCS-based entities. Part of the analysis thus needs to address whether various financial markets are developed enough, so that the new lenders will be able to obtain existing funds to compete easily. Indicators to be used here include:

- The presence and development of interbank and other (intra-system) financial markets
- The presence of well-developed bond and other public debt markets

For example, if there is not a well-developed financial market for transferring funds from commercial banks, insurance corporations, or pension funds to providers of DPCS—meaning DPCS providers cannot, in practice, access these funds—then DPCS providers will not be as easily able to lend. Similarly, if they are not able to raise funds themselves—for

¹⁰¹ This is a credit-specific branch and, therefore, is depicted in red in Figure V.1

¹⁰² Adjusted for the risk that the activities of the financial providers pose to consumers and the overall financial system (see Claessens and Rojas-Suarez, 2016)

¹⁰³ One could call this the secondary market for savings in that it refers to the reallocation of the savings collected in primary markets. Most often, though, it is referred to as financial markets. In practice, this market is larger in turnover than the primary market.

example, if they cannot securitize their credits due to the limited development of capital markets—they will be at a disadvantage as they will need more access to funds.

By its very nature, analysis of this factor will typically be country specific. There can be a large variation in funding structures, but whether these are available to DCPS providers is often very institution dependent. In the case of Big Tech payment platforms, such as those active in China (Alipay and Tencent), customers often maintain unused balances in their accounts. Some of these Big Techs offer consumers, mostly through apps, short-term investments into money market funds to earn interest or fees on these balances. One example is Ant Financial, a subsidiary of the Alibaba group, which also includes Alipay. Within five years, the Yu'eBao money market fund offered to Alipay users grew into the world's largest fund, with assets of CNY 1.3 trillion (USD 190 billion) and over 350 million customers at the end of 2018. Such money market funds offered by the Big Tech can be managed by companies affiliated with the Big Tech firm, which can then provide the group with access to (cheap) financing, some of which could be used for DPCS. This type of arrangements can vary both across countries and over time. In China, for example, while the Big Tech payment providers had relatively easy access to external financing this way, they were required in 2018 to deposit their excess float in the central bank, thus eliminating a preferential funding source.

A second factor is the possibility of discriminatory pricing in these markets, where DPCS-based entities can only obtain funding at less favorable terms than other financial services providers. One way to think about this is that some of the general supply-demand factors mentioned before can present themselves along each element of the financial intermediation chain. Analyzing this possibility thus represents a specific case of the necessity to identify demand versus supply factors. Here, the pricing of claims issued by various types of financial institutions can help to differentiate the cause: whether there is a lack of supply of external financing to the specific group (e.g., new entrants aiming to provide DPCS) or for the specific purposes (here DPCS), or a lack of demand for external financing by these groups or for this purpose. For example, the presence of high(er) spreads for financial institutions providing internet-only based credit, adjusted for risks, may suggest that their demand for funds is large, but that their access to external financing is (more) limited.

Analysis using the common demand versus supply approach to the various elements of the financial intermediation chain will not be easy. Data availability, especially on the costs of various funding sources, will often be a major hindrance for assessing constraints.¹⁰⁴

¹⁰⁴ Overall, however, it is likely that the Big Tech firms' weighted average costs of capital (WACC) is higher than that of traditional financial institutions, such as commercial banks. This is due, among other reasons, to the fact that Big Techs do not raise funds using deposits, which have typically lower cost (as deposits include a liquidity premium). Some evidence indeed finds that on average Big Tech's WACC is some 3.25 percentage points higher than that of the largest global systemically important financial institutions (G-SIFIs) (Frost et al., 2019). This in turns means that the lending rates would have to be higher unless the screening and monitoring technology is much more superior.

A third factor can be a limited ability for the new intermediaries to sell off newly generated credit and thus free up balance sheets for new DPCS. This has to do with the development of securitization markets and other often institutional factors. Many of these will be country specific. In the United States, for instance, fintechs such as Quicken Loans have made great inroads in providing mortgages using digital platforms, allowing very rapid access to this DPCS. But the funding of platforms is almost “guaranteed” since they can sell so-called “conforming” mortgages easily to the public sector (in the form of the government-sponsored enterprises Fannie Mae and Freddy Mac). Accordingly, the special institutional environment has allowed for the rapid emergence of DPCS, but their role has been more akin to a broker than to an intermediary.¹⁰⁵ In many other countries, this option of selling to the government does not exist. Moreover, banks typically dominate financial intermediation and banking concentration can be quite high, making it less likely for providers of DPCS to get financing from existing sources.

i.2. Limited Competition

The second lower-tier branch is associated with *market structure* issues and deals with *competition* problems regarding the operation of new lenders. That is, the analysis needs to assess whether there is a contestable market that provides sufficient scope for the potential entry of new lenders with the right technology and means to efficiently deliver DPCS. The general elements here can borrow from the corresponding branch in the payments and store-of-value trees. The country-specific application comes in assessing whether the frameworks for the entry of new, digital-based lenders and their ability to operate (including raising funds) might be binding constraints. This branch is, therefore, very complementary to the branch on inefficiencies in financial markets discussed above. For instance, there can be market-structure determined barriers that put the new entrants at a competitive disadvantage. For example, their cost of funds or of investment opportunities may be dictated by those financial institutions (e.g., banks) that are potentially also their competitors in DPCS. These may then charge the digital providers higher interest rates for funds or pay lower rates on their excess deposits.

Such competition barriers could be assessed using similar indicators to those used in the payments and store-of-value trees, for example, those assessing the competitive state of banking systems (using variables such as concentration and H-statistics; see, subsection 2.b.i. of section III. Payment Services). Nevertheless, assessing the degree of competition and contestability for DPCS is not as easy. The limited experiences and related lack of data makes this much harder to do in the usual way for the new DPCS. New entrants are still rare and recent, and historical relationships between market structure and performance are thus harder to discover. In addition, digital platforms, including those that offer DPCS, exploit

¹⁰⁵ Note that while there can be benefits for financial inclusion, it might also be the case that the consumers are willing to pay a premium for using the convenience of getting credit online. This raises many issues: what benchmark to use to assess what is a reasonable (“fair”) rate? Do consumers pay too much for this convenience and is thus the surplus created by the new technology and delivery mechanisms (largely) captured by the (new) financial services providers?

natural network effects—the value of the services they offer increases as more people use those services. With their marginal costs very low, the provision of services is easily scalable. This easily generates network externalities, where a few Big Techs dominate. To assure competition, another approach may be needed to prevent market dominance on digital platforms from emerging in the first place.

Accordingly, analysis will not be easy. Nevertheless, studies for countries with more-developed DFSP markets, like the United States, provide some guidance. Analysis has, for example, discovered relationships between the banking structure and the entry of new types of lenders by exploiting differences at the regional level (e.g., Buchak et al. (2018)).¹⁰⁶ Moreover, the level of fintech and Big Tech credit across countries has been related to a less competitive banking system (in addition to higher income per capita and less regulatory stringency).¹⁰⁷ These studies, while only a small sample, suggest that traditional indicators, like concentration, do not suffice.

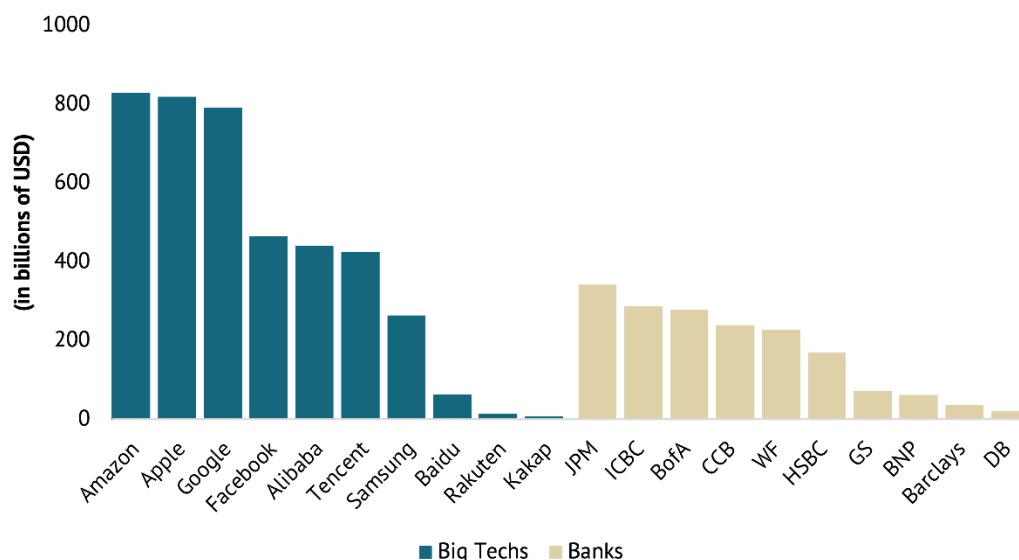
Lacking extensive data on actual presence and other related measures (e.g., of actual lending), the opportunities available to existing (and perhaps future) DPCS entities could be proxied by the actual financial performance and valuation of various types of financial intermediaries. By comparing the (relative) profitability of various types of financial intermediaries, including with firms in other sectors in the same country or across countries (or both), one may be able to identify barriers. For example, a monopolistic market structure may show up in high profitability and valuation. Indeed, the market capitalization of Big Tech today exceeds that of many banks (see Figure V.7). This suggests some degree of limited competition, possibly related to the unique business model of Big Techs.¹⁰⁸

¹⁰⁶ Relationships also arise due to regulatory burdens. For instance, Buchak et al. (2018) exploit regional variation over the period 2008 to 2016 to show that shadow banks increased their market share more in mortgage lending in regions where various regulatory and supervisory pressures on banks were higher.

¹⁰⁷ See Claessens et al. (2018) and Frost et al. (2019).

¹⁰⁸ Besides the valuation and overall capitalization of Big Tech with a large financial services provision, other measures, such as the price-to-earnings (P/E) ratio, price-to-book (P/B), or other relative indicators, can similarly be compared with those of traditional financial services providers. The higher the valuation, the greater the private rate of return and the less likely that the market is contestable. Similarly, actual performance of fintech firms (e.g., rates of return, profit margins, cash-flow earnings, return on equity) could be compared again with those of traditional financial services providers.

Figure V.7. Market capitalization of major financial groups and Big Tech firms



Source: Frost et al. (2019)

i.3. Unleveled Playing Field

The third lower-tier branch related to *market structure* deals with level playing field issues: that is, it considers whether entities engaged in DPCS can be held to different regulatory standards than traditional credit providers.¹⁰⁹ This unlevel playing field can arise because DPCS providers may only be able to access funds at very high regulatory costs (e.g., internet-only banks may have special liquidity requirements) or they might not be allowed to use certain tools (e.g., they may not be allowed to crowdfund or take deposits to raise funds themselves).

This unlevel playing field can also arise due to the (absence of) regulatory treatment of (some) digital store-of-value products (e.g., digital wallets may not be eligible for deposit insurance, or are treated differently from deposits). Alternatively, it could be that there is less access to the existing privately provided digital infrastructure or platforms for the (new) DSPs compared to other providers. Thus, constraints affecting the level playing field for the provision of digital store-of-value services are also constraints for the provision of DPCS.

Quantitative indicators on these items for a large set of countries to allow for easy comparisons will be most often missing. Nevertheless, Table V.1 provides a very high-level summary of the characteristics of the competitive structure of DFS across major jurisdictions: China, India, the United States, and Europe. The first row suggests, for

¹⁰⁹ One should also analyze to what extent rules that apply to all types of financial services providers may be limiting the extension of credit in an economically inefficient way. It could be, for example, that there are caps on interest rates that make lending not profitable. Alternatively, there can be direct lending schemes that distort the environment. Even if they affect all forms of lending equally, i.e., if they are not DPCS specific, they still limit credit extension.

example, that market structure is more an issue in China and the United States, but less in India. This can be a starting point for further analysis within a country. Institutional comparisons across different providers are then needed. For example, these can show that there is a prohibition on MNOs extending credit, or they can extend credit, but the rules governing these activities can differ from those for commercial banks. Some of these very specific rules may end up limiting access of finance for DPCS-oriented entities on an equal basis. Remedies then call for specific issues to be addressed, including conditions for being eligible for deposit insurance, or access to the payments system and related overdrafts.

Table V.1. Characteristics of the development of Big Techs across major jurisdictions

	China	US	Europe	India
Big Tech firms dominate digital platforms	Yes	Yes	Partly	No
Digital platforms' big impetus to financial inclusion	Yes	No	No	Yes
Active competition (anti-trust) policy	No	Partly	Yes ^a	Partly ^b
Legislation-set privacy rights for platform users	Partly ^c	No	Yes ^d	Yes ^e

Source: Authors

^aE.g., The German competition authority (Bundeskartellamt) ruling that prohibits a social network from systematically combining user data from different social network applications, 2019. ^bIndian e-commerce law, amended in 2019, prohibits foreign e-commerce platforms from selling products supplied by affiliated companies on their Indian shopping site. ^cPersonal Information Security Specification, May 2018, sets out guidelines for the collection, transfer, and disclosure of personal information. ^dEU's General Data Protection Legislation, 2018. ^eMinistry of Electronics and Information Technology standard for digital signature to gain users' consent on use of data; RBI guidelines for account aggregators to collect data and share with consent, 2016; Data Protection Law under discussion, 2019.

ii. Infrastructure

The second potential cause of *high cost of financial intermediation* relates to the availability of necessary digital financial infrastructure. Issues involved here are similar to those discussed in the previous trees: the physical ("hard") or institutional ("soft") infrastructure may be insufficient.

Typically, the hard infrastructure (e.g., telecommunications, internet, mobile) largely exists or can (generally) be provided most efficiently by the private sector. As discussed in section III,

the soft (institutional) infrastructure includes as basic elements standards for communications and other norms common to telecommunications. To assess whether there is insufficient provision of digital infrastructure and its causes, the relevant indicators are the same as those discussed in the payments tree (see subsection 2.a. of section III) and will not be repeated here. While DPCS will rely even more on some infrastructure elements than other services (e.g., verifying the identity of the borrower takes on great importance, see below), these differences are largely of a quantitative nature.

For Big Tech, once again, the high-level comparison of Table V.1 provides some insights. For example, while market structure is less an issue in India compared to the other countries, at the same time, as the second row notes, the digital platform is still less developed there.

iii. Low Appropriability of Returns

Appropriability is an issue common to many other financial services. Of the causes identified for the other services (see section III) some apply as well. Coordination failures are less important in the provision of traditional credit (as it does not have much externalities or network effects) but network externalities are extremely important in the provision of DPCS, as noted in subsection (iv) below. Distortionary taxes and other policies reducing the rates of return can apply to credit as well. The two lower-tier branches that apply most—but differently—to all types of credit (digital or not) are poor governance and weak institutions, and problems identifying customers. We focus on these two in this sub-section. An additional lower-tier branch constraining the appropriability of returns by providers of DPCS is the presence of monopolistic use of data; this will also be discussed in subsection (iv).

Regarding the quality of institutions, the channels through which poor governance and weak institutions affect credit are different than for other financial services because of the particular characteristics of credit. Credit services differ qualitatively from some of the other financial services, including DFS, in that the contract does not involve a one-time transaction service, as in the case of payments or the distribution of a service provided by a third party (e.g., a money market fund offered by a third party that is made available through the digital platform). Instead, for a DPCS, it is a credit exposure for the provider that will play out over time. As such, the demands are higher in making sure the contract with the borrower is enforceable and efficiently so. Many of the demands that derive from there are the same as those for traditional credit. Related to this issue is reducing the various costs of credit intermediation (e.g., the costs of screening, monitoring, and actual enforcement of the claim in case of delays, restructuring, or bankruptcy).

Some indicators related to the quality of institutions that affect the provision of credit services are presented in Hausmann et al. (2008). These and other suggested indicators are:

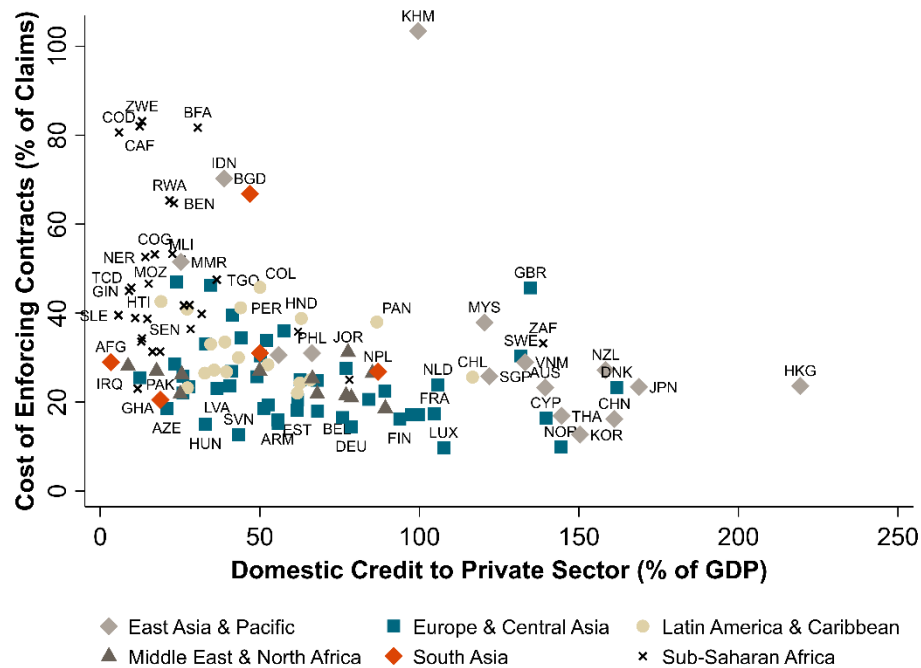
- The quality of property rights and judicial enforcement of rules
- Lack of a proper bankruptcy regime
- The costs of enforcing contracts
- The recovery rates in case of bankruptcy

Due to the inherent financial frictions (e.g., need to overcome principal-agent issues, address information asymmetries, etc.), some of the costs to provide credit are unavoidable. Scale can also play a role (e.g., a small country cannot afford the same technology as larger countries can). Therefore, a benchmark of the reasons for high intermediation costs is needed. The benchmark can be based on international comparisons, and databases such as the World Bank's Doing Business report allows one to compare the value of some the indicators suggested above (such as the general quality of property rights, the cost of enforcing contracts, or the recovery rates in bankruptcy) across countries. If the costs to collect is high and credit is low, then there are indications that the appropriability of returns is a potentially binding constraint. Figure V.8 shows the global distribution of the variables *cost of enforcing contracts* and *recovery rates* from the Doing Business report.¹¹⁰

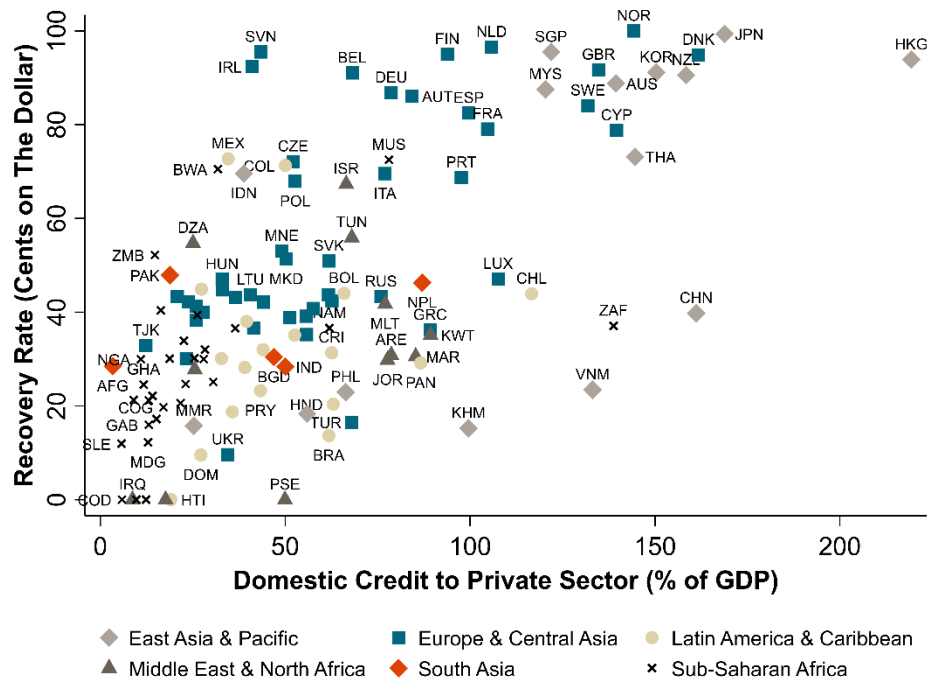
¹¹⁰ The *cost to enforce contracts* is defined in the World Bank's Doing Business report as "a percentage of the claim value, assumed to be equivalent to 200% of income per capita or \$5,000, whichever is greater. Three types of costs are recorded: average attorney fees, court costs and enforcement costs. Bribes are not taken into account." The *recovery rate* is recorded as "cents on the dollar recovered by secured creditors through judicial reorganization, liquidation or debt enforcement (foreclosure or receivership) proceedings. The calculation takes into account the outcome: whether the business emerges from the proceedings as a going concern or the assets are sold piecemeal." See, <https://datacatalog.worldbank.org/dataset/doing-business> and <https://www.doingbusiness.org/en/methodology>

Figure V.8. Cost of enforcing contracts and recovery rates (as percentage of credit/GDP)

A. Cost of enforcing contracts



B. Recovery rates



Sources: IMF – International Financial Statistics (2018) and World Bank – Doing Business (2018)

In countries like the Central African Republic, Congo, Zimbabwe, Burkina Faso, and Bangladesh, where the provision of credit is very low, there is a combination of very high cost of enforcing contracts (on or above 70 percent of the claim value) and low or extremely low recovery rate (less than 30 percent in all cases and zero in Central African Republic and Congo). In these situations, institutional weaknesses need to be included as candidates for binding constraints.

Turning to the costs associated with identifying customers, those that apply to all financial services are discussed in subsection III.2.c and will not be repeated here. However, informational requirements (both from a business perspective or for the purpose of complying with regulations), are generally larger for credit than for other financial services (such as making payments) and even more for DPCS. For example, the providers of DPCS need to be able to identify borrowers uniquely digitally. They also need to be able to use digital signatures as sufficient proof for an agreement to a contract to allow for its enforcement. For consumers, identification requires the presence and coverage of digital ID (e.g., as that provides a ready source for clients to be easily onboarded digitally). To a certain extent, assessments of the digital ID environment are possible, using data from the Global Legal Entity Identifier Foundation (GLEIF).¹¹¹ For firms, the use of legal entity identifiers (LEIs) scaled properly, and then compared with the actual provision of DPCS, can be used as a proxy for digital ID as a constraint.¹¹² For example, fintech credit and LEI are low in many advanced economies, suggesting that the absence of LEI could be a constraint. In some countries (e.g., those in the EU), however, the use of the LEI (or equivalent indicators) is more widespread, yet DPCS is low. Thus, in those cases, DPCS is likely constrained by other factors.

iv. Digital Credit-Specific Constraint: Data

A constraint that is specific to DPCS is *data* since it does not apply in the same way to other DFS. This dimension is depicted in the Figure V.1 in **red** and calls for specific assessments (and related policy recommendations).

DPCS differ qualitatively from other DFS in their greater reliance on data on both the pool of (potential) borrowers and on the specific borrower.¹¹³ Data are always important for credit extension for several reasons: the screening of borrowers, the monitoring of their performance and behavior, and the enforcement of the claim in case of payment difficulties or default. Accordingly, some of the data aspects are similar both in traditional and digital

¹¹¹ World Bank: <http://id4d.worldbank.org/global-dataset>. See further details in the subsection “Problems Identifying Customers” in section III.

¹¹² See <https://www.gleif.org/en/lei-data/global-lei-index/lei-statistics>.

¹¹³ The importance of data holds also for insurance DFS, with the additional twist that the insurance market can stop functioning if perfect discrimination is possible since the pooling equilibrium then breaks down.

credit.¹¹⁴ The digitalization can make for a material difference, however, to the importance of data.

Data are core to fintech and Big Tech business models, where three elements reinforce each other: network externalities, data, and activities.¹¹⁵ Data matter for credit, more so than for other financial services. Specifically, firms involved in DPCS, such as fintech companies and Big Techs, collect, analyze, and use large amounts of customer data for many purposes, including:

- Data can help *identify* and *screen* the borrowers that “qualify” for a credit. Knowing potential clients’ past purchasing patterns, for example, can be a valuable input for identifying potential clients and improving screening. This is especially so for those large Big Tech providers that can use their “big” data collected from other parts of their platform (e.g., in the marketplaces or social media they run) to help with marketing and pricing strategies. Together with using advanced data analytics, this can allow for quick loan approval.
- Data are obviously important for *monitoring* the behavior of borrowers, for example, observing their (real-time) cash flows and sales, their relationships with other agents (clients, suppliers, etc.), rating of services by clients, and so on. For example, payment transactions can be collected to generate insight on the network of links between fund senders and recipients, which can then be used for credit scoring and credit risk management in addition to enhancing the financial services offered and provided. All of this can help identify (emerging) credit risks, and thereby mitigate information and incentive problems traditionally addressed through the posting of collateral.
- Access to data and to related platforms for data could also be a source of *enforcement*. For example, it can help to establish some costs of defaulting for the borrower, e.g., by having the borrower enter a negative list (e.g., the equivalence of what is done through a blacklist in the traditional credit registries). Such “reputational” costs upon a default are especially large for the big platforms. Captive ecosystems can arise given the significant network externalities with data collections (large economies of scale and scope). These systems can come with potential high exit costs, since being excluded from a specific platform adversely affects a firm’s overall business prospects, thus allowing for enforcement that is possibly better or cheaper than the enforcement obtained through traditional methods.

¹¹⁴ Many studies have, for example, documented the value of credit registries with negative (e.g., late payments, defaults) and positive information for the volume and efficiency of credit extensions.

¹¹⁵ The network externalities of a Big Tech’s platform refer to the fact that a user’s benefit from participating on one side of a platform (e.g., as a seller on an e-commerce platform) increases with the number of users on the other side (e.g., the number of buyers). Network externalities beget more users and more value for users. These externalities, in turn, allow the Big Tech to obtain more data, and thereby generate a positive feedback loop. The analysis of large troves of data enhances existing services and attracts further users. More users, in turn, provide the critical mass of customers to offer a wider range of activities, which yield even more data. These network externalities apply to many financial services and accordingly, represent an essential element of Big Techs’ entry into financial services provision.

The effective use of data can offer many benefits for DPCS. Indeed, it can help solve current problems with the provision of digital credit observed in some EMDEs. For example Wamalwa et.al (2019) argue that in Kenya, lacking detailed real-time data on customers' transactions (combined with the absence of collateral) to assess borrowers' creditworthiness, a number of lenders of digital credit have opted to offer mobile credit at short tenures, small amounts and at relative higher interest rates compared those charged for traditional bank loans. Evidence from the Central Bank of Kenya (CBK) shows that, in recent years, the ratio of digital non-performing loans to total digital loans has been larger than the corresponding ratio for traditional bank lending.¹¹⁶

Notwithstanding the potential benefits, the use and importance of data can also lead to some new issues that represent barriers to an efficient delivery of the DPCS or the emergence of a competitive market for (new) DPCS. Data may be used not only to assess a potential borrower's creditworthiness, but also to identify the highest rate the borrower would be willing to pay for a loan (or the highest premium a client would pay for insurance). Discrimination may arise with the use of algorithms for credit allocation, giving rise to new consumer and investor protection issues. A specific risk is the anti-competitive use of data. Given their scale and technology, Big Tech platforms have the ability to collect massive amounts of data at near zero costs. This can give rise to so-called digital monopolies, or "data-opolies." A dominant position in data can lead to even greater risks of price discrimination and rent extraction (see further BIS, 2019; Vives, 2019).

These various aspects mean that many different elements need to be assessed to establish the relevance of data as a constraint for DPCS. Since it is early days for DPCS, and the roles of data are different for DPCS than for the general provision of credit, there is not yet either a good conceptual framework or a multitude of information that can easily shed light on these possible constraints. As an example, the comparison of the models in the US, Europe, China, India (bottom row of Table V.1) shows that there is a wide spectrum as to how to organize and collect data and how to grant access by specific (financial) service providers to data. Some countries have a more top-down, government-led approach, designing the framework for data collection and dissemination; other have a more bottom-up, market-led approach. In the treatment of user data, India is closer to a European model in that it relies more on the adoption of a consent-based approach, than the United States or China, which have more laissez-fair models (see Table V.1).

There can also be market structure issues in regard to data. A major risk is the anti-competitive use of data. Given their scale and technology, Big Tech firms collect massive

¹¹⁶ Based on information from the CBK, Wamalwa et al. (2019) show that the ratio of digital non-performing loans to total digital credit (NPL ratio) averaged at 21 per cent between March 2015 and March 2018, while the banking industry average NPL ratio was 10.2 per cent over the same period. There are also reports arguing the presence of household's over-indebtedness in digital credit. See, for example, <https://qz.com/africa/1722613/mobile-money-lending-in-kenya-helps-but-also-spikes-debt/> and <https://www.economist.com/finance-and-economics/2018/11/17/borrowing-by-mobile-phone-gets-some-poor-people-into-trouble>

amounts of data at near zero cost. And data have more value to Big Tech firms. With their dominant position in data established, these firms can not only reap more benefits from new data availabilities, but also drive out others. A level playing field in data then needs to be enforced.¹¹⁷ Furthermore, raw data alone is not enough for DPCS as data needs to be related to specific individuals and business and most often be verified.

VI. Concluding Remarks

Despite ambitious and immense public and private initiatives to promote financial inclusion, especially by using digitally provided financial services, large segments of the populations in EMDEs remain underserved.¹¹⁸ An extensive literature explores possible obstacles to increasing financial inclusion and organizations like AFI, CGAP and the World Bank Group have published toolkits and diagnostic guides to support policymakers, including in their formulation and implementation of national financial inclusion strategies. Yet, policymakers still need better tools to systematically prioritize their actions based on the identification of country-specific binding constraints. Large differences in countries' characteristics—market structure, economic, regulatory, institutional, geographical, and demographic, among others—can mean that a constraint to financial inclusion binding in one country might not bind in another. If the country-specific root causes of the problem are not properly diagnosed, interventions may focus on nonbinding constraints, that is, obstacles that will not deliver the desired results unless other impediments are lessened or removed first.

The decision tree presented in this paper provides a framework that can serve as a valuable decision-making tool and help design the most effective policies for improving financial inclusion, especially by digital means. Inspired by the basic concepts developed by Hausman and coauthors in their Growth Diagnostics (2005, 2008), the tree provides for a structured approach to identify what the truly binding constraints to increasing financial inclusion are. Policymakers will be able to adapt the tree to their specific settings, different financial services, and specific segments of the population in need.

The tree uses a deductive top-down approach and explores the various potential causes (branches in the tree) impeding advances in financial inclusion; differentiating between demand and supply side constraints. To identify the most relevant constraints, the tree methodology calls for analyzing the observed (or shadow) prices and quantities used in the

¹¹⁷ Even then, the model can deviate from what the rules are trying to achieve. For example, in China there has been a mandate since 2006 to establish, operate, and maintain a national centralized commercial and consumer credit reporting system. Traditional financial institutions comply (and can access records), but new DCPS do not yet provide their data. In Tanzania, unregulated digital lenders are not required to report borrower loan activity to credit reference bureaus, while regulated lenders do not always comply with requirements to report positive and negative credit history. Lack of coverage and compliance mean there is limited information available on digital borrowers' formal credit history and current outstanding loans. In Kenya, nonregulated lenders can report to the central credit bureau with permission from their customers and approval by the central bank, but they are not required to do so.

¹¹⁸ Women, youth, and vulnerable segments, such as forcibly displaced persons, are disproportionately excluded and underserved.

financial services markets (particularly DFS). To further assess potentially binding constraints, the tree uses benchmarking and a wide-ranging set of indicators, including aggregate and micro-level statistics as well as survey data to reflect providers' and consumers' perceptions. To more easily navigate the tree and illustrate applications, country examples are used throughout the paper.

Recognizing that constraints can differ by financial service, separate trees are presented for payments and transfers, store of value, and credit services.

There are three general lessons derived from constructing the trees. First, there are elements (branches) that need to be assessed in all trees. For example, two such elements are the nature of competition between various providers, and the rules under which providers operate. A mono/oligopolistic market structure can prevent the entry of new players and thereby hinder financial inclusion. And a regulatory environment that does not foster a level playing field can hinder the operations of new or nontraditional providers. These two elements need to be evaluated for all financial services, digital or traditional, as potential binding constraints for their provision (supply side of the trees).

Second, as financial products get more complex in terms of their nature and risk characteristics, the trees become more extensive. As a consequence, the store-of-value tree has more branches than the payments and transfers tree, and the credit tree has the most of all.

Third, some constraints are specific to DFS. On the demand side of the trees, low digital literacy (to be differentiated from low financial literacy) can prevent consumers from demanding DFS. On the supply side, insufficient provision of private and public digital infrastructure may severely constrain the provision of mobile money and other DFS. Since the new DFS providers rely heavily on the use of data (e.g., in the provision of credit services to assess borrowers' creditworthiness and to monitor borrowers' ability to repay loans), the market structure for data also needs to be competitive (e.g., to avoid Big Tech platforms that can collect massive amounts of data at almost zero cost, to dominate markets, including by engaging in price discrimination and rent extraction, and hamper the entry and expansion of other providers and the provision of DFS). In addition, platforms for DFS need to reach a large enough scale to offer affordable services to users on both sides of the transaction (i.e., DFS are characterized by economies of scale). Also, DFS involve crucial network externalities that affect both the supply and demand sides of the trees: the value of these services to any given user or provider depends on the number of other users and providers participating in the network with whom they can transact. Coordination failures occur when users on one side of the platform (say, merchants in the market for digital payment services) do not expect the users on the other side to join (say, consumers). Thus, assessing whether coordination failures are potential constraints is a task more specific to DFS and less so for traditional financial services.

Using the framework proposed and indicators available for assessing constraints, the paper presents a number of examples to illustrate the power of the analysis. However, country-specific conclusions can only be derived through in-depth study of particular characteristics

and circumstances. Moreover, as countries vary in many ways, assessing constraints to financial inclusion requires the use of multiple indicators; no single indicator or test can tell which constraint is truly binding. Undertaking case studies is, therefore, the next step to put the tree to work and support the efforts of policymakers in designing strategies that effectively deliver greater financial inclusion.

Annex 1. Pricing Structures for Mobile Money Services: Issues for Assessing Constraints

Data from IPA (Innovations for Poverty Action)¹¹⁹ provide information about usage fees for 21 mobile payment products in seven countries (Bangladesh, Kenya, India, Nigeria, Pakistan, Tanzania, and Uganda). Fees included are (a) fees on deposits (cashing-in), (b) fees on withdrawals (cashing-out), and (c) fees on transfers. IPA also produces an indicator termed fees on “full payments cycle,” which aggregates the three types of fees.

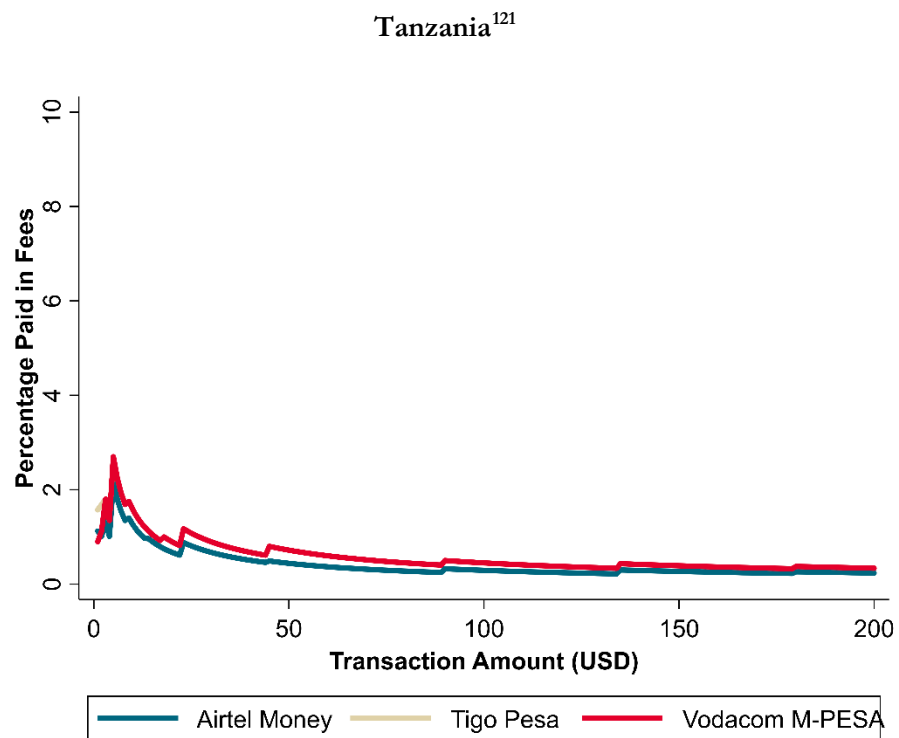
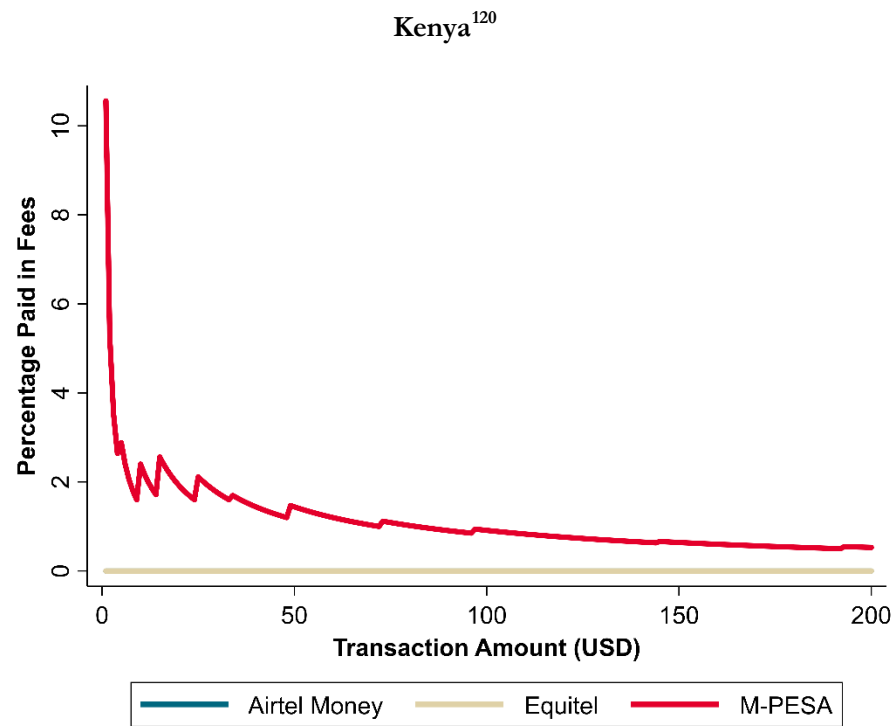
Pricing models vary significantly. As discussed in Holloway et al. (2017), pricing for transfer can be classified as (1) slab-based pricing, where a flat fee is charged for transactions within a predefined range; (2) percentage-based pricing, where a flat percentage of the amount sent is charged, regardless of the amount; and (3) free, where no fee is charged to the user. As the authors indicate, slab-based pricing, which is the most common model among countries in the sample, is regressive since low-income consumers must pay higher fees on a percentage basis (fee as a percentage of the transaction value). Nonetheless, this model has the benefit of being easier to understand by low-income, low-educated consumers (and, therefore, less subject to potential fraud) than a percentage-based pricing model. These considerations are important when deciding whether a certain pricing scheme could be a potential constraint for inclusion.

Moreover, because of the different types of fees associated with a mobile money product, care must be taken when comparing countries. Cook (2017) provides a good example by comparing Kenya and Tanzania, which we illustrate in Figures A.1 and A.2.

According to Figure A.1, transfer fees, as a percentage of the transfer amount, charged by Kenya’s M-Pesa, the leading provider of mobile money, are much higher for low-value transactions (less than US\$ 50) than corresponding fees charged in Tanzania.

¹¹⁹ See, “How Do Mobile Money Fee Structures Impact the Poor?” and [IPA Fee Structure Analysis 2017.06.20.xlsx](#)

Figure A.1. Mobile money transfer fees in Kenya and Tanzania



Source: IPA – CGAP (2017)

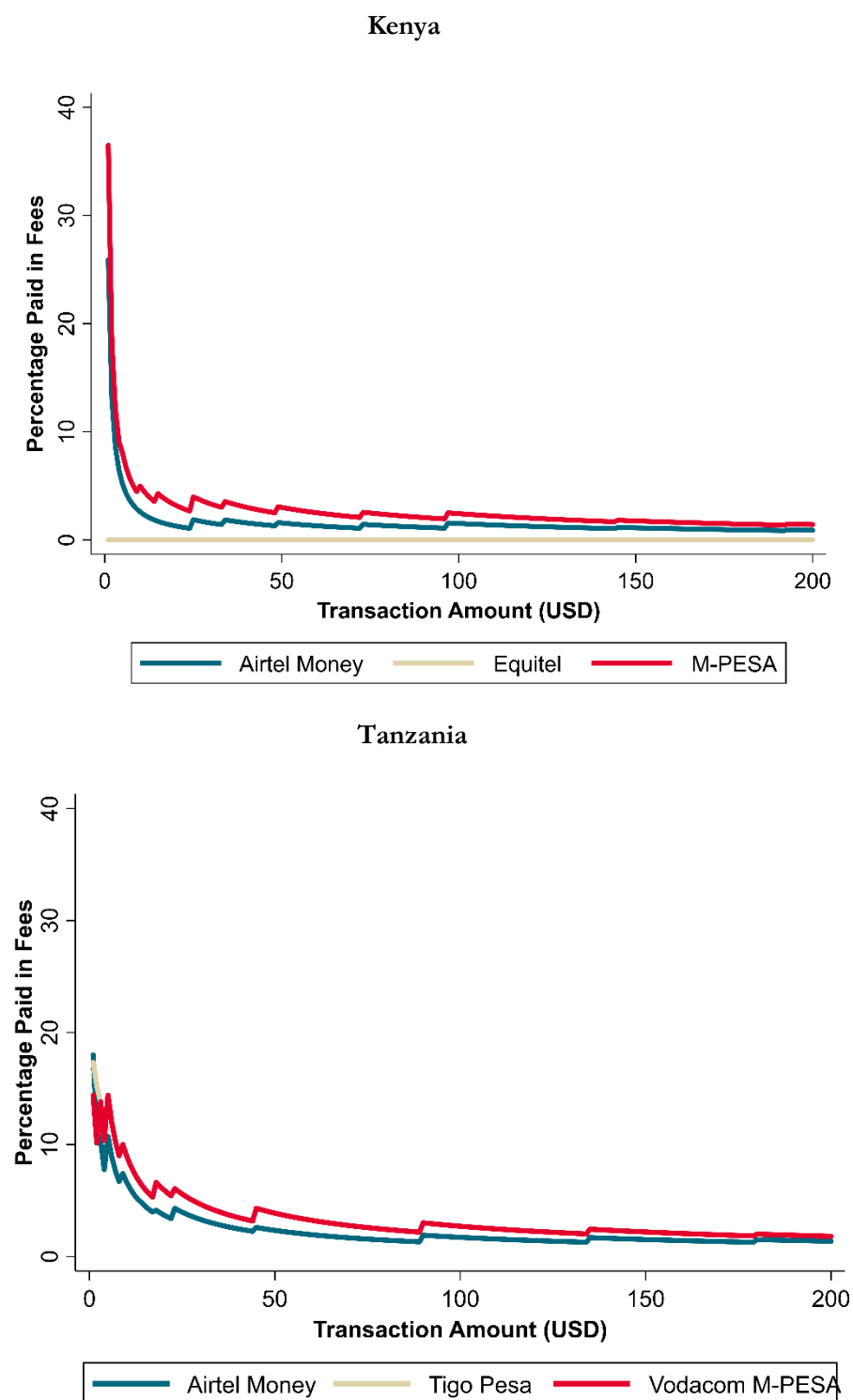
However, when fees on the “full payment cycle” are compared, fees in Tanzania (on a percentage basis) start dropping lower than fees in Kenya for transactions above US\$2 dollars.¹²² This, of course, does not mean that M-Pesa’s dominant position in the market does not play a role in its pricing capabilities (and needs to be considered for assessing binding constraints in reaching the remaining excluded population). The message is that when evaluating fees, the details of alternative models in different country settings must be taken into account.

¹²⁰ Airtel money and Equitel did not charge for low-value transfers.

¹²¹ Fees charged by Tigo Pesa and Vodacom M-Pesa are identical, according to IPA data.

¹²² IPA data for 2017 show that while Kenya’s M-Pesa fee, as a percentage of the full payment amount, was almost double that of Tanzania’s Tigo Pesa for a payment value of US\$1, the differential declined significantly for a payment amount of US\$2. For a payment value of US\$3, Tanzania’s Tigo Pesa charged higher fees (as a percentage of the full payment amount) than Kenya’s M-Pesa.

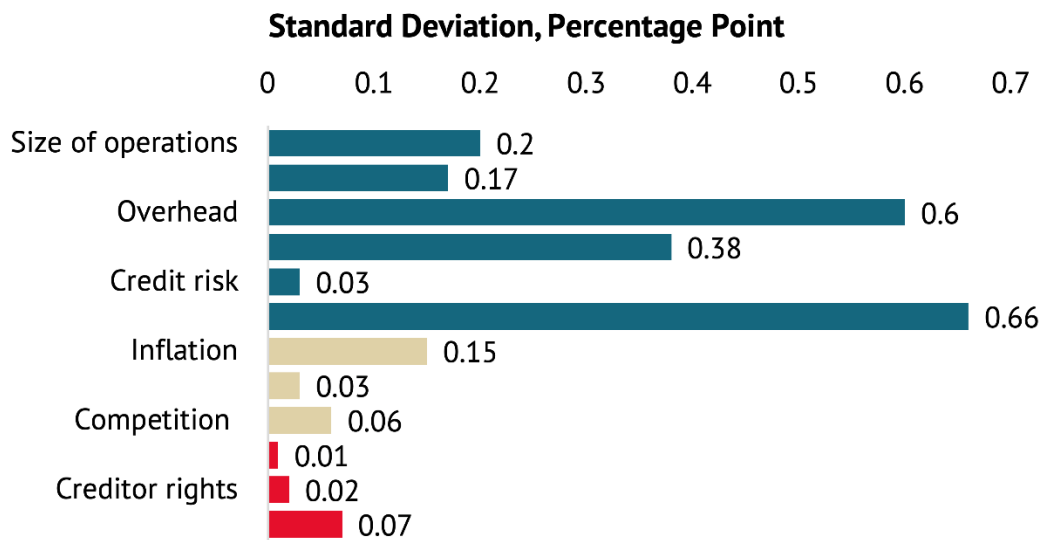
Figure A.2. Mobile money full payments fees in Kenya and Tanzania



As also discussed in Cook (2017), *directly* charging no fees to the consumer for undertaking payment transactions does not mean that the consumer will not have to pay for making

payments. For example, PayTM in India does not charge consumers for transfers since its business profitability relies on merchants' revenues; however, merchants will pass on at least part of their transaction costs to the consumers. In the case of Kenya's Equitel (shown in Figure A.2), the provider charges for transfers to other providers.

Annex 2. Cross-Country Variations in Net Interest Margin Attributions, 2005-2014



Source: Calice and Zhou (2018)

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20. World Bank – Doing Business
21. World Bank – Enterprise Surveys
22. World Bank – Findex
23. World Bank – Global Financial Inclusion and Consumer Protection Survey
24. World Bank – World Development Indicators
25. World Bank – World Governance Indicators
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Note that national data sources, e.g., central bank statistics, are not included in this list but should be considered when applying the methodology to concrete country cases.

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