A Decision Tree for Digital Payment Services: The Case of Mexico

Ivonne Acevedo and Miguel Székely

Abstract

This paper explores the reasons why digital payment services in Mexico are used to a much lower extent than would be expected considering the country's level of development and the authorities' efforts to expand these types of services during the past two decades. The paper applies the analytical framework proposed by Claessens and Rojas-Suarez (2020), which consists of identifying the binding constraints preventing an increase in the usage of digital payment services, among a set of alternative explanations. The methodology starts by evaluating the price and usage of digital payment services to discover whether constraints may be on the supply side, the demand side, or both. The main findings suggest that the crucial binding constraints on the expansion of digital payment services in Mexico are mainly on the supply side of the decision tree. Indeed, we identify the regulatory framework seems to be a binding constraint, since it creates an unlevel playing field among the providers of digital payment services. Current regulation could also be a constraint on increasing the provision of digital financial infrastructure, particularly for expanding cash-in and cash-out access points in rural areas. Thus, relaxing the regulatory constraint could enable the expansion of digital payment services. In addition, there is evidence suggesting that a coordination failure, reflected in a strong preference for transacting in cash, might be a binding constraint in the country. Perceived low or nonexistent benefits from using digital payment services could be the source of the coordination failure, since it prevents the formation of a critical mass of users, which in turn discourages suppliers from offering these services.

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Contents

List of figures

List of tables

Abbreviations

ATM	automated teller machine
Banxico	Banco de México
BIS	Bank for International Settlements
CAF	Corporación Andina de Fomento (Development Bank of Latin America)
CGAP	Consultative Group to Assist the Poor
CIAT	Inter-American Center of Tax Administrations
CLABE	Clave Bancaria Estandarizada (a unique bank account identifier used in Mexico)
CNBV	Comisión Nacional Bancaria y de Valores (National Banking and Securities Commission)
CoDi	Cobro Digital
COFECE	Comisión Federal de Competencia Económica (Federal Commission for Economic Competition)
CONAIF	Comisión Nacional de Inclusión Financiera (National Commission for Financial Inclusion)
CONDUSEF	Comisión Nacional para la Protección y Defensa de los Usuarios de Servicios Financieros
CONEVAL	Consejo Nacional de Evaluacion de la Politica de Desarrollo Social (National Council for the Evaluation of Social Development Policy)
CPMI	Committee on Payments and Infrastructure
CURP	Clave Única de Registro de Población (Mexican national ID card)
DMW	daily minimum wage
ENAFIN	Encuesta Nacional de Financiamiento de las Empresas (National Survey of Enterprise Financing)
ENDUTIH	Encuesta Nacional sobre Disponibilidad y Uso de Tecnologías de la Información en los Hogares (National Household Survey on Availability and Use of Information Technologiess)
ENIF	Encuesta Nacional de Inclusión Financiera (National Financial Inclusion Survey)
FAS	Financial Access Survey
FIMPE	Fideicomiso para el Impulso de la Infraestructura de Medios de Pago Electrónico
FOMIN	Fondo Multilateral de Inversiones (Multilateral Investment Fund)
GNI	gross national income
GSMA	Global System for Mobile Communications Association
HHI	Herfindahl–Hirschman index

i2i	insight2impact
ID4D	Identification for Development initiative
IFPE	institucion de fondos de pago electrónico (electronic payment institution)
IFT	Instituto Federal de Telecomunicaciones (Federal Telecommunications Institute)
IMF	International Monetary Fund
INEGI	Instituto Nacional de Estadística y Geografía (National Institute of Statistics and Geography)
IPAB	Instituto para la Protección del Ahorro Bancario (Bank Savings Protection Institute)
ITF	institucion de tecnología financiera (financial technology institution)
ITU	International Telecommunication Union
KYC	know-your-customer
LAC	Latin America and the Caribbean
LIC	Ley de Instituciones de Crédito (Credit Institutions Law)
MMU	Mobile Money for the Unbanked project
MMW	monthly minimum wage
NFC	near-field communication
POS	point-of-sale
p.p.	percentage points
PPP	purchasing power parity
PROFECO	Procuraduría Federal del Consumidor (Office of the Federal Prosecutor for the Consumer)
SMS	short message service
SOCAP	sociedad cooperativa de ahorro y préstamo (savings and credit cooperative society)
SOFICO	sociedad financieras comunitaria (community financial Society)
SOFIPO	sociedad financiera popular (popular financial Society)
SPEI	Sistema de Pagos Electrónicos Interbancario (Mexico's interbank electronic payment system)
UDI	investment unit
VAT	value-added tax

Foreword

Financial inclusion, especially through digital means, is broadly regarded as a catalyst for development and a driver of economic inclusion. While a large number of countries have implemented policy changes to advance digital financial inclusion, results are mixed and there is a substantial divide between countries that have achieved great success and those that continue to lag behind.

To support policymakers' efforts to improve the effectiveness of their financial inclusion strategies, in early 2020 CGD published an analytical framework, *A Decision Tree for Digital Financial Inclusion Policymaking*, that allows a systematic identification of the most problematic constraints in country-specific settings. Many constraints can restrict financial inclusion, but to different degrees. Therefore, the *Tree* aims at diagnosing which constraints are binding, i.e., impeding significant usage of digital financial services. Without this kind of analysis, gaps in financial inclusion strategies may persist and policymakers may focus attention on non-binding constraints, obstacles whose solutions will not deliver significant improvements unless other first-order impediments are addressed.

The Tree methodology uses a deductive top-down approach to analyze various potential demand and supply causes (branches in the tree). An important feature of the analytical framework is that it calls for analysis of the observed (or shadow) prices of digital financial services to identify the most pressing (binding) constraints. Application of the methodology involves 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.

In this paper, Ivonne Acevedo and Miguel Székely apply the Tree methodology to the case of Mexico.

Despite ambitious regulations aimed at advancing digital financial inclusion, like the Fintech Law of 2017, the level of financial inclusion in Mexico has remained low and stagnant over the last decade. Local data shows that Mexico's financial account ownership level for the adult population (47 percent) is around 30 percentage points lower than in comparable countries in Latin America and well below the average for upper-middle-income countries.

As a starting point in understanding the key reasons behind this poor performance, Acevedo and Székely present a detailed account of fees charged for different digital payment and transfer services in Mexico and other countries in Latin America. Evaluating ATM fees, merchant discount rates for debit card transactions, and mobile money fees, the authors find that these charges are considerably higher in Mexico. Further, they show that there are additional costs involved in accessing these services—like transportation—that are disproportionately larger for rural populations. This evidence suggests serious supply-side constraints.

Acevedo and Székely find that existing regulations create an unlevel playing field among digital payment services providers that restricts the activities of nonbank digital financial service providers. To demonstrate that regulatory constraints are indeed binding, the authors

show that non-bank providers try to circumvent regulatory restrictions by changing their mode of operation and by forming alliances with financial institutions.

But this well-known unlevel playing field is not the only binding constraint in Mexico. Acevedo and Székely identify coordination failures as an additional binding factor. In Mexico, many potential customers perceive the benefits of digital financial services as low, hindering the formation of a critical mass of users. This prevents providers from offering digital financial services at affordable prices. As a result, a substantial part of the low-income population in Mexico are excluded from digital payment services.

While Mexico's regulatory issues have been widely discussed in the past, many specific problems remain unsolved. This paper urges policymakers to acknowledge the limitations and counterproductive effects of some parts of the current regulatory framework. Moreover, the paper points to other problems, like coordination failures, that are not so well understood but are also crucial to unleash the untapped potential of digital financial services in the country.

This is the third in a series of five policy papers that employ the Decision Tree methodology that my colleagues and I developed to disentangle the most pressing constraints to financial inclusion in countries where the low levels of inclusion are truly concerning and a hindrance to prosperity. The other four papers study Ethiopia, India, Indonesia, and Pakistan.

To learn more about this project, find these papers, and read additional material, please visit cgdev.org/page/policy-decision-tree-improving-financial-inclusion.

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1. Introduction

According to data from the Global Findex (World Bank 2017b), in 2017, 37 percent of the adult population (ages 15 and up) in Mexico reported having a banking account, 10 percentage points (p.p.) higher than the observed value for 2011—although it was also 2 p.p. lower than what was observed in the peak year, 2014 (39 percent). Similarly, data from the most recent (2018) National Survey for Financial Inclusion (Encuesta Nacional de Inclusión Financiera, or ENIF)[1] reveal that 47.1 percent of the population ages 18 to 70 had a bank account, 3 p.p. higher than the reported value for 2015 (INEGI 2018a). However, data from Global Findex shows that both measures were lower than the average for Latin America and the Caribbean (LAC), of 55.1 percent, and significantly lower than the average for upper-middle-income countries, which was 73.1 percent in 2017.

In terms of digital financial services, Mexico also reported lower usage than its peers in the Latin American region. For example, in 2017, only 32 percent of the adult population reported making or receiving digital payments in the past year, and 5.5 percent reported using a mobile money account in the last 12 months. An important fact to mention is that these low levels of digital financial inclusion in Mexico are observed at a time when the country has spent the past two decades implementing significant changes to improve financial inclusion.

This document seeks to analyze the underlying factors that could explain the relatively low levels of digital financial inclusion, and specifically, the low use of digital payment services in the country. For the analysis, we adopt the framework proposed by Claessens and Rojas-Suarez (2020), which starts by establishing that if several constraints are preventing an increase in the usage of digital payment services, only the removal of the constraints that are *binding* would have a positive and large impact on usage. The framework consists of a top-to-bottom decision-tree approach, wherein the top branches describe the potential causes of low financial inclusion and the subsequent branches identify the potential root causes. The analytical framework starts with an evaluation of digital payment services in terms of their observed price and usage, which is employed to guide the search for binding constraints and whether they seem to be present on the supply side, the demand side, or both.

The document comprises seven sections. Section 2 describes the different types of digital payment service providers in Mexico. Section 3 presents the most recent information on the state of digital financial inclusion in Mexico and other countries in the Latin American region. Section 4 discusses the framework and methodology for this analysis. Section 5 provides a comparative price analysis of the fees and commissions for digital payment services in Mexico and other countries in the Latin American region. Sections 6 and 7 analyze potential supply- and demand-side constraints, respectively, to identify which could be binding. The last section offers some conclusions.

[1] We use the Spanish-based acronyms for many programs and entities throughout the paper.

2. Digital payment service providers in Mexico

This section describes the types of digital payment service providers that exist in Mexico. We focus on the products and services offered by banks and nonbank digital payment service providers.

For commercial banks, we focus on three types of digital financial services: transactional accounts, automated teller machines (ATMs), and point-of-sale (POS) devices. For the nonbank digital service providers, we focus on the electronic payment institutions (IFPEs), defined in the country's 2018 Law for Financial Technology Institutions (ITFs), commonly called the Fintech Law, as those that issue, distribute, manage, redeem, and transact with electronic payment funds (Diario Oficial de la Federación (DOF), 2018).

As for mobile money, interestingly, in the regulatory framework of Mexico, there is no explicit definition. The 2008 Credit Institutions Law (LIC) includes a definition of *mobile payments*, which are not strictly the same as mobile money, classifying them as electronic banking services associated with a bank account or a card in which the access device is linked to a unique user identifier, enabling monetary transactions such as transfers, bill payments, and balance inquiries. For this reason, hereafter, we use the definition of mobile money that is used by the Mobile Money for the Unbanked (MMU) project of the Global System for Mobile Communications Association (GSMA). The GSMA-MMU definition considers as mobile money a service that meets the following criteria: (1) it must include transferring money and making payments using a mobile phone; (2) it must be available to the unbanked; (3) it must offer a network of physical transactional points (excluding ATMs and bank branches), including correspondent agents; (4) services offering a mobile phone as another channel to access a traditional banking product are excluded; and (5) payment services linked to a traditional banking product are not included.[2]

2.1. Commercial banks' products and services

Commercial banks are regulated under the LIC and by a set of secondary regulations containing more specific provisions. Although other institutions—such as popular financial Societies (SOFIPOs), community financial Societies (SOFICOs), savings and credit corporative societies (SOCAPs), and credit unions—are regulated by the National Banking and Securities Commission (CNBV), these are not included in the scope of this research because their core financial services are to carry out fundraising and credit-granting transactions, rather than digital payment services.[3]

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[2] The GSMA-MMU website provides more information https://www.gsma.com/mobilefordevelopment/mobile-money/.

[3] However, it is worth mentioning that some of the financial entities operating as SOFIPOs are digital banks offering their services and products through a smartphone app.

As of 2020, there are 50 institutions authorized by the CNBV. The seven largest banks accounted for 78 percent of the country's total assets by December 2019, and the rest of the banks are classified by the CNBV as retail, commercial, and investment banks. According to the regulatory framework, banks can partner with other entities—such as telecom companies and correspondent agents—to offer innovative financial services. In Mexico, commercial banks can offer financial services through electronic banking—consisting of mobile banking and Internet banking. Mobile banking is defined as the use of a mobile phone to access banking services and make financial transactions using a bank's mobile application. On the other hand, Internet banking requires a computer, tablet, or other device with an Internet connection to access the bank's online services. A deposit account in a commercial bank is required for both digital channels.

Commercial banks provide digital tools for existing customers with bank accounts. Also, some banks offer digital bank accounts for new clients, who can open an account online using a smartphone and an Internet connection. According to a recent report describing the digital tools in the Mexican banking system, 39 banks have developed 182 digital tools, of which 51 correspond to mobile banking, and the rest are designed for market segments such as insurance, factoring, or investment (Finnovista 2020b).

Table 1 presents the four-tier scheme for transactional deposit accounts offered by the commercial banks in Mexico and the main access channel for accessing each tier (CNBV 2013). This scheme applies only to individuals and excludes firms.

Table 1. Four-tier scheme offered by financial credit institutions, Mexico

Characteristics	Simplified accounts			Level 4 Traditional deposit account
	Level 1 Prepaid card	Level 2 Low transactional level	Level 3 Low risk	
ID requirements	None	Proof of ID (name, date of birth) Proof of address	Complete customer information: • Proof of ID (name, date of birth) • Proof of address • Nationality • Occupation • Telephone • E-mail • Federal taxpayer ID	Complete customer information: • Proof of ID (name, date of birth) • Proof of address • Nationality • Occupation • Telephone • E-mail • Federal taxpayer ID
Requirements for opening the account	Remotely	In person Remotely	In person, no hard copies of ID requirements	In person, with hard copies of ID requirements

Characteristics	Simplified accounts			Level 4 Traditional deposit account
	Level 1 Prepaid card	Level 2 Low transactional level	Level 3 Low risk	
Access points to open the account	Correspondent agents Commercial shops Electronic means	Bank branches Correspondent agents Electronic means	Bank branches Correspondent agents	Bank branches
Access channels	Branches ATMs POS terminals Correspondent agents	Branches ATMs POS terminals Correspondent agents Electronic banking Mobile phones	Branches ATMs POS terminals Correspondent agents Electronic banking Mobile phones	Branches ATMs POS terminals Correspondent agents Electronic banking Mobile phones
Transactional limits (in UDIs)[a]	750 monthly deposits (about US$256.61) 1,000 maximum balance (about US$342)	3,000 monthly deposits (about US$1,026.42)	10,000 monthly deposits Unlimited maximum balance (about US$3,421)	No limits

[a]The limits are measured in investment units (UDIs). As of May 10, 2021, 1 UDI is equivalent to 6.794389 Mexican pesos (about US$0.34).
Source: CNBV (2013, 2015).

In practice, the existing mobile money services—as defined by GSMA-MMU—have followed a bank-led model (offered in conjunction with banks) in the aftermath of a reform in the LIC in 2011. In that year, Telcel—the largest mobile network operator in the country—partnered with two commercial banks to develop Transfer, a mobile payment operator in charge of processing, storing, and managing the bank accounts linked to a mobile phone number in real time, allowing users to make payments electronically, and to send and receive money, from a Telcel phone, whether it is a smartphone or not. Transfer is the only mobile money service in Mexico included in GSMA's mobile money tracker (GSMA-MMU 2021).

2.2. Nonbank digital service providers

Since 2017, Mexico has had one of the main Fintech ecosystems in Latin America, and to stabilize its growth and provide legal certainty to the industry, in 2018, regulators approved the Law for Financial Technology Institutions (ITFs). The Fintech Law—as it is commonly known—regulates the registration, operation, and supervision of two types

of ITFs: crowdfunding institutions and electronic payment institutions (Ley DOF 2018).[4] The law defines electronic payment institutions (IFPEs) as those that issue, distribute, manage, redeem, and transact with electronic payment funds. The electronic payment funds are stored in mobile phones, prepaid cards, or digital wallets and are used to make payments or transfer funds (CNBV 2018b).[5] Importantly, the law establishes that IFPEs can receive cash deposits *only if* they file a request and are authorized by the CNBV to do so. If they do not ask for authorization to receive cash deposits, they can receive deposits only from a supervised financial entity.[6]

ITFs that were already providing services before the enactment of the law in 2018 had to file for the CNBV's authorization and could continue operating under a transitory provision.[7] According to information from the CNBV, in 2018, 93 fintechs have requested authorization to operate as ITFs, and 63 percent of them requested permission to operate as an IFPE. Their approval process, however, has been delayed because of the sanitary emergency caused by the COVID-19 pandemic.

As of June 22, 2021, the CNBV has issued 14 authorizations for ITFs to operate. The first authorization for an IFPE was given in January 2020, and the rest were authorized in March, April, and June 2021. Also, in the same period, the CNBV announced the authorization of 32 additional ITFs, subject to the compliance with certain conditions.[8]

Another important element to keep in mind through the rest of the analysis is that because implementation of the Fintech Law is in its early stages, there are no systematized data yet about the usage and coverage of IFPEs in the country. For this paper, we use secondary information from various sources.

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[4] Crowdfunding institutions are defined as those providing investment schemes such as debt, equity, and joint crowdfunding services. In addition, the Fintech Law allows ITFs to conduct transactions with virtual assets (cryptocurrencies) authorized by the Bank of Mexico (CNBV 2018b).

[5] Although IFPEs offer store-of-value functionalities, the analysis focuses on the payment services and their fees and commissions for making deposits, payments, transfers, and withdrawals.

[6] The Fintech Law defines financial entities as financial holding companies, credit institutions, brokerage firms, stock exchange houses, credit unions, investment funds, auxiliary credit organizations, clearinghouses, SOFIPOs, SOCAPs, SOFICOs, securities deposit institutions, investment fund operators, multiple-purpose financial companies, and credit bureaus, among others (DOF 2018 9 March 2018).

[7] The transitory provision article establishes grace periods for entities that were already carrying out activities regulated by the Fintech Law at the time it became effective and are awaiting approval by the CNBV.

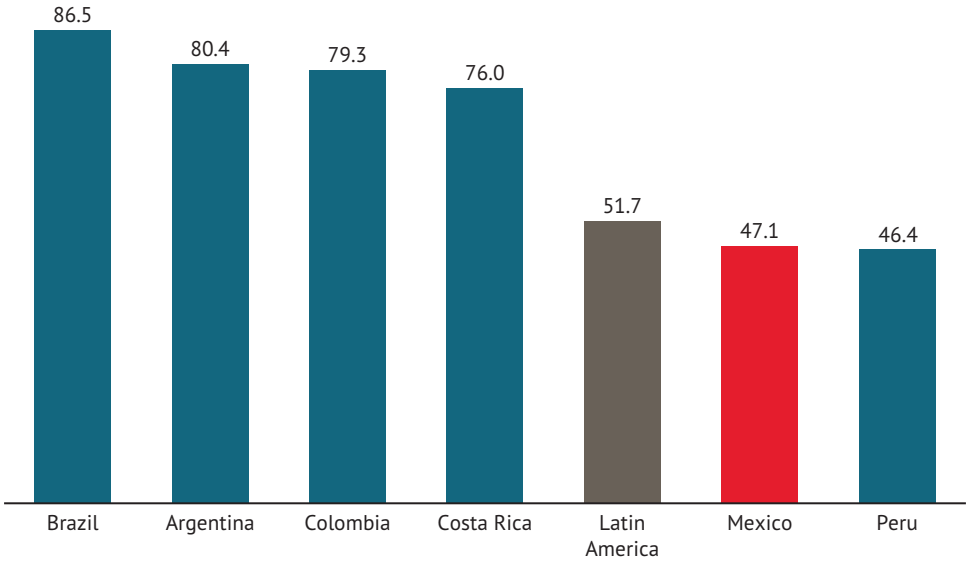
[8] More information is available at https://www.gob.mx/cnbv/articulos/cnbv-actualiza-informacion-respecto-al-proceso-de-autorizacion-de-instituciones-de-tecnologia-financiera?idiom=es.

3. The state of digital financial inclusion in Mexico

This section briefly describes the current state of financial inclusion in the country and provides a set of indicators for other Latin American countries to offer benchmarks for interpreting the data better.

As a starting point, Figure 1 shows the latest available national data from a set of countries with information on account ownership. In Mexico, data from the most recent ENIF (INEGI 2018a) reveal that 40 percent of the adult population (ages 18 to 70 years) had a bank account (transactional, payroll, savings, or pension) at a financial institution in that year, which, added to the population who had an account to receive social or cash transfers from the government, reaches 47.1 percent of the adult population. As can be seen in the figure, this is below the rate observed in peer countries.[9] It is worth noting that for the other countries in the figure, except for Peru, account ownership rates are, on average, 27 p.p. higher than the rate in Mexico.

Figure 1. Financial account ownership (percentage of adult population), Latin America, various years



Note: In Argentina and Brazil, the information is for the popualtion 15 years and older; Colombia, Costa Rica, Mexico, and Peru data include the population ages 18 and up. For Latin America overall, the value is a simple average using data from Global Findex 2017 (World Bank 2017b).
Sources: ENIF 2018 (INEGI 2018a), Central Bank of Argentina (BCRA 2020), Banca de las Oportunidades (2019), Costa Rican Banking Association (ABC 2018), Central Bank of Brazil (BCB 2018), INEI (2020), and Global Findex database 2017 (World Bank 2017b).

[9] In terms of the number of deposit accounts with commercial banks per 1,000 adults, data from the Financial Access Survey for 2019 (IMF 2020) indicate that Mexico ranked eighth among the Latin American countries in this dimension. Additionally, data from the CNBV show wide disparities across the 32 Mexican states, with 10 states in the central and southern regions showing low values (CNBV 2020b).

Data from the Global Findex (World Bank 2017b), which allows cross-country comparisons, show that El Salvador and Mexico were the countries in the region with the lowest percentages of account ownership in 2017, at 30.4 and 36.9 percent of the adult population, respectively. Also, in Mexico between 2014 and 2017, account ownership decreased from 39.1 percent to 36.9 percent, the opposite of the increasing trend observed in the Latin American region. Moreover, data for Mexico from the same source show that the percentage of the adult population who made or received digital payments in 2017 was 31.7 percent, 10.5 p.p. below the average for Latin America.

Concerning mobile money, while there has been an increase in the uptake of this service across Latin America over the last few years, in Mexico, the data show an increase of only 2.2 p.p. between 2014 and 2017, according to Global Findex data (World Bank 2017b).[10] However, among the poorest population in Mexico, the use of mobile money accounts has not increased during the same period (it remained between 2.3 percent in 2014 and 2.25 percent in 2017).

As for financial infrastructure, data from the 2019 FAS (IMF 2020) provide information on the number of existing commercial bank branches and ATMs. The data show that Mexico, with 13.7 commercial bank branches per 100,000 people, ranks lower than Brazil, Colombia, and Costa Rica, but higher than Ecuador and Peru. For the number of ATMs per 100,000 adults, Mexico is in the sixth position, ranking below other upper-middle-income countries such as Brazil, Costa Rica, and Peru.

According to the financial inclusion databases from the CNBV, as of June 2020, the geographical coverage of commercial branches and ATMs also varies significantly within the country (CNBV 2020a). The latest report on financial inclusion in Mexico, for 2019, showed at least one commercial branch in 51 percent of the municipalities, equivalent to a demographic coverage of 92 percent of the population (CNBV 2020b). For ATMs, the CNBV (2020b) estimated a municipal coverage of 59 percent, equivalent to a demographic coverage of 95 percent.

For the number of POS terminals, data from the Committee on Payments and Infrastructure (CPMI) of the Bank for International Settlements (BIS) reveal that in 2019, Mexico was one of the countries with a relatively low number of POS devices from commercial banks per million inhabitants, at 9,995, lower than Argentina (11,676) and Brazil (53,084) (CPMI-BIS 2020). Considering the distribution within the country, data from the CNBV for 2020 show that states in the southern region had even lower coverage of POS devices. Moreover, in 12 states, the number of retailers using POS devices per 10,000 adults was well below the national average (CNBV 2020b).

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[10] According to the glossary of the Global Findex (World Bank 2017b), the metric for mobile money accounts was respondents who reported personally using services included in the GSMA-MMU database to pay bills or to send or receive money in the past 12 months.

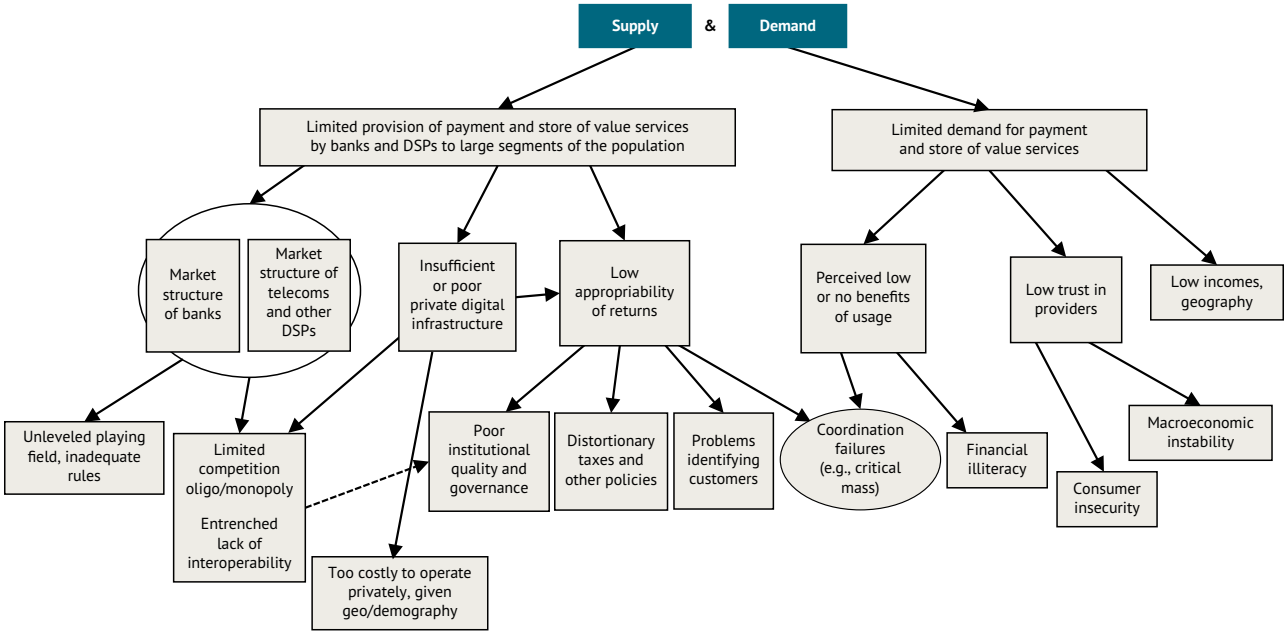
Finally, data from the FAS for 2019 show that for the number of non-branch retail agent outlets of commercial banks per 1,000 km^2, Mexico was located in the middle of the Latin American countries, with a value of 24.9, just above Brazil, Bolivia, Panama, and Uruguay (IMF 2020). For the number of the same type of outlets per 100,000 adults, Mexico had one of the lowest values compared with Brazil, Colombia, the Dominican Republic, Ecuador, and Peru, which are also upper-middle-income countries in the region (IMF 2020).

In sum, the evidence shows that Mexico has lower-than-expected levels of account ownership compared with other countries in Latin America with similar income levels. The data available for digital financial products suggest an increase in the percentage of mobile money accounts in the country, but the level is still low, and most important, the inequalities within the country are significant. In the provision of financial infrastructure—commercial branches, ATMs, and POS devices—Mexico also had lower values than Argentina, Brazil, Colombia, and Costa Rica, with large intracountry inequalities as well. Particularly, the states in the central and southern regions show levels below the national average in most services.

4. Framework and methodology

To explore the underlying factors (binding constraints) behind the relatively low levels of digital financial inclusion in Mexico, reflected in the low usage of digital payment services, we follow the analytical framework proposed by Claessens and Rojas-Suarez (2020), illustrated in Figure 2. This framework consists of a top-to-bottom decision tree approach wherein the top branches describe the potential causes for the low usage of digital payment services, and the subsequent branches identify the potential root causes. It is worth mentioning that the authors presented a decision tree for three specific financial products: digital payment services, store-of-value services, and credit services. As mentioned earlier, our paper focuses exclusively on the digital payment services tree for Mexico. Appendix B provides more details on the analytical framework.

Figure 2. Determinants of inadequate financial inclusion in the use of digital payment services, Mexico



Note: DSP = digital service provider.
Source: Claessens and Rojas-Suarez (2020).

The methodology starts by evaluating a financial service—in our case, the digital payment services as a whole—in terms of its observed (or shadow) price and its usage (quantified) to identify whether the most important constraints are on the supply or the demand side (Figure 2). One key aspect of the methodology is comparing a wide range of indicators with those of peer group of other countries in the region (benchmarking), particularly countries with similar income levels, such as, here, Argentina, Colombia, Brazil, Ecuador, and Costa Rica. Thus, by benchmarking relevant indicators, the methodology allows us to discard constraints until the binding constraint(s) is (are) identified.

Following the structure of the decision tree, if the use of digital payment services is low, there are three potential causes on the supply side: certain characteristics of the market structure, low or poor provision of private digital infrastructure, and problems with the appropriation of returns by providers. On the demand side, the factors associated with low usage of digital payment services are customers' perception of low or no benefits of using the services, their low trust in providers, and low income levels across the population or some of its subgroups. In addition, we borrowed the branch of financial literacy from the store-of-value decision tree and added it as a second-tier branch on the demand side.

The first branch on the supply side is market structure, defined by the Financial Stability Board 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" (FSB 2019, 3). The potential root causes associated with market structure are presented in the lower branches of the tree. The first lower branch represents the degree of competition among providers of digital payment services, and the second lower branch encompasses the regulatory framework under which providers function. Consequently, limited competition or an unlevel playing field, in which the regulations favor one provider over others, determines the market structure and could be a constraint on digital payment services.

The next top branch on the supply side is an insufficient provision of private digital infrastructure. The two determining factors (lower branches) are entry barriers—due to impositions by the public sector or market characteristics in the industry—that are too high, and lack of profitability in increasing private digital infrastructure given the degree of competition.

The third and final top branch on the supply side is low appropriability of returns—that is, a low capacity of digital payment providers to capture profits. Four lower branches in the tree could affect the appropriability of returns: First, poor institutional quality of governance could disincentivize the entry of new providers and, as a result, reduce the supply of digital financial services. Second, distortionary policies—including taxes on payment services—could reduce providers' profits, causing another disincentive. Third, problems identifying customers—the know-your-customer (KYC) requirements—could affect the provision of digital payment services, particularly for the lower-income segment of the population. Last, the presence of coordination failures—caused when demand and supply constraints intersect—could reduce profits if the lack of a critical mass of customers does not allow providers to reach economies of scale.

On the demand side, the first top branch of the tree is the customers' perception of low (or no) benefits from the use of digital payment services, which could be a reflection of a coordination failure associated with demand and supply. One potential root cause that could explain the perception of low benefits is insufficient knowledge about the services. As mentioned earlier, to explore this question further, we add financial literary—which Claessens and Rojas-Suarez (2020) included in the store-of-value decision tree—as a second-tier branch on the demand side of our tree (red box in Figure 2).

The next top branch on the demand side is low trust in providers due to consumer insecurity stemming from previous fraud experiences or lack of customer protection. Also, macroeconomic uncertainty could affect the financial system's stability, lowering consumer trust in providers of digital payment services. The final top branch of the demand side is customers' low income and geographical distribution, both of which could lead to low use of digital payment services.

The tree also allows for interaction between branches. For example, as denoted by the dotted lines in Figure 2, poor institutional quality can potentially be the source of entrenched monopoly power and can also be the root cause of a regulatory framework that creates an unlevel playing field.

For navigating the decision tree in search of the binding constraint, we use the set of principles recommended by Claessens and Rojas-Suarez, taken originally from Hausmann, Klinger, and Wagner (2008):

1. The prices of financial services serve as indicators to determine whether binding constraints are (likely) on the demand or the supply side of the tree.
2. A sign of a binding constraint is that its relaxation is associated with a significant improvement in digital financial inclusion.
3. A constraint is binding if the agents affected by it are trying to overcome or bypass the constraint.
4. Agents less exposed to a binding constraint are more likely to thrive, compared with the segment of the population more exposed to the constraint.

Finally, it is important to stress that the implementation of the methodology is limited by the availability of comparable data across countries. In what follows we employ multiple databases such as the Global Findex (World Bank 2017b), the FAS databases (IMF 2020), the CPMI (CPMI-BIS 2020), survey data from various sources, the financial inclusion databases from the CNBV (2020a), and data from other banking regulatory agencies in the Latin American region.

5. Price analysis

A first step for implementing the methodology discussed in the previous section is engaging in an analysis of the fees and commissions charged by digital providers of payment services in the country. For this purpose, we compare the fees and commissions charged by banks in Mexico with those of their counterparts providing similar services in other Latin American countries.

As a starting point, Table 2 presents a comparison of the characteristics of basic bank accounts for five countries in the region. For all countries, the supervisory agency (central bank or superintendency) has a regulation outlining the general characteristics of these products. In general, there is no commission for opening or maintaining a basic bank account, which provides a debit card for making transactions, allowing the account holder to use ATMs from the bank's network free of charge. Interestingly, despite their availability, 54.2 percent of adult respondents to the ENIF 2018 said they were not aware that banks offered basic accounts for the general public with no opening or maintenance fees (INEGI 2018a).

Table 2. Comparison of basic bank accounts' characteristics for selected countries in Latin America, 2020

Country	Account name	Commissions	Access to a debit card	ATM withdrawals	ID requirements
Argentina	Universal Free Account (Cuenta Gratuita Universal, or CGU)	No commission for opening, maintaining, making transfers, or using ATMs from the same bank	Yes	Yes, free withdrawal when using ATM from the same bank, and up to 8 withdrawals using ATMs from other banks	Proof of ID Must not already have a bank account
Mexico	Basic Payroll Account Basic Account for the General Public	No commission for opening, maintaining, making transfers, or using ATMs from the same bank	Yes	Yes, free withdrawal when using ATM from the same bank	All accounts are classified as Level 2 Proof of ID Proof of address
Paraguay	The products for basic savings accounts with no commission vary across banks.	No commission for maintaining accounts, other commissions might apply depending on the bank	Yes	Yes, free withdrawal when using ATM from the same bank	Proof of ID

Country	Account name	Commissions	Access to a debit card	ATM withdrawals	ID requirements
Peru	Basic Savings Account	No commission for opening, maintaining, making transfers, or using ATMs from the same bank	Yes	Yes, free withdrawal when using ATM from the same bank	Proof of ID
Uruguay	Basic Savings Account (Cuentas Básicas de Ahorro, or CBA)	Commissions might vary across banks	Yes	Yes	Proof of ID Proof of address and phone number

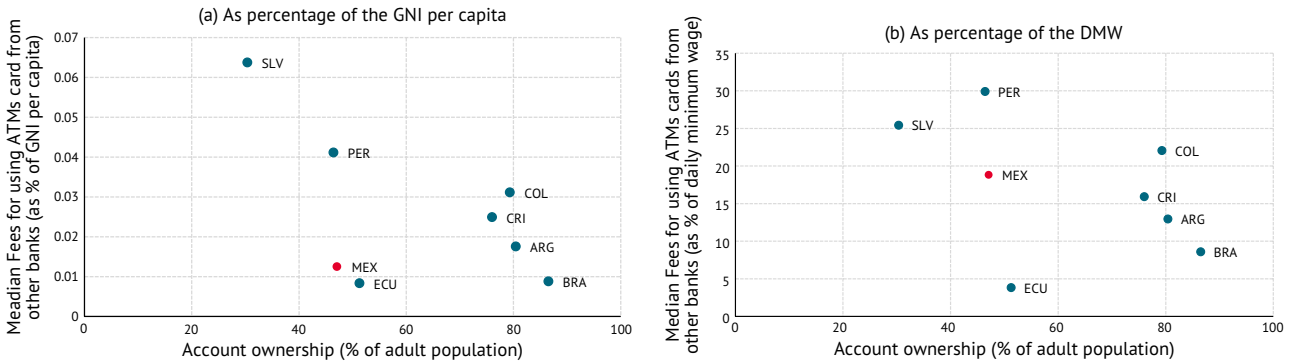
Source: Banxico and information from the central banks or the banking supervision institutions in each country.

The last column in Table 2 shows the ID requirements for opening a basic bank account, which might impose additional barriers for low-income populations. Mexico and Uruguay are the only countries in the sample that, besides requiring proof of ID, also ask for proof of address, which could represent a shadow cost for accessing these types of accounts.

Since 2010, the Bank of Mexico (known locally as Banxico)—Mexico's central bank—prohibited commercial banks from charging their customers fees for withdrawing money, making deposits, or verifying their account balances at ATMs or branch offices operated by the bank holding the account. However, banks can charge commissions for making withdrawals at their ATMs with cards from other financial institutions. Figure 3 shows median fees and commissions relative to the gross national income (GNI) per capita and the daily minimum wage (DMW) of countries in Latin America with available data (Panels (a) and (b), respectively). In relation to GNI per capita, Ecuador and Mexico show lower prices and relatively low financial inclusion (Panel (a)). Based on the DMW, El Salvador, Mexico, and Peru have the lowest percentage of account ownership and higher median fees as a percentage of the DMW. In this respect, it is important to note that the DMW measure seems more appropriate for making comparisons, since a large proportion of the employed population in Mexico earns less than 2 times the DMW, whereas the GNI per capita might mask larger problems with income distribution.[11]

[11] According to data for December 2020 from the National Survey of Occupation and Employment, in Mexico, 23 percent of the employed population (ages 15 years and older) earned the equivalent of a monthly minimum wage, and 34.2 percent earned more than 1 times the monthly minimum wage but less than 2.

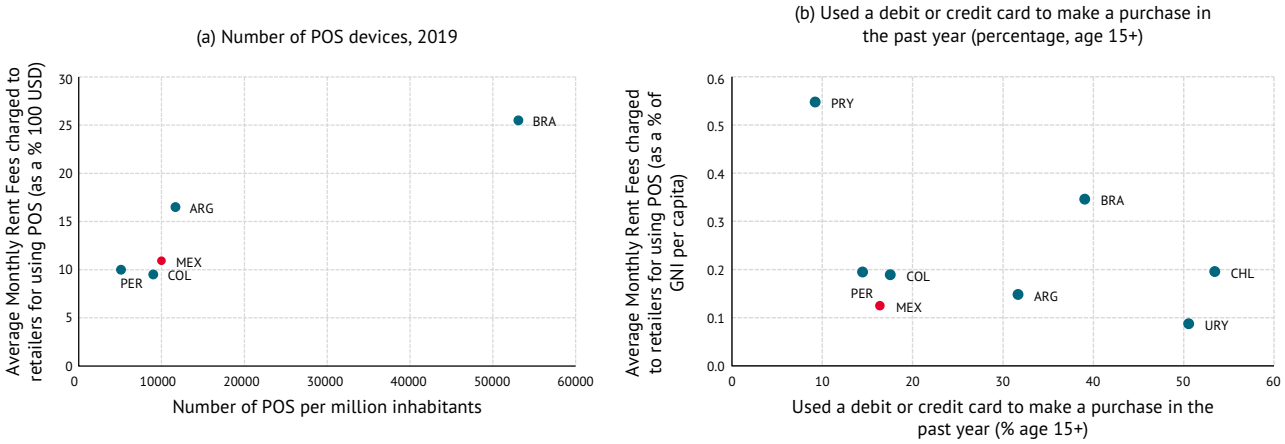
Figure 3. ATM fees for making withdrawals with cards from other banks and account ownership, 2018



Note: For Mexico, the DMW used in the calculations is the average mimium wage published by the National Minimum Wage Commission on Janyary 1, 2020, equivalent to 123.22 Mexican pesos (about US$6.50). For the rest of countries, the data come from ILOSTAT (ILO 2021). For Colombia, Costa Rica, Mexico, and Peru, the account ownership indicator covers the population ages 18 and over. For the rest of the countries, the data are for those 15 and older. The reported commissions are the median upper-bound fees that banks are allowed to charge non-customers for withdrawing money from their ATM network. ARG = Argentina, BRA = Brazil, CHL = Chile, COL = Colombia, CRI = Costa Rica, DOM = Dominican Republic, ECU = Ecuador, GTM = Guatemala, HND = Honduras, MEX = Mexico, PAN = Panama, PER = Peru, PRY = Paraguay, SLV = El Salvador, URY = Uruguay.
Source: Own calculations based on data from Banxico (2020c) , ENIF 2018 (INEGI 2018a), Central Bank of Argentina (BCRA 2017), Banca de las Oportunidades (2019), Banking Association in Costa Rica (ABC 2018), Central Bank of Brazil (BCB 2018), INEI (2020), Global Findex database 2017 (World Bank 2017b), World Development Indicators for 2019 (World Bank 2021a), and data from the banking supervision institutions in each country.

Figure 4 provides information on the monthly rental fees for POS units charged to retailers, as a percentage of US$100, for a set of upper-middle-income countries in Latin America. Panel (a) shows rents in terms of the number of POS units per million inhabitants, for five countries with available data. Colombia, Mexico, and Peru have a lower number of POS devices from commercial banks per million inhabitants but also register the lowest monthly fees and commissions (in US$100s). Panel (b) shows the relationship between the monthly rental fees as a percentage of the GNI per capita and the percentage of the adult population who used a debit or credit card to make a purchase in the past year. Colombia, Mexico, and Peru remain in the lower left quadrant.

Figure 4. POS rent fees charged to retailers, various years

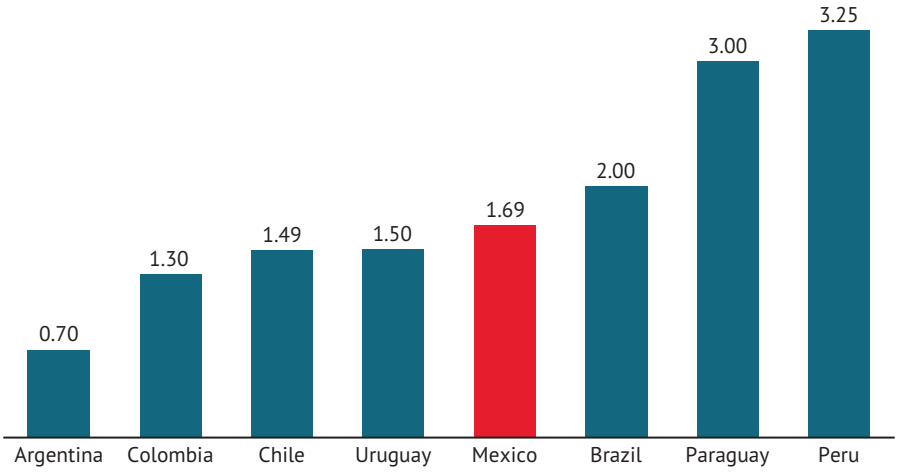


Note: For Colombia, Ecuador, El Salvador, and Peru, the number of POS devices comes from Minsait (2019). For comparison, the fees and commissions correspond to a regular POS device. ARG = Argentina, BRA = Brazil, CHL = Chile, COL = Colombia, CRI = Costa Rica, DOM = Dominican Republic, ECU = Ecuador, GTM = Guatemala, HND = Honduras, MEX = Mexico, PAN = Panama, PER = Peru, PRY = Paraguay, SLV = El Salvador, URY = Uruguay.
Source: Banxico (2020c); for the rest of the countries, price data are from CEPAL (2017) and POS data are from CPMI-BIS (2020), and Minsait (2019). The data for the use of debit or credit card is from Global Findex 2017 (World Bank 2017b).

However, in Mexico, in addition to the monthly rental fees charged to merchants for the POS device, there are other associated costs. For example, the median fee for contracting the services is US$13, and a median monthly penalty of US$10 is charged to merchants that do not meet a minimum monthly sales target. Moreover, as compared with other countries in the region, Mexico has an average merchant discount rate for transactions with a debit card higher than that of Argentina, Chile, Colombia, and Uruguay (Figure 5). Moreover, in Mexico, although there are payment aggregator suppliers that might charge lower subscription and rental commissions, they have an average merchant discount rate of 3.6 percent for debit cards.[12] When the total costs for using POS devices and the higher merchant discount rate are added, there are signals of supply-side constraints on the use of POS devices in digital payment services.

[12] The CNBV defines a payment aggregator as an agent network acting under a service contract that offers payment services for accepting card payments and provides the infrastructure to connect to the network.

Figure 5. Average merchant discount rate for transactions with debit cards (percentage), 2020



Note: For Mexico, the discount rate is the wighted average of the discount rates using the various available debit cards.
Source: Data from Banxico (2020a), BCRA (2017), Redeban (2020), MEF (2020), Transbank (2021), and CEPAL (2017).

As for mobile money services, as discussed in Section 2, the only provider—which follows a bank-led model, as defined by the GSMA-MMU—is called Transfer, with two financial products, each operated by a different commercial bank.

In this respect, Table 3 presents the main fees and commissions for mobile money products in seven countries in Latin America as a percentage of their respective DMWs, assuming a transactional amount of US$1. The mobile money products documented are listed in the GSMA-MMU mobile money deployment tracker (GSMA-MMU 2021)—except for Ecuador. For Mexico, the fees listed in the table correspond to a flat rate charged for cash-in and cash-out services using correspondent agents. The data reveal that, on average, Mexico has the highest fees for cash-in and cash-out services through an agent, which again could be signaling supply constraints. Moreover, the results suggest that for the poorer population, who make smaller transfer amounts, the use of this service is proportionately more expensive.

Table 3. Fees and commissions for mobile money products with a transactional amount of US$1, as a percentage of DMW

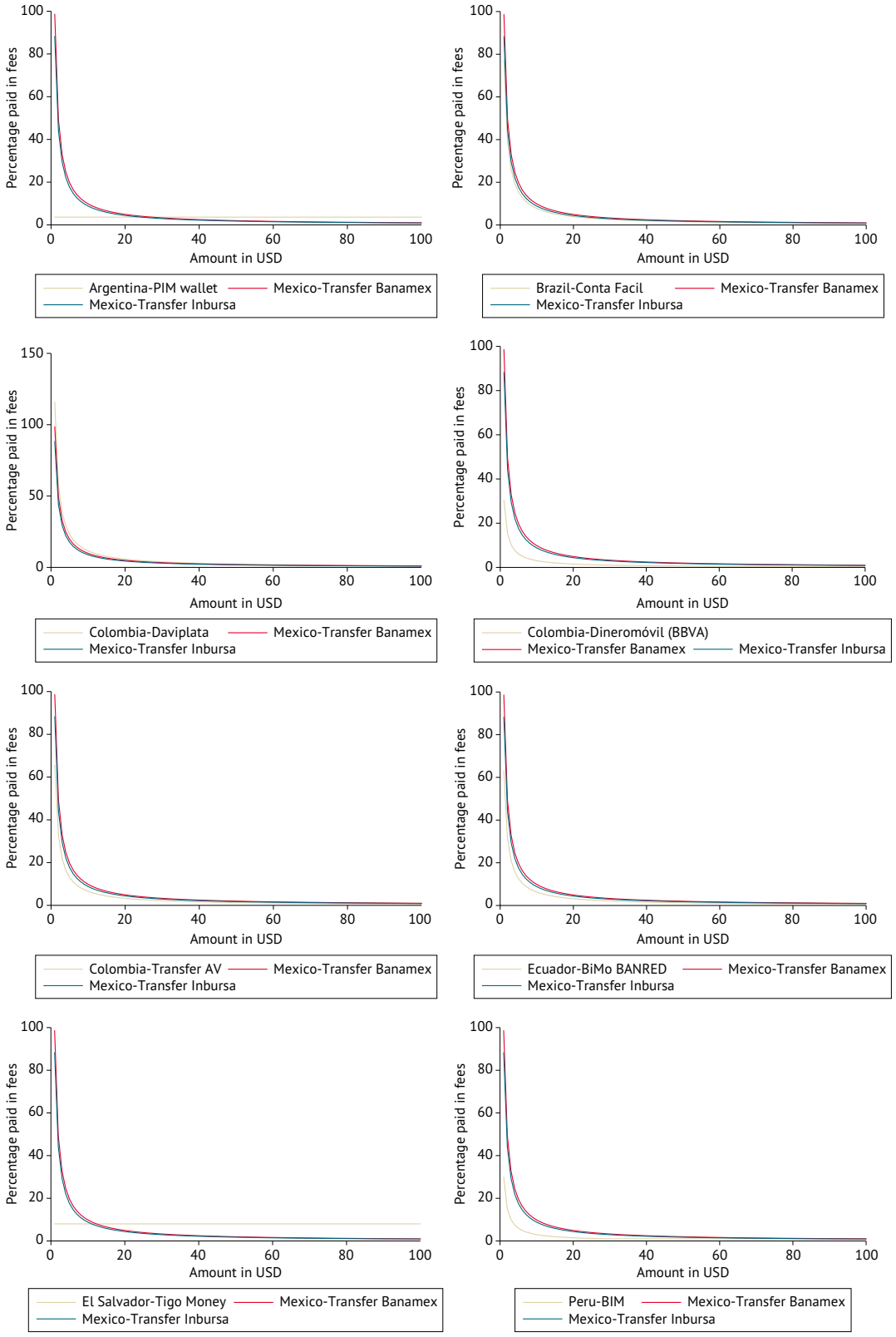
Country/Service provider	Fees for making withdrawals (cash-out transactions)	Fees for making deposits (cash-in transactions)	Fees for making transfers (using a mobile phone)	Mobile money account ownership (% ages 15+)
Argentina/Pim	0.19%	0.1%	0	2.4
Brazil/Conta Fácil	2.9%	2.9%	2.9%	4.8
Colombia/Daviplata	0% using own network 13% using other channels	0%	0%	
Colombia/Dinero Móvil (through BBVA Colombia)	n.d.	3%	0%	4.7
Colombia/Transfer AV Villas	0%	6%	1%	
Ecuador/BIMO (through Banred)	1%	3%	1%	2.9
El Salvador/Tigo Money	0	0.4%	0.4%	
Mexico/Transfer Banamex[a] (using correspondent agents)	7%	7%	1%	5.6
Mexico/Transfer Inbursa[a] (using correspondent agents)	6%	7%	1%	
Peru/BIM	0	3%	0	2.6

Note: [a]The commissions refer to deposits and withdrawals using banking correspondent agents. n.d. = no data available.
Sources: Own calculations based on data from Banxico (2020c), information from the applications' websites, and Global Findex 2017 (World Bank 2017b).

Claessens and Rojas-Suarez (2020) discussed the different types of pricing models for mobile money services. In the sample of products included in Table 4, there is a mix of pricing practices across countries and products. Figure 6 shows the data for a full payment cycle—aggregating the fees for cashing in, transferring money, and cashing out—comparing mobile money products in other Latin American countries with those in Mexico. For example, Argentina's Pim wallet charges a percentage-based fee for cashing in and out, while both mobile money products in Mexico charge a flat fee for the full payment cycle. For low transaction amounts (less than US$40), Mexico's mobile money services have a higher fee as a percentage of the transferred amount than the equivalent services in Argentina.

For Colombia, the three mobile money services have a pricing scheme similar to that of Mexico's Transfer. However, for transactions of less than US$50, in Colombia, Dinero Móvil and Transfer AV Villas have lower full-cycle payment fees as a percentage of the transferred amount. Peru's BIM has a stepped pricing scheme for cashing in. However, when comparing the full payment cycle for Peru's BIM and Mexico's Transfer, the percentage paid in fees is lower for the former. Only Tigo Money in El Salvador—which charges a percentage for cashing in and out—has a higher percentage paid in fees than Mexico's Transfer for transactions greater than US$10.

Figure 6. Mobile money full payment cycle in selected Latin American countries, 2020



Sources: Own calculations based on data from Banxico (2020c) and information from the applications' websites.

As for the other costs of accessing these services, Table 4 presents the average time and cost for a round trip to a bank branch, ATM, and correspondent agent in urban and rural areas of Mexico—including the out-of-pocket expenses in transportation and the social value of time—as a percentage of the DMW.[13] In urban areas, the median time to arrive at a correspondent agent is 5 minutes, compared with 20 minutes in rural areas. Moreover, the median costs as a percentage of the DMW are much higher in rural areas (48 percent of DMW) compared with urban areas (5 percent). Overall, the total median costs for accessing branches, ATMs, and correspondent agents are higher in rural than urban areas.

Table 4. Mexico: Average time and cost to get to a bank, ATM, and correspondent agent, 2018

Access channel	Measure	Urban	Rural
Branch	Median time to get to branch (in minutes)	15	30
	Median cost for a round trip to branch (in Mexican pesos)	16	50
	Total median cost (travel cost and social value of time) as percentage of DMW	32%	85%
ATM	Median time to get to ATM (in minutes)	10	30
	Median cost for a round trip to ATM (in Mexican pesos)	14	40
	Total median cost (travel cost and social value of time) as percentage of DMW	25%	74%
Correspondent agent	Median time to get to correspondent agent (in minutes)	5	20
	Median cost for a round trip to correspondent agent	0	26
	Total median cost (travel cost and social value of time) as percentage of DMW	5%	48%

Note: In 2018, in Mexico, the social value of time was estimated at 50.25 Mexican pesos per hour (CEPEP 2018).
Sources: ENIF 2018 (INEGI 2018a), CEPEP (2018).

Finally, to provide further insights regarding the costs of using digital financial services, Table 5 presents an approximate median total cost for a set of digital financial services such as making withdrawals from an ATM, and for the full payment cycle for using mobile money services in Mexico, relative to the international poverty lines for the socioeconomic classes. For ATMs and mobile money services, besides the commissions, the costs include the median travel cost and social value of time for accessing ATMs and correspondent agents, respectively. The total costs are presented as a percentage of the international poverty lines. For vulnerable and middle-class respondents, the upper cutoff values are used in the estimates.

[13] For other countries, we could not find similar data for making comparisons based on nonpecuniary costs.

Table 5. Total costs of using digital financial services by socioeconomic class as a percentage of international poverty lines, Mexico, 2018

Indicator	Poor US$5.5 a day (2011 PPP)	Vulnerable US$5.5–US$13 a day (2011 PPP)	Middle-class US$13–US$70 a day (2011 PPP)
Poverty headcount (percentage of the population)	22.70%	46.0%	29.60%
Total costs for using digital financial services			
Making withdrawals using ATMs from consumer's own bank *Cost = fees ($0) + travel cost and social value of time to access ATM*	67.8%	28.7%	5.3%
Making withdrawals at ATMs from other banks *Cost = fees + travel cost and social value of time to access ATM*	97.7%	41.3%	7.7%
Full payment cycle for using mobile money services *Cost = cash-in fee + transfer fee + travel cost and social value of time to access a correspondent agent + cash-out fee*	63.5%	26.9%	5.0%

Note: The international poverty line established by the World Bank for upper-middle-income countries is US$5.50 a day (2011 PPP prices). The vulnerable class has a daily per capita income between US$5.5 and US$13 (2011 PPP prices); the middle class is defined as those with a daily per capita income between US$13 and US$70 (2011 PPP prices). The PPP conversion factor used in the estimation is 8.88861 (local currency unit to international dollars), based on data from the World Development Indicators (World Bank 2021a). The percentages are calculated using the upper cutoff value for each socioeconomic class.
Source: Banxico (2020c), ENIF 2018 (INEGI 2018a), CEPEP (2018), and data from the LAC Equity Lab of the World Bank.

In Mexico in 2018, 22.7 percent of the population lived on less than US$5.5 per day at a 2011 purchasing power parity (PPP), and for this segment, the total costs of accessing digital financial services as a percentage of the poverty line are higher, particularly the cost of using mobile money services. Likewise, for the vulnerable class—46 percent of the population—the cost of using digital financial services ranges from 26.9 to 41.3 percent. When accounting for the income level, the total costs for using digital services are high for a large proportion of the population, signaling supply-side constraints.

In sum, in general terms, the price analysis suggests that supply-side constraints might explain the relatively low financial inclusion in digital payment services in Mexico. The main findings are as follows:

- In Mexico, basic bank accounts are financial products offered by all the depository banks in the financial system, and by regulation, they do not charge commissions for opening or maintaining the bank account. The accounts are linked to a debit card, and customers can use the ATM network of their own bank free of charge. The features of basic accounts do not vary across a sample of other countries, but in Mexico, the KYC regulations for basic accounts are quite demanding—including proof of identity and address—contrary to the requirements in the other countries in the sample. An important issue is that for the low-income segments of the

population, the KYC requirements and the costs of accessing financial channels (correspondent agents or bank branches) to open a basic bank account are quite high and could signal supply-side constraints.

- For ATMs, banks cannot charge customers for using their own network, but there are fees for making withdrawals with cards from other banks. For this service, Mexico shows higher fees as a percentage of the DMW, similar to those in Peru and El Salvador, countries that also have a low provision of ATMs compared with other countries in the sample. Following Principle 1 of the decision tree methodology, the price analysis signals supply-side constraints on the provision of ATMs.
- There is also evidence suggesting supply-side constraints in the provision of POS terminals. In this sense, the costs of renting a POS device are lower than the fees charged in other countries in the sample, but the total costs for merchants include subscription fees and, in some cases, penalties for not meeting a monthly sales target, which increase the costs for merchants. Also, the merchant discount rate, while having decreased over time, is still higher than the rate in other countries.
- For mobile money products, the high prices charged for a full payment cycle in Mexico relative to other countries would also seem to be an indication of the existence of supply-side constraints.
- We also discussed the costs for reaching financial access points—measured as out-of-pocket expenses in transportation and the social value of time—and found that the costs are significantly higher for the rural population, which would, in general terms, suggest both supply and demand constraints. The supply-side constraints might arise from the insufficient private digital infrastructure, while the demand-side constraints could be associated with low income or geography.
- Finally, for the nonbank digital providers (IFPEs), information from Web searches shows that opening a digital account using these applications is free, and the fees for cash-in and cash-out transactions might vary depending on the access channel (banks' ATMs or correspondent agents). However, one feature of the IFPEs is that most of them require a smartphone and an Internet connection to access services. Thus, supply-side constraints such as an unlevel playing field or low provision of digital infrastructure will be explored to determine whether they could explain the low digital financial inclusion in the country.

While the price analysis provides signals of supply-side binding constraints in the provision of digital financial services, the methodology calls for a full analysis of the tree to assess the potential constraints on both the supply and the demand sides to reach definite conclusions. Thus, the rest of the paper is devoted to analyzing the potential root causes (binding constraints) that could explain the low digital financial inclusion in payment services in Mexico on the supply and demand sides, respectively. The following section starts the discussion with the supply-side branches of the decision tree (Figure 2).

6. Supply-side analysis

As mentioned in the previous section, low financial inclusion in the use of digital payment services in Mexico could be the result of multiple factors, illustrated in Figure 2. This section delves into the analysis of supply-side factors specifically. These include market structure, as well as insufficient private digital infrastructure and problems faced by providers in appropriating the returns from their investments.

6.1. Market structure

The two potential root causes for a market structure that can explain low financial inclusion, as discussed in the methodological section, are the presence of an unlevel playing field and limited competition. The first refers to the regulatory framework under which the providers of digital payment services function and the second refers to the degree of competition between providers of these services. We explore each in turn in the following subsections.

6.1.1. Unlevel playing field

In 2008, changes to the regulatory framework of the country were introduced, including a disposition allowing banking institutions to contract with third-party agents (known as banking correspondents) to provide basic financial services such as taking deposits, making withdrawals, facilitating transfers, offering loans, and performing utility payments.[14] As of 2019, the latest report from the CNBV estimates the existence of 5.2 correspondent agents per 10,000 adults, with a presence in 74 percent of municipalities, where 98 percent of the Mexican population is located (CNBV 2020b). Despite the expansion since 2008, data from FAS 2020 show, however, that Mexico has the lowest number of correspondent agents per 10,000 adults among Latin American countries (IMF 2020).[15]

One factor that might explain their low numbers in Mexico is that agents must meet a list of requirements to be considered banking correspondents, including sufficient infrastructure to carry out the operations, at least three years of being formally constituted as an entity,

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[14] Resolution DOF 2/12/2008.

[15] In terms of empirical evidence, for correspondent agents specifically, an early assessment did not find conclusive evidence suggesting a statistically significant association between the increase in the number of credit and debit cards and the presence of correspondents in "treated" municipalities (Peña and Vázquez 2012). Nonetheless, the results did find evidence showing an increase in the geographical coverage of banking correspondents. In contrast, Carabarín and others (2016) estimated a positive and significant effect of the presence of banking correspondents on two outcome variables at the municipal level in Mexico: the volume of transactions and the number of transactional bank accounts. However, the authors highlighted that the results capture a considerable spillover effect driven by customers switching from one bank to another to make better use of the services provided by correspondent agents. A recent study from the CNBV (2018a)—which used a propensity score matching technique—found a positive correlation between the presence of banking correspondents and an increase in financial outcomes at the municipal level, such as the number of transactional accounts and the number of financial transactions using ATMs and POS units.

a satisfactory business and credit history, and no felony conviction (CNBV 2010, 2011). Compared with other countries in the Latin American region (see Table 6), Mexico and Peru have the highest requirements for becoming an agent, and Mexico, in particular, has tougher regulations concerning agents' liabilities. In addition, although the Mexico regulation allows for an agent to sign a contract with multiple financial institutions, this authorization process must be carried out for every financial institution separately, with the additional burdens and transaction costs implied.

Table 6. Requirements for correspondent agents

Attribution	Brazil	Colombia	Mexico	Peru
Supervisory authority	Central Bank of Brazil	Financial Superintendence of Colombia	CNBV	Superintendency of Banking, Insurance and Private Pension Fund Administrators
Law/decree	Resolution CMN 3110, July 2003, as amended by Resolution CMN 3156, December 2003; Resolution CMN 3654, December 2008; Resolution CMN 3954, February 2011	Decree 2233–July 2006; Decree 1121–March 2009	Banking Resolution, 12/2009 LIC DOF 01-02-2008	Resolution B2147–2005; Resolutions SBS 775–2008 and 6285–2013
Agent eligibility	Only business companies and associations. Financial institutions and other institutions that are part of the national financial system can be agents. Notary and registry services suppliers. Individuals may not act as agents.	Any type of legal entity, including credit unions. Individuals who permanently carry out commercial activities can be agents.	Any legal entity, except financial institutions whose exclusive business is conducting auxiliary credit activities, such as brokers and dealers. Individuals can be agents if they have a permanent business establishment. Pawnbrokers and similar entities cannot be agents.	Any type of legal entity. Individuals who permanently carry out commercial activities. Casinos and exchange houses cannot be agents.
Requirements	For credit operations, agents have to pass a certification.	The financial institution is required to assess the correspondent's moral integrity, physical and technical infrastructure, and human resources.	Agents should have a permanent establishment for the business operations, have sufficient capacity to properly operate electronic devices, have the necessary infrastructure to process banking operations, demonstrate good reputation and credit history, have trained personnel to operate payment devices, and have no felony convictions.	The establishment should have an adequate physical infrastructure and human resources for the provision of the services, trained personnel to carry out the operations, enough capital for carrying out agent operations, and no reports at credit bureaus.

Attribution	Brazil	Colombia	Mexico	Peru
Agent exclusivity	Not mentioned in the regulation	Not mentioned in the regulation	An agent can sign one or more contracts with different banks, or sign an exclusive contract with a financial institution. Banks cannot hire agents that have been acting as exclusive agents to another bank in the past 12 months. Agents cannot sign exclusive agency agreements to conduct payments of nonbank services and credit card payments.	Not mentioned in the regulation
Services	Cashing in Cashing out Bill and service payments Account opening	Cashing in Cashing out Bill and service payments Account opening Balance inquiries	Cashing in Cashing out Bill and utilities payments Account opening Loan payment Balance inquiries	Cashing in Cashing out Bill and service payments
Liabilities for agents	Contracting party is fully responsible for the service provided by its agents.	Contracting party is fully responsible for the service provided by its agents.	Contracting party is fully responsible for the service provided by its agents. Agents are subject to administrative, civil and criminal charges for infringing applicable legislation.	Contracting party is fully responsible for the service provided by its agents.

Sources: Information from the countries' central banks and financial superintendencies; CNBV (2010, 2011); Kerse, Meagher, and Staschen (2020); FOMIN, IDB, and CAF (2013); and CGAP (2011).

Because of the regulation, most of the correspondent agents in Mexico are retail chain stores that can comply with all of the technical and operational requirements. The result is that as of 2019, the main retail chain store in the country, Oxxo, had 43 percent of the total correspondent agents. Oxxo is followed by Red Yastás, the main agent network manager in the country, with 17 percent; this network imposes entry requirements for business owners that include an official ID, proof of address, bank account, and fiscal compliance, as well as a computer with Internet connection and a printer in the business. Walmart is next, with 6 percent of correspondent agents (CNBV 2020b). An important aspect to highlight is that the commissions for cashing in using correspondent agents are quite high, ranging from 6 to 15 Mexican pesos, equivalent to 4 to 11 percent of the DMW in 2021.

The high entry costs imposed on small business owners to engage in the network could actually be deterring smaller stores from acting as agents, which in turn reduces the footprint of correspondent agents and, particularly, the provision of digital payment services for lower-income populations. In this respect, only two banks have small shops as correspondent

agents, and only nine banks have agreements with the largest retail chain store, Oxxo.[16] As for IFPEs, those that have authorization for cashing in and cashing out also use the same correspondent agent network as the banks, a situation not likely to generate an expansion in the correspondent networks or a reduction in the commissions for using these services.

As discussed earlier, in 2009, additional changes were introduced to the regulatory framework, allowing for a bank-led mobile money model, whereby telecom companies had to partner with banks to offer mobile money services. An early initiative for promoting mobile payments was introduced by a trust fund formed by the banks, called FIMPE (Fideicomiso para el Impulso de la Infraestructura de Medios de Pago Electrónico), which created a mobile banking platform called Nipper, serving any bank willing to join. In 2008, 12 banks and 2 telecoms—Movistar and Iusacell, together accounting for less than 30 percent of the market—adopted Nipper, allowing users to associate a phone number with a bank account to make transactions (Banxico 2009; CGAP 2010). Nevertheless, this venture was not successful. At its maximum, it reached fewer than 300,000 users, and although there is no empirical evidence analyzing this case, some reports attributed the failure to the lack of participation of the largest telecom (Telcel–América Móvil), a failed advertising campaign, and the fact that the only transaction supported was airtime top-up (Enríquez et al. 2009). These factors prevented the initiative from reaching the critical mass necessary to reap the benefits of the expected economies of scale.

Interestingly, later, in 2010, as mentioned in Section 2, two banks partnered with Telcel–América Móvil through the mobile money operator Transfer—which is currently the only operating mobile money provider, as defined by GSMA, in the country—to offer mobile money products. According to the National Commission for Financial Inclusion (CONAIF 2016), between 2011 and 2015, the number of mobile money accounts increased from 200,000 to 6 million, representing 7 percent of all commercial bank accounts in Mexico.[17]

Figure 7 shows the results of the Mobile Money Regulatory Index, designed by GSMA, which confirms the important role that regulation still has in Mexico. The index includes 90 countries and measures the extent to which their regulatory framework enables widespread mobile money adoption.[18] Scores range from 0 to 100, and a higher score is associated with a more enabling regulatory framework. Among the 11 Latin American countries included in the study Mexico ranks 8th, and it places in the 74th position among all 90 countries in the sample.

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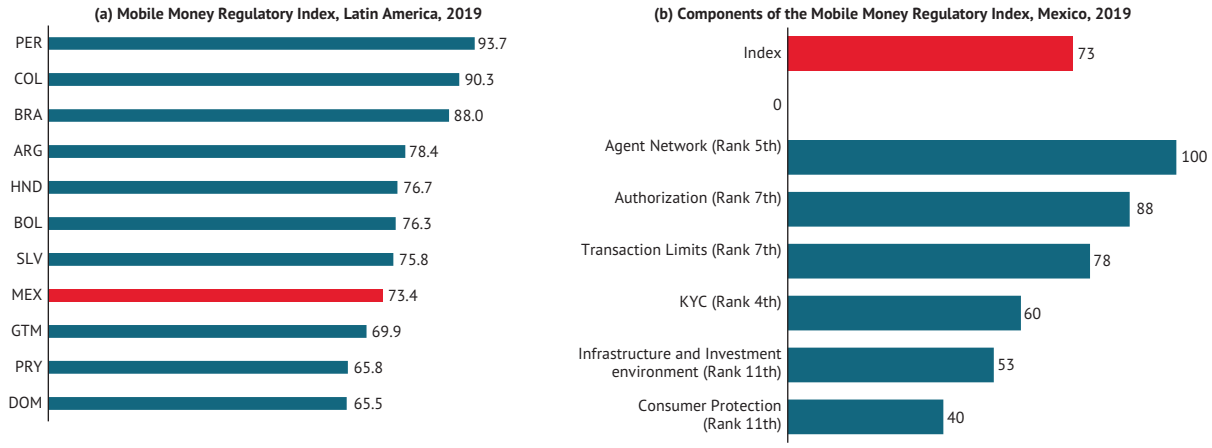
[16] As of April 2021, the second-largest bank in the country announced that its contract with Oxxo will not be renewed; thus, this bank will be exiting the agent network.

[17] In 2012, the largest retail store chain in the country (Oxxo) developed a branded transactional debit card (Saldazo) linked to a simplified bank account, in partnership with a commercial bank and the Transfer app. Casanova and Zapata (2016) discussed Saldazo's business model and argued that brand recognition and trust, combined with high store accessibility, played an important role in promoting the product among low-income population segments. The authors argued that driving cheaper transaction costs, particularly for mobile transactions, is a challenge for the profitability of this business model.

[18] The methodology is described in GSMA (2021).

Figure 7. Mobile Money Regulatory Index, 2019



Note: The index is a single composite indicator measuring how enabling a country's regulatory framework is. It consists of six dimensions, which are aggregated to produce the overall index score, for a total of 26 indicators. ARG = Argentina, BOL = Bolivia, BRA = Brazil, CHL = Chile, COL = Colombia, CRI = Costa Rica, DOM = Dominican Republic, ECU = Ecuador, GTM = Guatemala, HND = Honduras, MEX = Mexico, PAN = Panama, PER = Peru, PRY = Paraguay, SLV = El Salvador, URY = Uruguay.
Source: GSMA (2019).

The two dimensions in which Mexico performs worst are investment and infrastructure environment, and consumer protection. The first of these dimensions measures the external factors that are likely to affect the regulatory environment, such as affordability, identity verification, interoperability, and national financial inclusion policies. The consumer protection dimension examines the general consumer redress and disclosure mechanisms and the provisions for safeguarding customer funds. In both dimensions, the indicators that score the lowest are those associated with the bank-led model, which requires mobile money operators to rely on banks for the safeguarding of funds, and those related to settlement access.

Considering that telecom companies could provide mobile money services only in association with a bank up until 2018, the regulatory framework imposing a bank-led model for mobile money might have been a binding constraint on the provision of digital payment services in Mexico, since the regulation framework favored the banking industry (Suárez 2016).

To further level the playing field, the Fintech Law was enacted in 2018 with the objective of regulating two types of ITFs: IFPEs and crowdfunding institutions (as discussed in Section 2). Although authorized ITF companies are required to comply with reporting and disclosure requirements, as already mentioned, only 14 ITFs have been authorized to date.

An important feature of the products offered by IFPEs is that they are designed for 3G technologies and above, thus requiring users to have a smartphone and excluding users with basic cell phones. Table 7 compares the regulatory framework of IFPEs in Mexico with those of similar digital payment service providers in other countries. As compared with other countries, in Mexico, the regulatory provisions for IFPEs are more complex and the capital requirements are among the highest in the region—except for Peru, which also has

lower digital financial inclusion. Moreover, IFPEs can receive cash deposits *only if* the CNBV grants them an authorization. If they do not ask for authorization to receive cash deposits, the IFPEs can receive deposits only from supervised financial entities. Dias and Staschen (2019) argued that this rule requiring additional authorization for receiving cash deposits is not common in electronic money issuers' regulations and can hinder the advancement of financial inclusion.

Table 7. Regulatory provisions for digital service providers similar to IFPEs

Country	Law or regulatory provision	Regulatory agency	Authorization for operating	Minimum initial capital
Argentina	Comunicaciones "A" 6859 and 6885	Central Bank of Argentina	Register in the official registry of service payment providers	There is no minimum capital requirement
Brazil	Law 12,865 and Resolutions 3680, 3681, 3682, 3885	Central Bank of Brazil National Monetary Council	Request authorization from the central bank	2 million Brazilian reals (US$365,972); 1 million reals (US$175,054) for payment service initiators (agents who only receive the payment order but do not execute the transaction)
Chile	Agreement 2704, Central Bank of Chile	n.a.	n.a.	n.a.
Mexico	Fintech Law, 2018, and Resolution 12/2018 Banxico	CNBV and Banxico The authorization is issued after the agreement of an Interinstitutional Committee.	Request authorization to operate as an ITF	500,000 UDIs (about US$166,836); 700,000 UDIs (US$233,570) if authorized to operate with virtual assets or act as a clearinghouse.
Peru	Law 29985/201 Law 29440 and Resolution 0003-2020, Central Bank of Peru	Central Bank of Peru Superintendency of Banking, Insurance and Private Pension Fund Administrators	Only entities authorized by the Superintendency of Banking can issue e-money Digital services providers such as e-wallets and QR codes should register in the official registry created by the central bank	S/. 2,536,243 (about US$652,829 on March 2021)
Uruguay	Resolution 2,246, Central Bank of Uruguay	Central Bank of Uruguay	Register in the official registry created by the central bank	n.a.

Note: n.a. = not applicable; UDI = investment unit (as of May 10, 2021, 1 UDI is equivalent to 6.794389 Mexican pesos, or about US$0.34).
Source: Dias and Staschen (2019) and Diehl and Lava (2020).

A relevant piece of evidence pointing to the restrictions imposed by an overburdening regulation is that before the Fintech Law was enacted in 2018, PayPal and Conekta, two digital payment providers, changed their operations to eliminate the store-of-funds functionality in their platforms. By not retaining funds from users, they would not be subject to regulation as IFPEs under the Fintech Law. Both companies remain as payment aggregators to facilitate transactions, but they now avoid the complications of managing payment funds. This is consistent with the fact that according to the CNBV, out of 238 fintechs operating in 2017, 79 percent offered payment and remittances, crowdfunding, financial management, and lending services (CNBV 2018b), and in 2018, the Finnovista Fintech Radar counted 125 new fintech startups, 75 of them in the payments and remittances segment and 30 in the crowdfunding segment (Finnovista 2018, 2020a). However, according to information published by the CNBV only 93 fintechs—about 1 in 4—had requested authorization to operate as an ITF.[19]

Following the decision tree methodology's third principle for identifying binding constraints, the behavior of Mexico's digital service providers suggests that the expansion of digital payment services may be undermined by regulatory constraints. Specifically, there is evidence of continuous attempts by potential providers to bypass regulations by either changing their modality of operation or creating strategic alliances with financial institutions that are already authorized by the regulators.

In the following sections, we continue exploring the other branches on the supply side of the decision tree to analyze whether leveling the playing field, although it seems to be a necessary condition, might not be sufficient to improve inclusion in digital payment services in the country.

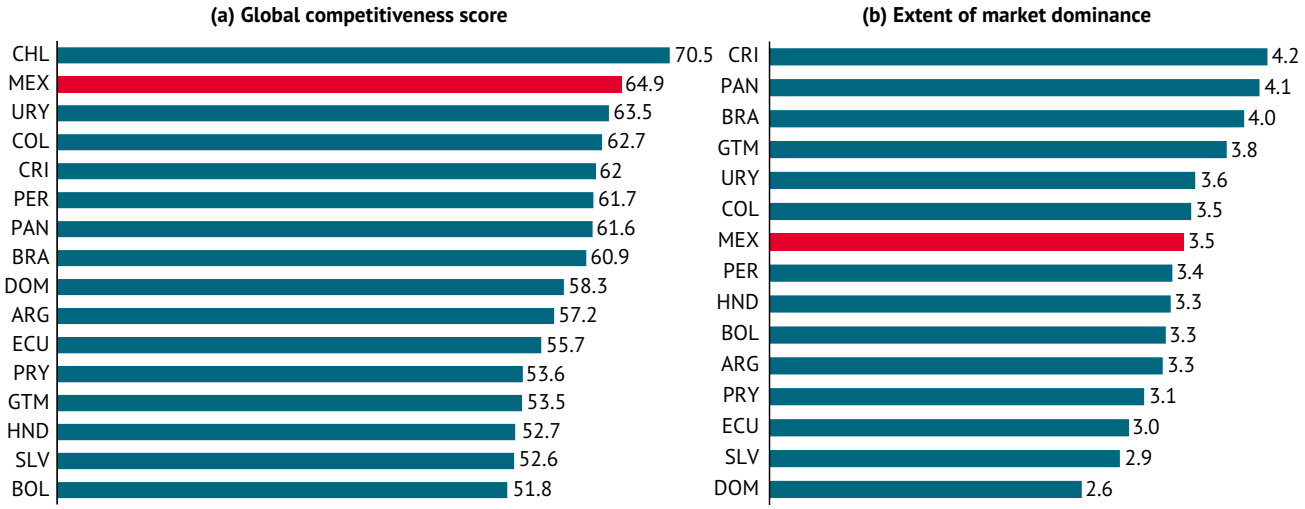
6.1.2. Limited competition

Following the decision tree methodology, we turn to another potential root cause associated with deficiencies in the market structure—limited competition (Figure 2). To analyze whether limited competition is a potential root cause of the low provision of digital payment services, we follow the steps proposed by Claessens and Rojas-Suarez (2020), starting by analyzing the level of competitiveness of the overall economy. Mexico stands out in this dimension in recent decades after having implemented a series of liberalization reforms to integrate into the global economy, which go in the direction of enhancing competition in all markets, including financial. In the 2020 *Doing Business* report (World Bank 2020a), whereas Mexico ranked 60th among 190 countries in the sample, it ranked as the highest among

[19] An interesting development that could be indicative of the remaining costs and burden of regulation is that in early 2021, AT&T—one of the telecom companies operating in the market—opted not to capitalize on its telecom network but instead to offer an electronic payment service in alliance with Broxel, a digital bank operating as a SOFIPO, to launch a financial product called AT&T ReMo for making transactions. The application requires a smartphone, and the account can be opened remotely using the app.

LAC countries, followed by Colombia (67th), Costa Rica (74th), and Peru (76th). Brazil and Argentina ranked in positions 124 and 126, respectively (Table A.1 in Appendix A).[20]

Figure 8. Global competitiveness, 2019



Note: ARG = Argentina, BOL = Bolivia, BRA = Brazil, CHL = Chile, COL = Colombia, CRI = Costa Rica, DOM = Dominican Republic, ECU = Ecuador, GTM = Guatemala, HND = Honduras, MEX = Mexico, PAN = Panama, PER = Peru, PRY = Paraguay, SLV = El Salvador, URY = Uruguay.
Source: Schwab (2019).

According to the World Economic Forum's *Global Competitiveness Report 2019* (Schwab 2019), in LAC, Mexico ranked in the second position (48th among 141 global economies), just below Chile (33rd globally), mainly for improving its scores on the pillars of institutions, labor market, and adoption of information and communication technology. As compared with other countries in the region with similar income levels, it is also notable that Mexico has a higher rank than Argentina, Brazil, Colombia, and Peru on this indicator (Panel (a) of Figure 8). For the indicator on the extent of market dominance, Mexico ranks in the middle, with levels close to the average (Panel (b) of Figure 8), which confirms that Mexico stands out as a competitive economy.

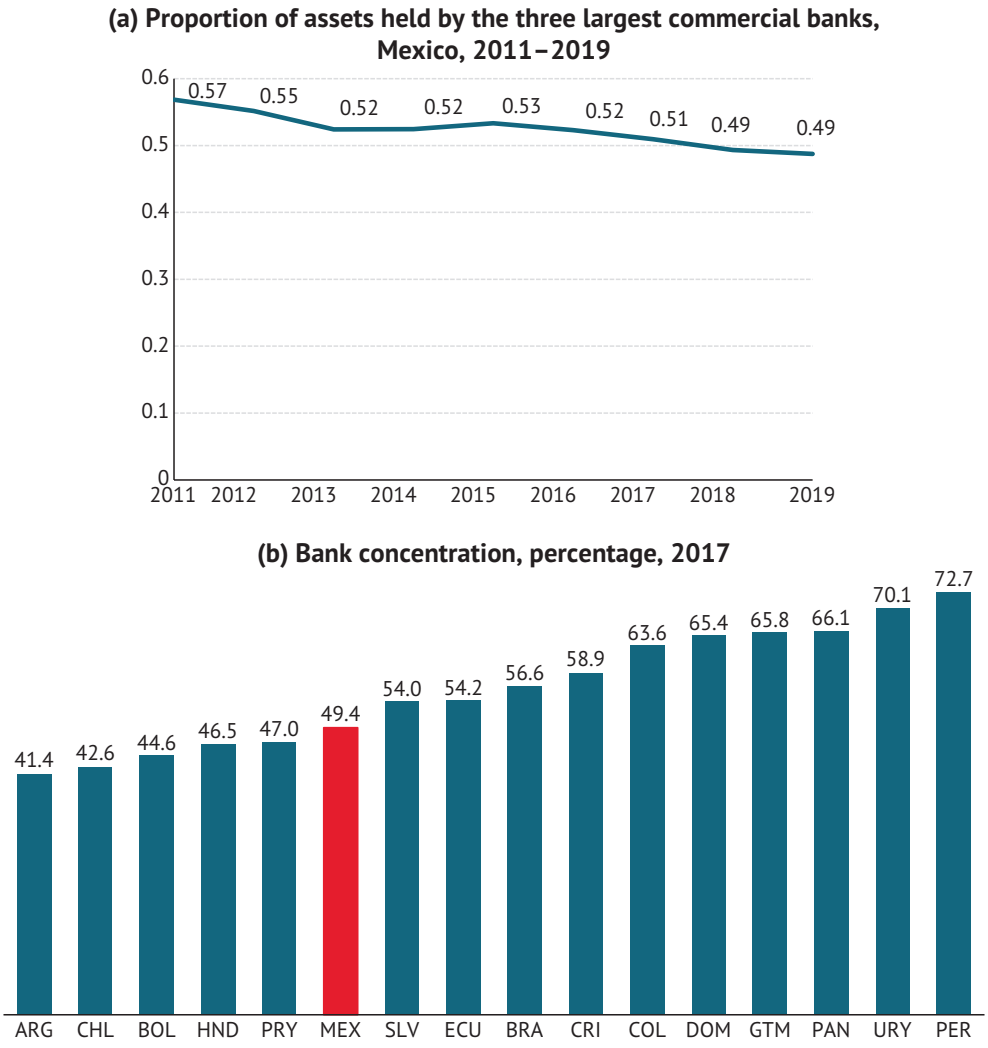
Competition in the financial sector

As for the financial sector specifically, in 2019, the three largest banks held about 49 percent of the banking system's assets, which is 8 p.p. lower than the observed value in 2011 (Panel (a) of Figure 9). An assessment of the Mexican banking sector from the World Bank (2017a) showed that the country's Herfindahl–Hirschman index (HHI) for commercial banks' assets, deposits, and loans is declining over time.

[20] Mexico's ranking has fluctuated over time. In 2014 the country obtained its highest ranking (42), but since then, its ranking has deteriorated, from 54 in 2018 to 60 in 2019.

Panel (b) of Figure 9 provides recent data regarding the bank concentration—measured as assets of the three largest commercial banks as a share of total commercial banking assets—for countries in the Latin American region. As shown, bank concentration in Mexico is lower than the regional average (56.2 percent), and the country ranks 11th among the 16 countries in the sample. Also, a comparative analysis for Argentina, Chile, Colombia, Brazil, and Mexico, using data for commercial banks up to 2015, estimates an *H*-statistic (a measure of competitiveness) of 0.64 for Mexico, below Chile (0.81) and Colombia (1.01), but higher than Argentina (0.54) and Brazil (0.60) (World Bank 2017a).

Figure 9. Bank concentration



Note: Bank concentration is defined as assets of the three largest commercial banks as a share of total commercial banking assets. ARG = Argentina, BOL = Bolivia, BRA = Brazil, CHL = Chile, COL = Colombia, CRI = Costa Rica, DOM = Dominican Republic, ECU = Ecuador, GTM = Guatemala, HND = Honduras, MEX = Mexico, PAN = Panama, PER = Peru, PRY = Paraguay, SLV = El Salvador, URY = Uruguay.
Source: Global Financial Development Database updated with data through 2017 (World Bank 2019), and CNBV (2019a).

However, in relation to card payment services, Mexico's Federal Commission for Economic Competition (COFECE) recently presented preliminary results of a study showing that eight banks are co-owners of the only two clearinghouses operating in the country, a situation that could generate anticompetitive advantages in this particular segment of the market (DOF 2020).[21] COFECE also argued that due to the lack of competition in the card payment network, the fees banks charge commercial merchants are high, discouraging firms from accepting card payment methods.

In this respect, quasi-experimental evidence from a pilot program designed to encourage digital payment methods in small merchant firms showed that lowering the merchant discount rate and providing information about the benefits of accepting card payments was associated with an increase in sales, compared with a control group, which could encourage small merchant firms to adopt card payments (Banxico 2020a).

This finding is consistent with the price analysis discussed in Section 5, which signaled possible supply-side constraints in the provision of POS payments. Although, in principle, lack of competition in this particular segment could appear to be associated with the low provision of digital payment systems using POS devices, recent data suggest that the market concentration in the card payment segment has also decreased over time (Figure 10). Also, the HHI in the card issuer segment—that is, among the financial institutions offering debit and credit cards to their clients—decreased, on average, 14 percent between 2014 and 2020. In the acquiring segment (banks and nonbanks), the HHI declined at a faster rate over the same period (Panel (a) of Figure 10).[22] The decrease in market concentration in the acquiring segment is associated with the increasing participation of nonbank acquirers and payment aggregators in the provision of card payment services, which provides merchants with more alternatives to accept card payments as a payment method (Panel (b), Figure 10).

Another factor that could explain the increase in the number of nonbank acquirers and payment aggregators is that their price scheme might be less costly for merchants with lower sales volumes. In contrast, merchants using banks' POS devices face monthly rental fees and penalties for not meeting monthly sales targets (Banxico 2020a).

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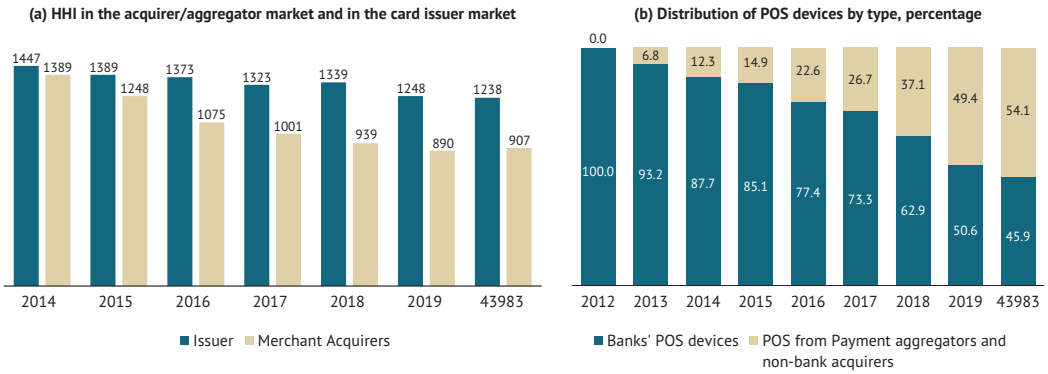
[21] The card payment systems allow transactions between cardholders and businesses for the purchase of goods and services.

[22] Acquirers are the financial institutions that process credit or debit card payments on behalf of a merchant. Thus, acquirers allow merchants to accept credit or debit card payments from a card-issuing financial institution.

Figure 10. Card payments market, Mexico, 2012–2019



Source: Banxico (2020a).

In 2019, Banxico launched a digital payment system, Cobro Digital (CoDi), to facilitate transactions through mobile phones using QR codes and near-field communication (NFC) technologies. The CoDi platform requires a mobile device such as a smartphone or tablet. For making or receiving a payment, the user needs to have an account in a financial institution, although there are no fees or commissions for using the platform. All banks are required to provide CoDi to their customers, and data from Banxico show that as of December 2020, about 6.4 million accounts are associated with the banking app that enables CoDi to make payments; however, only 309,000 accounts had generated at least one payment request over the past year, and only 255,000 accounts had made at least one payment through the app.

As discussed by Navis and others (2020), the effect of CoDi on the usage of digital payments might be restricted by CoDi's requirements that users have both a smartphone and an account with a regulated financial institution. Moreover, another element that might reduce the uptake of CoDi is the lack of incentives for market participants under the prohibition against charging customer, merchant, or interparty fees (Cook, Lennox, and Sbeih 2021). All of these restrictions could make the impact of CoDi on digital financial inclusion for the lower-income and unbanked populations very limited.

For IFPEs, although more competition or cooperation is expected after the implementation of the Fintech Law (Navis et al. 2020), to date there are no available data to measure the degree of competition between ITFs, the banking sector, and other nonbanking institutions. However, some alliances might signal the degree of cooperation that could be expected going forward. For example, in 2020, a bank and a fintech (Banorte and Rappi) announced a joint venture to create a new entity with an authorized license of its own to offer digital financial products to its user base. Another example is Klar, a digital financial provider operating through a credit provider and an IFPE to offer payment services and credit products (Jeník, Flaming, and Salman 2020). These examples suggest that there is growing cooperation in the provision of digital payment services.

Because the changes just described are relatively new, there are few signs yet that improved competition (which would relax the possible binding constraint of low competition) has the potential to trigger a significant surge in the use of digital payment services in the country.

Recalling the methodology's Principle 2, this suggests that limited competition is *not* a candidate for being a binding constraint at the moment.

Interoperability

Another relevant issue is the degree of interoperability of payment systems. Claessens and Rojas-Suarez defined interoperability as "the capacity that the services developed and provided by one scheme may be used in platforms developed by other schemes" (2020, 26). Particularly for mobile money markets, Bourreau and Valletti (2015) described three levels of interoperability: the customer, agent, and platform levels.[23]

In 2004, Banxico established an interbank payments system, the Sistema de Pagos Electrónicos Interbancarios (SPEI), which functions as the clearing and settlement mechanism for financial transactions and also supports retail payments. At first, only banks participated directly in SPEI, but in August 2006, Banxico began allowing the participation of other regulated financial institutions (Banxico 2017).

Since 2018, with the approval of the Fintech Law, the ITFs can connect to SPEI if they meet the risk management protocols, but unlike banks, they are not required to do so. To directly connect to SPEI, nonbanking institutions are required to adopt cybersecurity compliance measures similar to those of the banks, and they also have to hold reserves at Banxico. Cook, Lennox, and Sbeih (2021) pointed out that given the strict risk management requirements for connecting to SPEI, it is unlikely that nonbanks are willing to invest the resources to comply with all the cybersecurity measures. However, smaller financial institutions can connect to SPEI indirectly through nonbank participants already connected to SPEI.[24]

For ATMs, in 2014, COFECE presented a study on the financial system to provide recommendations for improving competition in the interoperability of ATMs. The study identified the high fees for making withdrawals at other banks' ATMs, which force a large proportion of account holders use their own banks' ATMs, as a potential source of limited ATM competition (Figure 3). To address this issue and increase access to ATM infrastructure, Banxico modified its regulation to allow financial institutions to sign ATM sharing agreements (OECD 2017a). As of September 2020, 22 such agreements had been signed by commercial banks, reducing consumer-paid commissions by approximately 46 percent between 2015 and 2020 (Banxico 2020a). However, IFPEs that offer debit cards

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[23] As explained by Claessens and Rojas-Suarez, "Bourreau and Valletti (2015, 15) 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)".

[24] One example of a nonbank participant connected to SPEI is STP (Sistema de Transferencias y Pagos), which acts as a payment aggregator and settlement service for smaller financial institutions (Cook, Lennox, and Sbeih 2021).

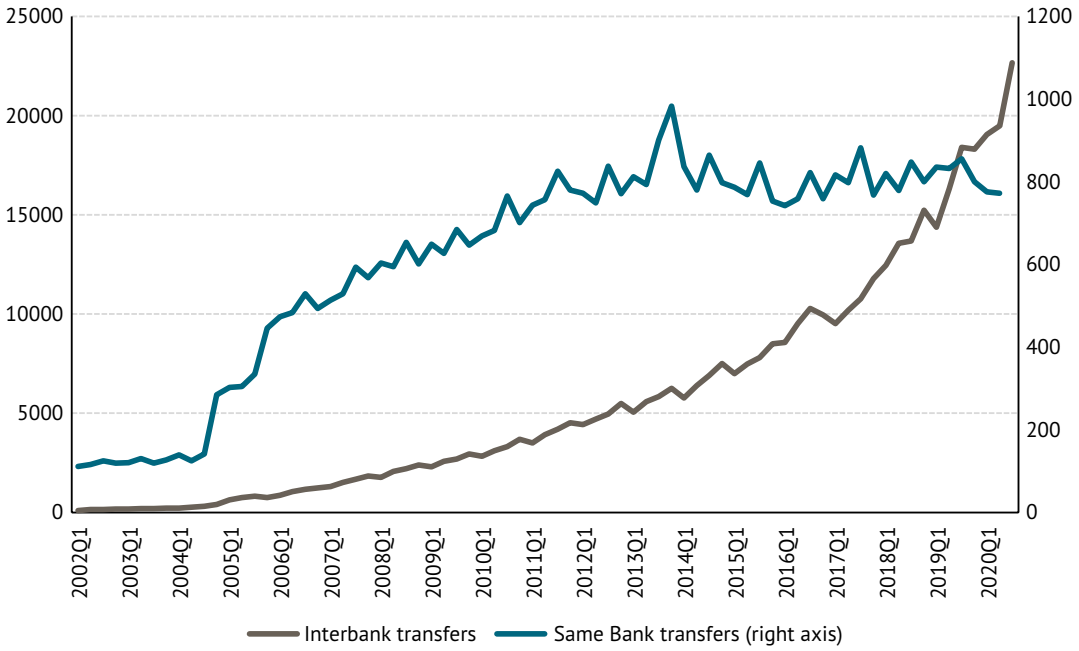
and have authorization for cashing out still require the banks' ATM infrastructure, and commissions for making withdrawals might vary depending on the bank.

At the consumer level, firms and customers have access to SPEI by using their bank accounts for making transfers, and banks offer access through various channels such as Internet banking, mobile phones, and branches. For addressing the payments, the clients have a unique bank account identifier (CLABE) that is assigned at the system level. Cook, Lennox, and Sbeih (2021) highlighted that phone numbers are also used as unique identifiers at the participant level. For those IFPEs connecting directly or indirectly to SPEI, a CLABE is assigned for making transfers to banks, other IFPEs, or other financial entities.

Finally, at the agent level, correspondent agents can sign one or more contracts with different financial institutions, or they may sign an exclusive contract with a single financial institution (Table 6). In this sense, agents are free to provide their services to multiple banks and other digital financial providers. According to the CNBV, on average, in 2019, the number of financial institutions per correspondent agent was 8.1, compared with 6.9 in 2018 (2020b).

Figure 11 shows the numbers of electronic within-bank and interbank electronic transfers made in Mexico in selected quarters from 2002 to 2020. The data show a more rapid increase in interbank transfers starting in 2006—after the law allowed participation of nonbank institutions authorized and supervised by regulators—compared with within-bank transfers. Data show that the number and the volume of transactions processed by SPEI have increased at an annual rate of 30 percent over the past five years (Banxico 2019). As of June 2020, Banxico registered 86 participants in SPEI, according to information in the website.

Figure 11. Number of electronic bank transfers, Mexico, 2002–2020



Source: Data from the Economic Information System of Banxico.

Although participating in SPEI requires a high investment in risk management and cybersecurity, there is no strong indication that interoperability constitutes a current binding constraint on digital financial inclusion in Mexico. Over the last decade, Banxico has made a series of upgrades to expand the capacity of SPEI and allowed nonbanking institutions to connect to the system. However, these improvements have not translated into a significant increase in the use of digital payment services to date. Following Principle 2 from the decision tree methodology, it is unlikely that lack of interoperability is currently a binding constraint on the provision of digital payments, since several improvements in this area have not expanded the use of digital payment services.

6.2. Insufficient or poor private digital infrastructure

Moving to another branch on the supply side of the decision tree, in what follows we analyze whether the high prices for the provision of digital payments are associated with an insufficient private digital infrastructure.

Figure 12 provides a cross-country price comparison of a basket of mobile phone and Internet services. To facilitate comparison, we use indicators measuring the degree of connectivity, such as the number of subscriptions to mobile phones and the percentage of households with an Internet connection. The prices come from the International Telecommunication Union (ITU), which compares mobile/cellular and Internet prices based on the cheapest plan offered in the most common contract modality (prepaid/postpaid) by the largest operator in each respective country.[25] In Mexico, the most common contract modality is the prepaid plan, and as of June 2020, the largest mobile operator, Telcel-América Móvil, held 62.6 percent of the mobile phone market. Thus, the ITU price data can provide useful information about price patterns in the country.[26]

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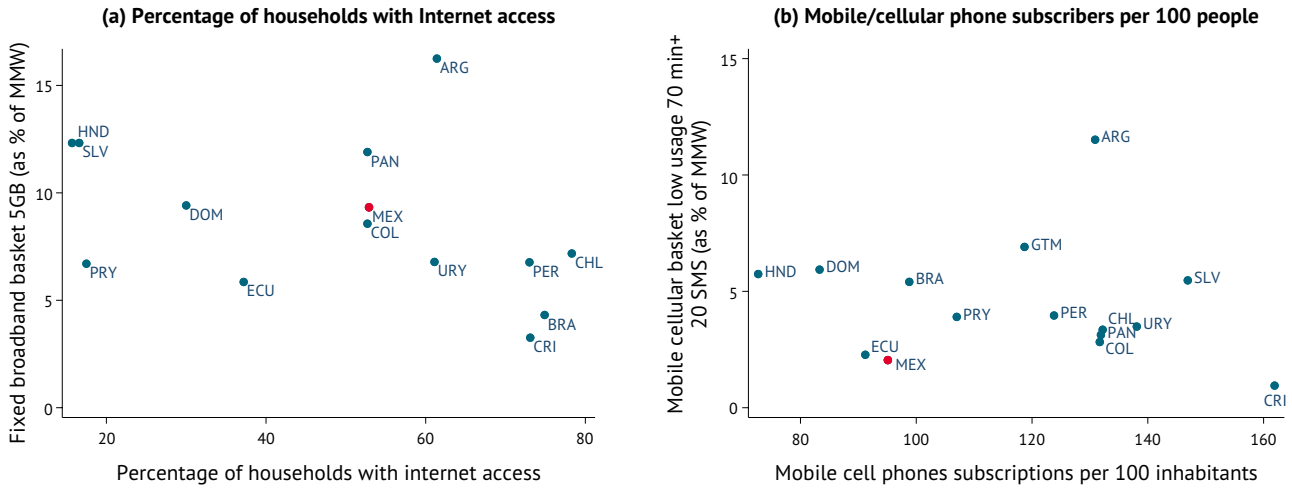
[25] More information is available at https://www.itu.int/en/ITU-D/Statistics/Documents/ICT_Prices/ICT%20Price%20Basket%20rules_E.pdf.

[26] One relevant feature in the use of mobile phones in Mexico is that a large proportion of the population uses prepaid mobile services plans—that is, buys airtime in prepaid packages. Data from the National Household Survey on Availability and Use of Information Technologies (ENDUTIH) 2019 show that, on average, 81 percent of the adult population with a mobile phone uses only a prepaid mobile plan, with an average monthly expense of 144 Mexican pesos, equivalent to 3.8 percent of the monthly minimum wage (INEGI 2019). Data from the IFT comparator tool for prepaid plans (http://comparador.ift.org.mx/) do not show any rural-urban differences in prepaid plan pricings.

Figure 12. Connectivity indicators: Usage and prices, 2019



Note: Mobile cellular subscriptions are subscriptions to a mobile telephone service that offer voice communications. The indicator includes the number of postpaid subscriptions and the number of active prepaid subscriptions. The fixed broadband subscriptions indicator covers fixed subscriptions for high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to or greater than 256 kbit/s. ARG = Argentina, BRA = Brazil, CHL = Chile, COL = Colombia, CRI = Costa Rica, DOM = Dominican Republic, ECU = Ecuador, GTM = Guatemala, HND = Honduras, MEX = Mexico, PAN = Panama, PER = Peru, PRY = Paraguay, SLV = El Salvador, URY = Uruguay.
Source: IFT (2019), World Development Indicators for 2019 (World Bank 2021a), and ITU (2020).

Panel (a) provides data for the price of a fixed-broadband basket of 5 GB as a percentage of the MMW and the percentage of households with Internet access. For this basket, the price is higher in Mexico than in Brazil, Chile, Peru, and Uruguay, which have a higher percentage of households with Internet access and lower prices as a percentage of the monthly minimum wage (MMW). However, since 2013, when the telecommunication reform was enacted to improve competition, there has been a 25 percent reduction in the Mexican telecommunication price index (IFT 2019, 2020).

Panel (b) shows the price (as a percentage of the MMW) of a mobile-cellular low-usage basket (a monthly talk allocation of 70 minutes and 20 SMS messages) in relation to the mobile phone penetration in a set of countries in the Latin American region. Despite lower prices for its low-usage plan, Mexico is one of the countries with the lowest numbers of cellular phone subscribers per 100 inhabitants. According to the GSMA, in spite of being one of the few countries in the Latin American region with less than 100 percent penetration of mobile phones—mainly because ownership of multiple SIM cards (i.e., multiple phones) is less common in Mexico than in the rest of the region—the Mexican mobile market is nevertheless relatively mature (GSMA 2016a). In this respect, estimates from the Federal Telecommunications Institute (IFT) show that 87.9 percent of Mexico is covered by

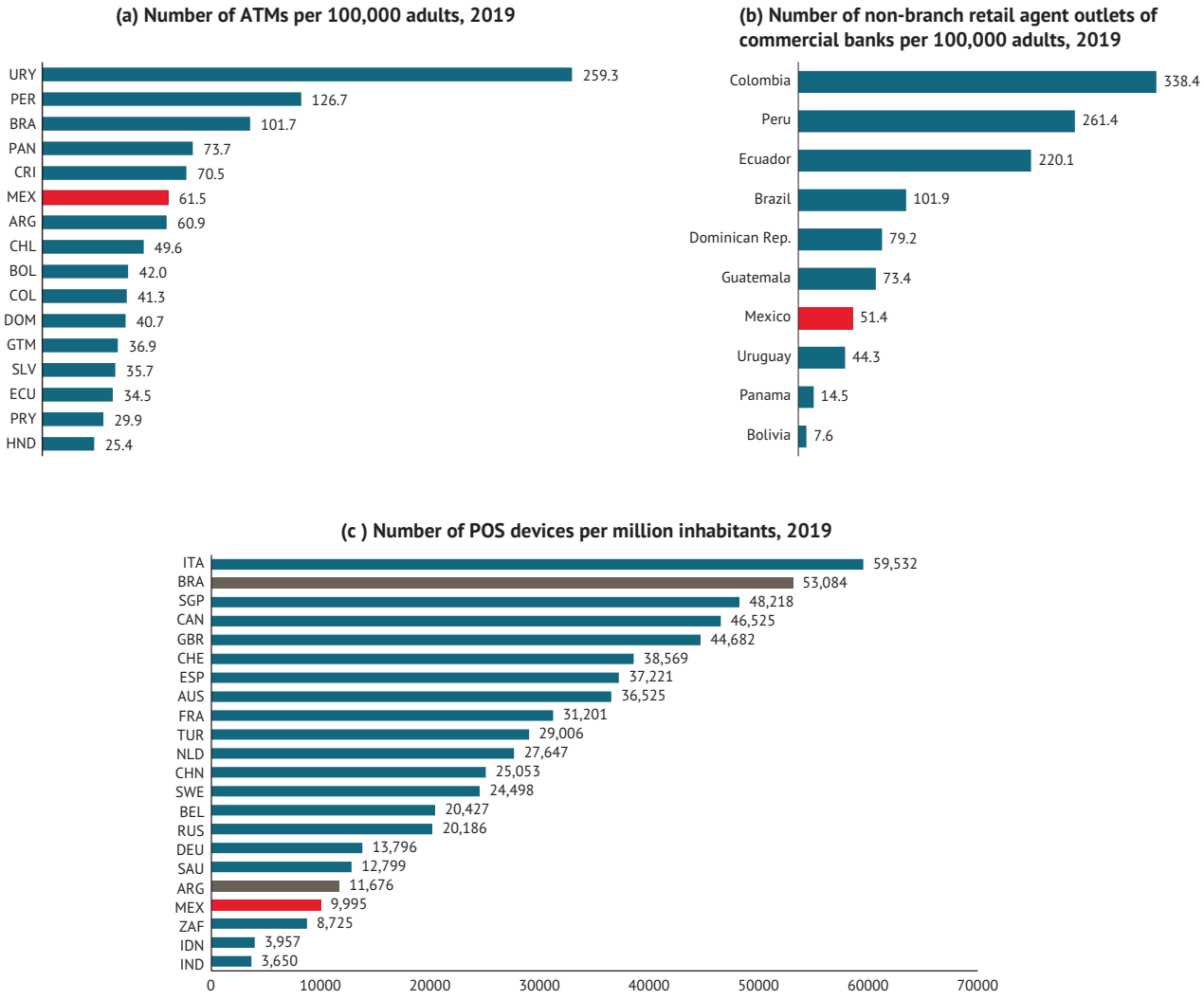
a 4G network (IFT 2019). Moreover, estimates of the GSMA show that in 2019, 56 percent of all connections were 3G technology, 31 percent 4G, and 13 percent 2G (GSMA 2020). GSMA projects that by 2025, 55 percent of all connections will be using 4G technology, 31 percent 3G, and 12 percent 5G (GSMA 2020).

In addition, data from the National Household Survey on Availability and Use of Information Technologies, or ENDUTIH (INEGI 2019), estimate that in 2019, 70.1 percent of the population and 56.4 percent of households had access to the Internet. For mobile phones, the same data show that 83.2 percent of the adult population ages 15 and older (approximately 78.2 million people) were active users. Among those adults with mobile phones, 88.1 percent had a smartphone (approximately 68.2 million people), while the rest used a basic cell phone. Although the usage of mobile phones—including smartphones—is high in Mexico, there are gaps between rural and urban areas, with 67.3 and 87.5 percent of the adult population in these two areas having a smartphone, respectively.

In this respect, Cave, Guerrero, and Mariscal (2018), using spatial analysis, identified two types of factors associated with the digital gap in rural areas in Mexico: the lack of infrastructure (on the supply side), and the lack of income and education (on the demand side). For the supply side, the authors identified the lack of geographical coverage as the main factor in not having a mobile Internet connection in localities with fewer than 5,000 inhabitants. According to their estimates, closing the digital gap on the supply side would benefit more than 4 million people in the lowest income deciles—which are concentrated in southern states such as Chiapas, Guerrero, and Oaxaca.

In particular, for the provision of digital financial infrastructure, the CNBV estimates that at least 80, 85, and 87 percent of the population lives within 4 kilometers of an ATM, a POS device, and a correspondent agent, respectively (CNBV 2020b). International comparisons show that relative to other countries in the Latin American region, Mexico has a lower provision of correspondent agents and POS devices—but for ATMs it ranks 6th among 16 countries (Figure 13). There are also important geographical differences in the provision of digital financial infrastructure. For instance, spatial data on the distribution of ATMs and POS terminals for 2020 show that the states with lower penetration of digital infrastructure are those with lower incomes and higher proportions of rural populations, and are concentrated in the central and southern regions (CNBV 2020b).

Figure 13. Digital financial infrastructure, Mexico, 2019



Note: ARG = Argentina, AUS = Australia, BEL = Belgium, BOL = Bolivia, BRA = Brazil, CAN = Canada, CHE = Switzerland, CHL = Chile, CHN = China, COL = Colombia, CRI = Costa Rica, DEU = Germany, DOM = Dominican Republic, ECU = Ecuador, ESP = Spain, FRA = France, GTM = Guatemala, GBR = United Kingdom, HND = Honduras, IDN = Indonesia, IND = India, ITA = Italy, MEX = Mexico, NLD = Netherlands, PAN = Panama, PER = Peru, PRY = Paraguay, RUS = Russia, SAU = Saudi Arabia, SGP = Singapore, SLV = El Salvador, SWE = Sweden, TUR = Turkey, URY = Uruguay, ZAF = South Africa.
Source: IMF (2020); CPMI-BIS (2020).

In this respect, Peñaranda (2018) presented a qualitative diagnostic of the digital financial services provided by fintechs and their potential to help increase financial inclusion in rural areas of Mexico, finding that when asked about the main barriers to offering digital payment services in rural areas, 66 percent of interviewees said that the lack of digital infrastructure is an important factor preventing them from offering their services in rural areas.

In sum, there is evidence that for a segment of the rural population, the lack of digital infrastructure might be a constraint on accessing mobile and Internet services, and by applying the methodology's Principle 4, access to digital infrastructure could still be a binding

constraint for these groups of the population. Likewise, the low provision of digital financial infrastructure, particularly of correspondent agents and POS devices, seems to be associated with market structure factors such as the regulatory framework, which might be creating an unlevel playing field for digital payment providers.

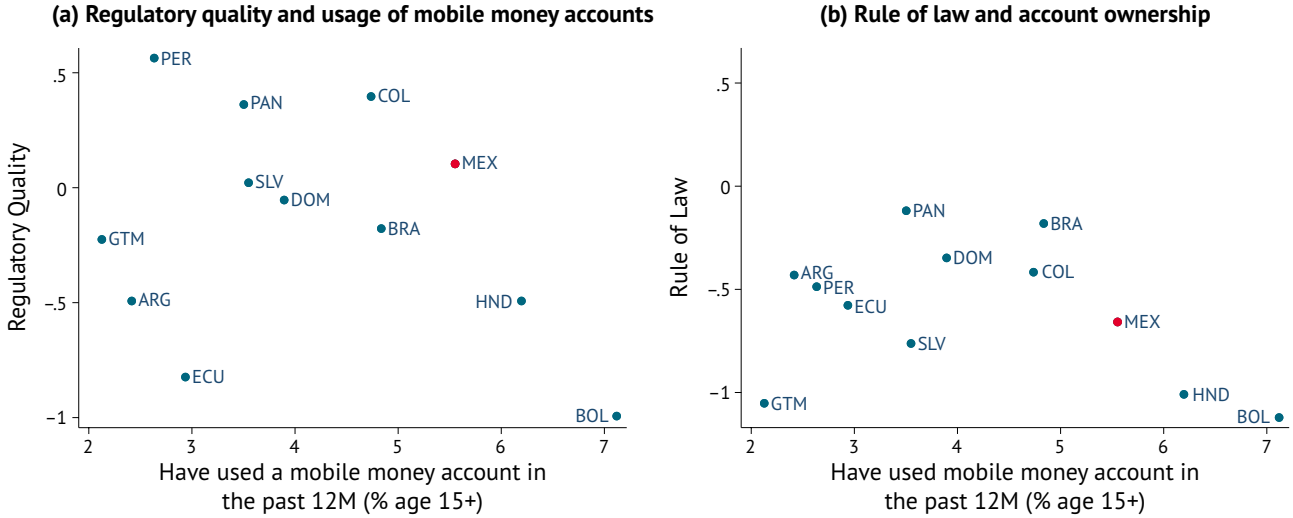
6.3. Low appropriability of returns

Next, we explore factors that could lower the appropriability of returns from investing in the provision of digital payment services, which could discourage their supply. As described in Section 4, the second-tier branches that could explain the wedge between private and social returns are poor institutional quality and governance, distortionary taxes, problems verifying the identity of customers, and coordination failures, all of which we explore in this section.

6.3.1. Poor institutional quality and governance

As pointed out in the methodological section, the quality of institutions in a country can hamper or discourage the entry of new financial providers and can also have an impact on the range of financial services they offer. Figure 14 provides general information about the institutional quality indicators for Latin American countries. Panel (a) of Figure 14 shows the indicator for regulatory quality, which "captures perceptions of the ability of the government to formulate and implement sound policies and regulations that allow and promote private-sector development." The second indicator, illustrated in Panel (b), is rule of law, which "captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence." The indicators range from –2.5 to 2.5, with higher values associated with better governance (World Bank 2021b).

Figure 14. Governance indicators

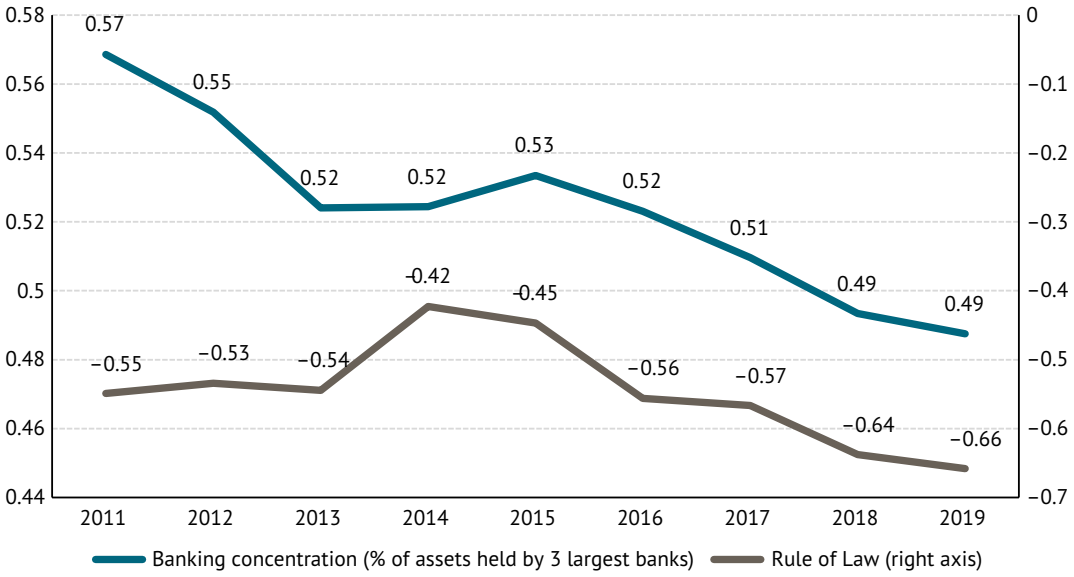


Note: ARG = Argentina, BOL = Bolivia, BRA = Brazil, COL = Colombia, DOM = Dominican Republic, ECU = Ecuador, GTM = Guatemala, HND = Honduras, MEX = Mexico, PAN = Panama, PER = Peru, SLV = El Salvador.
Source: World Bank (2017b, 2021b).

On the regulatory quality indicator, Mexico performs poorly compared with Colombia, Panama, and Peru. Interestingly, even though Bolivia and Honduras register values lower than those of Mexico for both regulatory quality and rule of law, these two countries still have a higher percentage of the population who have used a mobile money account in the past 12 months (Figure 14). On the other hand, Panel (b) of Figure 14 shows that Mexico has a higher usage of mobile money than most comparator countries but a lower degree of overall institutional quality, which could signal that institutional quality might not be a binding constraint for the provision of digital payment services in Mexico.

To explore further whether poor governance could be a potential root cause for low digital financial inclusion, we turn to its relationship with the second-tier branches of the market structure. Figure 15 shows the evolution of the indicators for rule of law and for banking concentration in Mexico from 2011 to 2019. Since 2015, the rule of law indicator shows a downward trend—implying that the situation has worsened—and in the same period, banking concentration has slightly decreased. Additionally, the expansion of Transfer, the mobile money service in Mexico, and approval of the Fintech Law coincide with the decline in the rule of law, reinforcing the previous suggestion that weakness in institutional quality might not be associated with limited competition in the provision of digital financial services.

Figure 15. Evolution of indicators for rule of law and banking concentration, Mexico, 2011–2019

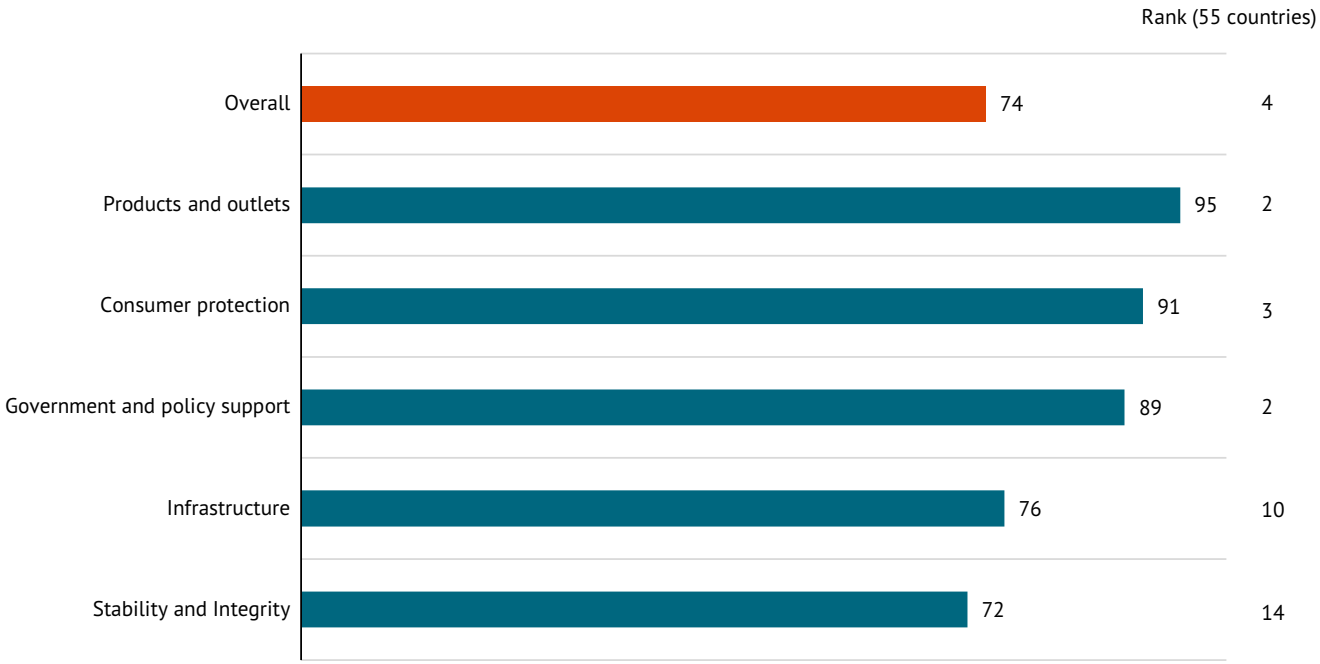


Note: Banking concentration is defined as assets of a country's three largest commercial banks as a share of its total commercial banking assets.
Source: World Bank (2021b), CNBV (2019a).

Figure 16 presents Mexico's 2020 Global Microscope for Financial Inclusion scores (EIU 2020) for further exploration. The Global Microscope is a tool to assess the enabling environment for financial inclusion in 55 countries across five categories: government and policy support, stability and integrity, products and outlets, consumer protection, and infrastructure. In 2020, Mexico was ranked quite high, in 4th place, similar to its 2019 level,

with an overall score of 74. In the area of government and policy support—which measures the degree of coordination and the incentives that governments are introducing to create favorable environments for financial inclusion—Mexico had a total score of 89, based on the broad strategies implemented by the government for financial inclusion. Interestingly, the overall results from the Global Microscope are consistent with the regulatory quality indicator (World Bank 2021b), in which Mexico performed above average (see Figure 14).

Figure 16. Global Microscope scores, Mexico, 2020



Source: EIU (2020).

The component in which Mexico performs lowest is stability and integrity, which assesses the regulation, supervision, and monitoring of financial service providers serving low- and middle-income populations. Here Mexico ranked 14th among the 55 economies. One of the relevant conclusions in the report is that Mexico has room for improvement in its supervisory capacity, such as technical capacity and market monitoring, because the country does not regularly monitor nonregulated financial providers that supply financial services to the low-income population, an omission that could affect the rest of the financial system (EIU 2019, 2020).

In this regard, the latest financial system stability assessment from the International Monetary Fund (IMF) pointed out that Mexico's banking sector supervision and regulatory framework have improved significantly since 2012 (IMF 2016). Currently, the CNBV has powers to impose limitations on dividend payments, limitations on operations, and management changes (World Bank 2017a). It also has sanctioning powers that include mandatory fines for serious law violations and fines on individuals such as bank directors and management. As for areas for improvement, the IMF points to the CNBV's lack of autonomy to set its own budget, which must be approved by the Ministry of Finance and Public Credit, and therefore

might be subject to fiscal measures adopted by the federal government, such as a salary freeze (IMF 2016). Another relevant issue that, according to the report, could hinder the quality of the country's supervisory capacity is staffing constraints and high staff turnover, which could also hamper the implementation of improvements in regulation (IMF 2016).

The data discussed here suggest that while Mexico could improve the quality of its regulatory agency, the IMF has highlighted significant improvements in strengthening financial-sector prudential oversight, and the Global Microscope emphasized progress made in the regulatory pillar of financial inclusion. Thus, the governance indicators for the overall economy and the financial sector suggest that Mexico's performance is above average. However, both sources identified that there is room for improvement in the country's supervisory capacity. In this respect, supervisory capacity—specifically staffing constraints and technical capacity—could be associated with the implementation of the regulatory framework discussed in the previous section. Applying Principle 2 for identifying binding constraints, the improvements in regulatory capacity might not lead to a significant expansion of digital financial payment services, but they could be a necessary condition (enabling factor) for improving the implementation of the and leveling the playing field among digital payment providers.

6.3.2. Distortionary taxes

This section discusses distortionary taxes or policies that could impair the appropriability of returns and discourage the provision of digital payment services in Mexico.

In Mexico, in July 2008, a 2 percent tax was placed on cash deposits made into the client's bank account that exceeded the amount of 25,000 Mexican pesos (about US$2,400) per month. Later, the tax was raised to 3 percent on deposits greater than 15,000 Mexican pesos (about US$1,400 in 2008). The tax was overturned in 2014 and replaced by another mechanism whereby financial institutions have to report directly to the Tax Administration Service if a client receives more than 15,000 Mexican pesos (about US$1,100 in 2014) in cash deposits per month.

To explore this aspect in more detail, we verified whether cash-to-deposit ratios varied significantly with changes in the tax regulations (Figure 17). Specifically, using the data depicted in Figure 17, we estimated a regression in which the dependent variable was the natural logarithm of the cash-to-deposit ratio and the independent variables included the lag of the cash-to-deposit ratio and a dummy variable that took the value of 1 for the period when the financial tax was in place, and 0 otherwise. Although the coefficient for the tax variable was positive, suggesting a positive association between cash-to-deposit ratios and the financial tax, it was not statistically significant.[27]

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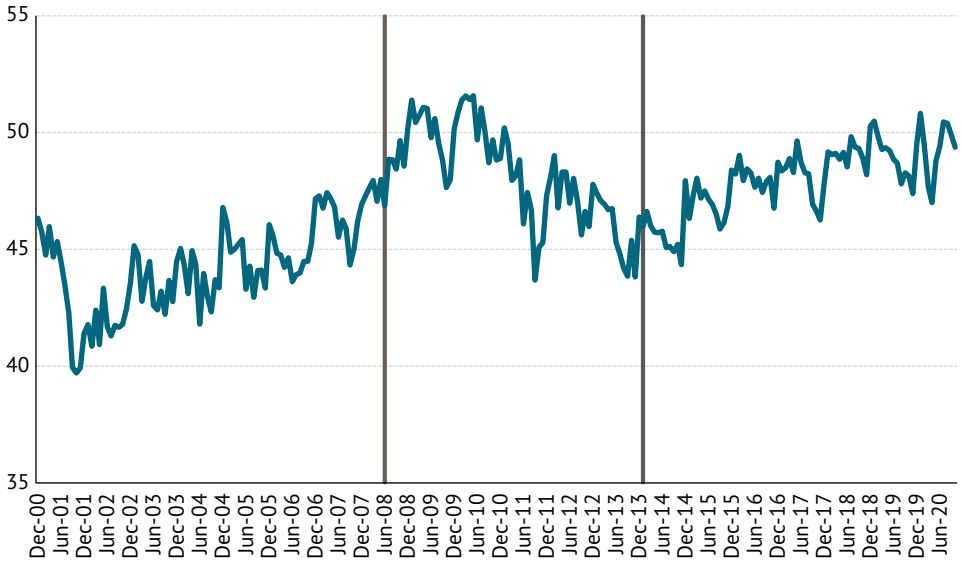
[27] The coefficient for the lag of the natural logarithm of the cash-to-deposit ratio is 0.903138, and the standard error is 31.34. For the tax binary variable, the coefficient is 0.0035279, and the standard error is 0.96. Robust standard errors are reported.

Figure 17. Cash-to-deposit ratio, percentage, 2000–2020, Mexico



Source: Data from the Economic Information System of Banxico.

Figure 18 shows the tax structure for mobile operators and consumers in Mexico. A value-added tax (VAT) of 16 percent is applied to all goods and services except for food and medicines in the country. Also, since 2010, there is a 3 percent special tax on all telecommunication services (phone calls and SMS messages) except Internet access and public and rural telephony. A GSMA report on taxation in the mobile industry in Mexico estimated that taxes on consumers accounted for 18.9 percent of the total cost of mobile ownership in 2014 (GSMA 2016b).

Figure 18. Taxes on the mobile industry, Mexico

	Payment Base	Type	Tax Rate
Taxes and fees for mobile operators	Imported network equipment	VAT	16%
		Customs duty	0–15%
		Custom processing fee	0.8%
	Imported SIM cards and vouchers	IVA	16%
		Customs processing fees	0.8%
	Profits	Corporate tax	30%
	Flat fees	Spectrum fess	Fixed amount per MHz based on band and coverage
		Licenses fees	Varies
Consumer taxes	Equipment	VAT	16%
	SIM activation, calls and SMS	VAT	16%
	Calls and SMS	IEPS	3%
	Broadband	VAT	16%

Note: IEPS = Mexico's 3 percent special tax on all telecommunication services.
Source: GSMA (2015).

In addition, mobile operators are subject to general taxes, such as VAT, a 30 percent corporate tax, customs duties, and regulatory fees, which are similar to those applied to other sectors and services in the economy. For the corporate tax, data from the Inter-American Center of Tax Administrations show that Mexico has one of the highest across-the-board corporate tax rates, just below that of Colombia and similar to levels in Argentina, Costa Rica, and El Salvador (CIAT 2019). The rest of the 42 covered countries reported corporate tax rates lower than 30 percent.

Likewise, Mexican mobile operators face flat fees for access to the radio spectrum that are among the highest in the Latin American region, with annual fees constituting a high percentage of the total spectrum costs (GSMA 2018). In this respect, the GSMA has argued that the high cost of the spectrum might hinder any growth in demand for mobile broadband in the upcoming years, particularly any expansion of 5G technology (GSMA 2018).

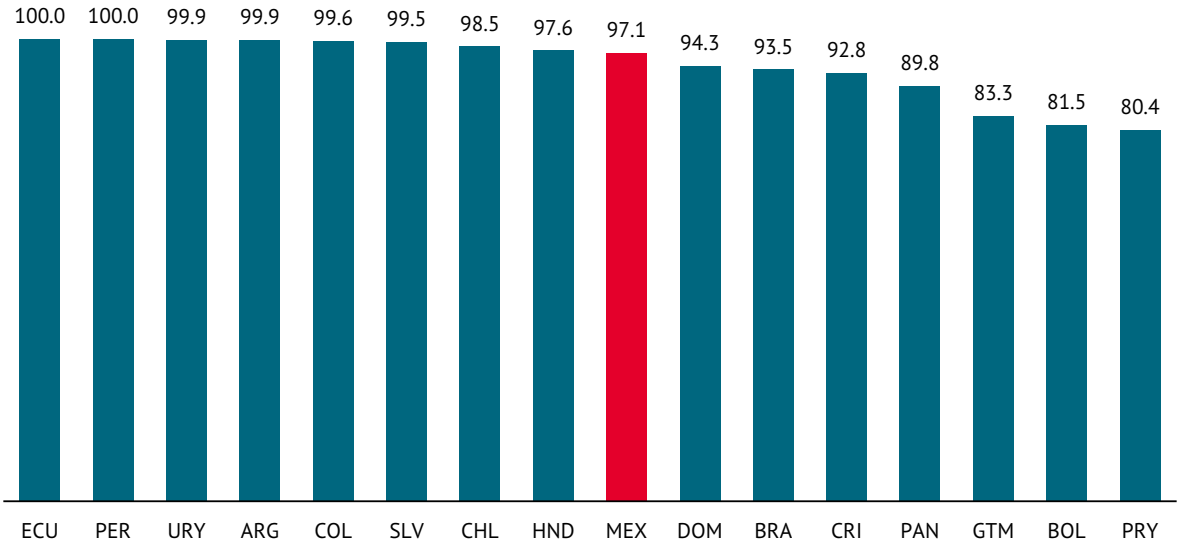
This evidence suggests that the implementation of the financial tax initially led to a slight increase in the cash-to-deposit ratio, but the result is not statistically significant. Thus, it does *not* seem that taxes have substantially discouraged the use of financial services. On the other hand, the data show that mobile operators in Mexico face higher taxes than those in other Latin American countries, which could hamper the expansion of mobile broadband, particularly where there is insufficient provision of digital infrastructure. However, applying Principle 2 of the decision tree methodology, asking whether changes implemented have generated significant expansion in the provision of digital payment services, reveals that there is not enough evidence to support the argument that distortionary tax policies are a potential root cause for low provision of digital payment services.

6.3.3. Problems identifying customers

Problems identifying customers have to do with KYC requirements that could affect the provision of digital payment services, especially for the lower-income segment of the population. Following Claessens and Rojas-Suarez (2020), we classify the documentary requirements for identifying customers into two types: basic ID, which refers to a national identification card, and ID+, which includes supplementary documents such as proof of address, proof of employment or income, and proof of nationality, among others.

As discussed before, in 2011, Mexico implemented a four-tier scheme for opening transactional accounts in financial credit institutions, authorized by the CNBV (Table 1). For all levels except Level 1 (prepaid cards), official proof of address is required to open an account. The basic bank accounts, mobile money accounts, payroll bank accounts, and digital accounts are all classified as Level 2 accounts that require ID+ (national ID card and proof of address). In this respect, it is important to note that Mexico has a lower percentage of the population with a national identity card than several of its Latin American peers (Figure 19).

Figure 19. Percentage of the adult population with an ID, Latin America, 2018



Note: The age cutoff to be considered an adult varies by country. ARG = Argentina, BOL = Bolivia, BRA = Brazil, CHL = Chile, COL = Colombia, CRI = Costa Rica, DOM = Dominican Republic, ECU = Ecuador, GTM = Guatemala, HND = Honduras, MEX = Mexico, PAN = Panama, PER = Peru, PRY = Paraguay, SLV = El Salvador, URY = Uruguay.
Source: Global ID4D Dataset (World Bank 2018a).

In Mexico, at birth, individuals have to be registered in two institutions. First, there is a state-level registry for the issuance of a birth certificate, and second, there is the National Population Registry, which issues a unique identity key (known as a CURP). Before 2015, each state had different birth certificate forms and formats, which delayed data consolidation. Data from the World Bank's Identification for Development (ID4D) initiative for 2018 (World Bank 2018a) show that 3 percent of the Mexican population (approximately 3.7 million people) were unregistered, which is a rate higher than in Argentina (0.1 percent) and Colombia (0.4 percent), but below those of Brazil (6.5 percent) and Costa Rica (7.2 percent) (Figure 19). In Mexico, a higher percentage of the unregistered population is concentrated in the southern region.

For the population 18 and older, both the birth certificate and the CURP are required to obtain a voter identity card issued by the National Electoral Institute, which is the de facto official national ID card (World Bank 2018b). However, other agencies, such as the Mexican Institute of Social Security, the National Commission of the Pension Saving System, the tax authority, and the Ministry of Foreign Affairs, have developed different identification systems, using biographic and biometric databases, which are also considered to be official IDs for different purposes. According to the World Bank, the fragmentation of the identification system in Mexico causes challenges for financial institutions' compliance with the customer due diligence process (World Bank 2020b).

As we observed in Table 2, in Mexico, basic bank accounts are classified as Level 2 ID+ transactional accounts. Other countries require only proof of identity to open a basic account, unlike Mexico (the only other exception is Uruguay).

For mobile money services, Table 8 provides the scores for the components of the KYC pillar of the GSMA regulatory index. Recall that Mexico scored 60 points in total for the KYC pillar of the Mobile Money Regulatory Index (presented in Figure 7). However, for the component of KYC requirements, the country's score is 0 because identity verification for accessing mobile money services extends beyond a single form of ID and a mobile number. Similarly, the Global Microscope (2019) highlighted Mexico's disproportionate due diligence requirements for providers serving low-income customers, which violate one of the four key enablers of digital financial inclusion for low-income customers.[28]

Table 8. Indicators of KYC regulations for the GSMA Mobile Money Regulatory Index, 2019

Country	KYC pillar of the GSMA Mobile Money Regulatory Index, 2019				Have used a mobile money account (percentage, ages 15+), 2017
	Permitted ID	KYC requirements	KYC proportionality	KYC score	
Colombia	100	80	100	92	4.7
Peru	100	80	100	92	2.6
Argentina	100	0	100	60	2.4
Mexico	100	0	100	60	5.6
Brazil	0	80	100	52	4.8
Honduras	0	80	100	52	6.2
El Salvador	0	80	0	32	3.5
Bolivia	0	0	0	0	7.1
Dominican Republic	0	0	0	0	3.9
Guatemala	0	0	0	0	2.1
Paraguay	0	0	0	0	28.9

Note: For "permitted ID," 100 points are awarded if a national ID must be used, all population above the cutoff age are registered, and at least 90 percent of a country's adult population has a national ID (according to the ID4D database), based on World Bank Findex data; or if documents beyond government-issued IDs can be used to meet the minimum requirements in the context of accessing mobile services. For "KYC requirements," a 0 is awarded if requirements for verification are extended beyond one form of ID and a mobile number. For "KYC proportionality," 100 points are awarded if KYC requirements for opening an entry-level mobile money account are less strict than those for a standard bank account.
Source: GSMA (2019); World Bank (2017b).

Even for IFPEs, the Level 1 accounts have ID+ requirements in addition to proof of identity, such as proof of occupation or business activity, which users have to provide—although this information is not verified (Table 9). Level 2 accounts—which have transactional limits similar to the Level 2 accounts for banks—also have ID+ requirements for proof of identity, address, and occupation, with copies of both the ID and the address

[28] Following CGAP, the four basic enablers of digital financial inclusion are issuance of e-money permitted by nonbanks, the presence of financial service agents, proportionate customer due diligence, and effective consumer financial protection (cited in EIU 2019). Only four countries included in the Global Microscope report for 2019 scored all the available points across all the enablers—Colombia, India, Jamaica, and Uruguay (EIU 2019).

document to verify the information. In contrast, in Peru, the three-tier KYC scheme established simplified electronic fund accounts that require only proof of identity, with a monthly transactional limit of approximately US$3,000 (AFI 2019)—higher than the transactional limit of Level 1 and 2 accounts established for IFPEs in Mexico. In contrast with Mexico, Brazil implemented simplified accounts with an average monthly deposit of US$900, allowing the use of alternative forms of identity documentation such as records of welfare receipt (AFI 2019).

Table 9. IFPEs' accounts limits and onboarding requirements for individuals, Mexico, 2018

Level	Account level[a]	Onboarding requirements	
1	Balance: 1,000 UDIs (about US$342) Monthly deposits: 750 UDIs (about US$256)	Full name Birth date Gender Place of birth	Occupation, profession, or business activity Email address Phone number
2	Monthly deposits: 3,000 UDIs (about US$1,026) Daily cash withdrawals: 1,500 UDIs (about US$513) Monthly cash deposits: 10,000 UDIs (about US$3,421) No balance limit	Full name Birth date Gender Place of birth Occupation, profession, or business activity	Email address Phone number Proof of address Copy of official ID Copy of proof of address Digital signature
3	No balance limits Monthly cash deposits: 10,000 UDIs (about US$3,421) (The IFPE may establish additional limits)	Full name Birth date Gender Place of birth Occupation, profession, or business activity Email address	Phone number Proof of address Copy of official ID Copy of proof of address Digital signature Proof of income Tax ID (with e.firm) Fill-in questionnaire about the sources of the income

Note: [a]As of May 10, 2021, 1 UDI is equivalent to 6.794389 Mexican pesos (about US$0.34).
UDI = investment unit.
Source: Ley DOF (2018) and its General Dispositions.

In 2017, the CNBV introduced changes to the regulation to require financial institutions to collect and verify biometrics, promoting digital onboarding of new bank account customers (World Bank 2018, DOF 29/08/2018). One challenge is that although public and private institutions collect biometric information, there is no centralized database to validate the data. At the end of 2020, the Mexican Congress approved a new law to roll out a national biometric digital ID card—which will include full name, date of birth, place of birth, nationality, CURP, and biometric data—paving the way for a new digital ID system in subsequent years.

The changes in the regulation covered digital onboarding for opening Level 2 digital bank accounts remotely. According to data from the Fees and Commissions on Payment Services from Banxico (Banxico 2020c), there are approximately 10 products for digital

bank accounts with an onboarding process for new clients. However, to open a digital bank account remotely, users must download the bank's application and, in some cases, validate the information by receiving a video call from a sales agent—a process that requires an Internet connection and a smartphone with a front-facing camera. Thus, the regulation for implementing digital onboarding to open a bank account can be onerous, given the pixel and other specifications for the video call, which itself likely runs down the user's available plan data, posing a barrier to access.

Thus, overall, the data suggest that the KYC requirements for Level 2 bank accounts—which are the most relevant for financial inclusion purposes—are higher than those in other Latin American countries due to ID+ requirements for opening an account. Moreover, for IFPEs, the KYC requirements are similar to those established for banks, even though the scope of their services is reduced. Nevertheless, applying Principle 2 of the methodology, problems verifying the identity of customers do not seem to be a binding constraint, given that the implementation of the four-tier scheme was not accompanied by an expansion in the use of digital financial services.

6.3.4. Coordination failures

This section discusses the fourth second-tier branch under low appropriability of returns, coordination failures. Before starting the analysis to determine whether a coordination failure could be a potential root cause for the limited provision of digital payment services in Mexico, we briefly discuss the nature of a coordination failure in the context of digital payment platforms.

Digital payment services allow different users to make financial transactions such as transfers, bill payments, or purchases of goods and services. Due to the nature of the payment services, a critical mass of customers is vital for providers to reach the economy of scale required to make the platform profitable.

In particular for mobile money platforms, as discussed by Bourreau and Valletti (2015), there is a two-sided problem: on the one hand, there are consumers (users) who will be willing to join the platform only if there are enough agents (i.e., merchants and other users) willing to make transactions through the platform; on the other hand, agents will be willing to join and offer the services only if a sufficiently large base of users (consumers) adopts the mobile payment system. Given the two-sided nature of a potential coordination failure, supply and demand forces interconnect in the decision tree (Figure 2) For digital payment platforms, on the supply side, for example, reaching a large enough scale of customers is required to offer affordable services. On the demand side, barriers to adopting digital payment services can be related to a perception of low benefits from their usage, which might manifest as greater popularity of other payment options, such as cash (Claessens and Rojas-Suarez 2020).

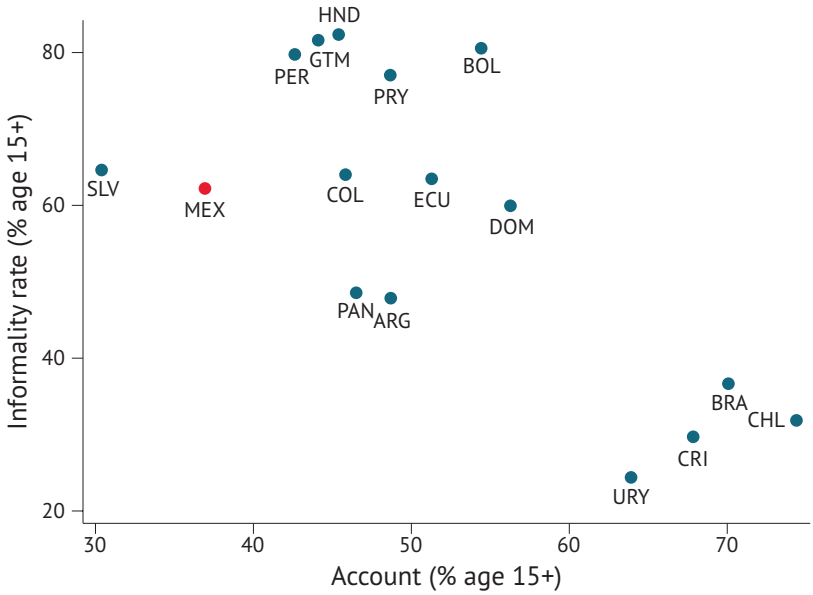
As an initial assessment, it is important to mention that in Mexico, there is a strong preference for making transactions in cash, which signals the existence of a coordination problem. In this respect, data show that Mexico has one of the lowest rates of cashless payments per capita among countries with available data. As shown in Table A.2 in

Appendix A, countries like Argentina and Brazil, for instance, have a much higher rate of cashless payments per inhabitant compared with Mexico, although the three countries' development levels are similar.

Along these lines, a recent national survey from Banxico provides information on consumers' preferred payment methods during the Covid-19 pandemic (Banxico 2020b). The data show that as of November 2020, on average, 86 percent of the population used cash as the main payment method, 7 p.p. lower than the pre-pandemic estimate. However, in municipalities with fewer than 50,000 inhabitants, cash as the main payment method increased during this period to 98 percent, from a pre-pandemic level of 86 percent. The data also reveal that 65 percent of the population would use cash to pay for transactions of less than 500 Mexican pesos (about US$22), 45 percent would pay in cash for transactions between 500 and 1,000 Mexican pesos (about US$22–US$45), and 38 percent would use cash for transactions of more than 1,000 Mexican pesos (approximately US$45) (see Figure A.1 in Appendix A).

Another feature of the Mexican market that might play a role in explaining the low levels of use of digital financial services is the high percentage of informal economic activity, which, among other things, is characterized by a strong preference for cash so as to navigate "under the radar" of fiscal authorities. Figure 20 shows that countries in the Latin American region with lower informality rates register a higher proportion of account ownership. Evidence for Mexico suggests that informality can be explained by rigid labor regulations; low labor productivity, which is associated with low educational outcomes; and low institutional quality (Levy 2018; Sorsa, Arnold, and Garda 2019).

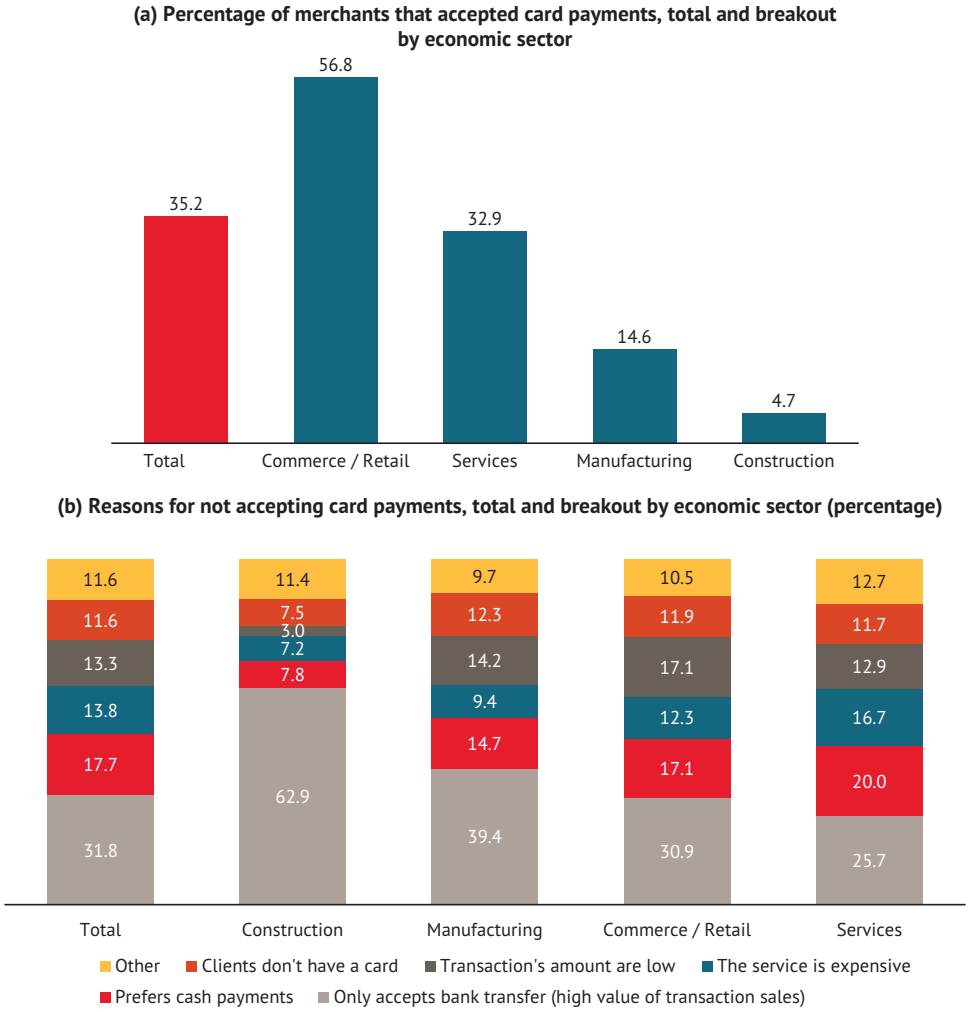
Figure 20. Informality rates and account ownership, Latin America, 2017–2018



Note: Formality is defined as having social security. ARG = Argentina, BOL = Bolivia, BRA = Brazil, CHL = Chile, COL = Colombia, CRI = Costa Rica, DOM = Dominican Republic, ECU = Ecuador, GTM = Guatemala, HND = Honduras, MEX = Mexico, PAN = Panama, PER = Peru, PRY = Paraguay, SLV = El Salvador, URY = Uruguay.
Source: Estimates from household surveys and World Bank (2017b).

From the merchant's side, the National Survey of Enterprise Financing (ENAFIN) (INEGI 2018b) provides information about the percentage of enterprises that accepted card payments using POS devices, smartphones, tablets, or webpages.[29] The data show that, on average, only 35.2 percent of enterprises accepted card payments, 3 p.p. higher than the value reported in 2015 from the same source. Even in industries more likely to use digital payment services, such as commerce/retail and services, the usage is low, at 56.8 and 32.9 percent, respectively (Panel (a), Figure 21). This is surprisingly low considering that the survey covered formal enterprises in large urban areas, where the supply of digital infrastructure does not seem to be a limitation.

Figure 21. Merchants' acceptance of cards as a payment method, Mexico, 2018



Note: Includes POS devices and payment aggregators (smartphones, applications, or webpages).
Source: ENAFIN (INEGI 2018b).

[29] The survey includes registered urban enterprises with more than six employees. The sampling framework for the ENAFIN comes from the National Statistical Framework of Economic Units and the Statistical Business Register of Mexico. In Mexico, on average, 40 percent of the employed population is self-employed (INEGI 2020).

As for the reasons for not accepting card payments, 32 percent of the enterprises said they preferred bank transfers because of the high monetary value of their transactions, but these results are mainly explained by the construction and manufacturing industries (Panel (b) in Figure 21). The second reason was a preference for cash (18 percent), followed by a perception that the digital service is too expensive (14 percent), the transaction amounts are low (13 percent), and the clients do not have a card for making a digital payment (12 percent). In the commerce/retail and service industry, these four reasons account for more than 50 percent of merchants who do not take cards.

These findings are consistent with a study from insight2impact (i2i) and the CNBV, which combines information from the ENIF 2018 (INEGI 2018a), a survey on financial needs in the state of Puebla, and administrative data on transactions from commercial banks to analyze the financial needs of the population (CNBV 2019b). Although the results are not representative at a national level, they provide some insights into the financial preferences of the population. The results suggest that a large proportion of the population prefers paying in cash—even though they have a bank account—because cash is more convenient and flexible, offering more control over their finances.[30]

In summary, the evidence suggests that a coordination failure, which is reflected in a strong preference for cash in transactions, might be a binding constraint in the country. In this sense, the data show that a large segment of the population prefers to carry out transactions using cash instead of formal financial instruments, especially digital payment services. The source of this problem might be that a large proportion of potential consumers of digital payment services do not perceive a significant benefit from using these services; thus, the suppliers lack the critical mass of users necessary to achieve economies of scale and thus offer services affordable to low-income users. To explore the root causes associated with the strong preference for cash, the following section discusses the demand-side constraints.

[30] It is worth mentioning that the strong preference for cash has also been documented in the use of other digital financial services such as store-of-value and credit services. For example, a case study of Mimoni/Lumbrera, a consumer lending company that manages no cash and offers cash-free solutions for keeping, spending, and paying money, found that the company's clients preferred cash transactions. The authors attributed this behavior to the flexibility of spending cash at their discretion (Manjarrez 2016).

7. Demand-side analysis

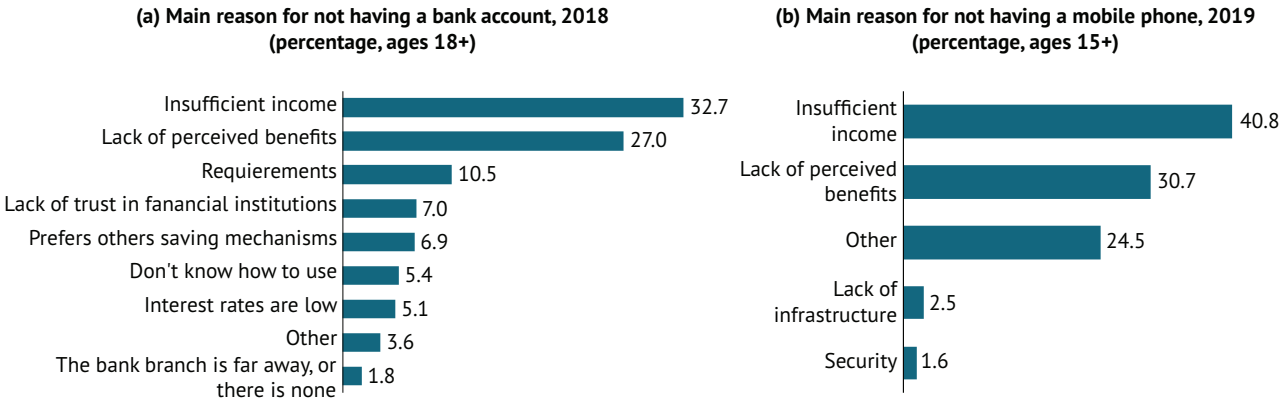
This section turns to the demand-side dimension of the analysis. As mentioned in the methodological section, the top branches explaining the low use of digital payment services are low trust in financial service providers, low-income levels across the population or subgroups, and customers' perception of low or no benefits of the services. We start the discussion with the perceived low or no benefits of usage, which is linked to the discussion of coordination failures analyzed in the previous section.

7.1. Perceived low or no benefits of usage

As discussed in the previous section, the evidence of a strong preference for making financial transactions with cash suggests the existence of a coordination problem. In this respect, the data suggest that a large proportion of the population might perceive that using formal financial services—in particular, digital financial services—carries low or no benefits.

As an initial assessment of perceived low benefits, Panel (a) in Figure 22 presents the distribution of the main reasons stated by the adult population (ages 18 to 70) for not having an account at a financial institution.[31] The main self-reported reason was insufficient income (32.7 percent), followed by lack of perceived benefits (27 percent) and not having the necessary documentation to open an account (10.5 percent). Moreover, among the population ages 15 and over with no cellular phone, data from the 2019 ENDUTIH survey (INEGI 2019) show that 40.8 percent (approximately 6.5 million people) said insufficient income was the main reason for not having a cell phone, followed by lack of perceived benefits of having a mobile phone, with 30.7 percent (Panel (b) in Figure 22).

Figure 22. Self-reported reasons for not having bank account or mobile phone, Mexico, 2018 and 2019



Source: INEGI (2018a, 2019).

[31] The survey allowed the choice of only one reason among all the options.

To approximate whether a perception of low or no benefits could explain the low use of digital payment services in Mexico, we use data from ENIF 2018 (INEGI 2018a) to create a set of 60 cohort groups defined by region, gender, and age of the population; we then analyze the association between the percentage of the population in each group who do not have a bank account with the percentage of the population who reported not needing one as the main reason.[32] For ATMs and correspondent agents, we use the percentage of the population who said they did not use these to make transactions because they preferred using other channels. Additional controls such as the percentage of the rural population and average years of schooling were also included in the estimation. It is important to note that these results show the association between the variables, which is not interpreted as a causal relationship.

Table 10 shows the regression results for each dependent variable. Column (1) shows that the coefficient for not needing a bank account as the main reason for not having one is not statistically significant. For the percentage of the population with a bank account who do not use a mobile banking application, the coefficient for preferring alternative methods for making transactions is also not statistically significant (Column (2) in Table 10). Similar results are estimated for the percentage of the population who do not use ATMs or correspondent agents.

Table 10. Regression estimates for perceived low or no benefits as the main reason for not using digital financial services, Mexico, 2018

Variable	(1) Do not have a bank account (%)	(2) Do not use mobile banking (of those with a bank account) (%)	(3) Do not use ATMs (%)	(4) Do not use correspondent agents (%)
Percentage who said they do not need a bank account as the main reason for not having a baking account	0.203			
	(0.181)			
Percentage who said they prefer using other channels over mobile banking		–0.0530		
		(0.107)		
Percentage who said they prefer using other channels over ATMs			–0.324*	
			(0.179)	

[32] The survey is representative at the national level, for both urban and rural areas, and for six geographical regions.

Variable	(1) Do not have a bank account (%)	(2) Do not use mobile banking (of those with a bank account) (%)	(3) Do not use ATMs (%)	(4) Do not use correspondent agents (%)
Percentage who said they prefer using other channels over correspondent agents				0.249
				(0.151)
Percentage of the population that is rural	0.0529	–0.0605	0.198**	0.0361
	(0.132)	(0.105)	(0.0883)	(0.0990)
Average years of education	0.0288***	–0.0415***	–0.0137*	–0.0117*
	(0.00880)	(0.00636)	(0.00762)	(0.00689)
Percentage of informal workers	0.420***	0.00674	0.428***	0.419***
	(0.143)	(0.0904)	(0.132)	(0.105)
Constant	–0.0965	1.202***	0.411***	0.406***
	(0.147)	(0.104)	(0.136)	(0.130)
Observations	60	60	60	60
R squared	0.258	0.591	0.658	0.506

Note: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. *Formal sector* is defined as having social security.
Source: Estimates using INEGI (2018).

However, the coefficient for the average years of schooling is statistically significant in two specifications (Columns (2) and (3)), suggesting that on average, lower educational attainment is associated with lower account ownership and less usage of digital tools. Similarly, the coefficient for the percentage of informal workers is positive and statistically significant in all of the specifications, showing that a higher percentage of informal workers is correlated with a higher percentage of the population without a bank account and less usage of digital tools. Overall, these results suggest that for a large segment of the population—workers in the informal sector and those with less education—a coordination failure could constitute an underlying binding constraint on using digital payment services in the country.

To explore this result further, we borrow from the branch of financial literacy used to analyze store-of-value services in the Claessens and Rojas-Suárez (2020) methodology to analyze whether this factor could be associated with the low perceived benefits of using digital payment services in Mexico.

In terms of financial literacy, the Mexican Financial Inclusion Policy 2020–2024 includes a national strategy for financial education given the growing concern that many potential consumers may not have sufficient information and financial knowledge to use financial

products. Table 11 presents financial literacy data for G20 countries (OECD 2017b), with Mexico registering a relatively high average score of 58 points on the financial literacy index—similar to Brazil and Peru, and better than other Latin American countries such as Argentina and Colombia. For the financial attitude component—which measures savings preferences—Mexico registered an average score of 60; it had an average score of 59 in the financial knowledge pillar, which measures basic financial concepts. However, for financial behavior—actions and behaviors about choices regarding financial products, budgeting, financial planning, saving, and spending—Mexico had the lowest normalized score.

Along the same lines, data from ENIF 2018 show that 54.2 percent of the adult population reported being unaware of basic accounts for the general public—although opening such an account is free of fees and commissions—which might suggest issues with the dissemination of knowledge about the available instruments (INEGI 2018a).[33] In addition, Peñaranda (2018) analyzed the barriers to the expansion of digital financial services provided by fintechs and nonbanking institutions in rural areas of Mexico, and reported that 88 percent of interviewees mentioned low financial literacy and low digital skills as the main barriers to expanding their services in rural areas.

Table 11. Financial literacy scores, normalized to 100, 2017

Country	Financial literacy score	Financial knowledge	Financial behavior	Financial attitude
France	71	70	74	64
Canada	70	70	69	70
China	67	67	69	62
South Korea	66	70	64	64
Germany	66	69	64	64
Indonesia	64	56	63	74
United Kingdom	62	60	62	66
Turkey	60	66	53	62
Russia	58	59	57	58
Mexico	58	59	56	60
Brazil	58	61	51	68
Peru	58	58	57	53
India	56	50	62	52
Argentina	54	59	49	58
Colombia	54	55	53	52
Italy	52	50	49	62

Note: For Colombia and Peru, the data are for 2020; for the other countries, 2017.
Source: OECD (2017b, 2020).

[33] For saving purposes, Bruhn, Ibarra, and McKenzie (2013) evaluated a financial literacy program in Mexico using a randomized controlled trial and found no statistically significant association between being offered a course on financial literacy and people's saving outcomes, as compared with a control group.

Table C.2 in Appendix C shows the marginal effects of probit regressions using data from ENIF 2018 (INEGI 2018a), where the dependent variables are binary. As a proxy of financial literacy, the regression includes as explanatory variables the scores for the financial knowledge and financial behavior indexes. Since the financial attitudes index is associated with saving (rather than payment) preferences, this component is not included in the analysis (see Appendix C for a detailed description of the regression model).

For the specifications controlling for financial knowledge, which comprise seven questions related to basic financial concepts such as inflation, interest rate, risks, and diversification, there is a positive and statistically significant association between the financial knowledge score and the probability of using mobile banking and/or ATM devices (Columns (2) and (3) in Table C.2). When controlling for the financial behavior score, there is a positive and statistically significant relationship between the financial behavior score and the probability of having a bank account or of using mobile banking, ATMs, or correspondent agents (Columns (5) to (8) in Table C.2).

Another issue that could be associated with the perceived low benefits of using digital payment services is that the current supply of digital financial services—offered primarily by banks—might not be tailored to meet the financial needs of low-income customers. In this respect, Perez (2020) argued that the financial products for low-income customers in Mexico are less profitable for the banking sector than those offered to high-income consumers, and therefore the banks do not have many incentives to offer financial services to low-income population segments. A similar insight is discussed in the study from i2i and the CNBV (2019) for the state of Puebla, where the authors found evidence suggesting that the current supply of formal financial products and services does not cater to the financial needs of a large segment of the population, who prefer making transactions in cash—even if they have a bank account—rather than using formal financial services (CNBV 2019b).[34]

In sum, there is evidence suggesting that perceived low or no benefits from using digital payment services could be the source of the coordination failure that prevents the formation

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[34] Earlier empirical evidence also shows a strong preference for cash among low-income segments of the Mexican population. Sandford (2016), using information from the financial diaries of 185 low-income families in Mexico City, Puebla, and rural Oaxaca, argued that families value keeping money on hand to spend immediately for emergencies. Small business owners, the study found, like to have cash on hand because after collecting the profits, they reinvest the money immediately to buy inventory. Thus, the study concluded, low-income Mexicans appreciate and require flexibility in their financial products. Noor and Zapata (2012) analyzed a pilot program by CGAP, IDEO.org, and the largest bank in Mexico to design financial products that could be attractive to low-income populations. The results suggest that low-income population segments tend to keep cash on hand to manage their money better. Also, participants thought they could have a bank account only if they had an additional income. In another report, Zapata (2013) examined a government initiative to use the government-to-person payment platform of the country's conditional cash transfer program (Oportunidades, later named Prospera) to build a network of banking correspondents in rural areas, aimed at improving financial inclusion for low-income groups. According to the study, although the payment digitalization process was successful—with approximately 6.5 million beneficiaries having accounts with biometrically linked cards—the financial inclusion targets were not met. The results showed that beneficiaries in rural areas used the account only to withdraw all of the government transfer as cash.

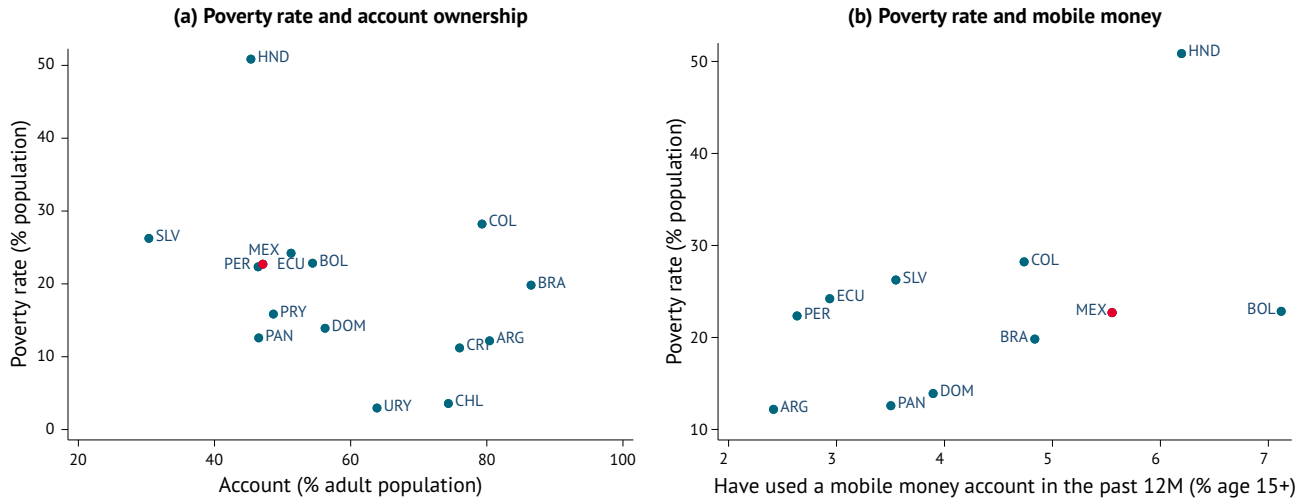
of a critical mass of users. The evidence suggests that the combination of lower educational attainment, lower financial literacy, a higher proportion of the employed population working in the informal sector, and a lack of tailor-made financial services for low-income customers could be underlying factors explaining the low perceived benefits of using digital payment services. Thus, by applying Principle 3 of the methodology, we find evidence that a coordination failure might be a binding constraint in the country, and perceived low or no benefits from using digital payment services could be the root cause, since a large proportion of the population prefers using cash for financial transactions.

7.2. Low income or geography

As shown in Panel (a) of Figure 22 (in the previous section), "lack of funds" was the main self-reported reason for not having a bank account for 32.7 percent of the population 18 to 70 years old (although this question mainly refers to having an account for the purpose of saving, we use it as a proxy for the respondent's payment preferences). Also, data from ENDUTIH 2019 (INEGI 2019) show that 40 percent of the population ages 15 and over with no cell phone gave lack of income as the main reason (Panel (b)). According to the National Council for the Evaluation of Social Development Policy (known locally as CONEVAL), in 2018, 41.9 percent of the Mexican population were poor—approximately 52.4 million people—and 29.3 percent (37.6 million people) were classified as multidimensionally poor because of poor health, low education, and lack of access to social services.

For making international comparisons, Panel (a) in Figure 23 shows the distribution of the poverty rate using international poverty lines. The results show that although Mexico has poverty levels similar to those of Bolivia, Brazil, Ecuador, and Perú—measured as a daily per capita income of less than US$5.5 in 2011 PPP—account ownership is much lower. However, for mobile money, there is no clear pattern of relationship between the incidence of poverty and the use of mobile money accounts, since Bolivia, Honduras, and Mexico have both higher poverty rates and higher use of mobile money than other countries (Panel (b)).

Figure 23. Poverty rate and use of financial services, 2017–2018



Note: Poverty rate using international poverty line of US$5.5 daily per capita income (2011 PPP dollars a day). ARG = Argentina, BOL = Bolivia, BRA = Brazil, CHL = Chile, COL = Colombia, CRI = Costa Rica, DOM = Dominican Republic, ECU = Ecuador, HND = Honduras, MEX = Mexico, PAN = Panama, PER = Peru, PRY = Paraguay, SLV = El Salvador, URY = Uruguay.
Source: ENIF 2018 (INEGI 2018a), BCRA (2020), Banco de las Oportunidades (2019), ABC (2018), BCB (2018), INEI (2020), Global Findex database 2017 (World Bank 2017b), and data from the LAC Equity Lab of the World Bank.

The marginal effects for the probability of having a bank account show that the income variable coefficient is not statistically significant, which might be associated with the fact that in recent years government program beneficiaries are receiving social transfers through a bank account (see Table C.1 and the rest of Appendix C for a detailed description of the specifications).[35] Likewise, across all the specifications, individuals in rural areas are less likely to have a debit card or to use a mobile banking app, an ATM, or a correspondent agent than are those in the urban areas.

Table 12 provides more disaggregated data for the median time and cost of a round trip to a bank branch, ATM, and correspondent agent in urban and rural areas in Mexico. In rural areas, only 12 percent of the adult population (18 to 70 years old) spent less than 10 minutes on a round trip to a correspondent agent, and approximately 51 percent spent between 11 and 60 minutes on such a trip. The median costs—which include the round-trip travel costs and the social value of time—as a percentage of the DMW are higher in rural areas for all financial access points.[36] Therefore, for the rural population, lack of access points for cashing in or cashing out could potentially be a root cause of the low use of digital payment services.

[35] Other results from the estimation are consistent with the data discussed previously. For example, higher educational attainment is associated with a higher probability of having a bank account and using digital tools. Working in the informal sector—defined as not participating in social security—has a negative and statistically significant association with having a bank account, using mobile banking, and using ATMs. Also, when a person's wages are paid in cash—compared with other payment methods such as direct deposit or checks—the probability of having a bank account decreases, on average, by 54 p.p. (Table C.1 in Appendix C).
[36] In 2018, in Mexico, the social value of time was estimated at 50.25 Mexican pesos per hour (CEPEP 2018).

Table 12. Average time and cost to get to a bank branch, ATM, or correspondent agent, Mexico, 2018

Time interval	Urban			Rural		
	Distribution	Median cost (in Mexican pesos)	Total median cost (travel cost and social value of time) as % of DMW	Distribution	Median cost (in Mexican pesos)	Total median cost (travel cost and social value of time) as % of DMW
Distance to bank branch						
Less than 10 minutes	25%	0	5%	4%	0	5%
10 to 20 minutes	55%	18	35%	29%	30	48%
21 to 30	1%	20	46%	2%	20	46%
31 to 60 minutes	16%	22	53%	30%	60	96%
More than an hour	4%	50	113%	34%	80	147%
Distance to ATM						
Less than 10 minutes	31%	0	5%	5%	0	5%
10 to 20 minutes	61%	15	31%	28%	30	48%
21 to 30	2%	20	46%	2%	20	46%
31 to 60 minutes	15%	20	51%	23%	50	85%
More than an hour	2%	30	91%	16%	80	147%
Distance to correspondent agent						
Less than 10 minutes	52%	0	5%	12%	0	5%
10 to 20 minutes	37%	0	9%	31%	20	37%
21 to 30	1%	20	46%	3%	50	80%
31 to 60 minutes	5%	20	51%	18%	40	74%
More than an hour	1%	60	125%	9%	52	116%

Source: ENIF 2018 (INEGI 2018a) and CEPEP (2018).

As discussed in Section 6.2, inadequate provision of digital infrastructure might be a binding constraint on digital access for a segment of the population in rural areas. The evidence discussed in this section reinforces this previous finding by showing that rural people pay more than their urban counterparts to access a financial provider.

7.3. Low trust in providers

Turning to another top branch of the decision tree, this section discusses the low trust in providers, which we explore through indicators associated with consumer insecurity.

Since there are no data from Mexico regarding the reasons for not using mobile money products or IFPEs, we again rely on data from the ENIF 2018 (INEGI 2018a), and as a proxy for the uptake of digital payment services, we use information about the use of mobile banking, ATMs, and POS devices. Recalling the results from Figure 22, 7 percent of the financially excluded population ages 18 to 70 said that lack of trust is their main reason for not having a bank account. Also, it is worth noting that among the adult population with a

bank account in a financial institution, only 26 percent reported using mobile banking. The main reasons given for not using mobile or Internet banking are a preference for other access channels (21.3 percent), lack of knowledge about the service (19.6 percent), and lack of trust (18.5 percent).

Table 13 provides regression estimates using the synthetic group cohorts described in the previous section, and the association between the percentage of the population without a bank account and the percentage of that population who reported lack of trust in financial institutions as the main reason (Column (1)). Columns (2) through (4) present the correlations between the percentage of the adult population who do not use mobile banking, ATMs, and correspondent agents, respectively, and the percentage of the population who cited lack of trust as the main reason for not using these channels. For all of the specifications, the coefficient of lack of trust is not statistically significant, suggesting that it is an unlikely root cause for the low use of digital payment services.

Table 13. Regression estimates for lack of trust as the main reason for not using digital financial services, Mexico, 2018

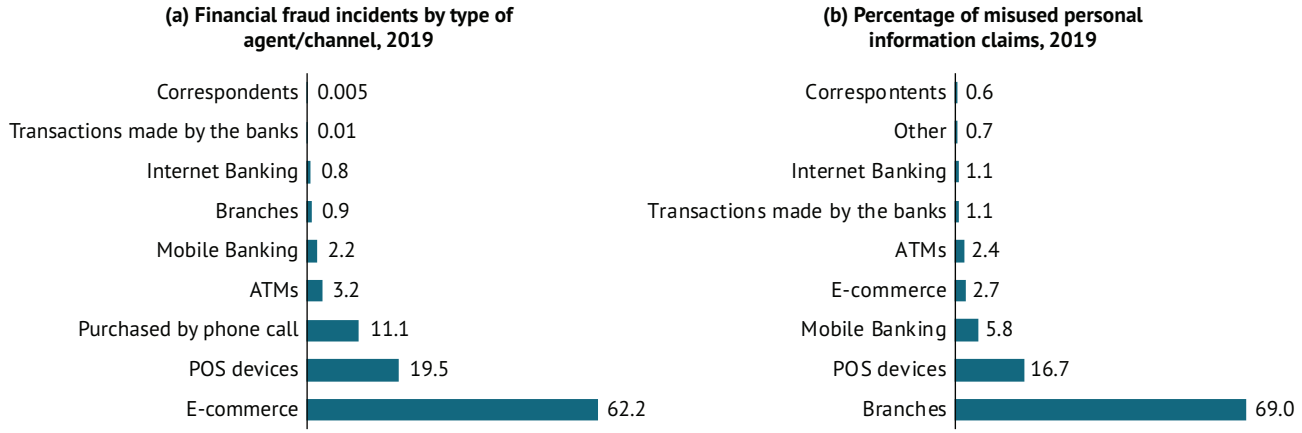
Variables	(1)	(2)	(3)	(4)
	Do not have a bank account	Do not use mobile banking, among those with a bank account	Do not use ATMs	Do not use correspondent agents
Percentage of the adult population citing lack of trust as the main reason for not having a bank account	–0.409			
	(0.297)			
Percentage of the adult population citing lack of trust as the main reason for not using mobile banking		–0.120		
		(0.188)		
Percentage of the adult population citing lack of trust as the main reason for not using an ATM			0.469	
			(0.666)	
Percentage of the adult population citing lack of trust as the main reason for not using correspondent agents				0.546
				(0.367)
Constant	0.524***	0.807***	0.532***	0.569***
	(0.0294)	(0.0361)	(0.0262)	(0.0384)
Observations	60	60	60	60
R squared	0.034	0.008	0.008	0.033

Note: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Source: Estimates using ENIF 2018 (INEGI 2018a).

To further examine lack of trust, we complement the previous results with data on consumer protection under the idea that consumer insecurity could be a potential root cause for lack of trust in digital payment services. The ENIF 2018 (INEGI 2018a) includes data about the percentage of the adult population (18 to 70 years old) who have been victims of theft or robbery in the past 3 years. Of adults with an active bank account, 5.6 percent said they had been victims of debit/credit card cloning, 5.2 percent had been subject to misuse of personal data, and 2.1 percent had been financial fraud victims.

In 2019, the National Commission for the Protection and Defense of Financial Services (CONDUSEF) reported receiving 68,650 claims for misuse of personal information and 9.3 million claims for financial fraud or theft. Panel (a) in Figure 24 shows the distribution of financial fraud claims and the type of agent or channel, revealing that 62 percent of the total fraud claims were related to e-commerce, followed by POS terminals (11.1 percent). Claims at the agent level, such as ATMs, branches, or correspondents, represented less than 5 percent of all fraud claims. Similarly, Panel (b) in Figure 24 provides information about the distribution of claims received in 2019 for misuse of personal information: 69 percent involved misuse of information by bank branches, followed by POS terminals, with 16.7 percent. ATMs and correspondent agents together accounted for 3 percent of the total claims.

Figure 24. Financial fraud claims (percentage), Mexico, fourth quarter of 2019



Source: CONDUSEF (2020).

In this respect, a report focusing on consumer protection practices in Mexico highlighted that even though the low-income population is less exposed to financial fraud or theft, due to having mostly low-value transactions, this segment faces additional costs that might hinder financial inclusion (EA Consultants 2020). For example, when consumers from more vulnerable segments are victims of financial fraud or theft, the potential impact on their well-being is proportionally larger than it would be for higher-income consumers. Moreover, the claims process, from submission to settlement, might discourage the use of digital payment services, especially in light of the fact that, on average, one-third of the complaints remain unresolved (Table 14).

Table 14. Average time to settle a complaint or claim, by type of institution (of adult population who made a fraud or review claim), Mexico, 2018

Time	Bank or other financial institution	CONDUSEF	PROFECO	Other judicial authority
A week or less	31%	21%	27%	8%
More than a week and less than a month	19%	17%	8%	19%
One to six months	19%	21%	14%	14%
More than six months	3%	7%	3%	7%
Unresolved	28%	34%	49%	51%

Note: PROFECO = Office of the Federal Prosecutor for the Consumer.
Source: ENIF 2018 (INEGI 2018a).

However, considering the data and applying Principle 2, it is unlikely that an increase in consumers' trust in financial institutions will significantly expand the use of digital payment services, particularly in lower-income segments of the population. Thus, lack of trust does not seem to be a binding constraint on increasing the use of digital financial services in Mexico.

8. Conclusions

This paper explores the reasons why digital payment services are used to a much lower extent than would be expected in Mexico, in spite of the country's level of development and efforts during the past two decades to expand these types of services.

A variety of indicators reveal the lower-than-expected levels of account ownership and use of digital payment services, including low percentages of individuals using mobile money accounts—even though their use increased in the period 2014–2017. Also, the provision of financial infrastructure, such as commercial banking branches, ATMs, POS devices, and correspondent agents, is below the observed levels in other Latin American countries with similar income levels. In addition, Mexico is characterized by large intra-country inequalities, with particularly low levels of usage of digital financial services in the central and southern regions of the country.

To explore the underlying factors associated with these realities, we use the framework proposed by Claessens and Rojas-Suarez (2020), which is organized as a top-to-bottom decision tree approach in which top branches of the "tree" describe the potential causes, and the subsequent branches identify the potential ultimate root-cause binding constraints.

The approach starts from the premise that if there are several factors (constraints) preventing the increase in the usage of digital payment services, only the removal of the constraints proven to be *binding* would have a positive and important effect on digital financial inclusion in payment services. For navigating the decision tree in search of the binding constraint,

Claessens and Rojas-Suarez (2020) used the following set of principles, taken from Hausmann, Klinger, and Wagner (2008): (1) the prices of financial services serve as indicators to determine whether binding constraints are (likely) on the demand or the supply side of the tree; (2) a sign of a binding constraint is that its relaxation is associated with a significant improvement in digital financial inclusion; (3) a constraint is also likely binding if the agents affected by it are trying to overcome or bypass the constraint; (4) agents less exposed to the constraint are more likely to thrive, compared with the segment of the population more exposed to it, if it is a binding constraint.

Following the methodology, we first perform a comparative price analysis to search for signs of imbalances between apparent costs and usage rates. The evidence shows in this respect that fees and commissions charged by ATMs, POS terminals, and mobile money services are higher in Mexico than in other countries in the region, while there is evidence that rural populations face higher transactional costs—including long distances and time—to access financial service providers. In principle, following Claessens and Rojas-Suarez (2020), these elements would suggest the existence of relevant supply-side constraints.

In fact, after applying the methodology, our conclusion is that most of the binding constraints for the expansion of digital payment services in Mexico are on the supply side. First, the regulatory framework could be creating an unlevel playing field between providers of digital services; we conclude that removing this constraint is a necessary condition for improving the provision of digital payment providers. The analysis suggests that Mexico has stricter regulations than do other countries for authorizing correspondent agents, which might discourage smaller shops from becoming agents, reducing the cash-in and cash-out access points. As a result, (high-cost) retail chain stores are the most common type of correspondent agent in Mexico. Moreover, since IFPEs also rely on the same type of correspondent agents as banks and other financial entities, it is unlikely that under current regulations they will expand their networks, particularly in rural areas.

Moreover, the regulation for IFPEs is likely to generate an unlevel playing field because the regulatory provisions for IFPEs are more complex, including, for instance, higher capital requirements and capital adequacy ratios, than in other countries in the region. Another distinct feature of the Mexican regulation is that IFPEs can receive cash deposits only if they ask for additional authorization; otherwise, they can receive funds only via transfers from supervised financial entities. Moreover, the products offered by IFPEs are designed for smartphones with 3G technologies and above, excluding 2G technologies. Applying Principle 3 for identifying binding constraints—a constraint is binding if agents are trying to overcome it—the evidence suggests that some digital payment providers have changed the way they operate to bypass the regulation or are forming alliances with financial entities that are already authorized to offer digital financial services.

Second, there is evidence suggesting that a coordination failure might be a binding constraint on the expansion of digital payment services in the country. In this sense, the strong preference for carrying out financial transactions using cash rather than financial services, especially digital payments services, signals the existence of a coordination problem. The analysis suggests that the root cause of the coordination failure is that a large proportion

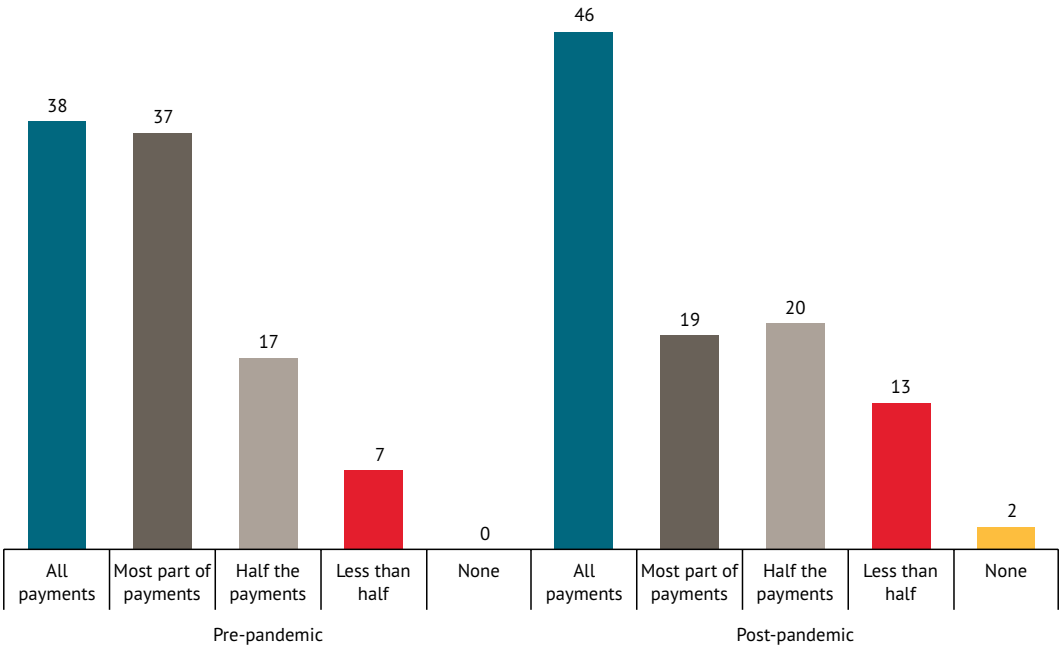
of potential consumers of digital payment services do not perceive a benefit from using them, preventing the critical mass of users required to achieve economies of scale. As a result, digital financial providers do not find it profitable to offer digital financial services at prices affordable to low-income consumers. This suggests that the removal of this binding constraint could significantly increase the use of digital payment services in the country.

In sum, this study finds that despite efforts in the right direction, additional measures and fine-tuning are necessary to fulfill the objective of considerably expanding an adequate and affordable availability, as well as use, of digital financial services in Mexico. We have pointed out here that the two most critical areas for doing so are regulation and the lack of a critical mass of users that could enable a larger supply at affordable prices. Addressing these issues and at the same time consolidating the implementation of the recent Fintech Law seem to be critical parts of the road map for the coming years. Although challenging given Mexico's development level and advancements in the past, this seems likely and, more so, necessary, to trigger the potential for digital financial inclusion to be at the core of improving the standard of living of large sectors of the population that have not yet perceived the benefits of these services.

9. Appendixes

Appendix A. Additional tables and figures

Figure A.1. Percentage of payments made with cash, Mexico, 2020



Note: Total population: 71.9 million. The question was "Since the beginning of the pandemic, what quantity of payments did you pay in cash?"
Source: Banxico (2020).

Table A.1. *Doing Business* rankings, Latin American countries, 2020

Country	Ranking: Ease of Doing Business Index	Ranking: Starting a business	Ranking: Getting credit	Ranking: Paying taxes	Ranking: Enforcing contracts	Ranking: Resolving insolvency
Argentina	126	141	104	170	97	111
Bolivia	150	175	144	186	109	103
Brazil	124	138	104	184	58	77
Colombia	67	95	11	148	177	32
Costa Rica	74	144	15	66	111	137
Dominican Republic	115	112	119	150	133	124
Ecuador	129	177	119	147	96	160
El Salvador	91	148	25	70	126	92

Country	Ranking: Ease of Doing Business Index	Ranking: Starting a business	Ranking: Getting credit	Ranking: Paying taxes	Ranking: Enforcing contracts	Ranking: Resolving insolvency
Guatemala	96	99	15	104	176	157
Honduras	133	170	25	167	154	143
Mexico	60	107	11	120	43	33
Panama	86	51	25	176	141	113
Paraguay	125	160	132	126	72	105
Peru	76	133	37	121	83	90
Uruguay	101	66	80	103	104	70

Note: The *Doing Business* rankings include 190 countries.
Source: World Bank (2020a).

Table A.2. Average number of cashless payments per inhabitant per year, 2012–2019

Country	2012	2013	2014	2015	2016	2017	2018	2019
Argentina	27	29	32	36	42	47	53	61
Australia	339	363	386	417	455	498	518	551
Belgium	226	242	307	287	303	339	372	404
Brazil	116	127	136	138	140	149	165	196
Canada	292	308	325	336	349	364	390	395
China	15	19	27	49	70	97	142	224
France	274	273	286	304	313	328	351	372
Germany	226	243	218	237	242	254	269	287
India	2	3	4	5	8	12	18	24
Indonesia	5	14	19	23	28	34	41	44
Italy	72	74	77	85	94	100	111	125
Mexico	25	27	29	31	33	36	40	46
Netherlands	345	378	383	401	421	455	505	544
Russia	42	59	79	100	133	179	241	318
Saudi Arabia	5	14	16	19	23	29	38	59
Singapore	644	698	711	728	759	782	831	848
South Africa	54	58	63	69	78	79	85	93
South Korea	304	338	372	414	453	501	547	607
Spain	0	0	140	139	152	175	184	206
Sweden	352	375	402	429	481	497	529	544
Switzerland	205	211	220	244	256	275	299	324
Turkey	39	46	49	53	58	66	76	87
United Kingdom	291	307	329	354	383	411	448	484
United States	366	386	405	417	441	468	496	525

Source: CPMI-BIS (2020).

Appendix B. The decision tree methodology: further details

This appendix extends the discussion in section 3 by providing additional details regarding the methodology used in this paper. The complete analytical framework, the principles of the methodology, and numerous examples can be found in Claessens and Rojas-Suarez's 2020 paper "A Decision Tree for Digital Financial Inclusion Policymaking."

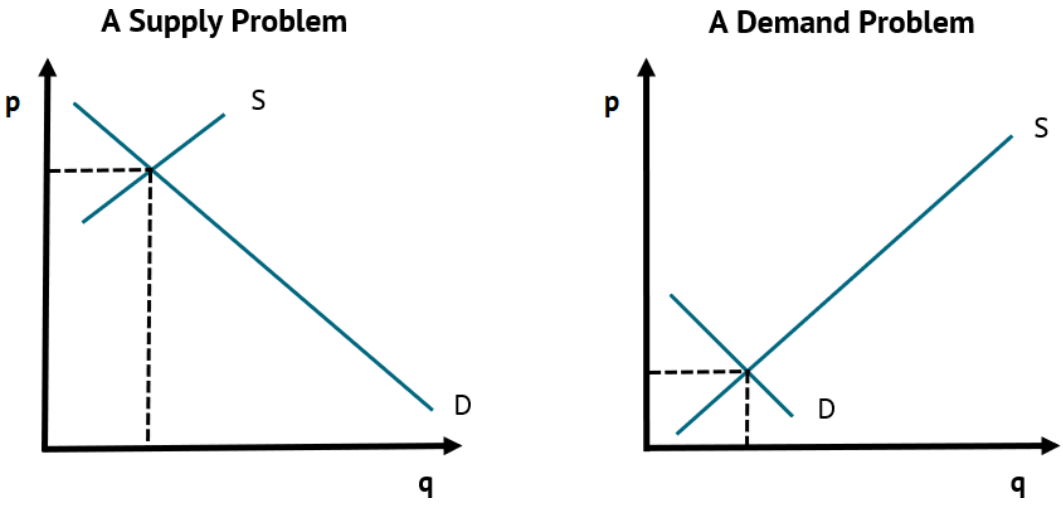
The methodology is inspired by Hausmann and coauthors' work on growth diagnostics (the 2005 "Growth Diagnostics" and the 2008 "Doing Growth Diagnostics in Practice"), which created a decision tree to identify the binding constraints on growth in developing economies—that is, the factors that are preventing countries from reaching their growth potential. The motivation behind this framework is to offer a diagnostic tool that will help policymakers to prioritize policy in areas where actions are needed the most and can have a larger impact. Many factors can be constraints; indeed, all the branches in the decision tree are determinants of financial inclusion, but the methodology seeks to find those that are ***binding.***

Hence, the decision tree for digital financial inclusion outlines a set of potential constraints that analysts have to evaluate in order to determine which are binding, in the sense that they are the root cause limiting the expansion of financial inclusion. Claessens and Rojas-Suarez offered three different trees for payment, store of value, and credit services, though some constraints are naturally common for the three trees. These trees have served as a guide in the search for the binding constraints to digital payments and transfers in Mexico.

The decision tree for digital payments and transfers is presented in Figure 2 in section 4. We evaluate all the branches (and sub-branches) of the tree to identify the binding constraints to financial inclusion, applying the following principles:

1. ***Prices of financial services are key indicators to determine whether binding constraints are (likely) on the demand or the supply side.*** Observing low quantities (low usage) does not indicate whether the constraints are affecting providers or consumers. Analysts can get an *initial* idea of whether binding constraints are on the supply or demand side by considering prices, though they should evaluate all the branches in the tree individually. Generally, if the price of a service is relatively high compared with either another similar service or the (properly adjusted) customary price charged in other countries with similar levels of development, it indicates the existence of supply-side constraints (left graph in Figure B1.1). This suggests that providers are willing to supply the service only at a high price (due to high costs or other distortions related to supply-side constraints). These high prices, as a result, exclude significant proportions of the population, who cannot afford the service. On the other hand, if the price is relatively low, this would indicate a demand-side problem, since users are unable or unwilling to use the service despite its low price (right graph in Figure B1.1).

Figure B.1. Distinguishing between supply and demand problems



Source: Claessens and Rojas-Suarez (2020), taken from Hausmann et al (2008).
Note: S and *D* represent, respectively, the supply of and demand for a financial service, and *p* and *q* represent, respectively, the price and quantity used of that service. Actual usage occurs at the intersection of both curves.

In addition, in many cases, it is necessary to consider a broader definition of prices, accounting for potential unobserved shadow prices and other factors, such as opportunity costs, that affect the market equilibrium. A clear example of this is geographical constraints, where the opportunity cost of displacement is built in for customers and might cause low demand.

The three other principles indicate that a constraint is likely binding:

2. ***If relaxing the constraint results in a significant change in usage*** or other relevant behaviors. For example, if reducing or eliminating certain taxes to payment services causes a sharp rise in the usage of the service
3. ***If agents are trying to overcome or bypass the constraint*** by using either alternative equivalent services such as informal lending (when analyzing credit markets) or a combination of other, less efficient, financial instruments
4. ***If agents less intensive in that constraint are thriving***—that is, if the constraint affects only a subpopulation and those not affected by it are largely financially included. For example, in countries where institutional and governance quality is low, the ability to use financial services may depend on factors other than those driving the sound conduct of business, such as political connections. If so, one should observe that those with privilege to use the services do better than what is expected given their capacities.

Further considerations to take into account when using the decision tree methodology include these:

- ***When assessing whether a constraint (branch in the tree) is binding, analysts need to consider as many indicators as possible, including hard data as well as surveys reflecting perceptions.*** Claessens and Rojas-Suarez suggested possible indicators to use on each of the branches, but analysts should select a set of indicators based on the specific characteristics and context of both the services and the country under study. Data should encompass both aggregate and microlevel statistics.
- ***Keep in mind that removing nonbinding constraints might be necessary to expose a binding constraint.*** For instance, allowing mobile money to operate by law can ease a constraint but, while necessary, it might not be sufficient to improve financial inclusion. Relaxing this constraint might instead help to uncover a truly binding constraint, such as the lack of a critical mass of customers (a coordination problem).
- ***Acknowledge that branches can interrelate.*** In some cases, to fully evaluate a branch requires analyzing others. Analysts should draw these connections and assess which indicators to use in each of the branches to evaluate them.

Appendix C. Regression models

For analyzing the relationship between the sociodemographic characteristics of the population and the use of financial services, we use a probit regression with the following specification:

$$\begin{aligned}\Pr(Y_i = 1 \mid X_i) = \Phi(\alpha + \beta_1 Male_i + \beta_2 Rural_i + \sum_{m-2}^{5} Y_{m,i} Age\,Cohort_{m,i} \\ + \sum_{n=2}^{5} \delta_{n,i} Education\,Level_{n,i} + \beta_3 Ln(Monthly\,wage)_i + \beta_4 Wage\,in\,cash_i \\ + \sum_{s=2}^{6} Y_{s,i} \,\mathrm{Re}\,gion_{s,i} + u_i).\end{aligned} \tag{C.1}$$

In Equation (C.1), the dependent variables are binary, taking the value of 1 when the person indicates that she or he has a bank account, has a debit card, uses a mobile banking application associated with a bank account, has used ATMs, or has used correspondent agents, and 0 otherwise. As controls, the regression includes binary variables taking the value of 1 if the person is male, lives in a rural area, or reports being paid in cash, and 0 otherwise. Also, the regression includes a categorical variable for the respondent's age, where the base category is 18 to 24 years; a categorical variable for educational attainment, with no schooling as the base category; and a categorical variable for the region, with Mexico City as the base category. Another variable included in the analysis is informality, taking the value of 0 if the person does not have social security in her or his main occupation, and 0 otherwise. Finally, the natural logarithm of the person's monthly wage is included in the specification. It is worth mentioning that the results are interpreted as an association between the variables and not as a causal relationship.

Table C.1 presents the marginal effects from the probit regression for using the five respective financial services.

Table C.1. Marginal effects from probit regression for using financial services

Variable	(1) Has a bank account	(2) Has a debit card	(3) Has mobile banking	(4) Has used ATMs	(5) Has used correspondent agents
Male	–0.0755***	–0.0283	0.0127	–0.0365***	–0.0529***
	(0.0147)	(0.0198)	(0.0203)	(0.0131)	(0.0170)
Rural area	0.0128	–0.0586***	–0.0899***	–0.0478***	–0.132***
	(0.0156)	(0.0223)	(0.0283)	(0.0149)	(0.0199)
Age cohort: 25 to 39 years	0.0537***	0.0364	0.0295	0.0102	–0.0178
	(0.0188)	(0.0340)	(0.0310)	(0.0179)	(0.0248)
40 to 55 years	0.0532***	0.0647*	–0.0687**	–0.0157	–0.0559**
	(0.0193)	(0.0341)	(0.0314)	(0.0191)	(0.0254)
56 to 64 years	0.0901***	0.0526	–0.204***	-0.0316	–0.0495
	(0.0263)	(0.0416)	(0.0336)	(0.0255)	(0.0357)
65 and over	0.210***	0.00903	–0.237***	0.112***	–0.0932*
	(0.0365)	(0.0599)	(0.0380)	(0.0412)	(0.0518)
Education: Primary	0.0251	–0.145**	0.00375	0.107***	0.0255
	(0.0321)	(0.0697)	(0.0179)	(0.0362)	(0.0479)
Lower secondary	–0.000388	0.0171	0.156***	0.159***	0.112**
	(0.0294)	(0.0651)	(0.0270)	(0.0341)	(0.0444)
Upper secondary	0.0547*	0.0116	0.178***	0.238***	0.144***
	(0.0291)	(0.0638)	(0.0213)	(0.0336)	(0.0435)
Tertiary	0.112***	0.0934	0.319***	0.351***	0.229***
	(0.0309)	(0.0649)	(0.0183)	(0.0350)	(0.0450)
Informal	–0.0664***	0.0193	0.0671**	–0.0585***	–0.0118
	(0.0188)	(0.0300)	(0.0278)	(0.0172)	(0.0238)
Wage paid in cash	–0.496***	–0.0638**	–0.0549**	–0.401***	0.0384
	(0.0191)	(0.0303)	(0.0275)	(0.0166)	(0.0248)
Ln (Monthly wage)	0.00684	0.0738***	0.123***	0.0330***	0.0762***
	(0.0102)	(0.0133)	(0.0161)	(0.00991)	(0.0125)
Region: Northwestern region	0.0458*	0.0697**	–0.0110	0.0523**	0.279***
	(0.0240)	(0.0288)	(0.0320)	(0.0229)	(0.0268)

Variable	(1) Has a bank account	(2) Has a debit card	(3) Has mobile banking	(4) Has used ATMs	(5) Has used correspondent agents
Northeastern region	–0.0439*	–0.0284	–0.0192	0.00715	0.203***
	(0.0232)	(0.0318)	(0.0318)	(0.0226)	(0.0268)
Western region and Bajío	–0.0494**	–0.209***	0.00961	-0.0372	0.0924***
	(0.0251)	(0.0363)	(0.0356)	(0.0237)	(0.0287)
South-central and eastern regions	–0.0712***	–0.153***	–0.0465	–0.0571**	0.110***
	(0.0250)	(0.0375)	(0.0370)	(0.0248)	(0.0291)
Southern region	0.0200	–0.0332	–0.000609	–0.00779	0.0995***
	(0.0245)	(0.0331)	(0.0341)	(0.0233)	(0.0275)
Observations	7,657	4,248	3,813	7,657	7,657

Note: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Northwestern region: Baja California, Baja California Sur, Chihuahua, Durango, Sinaloa, Sonora; northeastern region: Coahuila, Nuevo León, San Luis Potosí, Tamaulipas; Western region and Bajío: Aguascalientes, Colima, Guanajuato, Jalisco, Michoacán, Nayarit, Querétaro, Zacatecas; south-central and eastern region: Hidalgo, Mexico (state), Morelos, Puebla, Tlaxcala, Veracruz; southern region: Campeche, Chiapas, Guerrero, Oaxaca, Quintana Roo, Tabasco, Yucatán.
Source: Authors' estimates using data from ENIF 2018 (INEGI 2018a).

Probit Regression Including Financial Literacy Variables

For estimating the relationship between the probability of using financial services and a respondent's financial literacy, we use the following specification:

$$\Pr(Y_i = 1 | X_i) = \Phi(\alpha + \beta_1 Male_i + \beta_2 Rural_i + \sum_{m-2}^{5} Y_{m,i} Age\,Cohort_{m,i} + \sum_{n=2}^{5} \delta_{n,i} Education\,Level_{n,i} + \beta_3 Financial\,Literacy\,Score_i + u_i) \quad \text{(C.2)}$$

In Equation (C.2), the dependent variables are the same binary variables described for Equation (1). The independent variables include sociodemographic characteristics. For approximating financial literacy, we follow the methodology described by the CNBV (2019a), which measures three dimensions of financial literacy—financial knowledge, financial behavior, and financial attitudes—using information from the 2018 ENIF (INEGI 2018a). Although the CNBV calculates the financial literacy score by adding the scores of the three dimensions, we use the individual subscores for knowledge and behavior. The results are presented in Table C.2.

Table C.2. Marginal effects from probit regression including financial literacy subscores

Variables	(1) Has a bank account	(2) Has used mobile banking	(3) Have used ATMs	(4) Has used correspondent agents	(5) Has a bank account	(6) Has mobile banking	(7) Has used ATMs	(8) Has used correspondent agents
Financial knowledge subscore	0.0099	0.0175**	0.0139**	0.00536				
	(0.00597)	(0.00770)	(0.00584)	(0.00589)				
Financial behavior subscore					0.0503***	0.0427***	0.0421***	0.0287***
					(0.00327)	(0.00459)	(0.00309)	(0.00332)
Male	0.0400***	0.0480***	0.0686***	0.0228	0.0132	0.0407**	0.0653***	0.0254**
	(0.0138)	(0.0176)	(0.0134)	(0.0139)	(0.0124)	(0.0163)	(0.0117)	(0.0122)
Rural	–0.0370**	–0.148***	–0.166***	–0.164***	–0.0122	–0.128***	–0.149***	–0.173***
	(0.0168)	(0.0276)	(0.0156)	(0.0171)	(0.0144)	(0.0254)	(0.0133)	(0.0145)
Age cohort: 25 to 39 years	0.155***	0.0732***	0.0820***	0.0224	0.131***	0.0570**	0.0677***	0.0152
	(0.0195)	(0.0275)	(0.0192)	(0.0207)	(0.0180)	(0.0257)	(0.0171)	(0.0186)
40 to 55 years	0.171***	–0.0131	0.0838***	–0.0304	0.141***	–0.0355	0.0665***	–0.0303
	(0.0204)	(0.0276)	(0.0203)	(0.0213)	(0.0187)	(0.0254)	(0.0179)	(0.0191)
56 to 64 years	0.163***	–0.120***	0.0601**	–0.0419	0.152***	–0.137***	0.0386*	–0.0446*
	(0.0276)	(0.0348)	(0.0268)	(0.0283)	(0.0241)	(0.0302)	(0.0227)	(0.0245)
65 and over	0.366***	–0.155***	0.126***	–0.127***	0.319***	-0.161***	0.123***	–0.101***
	(0.0337)	(0.0383)	(0.0374)	(0.0363)	(0.0297)	(0.0358)	(0.0318)	(0.0309)
Education: Primary	–0.0455	0.00482	0.0186	–0.00604	–0.0340	0.00482	0.0629**	0.0306
	(0.0471)	(0.0117)	(0.0400)	(0.0472)	(0.0333)	(0.0120)	(0.0262)	(0.0322)
Lower secondary	0.0223	0.126***	0.118***	0.0744*	–0.00384	0.134***	0.164***	0.112***
	(0.0448)	(0.0236)	(0.0388)	(0.0447)	(0.0310)	(0.0220)	(0.0246)	(0.0303)
Upper secondary	0.106**	0.153***	0.272***	0.107**	0.0679**	0.155***	0.301***	0.147***
	(0.0444)	(0.0165)	(0.0386)	(0.0439)	(0.0307)	(0.0160)	(0.0246)	(0.0297)
Tertiary	0.287***	0.359***	0.492***	0.176***	0.214***	0.332***	0.498***	0.202***
	(0.0448)	(0.0150)	(0.0389)	(0.0443)	(0.0317)	(0.0145)	(0.0256)	(0.0305)
Observations	10,377	4,846	10,377	10,377	12,309	5,267	12,309	12,309

Note: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Source: Estimates using ENIF (INEGI 2018a).

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