WP/21/175

IMF Working Paper

Fintech Potential for Remittance Transfers: A Central America Perspective

By Julia Bersch, Jean François Clevy, Naseem Muhammad, Esther Pérez Ruiz, and Yorbol Yakhshilikov

INTERNATIONAL MONETARY FUND

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Fintech Potential for Remittance Transfers: A Central America Perspective

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Authorized for distribution by Patricia Alonso-Gamo

June 2021

Abstract

This paper analyzes the potential for fintech to facilitate cheaper and more efficient remittances, and to enhance financial inclusion in Central America. Digital remittances remain nascent in the region, primarily reflecting behavioral inertia, small cost advantages of digital over traditional channels, and inadequate financial literacy. Through expanded alliances between traditional and fintech operators, digital remittances can further reduce transaction costs and reach those remote, low-income households in a timely and secure manner. A meaningful expansion of fintech remittances necessitates an enabling regulatory environment for digital financial services, and KYC and AML/CFT requirements proportionate to the value of transfers.

JEL Classification Numbers: E42, F24, G23, G28, G53, L11, O54.

Keywords: Central America, fintech, remittance transfers, cross-border payments, mobile money, financial inclusion, financial regulation, financial integrity, digital uptake, competition.

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[1] Prepared by the Western Hemisphere Department Fintech working group, led by S. Pelin Berkmen and under the guidance of Patricia Alonso-Gamo. The authoring team gratefully acknowledges comments from Alejandro Werner and IMF reviewing departments. We would like to thank the participants of the XVI Regional Conference for Central America, Panama, and the Dominican Republic (especially panelists from Western Union and Mc Kinsey) for fruitful exchanges. Finally, we are grateful for the excellent research assistance provided by Cristhian Vera and wishes to thank Anaysa Delsid for her excellent administrative support.

CONTENTS

List of Acronyms

AI	Artificial Intelligence
AML	Anti-Money Laundering
API	Application Programming Interface
ATM	Automated Teller Machine
CA	Central America
CFT	Combating the Financing of Terrorism
CPMI	Committee on Payments and Market Infrastructures
DLT	Distributed Ledger Technology
EAP	East Asia and Pacific
ECA	Europe and Central Asia
EMDE	Emerging Market and Developing Econonomies
GSMA	Global System Mobile Association
KYC	Know Your Customer
LAC	Latin America and the Caribbean
LIC	Low Income Countries
MENA	Middle East and North Africa
MMRI	Mobile Money Regulatory Index
MNO	Mobile Network Operator
MTO	Monetary Transfer Operator
NA	North America
P2P	Person-to-Person
SA	South Asia
SSA	Sub-Saharian Africa

I. EXECUTIVE SUMMARY

Remittances are an important source of foreign currency income in Central America (CA), exceeding in many cases income from tourism and/or foreign direct investment. They also represent a critical lifeline for millions of Central American households. Hence the strong policy interest in making these payments as affordable, agile, reliable, and remotely accessible as possible.

After reviewing the role of remittances as a central source of income in CA, this paper presents key features of the U.S. remittance corridors with the region and explores the potential for digitalization and fintech to enhance customers' experience with these transfers, in line with the principles established by the Bali Fintech Agenda (BFA) (IMF and World Bank, 2018), which aims at fostering technology innovations in support of growth, financial stability, inclusion, and integrity. As such, the BFA, and the fintech-enabling regulations it pursues, is of direct relevance for the remittance industry.

As we investigate key trends in the remittance industry in CA, our paper follows a suite of institutional contributions in the area of fintech cross-border payments (He et *al.*, 2017; IMF, 2019). As part of the broader fintech strategy, the IMF is collaborating with the Committee on Payments and Market Infrastructures (CPMI) on a global roadmap to improve cross-border infrastructure and payments at the request of the G20 (BIS, 2020). Such strategy involves, *inter alia*, Fund's participation in the CPMI-IOSCO working group on digital innovations. As the global roadmap shapes up, further work will be needed to distill the key elements relevant for CA to ensure that the region benefits from global advances.

The paper's key findings include the following:

- Fintech advances and further digitialization in the remittance industry can be expected to expand this source of revenue to migrants' families, thereby contributing to lowering poverty and inequality and raising their access to financial services. Vulnerable households living in the rural areas of CA, with young and educated women, are to gain the most.

- Traditional operators have provided remittance services at competitive prices by global comparison. In 2019, the average fee for a US$200 transfer to CA was the second lowest worldwide behind South Asia. Nonetheless, average remittance fees remained above the Sustainable Development Goal (SDG) of US$6 (for a US$200 transfer) in all CA countries. The evidence suggests that greater competition could further decrease remittances fees.

- Remittance-recipient CA countries are already having a glimpse at fintech opportunities. The transformation to the industry has so far been more parsimonious than groundbreaking, involving mutually beneficial alliances between traditional and new operators. Such alliances are enabling more efficient and transparent back-end processes to traditional operators, and increased access to low-digitalized customers at the payout for new operators. Overall, traditional operators continue to dominate the remittance market in CA, and the cost

differential between incumbent and new entrants remains small to motivate a definitive consumers' shift to fintech remittances. COVID-19 is shaking up domestic and cross-border payments, prompted by a shift in consumers' and governments' preferences towards digitalization.

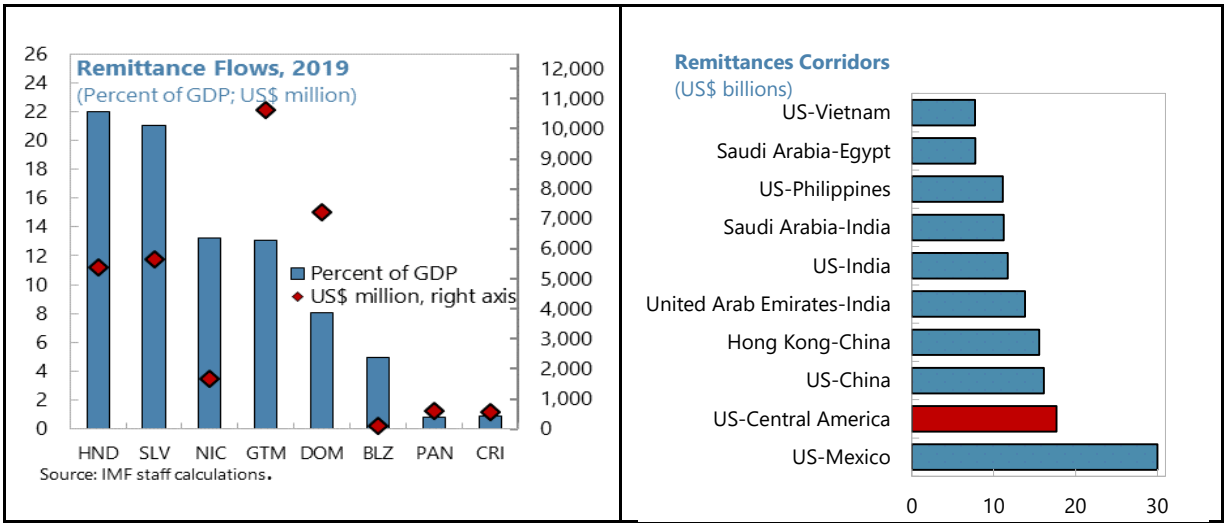
- In addition to further cost reduction, fintech can promote financial inclusion. Detached from bank branches and agent networks, digital remittances can reach remote, low-income households. Digital remittances are also faster than those channeled physically and the associated information can complement traditional banking instruments for the assessment of creditworthiness.

- Options to foster fintech remittances comprise expanding the use of mobile financial services, nascent in CA at present, and broadening and deepening the mutually beneficial alliances of telecommunication and fintech providers with traditional operators. Both options are likely to involve greater financial development and inclusion in CA. As an integral part of national financial inclusion strategies, the public and private sector should work together in CA to enhance digital and financial literacy for everyone.

- There is room for regulators to provide an enabling environment that fosters the digitalization of remittances, while guarding against any potential risks. Internet network coverage is broadly adequate in CA, but financial literacy and digitalization, particularly mobile financial services' penetration, are still lagging. A meaningful expansion of digital remittances necessitates a regulatory environment enabling a level-playing field for digital financial services and greater interoperability with payment systems. There is a trade off between making know your customer (KYC) and AML/CFT requirements proportionate to the value of transfers and easing digital financial services. New technologies such as digital IDs facilitating the identification process and due diligence can help improve security of transactions and ease the tradeoff between promoting financial digitalization and limiting risks to financial integrity.

II. INTRODUCTION

Workers' remittances have become a major source of financing for many CA countries, reaching levels comparable with foreign direct investment or official development assistance. Remittances from CA migrants to the United States represent 82 percent of the total and, with an inflow of US$24 billion in 2018 (7 percent of its GDP), the U.S.–CA corridor is the second largest in the world after the U.S.–Mexico corridor. With 35 percent of total remittances, Guatemala accounts for the largest share in the corridor, followed by the Dominican Republic and El Salvador (20 percent each). Remittances represent a critical lifeline for millions of Central American households, including the most vulnerable.



Earlier studies had documented that remittances act as macroeconomic stabilizers to short-term shocks, while their impact on long-term economic growth seems muted. The key findings of earlier literature on the region include:

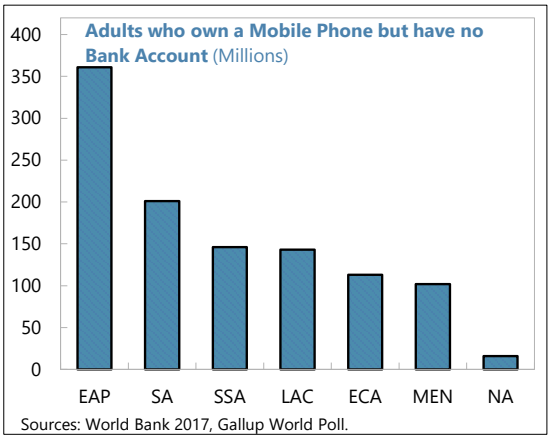
- *Stabilization role*. Remittances are often found to be countercyclical with respect to the recipient country business cycles, complementing the external financial flows and supporting financial stability (Spatafora, 2005; Frankel, 2011; Bettin *et al.*, 2014). In times of short-lived external shocks, remittances tend to dampen output volatility, and relatively more so in LAC than in other emerging markets (Beaton *et al.*, 2017).

- *Growth effects*. Remittances seem to have positive (though not always statistically significant) growth effects, which are largest in the high-remittance-receiving subregions (Beaton *at al.* 2017). In the LAC region, countries with lower long-term average growth rate of real GDP per capita—controlling for the rate of convergence—have received higher remittances as a share of GDP.

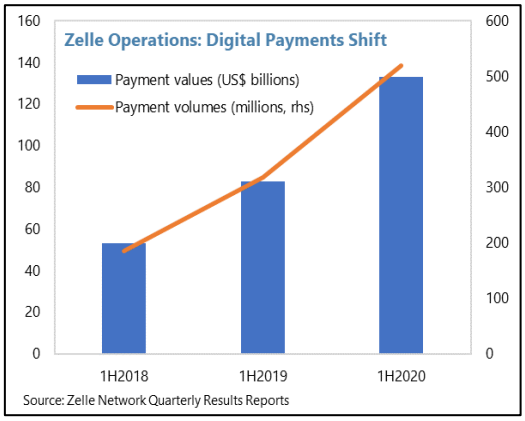
- *Use of remittances*. Remittances are not associated with a substantial increase in domestic investment, but are rather directed to consumption (Barajas *et al.*, 2009). Some argued that remittance recipients rationally substitute unearned remittance income for labor income and, since labor and capital are complementary goods in production, this may negatively affect the

rate of capital accumulation. Liquidity constraints despite remittance income and/or inadequate financial inclusion may further limit the remittance-growth channel.

- *Impact on inequality.* Remittances are found to decrease income inequality significantly by about 5 to 6 points in those CA countries that are large remittance recipients (Annex I).



Given remittances' overall positive effects on the recepient countries, there is a strong policy interest in making these payments as affordable, reliable, and accessible as possible, with the advent of fintech innovations bringing new opportunities in this regard. Fintech startups globally were inspired by the idea of making payments more secure and less expensive, coupled with the fact that millions of people around the world have a mobile phone but no bank account. The underbanked segments of the Asian and African population, in particular, are on the forefront in the use of fintech technology for remittances. By contrast, the evidence presented in this paper suggests ample scope to enhance remittances' digitalization in CA.



Although traditional cash-based remitters had started to diversify into digital transfers pre-COVID-19 to better meet their customers' needs, inadequate market competition and behavioral inertia dragged remittances' digitalization. The advent of COVID-19 is accelerating customers' and governments' uptake of digital remittance and payments. As a way of illustration, Zelle's payments value and volume in the U.S. both grew around 60 percent during the first half of 2020, while Tigo Money's digital transactions in the LAC region almost doubled during the second quarter of 2020.

This paper explores the role of Fintech, and digitalization more broadly, to reduce remittances costs and enhance access of vulnerable populations in CA to financial services through digital means. To this aim, Section III defines the notion of digital, and more specifically, fintech remittances used in this paper. Section IV presents evidence of the low levels of remittances' digitalization in the U.S. remittance corridor with CA and discusses the underlying reasons, notably inexpensive cash remittances alongside demand and regulatory impediments (discussed in detail under Section VII). Section V analyzes the key drivers of remittances fees charged by one traditional Money Transfer Operator (MTO) and two digital providers operating in about 30 remittance corridors originating in the U.S., and the scope for digitalization to further reduce remittance costs. Section VI finds that financial inclusion through the banking sector for remittances receivers in CA remains inadequate. Section VII uses country case studies to discuss

the role of supply, demand and regulatory conditions in supporting the use of mobile phones to receive financial remittances and to access digital financial services—a promising digitalization avenue in CA. Section VIII concludes with policy recommendations to foster digital remittances and financial inclusion through mobile money.

III. WHAT ARE FINTECH REMITTANCES?

After reviewing the role of remittances in CA and the potential for technology innovations to expand their beneficial effects, this section lays out the notion of digital and fintech remittance operators used throughout the rest of the paper.

- *Digital remittances*. International money transfer services accessed and/or delivered through digital channels (internet, mobile phone). Digital remittance services usually employ agents and the network of other third-party intermediaries to improve accessibility and lower the delivery cost (Alliance for Financial Inclusion, 2016).

- *Digital remittance operators*. While there is no clear-cut definition of digital remittance operators, we take a pragmatic approach and define as such those providers for which digitalized remittances are the main source of income (over 50 percent of revenues).

- *Fintech remittance operators*. Fintech operators are defined as those that incorporate technology advances that can potentially transform the provision of financial services through new business models, applications, processes, and products (BFA, IMF and World Bank, 2018; Berkmen *et al.*, 2019). As such, Fintech firms have an efficiency edge over traditional firms, thereby contesting extraordinary margins.

Fintech operators may bring about innovations in any of the four segments involved in the remittance service. The remaining of this section describes the traditional provision of remittances alongside the technological transformation fintech is bringing to this industry.

The remittance industry has traditionally been structured around four segments (He *et al.* 2017). The front-end processes of *capturing* and *disbursing* entail interfacing directly with the end-users, migrants, and recipient households. The back-end processes of *messaging* and *settlement* are handled by remittance service providers (RSP). *Messaging* involves handling payment instructions. *Settlement* involves the transfer of money within a jurisdiction from bank to bank, most often in reserves at the Central Banks (*domestic settlement*); and the transfer of funds across borders, commonly by correspondent banks that hold accounts with one another (*cross-border settlement*).

All four segments have traditionally been prone to market concentration, albeit for different reasons: (i) high fixed costs from physical agent locations (*capturing, disbursing*); (ii) inadequate interoperability (*messaging*); (iii) network externalities the higher the volume of transactions (*domestic settlements*); and (iv) more effective management of liquidity and FX risks the higher the volume of transactions (*cross-border settlements*). Compliance with AML/CFT and KYC regulations have traditionally added to the industry's fixed costs structure.

Fintech can enhance customer experience with remittance transfer. At the *front-end,* mobile money and online wallets can provide complete visibility into the payment status and delivery. At the *back-end*, in addition to innovative solutions that involve traditional settlement, distributed Ledger Technology (DLT) or blockchain token-based payments provide decentralized alternatives to the account-based payments of correspondent banking.[2][3] As a result, transactions are made: (i) faster, through real-time settlement and bidirectional messaging between banks;[4] (ii) certain and transparent, through disclosure and validation of rich information prior to settlement (supported by Big Data and Artificial Intelligence, AI), facilitating compliance with AML/CFT and KYC regulations and credit scoring; (iii) and cost-effective, through lower processing and liquidity costs (on demand provision of liquidity, high Straight-Through-Processing (STP) rates, and reduced reliance on *nostro accounts* for global payments).

Globally, the remittance industry continues to be dominated by traditional money transfer operators with growing presence of fintech providers.

- *Traditional Money transfer operators*. As of 2Q2019, historic key players *Western Union* and *MoneyGram* (200+ countries each, about 500,000 and 347,000 agents worldwide, respectively)[5] continued to lead the ranking of cross-border remittances (Figure 2). These traditional operators are currently undergoing structural change. *Western Union* has partnered with cross-border payments network *Thunes* to enable clients to transfer funds directly to mobile wallets using Blockchain. And both *Western Union* and *MoneyGram* have partnered with the global settlement and currency exchange network DLT *Ripple* to provide real-time messaging, clearing and settlement of remittances.

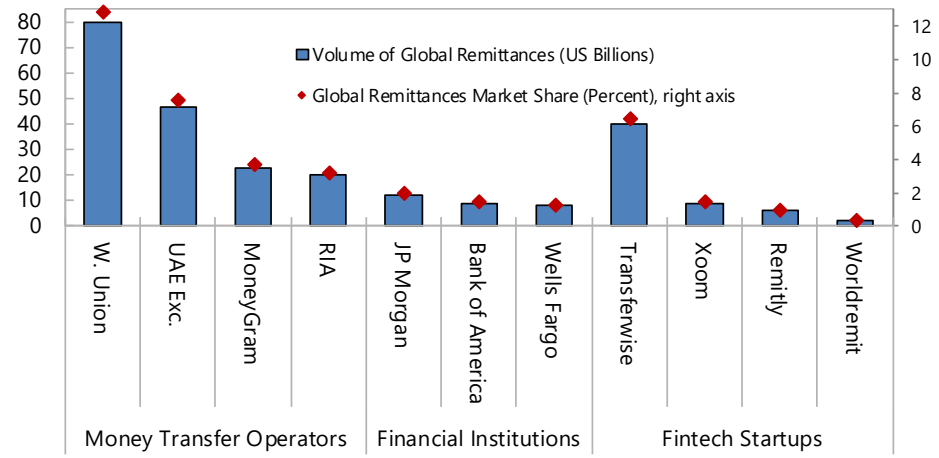
[2] For a detailed description of DLT and blockchain, see https://tradeix.com/distributed-ledger-technology/ and IMF Staff Discussion Note 16/03.

[3] Remittance transfers have traditionally flown through a chain of intermediaries, such as correspondent banks or national payment systems, before they eventually wind their way from the sender to the recipient, resulting in delays, transaction costs, and opacity. DLT enables financial institutions with no direct relationship to coordinate their actions without relying on these intermediaries (Adams and Lipis, 2014; Cheng, 2018; ECB, 2019; He *et al*., 2017).

[4] API-based messaging enables bidirectional communication and allows the beneficiary bank to receive more efficiently KYC and risk information, fees, FX rates, and expected time of funds delivery. This associated entire cost structure is notified to the originating bank in a transparent manner. The resulting reduction of missing or incorrect information increases STP rates and reduces payment processing costs. Instant confirmation and real-time liquidity monitoring further reduces reconciliation costs.

[5] *MoneyGram* primarily offers services through third-party agents including retail chains, independent retailers, post offices, and financial institutions.

Figure 1. Cross-Border Money Transfer Volume by Category



Sources: Bloomberg L.P.; Proof of Capital; SaveOnSend; and IMF staff calculations.

- *Fintech money transfer operators*. In the 2010s, fintech startups entered the online market focusing on different consumer bases, developed countries (*TransferWise*), African and working-class migrants (*WorldRemit*), and US-based immigrants (*Remitly*). Their cost-effectiveness stems from: (i) avoiding cross-border payments and currency conversion by matching transfers flowing in opposite directions (*Transferwise*); (ii) price-differentiating by volume and speed (*Remitly,* fee-free for large transfers to India of US$ 1,000 or more);[6] and (iii) heavily focusing on mobile-to-mobile remittances (*WorldRemit*). These operators have built a global network with financial institutions and mobile telecom companies, allowing accurate tracking of payment status (increasing transparency), almost instantaneous payments (increasing speed), and reliance on AI and machine learning to allow for identification and secure regulatory compliance (reducing costs).

IV. U.S. To CA Remittances Corridor: Stylized Facts

After laying out the notion of fintech remittances, this section characterizes the U.S. remittances corridors with CA.[7] We present stylized facts about the traditional and fintech money transfer operators, modes of transfer, and remittances costs.

A. Operators

RSP in LAC have surged over the past decade, increasing from an average of 14 providers per country in 2010 to 20 in 2016 (Orozco *et al.*, 2016) and expanding considerably their payment networks. In the top 11 LAC remittance-receiving countries, the distribution network increased tenfold since 2009 (and doubled since 2012) to reach an estimated 500 thousand payment locations in 2016.

[6] For details, see https://transferwise.com/in/blog/top-international-money-transfer-companies.

[7] Throughout this section, CA comprises Belize, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua, and Panama.

Financial institutions and traditional MTOs continue to dominate the LAC remittances market (Berkmen *et al.,* 2019). Traditional MTOs have been gaining market share against traditional bank and financial institutions following regulatory changes favorable to the expansion of retail agent locations. Mobile money remittances in 2019 remained low at about 0.15 percent of all transfers for the LAC region (versus 14.3 percent in SSA[8] and 1.2 percent in EAP), and much smaller than the LAC's share in world remittances of 15 percent. Digital remittances are primarily offered by global online money transfer services *TransferWise* (a P2P remittances provider) and *World Remit* (in partnership with mobile network operators or MNOs, MTOs and banks). Meanwhile, LAC fintech remittances startups remained very minor at less than 1 percent of total startups in 2018.

Mobile Money Remittances, 2019
(Percent of Total Remittances)

South Asia	0.07
Europe and Central Asia	0.23
Latin America and the Caribbean	0.14
East Asia and Pacific	1.17
Middle East and North Africa	1.32
Sub-Saharan Africa	14.31

Sources: GSMA, World Bank, and staff calculations.
Note: Country coverage by regions is listed in Annex III.

B. Modes of Transfer

Pre-COVID, survey data for CA had consistently pointed to the dominance of physical locations and cash in originating remittances as well as country heterogeneity in the delivery methods (Martin *et al.*, 2019).[9]

- *Prevalence of traditional MTOs at origination.* 80 percent of migrants send their remittances through agent-based interactions and pay with cash. *Western Union, Money Gram* and *Ria* dominate these agent-based transactions. The financial sector has a limited role in originating remittances from the U.S., and transactions originated through digital platforms (e.g., *Xoom*) remain still nascent.

- *Country heterogeneity in the delivery methods.* The financial sector still retains an important market share in the payout, as almost half of remittances are received directly through bank accounts or cashed out at bank branches. The other half is delivered through traditional chain stores and MTOs, who have entered into alliances with local retail stores or local transfer companies to gain market penetration. Country heterogeneity in delivery modes owes to idiosyncratic factors. For example, recipient countries with large banking geographical outreach (El Salvador) rely relatively more on the financial system for a payout. *Xoom* and *Remitly* offer cash pick-up in chain stores (like *Elektra* in Honduras and Guatemala, or *Super Selectos* in El Salvador), in microfinance institutions (*MiCoope* in Guatemala, *Fedecredito* in El Salvador, and *Intibucana* in Honduras), or offer cash home-delivery (Dominican Republic).

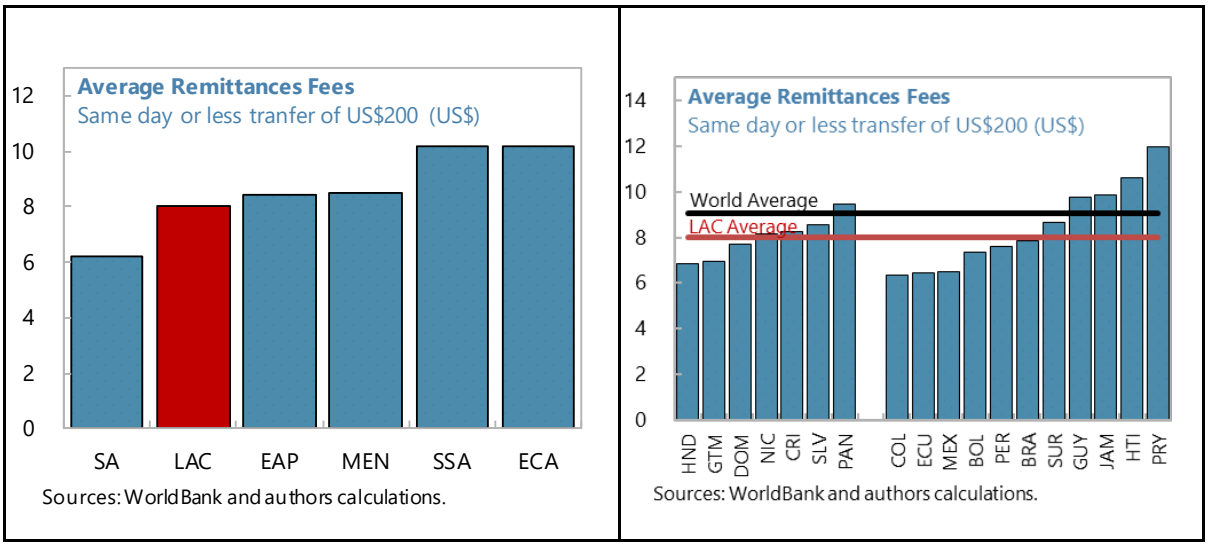
[8] Launched in 2007, mobile money remittances started to connect Kenyan immigrants in European countries to their home families. In 2018, there were more than 90 countries, and 184 country corridors, where mobile money was used to send and/or receive remittances. Unlike in Africa and Asia, mobile payments still are at a nascent stage in LAC and CA.

[9] Direct data on market shares, by either operators or transfer modes, are not available for CA.

Overall, the remittance industry has been slow in embracing digitalization. Although traditional cash-based remitters have diversified into digital transfers to better satisfy their customers' needs, digitalization has been impaired by inadequate market competition and behavioral inertia (Section VII.A). More recently, the advent of COVID-19 has prompted a shift in customers' and governments' preferences towards digital remittance and payments, spurring the transformation of the industry as a result (Section VII.C).

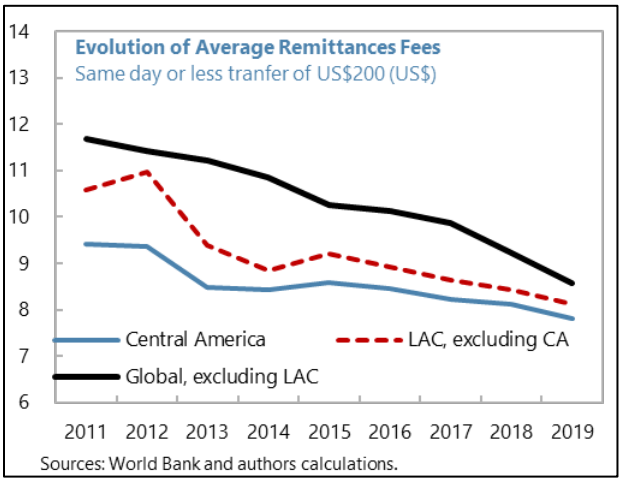
C. Remittances Costs

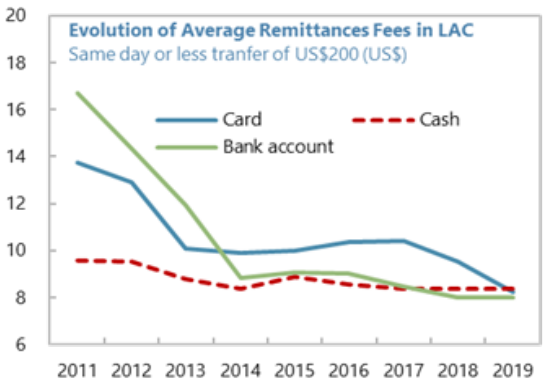
Unlike for operators' volumes and market shares, there is available and comparable data for remittance costs across world sample regions. Those costs vary depending on several dimensions such as speed, mode of transfer, amounted transmitted, or size of the corridor (for an analytical approach, see Section V). For simplicity, this section focuses on a US$ remittance transfer in the same day or less—the most prominent type of transfer.

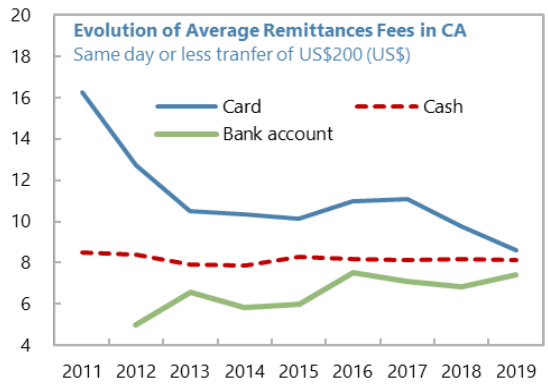


The 2019 average fee for a US$200 transfer to both LAC and CA is the second lowest worldwide behind SA. Within LAC, average fees were highest for transfers to Paraguay, twice as much as for low-fee transfers to Colombia, Ecuador and Mexico. Average fees for transfers to CA are lower than for LAC (but still higher than for those directed to Mexico) reflecting the dominance of the less costly cash-to-cash transfer mode. The large size of the remittance corridors (CA and Mexico) and financial development (Colombia and Mexico) could partly explain remittances' low costs (Section VI). Despite being relatively low, average remittances fees in all LAC countries remained above the SDG goal of 3 percent (or US$6 for a US$200 transfer).

The average fee for a US$200 transfer to both LAC and CA had been gradually falling over the past decade in tandem with the raising number of RSP, both traditional and fintech, and tighter competition. This mirrors a global trend of declining remittance costs as digital operators entered the market (see Box 1 for mobile money providers in particular). Over the past decade, the average fee fell by 21 percent in LAC and 17 percent in CA, somewhat below the 26 percent world decline, given their lower initial costs. Within LAC, the fall in remittance fees was driven by Bolivia, Colombia, and Paraguay. By modes, the decline in the card mode of transfer was widespread in LAC and particularly marked over 2011–13 (more than 30 percent) and 2017–2019 (20 percent). Starting from already low levels in 2010, those fees charged for cash remittances remained relatively unchanged in LAC and CA during the same period.



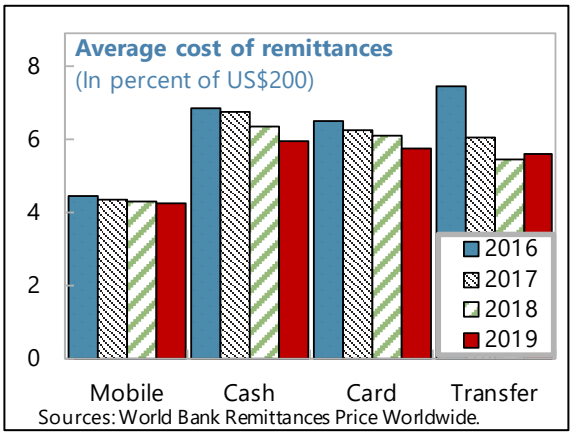




Box 1. Mobile Money Providers and Remittances Costs

The cost of sending remittances in 2019 stood at US$30 billion globally, or 7 percent of total remittances. Remittances costs worldwide have been declining since 2016, coinciding with the growing presence of mobile money RSPs and the following cost developments in the industry:

- *Mobile money RSPs would seemingly increase the degree of competition in those corridors where they operate* (GSMA, 2016). The cost distribution for corridors with mobile money RSP shows a leftward shift of the same distribution for corridors without mobile money RSP (box Figure 1). For a US$200 delivery, the differential cost between corridors with and without mobile money services providers was the most pronounced for bank transfers, and the least marked for cash remittances—the riskier mode of transfer given the difficulty to verify identity and comply with KYC and AML/CFT regulations.



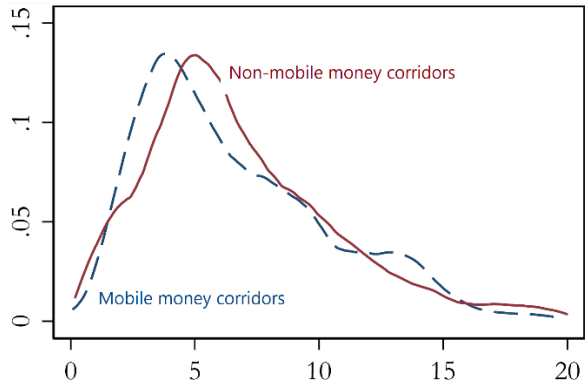
Sources: World Bank Remittances Price Worldwide.

- *In those corridors with mobile money operators, the cost of traditional RSP providers would have proved elastic to that of mobile money RSP.* It fell, on average, by 30 cents to every 10-cent reduction in mobile money RSP costs over 2016–19. Such decline was most pronounced for bank transfers but was also apparent for the cash and card modes. Even so, there remained a sizable cost gap in 2019 between traditional delivery modes and mobile remittances for a US$200 delivery.
- *The share of corridors with volume-differentiated fees has decreased over the past three years.* While price differentiation remains between the two most common transfer amounts of US$200 and US$500, the share of corridors applying volume-differentiated fees over 2016–19 declined from 39 to 32 percent for cash corridors, and from 37 to 21 percent for non-cash corridors.

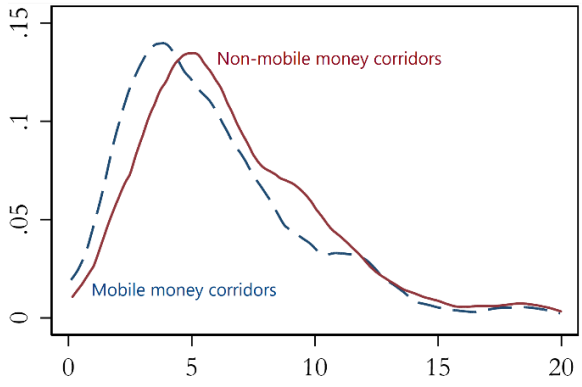
Box Figure 1. Global Cost Distribution for Remittances Transfer by Mode, 2017 and 2019

(US$ 200 transfer, one day or less)

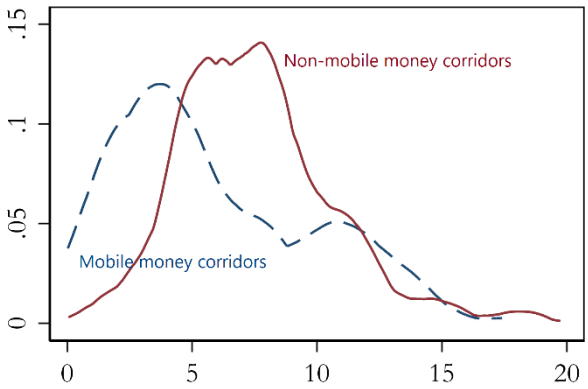
Cash, 2017



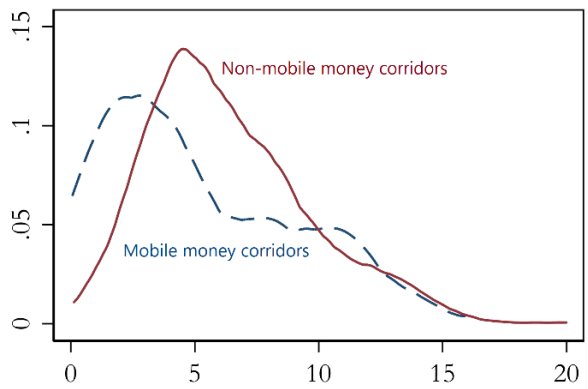
Cash, 2019



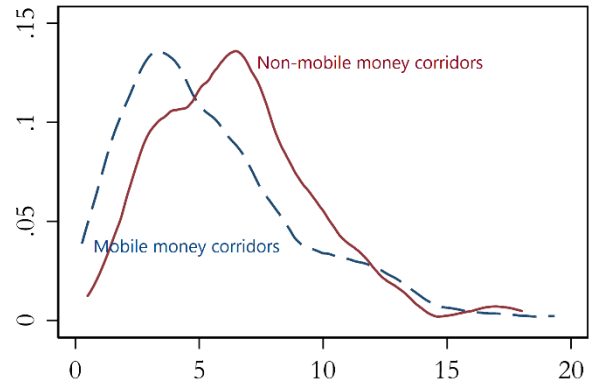
Card, 2017



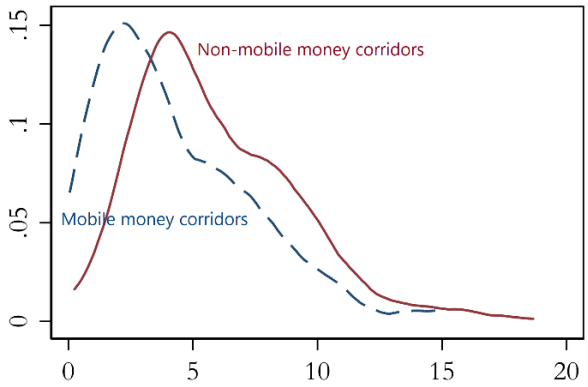
Card, 2019



Bank Transfer, 2017



Bank Transfer, 2019



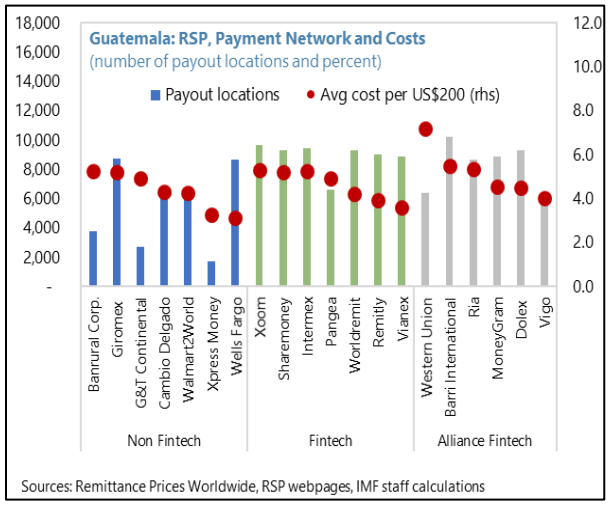
Sources: World Bank Remittances Price Worldwide and author calculations.

Note: The sample includes 354 corridors, of which 56 with mobile money providers and 298 without. The sample split by region and type of corridor is as follows (first/second number indicates corridors without/with mobile money providers): East Asia and Pacific 74 (56/18); Europe and Central Asia 50 (50/0); Latin America and Caribbean (41/0); Middle East and North Africa 37 (35/2); South Asia 68 (55/13), Sub-Saharan Africa 84 (61/23).

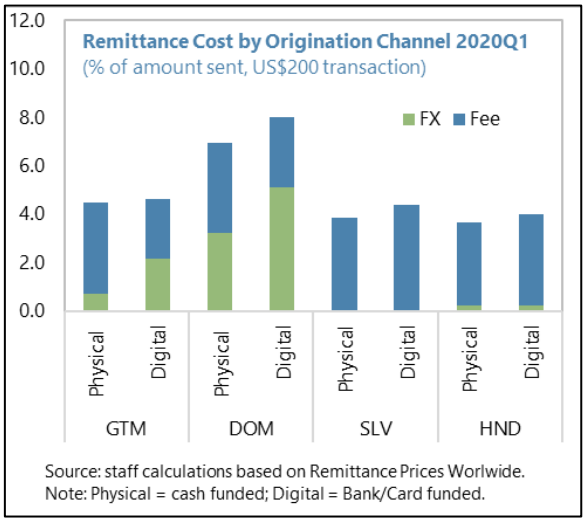
Fintech remittances in the region do not necessarily cost less:

- A survey-based study (Martin *et al.*, 2019) covering selected U.S. corridors to LAC and CA countries found that, initiating a remittance in the U.S. towards the Dominican Republic and El Salvador using cash at a brick-and-mortar location is cheaper, on average, than originating it online (or with a mobile app) and funding through a bank account. The opposite holds for transfers to Mexico and Colombia, although the cost advantage of digital channels over brick-and-mortar locations can be quite small.

- For illustrative purposes, we collected information on the pay network and associated costs of each operator in Guatemala for a US$200 transfer across all modes. The sample includes 159 thousand payout points in 2019 and comprises seven fintech operators, seven non-fintech operators, and six hybrid operators (text chart). The average cost of sending remittances to Guatemala was 4.7 percent in 2019 overall, and 4.3, 4.6, and 5.2 percent for non-fintech, fintech, and hybrid operators, respectively. There is a wide range of prices for both online and brick-and-mortar origination. Amongst non-fintech operators, *Wells Fargo* offered the lowest average cost (3.1 percent through Bank account transfer) and *Western Union* the highest (7.2 percent), although the cash option was much cheaper (4.6 percent).



- By *cost components*, preliminary findings show that, for those CA countries where the FX margin plays a role such as Guatemala and Dominican Republic, digital providers hold a comparative advantage over cash intensive traditional MTOs in the *fees* offered at origination, whereas the latter are most competitive in the FX rate offered at the payout. Alliances between traditional MTOs, for the most part long in dollars with physical agents and having ample liquidity in local currency, would allow for favorable FX rates passed on to remittance recipients. In those CA countries that are dollarized (El Salvador) or have a crawling peg arrangement (Honduras), traditional providers offer more competitive fees than digital operators.



V. EMPIRICAL ANALYSIS OF REMITTANCE FEES' DRIVERS

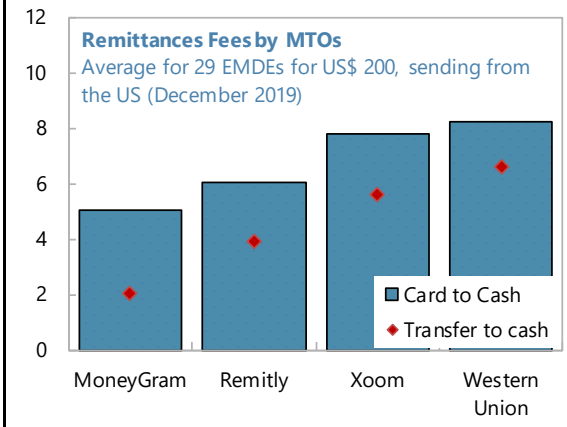
While remittance fees to CA countries are lower than in other world regions (Section IV), they still remain above the SDG goal of 3 percent, or US$6, for a transfer of US$200. Earlier studies had found economies of scale and financial development in recepient countries as two important drivers of remittance fees (Freund and Spatafora, 2005; Bettin *et al.,* 2014; and Beck, 2009). Berkmen and others (2019) further pointed to inadequate financial sector competition in the recipient countries as one limiting factor in lowering remittances fees.

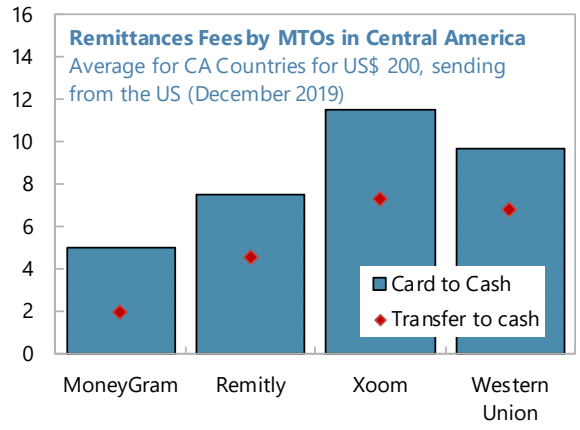
To further explore the role of these and other drivers in determining remittance fees, we investigate firms' fees setting using a sample of emerging markets that includes CA countries. Specifically, we focus on remittance fees set by three operators—one traditional MTO, *Western Unio*n, and two digital operators, *Xoom* and *Remitly*. The sample covers 31 corridors (of which 15 LAC corridors) originating from the US. The analysis considers two modes of transactions, card-to-cash and bank transfer-to-cash, for both a US$200 and a US$500 remittance.

Our results further show that all three firms charge fees that are differentiated by the remittance amount and mode (see Annex IV). Furthermore, there is evidence that remittance companies differentiate fees in response to competitors' fees, the size of the corridor, and the level of financial development and overall competition in the host and recipient country (for detailed regression results, see Table A.IV.1– A.IV.6, Annex IV). In particular, regressions point to three systematic findings: (i) there is strong evidence that remittance fees are positively associated with competitors' fees, with the elasticity being generally higher for card-to-cash than for bank transfer-to-cash remittances; (ii) there is some evidence that higher remittance corridors have lower fees, pointing to economies of scale in remittance transfer;[10] and (iii) there is some evidence that comparatively higher financial development (relative to the global average) and competition[11] are associated with lower fees. Specifically, an improvement in the financial system development index by 10 percent could allow for a reduction in remittance fees from 2 to 3 percent across the three firms.

[10] The presence of economies of scale in the remittance industry could in turn explain markets' segmentation between firms.

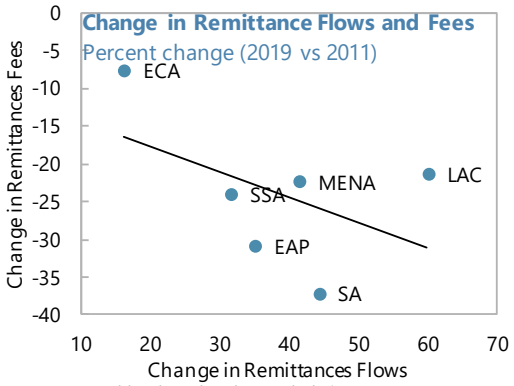
[11] Fees differentiation in the U.S. remittance industry, both by traditional and new fintech firms and across transaction modes, suggests that higher competition could bring about lower remittance fees.



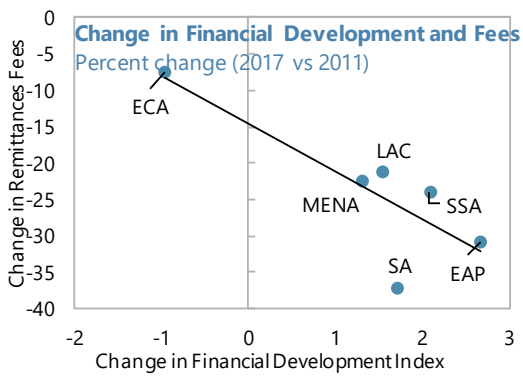


Source: Authors' data collection from market operators.
Note: EMDE includes ARG, BGD, BOL, CHL, COL, CRI, DOM, ECU, SLV, GTM, HND, IDN, JAM, KEN, MEX, NIC, NGA, PAK, PER, PHL, ROM, RUS, TUR, UKR, VNM, ZAF, LKA, THA, ARE. CA includes HND, DOM, NIC, SLV, GTM, CRI.

Overall, the main policy implications emerging from our empirical analysis are that remittances-receiving countries, both in CA and elsewhere, could further lower remittance fees by increasing competition in the financial sector, deepening financial development, and expanding financial inclusion.



Sources: WorldBank and authors' calculations.
Note: . EAP = East Asia Pacific; ECA = Europe and Central Asia; LAC = Latin America; MENA = Middle East and North Africa; SA = South Asia; SSA = Sub-Saharan Africa.



Sources: WorldBank and authors' calculations.
Note: . EAP = East Asia Pacific; ECA = Europe and Central Asia; LAC = Latin America; MENA = Middle East and North Africa; SA = South Asia; SSA = Sub-Saharan Africa.

VI. REMITTANCES AND FINANCIAL INCLUSION IN CA

It has been well documented that remittances can enhance the financial inclusion of migrants' families. Using a panel of 109 countries over the period 1975–2007, Aggarwal *et al.* (2011) find that remittances are positively and significantly correlated with credit- and deposit-to-GDP ratios. Using a large sample of countries over the period 2004–17, Tu *et al.* (2019) find that higher remittances broaden financial inclusion and economic development in middle-income countries. In parallel, the literature has also found evidence of a positive association between traditional, and more recently digital, financial inclusion, and growth. Sahay *et al.* (2015a) and Čihák and Sahay (2020) show, for large country samples, that both financial access and financial deepening support growth

and lower income inequality, with limited negative externalities on financial stability provided that the regulatory environment is sound. Dabla-Norris *et al.* (2015) and Wong and Li (2018) document the growth-enhancing and inequality-reducing effects of financial inclusion for the Latin America and the Caribbean regions, respectively. Furthermore, Sahay et *al.* (2020) document positive effects of digital payments on growth through lower transaction costs and higher liquidity and creditworthiness.

Is there potential for digital remittances to enhance the financial inclusion of remittance-recipient populations in CA? To address this question, this section first explores the extent of financial inclusion amongst migrants' families in the four largest CA remittance-receiving countries (El Salvador, Guatemala, Honduras and Dominican Republic). To do so, we investigate those attributes that make households more prone to receiving remittances while also reducing the odds of financial inclusion. For those vulnerable groups, digital solutions that overcome challenges related to reach can potentially enhance their financial inclusion.

Drawing on an emerging literature (see, e.g., Allen *et al.*, 2016, Clamara *et al.*, 2014), we estimate two *probit* regressions, one on the probability of receiving remittances based on households' characteristics (household level survey data, 2016), and a second one on the probability of financial inclusion based on individuals' characteristics (Findex data, 2017):

$$Remittance\text{-}receivers_i = \alpha + \beta X_{i+} \mu_i \qquad (1)$$

$$Account_i = \alpha + \beta X_{i+} \mu_i \qquad (2)$$

$Remittance\text{-}receivers_i$ is a dummy variable which takes value of 1 if the household receives remittances and 0 otherwise. $Account_i$ is a dummy variable which takes value of 1 if an individual has an account (at a financial institution, post office, or elsewhere) and takes value of 0 otherwise.[12] Vector X_i comprises a core set of socioeconomic characteristics in both equations, which is in equation (2) if further expanded to include households' remoteness relative to financial institutions and the use of mobile phone.

We estimate the *probit* regressions for El Salvador, Guatemala, Honduras, and the Dominican Republic.[13] We follow Bui (2015) and Randazzo and Piracha (2019) and use those variables possibly influencing the likelihood of remittances (Table AII.1–A.II.2, Annex II): (i) households' size; (ii) households' head education and employment status; (iii) households' income level and diversification; (iv) the presence of neighbor remittance-recipient households (agglomeration effects); and (v) a suite of interaction terms.

[12] Having access to a bank account is used as a proxy for financial inclusion, broadly defined as the ability to access financial services. It is important to note that such financial access is a necessary but not sufficient condition for financial inclusion. Our study focuses on the financial access component given lower data coverage for broader financial inclusion series.

[13] Nicaragua is excluded due to lack of household survey data.

Our empirical findings suggest that the chances of receiving remittances are higher in the rural households where head is a young and educated woman. Poverty and network effects also play a role in households' self-selection for migration (Table AII.3, Annex II). Specifically:

- *Households' head personal and location characteristics*. Woman-headed households are more likely to receive remittances (by 13, 8 and 7 percentage points in Guatemala, El Salvador and Dominican Republic, respectively) as compared to their male counterparts. This likely reflects women's dependency on remittances predominantly sent male migrants. Rural households are more likely to receive remittances (by 4 and 8 percentage points in Guatemala and El Salvador, respectively) as compared to their urban counterparts. The older the households' head, the lower the chances of receiving remittances in El Salvador and the Dominican Republic.

- *Households' head education and employment status*. In all countries, households' heads with primary education are less likely to receive remittances relative to those with middle and university schooling. Chances of receiving remittances are higher for those heads who are unemployed in all countries.

- *Households' size and income*. Remittance-receiving households tend to be smaller in size in El Salvador, Dominican Republic and Honduras. Households with more diversified sources of income have more chances to receive remittances.

- *Agglomeration effects*. Having remittance-receiving neighbors somewhat increases the chances of receiving remittances in Dominican Republic, El Salvador, and Guatemala.

Attributes that make households more prone to receiving remittances also reduce the odds of financial inclusion (Table AII.4, Annex II). The odds to be financially included are higher, on average, for the male individuals of old age in urban areas. Less educated and younger individuals are more likely to be excluded from the financial system. These findings are in line with Brown *et al.* (2013) and Joshi and Shrestha (2018). Specifically:

- *Individuals' personal and location characteristics*. Individuals living in rural areas are less likely to have access to a bank account in all four countries. Women have less chances to access an account in the Dominican Republic (the opposite holds for Honduras), although those chances increase for poor women (the interaction of female and poor class is positive and significant). The older the individuals the higher the chances of having an account in El Salvador and Honduras, although such probability is reduced for the less educated individuals (the interaction term between age and primary education is negative and significant for those two countries).

- *Individuals' education and employment status*. Individuals with primary education are less likely to open an account at a financial institution relative to those with higher education levels (by 39 and 32 percentage points in Guatemala and the Dominican Republic, respectively). Being unemployed reduces the chances of having an account at a financial

institution (by 16 percentage points both in Guatemala and El Salvador, and by 12 and 18 percentage points in Dominican Republic and Honduras, respectively).

- *Use of mobile phones*. Individuals who own mobile phones are more likely to have access to an account at a financial institution in all four countries. Previous studies had documented positive effects of mobile penetration on deposit taking and access to credit for households that would be financially excluded otherwise (Andrianaivo and Kpodar, 2011 and 2012). Higher mobile phone diffusion reduces users' costs of distance and time to physical branches and facilitates data collection for the assessment of credit worthiness and monitoring.

VII. REMITTANCES DIGITALIZATION IN CA: COUNTRY CASE STUDIES

A. Remittances Digitalization: Supply, Demand, and Regulatory Conditions

The evidence provided in Section VII.B suggests a low use of digital platforms for remittances origination and payout in CA. This section sheds light on possible impediments to the digitalization of remittances from a threefold perspective, technology conditions, the consumers' digital uptake, and the regulatory environment (Figure 2). The discussion primarily focuses on the digitalization of the capturing and disbursing of remittances. While fintech innovations on the settlement and messaging segments have a great potential to bring competition to the industry and affect its cost structure, sparse information on the messaging and settlement segments for CA makes it difficult to discern the transformation underlying those back-end processes at this stage.

Technology *availability* does not seem to represent an impediment to remittance digitalization (Figure 2, top charts). At origination, the use of smartphone is widespread amongst Hispanic migrants (Martin *et al*., 2019; Pew Research Center, 2015) and the principal means of accessing internet for those Hispanics residing in the United States. On the receiving end, mobile and 3G network coverage match the coverage in LAC for most CA countries. Despite relatively favorable technology availability, the consumers' digital *uptake* of remittances is moderate, reflecting primarily a combination of behavioral inertia and/or informal employment status at origination, and inadequate financial literacy on the receiving end.

- *At origination,* only 20 percent of migrants use online banking platforms, with the odds of originating remittances through a digital channel being higher when senders are paid into a bank account. For physical senders, routine-seeking and cognitive rigidity (Rinehart *et al*. 2018; Kosse and Vermeulen, 2014), coupled with a small cost differential between non-digital and digital channels (Section VII.B), could explain a slow shift to remittance digitalization.

- *On the receiving end,* many people in CA remain unconnected or under-connected (Figure 3, middle charts), whether due to inadequate financial literacy, expensive and/or low-quality internet service. Over two thirds of the population in Guatemala, Honduras, and Nicaragua, and over a third in El Salvador and Dominican Republic, is yet to experience the mobile internet. In addition, as already suggested in Section VI and Annex II, the age and education of remittance recipients may also determine the uptake of technology.

An enabling regulatory environment is positively associated with mobile financial services (Global System Mobile Association, GSMA, 2019; Figure 2, bottom left chart), with mobile money platforms being an early developer of fintech remittances.[14] As such, the dimensions included in the GSMA mobile money regulatory index (MMRI) broadly pertain to the digitalization of remittances. From a supply standpoint, regulations directly affect the operating costs of incumbent firms, cost barriers for new entrants, competition, and access to financial services. From a demand perspective, regulation affects the ease for new customers to enroll for mobile money and use it for remittances and related services.

There is room to further enhance the regulatory framework in CA, both to support the entry and expansion of digital providers, and to support the consumers' digital uptake. On average, CA scores poorly on the MMRI, relative to LAC and e.g. Paraguay, the latter representing a good benchmark for the region (Figure 2, bottom right chart).[15] While CA fares well on the infrastructure, agent network and consumer protection dimensions, it scores poorly on authorization, transaction limits, and KYC regulations. Key country-specific findings across regulatory dimensions include:

- Dominican Republic and Nicaragua score poorly on *authorization requirements* to provide mobile money services, including the proportionality of capital requirements.

- El Salvador and Nicaragua score poorly on *infrastructure and investment environment,* which covers sector-specific taxation, ID verification infrastructure, interoperability infrastructure, and provisions on the utilization of interest income.

- All CA countries score high on *agent network,* which covers the agents' eligibility criteria, authorization requirements and permitted activities, the overall ease for senders to exchange conventional money for e-money (cash in) and for mobile money recipients to liquidate e-money for conventional money (cash out).

- Guatemala scores poorly on *consumer protection,* which covers consumers' access to complaint procedures, providers' disclosure of price and terms of service, and provisions on safeguarding customer funds (liquidity requirements on e-money liabilities), including deposit insurance measures.

- Dominican Republic, El Salvador, Guatemala, and Honduras score poorly on *transaction limits,* which capture the proportionality of entry-level and transaction ceilings—a critical facilitator for mobile money usage. Tight transaction limits constrain the use of mobile money accounts.

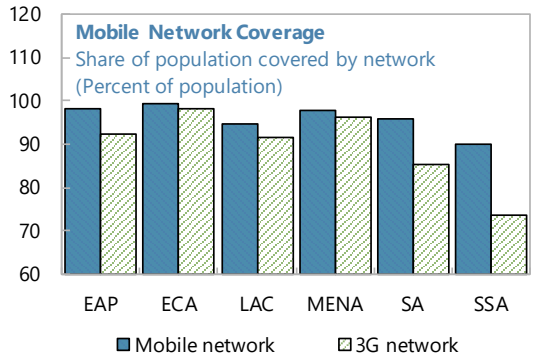
[14] The positive relation is confirmed upon controlling for other country-level factors that influence mobile money adoption, such as per capita GDP, formal account ownership, and population density (GSMA, 2019).

[15] Paraguay is a relevant point of reference for CA as use of mobile money and digital financial services is very high and it has similar characteristics as CA with low banking penetration in rural areas, high mobile phone coverage, and extensive use of cash in rural areas.

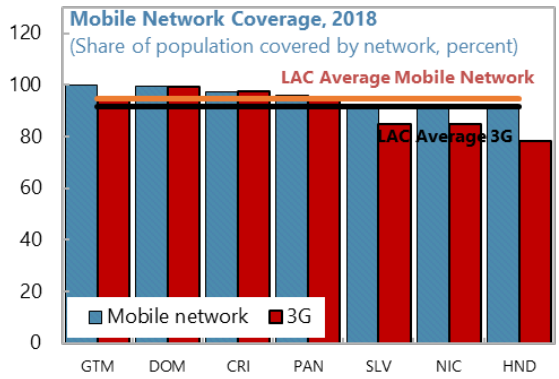
- Dominican Republic, Guatemala, Honduras, and Nicaragua all score poorly on *regulations*, which covers the proportionality of KYC and AML/CFT requirements according to differentiated users' risk profiles to encourage customers to enroll in mobile money services while preserving financial integrity.

Figure 2. Supply, Demand and Regulatory Conditions of Remittances Digitalization in CA

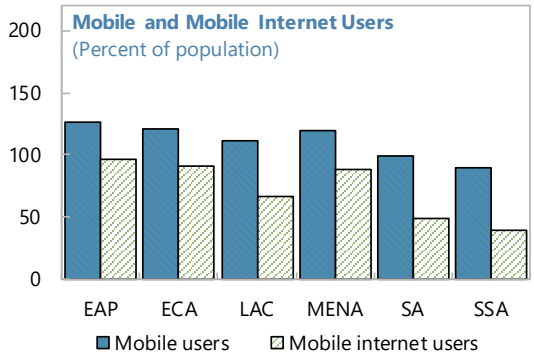
While network access seems adequate, customers' moderate uptake of digitalization and a low enabling regulatory environment may operate as impediments to remittance digitalization



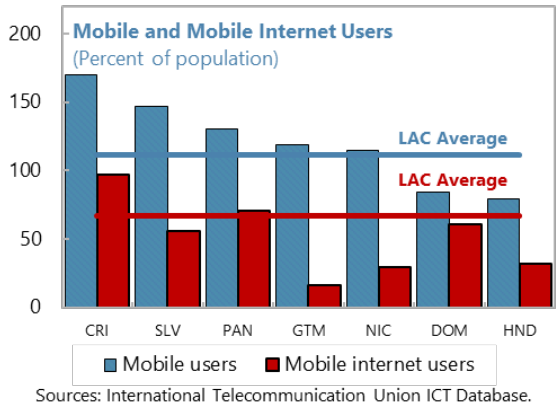
Sources: International Telecommunication Union ICT Database.



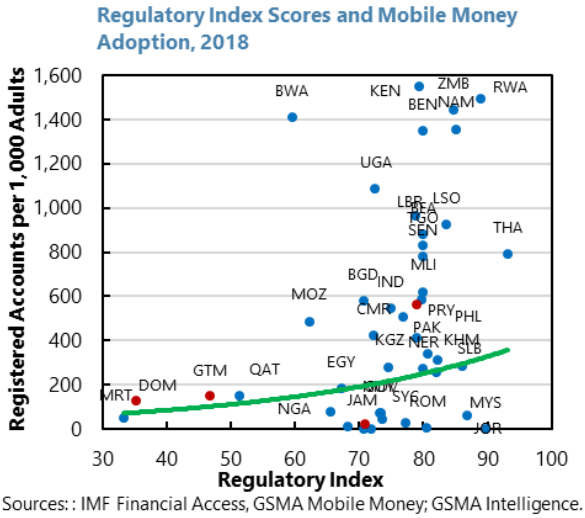
Sources: International Telecommunication Union ICT Database.



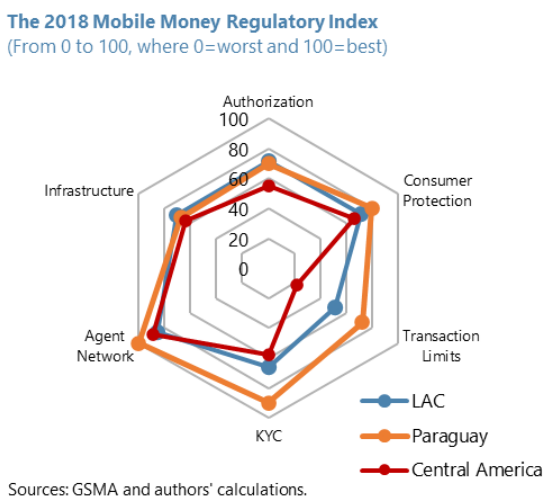
Sources: International Telecommunication Union ICT Database.



Sources: International Telecommunication Union ICT Database.



Sources: : IMF Financial Access, GSMA Mobile Money; GSMA Intelligence.



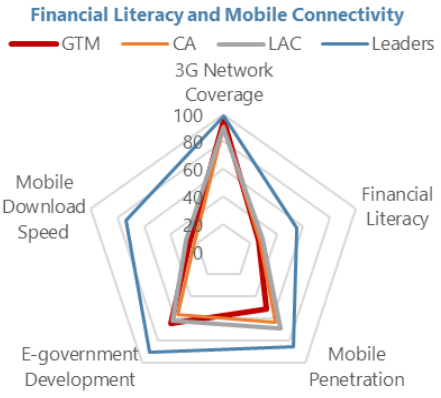
Sources: GSMA and authors' calculations.
Note: CA Average inlcude SLV, GTM, HND, and DOM.

B. Country Case Studies

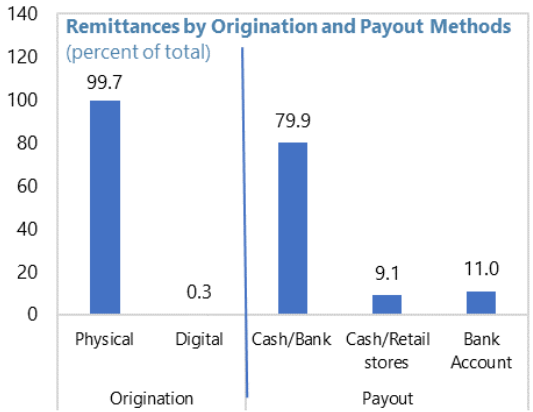
This section analyzes the supply, demand, and regulatory conditions shaping remittances digitalization in Guatemala and Honduras. Guatemala is a relevant case study given its large inflows of remittances and regulatory attempts at financial inclusion. Honduras stands out as one of the first countries in CA to provide a regulatory framework for e-money. In both countries, the cost of remittances is close to the SDG goal, with MTOs reducing their costs through partnerships. At the same time, there is room to further improve efficiency and transparency of remittances and ensure competition and innovation going forward. This could be supported by improving interoperability in both countries, introducing e-money regulation to provide a level playing field in Guatemala, and refining existing regulations in Honduras, as well as by fostering the use of digital financial services more broadly.

Guatemala

Stylized facts of the U.S.-Guatemala corridor. In 2019, remittances inflows reached US$10½ billion (over 13 percent of GDP; 90 percent from the U.S.), positioning the U.S.-Guatemala corridor as the second largest in Latin America after the U.S.-Mexico corridor. Remittances account for about 45 percent of recipient households' income (one in ten), which tend to invest a larger share of their budget in education and health relative to non-remittance-receiving households (Pérez and Valente, 2018). Despite steady progress in internet network coverage and digital public services, financial literacy and mobile penetration are still lagging. In addition, the lack of an enabling regulatory environment has hampered mobile financial services' penetration to serve the unbanked population.



Source: GSMA, S&P Global.
Leader refers to the country group with scores higher than 75 in the GSMA Mobile Connectivity Index 2018.



Source: Survey on Migration and Remittances 2016, OIM.

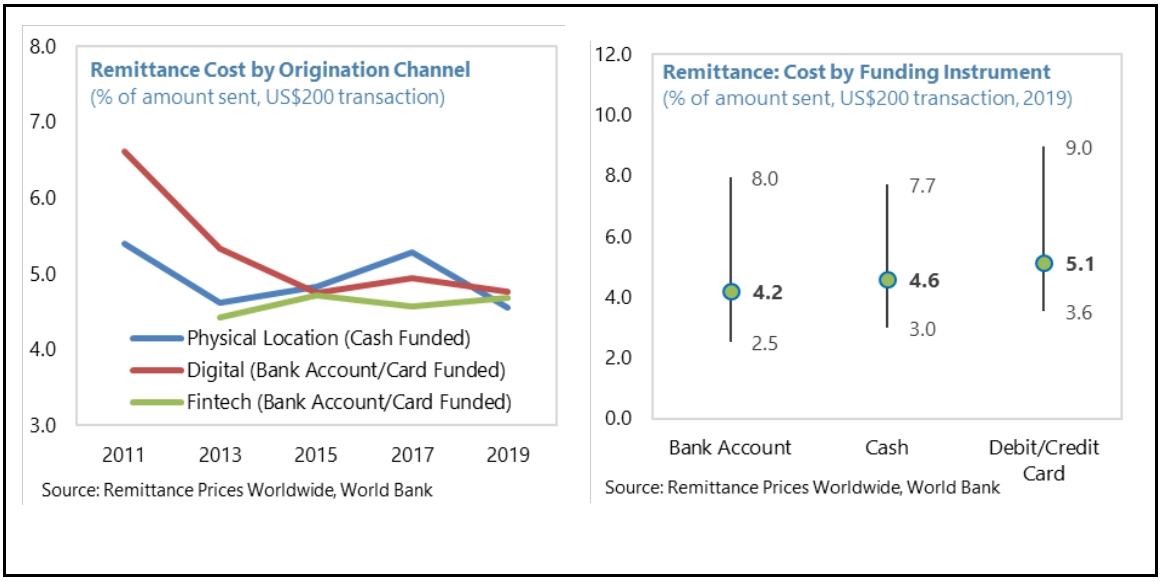
Supply conditions

- *Providers*. During the last decade, RSPs to Guatemala have diversified, including new fintech players operating through digital origination platforms. On their side, traditional MTOs have also complemented cash collection at physical locations with online platforms allowing for

credit/debit card and bank account transfers. However, remittances are still mainly originated through physical locations and the use of digital platforms is still nascent (0.3 percent of total). On the receiving side, cash pick-up dominates (89 percent of total remittances), while bank account usage remains low. The banking sector plays an important role in the payout of remittances (91 percent of the total payout, of which 80 in cash) due to its large network coverage (28 bank branches per 1,000 km^2).

Despite progress in mobile penetration, *Tigo Money* operations—Millicom's mobile financial service—are still shallow. As of June 2020, only 4.1 percent of the Tigo's customer base had active mobile financial services. Although *Tigo Money* operates in collaboration with local banks and 8 major RSPs, receiving cross-border payments through Tigo's e-wallet is still a nascent business, barely representing 2 percent of total remittance inflows.

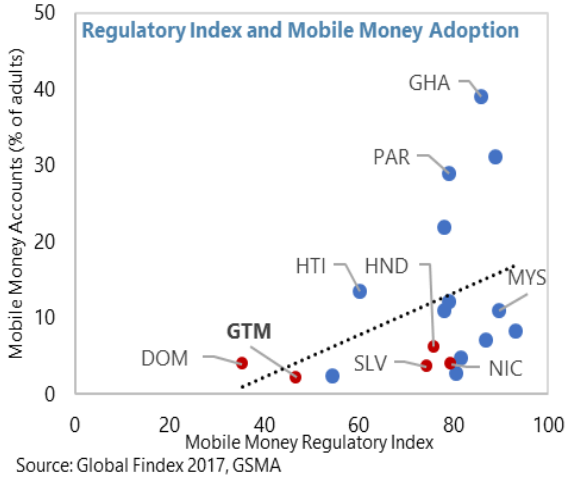
- *Costs.* In Guatemala, digital origination (mobile app or internet browser) is not yet the most cost-effective platform. Although the entry of fintech providers since the early 2010s has increased competition for digital remittances and reduced their average cost by almost 30 percent over the last decade, they are just as competitive as cash transfers. To to speed up and reduce the cost of transactions, cash intensive traditional MTOs like *Western Union, MoneyGram* or *Barri International* have gradually entered into alliances with fintech and telecommunication companies over the past decade. In parallel, those new operators that rely exclusively on digital origination platforms (*Pangea, Worldremit, Remitly*) have also partnered with local banks (*Banco de Desarrollo Rural, Banco Industrial, GyT Continental*), cooperatives (*FENACOAC/Micoope*) and retail stores *(Elektra*) to expand their payout network. These developments have gradually reduced average and dispersion of remittance transfer costs across modes in Guatemala.



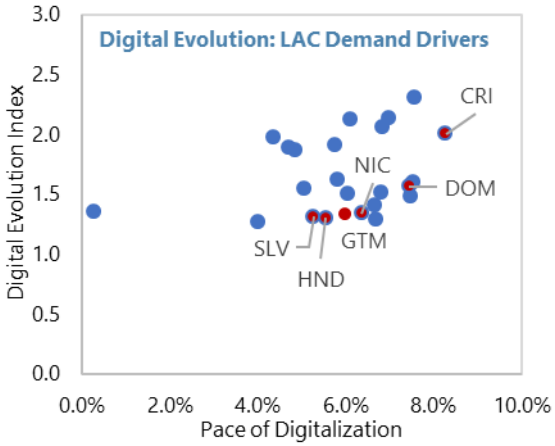
Demand conditions. As suggested by the Digital Evolution Index, the uptake of digital payments has been slow in Guatemala despite the widespread use of smartphones and access to internet, and most remittances continue to be paid in and out in cash. On the origination side, there seems to be an entrenched preference for physical agents as digital channels are not necessarily less costly lacking a proportional regulatory framework in recipient countries (below). On the

recipient side, financial literacy and financial inclusion remain inadequate, as only 44 percent of the population has an account with a financial institution or a mobile money service provider. As pointed out by the EIU's Global Microscope, progress in demand conditions have also been hindered by a relatively weak interoperability (supply factor) and an inadequate regulatory framework (institutional factor).

Regulatory environment. Guatemala has taken important regulatory steps towards financial inclusion, by allowing banks to extend financial services through agent networks, implementing a simplified regime for offering financial services to low-volume clients, and launching account-based mobile financial services. Despite these regulatory changes, mobile financial services (MFS) remain exclusively related to, and regulated as, services channeled through already supervised financial institutions, which undermines MFS' potential for financial inclusion. The low scores in the GSMA's dimensions of the MMRI indicate that Guatemala still lacks a dedicated regulatory framework for the provision of mobile money services and for the protection of customer resources. Specifically, the provision of MFS by non-financial institutions is subject to the same AML/CFT framework as for banks, weighing on the cost-efficiency of small transactions. In addition, mobile money providers have no direct access to the national payments and settlement system, hampering interoperability and other benefits for unbanked customers.



Source: Global Findex 2017, GSMA



Source: Institute For Business In The Global Context

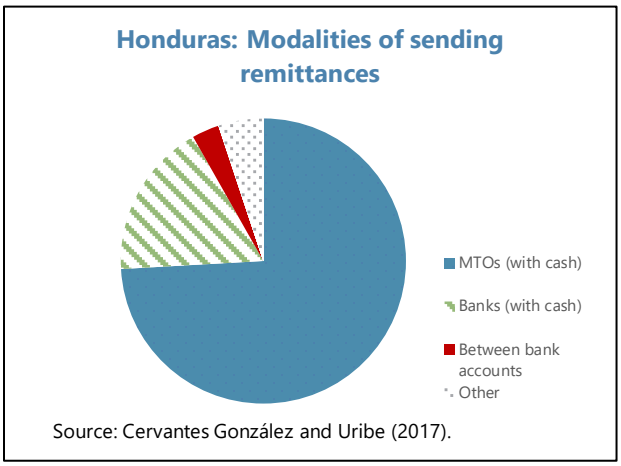
Note: The Regulatory Index and Moble Money Adoption chart includes BOL, COL, PER, NIC, PAR, HND, SLV, HTI, ARG, GTM, DOM for LAC; GHA, RWA, SLE and MDG for SSA; MYS and THA for EAP.
The Digital Evolution Index analyzes four underlying drivers of a country's digitalization, supply, demand conditions, institutional environment, and innovation and change. These drivers are divided into 12 components comprising 99 indicators. The pace of digitalization (the growth rate of a country's digitalization over 2008—17) is a lead indicator of digital potential and prospects.

Honduras

Stylized facts. In 2019, Honduras received international remittances of US$5.4 billion (22 percent of GDP; of which about 85 percent originated from the United States).

Supply conditions

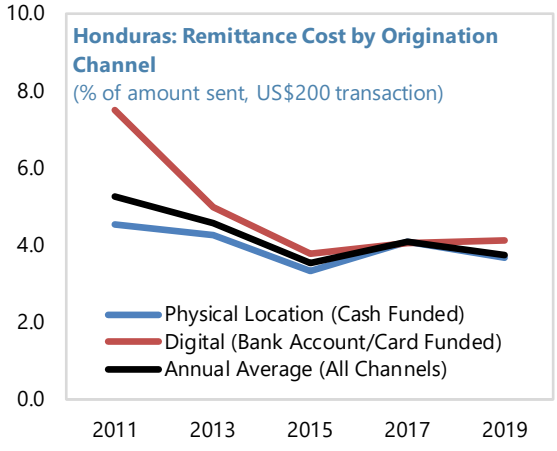
- *Providers*. Remittances to Honduras are mainly sent via traditional MTOs, followed by banks, while other modalities remain negligible. Virtually all transactions are originated in cash, including those channeled via banks (Cervantes González and Uribe, 2017).



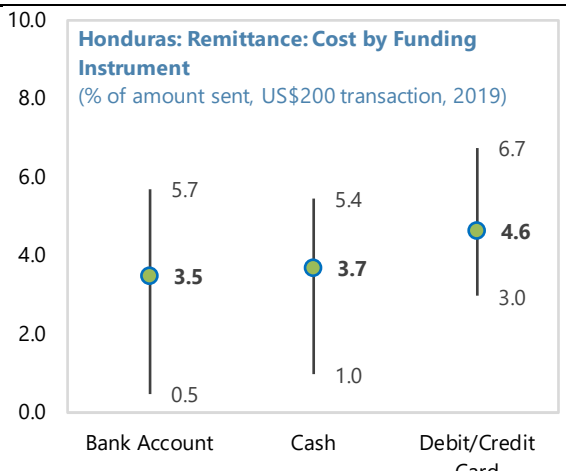
Source: Cervantes González and Uribe (2017).

As in Guatemala, traditional MTOs have diversified their options for sending and receiving remittances by strengthening their collaboration with chain stores, retail sellers, mobile money companies, etc. and by diversifying their agent networks to facilitate transfers and remain competitive.

The use of innovative financial instruments has been increasing in Honduras in recent years. *Tigo Money* started operating in 2011 and was licensed as the first mobile money company in 2019 (under the abbreviated name DINELSA); and *Tengo* was created in 2013 and offers electronic wallets.[16] Both are collaborating with banks and MTOs to allow users to receive international remittances as mobile money and in electronic wallets. In 2019, 17.6 percent of *Tigo Money* transactions and 8.8 percent of *Tengo* transactions were to receive remittances (CNBS, 2020), although they accounted for only an estimated 1 percent of total remittances altogether. In 2018, the share for *Tigo Money* transactions was 15 percent, while for *Tengo* they were included in the residual category (CNBS, 2019).[17]



Source: Remittance Prices Worldwide, World Bank



Source: Remittance Prices Worldwide, World Bank

[16] *Tengo* is supervised under the regime of non-financial professional activities (*Actividades Profesionales no Financieras Designadas*).

[17] No data is available prior to 2018.

- *Costs*. The 2019 average cost of sending remittances from the U.S. to Honduras was the lowest in Central America, at about 3¾ percent for a $200 transfer (World Bank), slightly above the SDG target. Senders have reported average costs of 2 to 3 percent during the last two years (Central Bank of Honduras' remittances survey). While the cost of digitally-originated remittances has declined significantly (about 45 percent) over the last decade, card-funded transactions remain the least cost-effective ones.

Demand conditions. Recipients of remittances are mostly financially excluded, and they are a target group of the 2015 National Financial Inclusion Strategy. Just 17 percent of remittance recipients had a checking account, while some two-thirds had a savings account or investment fund; at the same time, most recipients (92 percent) had a mobile phone, while nearly two-thirds used the internet (Cervantes González and Uribe, 2017). Hence, there is scope to strengthen the use of mobile money for remittances and other financial transactions. The EIU's Global Microscope (2019) indicates that Honduras' digital uptake could be hindered by inadequate interoperability and access to retail payment infrastructure, and vulnerable to cyber-security risks. In a context of security concerns that favors collecting money in banking institutions over more informal settings, the lack of interoperability between mobile money and banks is probably one of the biggest impediments to the expanded use of mobile money transfers.

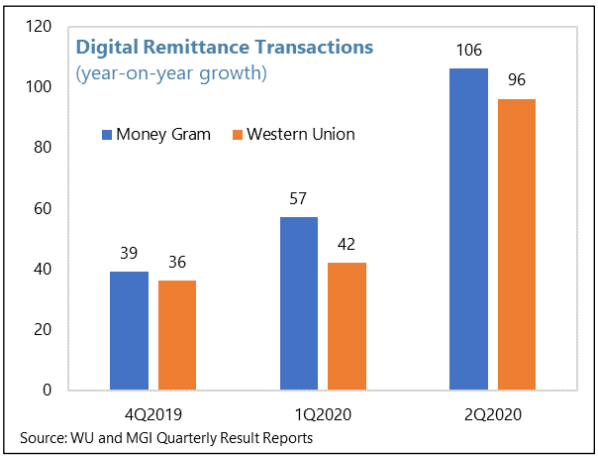
Regulatory environment. The 2016 mobile money regulation is a welcome step.[18] However, the regulatory framework is not well defined and was shaped for the operation of pioneer companies in electronic money (*Tigo Money* and *Tengo*). For example, some elements such as high requirements for agents and authorized transactional centers (which exclude small informal merchants as distributors) and the tax implications from the definition of electronic money (GSMA, 2016) could constrain its scope to increase financial inclusion. The high minimum capital requirement (30 million Lempiras, about US$1.2 million) could also be a barrier for new entrants. Honduras' transactional limits for mobile financial services are set low in global perspective (currently at 30,000 Lempiras a month, around US$1,250, both for the maximum stock and flow). Currently, there is virtually no interoperability between mobile money and banks' payment systems.[19] To address these issues, and to more generally foster the development of innovative financial instruments and strengthen financial inclusion, including through regulatory improvements, the Central Bank and the Banking Supervisor (CNBS) are working together in various areas, including in the Financial Innovation Board, and in close collaboration with financial institutions and the private sector. One element was the creation of a Technical Committee for Innovation and Financial Technology which addresses Fintech-related issues. Expediting the approval of an updated regulation that supervises the sector more efficiently and allows for free participation of any company within the sector would support competition and foster financial innovation.

[18] Given the growing activities of *Tigo Money*, there was a need for regulation to protect consumers and prevent money-laundering. This mobile money regulation is currently under review and expected to be updated by August 2021 (https://www.bch.hn/varios/MIF/Paginas/Normativa-.aspx).

[19] At the moment, there are only a few bilateral agreements, between *Tigo Money* and Banpaís as well as *Tengo* with Ficohsa.

C. COVID-19 Pandemic Reshaping the Digital Remittance and Payments Landscape

The COVID-19 shock is reshaping the cross-border payments landscape, shaking up behavioral inertia at origination and promoting the digital uptake on the receiving end. Social distancing and mobility restrictions have forced traditional MTOs to adjust their services to satisfy their customers' pressing needs to keep sending resources to their home country. For instance, *Western Union* and *Money Gram* have recorded an unprecedented expansion of their digital channels, growing around 100 percent during the second quarter of 2020, thus accounting for around 22 percent of their total customer-to-customer revenues (versus 14 percent before the pandemic).



Governments' responses to protect households have also favored the adoption of digital payment solutions. Experiences during previous economic crises have shown that direct cash transfers can be effective in protecting vulnerable households, including those in the informal sector and poorer regions. In the context of COVID-19, cash transfers through digital payment solutions have provided a transparent, effective, and contactless alternative to mitigate the impact of containment measures. For example, in CA, Honduras and Guatemala have designed innovative solutions for supporting informal sector workers while promoting the adoption of digital payments. Honduras launched the *Bono Único* program, that provided electronically (through a mobile phone text message) vouchers of 4,000 Lempira to more than 70,000 households. Guatemala also provided through electronic transfers and tokens the *Bono Familia,* a cash transfers program of up to 2,600 quetzals directed to vulnerable households.

VIII. Concluding Remarks: Perspectives For Payments And Remittances Digitalization In CA

Traditional operators in CA have provided remittance services at competitive prices by global comparison. Nonetheless, average remittances fees remain above the 3 percent SDG, and greater competition could further decrease remittances fees, improve transparency, and reduce the time of transactions. Most importantly, digital remittances can reach remote, low-income households in a timely and secure manner, and help strengthen financial inclusion, including if accompanied by enhanced interoperability.

Despite the steady progress in mobile penetration and regulatory frameworks, CA has been slow in embracing the digitalization of payments and remittances. The COVID-19 pandemic has shaken the status quo bias and boosted the demand for digital payment services. Building on the

momentum created by the pandemic, expanding the use of mobile financial services and promoting adequate regulation—including to make digital financial services more cost-effective—could support increased remittances digitalization and financial inclusion in CA. For example, the use of digital means for social welfare payments should be maintained beyond the pandemic.

To sustain this process, regulators and public authorities should aim for easing transfers while safeguarding customer protection and financial stability and integrity (IMF, 2019). Facilitating the entry of new operators and broadening the current collaboration of telecommunication and fintech companies with banks and traditional MTOs can greatly expand the use of digital financial services and financial inclusion.

International standards can guide regulators in striking the right balance between financial inclusion and stability. Accordingly, the regulation of mobile financial services should be risk-sensitive and proportionate to low-value and high-frequency transfers, while maintaining effective safeguards and controls against ML/TF risks. Compliance with international standards can promote the access and broader use of financial services for individuals and businesses—especially low-income, unserved and underserved groups—while preserving and possibly increasing the reach and effectiveness of AML/CFT regimes.

It is expected that regulators and the industry implement risk-based and proportionate regulations in a gradual manner (FATF, 2017) and in compliance with the following principles:

- *Continuous risk assessment*. Regulators and financial providers should closely monitor the inherent risks of those financial products targeted at underserved groups and gradually ease KYC and customer due diligence (CDD) processes as warranted.

- *Risk mitigation through proper design of financial products*. Mobile financial products for entry-level customers should embed adequate mitigation measures, such as limiting the products' features or adopting a progressive CDD approach. For example, the use of digitalized remittances could be initially restricted to payment services; and accounts could have transactional limits on monthly withdrawals and/or balances depending on the scope of CDD conducted and customers' risk profiles. Additional features such as credit scoring, lending, and insurance, could be unlocked once unbanked customers enrolled under simplified KYC/CDD regimes demonstrate a low-risk track record.

- *Appropriate consumer protection*. Regulations should strengthen consumers' confidence in mobile financial services through: (i) establishing initial capital requirements; (ii) separating customers' funds from the provider's capital in trusts; and (iii) encouraging interoperability to promote competition, reduce fixed costs and unlock economies of scale (GSMA, 2017).

Key Enablers of Digital Financial Inclusion

	E-money issuance by nonbanks[1]		Use of agents[2]		Risk-based customer due diligence[3]		Consumer protection[4]	
Guatemala	2		83		1		2	
Honduras	6		100		1		2	

Notes:
[1] Indicator 2.1.3 Market entry restrictions for e-money issuers (range 0-6)
[2] Indicator 3.5 Financial outlets (agents, merchants and electronic channels) (range 0-100)
[3] Indicator 2.3.2.a Disproportionate due diligence requirements for providers serving low-income customers (range 0-2)
[4] Indicator 4.1.7.a Protection for digital financial services users (range 0-2)

Source: EIU, 2019, Global microscope.

Within these principles, national regulations should be tailored to address country-specific challenges. For Honduras and Guatemala, the two case studies presented earlier, regulatory improvements to broaden the use of mobile financial services and strengthen digital financial inclusion include regulating e-money issuance (in Guatemala), widening the scope and reach of operations (e.g., interoperability), and promoting risk-based customer-due diligence.

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Annex I. Impact of Remittances on Households' Income

This annex presents evidence for CA on the impact of remittances on income inequality. For this purpose, we use household survey data for four CA countries (Dominican Republic, Guatemala, El Salvador, and Honduras)[20] to examine the impact of remittances on households' income by splitting the sample into remittance- and non-remittance-receiving households. Within each category, we present data for households' income, size, rural/urban location, head's gender, age, and education. For each of the four countries of interest, we also generate the households' income distribution and Gini coefficients with and without remittances.

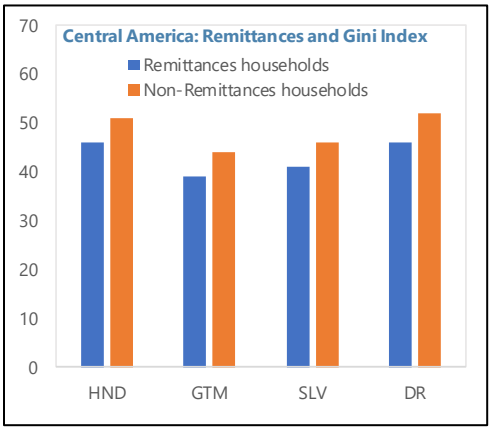
Key findings emerging on the impact of remittances on households' income comprise:

Remittances and the Households Distribution of Income
(Average monthly per capita income, US$)

	HND	GTM	SLV	DR
Remittances Households	221	233	332	212
Non-remittances Households	178	146	212	124

Source: Staff calculations based on Household Survey Data.

- *Households' per capita income*. On average across countries, per capita income in remittance-receiving households is over 50 percent higher than in non-remittances receiving households and ranges between 24 percent higher in Guatemala and 70 percent higher in Honduras. In Guatemala and El Salvador, the proportion of remittance-receiving households living in urban areas tends to be smaller than for non-remittance receiving households, while the opposite holds for Honduras and the Dominican Republic (Tables AI. 1–AI. 4).



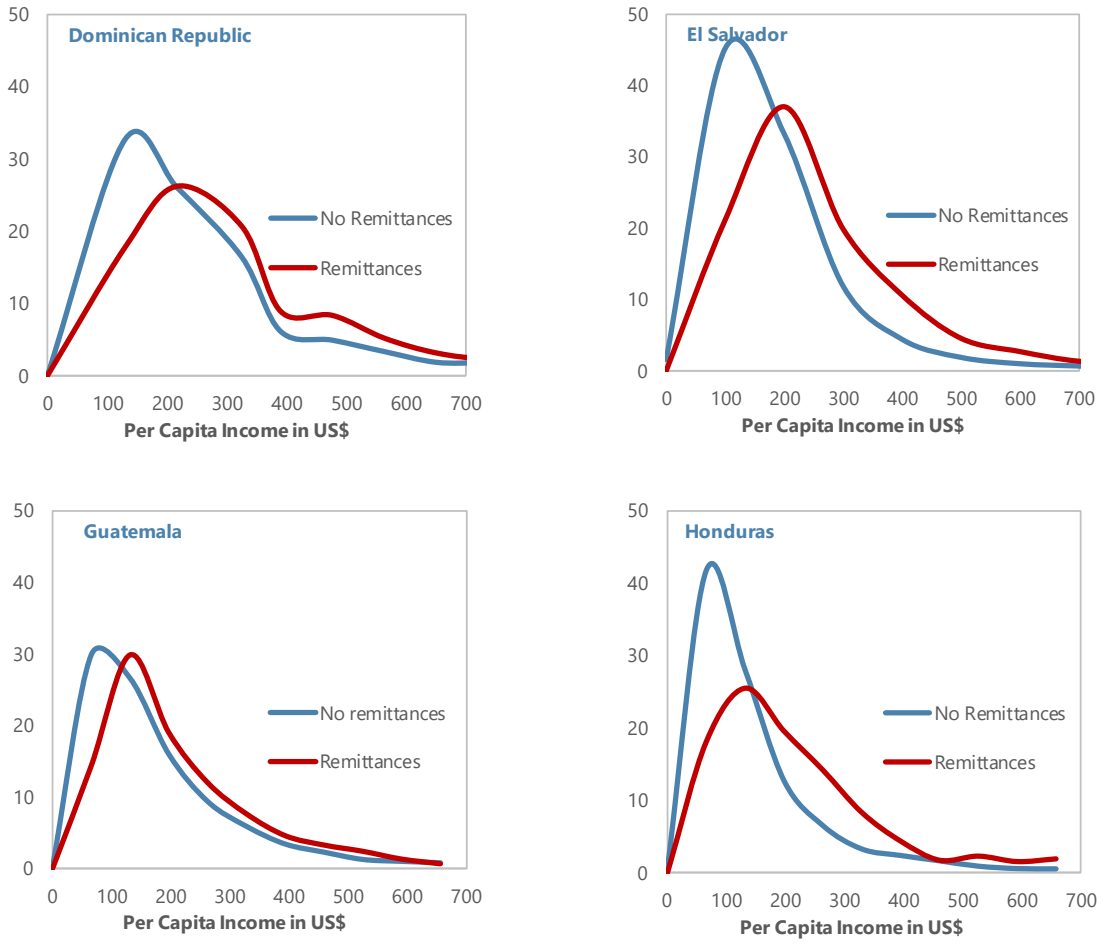
- *Poverty*. For those remittance-receiving households, the poorest quintiles benefit relatively more from remittances than the wealthier households (Figure AI.1).

- *Inequality*. In line with the findings in Vacaflores (2018), Akobeng (2016), and Adams and Page (2005), the evidence from household survey data suggests remittances reduce income inequality significantly by about 5 to 6 Gini points in all four countries.

[20] The sample includes CA countries with remittances over 5 percent of GDP. Nicaragua is excluded due to lack of data.

Figure AI.1. Impact of Remittances on the Distribution of Income

The poorest quantiles benefit relatively more from remittances than the wealthier households



Source: Author calculations based on Household Surveys.

Table AI. 1. Guatemala: Households Characteristics

	Receive remittances	Receive no remittances	Total
Mean age of Household head(years)	51.198	48.765	48.982
Household head is between 25 and 59 years old	0.631	0.641	0.640
Household head is above 59 years old	0.318	0.300	0.302
There are children below age 5 in household	0.325	0.388	0.382
There are children between 5and 15 years old in household	0.547	0.536	0.537
There are household members with primary education	0.902	0.855	0.859
There are household members with secondary education	0.570	0.563	0.564
There are household members with tertiary education	0.097	0.136	0.132
Area (Urban=1)	0.464	0.553	0.545
Mean monthly per capita income (Inc. Remittances) in quetzals	1,576.011	1,244.254	1,274.513
Remittances as percent of total per capita income (Inc. Remittances)	0.279	0.000	0.025
Observations	458	4,934	5,392

Source: IADB Household Survey for Guatemala, 2016

Table AI. 2. El Salvador: Households Characteristics

	Receive remittances	Receive no remittances	Total
Mean age of Household head(years)	56.98	50.36	51.68
Household head is between 25 and 59 years old	0.45	0.63	0.59
Household head is above 59 years old	0.50	0.32	0.35
There are children below age 5 in household	0.22	0.27	0.26
There are children between 5and 15 years old in household	0.39	0.41	0.41
There are household members with primary education	0.86	0.80	0.81
There are household members with secondary education	0.64	0.70	0.69
There are household members with tertiary education	0.23	0.34	0.32
Area (Urban=1)	0.53	0.66	0.64
Mean monthly per capita income (Inc. Remittances) in US$.	250.97	163.09	179.47
Remittances as percent of total per capita income (Inc. Remittances)	0.31	0.00	0.06
Observations	4,425	16,184	20,609

Source: IADB Household Survey for El Salvador, 2016

Table AI. 3. Dominican Republic: Households Characteristics

	Receive remittances	Receive no remittances	Total
Mean age of Household head(years)	50.65	48.78	49.05
Household head is between 25 and 59 years old	0.62	0.70	0.69
Household head is above 59 years old	0.33	0.26	0.27
There are children below age 5 in household	0.21	0.22	0.22
There are children between 5and 15 years old in household	0.40	0.35	0.36
There are household members with primary education	0.66	0.69	0.69
There are household members with secondary education	0.79	0.71	0.72
There are household members with tertiary education	0.45	0.45	0.45
Area (Urban=1)	0.72	0.66	0.67
Mean monthly per capita income (Inc. Remittances) in Dominican Peso	16,025.67	11,637.96	12,276.90
Remittances as percent of total per capita income (Inc. Remittances)	0.18	0.00	0.03
Observations	1,080	6,927	8,007

Source: IADB Household Survey for Dominican Republic, 2016

Table AI. 4. Honduras: Households Characteristics

	Receive remittances	Receive no remittances	Total
Mean age of Household head(years)	54.99	48.97	50.04
Household head is between 25 and 59 years old	0.49	0.65	0.62
Household head is above 59 years old	0.46	0.28	0.32
There are children below age 5 in household	0.33	0.38	0.37
There are children between 5and 15 years old in household	0.48	0.53	0.52
There are household members with primary education	0.91	0.91	0.91
There are household members with secondary education	0.69	0.58	0.60
There are household members with tertiary education	0.30	0.28	0.29
Area (Urban=1)	0.62	0.56	0.57
Mean monthly per capita income (Inc. Remittances) in Lempira	4,944.01	2,963.71	3,317.80
Remittances as percent of total per capita income (Inc. Remittances)	0.23	0.00	0.04
Observations	1,065	5,146	6,211

Source: IADB Household Survey for Honduras, 2016

Annex II. *Probit* Models: Data and Regression Results

A. Data

Table AII. 1. Household Survey Data Variables

Variables	Description of Variables
Remittance Receivers (dependent variable)	A dummy which takes value of 1 if the household receive remittances and 0 otherwise.
Head Female	A dummy which takes value of 1 if the household is female and 0 otherwise.
Head Age	Age in years
Head Primary	A dummy which takes value of 1 if the household head completed primary education and 0 otherwise.
Head Poor Class	A dummy which takes value of 1 if the household head is poor and 0 otherwise.
Female*Age	Interaction between Female and age head.
Female*Primary Educ	Interaction between Female and primary education.
Female*poor class	Interaction between Female and poor class
Age*Primary educ	Interaction between age and primary education
Age* Poor class	Interaction between age and poor class
Primary educ*Poor class	Interaction between primary education and poor class
Female*Age Primary educ	Interaction among female, age and primary education
Female*Age*Poor class	Interaction among female, age and poor class
Age* Primary educ Poor class	Interaction among age, primary education and poor class
Female*Age*Primary educ *poor class	Interaction among Female age, primary education and poor class
Neighbors	This variable shows if the neighbors also receive remittances
Head Unemployed	A dummy which takes value of 1 if household head is unemployed and zero otherwise.
Household Size	Provides information regarding number of people in a household
Number of income sources	Dummy variable for number of income sources. Takes value of 1 if household has one source of income, 0 otherwise.

Source: IADB Household Surveys for Dominican Republic, Guatemala, El Salvador, and Honduras (2016) and Costa Rica (2015).

Table AII. 2. Findex Data Variables

VARIABLES	Description of the variables
Account (Dependent variable)	A dummy which takes value of 1 if the individual is having account and 0 otherwise.
Female	A dummy which takes value of 1 if the individual is female and 0 otherwise.
Age	Age in years
Primary	A dummy which takes value of 1 if the individual completed primary education and 0 otherwise.
Poor Class	A dummy which takes value of 1 if the individual is poor and 0 otherwise.
Female*Age	Interaction between Female head and age.
Female*Primary Educ	Interaction between Female and primary education.
Female*poor class	Interaction between Female and poor class
Age*Primary educ	Interaction between age and primary education
Age* Poor class	Interaction between age and poor class
Primary educ*Poor class	Interaction between primary education and poor class
Female*Age Primary educ	Interaction among female, age and primary education
Female*age*Poor class	Interaction among female, age and poor class
Age* Primary educ Poor class	Interaction among age, primary education and poor class
Female*age*Primary educ *poor class	Interaction among Female age, primary education and poor class
Unemployed	A dummy which takes value of 1 if the individual is unemployed and 0 otherwise.

Source: 2017 Findex database, World Bank.

To look at the role of financial inclusion, we utilize the 2017 global Findex database 2017, compiled by the World Bank. The survey provides information regarding individuals who are having an account at a financial institution, post office, or any other place that provides financial services. 1000 respondents are randomly selected for each country to participate in the survey. The survey data suggests that (i) the share of male individuals having an account at a financial institution is larger than for females in all five CA countries; (ii) individuals with primary education are less-banked than those with secondary and tertiary education in all five CA countries; (iii) the share of those having an account at a financial institution is higher for individuals aged below 50, except for Costa Rica; and (iv) the proportion of those having an account at a financial institution is lower among individuals with low income.

B. Regression Results

Table AII. 3. *Probit* Model for Remittances and Household Characteristics

Variables	GTM	SLV	DR	HND
Head Female	0.13***	0.08**	0.07**	0.14*
	(0.04)	(0.04)	(0.04)	(0.07)
Head Rural	0.04***	0.08***	-0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.02)
Head Age	0.00	-0.00***	-0.00***	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Head Prim-educ	-0.05**	-0.32***	-0.16***	-0.21***
	(0.02)	(0.03)	(0.05)	(0.05)
Head Poor Class	-0.09	-0.37***	0.10	-0.85**
	(0.10)	(0.12)	(0.12)	(0.41)
Female*Age	-0.00**	0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Female*Prim-educ	0.05	0.17***	-0.04	0.05
	(0.04)	(0.06)	(0.08)	(0.11)
Female*poor class	-0.01	-0.20	-0.23**	0.23
	(0.06)	(0.12)	(0.12)	(0.27)
Age*Prim-educ	0.00*	0.01***	0.00**	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)
Age*Poor Class	0.00	0.00	-0.01*	0.01*
	(0.00)	(0.00)	(0.00)	(0.01)
Prim-educ*Poor Class	0.01	0.34***	-0.03	0.62
	(0.10)	(0.13)	(0.15)	(0.40)
Female*Age*Prim-educ	-0.00	-0.00***	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Female*age*Poor Class	-0.00	0.00	0.00*	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Age*Prim-educ*Poor Class	-0.00	-0.01**	0.00	-0.01*
	(0.00)	(0.00)	(0.00)	(0.01)
Female*Rural*Age*Prim-educ	-0.00	0.00	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Neighbors	0.01***	0.00***	0.00***	-0.00*
	(0.00)	(0.00)	(0.00)	(0.00)
Head Unemployment	0.06***	0.18***	0.18***	0.14***
	(0.01)	(0.01)	(0.01)	(0.02)
HH Size	-0.00	-0.00**	-0.01***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)
Income Sources	0.06***	0.08***	0.09***	0.07***
	(0.01)	(0.00)	(0.01)	(0.01)
N	5392	20609	8007	6211

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.0$.

Table AII. 4. *Probit* Model for Financial Inclusion and Household Characteristics, Findex Data

Variables	GTM	SLV	DR	HND
Female	-0.00	-0.02	-0.14*	0.16**
	(0.07)	(0.07)	(0.08)	(0.07)
Remote	-0.26***	-0.30***	-0.34***	-0.26***
	(0.04)	(0.05)	(0.05)	(0.03)
Age	0.01	0.01***	0.00	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)
Primary-Educ	-0.39***	-0.05	-0.32***	0.00
	(0.14)	(0.12)	(0.12)	(0.13)
Poor Class	-0.09	-0.24	-0.14	-0.25
	(0.16)	(0.20)	(0.17)	(0.18)
Female*Age	-0.00	-0.00	0.00	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)
Female*Prim-educ	0.22***	0.02	0.11*	-0.01
	(0.07)	(0.06)	(0.06)	(0.06)
Female*Poor Class	-0.20**	0.13	0.00	-0.01
	(0.08)	(0.09)	(0.08)	(0.08)
Age*Prim-educ	-0.00	-0.00*	-0.00	-0.00*
	(0.00)	(0.00)	(0.00)	(0.00)
Age*Poor Class	0.00	-0.00	-0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Prim-educ*Poor class	0.21**	0.05	0.08	0.13
	(0.10)	(0.10)	(0.08)	(0.09)
Unemployment	-0.16***	-0.16***	-0.12***	-0.18***
	(0.03)	(0.03)	(0.03)	(0.03)
Owns Mobile phone	0.14***	0.20***	0.19***	0.21***
	(0.03)	(0.03)	(0.04)	(0.04)
N	1000	1000	1000	1000

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Annex III. Mobile Money Remittances: Regional Coverage

Table AIII. 1. List of Countries by Region

Country	Region	Country	Region
Afghanistan	South Asia	Malaysia	East Asia and Pacific
Albania	Europe and Central Asia	Maldives	South Asia
Argentina	Latin America and the Caribbean	Mali	Sub-Saharan Africa
Armenia	Europe and Central Asia	Mauritania	Sub-Saharan Africa
Bangladesh	South Asia	Mauritius	Sub-Saharan Africa
Benin	Sub-Saharan Africa	Mexico	Latin America and the Caribbean
Bolivia	Latin America and the Caribbean	Mongolia	East Asia and Pacific
Botswana	Sub-Saharan Africa	Morocco	Middle East and North Africa
Brazil	Latin America and the Caribbean	Mozambique	Sub-Saharan Africa
Burkina Faso	Sub-Saharan Africa	Myanmar	East Asia and Pacific
Burundi	Sub-Saharan Africa	Namibia	Sub-Saharan Africa
Cambodia	East Asia and Pacific	Nepal	South Asia
Cameroon	Sub-Saharan Africa	Nicaragua	Latin America and the Caribbean
Central African Republic	Sub-Saharan Africa	Niger	Sub-Saharan Africa
Chad	Sub-Saharan Africa	Nigeria	Sub-Saharan Africa
Colombia	Latin America and the Caribbean	Pakistan	South Asia
Congo	Sub-Saharan Africa	Papua New Guinea	East Asia and Pacific
Congo, Democratic Republic	Sub-Saharan Africa	Paraguay	Latin America and the Caribbean
Côte d'Ivoire	Sub-Saharan Africa	Peru	Latin America and the Caribbean
Dominican Republic	Latin America and the Caribbean	Philippines	East Asia and Pacific
Egypt	Middle East and North Africa	Qatar	Middle East and North Africa
El Salvador	Latin America and the Caribbean	Russian Federation	Europe and Central Asia
eSwatini	Sub-Saharan Africa	Rwanda	Sub-Saharan Africa
Ethiopia	Sub-Saharan Africa	Samoa	East Asia and Pacific
Fiji	East Asia and Pacific	Senegal	Sub-Saharan Africa
Gabon	Sub-Saharan Africa	Seychelles	Sub-Saharan Africa
Gambia	Sub-Saharan Africa	Sierra Leone	Sub-Saharan Africa
Georgia	Europe and Central Asia	Singapore	East Asia and Pacific
Ghana	Sub-Saharan Africa	Solomon Islands	East Asia and Pacific
Guatemala	Latin America and the Caribbean	Somalia	Sub-Saharan Africa
Guinea	Sub-Saharan Africa	South Africa	Sub-Saharan Africa
Guinea-Bissau	Sub-Saharan Africa	South Sudan	Sub-Saharan Africa
Guyana	Latin America and the Caribbean	Sri Lanka	South Asia
Haiti	Latin America and the Caribbean	Sudan	Sub-Saharan Africa
Honduras	Latin America and the Caribbean	Tajikistan	Europe and Central Asia
India	South Asia	Tanzania	Sub-Saharan Africa
Indonesia	East Asia and Pacific	Thailand	East Asia and Pacific
Iran	Middle East and North Africa	Togo	Sub-Saharan Africa
Iraq	Middle East and North Africa	Tonga	East Asia and Pacific
Jamaica	Latin America and the Caribbean	Tunisia	Middle East and North Africa
Jordan	Middle East and North Africa	Turkey	Europe and Central Asia
Kazakhstan	Europe and Central Asia	Uganda	Sub-Saharan Africa
Kenya	Sub-Saharan Africa	United Arab Emirates	Middle East and North Africa
Kyrgyzstan	Europe and Central Asia	Vanuatu	East Asia and Pacific
Lesotho	Sub-Saharan Africa	Vietnam	East Asia and Pacific
Liberia	Sub-Saharan Africa	Zambia	Sub-Saharan Africa
Madagascar	Sub-Saharan Africa	Zimbabwe	Sub-Saharan Africa
Malawi	Sub-Saharan Africa		

Annex IV. Drivers of Remittance Fees': A Firm Perspective

A. Empirical Approach

This annex presents the data on fees charged by the three MTOs underlying the analysis on remittances fees' drivers. It also reports detailed regression findings.

To investigate the drivers of remittance fees, we start from the following reduced-form equation for an MTO's pricing strategy:

$$\ln(fee)_i = \alpha_0 + \alpha_1 \ln(amt)_i + \alpha_2 \ln(fee_c)_i + \alpha_3 \ln(remit)_i + \alpha_4 X_i + \varepsilon_i \quad (4)$$

where $\ln(fee)_i$ is the natural log of remittances fees charged by the MTO for transfers to country i, $\ln(amt)_i$ is the natural log of the amount of remittances transferred, $\ln(fee_c)_i$ is the natural log of the average fee for competitors, $\ln(remit)_i$ is the natural log of the total volume of remittances sent from the U.S. to country i, and X_i is an indicator of financial development in country i.

To capture the effect of different modes of transaction on remittance fees, we focus on two modes of transfer, card-to-cash and bank transfer-to-cash. Given the papers' emphasis on digital remittances, for each of these transfer modes, we focus on the sender's use of the agent's mobile app or website.[21] We focus on cash remittances on the receiving end given its dominance:[22]

$$\ln(fee)_i = \alpha_0 + Card_i * (\beta_1 + \beta_2 \ln(amt)_i + \beta_3 \ln(fee_c)_i) + Transfer_i * (\alpha_1 \ln(amt)_i + \alpha_2 \ln(fee_c)_i) + \alpha_3 \ln(remit)_i + \alpha_4 X_i + \varepsilon_i \quad (5)$$

Payments by card are immediate and facilitated by the traditional card brands such as VISA, Mastercard, and American Express, whereas bank account transfers usually take 0–5 business days to process and may involve different banks. To capture the effect of the different modes of transaction on the pricing strategy, we added a dummy variable in specification (5) to differentiate between these two. This way, the elasticity of remittances fees to the amount of remittances and to the competitors' fees both depend on the mode of transaction. To illustrate, for the transfer mode of transaction, those elasticities are given by:

[21] While the data presented focuses on U.S. senders and two specific channels, the operators' comprehensive global pricing varies across the channels offered, with costs associated with cash transactions being significantly different from costs related to accounts transactions. For example, Western Union's account-to-account transaction is one of the fastest growing channels, and pricing is lower, than a cash service due to greater overheads for agent oversight and settlement processes. Pricing can be influenced by multiple factors, including consumer protection costs, market distribution, regulatory structure, volume, currency volatility, and infrastructure. Pricing can also vary by customer customization, such as channel preference, transaction speed, funding method, and assistance. To help customers make informed decisions, Western Union also offers a price estimation tool on their digital channels and through their in-country call centers and retail locations.

[22] The consideration of digital remittances at the payout, particularly for LAC, would restrict the sample considerably, given their low incidence *vis-à-vis* the cash options.

$$\frac{\partial \ln (fee)_i}{\partial \ln (amt)_i} = Card_i * \beta_2 + Transfer_i * \alpha_1 \quad (6)$$

$$\frac{\partial \ln (fee)_i}{\partial \ln (fee_c)_i} = Card_i * \beta_3 + Transfer_i * \alpha_2 \quad (7)$$

The priors for the elasticities defined by equations (5), (6) and (7) are as follows: (i) the fee's elasticity to the amount of remittances transferred, $\alpha_1 + \beta_2$, is expected to be positive if larger transactions were to be more costly because of their lower frequency, higher AML/CFT regulatory costs, or inadequate competition in that market segment; (ii) the fee's elasticity to the competitors' fee, $\alpha_2 + \beta_3$, is expected to be positive and higher the more firms align their fees to peers (the greater the competition amongst firms); (iii) the fee's elasticity to the total volume of remittances, α_3, potentially capturing economies of scale in remittances transfer, is expected to be negative if firms in larger remittances corridors were to invest more to reduce their marginal costs; (iv) the sign of the coefficient, α_4, is expected to be negative if more developed financial systems in the recipient countries result in less costly remittances, *ceteris paribus* the regulatory framework; and (v) by mode, the fees' elasticities for bank transfers (both to the amount of remittances transferred and to the competitors' fees) are expected to be lower than for card transfers, because bank accounts transactions are strictly monitored, which entails longer processing on average and less variation in fees.

The data collected for the purpose of the analysis suggests that fee payments by direct debit to a bank account is less expensive than by a debit or credit card, and those fees are *higher* for CA than for the sample average (see Table A.IV.1, Annex IV for detailed data on average remittance fees charged by the three operators of interest in each of the countries).

B. Fees Charged by Selected Operators for Remittances Originating in the U.S.

Table A.IV.1 Average Fees Charged by Three MTOs, 2019
(US$200 and US$500, same day or less)

	Xoom	*Remitly*	*Western Union*
LAC countries			
Argentina	13.5	7.1	20.0
Bolivia	11.5	7.0	10.0
Brazil	6.2	4.5	5.5
Colombia	6.2	4.0	5.6
Costa Rica	16.0	7.6	5.5
Dominican Republic	9.2	7.0	8.5
Ecuador	13.0	8.5	9.8
El Salvador	13.7	8.5	9.8
Guatemala	7.0	6.6	5.5
Honduras	13.7	5.2	10.0
Jamaica	9.2	4.9	5.5
Mexico	7.0	2.0	5.5
Nicaragua	13.7	8.5	18.8
Peru	9.0	8.5	8.5
Non-LAC countries			
Bangladesh	5.7	4.0	5.5
China	12.5	4.0	28.5
India	7.0	4.0	5.5
Indonesia	6.6	7.5	5.5
Kenya	6.6	0.0	5.5
Nigeria	6.6	4.0	5.5
Pakistan	5.7	2.0	5.5
Philippines	5.5	10.2	5.0
Romania	6.4	5.0	5.5
Russia			26.8
South Africa	8.0	5.7	22.3
Sri Lanka	13.0	6.0	5.5
Thailand	6.6	3.5	5.5
Turkey		4.2	8.5
Ukraine	6.6		16.3
Vietnam	5.2	6.6	8.5
Total	9.0	5.6	9.8

Sources: *Xoom, Remitly,* and Western Union websites; and authors' calculations.

C. Regression Results

We present results for three country groupings, emerging market, LAC, and non-LAC countries. The key findings that emerge for the LAC region from this analysis are:

- *Fee's elasticity to the amount of remittances transferred,* $\alpha_1 + \beta_2$. Evidence of fee differentiation (or lack of) is weak both for cash-to-cash and transfer-to-cash.

- *Fee's elasticity to the competitors' fee,* $\alpha_2 + \beta_3$. The elasticity with respect to competitor fees is found to be significant and large, suggesting that firms operating in LAC country destinations are highly sensitive to price movements *vis-a-vis* their competitors. The estimated elasticities do not differ widely across transaction modes.

- *Fee's elasticity to the total volume of remittances,* α_3. The demand elasticity coefficient was statistically significant only for one operator. Overall, fees do not differ widely across country destinations, which suggests a weak role for economies of scale in the provision of remittances. A low demand elasticity may be indication of markets' segmentation across firms.

- *Fees and development of financial system,* α_4. There is some evidence of a link between remittances fees and:

  (i) *Banking sector concentration*. A highly-concentrated banking sector in LAC countries is associated with higher remittances fees for only one of the three companies, suggesting that that particular firm may have difficulties accessing the markets leading to an extra premium for the remittances fee.

  (ii) *Financial development*. Tables A.IV.4- A.IV.7 report results for a general index and subcomponents of the financial development index. Greater financial development) and deeper financial institutions are associated with lower remittances fees. There is some evidence that improved financial access is associated with lower remittances fees. However, the coefficients for the financial institutions development index do not seem robust across firms.

  The following caveats, related to lack of data availability, are in order when interpreting the findings presented in this section: (i) the inclusion of a larger number of MTOs, financial institutions, and fintech operators, would allow to distill more systematic differences in price setting in the industry; (ii) the consideration of time-varying data would allow to check firms' pricing strategy in response to new entrants or price changes by competitors; (iii) the above data limitations restrain the sample size for subregions, precluding an analysis for CA; (iv) the exclusion of appropriate control variables such as regulation, the extent of firms' payment network, and the efficiency of the payment systems in the receiving countries, may lead to omitted variable bias.

Table A.IV.2 Firm regressions by mode of transfer (prices)

	Emerging markets			LAC			Non-LAC		
	XOOM	Remitly	WU	XOOM	Remitly	WU	XOOM	Remitly	WU
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Card to cash (D)	-1.463	0.719	0.056	-0.712	1.190	0.480	-2.283**	-0.274	-1.182
	(0.101)	(0.496)	(0.965)	(0.483)	(0.311)	(0.691)	(0.035)	(0.867)	(0.555)
Ln(amount)*Card to cash (D)	0.259*	0.047	-0.056	0.128	0.079	-0.170	0.407**	0.221	0.186
	(0.061)	(0.777)	(0.802)	(0.487)	(0.710)	(0.492)	(0.013)	(0.379)	(0.617)
Ln(amount)*Transfer to cash (D)	0.073	0.160	0.078	0.091	0.227	0.061	0.010	0.078	0.122
	(0.495)	(0.205)	(0.601)	(0.463)	(0.103)	(0.673)	(0.935)	(0.683)	(0.590)
Ln(fee competitor)*Card to cash (D)	0.660***	0.392**	0.792***	1.136***	0.514*	0.732**	0.182	-0.077	0.557
	(0.000)	(0.044)	(0.010)	(0.001)	(0.084)	(0.037)	(0.356)	(0.792)	(0.338)
Ln(fee competitor)*Transfer to cash (D)	0.255	0.324*	0.478*	0.897***	0.673*	0.321	-0.156	-0.022	-0.031
	(0.124)	(0.091)	(0.097)	(0.006)	(0.053)	(0.366)	(0.363)	(0.930)	(0.949)
Ln(remittances)	-0.044**	-0.009	-0.046	-0.029	-0.007	-0.158***	-0.023	0.002	0.001
	(0.049)	(0.716)	(0.124)	(0.411)	(0.867)	(0.000)	(0.378)	(0.950)	(0.977)
Financial Inclusion (World Bank)	0.012	-0.142	0.213	0.063	-0.264	-0.872***	0.298***	0.118	0.525***
	(0.899)	(0.211)	(0.126)	(0.762)	(0.221)	(0.000)	(0.006)	(0.452)	(0.008)
Constant	1.251	0.670	0.370	0.108	0.317	5.634***	0.733	0.416	-0.841
	(0.103)	(0.455)	(0.738)	(0.934)	(0.823)	(0.000)	(0.395)	(0.750)	(0.606)
Number of observations	108	102	116	52	50	52	56	52	64
R-squared	0.565	0.353	0.255	0.765	0.595	0.650	0.636	0.221	0.298

Note: * significant at 10%; ** significant at 5%, *** significant at 1%. Standard errors in parentheses.

Table A.IV.3 Firm regressions by mode of transfer (prices)

	Emerging markets			LAC			Non-LAC		
	XOOM	Remitly	WU	XOOM	Remitly	WU	XOOM	Remitly	WU
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Card to cash (D)	-1.740**	0.519	0.104	-1.156	1.814*	1.429	-2.111*	-0.215	-0.887
	(0.042)	(0.604)	(0.935)	(0.225)	(0.081)	(0.285)	(0.065)	(0.895)	(0.670)
Ln(amount)*Card to cash (D)	0.327**	0.097	-0.080	0.209	-0.073	-0.414	0.366**	0.198	0.032
	(0.015)	(0.542)	(0.724)	(0.202)	(0.682)	(0.130)	(0.033)	(0.423)	(0.933)
Ln(amount)*Transfer to cash (D)	0.072	0.158	0.078	0.089	0.146	-0.042	0.003	0.078	0.122
	(0.481)	(0.184)	(0.598)	(0.439)	(0.230)	(0.786)	(0.980)	(0.685)	(0.605)
Ln(fee competitor)*Card to cash (D)	0.594***	0.307*	0.816***	1.101***	0.738***	1.106***	0.267	-0.035	0.860
	(0.001)	(0.099)	(0.009)	(0.000)	(0.002)	(0.004)	(0.197)	(0.900)	(0.147)
Ln(fee competitor)*Transfer to cash (D)	0.239	0.262	0.452	0.855***	1.144***	1.015***	-0.052	-0.011	-0.031
	(0.133)	(0.151)	(0.121)	(0.001)	(0.000)	(0.005)	(0.770)	(0.965)	(0.951)
Ln(remittances)	-0.037*	0.004	-0.062**	-0.028	0.012	-0.071**	-0.013	0.006	0.004
	(0.083)	(0.865)	(0.030)	(0.283)	(0.683)	(0.040)	(0.675)	(0.861)	(0.939)
Top 3 banks concentration ratio	0.276**	0.320**	-0.033	-0.282	0.533**	-0.359	0.254	0.160	0.506
	(0.021)	(0.020)	(0.852)	(0.153)	(0.017)	(0.165)	(0.176)	(0.528)	(0.114)
Constant	0.198	-1.128	1.474	1.548	-3.255***	2.747**	0.780	0.236	-0.678
	(0.800)	(0.213)	(0.188)	(0.145)	(0.008)	(0.047)	(0.490)	(0.877)	(0.729)
Number of observations	112	106	120	56	54	56	56	52	64
R-squared	0.586	0.367	0.229	0.779	0.646	0.495	0.563	0.235	0.231

Note: * significant at 10%; ** significant at 5%, *** significant at 1%. Standard errors in parentheses.

Table A.IV.4 Firm regressions by mode of transfer (prices)

	Emerging markets			LAC			Non-LAC		
	XOOM	Remitly	WU	XOOM	Remitly	WU	XOOM	Remitly	WU
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Card to cash (D)	-1.640*	0.678	0.302	-1.544	1.026	0.778	-2.205*	-0.382	-1.009
	(0.055)	(0.494)	(0.808)	(0.102)	(0.345)	(0.570)	(0.055)	(0.815)	(0.602)
Ln(amount)*Card to cash (D)	0.306**	0.057	-0.139	0.368**	0.114	-0.210	0.381**	0.251	0.044
	(0.021)	(0.714)	(0.529)	(0.034)	(0.567)	(0.474)	(0.027)	(0.327)	(0.900)
Ln(amount)*Transfer to cash (D)	0.065	0.148	0.071	0.117	0.196	0.006	0.008	0.080	0.124
	(0.526)	(0.210)	(0.625)	(0.300)	(0.116)	(0.971)	(0.952)	(0.676)	(0.573)
Ln(fee competitor)*Card to cash (D)	0.637***	0.369**	0.921***	0.761***	0.421	0.779*	0.236	-0.130	0.835
	(0.000)	(0.044)	(0.003)	(0.009)	(0.126)	(0.059)	(0.260)	(0.669)	(0.126)
Ln(fee competitor)*Transfer to cash (D)	0.320**	0.348*	0.542*	0.612**	0.675**	0.680*	-0.121	-0.063	-0.124
	(0.046)	(0.055)	(0.057)	(0.026)	(0.030)	(0.088)	(0.523)	(0.808)	(0.791)
Ln(remittances)	-0.042**	-0.006	-0.056**	-0.055**	-0.005	-0.097***	-0.041	-0.003	-0.024
	(0.048)	(0.779)	(0.044)	(0.042)	(0.880)	(0.007)	(0.135)	(0.918)	(0.551)
Financial Development Index (IMF)	-0.201**	-0.250***	0.249**	-0.279**	-0.269*	-0.289*	0.168	0.172	0.579***
	(0.015)	(0.008)	(0.034)	(0.024)	(0.054)	(0.084)	(0.148)	(0.344)	(0.001)
Constant	1.926***	0.995	0.373	1.706*	0.353	2.631**	1.414	0.345	-0.540
	(0.005)	(0.212)	(0.706)	(0.057)	(0.742)	(0.028)	(0.107)	(0.788)	(0.717)
Number of observations	112	106	120	56	54	56	56	52	64
R-squared	0.596	0.390	0.281	0.798	0.640	0.506	0.575	0.222	0.340

Note: * significant at 10%; ** significant at 5%, *** significant at 1%. Standard errors in parentheses.

Table A.IV.5 Firm regressions by mode of transfer (prices)

	Emerging markets			LAC			Non-LAC		
	XOOM	Remitly	WU	XOOM	Remitly	WU	XOOM	Remitly	WU
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Card to cash (D)	-1.625*	0.708	0.104	-1.282	1.541	0.605	-2.172*	-0.435	-1.325
	(0.062)	(0.489)	(0.933)	(0.194)	(0.176)	(0.608)	(0.062)	(0.791)	(0.470)
Ln(amount)*Card to cash (D)	0.289**	0.045	-0.074	0.266	-0.029	-0.178	0.379**	0.261	0.147
	(0.033)	(0.783)	(0.733)	(0.137)	(0.888)	(0.465)	(0.031)	(0.309)	(0.659)
Ln(amount)*Transfer to cash (D)	0.066	0.150	0.076	0.097	0.184	0.032	0.006	0.081	0.126
	(0.527)	(0.217)	(0.595)	(0.412)	(0.157)	(0.818)	(0.964)	(0.671)	(0.543)
Ln(fee competitor)*Card to cash (D)	0.672***	0.395**	0.806***	0.978***	0.681**	0.729**	0.240	-0.148	0.633
	(0.000)	(0.037)	(0.007)	(0.001)	(0.019)	(0.031)	(0.268)	(0.628)	(0.221)
Ln(fee competitor)*Transfer to cash (D)	0.307*	0.347*	0.466*	0.787***	0.902***	0.499	-0.092	-0.090	-0.236
	(0.063)	(0.066)	(0.095)	(0.008)	(0.007)	(0.131)	(0.640)	(0.735)	(0.595)
Ln(remittances)	-0.049**	-0.007	-0.047*	-0.044	0.021	-0.117***	-0.029	0.005	0.015
	(0.025)	(0.764)	(0.096)	(0.134)	(0.562)	(0.000)	(0.297)	(0.870)	(0.703)
Financial Institions Index (IMF)	-0.178	-0.185	0.421**	-0.174	-0.051	-0.998***	0.164	0.267	1.060***
	(0.186)	(0.242)	(0.024)	(0.462)	(0.844)	(0.000)	(0.334)	(0.300)	(0.000)
Constant	1.969**	0.821	-0.359	1.221	-0.808	5.657***	1.267	-0.076	-2.644*
	(0.016)	(0.392)	(0.755)	(0.347)	(0.590)	(0.000)	(0.215)	(0.958)	(0.099)
Number of observations	112	106	120	56	54	56	56	52	64
R-squared	0.583	0.347	0.274	0.771	0.603	0.620	0.563	0.226	0.392

Note: * significant at 10%; ** significant at 5%, *** significant at 1%. Standard errors in parentheses.

Table A.IV.6 Firm regressions by mode of transfer (prices)

	Emerging markets			LAC			Non-LAC		
	XOOM	Remitly	WU	XOOM	Remitly	WU	XOOM	Remitly	WU
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Card to cash (D)	-1.643*	0.702	-0.037	-1.067	1.228	0.841	-2.109*	-0.624	-1.473
	(0.061)	(0.496)	(0.976)	(0.279)	(0.255)	(0.511)	(0.072)	(0.699)	(0.450)
Ln(amount)*Card to cash (D)	0.290**	0.042	-0.037	0.191	0.057	-0.238	0.366**	0.321	0.179
	(0.034)	(0.798)	(0.867)	(0.282)	(0.767)	(0.370)	(0.040)	(0.212)	(0.616)
Ln(amount)*Transfer to cash (D)	0.068	0.151	0.082	0.079	0.193	0.006	0.003	0.083	0.128
	(0.519)	(0.214)	(0.570)	(0.505)	(0.124)	(0.969)	(0.981)	(0.657)	(0.560)
Ln(fee competitor)*Card to cash (D)	0.670***	0.401**	0.740**	1.138***	0.527**	0.824**	0.267	-0.255	0.570
	(0.000)	(0.040)	(0.014)	(0.000)	(0.042)	(0.025)	(0.235)	(0.413)	(0.305)
Ln(fee competitor)*Transfer to cash (D)	0.288*	0.335*	0.390	0.945***	0.758**	0.680*	-0.050	-0.150	-0.318
	(0.087)	(0.082)	(0.167)	(0.001)	(0.012)	(0.056)	(0.803)	(0.567)	(0.507)
Ln(remittances)	-0.045**	-0.002	-0.060**	-0.028	-0.005	-0.116***	-0.035	-0.009	-0.037
	(0.039)	(0.943)	(0.032)	(0.352)	(0.883)	(0.001)	(0.201)	(0.777)	(0.361)
Financial Institions Depth Index (IMF)	-0.033	-0.038	0.147*	0.045	-0.176*	-0.315***	0.034	0.162	0.373***
	(0.564)	(0.569)	(0.063)	(0.661)	(0.083)	(0.007)	(0.642)	(0.115)	(0.001)
Constant	1.390**	0.209	0.927	0.198	-0.093	2.803***	1.789**	0.617	0.683
	(0.035)	(0.785)	(0.309)	(0.824)	(0.924)	(0.008)	(0.037)	(0.593)	(0.625)
Number of observations	112	106	120	56	54	56	56	52	64
R-squared	0.584	0.354	0.264	0.768	0.631	0.568	0.555	0.225	0.318

Note: * significant at 10%; ** significant at 5%, *** significant at 1%. Standard errors in parentheses.

Table A.IV.7 Firm regressions by mode of transfer (prices)

	Emerging markets			LAC			Non-LAC		
	XOOM	Remitly	WU	XOOM	Remitly	WU	XOOM	Remitly	WU
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Card to cash (D)	-1.715**	0.617	0.013	-1.225	1.700	1.155	-2.159*	-0.242	-0.799
	(0.050)	(0.548)	(0.992)	(0.207)	(0.126)	(0.370)	(0.061)	(0.882)	(0.667)
Ln(amount)*Card to cash (D)	0.309**	0.065	-0.037	0.245	-0.074	-0.343	0.376**	0.210	0.056
	(0.024)	(0.691)	(0.866)	(0.147)	(0.703)	(0.194)	(0.030)	(0.398)	(0.868)
Ln(amount)*Transfer to cash (D)	0.072	0.156	0.078	0.093	0.178	-0.013	0.005	0.078	0.119
	(0.490)	(0.200)	(0.588)	(0.431)	(0.168)	(0.929)	(0.968)	(0.684)	(0.572)
Ln(fee competitor)*Card to cash (D)	0.630***	0.364*	0.740**	1.023***	0.760***	0.992***	0.245	-0.056	0.812
	(0.001)	(0.055)	(0.013)	(0.000)	(0.004)	(0.007)	(0.245)	(0.843)	(0.122)
Ln(fee competitor)*Transfer to cash (D)	0.237	0.294	0.451	0.826***	0.975***	0.813**	-0.083	-0.014	0.097
	(0.150)	(0.117)	(0.105)	(0.003)	(0.002)	(0.021)	(0.653)	(0.956)	(0.829)
Ln(remittances)	-0.042*	0.003	-0.043	-0.039	0.029	-0.091***	-0.025	0.009	0.038
	(0.056)	(0.893)	(0.132)	(0.144)	(0.375)	(0.007)	(0.374)	(0.810)	(0.363)
Financial Institions Access Index (IMF)	0.066	0.062	0.218**	-0.100	0.070	-0.351**	0.101	0.097	0.484***
	(0.334)	(0.467)	(0.017)	(0.400)	(0.593)	(0.018)	(0.223)	(0.449)	(0.000)
Constant	1.081	-0.128	0.442	0.873	-1.388	2.828**	1.511*	0.492	-0.811
	(0.113)	(0.876)	(0.642)	(0.330)	(0.184)	(0.011)	(0.085)	(0.697)	(0.571)
Number of observations	112	106	120	56	54	56	56	52	64
R-squared	0.574	0.325	0.272	0.774	0.604	0.552	0.562	0.221	0.400

Note: * significant at 10%; ** significant at 5%, *** significant at 1%. Standard errors in parentheses.