Send me money ASAP: Fast Payment Systems and the Cost of Remittances

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Abstract

This paper investigates the impact of Fast Payment Systems (FPS) on international remittance costs using granular data from the World Bank's Remittance Prices Worldwide (RPW) database, covering 368 corridors from 2016 to 2024. Employing a two-way fixed effects framework, the analysis finds that following FPS implementation, primarily domestic in scope, remittance costs reduced, mainly through a decrease in the foreign exchange margin charged by market operators, that usually acts as a hidden fee. The effect is more pronounced for remittances collected in cash or via mobile wallets, while no significant impact is observed for bank account disbursements. The estimated effect is significant worldwide, but its magnitude varies considerably between economic regions. Using an instrumental variable approach, the study also suggests increased competition among remittance service providers as an important factor. These findings seem to underscore the policy relevance of FPS interlinking as a strategy to extend domestic efficiency gains to the cross-border dimension of payments.

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1 Introduction[1]

In recent decades, globalisation of trade, capital and migration flows have been associated with a remarkable increase in the demand for cross-border payments all over the world. An efficient payment system at the international level is crucial not only for the functioning of the global economy, but also as a pillar of financial inclusion, financial stability, monetary sovereignty, and even geopolitics (Panetta, 2025).

In November 2020, the G20 leaders endorsed the *Roadmap for Enhancing Cross-Border Payments* to address the main challenges and frictions facing cross-border payments today, compared to domestic payments(G20, 2020). Over the last five years, several international setting bodies, notably the Committee on Payments and Market Infrastructures (CPMI), have effectively contributed to the Roadmap, by enhancing payment system interoperability and establishing sound governance and oversight arrangements.

Among the key objectives to improve the cross-border payment market, specific attention has been paid to the remittance segment, which has a direct impact on the daily lives of people and the most vulnerable population groups. Remittances are, indeed, a crucial source of income for low- and middle-income households. The Global Knowledge Partnership on Migration and Development shows that in 2023, total remittances to these countries exceeded $650 billion and, in some economies, these exchanges of funds represent more than 20% of GDP, thus acting as a vital financial lifeline due to their resilience as a form of external financing (KNOMAD, 2024).

However, the market of remittances still face significant challenges so far. First, according to estimates provided by the World Bank, fees and costs for users are disproportionally high, in some cases up to the 14% of a single transaction (World Bank, 2024), dramatically reducing the amount received by the beneficiary.[2] Second, access to remittance services can be difficult for some population groups, with delays in fund transfers and negative economic effects on recipients who rely on timely access to funds. Several migrants and their families, particularly from rural and impoverished areas, receive their income from the informal economy, can be unbanked an characterized by the lack of financial education. Finally, banks, on their own, are engaged in de-risking practices, thus closing the accounts of money transfer

[1]The views expressed in this paper are those of the authors and do not necessarily reflect those of the Bank of Italy. Any remaining errors are the authors' own.

[2]The issue of the cost of remittances has been a topic of attention by international organizations even before 2020. For example, the United Nations (UN) in 2015 set a target within the Sustainable Development Goals (SDGs) to reduce the cost of remittances to 3 percent of the value transferred by 2030. For more on UN SDGs see: https://www.undp.org/sustainable-development-goals

operators, especially those serving fragile economies, due to tighter prudential standards and more complex and cumbersome regulations, aimed at combating money laundering and terrorism financing. These factors can create barriers to entry for new remittance providers and increase compliance costs and exacerbate the problems affecting the 'correspondent banking' model where some correspondent banks hold deposits owned by foreign respondent banks and provide them with payment services.

Alternative market players, notably crypto asset providers, are in search of business opportunities and argue that distributed ledger technology can be a solution to the inefficiencies of cross-border payments by enhancing speed, reducing costs, improving transparency and traceability as well as lowering barriers lower barriers to entry for smaller financial institutions and fintech companies. However, private solutions based on crypto assets carry significant risks. Bitcoin and the other unbacked crypto assets are intrinsically volatile and akin to gambling, and even stablecoins in many cases cannot guarantee convertibility at par at all times, making them prone to runs. Moreover, major crypto providers can seek to create "closed-loop solutions" that restrict payments to users who adopt a particular payment tool. As a result, the cross-border market can be characterized by a fragmentation of payment systems.

Policy considerations suggest that an effective strategy could be strengthening the interlinking of Fast Payment Systems (FPS) that have been implemented at the domestic level in several countries. A FPS brings benefits to end users as a digital alternative to cash, which is fast, safe, and cheap, especially in countries with low adoption of debit and credit cards (Frost et al., 2024). Moreover, FPS can act as a gateway to additional financial services (Pesme, 2023) and a tool to increase financial inclusion (Aurazo et al. 2024, 2025). Interlinking essentially allows payment service providers (PSPs) participating in an FPS to send (receive) fast payments to (from) PSPs in another country's FPS without being a participant in that FPS or opening settlement accounts with correspondent banks. Therefore, supporting the development of interlinking arrangements is a simple way to expand the benefits of FPS from the domestic side to the cross-border dimension and to overcome the inefficiencies of the correspondent banking model. As a result, some policymakers argued that "FPS also have the potential to improve cross-border remittance payments" (CPMI, 2021).

This paper assesses whether, following the introduction of an FPS in a specific country, the cost of remittances reduced. To this end, we use granular information at the international level and a "two-way fixed effects" econometric strategy. Attributing a direct effect to FPS implementation can be challenging, as most existing FPSs mainly handle domestic transactions. However, this effect cannot be ruled out. In some cases - such as cross-border

payments processed by money transfer operators - the 'last mile' of the transaction may effectively be routed through an FPS. In addition, indirect mechanisms can be triggered by the adoption of an FPS at the domestic level, which leads to a decrease in remittance costs. First, FPSs improve efficiency, transparency and competition in the market and can act as a catalyst for technological innovation (Cornelli et al., 2024b). Second, in countries with FPSs has been observed a reduction in cash usage and an increase in the number and frequency of small-value digital payments (Di Iorio et al., 2025). Third, the adoption of FPS is associated with improvements in financial inclusion indicators (Frost et al., 2024). To the best of our knowledge, this is the first attempt to quantify all these impacts together and our estimation results seem to corroborate the view that the implementation of FPS is significantly associated to a decline in remittance cost.

The remainder of the paper is the following. In Section 2 we describe the data used in the empirical analysis while Section 3 discusses the methodology employed. Section 4 shows the results of our estimation also highlighting some angles related to the technology and geography. In Section 5 we investigate the transmission channel of the effect of FPS on cost of remittances and in Section 6 we tested whether our findings hold also for higher amounts. Finally, Section 7 concludes.

2 Data and descriptive statistics

Our primary source of information is Remittance Prices Worldwide (RPW), the dataset on the cost of remittances provided by the World Bank. Launched in September 2008, the RPW is used as a reference to measure progress toward global cost reduction objectives, including the commitment of the G20 to reduce the global average to 3 percent.[3]

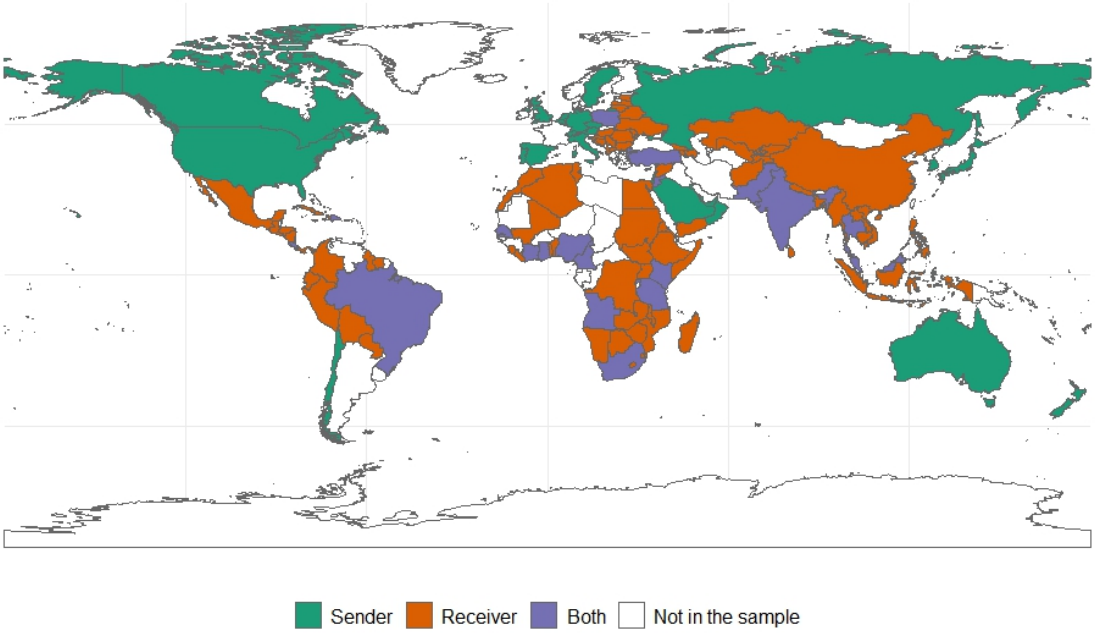
The data are quarterly and cover the period from Q2-2016 to Q3-2024. The granularity of the dataset is at the firm-level, where the firm is the remittance service provider. For each firm, the dataset includes the cost of sending the equivalent of both $200 and $500, expressed as a percentage of the amount of the transaction.[4] The total cost for remittance services consists of two main components: fees and foreign exchange margin (i.e. percentage difference between the foreign currency exchange rate applied to the transaction by the remittance service provider and the interbank exchange rate). The relative importance of the two components can vary significantly across countries.

[3]More information are available at http://remittanceprices.worldbank.org

[4]Throughout this paper, the term cost refers to the amount paid by the remittance sender, expressed as a percentage of the amount sent.

Moreover, we obtain the identity of the sending country (where money is sent from) and the identity of the receiving country (where money is sent to), which are combined to identify all remittance corridors operating at the global level.[5] In this regard, we deal with 49 sending and 105 receiving countries, encompassing 368 country remittance corridors worldwide. See Fig 1 for jurisdictions included in the dataset.

Figure 1: Countries covered by the World Bank RPW dataset



Note: the map is for illustrative purposes only and the boundaries may not reflect the actual situation.

Overall the distribution of the cost of a $200 remittance show an heavy-tailed distribution with some extreme values in both right and left tails.[6] For this reason we removed from the 1%, 0.5% for each tail, of extremest observations from the sample. Figure 2 shows the distribution of costs before and after the trimming procedure. After removing observations related to extreme costs we ended up with a dataset consisting of 182825 observations of which 94 show a small negative value.

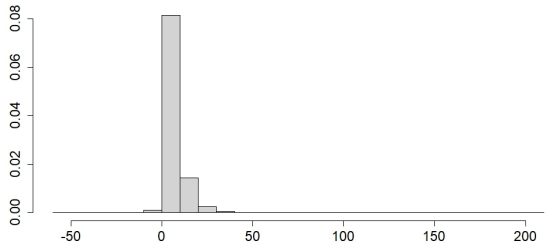
The granularity of the dataset allows different dimensions of analysis of the phenomenon. For example, the cost of remittances can vary significantly by the type of the remittance

[5]In international remittances wording, the term corridor refers to the sending country and destination country pair.

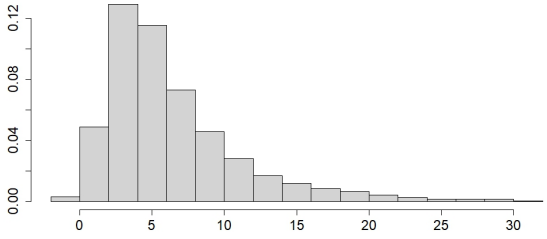
[6]In the RPW there can be some observations characterized by a negative value. The World Bank refer to these by saying *A negative total cost may be due to a promotion active at the time information was collected and does not mean that the sender is remunerated for using the service.*

Figure 2: Distribution of the total cost in percent of the amount sent for a $200 remittance

(a) Before trimming



(b) After trimming



Note: Costs reported on the x-axis are expressed in percentage

service provider (RSP). RPW dataset distinguishes between different categories of RPSs: Banks, Money Transfer Operators (MTOs), Mobile Operators, and Post Offices.[7] As shown Table 1 the vast majority of the data refer to Banks and MTOs. Moreover Banks are much more expensive than MTOs and other providers with an average cost for the former which is almost two times that of the latter.

Data show a significant regional heterogeneity with costs for sending remittances: South Asia is the cheapest region to receive remittances with an average cost of 5%, on the contrary Sub-Saharan Africa is the most expensive with an average of 8.05% for a $200 remittance.

RPW dataset includes also information on the pickup method used to disburse the funds to the recipient. The pickup method is mainly distinguished between cash, bank account and mobile wallet. There are others categories to collect remittances as ATM networks, debit card and home delivery but they represent a small minority in the dataset. In RPW cash is the most represented option to collect remittances followed by bank account. Both these traditional methods are much more expensive than digital means as mobile wallets. Knowing the pickup method is a useful information to capture country-specific differences in access to banking system, security needs, and desired speed of transfer by recipients. Cash pickup is face-to-face option, allowing recipients to collect cash at a local agent or office without needing a bank account; it provides immediate access to cash, so it can be is a good option for people living in areas with limited banking services but can involve higher fees and presents security risks for large amounts. Digital solutions, such as bank transfers and digital wallets,

[7]MTOs include both traditional providers and innovative fintech players. Thus far, it has included Western Union and MoneyGram, which operate in 95 percent and 90 percent of the country corridors covered in the database, respectively. Some MTOs can be defined as "digital-only" as they send remittances predominantly through digital channels. Examples in this regard are Wise, Remitly, WorldRemit, InstaReM and Xoom. Some of these remittance service providers also have physical channels.

provide more convenience, security, and integration with other financial services but require the recipient to have a bank account.

Finally, we consider a measure of the speed of remittances, captured by the time it takes for the money to be available for the receiver. This variable is categorical and ranges from "less than one hour" to "6 business days or more". The G20's roadmap for enhancing cross-border payments sets a specific target of 75% of cross-border remittance payments to provide availability of funds for the recipient within one hour of initiation, with the remaining 25% within one business day by the end of 2027. This applies to all remittance corridors.

However, a trade-off between transaction speed and cost exists, with faster payment methods often incurring higher costs, while cheaper options tend to be slower, as a result of several factors. Digitalization and faster payment systems increase speed but involve more complex or resource-intensive processes, whose effect on cost can depend on the country-specific infrastructure. The relationship between speed and cost can substantially differ depending on the service provider, with Bank and Post Office cross-border transactions usually much slower than money transfer operator and mobile operator services, due to due to a multi-hop system that involves correspondent banks. In contrast, money transfer operators may offer faster transactions, but this speed can come at a higher price. This can explain why simple descriptive statistics for cost and speed do not clearly show this relationship. In any event, the speed of remittances is a relevant control variable to be considered in the regressions.

Table 1: Descriptive Statistics for the cost of sending $200

	Min	Mean	Max	Std. Dev.	N. Obs
Remittances Cost					
Payment 200 USD	-0.06	6.46	31.44	4.87	182825
Firm-Type					
Bank	-0.06	10.02	31.44	7.28	28810
Money Transfer Operator	-0.06	5.75	31.44	3.88	148190
Other	-0.02	6.72	30.86	4.92	5825
Region					
East Asia & Pacific	-0.06	6.67	31.31	4.99	46569
Europe & Central Asia	-0.06	6.21	31.33	4.62	24335
Latin America & Caribbean	-0.05	5.96	30.29	3.61	23114
Middle East & North Africa	-0.05	6.60	30.49	4.63	16612
South Asia	-0.06	5.00	31.44	4.33	36075
Sub-Saharan Africa	-0.05	8.05	31.44	5.65	36120
Pickup Method					
Bank account	-0.06	6.78	31.44	6.18	67532
Cash	-0.06	6.37	31.33	3.93	107512
Mobile wallet	-0.05	4.73	28.30	3.07	7653
Other	-0.06	4.00	12.47	2.75	128
Speed Category					
Less than one hour	-0.06	6.14	31.33	3.88	90409
Same day	-0.06	5.83	30.86	4.24	25097
Next day	-0.06	5.65	31.12	4.50	21784
2 days	-0.06	7.17	31.31	6.10	23167
3-5 days	-0.06	8.23	31.44	6.84	20315
6 days or more	0.00	10.91	31.07	7.81	2053
Negative values	-0.06	-0.03	-0.01	0.02	94

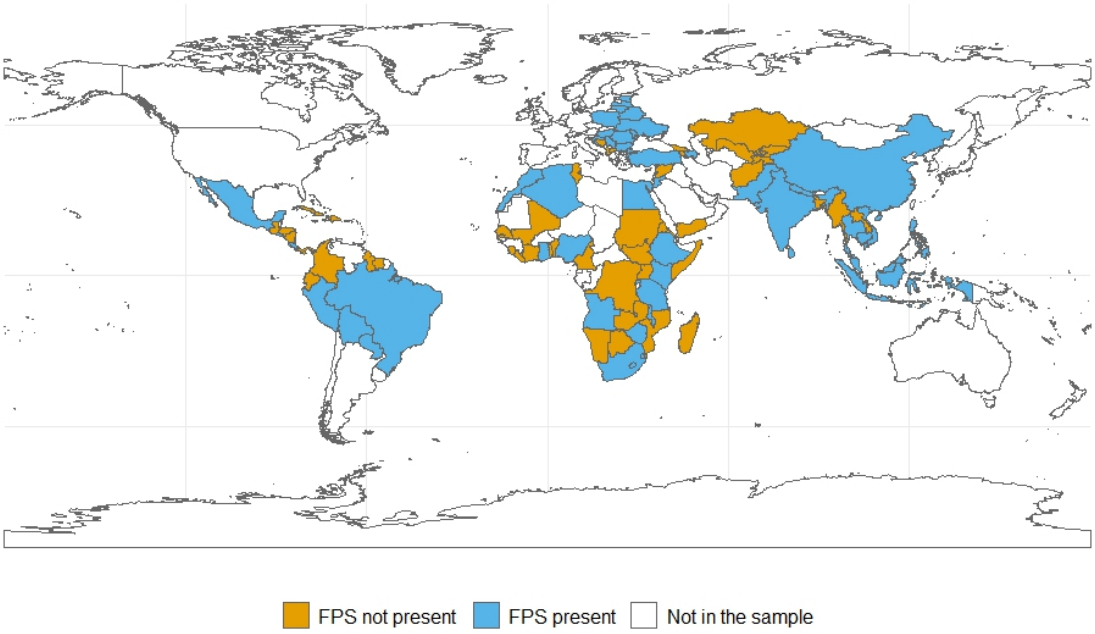
Note: Min, Max, Mean and Std. Dev. are expressed in percentage. The breakdown of cost by region refers to the cost of sending a remittance to that region. As for Firm-Type, the category "Other" includes categories for which it was difficult to attribute a unique label. As for the Pickup Method, the category "Other" includes: *ATM Network, Bank account/Cash, Home Delivery, Debit card.*

We merge the World Bank data with a country-year dataset with information about adoption of a Fast Payment System at the global level taken by the websites of the individual central banks. More precisely, for each receiving jurisdiction, we consider the presence/absence of FPS and the date of its implementation. Overall, we collect information on the implementation of fast payment systems in 50 receiving jurisdictions.[8]

[8]The list of FPS was compiled on a best effort basis. Following a conservative approach, some jurisdictions

In this paper, we focus the receiving side of remittances that includes a larger sample and emerging or developing economies where it is more reasonable to assume a potential effect of introducing an FPS. In contrast, the sample of sending countries is smaller, composed more of developed economies and for which the issue of remittance efficiency is less relevant. The set of receiving countries included in our dataset is shown in Figure 3. The presence of FPS is distributed among different geographic areas. Particularly in Eastern Europe and Asia-Pacific.

Figure 3: Receiving jurisdictions by FPS presence

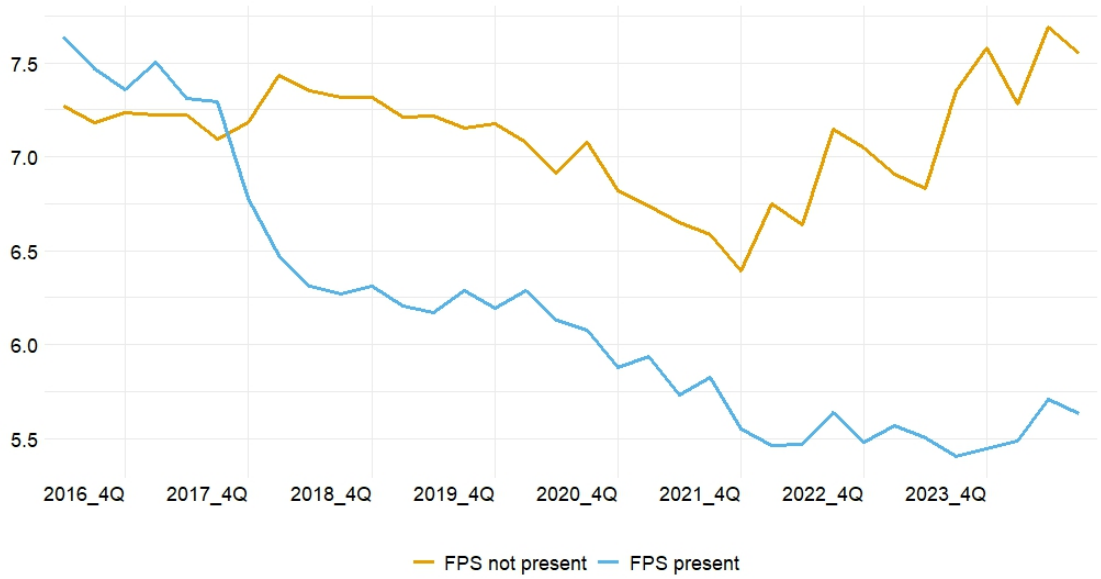


Note: the map is for illustrative purposes only and the boundaries may not reflect the actual situation.

An exploratory analysis of the data appears to support our hypothesis, as illustrated in Figure 4. Remittance costs to jurisdictions with an FPS tend to be lower than those to jurisdictions without. B This difference becomes more pronounced over time after 2018, as the number of FPS implementations increases. Before the gap was very small. Moreover, the cost for jurisdictions with an FPS shows a descending trend which stabilised since 2022. On the contrary, over the same period, countries without an FPS show an increasing trend in cost.

for which it was difficult to understand the actual implementation of a FPS were considered as without an FPS. Indeed, if a treated jurisdiction ended up in the sample of non-treated, it is reasonable to assume that the estimated effect of the treatment would be weakened compared to if it were correctly allocated in the sample of treated.

Figure 4: Quarterly average cost of remittances in percent of the amount sent ($200)



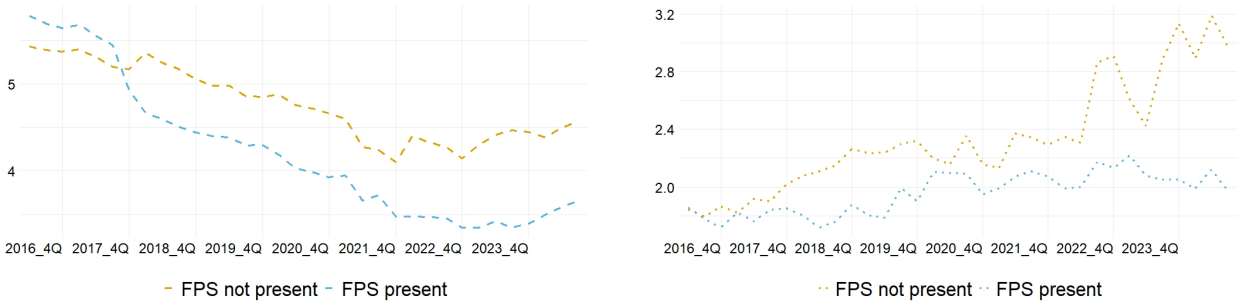
Note: averages computed removing the 1% of extreme observations from the World Bank RPW dataset.

By simply looking at the components of the total cost, this relationship seems to hold steady with jurisdictions which have implemented and FPS that show a substantially lower average fixed fee and FX margin than other jurisdictions. The trend in fixed fees appears to be the same for jurisdictions where an FPS is or is not implemented although at different levels, with the former being less expensive than the latter. In contrast, however, the trend in FX margins exhibits two very different trends: for jurisdictions with an FPS it is essentially stable and on lower levels, while for the others it is increasing. In other words, the effect of implementing an FPS seems to be more pronounced on FX margin than on fixed fees.

Figure 5: Components of the total cost of a $200 remittance

(a) Average fixed fee

(b) Average FX margin



Note:

3 Methodology

One of the most widely used econometric methods to estimate the impact of a policy introduction is the difference-in-differences (DiD), which allows researchers to compare changes in outcomes over time between a group affected by the policy and a group that is not, thereby isolating the causal effect of the intervention. The so-called Average Treatment Effect on the Treated (ATT) is a setup that relies on the assumption that the timing of the treatment is the same for all treated units.

However, in our context, the timing of the policy intervention, namely the implementation of an FPS, varies considerably between countries. This staggered adoption violates the assumption of a common treatment time required by the classical difference-in-differences framework. To address this, we rely on a two-way fixed effects (TWFE) model, which allows us to estimate the ATT while controlling for both unit and time fixed effects across a staggered treatment design.

More formally, the model has the following form:

$$Cost_{C_{ij}ptm} = \beta_0 \cdot \text{FPS}_{jt}^{year} + \beta_1 \cdot \text{Speed}_{C_{ij}ptm} + \text{Z}_{jt}^{year} + \delta_{C_{ij}*q} + \gamma_p + \omega_m + \tau_t + \epsilon_{C_{ij}ptm} \quad (1)$$

where $Cost_{C_{ij}ptm}$ is the remittance cost offered by firm p in the corridor C_{ij} - i.e. from the sending country i to the receiving country j - collected through the payment method m, at quarter t. FPS_{jt}^{year} is a dummy variable taking the value of one since the year of adoption of a FPS in a receiving jurisdiction j. The superscript $year$ indicates that this variable only varies at a yearly frequency since we don't have information about the quarter of implementation of the FPS. $\text{Speed}_{C_{ij}ptm}$ is a numeric variable representing the hours necessary for the funds to be credited to the recipient.[9] The vector Z_{jt}^{year} contains control variables at country-year level, i.e. per capita nominal GDP and the annual value of all remittance inflows in the receiving jurisdiction.

The high granularity of our dataset enables the inclusion of a rich set of fixed effects to account for a number of unobserved heterogeneity and mitigate omitted variable bias.

[9] In the original RPW dataset speed is an ordinal categorical variable with 6 categories as shown in Table 1. We transformed this categorical variable in a numeric one by assigning to each category the equivalent amount of hours. Specifically: "Less than one hour" = 0, "Same day" = 24, "Next day" = 48, "2 days" = 72, "3-5 days" = 96, "6 days or more" = 192.

The set of fixed effects includes: the corridor interacted with the calendar quarter $\delta_{C_{ij}*Q}$ to control also for potential seasonality; the firm used for the transaction γ_p, and the method by which the remittance is collected by the recipient ω_m. To control for common shocks that may simultaneously affect multiple jurisdictions—such as technological advancements— we also include time fixed effects τ_t. A detailed list and description of the variables used in the analysis is provided in Table 2.

To address potential autocorrelation and heteroskedasticity in the error terms, standard errors are clustered at the corridor-calendar quarter level.

Table 2: List and description of variables employed in our models

Variable	**Description**
Cost	Dependent variable in the first set of models. Numeric. It is the cost of sending the equivalent of 200 US dollars expressed as a percentage of the amount. It varies at the PSP level
FPS dummy	Independent variable. Binary. It takes the value of one since the year of implementation of an FPS in a receiving jurisdiction.
Speed	Independent variable. Numeric. It represents the number of hours required for the remittance to be credited to the recipient (in logarithm).
Corridor	Control variable. Categorical. It represents the combination of sending and receiving country.
Quarter	Control variable. Categorical. It represents the quarter of the year in which the observation was collected.
Time	Control variable. Categorical. It represents the period (year and quarter) in which the observation was collected.
Firm	Control variable. Categorical. It identifies the PSP.
GDP	Control variable. Numeric. Is the annual per-capita gross domestic product (in logarithm).
Remittances_in	Control variable. Numeric. It represents the annual value of all received remittance in a jurisdiction (in logarithm).
Collection_method	Control variable. Categorical. It identifies the instrument used to collect the remittance.

4 Estimation results

In this section we report model results following different approaches so as to show, but also test, the robustness of the obtained results. In the same vein, we estimate several specification each with an increasing set of controls.

The average effect of FPS implementation

We first consider a set of regressions restricted to a sample of countries that have implemented a fast payment system. The estimated coefficients can therefore be interpreted as the average effect of FPS adoption after its implementation. The estimated coefficients and model specifications are reported in Table 3.

Column (1) presents a baseline regression that tests whether the average cost of remittances decreases following FPS implementation in receiving jurisdictions. The results show a negative and statistically significant effect: the introduction of an FPS reduces the cost of sending a $200 remittance by nearly 1 percentage point, on average. However, this estimate does not include any controls and may suffer from omitted variable bias. For instance, the coefficient on remittance speed is positive—an unintuitive result suggesting that more expensive remittances are associated with longer delivery times.

Overall, the results support our hypothesis: remittance costs tend to decline following the adoption of an FPS in the receiving country. Specifically, for a $200 remittance, the estimated reduction in cost ranges from 0.30 to 1 percentage point.

It is important to note that the largest estimated effects are observed in model specifications with fewer controls. In particular, the inclusion of operator fixed effects — which control for supply-side factors — substantially reduces the estimated impact of FPS implementation, highlighting the significant role that payment service providers (PSPs) play in determining remittance costs. Moreover, in this model specification the sign of the coefficient on remittance speed is reversed, aligning it with expectations that faster payment services tend to be more expensive.

Table 3: Effect of FPS implementation on the cost of $200 remittances: regressions using only the treated jurisdictions

	(1)	(2)	(3)	(4)	(5)	(6)
FPS dummy	-0.950***	-1.023***	-0.629***	-0.581***	-0.302***	-0.009
	(0.030)	(0.056)	(0.048)	(0.047)	(0.051)	(0.056)
Speed (log)	0.130***	0.068***	-0.183***	-0.117***	-0.120***	-0.120***
	(0.006)	(0.025)	(0.011)	(0.010)	(0.010)	(0.010)
Fixed Effects						
Corridor × quarter		✓	✓	✓	✓	✓
Firm			✓	✓	✓	✓
Pickup method				✓	✓	✓
Time						✓
Control Variables						
GDP					✓	✓
Remittances In					✓	✓
Observations	131,859	131,859	131,859	131,859	126,256	126,256
RMSE	4.743	4.011	3.096	3.063	3.042	3.035
Adj. R^2	0.011	0.287	0.574	0.583	0.589	0.591
Within R^2		0.009	0.013	0.007	0.011	0.004

Note: Standard errors clustered at the corridor × quarter level in parentheses.

Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The dependent variable is the percentage cost of sending a $200 remittance.

It is also worth noting that regression (6) in Table 3, which includes time fixed effects, renders the FPS effect statistically insignificant. This is widely expected, as including time fixed effects in a sample composed solely of "treated" countries makes it impossible to disentangle the effect of the treatment (i.e., FPS implementation) from that of time.

To address this issue, we re-estimate the same set of regressions on the full dataset, which includes jurisdictions without an FPS, serving as a control group. The results, reported in Table 4, confirm our main findings. The implementation of a fast payment system significantly reduces remittance costs.

The estimated effect ranges from -1.3 to -0.25 percentage points. Interestingly, the magnitude of the effect decreases as more control variables are included in the models. Specification

(6) in Table 4, which includes time fixed effects for each quarter, yields an estimated effect that is less than half of that obtained from the same regression without time fixed effects. This suggests that time fixed effects are relevant control variables in our specific framework and that common temporal patterns affecting all jurisdictions are relevant in the data. In contrast, the association between remittance speed and cost remains more stable across specifications once more relevant controls are included.

Table 4: Effect of FPS implementation on the cost of $200 remittances: regressions using treated and not treated jurisdictions

	(1)	(2)	(3)	(4)	(5)	(6)
FPS dummy	-1.284***	-1.023***	-0.659***	-0.621***	-0.592***	-0.249***
	(0.023)	(0.056)	(0.048)	(0.047)	(0.055)	(0.062)
Speed (log)	0.231***	0.145***	-0.140***	-0.095***	-0.093***	-0.089***
	(0.006)	(0.021)	(0.009)	(0.008)	(0.008)	(0.009)
Fixed Effects						
Corridor × quarter		✓	✓	✓	✓	✓
Firm			✓	✓	✓	✓
Pickup method				✓	✓	✓
Time						✓
Control Variables						
GDP					✓	✓
Remittances In					✓	✓
Observations	182,825	182,825	182,825	182,825	171,156	171,156
RMSE	4.810	4.057	3.181	3.156	3.118	3.109
Adj. R^2	0.026	0.301	0.569	0.575	0.583	0.586
Within R^2		0.010	0.008	0.005	0.006	0.003

Note: Standard errors clustered at the corridor × quarter level in parentheses.

Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The dependent variable is the percentage cost of sending a $200 remittance.

Fixed fee vs. forex margin

As shown in Figures 5a and 5b the two components of the total cost of a remittance, i.e. the fixed fee and the forex margin, show a different dynamic over the sampling period. For this

purpose, we investigated how the introduction of an FPS affected each of these components, separately. Table 5 shows the estimated coefficients. The impact is stronger on the forex margin, more than two times the effect on the fixed fee. Speed does not show any relationship with the forex margin, while it is negatively related with the fixed fee. In other words, the reduction of remittance cost, following FPS implementation, mainly reflects a decline in exchange rate margin. This result is interesting, as the forex margin usually acts as a hidden fee, making it difficult for customers to compare the true cost of different payment services.

Table 5: Forex Margin vs. Fixed Fee

	FX Margin	**Fixed Fee**
FPS dummy	-0.169***	-0.080*
	(0.045)	(0.045)
Speed (log)	-0.003	-0.086***
	(0.005)	(0.007)
Observations	171,156	171,156
RMSE	1.889	2.479
Adj. R^2	0.392	0.644
Within R^2	0.0029	0.0033

Note: Standard errors in parentheses. Significance levels: * p< 0.10, ** p< 0.05, *** p< 0.01.
The dependent variables are the FX margin and the fixed fee (in percentage points). GDP and Remittances In are included as control variables.

Payment method analysis

As shown in Table 2, the cost of remittances varies significantly depending on the receiving channel. For this reason, we estimated the most comprehensive specification (column (6) in Tables 3 and 4) by splitting the dataset according to the receiving instrument.

The results, presented in Table 6, indicate that FPS adoption significantly reduces costs for remittances collected in cash and those received via digital wallets—two of the least expensive pickup methods. In contrast, no significant effect is observed for remittances credited directly to bank accounts. This finding is somewhat surprising, as bank account disbursement is the most expensive method according to the data, and therefore the one with the greatest potential for cost reduction. The magnitude of the effect is approximately

-0.30 to -0.40 percentage points, which is broadly consistent with the overall effect found in regression (6) of Table 4. Furthermore, speed appears to have a significant association only with cash remittances, while no significant relationship is found for mobile wallets or bank accounts.

Table 6: Heterogeneity across Receiving Instrument

	Cash	**Mobile Wallet**	**Bank Account**
FPS dummy	-0.303***	-0.384*	-0.097
	(0.073)	(0.212)	(0.087)
Speed (log)	-0.045***	0.019	-0.007
	(0.009)	(0.026)	(0.018)
Observations	99,815	6,628	64,616
RMSE	2.773	2.072	3.221
Adj. R^2	0.481	0.456	0.718
Within R^2	0.002	0.004	0.002

Note: Standard errors in parentheses. Significance levels: * p< 0.10, ** p< 0.05, *** p< 0.01.
The dependent variable is the percentage cost of sending a $200 remittance. GDP and Remittances inflows are included as control variables as well as the complete set of fixed effects: *corridor* × *quarter, Firm and Time.*

The benefits of FPS introduction appear to have materialized primarily through non-bank channels. Indeed, the receiving methods for which the effect is strongest are predominantly offered by money transfer operators (MTOs), whereas the role of banks appears negligible (see Table 7). Conversely, banks play a significant role in offering remittance receipt via bank accounts—a channel for which no cost reduction is observed.

Table 7: Distribution of receive methods by type of intermediary

Receive Method	**Bank**	**Money Transfer Operator**	**Other**
Bank account	34.5%	62.6%	2.8%
Cash	5.1%	91.6%	3.3%
Mobile wallet	0.2%	95.2%	4.6%
Others	6.2%	93.8%	0.0%

Heterogeneity across Regions

We also investigated whether the effects of FPS implementation vary across regions or are geographically uniform. As shown in Table 1, there appears to be substantial regional heterogeneity. To explore this further, we estimated the most comprehensive regression specification separately for each macro-region, as defined by the World Bank.[10] As a control group, we retained all countries without an FPS, regardless of whether they belong to the region under analysis.

The results, presented in Table 8, reveal a generally consistent effect, albeit with some exceptions. We find no statistically significant effects in Latin America and the Caribbean. In contrast, all other regions—except Sub-Saharan Africa (SSA)—exhibit a significant reduction in remittance costs of approximately 0.6 percentage points. SSA, which has the highest remittance costs globally (World Bank, 2024), shows a smaller but still significant reduction of about 0.3 percentage points following FPS implementation.

The association between transaction speed and cost is significant across all regions, though the magnitude varies. In Europe and Central Asia, each additional hour in remittance delivery is associated with a 0.10 percentage point reduction in cost. In other regions, the effect is smaller, ranging between 0.02 and 0.05 percentage points.

Table 8: Heterogeneity across Regions

	East Asia & Pacific	Europe & Central Asia	Latin America & Caribbean	Middle East & North Africa	South Asia	Sub-Saharan Africa
FPS dummy	-0.615***	-0.655***	0.077	-0.626***	-0.588***	-0.335*
	(0.100)	(0.149)	(0.153)	(0.124)	(0.152)	(0.186)
Speed (log)	-0.036***	-0.098***	-0.046**	-0.023*	-0.033**	-0.037**
	(0.011)	(0.015)	(0.014)	(0.013)	(0.011)	(0.014)
Observations	85,447	64,413	55,877	56,641	75,080	65,943
RMSE	3.032	3.313	3.042	3.018	2.967	3.281
Adj. R^2	0.615	0.542	0.595	0.599	0.628	0.607
Within R^2	0.0039	0.0067	0.0068	0.0076	0.0042	0.0063

Note: Standard errors in parentheses. Significance levels: * p< 0.10, ** p< 0.05, *** p< 0.01.
The dependent variable is the percentage cost of sending a $200 remittance. GDP and Remittances inflows are included as control variables as well as the complete set of fixed effects: *corridor* × *quarter, Firm and Time.*

[10]https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups

5 The role of market competition

To investigate the mechanism through which the introduction of an FPS affects remittance costs, we focus on market competition. Specifically, we argue that FPS implementation may influence remittance costs by increasing the degree of competition among remittance service providers within a given corridor.

This channel is frequently discussed in the literature, although the mechanisms through which competition increases can vary. For example, FPS enables instantaneous fund transfers between institutions, reducing frictions in deposit mobility. This empowers consumers to reallocate funds more freely, compelling financial institutions to compete more actively for deposits through better rates, lower fees, or improved services. FPS has increased liquidity mobility and challenged traditional deposit retention strategies (Sarkisyan, 2023).

Moreover, fast payments support real-time integration with digital wallets and non-bank platforms, allowing users to top up their balances instantly. This removes a key bottleneck in the user experience and enhances the competitiveness of non-bank services (Capgemini and Royal Bank of Scotland , 2015). FPS can also serve as a catalyst for expanding access to and usage of formal transaction accounts and related financial services (Frost et al., 2024). By facilitating the integration of informal economic actors into the formal financial system, FPS increases the number and diversity of participants, thereby expanding the addressable market and creating new customer segments for providers.

To empirically test the relevance of this channel, we rely on a instrumental variable approach and two-stage least squares (2SLS) estimation techniques. In the first stage, we regress the number of remittance service providers, constructed by counting the number of firms serving each corridor in each quarter, on the dummy variable for FPS introduction. This stage captures the extent to which FPS affects market structure exogenously, potentially by lowering entry barriers or incentivizing new entrants. While the number of PSPs may be endogenous—since remittance costs could influence market entry—we treat the introduction of FPS as an exogenous event.

The first-stage regression is specified as follows:

$$FirmNum_{C_{ijptm}} = \beta_0 \cdot \text{FPS}_{jt}^{year} + \beta_1 \cdot \text{Speed}_{C_{ijptm}} + \text{Z}_{jt}^{year} + \delta_{C_{ij*q}} + \gamma_p + \omega_m + \tau_t + \epsilon_{C_{ijptm}} \quad (2)$$

This equation is equivalent to equation (1), with the only difference being that the dependent

variable is $FirmNum$, which counts the number of operators in corridor C at time t.

In the second stage, we regress the average remittance cost on the predicted number of providers obtained from the first stage:

$$Cost_{C_{ijptm}} = \lambda_0 \cdot \widehat{FirmNum}_{C_{ijptm}} + \lambda_1 \cdot \text{Speed}_{C_{ijptm}} + \text{Z}_{jt}^{year} + \delta_{C_{ij*q}} + \gamma_p + \omega_m + \tau_t + \eta_{C_{ijptm}} \quad (3)$$

This specification allows us to isolate the causal effect of FPS introduction on remittance costs through the competition channel.

We test this hypothesis at both global and regional levels. Results are presented in Table 9. At the global level, the number of PSPs serving a corridor where the receiving country implemented an FPS increased by 0.25. This increase in competition translates into a 1 percentage point reduction in remittance costs.

At the regional level, East Asia and the Pacific show a stronger effect than the global average, with an increase of 0.347 in the number of providers and a corresponding cost reduction of 1.8 percentage points. The introduction of FPS has an even greater impact on the number of PSPs in South Asia and Sub-Saharan Africa, although the effect on remittance costs is smaller than the global average: -0.95 percentage points for South Asia and -0.38 percentage points for Sub-Saharan Africa.

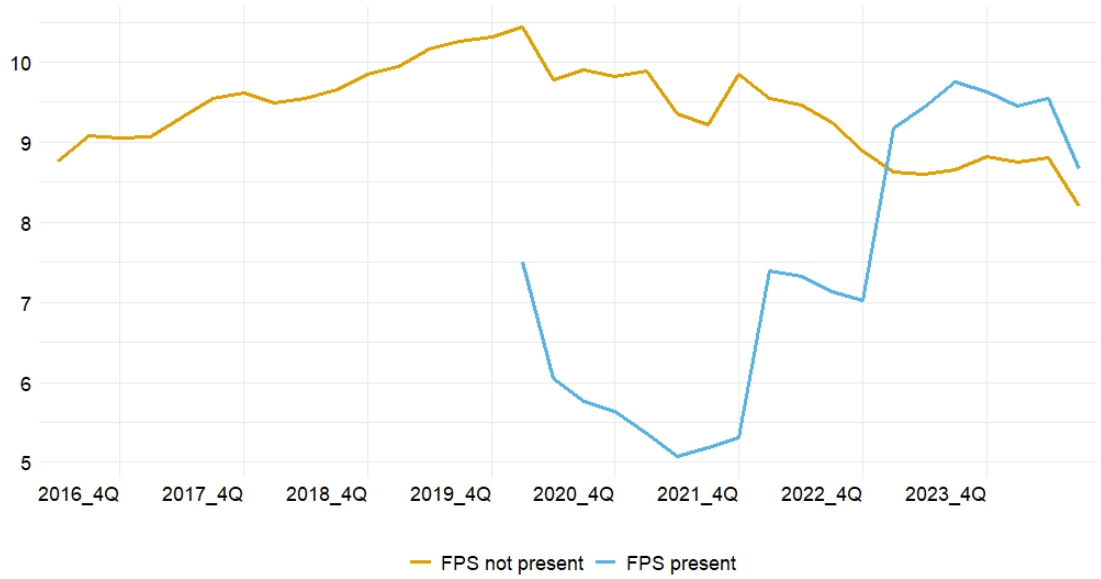
Table 9: Instrumental Variable Regression – Effect of FPS on Cost via Number of Firms by Region

	Global	East Asia & Pacific	Europe & Central Asia	Latin America & Caribbean	Middle East & North Africa	South Asia	Sub-Saharan Africa
First Stage (FirmNum)							
FPS dummy	0.249**	0.347*	0.019	0.118	-0.748***	0.617*	0.874***
	(0.101)	(0.188)	(0.164)	(0.279)	(0.197)	(0.244)	(0.224)
Second Stage (Cost)							
FirmNum (fitted)	-1.001*	-1.772*	-33.739	0.651	0.837**	-0.953*	-0.384*
	(0.511)	(1.065)	(285.177)	(1.630)	(0.287)	(0.454)	(0.211)
Speed (log)	-0.101***	-0.074**	-0.310	-0.039*	-0.021	-0.040**	-0.039**
	(0.012)	(0.027)	(1.809)	(0.022)	(0.014)	(0.014)	(0.014)
Observations	171,156	85,447	64,413	55,877	56,641	75,080	65,943
RMSE	3.435	3.882	39.100	3.135	3.186	3.253	3.317
Adj. R^2	0.494	0.369	-62.900	0.570	0.554	0.553	0.599
Within R^2	-0.217	-0.633	-137.600	-0.055	-0.106	-0.197	-0.015
F-test (1st stage)	338.4***	245.3***	0.60	12.7***	589.7***	345.8***	714.4***
Wu-Hausman	74.3***	155.1***	82.0***	0.78	66.0***	69.1***	15.4***

Note: Standard errors in parentheses. Significance levels: * p< 0.10, ** p< 0.05, *** p< 0.01.
The first stage regresses the number of firms on the FPS dummy and controls. The second stage estimates the effect of the fitted number of firms on remittance cost. GDP and Remittances inflows are included as control variables as well as the complete set of fixed effects: *corridor* × *quarter, Firm and Time*.

For Europe and Central Asia, as well as Latin America and the Caribbean, the data do not support our hypothesis, as the first-stage regression is not statistically significant. The case of the Middle East and North Africa (MENA) is more controversial, showing a reduction in the number of PSPs in corridors with FPS and a subsequent increase in remittance costs—contrary to expectations. However, this result may be explained by the limited number of treated jurisdictions (only five), with the first FPS implementation in the region occurring only in 2020, as shown in Figure 6. Moreover, at a descriptive level, since 2023 the expected relationship appears to hold in this region as well.

Figure 6: Average number of PSPs serving corridors in Middle East and North Africa



Note: averages computed removing the 1% of extreme observations from the World Bank RPW dataset. Quarterly data. Treated countries (i.e. FPS present) belong to the Middle East and North Africa while control group (i.e. FPS non treated) includes all countries without an FPS, regardless of whether they belong to the region under analysis.

6 Investigating the $500 amount

To assess the robustness of our findings, we replicate the core analyses using the cost of sending a $500 remittance, as reported in the RPW dataset. This higher amount allows us to verify whether the effects observed for $200 transfers—particularly the impact of FPS implementation on total costs, cost components, and across different channels and regions—hold consistently for larger transactions. While the structure of the results remains broadly aligned with those presented in previous sections, some notable differences emerge in terms of magnitude and statistical significance, offering additional insights into the channels through which FPS adoption affects remittance pricing.

In Table 10, we present the results of the FPS implementation on the cost of sending $500 remittances.[11] The first column reports estimates based on the full sample, including both treated and untreated jurisdictions. The second and third columns decompose the total cost into fixed fees and foreign exchange margins, while the final three columns show results from

[11]Consistent with the analysis for the $200 amount, we exclude the top and bottom 1% of extreme observations for the $500 cost.

the payment method analysis.

The findings indicate that FPS implementation has a statistically significant effect on the cost of $500 remittances, although the magnitude is smaller compared to the $200 case. Similarly, the relationship between cost and transaction speed appears less pronounced. The reduction in cost is primarily driven by a decline in the foreign exchange margin, with no significant effect observed for the fixed fee component. Interestingly, the association with speed persists only for the fixed fee, as was the case for the $200 amount. This suggests that the fixed fee may embed the cost component related to transaction speed.

Finally, the results confirm that FPS implementation predominantly affects non-bank channels, reinforcing the view that its benefits are more likely to materialise on non-banks rather than traditional banks.

Table 10: Effect of FPS implementation on the cost of $500 remittances

	Full sample	**Fixed Fee vs FX Margin**		**Payment Method Analysis**		
	Cost	FX Margin	Fixed Fee	Cash	Mobile Wallet	Bank Account
FPS dummy	-0.168**	-0.163***	-0.005	-0.236***	-0.215	-0.017
	(0.051)	(0.044)	(0.028)	(0.062)	(0.192)	(0.059)
Speed (log)	-0.068***	-0.003	-0.065***	-0.030***	0.013	-0.038***
	(0.006)	(0.005)	(0.004)	(0.007)	(0.024)	(0.011)
Observations	170,303	170,303	170,303	99,008	6,312	64,886
RMSE	2.235	1.776	1.391	2.245	1.855	1.938
Adj. R^2	0.492	0.409	0.568	0.467	0.475	0.633
Within R^2	0.0032	0.0029	0.0052	0.0019	0.0031	0.0038

Note: Standard errors in parentheses. Significance levels: * p< 0.10, ** p< 0.05, *** p< 0.01.
Fixed effects: corridor × quarter, period, firm, pickup method (where applicable).
Standard errors clustered at the corridor × quarter level.

In Table 11, we also examine regional heterogeneity in the effects of FPS implementation for the $500 remittance amount. The results are broadly consistent with those found for the $200 amount, although in some cases the estimated effects are smaller—particularly in East Asia & Pacific and South Asia.

Table 11: Heterogeneity across Regions for $500 remittances

	East Asia & Pacific	Europe & Central Asia	Latin America & Caribbean	Middle East & North Africa	South Asia	Sub-Saharan Africa
FPS dummy	-0.448***	-0.656***	0.084	-0.567***	-0.218*	-0.337*
	(0.079)	(0.127)	(0.159)	(0.115)	(0.117)	(0.149)
Speed (log)	-0.031***	-0.071***	-0.043***	-0.026**	-0.025**	-0.038***
	(0.008)	(0.011)	(0.011)	(0.010)	(0.009)	(0.010)
Observations	85,065	64,088	55,500	56,284	74,550	65,431
RMSE	2.212	2.405	2.330	2.283	2.160	2.465
Adj. R^2	0.502	0.463	0.483	0.503	0.537	0.481
Within R^2	0.0049	0.0082	0.0092	0.0102	0.0054	0.0092

Note: Standard errors in parentheses. Significance levels: * p< 0.10, ** p< 0.05, *** p< 0.01.
The dependent variable is the percentage cost of sending a $500 remittance. GDP and Remittances inflows are included as control variables as well as the complete set of fixed effects: *corridor* × *quarter, Firm, Period, and Pickup Method.*

Finally, we also investigate whether the effect of FPS implementation operates through increased market competition. The results, reported in Table 12, are broadly consistent with those obtained for the $200 remittance amount, although the overall magnitude of the effect is smaller. The only exception is South Asia, where the competition channel no longer appears statistically significant. Sub-Saharan Africa continues to stand out as the region where FPS adoption most strongly boosted competition, as reflected in a notable increase in the number of providers operating within each corridor.

Table 12: Instrumental Variable Regression – Effect of FPS on Cost for $500 via Number of Firms by Region

	Global	East Asia & Pacific	Europe & Central Asia	Latin America & Caribbean	Middle East & North Africa	South Asia	Sub-Saharan Africa
First Stage (FirmNum)							
FPS dummy	0.247*	0.342*	0.018	0.115	-0.743***	0.599*	0.867***
	(0.101)	(0.188)	(0.163)	(0.277)	(0.197)	(0.243)	(0.223)
Second Stage (Cost)							
FirmNum (fitted)	-0.681*	-1.309*	-36.241	0.733	0.763**	-0.364	-0.389*
	(0.363)	(0.776)	(326.492)	(1.946)	(0.263)	(0.245)	(0.184)
Speed (log)	-0.076***	-0.058**	-0.272	-0.036*	-0.026*	-0.028**	-0.040***
	(0.009)	(0.019)	(1.831)	(0.021)	(0.011)	(0.010)	(0.010)
Observations	170,303	85,065	64,088	55,500	56,284	74,550	65,431
RMSE	2.444	2.834	41.900	2.488	2.469	2.222	2.510
Adj. R^2	0.393	0.182	-162.300	0.410	0.418	0.510	0.462
Within R^2	-0.191	-0.634	-300.300	-0.129	-0.158	-0.052	-0.027
F-test (1st stage)	330.5***	237.0***	0.52	12.0***	578.8***	319.5***	698.9***
Wu-Hausman	64.2***	155.1***	156.1***	1.66	96.4***	18.4***	25.2***

Note: Standard errors in parentheses. Significance levels: * p<0.10, ** p<0.05, *** p<0.01.
The first stage regresses the number of firms on the FPS dummy and controls. The second stage estimates the effect of the fitted number of firms on remittance cost. GDP and Remittances inflows are included as control variables as well as the complete set of fixed effects: *corridor* × *quarter, Firm and Time*.

Overall these results confirm our findings and are in line with expectations as the size of the effects tend to diminsh for larger amounts. This makes sense as the cost of a remittance tends to decrease as the amount sent increases.

7 Conclusions

In this study, we find a significant reduction in the cost of remittances sent to countries that have implemented a fast payment system. While the estimated effect varies considerably across economic regions, this outcome is certainly a welcoming issue.

Attributing a direct causal effect to FPS implementation can be challenging, as most existing FPS were born to support domestic transactions. However, we argue that the observed reduction in remittance costs is more plausibly driven by indirect effects. FPS implementation typically enhances the domestic payment ecosystem by improving efficiency, transparency, and competition. Recent literature highlights that FPS can act as a catalyst for financial digitalisation, fostering the adoption of digital finance applications (Cornelli et al., 2024b). FPS are also associated with reduced cash usage and an increase in the number and fre-

quency of small-value card payments (Di Iorio et al., 2025). Furthermore, FPS development appears to support improvements in financial inclusion indicators (Frost et al., 2024).

All these developments are consistent with a decline in remittance costs. Digitalisation can generate efficiency gains for service providers, which may be passed on to end users in the form of lower fees. Greater competition is one of the potential channels through which the effect of introducing an FPS manifests. We tested this hypothesis finding a significant increase in the number of operators serving corridors where the receiving jurisdictions implemented an FPS and a subsequent reduction in costs. Increase in the number of PSPs is particularly large in Sub-Saharan Africa suggesting how these actions to improve the domestic payment ecosystem have a significant impact especially in regions with particular challenges (FSB, 2024). Finally, the cost-reducing benefits of FPS implementation appear to be more pronounced for smaller remittance amounts. This finding is particularly relevant from a policy perspective, as lower-value transfers are more likely to be sent by individuals with a vulnerable economic background, for whom remittances represent a vital financial lifeline.

Another important finding relates a potential trade-off between cost and speed of remitances. The G20 Roadmap sets targets for both reducing remittance costs and improving transaction speed. However, our results reveal a negative relationship between these two dimensions: faster services tend to be more expensive. This presents an additional challenge to achieving the dual objectives outlined in the roadmap.

The inefficiencies in remittances and cross-border payments remain a high-priority issue for international policy agendas. Major global institutions have set 2027 as the target year for achieving measurable improvements in cross-border transactions (FSB, 2021),[12] and our findings support the view that domestic FPS development can contribute to progress in this area.

In this context, interlinking arrangements —designed to extend the benefits of FPS to the cross-border dimension— represent a promising solution (Panetta, 2023). Such initiatives have the potential to transform the landscape of international retail payments and remittances, reducing costs and increasing speed, particularly for those who rely most on these services.

[12]For remittances, the target for reducing costs below 3 percent of the amount sent is set for 2030, in line with the UN Sustainable Development Goals.

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