

INTERNATIONAL MONETARY FUND

Managing Remittances Inflows with Foreign Exchange Interventions

Maria-Angels Oliva and Nika Khinashvili

WP/24/191

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WORKING PAPER

IMF Working Paper

Western Hemisphere Department

Managing Remittances Inflows with Foreign Exchange Interventions

Prepared by Maria-Angels Oliva and Nika Khinashvili *

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September 2024

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ABSTRACT: In a 157 emerging markets and developing countries sample, remittances continue to grow fast, outpacing other financial inflows (as a share of GDP), particularly in Asia. Without alternative policy instruments, foreign exchange interventions (FXIs) have often been the authorities' go-to tool to manage the short-term effects of these remittance inflows. However, this practice comes at a cost. This paper shows that FXIs are quick, temporary solutions that often may hinder the development of the recipient country's financial sector and may not support financial stability over the medium term. The analysis suggests that FXIs act as an insurance tool that, by mitigating FX volatility, protect remittance recipients and tradable sectors from FX risks, encouraging less bank deposits (consistent with more spending) and lower buffers in the banking sector. These costs add to other direct FXI-related costs already identified in the literature. The development of private sector market risk management tools should support longer-term structural reforms required to increase the absorptive capacity of additional FX inflows.

JEL Classification Numbers:	F240, F31, F32, G21
Keywords:	Remittance inflows; Foreign exchange interventions; Other financial flows; Banking Sector; Banking sector depth and stability.
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WORKING PAPERS

Managing Remittances Inflows with Foreign Exchange Interventions

Implications for the Banking Sector

Prepared by Maria-Angels Oliva and Nika Khinashvili¹

¹ The opinions expressed in this paper are solely those of the authors and do not necessarily reflect the views of the International Monetary Fund (IMF). Mr. Khinashvili, Ph.D. candidate at the Geneva Graduate Institute, worked on this paper as part of his 2023 summer internship project at the IMF. An original version of the paper was presented at the IMF Seminar Series for Interns. Results were also discussed in the 2024 CAPDR XVIII IMF Regional Conference held in Costa Rica, July 29-30. The authors would also like to thank Ding Ding, Carlos Chaverri, and Cédric Tille for excellent suggestions and comments and Rozi Lamprakaki for her research assistance support.

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Executive Summary

Remittance inflows have been growing fast in recent years, with remittance flows to Asia (as a share of GDP) dominating all other financial inflows within the region. Despite these trends, which began well-before the pandemic, the debate on financial inflows has revolved around capital flows and their impact. The literature on remittance flows has focused on the development and social safety net aspects associated with these inflows. Most of the literature on policy responses to remittance inflows has also focused on whether or not these responses have proven successful in reducing exchange rate volatility. Little attention has been paid to the side effects (positive and/or negative) of these policies, particularly on the financial sector.

The toolkit for managing the impact of capital inflows on the exchange rate and other financial portfolio flows has been broadening over time, but the tools for managing the pressures associated with large remittance inflows remain limited. The policy mix of macroprudential and capital flow management measures, and foreign exchange interventions (FXIs), proposed by the IMF's Integrated Policy Framework (IPF), can work well for capital flows but is less applicable to remittance-receiving economies given the safety-net nature of remittances—small, periodical transfers between private individuals that are largely used to cover for basic needs, health, education, and debt repayments to a large extent—and limited systemic risk. In practice, governments use sterilized FXIs to build reserves, as an effective non-conventional monetary policy tool when the policy rate suffers from weak transmission, and to manage the associated short-term pressures of often large, permanent financial inflows, including remittances (Patel et al. (2019)). This practice, however, comes at a cost that goes beyond the direct sterilization costs or the costs of managing higher-than-optimal levels of foreign exchange (FX) reserves.

This paper analyzes the less well-known effects of sterilized FX interventions on the development and financial stability of the financial sector. To the authors' knowledge, there are no papers assessing the costs and benefits of these interventions on the financial sector. The paper looks into a sample of 157 emerging market and developing economies. It presents empirical evidence that FXIs are quick, temporary fixes that hinder the development of the recipient country's financial sector, but often do not contribute to financial stability over the medium term. While remittances can help build bank deposits (good for financial depth) FXIs, when statistically significant, tend to partially offset these positive effects, especially when remittance inflows are not that large. By removing market risk uncertainty and ameliorate FX volatility, FXIs appear to ease recipients' credit constraints, reduce the need for maintaining deposits to ensure intertemporal consumption smoothing, and encourage

spending, the main use associated with remittances according to countries' household surveys. However, the negative effect of FXIs may attenuate when receiving large flows of remittances, with extra resources being kept in bank deposits for later use. On financial stability, the analysis shows FXIs work as an insurance tool that, by reducing the cost of foreign currency exposures, pushes agents to keep lower balances in banks and banks to hold lower buffers as a result. By subsidizing FX-related risks, FXIs protect remittance recipients and tradable sectors and encourage higher risk taking (moral hazard) behaviour. These costs add to other FXI-related direct costs already identified in the literature (e.g., sterilization costs, carry costs of holding international reserves).

The findings of this paper suggest that: (i) in line with the IMF (2023c) key principles for the use of FXIs, FXIs should be used sparingly and only as a tool to deal with particularly large remittance inflows that cause disorderly conditions, and (ii) the development of private sector risk management tools should support longer-term structural reforms to increase the absorptive capacity of additional FX inflows.

Introduction

What tools do authorities have at their disposal to manage the effects of large remittance inflows on the economy? Over the years, policymakers and researchers have paid increasing attention to remittance inflows, given their double-digit growth trends. Several countries have become economically dependent on these flows—with remittances accounting for over 20-30 percent of GDP in some cases. Apart from their size, remittance inflows are a safety net that funds consumption among vulnerable segments of society and a net inflow of foreign exchange. But these come at a cost—remittances put upward pressure on the exchange rate and on domestic prices and are an injection of liquidity that needs to be managed. Because of their broader social dimension, however, the policy tools available to manage the costs of remittance inflows are much more limited than those available to manage other types of financial inflows.

This paper examines the effects of remittance flows on the banking sector and fills a gap in the literature by looking at policy responses. In this paper we evaluate the performance of foreign exchange interventions (FXIs) as a policy response to remittance inflows, using cost-benefit criteria applied to the financial sector. Costs are defined in terms of how FXIs hinder the development of the financial sector through bank deposits, credit to the private sector, and sovereign debt holdings. Benefits are defined in terms of potential stability gains—defined in terms of higher regulatory capital ratios and lower net open foreign exchange (FX) positions. These benefits would be justified by banks' access to a relatively sustained level of stable funding in the system, given the persistence of remittance inflows intermediated in the system. Some of these inflows may remain on banks' balance sheet for some time either because recipients hold them as deposits (Orozco and Fedewa (2006) and International Organization for Migration (IOM, 2022)) or because spending proceeds, channeled through the formal economy, become new deposits. We look at financial flows to 157 emerging and developing economies during the years 2000-2022, across five regions—Africa, Asia, Eastern Europe (EE), Middle East, Caucasus, and Central Asia (MECCA), and Western Hemisphere (WH).

Remittance inflows are different in nature from capital inflows (foreign direct investment and portfolio investment). Remittances can be a key driver of growth through consumption smoothing and a critical safety net for the recipients, providing relief to the most vulnerable segments of the population. In addition, their channeling through the domestic banking sector (even when directed to informal segments of the economy) provides a steady source of funding (deposits) for the banks intermediating these inflows. These inflows can also enhance the depth and stability of the overall

banking system indirectly via consumption in the formal economy. The literature suggests that remittances can have a positive and significant impact on the accumulation of central bank international reserves (Vacaflores et al. (2014)) and indirectly on bank credit to the economy. At the same time, the steady inflow of private remittances from migrants to their relatives can come at a cost, altering the external and internal equilibria of the economy. For example, appreciation pressures driven by large inflows could undermine exporters' competitiveness (and result in Dutch disease when altering the consistency between the external position and that implied by the country's economic fundamentals). Excessive international reserves could also prove costly for central banks' income model (Levy Yeyati and Sturzenegger (2010), Jeanne and Ranciere (2006), Rodrik (2006)).

In practice, managing the effects of remittance inflows has proven to be a non-trivial task, with the policy toolkit available to authorities being rather limited. Many countries have relied on FXIs as the policy tool, with often sterilized operations (to some degree) to neutralize the effects of liquidity. FXIs work as a shock absorber tool that shields the value (in domestic currency) of the balance sheet over time, benefiting all stakeholders exposed to FX (exporters, importers, and the financial sector, in particular) with lower FX volatility, if FXIs are successful. Apart from its currency stabilizing and trade policy effects, and risk shielding, often, countries use FXIs to rebuild central bank reserves, build financial sector buffers, and as a non-conventional monetary policy tool to maintain price stability.¹ However, FXIs come with costs—direct fiscal costs, indirect costs by potentially introducing inconsistencies between monetary and FX policies (BIS (2022)), by inducing risk-taking and reducing the need for domestic private FX and hedging markets, and by limiting the depth and encouraging lower buffers in the financial sector.

Most of the empirical literature on remittances focuses on the macroeconomic implications of these flows—i.e., how remittances impact real growth, poverty, debt, and the equilibrium real exchange rate (Barajas et al. (2011), Beck et al. (2009); Chami (2008); Giuliano et al. (2009), Fagiolo et al. (2023))—; the developmental aspects of these flows (Aggarwal et al. (2011), Gupta et al. (2007), Lopez-Cordova et al. (2006)); and the costs of remittance transfers (Orozco et al. (2014), Schoenholtz and Cecchetti (2008), and World Bank (2023)). Barajas et al. (2018) is the closest reference to this paper in discussing the distinct characteristics of remittances vis-a-vis other financial inflows. The

¹ Singer (2010) discusses the benefits of foreign exchange stability (in the form of lower volatility) in economies receiving remittances. He argues that because remittances tend to be stable and countercyclical relative to the recipient country's economy, remittances support policymakers adopting fixed exchange rates.

paper, however, focuses on the impact of remittance inflows on monetary policy transmission and shows that transmission is weaker in remittance-receiving economies.

Furthermore, the literature on policy responses to financial inflows has centered around capital flows (KF)—sudden stop risks and how to manage capital inflows-related frictions. Recent work on the integrated policy framework (IMF (2021), IMF (2023a, b)) calls for a welfare-enhancing mix of monetary policy, foreign exchange intervention, capital flow management measures, and macroprudential policies in handling KF pressures. Fiscal measures have also been suggested to slow down flows and reduce market volatility (BIS (2022)). However, except for FXIs, most of these tools and discussions apply to foreign investment and especially, to portfolio inflows, but are less suitable for regular, low-value (albeit material in aggregate terms) remittance inflows—an income account flow. The general principles advanced under IMF (2023 c), and to guide the use of FXI are further supported by the results of this paper.

This paper shows that remittances tend to have a positive impact on the depth of the banking system by increasing bank deposits in a number of regions, especially in the short run. Higher remittances can also be associated with a safe-to-safe strategy of higher public debt security holdings funded through higher deposit holdings. The analysis also suggests that FDI inflows to remittance-receiving economies lead to lower bank deposits, with banks playing a pure intermediation role, while portfolio inflows have a positive, albeit statistically insignificant, effect. At the same time, remittances appear to support higher solvency ratios with a lag, when statistically significant, while having a mixed effect on region-dependent net FX mismatches. For example, remittances tend to be associated with lower mismatches in Asia but higher mismatches in the EE region; domestic net open position regulations and their enforcement can help explain the differences.

We also find that FXIs tend to reduce the benefits of remittance inflows for the banking sector. FXIs tend to work as a subsidy benefiting remittance inflow recipients and the tradable sector at the expense of the central bank and the depth and financial stability of the banking sector. We find empirical evidence suggesting that, by reducing the uncertainty associated with market risks, FXIs tend to further support the original objective of remittances, that is, to finance consumption and other basic expenditures by, otherwise, financially constrained recipients. For the full sample, and for the EE region in particular, the level of remittances matters—with large remittance inflows encouraging the extra resources to be kept as deposits for future spending. This positive effect doesn't tend to offset or change the negative effect of FXIs to all financial inflows on deposits. The

argument is that, while the bulk of the funds are still withdrawn, higher remittances provide additional resources that may be saved for later in the form of bank deposits in the meantime.

Evidence points to FXIs imposing medium-term costs on the banking sector, in addition to the direct costs borne by central banks in managing the pressures of financial flows, particularly remittances. These findings call for a sparing use of FXIs, to address episodes of large remittance inflows with disorderly conditions. These also call for renewed efforts to develop risk management instruments that transfer the market risk of financial inflows to the private sector. Longer-term structural reforms should accompany these short-term policies to create the much-needed space to absorb these inflows into the economy without creating imbalances.

Next section describes the data underlying the analysis and provides the data sources. Section 3 discusses the specificity of remittance inflows relative to other financial inflows, and section 4 focuses on the costs and benefits of remittance inflows on the banking sector as measured by depth and financial stability in the sector. Section 5 focuses on the effects of FXIs, if any, for the financial sector, and Section 6 summarizes key results and policy takeaways.

Data and Stylized Facts

The paper builds on the panel data analysis conducted by Aggarwal et al. (2011). The study covers 157 emerging and developing economies in five regions (Africa, Asia, EE, MECCA, and WH), with annual frequency data from year 2000 to 2022 (Table 1 in Annex I). The remittance inflow data is annual and obtained from the Global Knowledge Partnership on Migration and Development (KNOMAD), a datahub compiling the data from different sources including the IMF, UN, OECD, Eurostat, national statistical offices, and central banks of countries to limit gaps. In the paper, remittances are large (low) if the remittances-to-GDP ratio is greater or equal (less) than the median ratio of remittances-to-GDP in the full sample. Data on foreign direct investment and portfolio investment inflows are from the IMF's International Financial Statistics (IFS).

The analysis uses three measures from the Global Financial Development (GFD) database of the World Bank to capture financial market depth: the ratio of bank deposits to GDP, private sector bank credit to GDP, and banks' holdings of public debt to GDP (Table 1). The dataset shows bank deposits and public debt holdings in banks' balance sheets are larger (more financial depth) among high remittance flow recipients and peggers. Among regions, average deposits and bank credit are among the highest in Asia and EE. The analysis of financial stability— how remittance inflows and FX

interventions impact the capacity of banks to handle shocks and risks—relies on the banking system's actual regulatory capital ratio (defined as regulatory capital-to-risk weighted assets) and the net open FX position-to-capital ratio (measuring exchange rate risk exposures). The data draws from the Financial Soundness Indicators (FSI) database. Interestingly, banks operating in economies that receive large remittance inflows hold lower regulatory capital levels to GDP and have larger net FX open positions (i.e., lower buffers and higher exposures to FX risk). By region, WH shows this pattern.

	Mean	Stddev	P10	Median	P90		Mean	Stddev	P10	Median	P90
<i>Financial Sector Deepening (to GDP)</i>											
(1) Deposits	42.8	32.6	12.2	36.1	82.2						
<i>By region</i>						<i>Financial Sector Stability (in percent)</i>					
Eastern Europe (EE)	42.9	14.4	24.4	42.2	63.1						
WH	39.3	16.3	19.4	39.1	62.6						
Asia	49.8	30.9	16.1	42.3	108.9						
Africa	31.5	30.4	9.4	19.4	62.2	(1) Regulatory Capital	18.6	6.1	13.3	17.3	25.0
Middle East, Caucasus, and Central Asia (MECCA)	52.5	48.6	12.8	38.9	95.8	<i>By region</i>					
<i>Remittance inflows size</i>						EE	17.9	3.9	13.8	17.3	22.7
Large recipients	44.2	32.8	13.3	37.2	82.5	WH	16.3	2.3	13.4	16.1	19.1
Low recipients	40.7	32.7	11.3	33.4	82.3	Asia	17.1	5.9	11.8	15.5	24.0
<i>Exchange rate region</i>						Africa	17.4	5.3	11.1	17.8	23.7
Floaters	35.9	24.3	11.1	31.6	66.4	MECCA	20.2	7.9	15.1	18.2	24.2
Peggers	44.7	33.7	12.4	37.8	85.3	<i>Remittance inflows size</i>					
(2) Bank credit to the private sector	34.9	27.7	7.6	27.4	68.8	Large recipients	18	4.9	13	16.9	24.4
<i>By region</i>						Low recipients	19.1	6.8	13.5	17.7	26.1
EE	38.9	15.9	17.5	38.1	59.4	<i>Exchange rate region</i>					
WH	37.9	18.7	17.6	32.3	64.9	Floaters	17.8	4.1	13.5	17	23.3
Asia	52.9	41.8	13.4	35.5	120.3	Peggers	19.1	6.9	13.1	17.5	26.2
Africa	23.6	22.5	4.5	13.3	61.9						
MECCA	39.6	27.1	6.6	35.6	76.7	(2) Net Open FX Position Ratio	17.7	50.3	-1.8	4.6	50.8
<i>Remittance inflows size</i>						<i>By region</i>					
Large recipients	35.3	23.2	9.1	29.9	65.9	EE	8.3	13.4	-1.2	4.2	31.7
Low recipients	34.2	32.1	6.2	24.1	102.6	WH	24.9	35.4	0.1	11.5	106.9
<i>Exchange rate region</i>						Asia	5.7	14.1	-0.1	3.7	12.1
Floaters	30.6	24.9	6.5	24.1	62.5	Africa	8.4	75.3	-5.1	2.8	25.9
Peggers	36.5	28.1	8.1	29.2	70.1	MECCA	5.2	13.3	-2.5	3.5	16.1
(3) Public Debt Securities in Banks	42.8	39.5	13.7	32.2	76.3	<i>Remittance inflows size</i>					
<i>By region</i>						Large recipients	23.5	44.7	-1.9	5.7	94.4
EE	31.2	22.5	7.5	25.5	67.3	Low recipients	12.8	55.1	-1.7	3.9	32.9
WH	37.8	19.5	15.8	32.8	70.6	<i>Exchange rate region</i>					
Asia	28.8	12.4	14.2	25.7	47.3	Floaters	6.2	12.7	-1.4	2.7	19.6
Africa	41.3	14.1	28.9	38.5	56.3	Peggers	22.8	60.3	-2.1	6.3	86.1
MECCA	135.5	63.9	16.1	155.8	180.9						
<i>Remittance inflows size</i>											
Large recipients	69.1	59.8	26.8	36.8	161.3						
Low recipients	32.4	19.6	12	26.2	63.5						
<i>Exchange rate region</i>											
Floaters	35.4	17.9	14.6	32.3	63.7						
Peggers	60.7	63.9	10.3	33.4	160.1						

Source: IMF Staff

The FXI data, a key variable in the analysis, are from Adler et al. (2021), updated in 2023, and is the most comprehensive FXI database for cross-country analysis. On average, all regions have been net buyers of FX, regardless of their FX regime and the size of remittances received. By region, the MECCA accumulated the largest FX balances via FXIs between 2000 and 2022—the average FX balance accumulated via FXIs is 1.7 percent of GDP (Table 2). EE economies also had a robust accumulation of FX reserves through FXIs, albeit weaker than in the MECCA region. WH economies rank at the bottom just ahead of Africa. The variable FX regime draws on the IMF's de facto exchange rate regime classification.

	Number	Mean	Stddev	P10	Median	P90
FX intervention Policies (GDP)	4046	1.2	4.9	-2.7	0.6	5.9
<i>By region</i>						
Eastern Europe (EE)	242	1.4	3.6	-2.4	1.1	5.4
Western Hemisphere (WH)	484	0.8	3	-2.1	0.5	4.1
Asia	352	1.4	4.1	-2.7	0.7	6.9
Africa	572	0.7	5.1	-3.1	0.4	7.4
Middle East, Caucasus, and Central Asia (MECCA)	396	1.7	6.7	-4.2	0.9	8.4
<i>Remittance inflows size</i>						
Large recipients	1584	1.1	4.1	-2.4	0.7	5.2
Low recipients	1606	1.3	5.5	-3.1	0.5	6.3
<i>Exchange rate region</i>						
Floaters	1037	1.2	3.5	-1.8	0.7	5.2
Peggers	2284	1.1	5.4	-3.4	0.5	6.2

Source: Authors

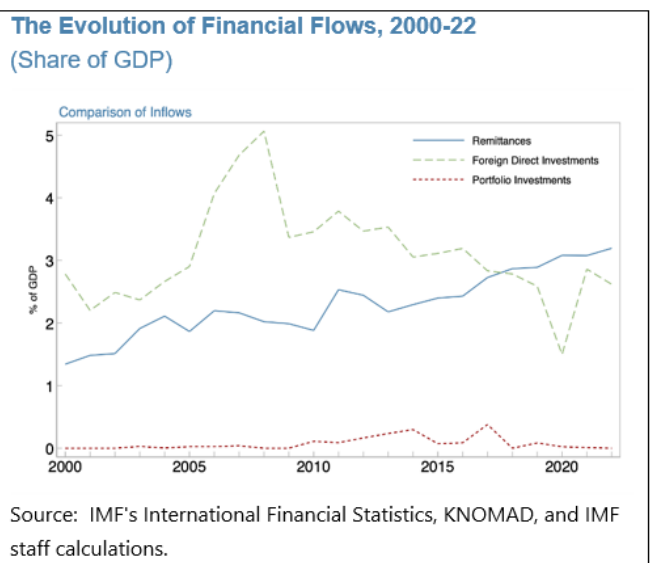
The control variables used in this paper are standard in the literature (Table 3). Data on inflation, monetary policy rates, central bank reserves, and trade (exports and imports) are from the IMF's International Financial Statistics. Data on gross domestic product (GDP), GDP per capita, and debt-to-GDP data are from the IMF's World Economic Outlook (WEO) database. Capital openness is taken from Chinn & Ito (2008), and the institutional quality data is from the World Governance Indicators (WGI) of the World Bank. The daily exchange rate is taken from Bloomberg. Finally, the macroprudential measures are from Alam et al. (2019), and the data on systemic banking crises is from Laeven & Valencia (2018).

	Number	Mean	Stddev	P10	Median	P90	Source
GDP per capita (PPP thousands, USD)	3231	12.7	16.1	1.7	8.2	26.5	IMF WEO
GDP growth rate	3246	6.6	16.5	-7.2	7.1	21.3	IMF WEO
Log of GDP (in thousands USD)	3090	9.7	2.2	6.8	9.6	12.7	IMF WEO
Inflation	2933	7.4	22.4	0.4	4.1	12.8	IMF IFS
Trade Openness	2738	57.7	33.4	27.1	51.1	95.1	Author's calculation
Exports (to GDP)	2738	24.5	19.7	5.1	19.6	49.9	IMF IFS
Imports (to GDP)	2738	33.3	18.7	15.01	30.2	54.4	IMF IFS
Capital account openness	2923	0.43	0.34	0.16	0.2	1	Chinn & To (2006)
Monetary Policy Rate	1117	7.9	9.1	2	5.7	15.5	IMF IFS
Macroprudential Policy	3297	0.4	1.6	0	0	2	Alam et al. (2019)
Central Bank Reserves (to GDP)	2002	22.5	36.6	6	16.1	38.9	IMF IFS
Debt (to GDP)	3138	52.6	45.1	14.8	42.9	94.6	IMF WEO
Banking crisis dummy	3297	0.01	0.12	0	0	0	Laeven & Valencia (2018)

Why are Remittance Inflows Different?

Over the past 20 years, foreign inflows of workers' remittances have not only been growing fast (also as a share of GDP), but remained stable and long-lasting, dwarfing other financial inflows. The trends discussed in Barajas et al. (2018) and covering until 2017 have only strengthened (Figure), also in real terms. Since 2017, remittance inflows as a share of GDP exceed FDI flows (to GDP) as the larger financial flow, reaching about USD 0.8 trillion (nominal terms) in 2023. By region, Asia showed the largest increase, followed by WH economies and EE according to the latest KNOMAD dataset (Figure 1 in Annex II).²

On average, remittance inflows exceeded the levels of FDI and portfolio inflows in the three regions reported (Table 4). Within each region, however, economies with lower inflows (10th percentile of the distribution) received more FDI than remittances. This also held for the median economy in the EE and WH regions, but not on average and at the 90th percentile, with remittance inflows largely surpassing FDI and portfolio flows. For some economies, remittance inflows are the larger source of foreign exchange receipts, also above trade.³



² Rahman and Kwen Fee (2014), also found South Asia as the largest recipient of remittance inflows.

³ A non-negligible number of LMICs in the Asian, MECCA, and WH regions face a high and growing revenue dependence on these inflows. Some major recipients include Tajikistan (51 percent of GDP), Tonga (44 percent), Lebanon (36 percent), Samoa (34 percent) and the Kyrgyz Republic (31 percent). Remittances to Central American economies (e.g., Nicaragua and Guatemala) are in the 20 percent of GDP range and account for a larger share of FX inflows than exports.

Table 4: Financial Flows Key Descriptive Statistics

	Number	Mean	Stddev	P10	Median	P90
<i>Financial Inflows (to GDP)</i>						
Remittances (t-1)	3,018	4.8	7.1	0.01	2.1	13.4
Eastern Europe (EE)	242	6.2	7.4	0.3	2.9	17.2
Western Hemisphere (WH)	440	5.6	8.6	0.2	2	16.1
Asia	351	4.2	5.1	0.08	2.8	9.7
Remittances (t-2)	2,747	4.6	7.1	0.0	2.0	12.8
Foreign Direct Investment (t-1)	2,851	4.9	15.3	0.1	2.8	10.1
Eastern Europe (EE)	242	5.2	10.4	0.9	3.2	9.1
Western Hemisphere (WH)	462	3.9	3.6	0.9	3.5	7.6
Asia	349	3	4.9	0.1	1.8	7.2
Foreign Direct Investment (t-2)	2,599	5.1	15.5	0.2	2.9	10.2
Portfolio Flows (t-1)	2,543	0.8	3.8	-0.5	0.02	3.1
Eastern Europe (EE)	236	0.6	1.8	-1.1	0.07	3.1
Western Hemisphere (WH)	436	1.1	2.7	-0.4	0.5	3.8
Asia	315	0.7	1.9	-0.6	0.1	2.6
Portfolio Flows (t-1)	2,310	0.8	3.4	-0.4	0.0	3.0

Source: Authors

The Distinctive Nature of Remittance Inflows

Why are remittances different from other financial inflows? There is extensive literature on the three main drivers of FDI inflows: market variables (i.e., market size and growth potential), efficiency gains (costs and production processes), and access to resources (natural resources). The portfolio flow literature points to a range of pull factors (i.e., risk appetite and U.S. government bond yields) and push factors (i.e., economic growth, external vulnerabilities, and financial market conditions) to explain the portfolio flow dynamics. Some of these characteristics help to explain why FDI and portfolio inflows display unstable patterns and do not have a strong track record in fostering financial depth and stability.

In contrast, remittances are interest rate-insensitive and often provide a safety net for recipients by helping to stabilize their income. These inflows are not driven by arm's length, profit maximization, or arbitrage opportunities but by altruistic motives to a large extent. Remittances are, for the most part, regular transfers of funds from workers abroad to family members; most recipients are part of the informal economy and do not have access to bank credit to ease financing constraints. These inflows are typically targeted at the most vulnerable segments of the recipient country's population. As such, they become an insurance tool for self and family, helping to smooth consumption and reduce poverty (Yoshino (2017)). In this regard, the channeling of remittances through the financial

sector should be expected to be temporary, and only a fraction of total receipts would be expected to remain as deposits in the financial system (see also surveys, e.g., IOM (2023) and empirical studies, e.g., Anzoategui et al. (2011)). The continued receipt of these inflows would also be expected to complement banks' liquidity buffers and contribute to support financial depth.

How do remittance (and other) inflows impact the depth of financial markets?

How do remittance inflows compare to other inflows in terms of supporting financial market's depth? To answer this question, we empirically study the relationship between different measures of financial sector depth and different financial flows (remittances, FDI, and portfolio investment as a share of GDP). In the baseline specification, we use deposits, private credit, and public debt securities (to GDP) as measures of financial sector depth $FD_{i,t}$ for country i at time t , following the literature (e.g., King and Levine (1993), Aggarwal et al. (2006), Demirguc-Kunt et al. (2011)), to estimate the following equation:

$$(1) \quad FD_{i,t} = \delta + \gamma_i + \sum_{k=1}^2 g_k^{Rem} Rem_{i,t-k} + \sum_{k=1}^2 g_k^{FDI} FDI_{i,t-k} + \sum_{k=1}^2 g_k^{PI} PI_{i,t-k} + \gamma^{Controls} X_{i,t-1} + \epsilon_{i,t}^{FD}.$$

The explanatory variable $Rem_{i,t}$ refers to the remittance inflow-to-GDP ratio for country i at time $t \in \{t, t-k\}$, where $k=1, 2$. In addition to remittance inflows, the analysis also includes foreign direct investment and portfolio investment flows to GDP, two other types of financial inflows. The explanatory variables FDI and PI refer to FDI-to-GDP and portfolio inflows-to-GDP with two lags, respectively. The estimated lag coefficients $\{\gamma_1^{Rem}, \gamma_2^{Rem}\}$ are the key coefficients of interest. We also analyze the coefficients $\{\gamma_t^{FDI}, \gamma_t^{PI}\}$ to identify the different nature of remittances compared to other financial flows. The use of lag variables in the specification of the model is to avoid possible endogeneity. The control vector $\{X\}$ includes the lagged values of control variables identified in the literature, $X = \{\text{per capita GDP, log of GDP in USD, inflation, trade openness, capital openness, monetary policy rate, exchange rate volatility, and three dummies—Global Financial Crisis, Taper Tantrum, and Covid}\}$. The model is estimated using panel estimation with random effects. (see also the robustness section for a discussion about other estimation methods).

Table 5a: Financial Flows on Banking Deepening, by Region

Model	Bank Deposits				Private Credit				Public Debt Securities			
	ALL	EE	WH	Asia	ALL	EE	WH	Asia	ALL	EE	WH	Asia
Remittances (t-1)	0.5 (0.3)	1.3*** (0.4)	0.9* (0.6)	0.6 (1.1)	0.4 (0.4)	2.0*** (0.6)	0.26 (0.7)	-0.1 (0.8)	4.3** (1.8)	5.0 (3.6)	-3.0 (4.5)	2.0 (1.8)
Remittances (t-2)	-0.3 (0.4)	-0.6 (0.4)	-3.6*** (1.3)	1.5 (1.4)	-0.3 (0.3)	-1.2 (1.0)	-2.1*** (0.8)	2.2*** (1.0)	0.4 (1.9)	5.8*** (2.1)	2.4 (4.5)	-1.3 (2.1)
FDI (t-1)	-0.04*** (0.01)	-0.01 (0.03)	-0.8*** (0.3)	-0.1 (0.1)	0.01 (0.02)	-0.04 (0.05)	-0.7*** (0.2)	0.01 (0.05)	0.1 (0.04)	0.1*** (0.02)	-1.7** (0.9)	-0.9*** (0.1)
FDI (t-2)	-0.00 (0.01)	0.02 (0.03)	-0.11 (0.2)	-0.13** (0.06)	0.03*** (0.01)	0.2** (0.1)	-0.04 (0.2)	0.05 (0.1)	-0.02 (0.1)	-0.01 (0.01)	-1.0 (0.7)	-0.0 (0.4)
PI (t-1)	0.05 (0.1)	0.2 (0.2)	0.001 (0.3)	-0.4 (0.3)	-0.03 (0.1)	0.8*** (0.3)	-0.14 (0.1)	-0.2 (0.4)	-0.5* (0.3)	0.06 (0.1)	-0.8 (1.0)	-0.3** (0.1)
PI (t-2)	-0.04 (0.08)	0.14 (0.1)	0.43* (0.3)	-0.00 (0.4)	0.06 (0.1)	1.0 (0.7)	0.44* (0.3)	-0.15 (0.3)	0.3 (0.3)	0.5 (0.3)	0.2 (1.0)	0.2 (0.3)
R ²	37.5	75.4	57.6	60.2	32.1	50.0	68.6	70.5	45.9	83.3	68.6	86.3
N	888	141	218	128	888	141	218	128	185	45	63	58

* p < 0.1; ** p < 0.05; *** p < 0.01

Table 5b: Financial Flows on Banking Deepening, by FX Regime and Size

	Bank Deposits				Private Credit				Public Debt Securities		
	FX Regime		Remittances Size		FX Regime		Remittances Size		FX Regime	Remittances Size	
	Floaters	Peggers	Large	Low	Floaters	Peggers	Large	Low	Floaters	Large	Low
Remittances (t-1)	0.42 (0.43)	0.78** (0.39)	0.53 (0.35)	0.24 (0.64)	0.64 (0.85)	0.54 (0.33)	0.45 (0.42)	-1.05** (0.50)	4.11** (1.83)	6.40*** (1.40)	4.04 (3.91)
Remittances (t-2)	-0.05 (0.23)	0.25 (0.41)	-0.21 (0.40)	-0.26 (0.39)	-0.38 (0.47)	0.24 (0.35)	-0.18 (0.29)	-1.96** (0.87)	0.95 (2.04)	-0.65 (3.40)	1.89 (2.67)
FDI (t-1)	0.00 (0.01)	0.09 (0.15)	-0.09 (0.12)	-0.04*** (0.01)	-0.00 (0.03)	0.36*** (0.11)	0.01 (0.14)	0.01 (0.02)	0.06 (0.04)	-0.42 (0.77)	0.04 (0.04)
FDI (t-2)	0.01** (0.01)	-0.06 (0.13)	-0.10 (0.08)	0.00 (0.01)	0.02*** (0.01)	0.13 (0.17)	0.17 (0.13)	0.03*** (0.01)	-0.02 (0.04)	-0.24 (0.44)	-0.04 (0.04)
PI (t-1)	-0.12** (0.06)	-0.05 (0.20)	-0.14 (0.19)	0.04 (0.07)	0.01 (0.12)	0.08 (0.19)	-0.07 (0.20)	-0.07 (0.09)	-0.49 (0.35)	-0.04 (0.47)	-0.61** (0.29)
PI (t-2)	-0.15*** (0.05)	-0.22 (0.24)	-0.14 (0.23)	-0.06 (0.08)	0.09 (0.09)	0.25* (0.13)	0.03 (0.12)	0.02 (0.11)	0.57* (0.31)	1.5*** (0.11)	0.05 (0.22)
R ²	64.4	39.1	34.2	45.0	56.7	43.4	35.7	38.6	47.1	91.9	47.6
N	438	448	440	448	438	448	440	448	166	42	143

In the aggregate, remittances increase deposits, especially in the short term, with a 1 percent increase in remittances leading to a 0.5 percent increase in the bank deposits-to-GDP ratio and by

0.2 percent after two periods (Table 5a, first column). The results are in line with other studies. Demirgüç-Kunt et al. (2006)'s panel analysis, covering 99 low-income recipients of remittances during 1975-2003, also presents evidence that remittances increase deposits to GDP by 0.5-0.6 percent when remittances increase by one percent. In their analysis, the causality from remittances to banking sector development holds even after correcting estimates for different potential sources of bias. For Mexico, Aggarwal et al. (2016) also finds a statistically significant causal link between remittances and banking sector development when using a micro-level database and instruments to ensure causality.⁴

While the aggregate effect is statistically insignificant in our case, there is: (i) a strong regional component, with remittances positively and significantly impacting bank deposits in EE and WH, and only EE after two periods (Table 5a, second to fourth columns), and (ii) a strong FX regime effect (Table 5b), with peggers showing a large positive and significant coefficient (+0.8) with remittances after one lag. In our estimations, the direct regional effect disappears and becomes negative in the WH region as time passes (coefficient -3.6, reversing the previous period's positive effects), pointing at the temporal nature of these deposits. This finding supports the results of also a few studies and surveys (e.g., IOM 2023) showing remittances are earmarked for consumption primarily and not for saving. Also, specifications in Tables (5a, b) capture the direct impact of remittances on FD but not how the proceeds from spending remittances are channeled through the formal sector, returning to the banking sector as bank deposits.

In contrast, FDI inflows reduce bank deposits (with a negative coefficient that is statistically significant in most specifications) and portfolio inflows don't appear to have a significant effect. By region, the result is particularly strong in WH (with an FDI coefficient of -0.8 with one lag), possibly capturing the repatriation of profits. This finding also holds in economies holding a floating exchange regime and those receiving low remittance inflows, with FDI showing negative coefficients. Compared to remittances, portfolio inflows have a small effect, if statistically significant.

On the asset side, banks tend to adopt a safe-to-safe transformation strategy with additional deposit funding, resulting from remittance inflows staying in the banking system (third column specifications

⁴ Other studies include Anzoategui, Demirgüç-Kunt, Martínez Pería (2014) with evidence for El Salvador, and Aggarwal, Demirgüç-Kunt, and Martínez Pería (2011), among others.

in Table 5a).⁵ On average, economies receiving higher remittance inflows are associated with larger holdings of sovereign debt. The result is strong in the EE region after two lags, with positive and statistically significant coefficients: a one percent increase in remittances increases public debt holdings by 5.8 percentage points in the second period. Also in the EE region, EE banks appear to fund some private sector credit with higher deposits accumulated from remittance receipts and in Asia, only after two periods. Still, in most other regions, remittances appear to substitute for credit, i.e., consumption and investment that banks would fund through credit are now financed through remittances. The negative and significant coefficient of remittance inflows on credit for small remittance recipients (Table 5b), and in WH economies, supports a crowding out effect of remittances on bank credit. Finally, the effects from FDI and portfolio inflows on public debt holdings appear to be much smaller than those from remittances, also when controlling for exchange rate regimes and the size of remittance inflows.

How do remittance (and other) inflows impact financial stability?

The empirical model (1) is also used to analyze the impact of remittance inflows on financial stability is:

$$(2) \quad FS_{i,t} = \delta^* + g_i^* + \sum_{k=1}^2 g_k^{*Rem} Rem_{i,t-k} + \sum_{k=1}^2 g_k^{*FDI} FDI_{i,t-k} + \sum_{k=1}^2 g_k^{*PI} PI_{i,t-k} + \phi^{Controls} Z_{i,t-1} + \epsilon_{i,t}^{FS};$$

with FS being the dependent variable financial stability for country i at time t , $FS_{i,t} = \{\text{actual regulatory capital ratio, net open foreign exchange position to bank capital}\}$ ⁶. Higher actual regulatory capital ratio in the banking sector provides higher buffers to the system. The net open FX position controls exposures to FX risk by measuring mismatches between asset and liabilities denominated in foreign currency. Also, the control vector $Z = \{\text{exports-to-GDP, imports-to-GDP, private credit-to-GDP, macroprudential policy, monetary policy rate, systemic banking crisis banking dummy, debt-to-GDP, GDP per capita (in PPP U.S.$), central bank reserves-to-GDP and regulatory capital. Coefficients } \{\gamma_1^{*Rem}, \gamma_2^{*Rem}\}$ are the key variables of this analysis.

⁵ Demirgüç-Kunt et al. (2006) find a statistically positive, albeit small, effect of remittances on bank credit to GDP, with a one percent increase in remittances leading to a 0.2-0.3 percent increase in credit to GDP. For the full sample, we find an estimate of a 0.4 percent increase in credit to GDP, but the coefficient is statistically non-significant in any sample. Giuliano and Ruiz-Arraz (2006) also found a positive relation between remittance flows and bank deposits and weaker correlations between remittance flows and bank credit.

⁶ We also examined the stock market capitalization-to-GDP ratio as another measure of financial depth. However, data limitations and the stock market's still minor role in emerging and developing markets' financial markets called for focusing on traditional banking.

Table 6a: Financial Flows on Financial Stability, by Region

	Actual Regulatory Capital Ratio				Net Open FX Position			
	ALL	EE	WH	Asia	ALL	EE	WH	Asia
Remittances (t-1)	0.09 (0.16)	-0.50*** (0.13)	-0.26 (0.16)	0.01 (0.38)	0.45 (0.55)	3.66*** (1.29)	-7.31 (9.56)	-1.56 (1.48)
Remittances (t-2)	0.04 (0.26)	0.71*** (0.05)	0.22 (0.15)	0.59*** (0.21)	-0.11 (0.20)	-0.82 (0.53)	10.44 (13.56)	-0.60 (0.95)
FDI (t-1)	0.00 (0.00)	0.00 (0.00)	-0.09 (0.09)	-0.26 (0.25)	0.00 (0.01)	-1.00 (2.36)	0.48* (0.28)	0.87 (0.76)
FDI (t-2)	0.01*** (0.00)	0.00 (0.01)	0.00 (0.05)	-0.01 (0.17)	-0.00 (0.00)	-0.57 (0.63)	0.57 (0.79)	-0.60*** (0.15)
PI (t-1)	-0.02 (0.02)	-0.04 (0.11)	-0.02 (0.06)	-0.28*** (0.07)	0.01 (0.04)	-1.29** (0.57)	0.18 (0.48)	-0.10 (0.24)
PI (t-2)	-0.04** (0.02)	0.00 (0.1)	-0.02 (0.07)	-0.14 (0.08)	0.04 (0.04)	-1.97* (1.1)	0.45 (0.5)	-0.08 (0.2)
R2	25.0	50.6	25.3	73.9	29.7	51.8	42.4	76.2
N	474	102	151	68	294	60	67	46

Table 6b: Financial Flows on Financial Stability, by FX Regime and Size of Remittances

	Actual Regulatory Capital Ratio				Net Open FX Position			
	FX Regime		Remittances Size		FX Regime		Remittances Size	
	Floaters	Peggers	Large	Low	Floaters	Peggers	Large	Low
Remittances (t-1)	0.15 (0.20)	0.03 (0.21)	0.07 (0.23)	0.30 (0.21)	1.56 (1.45)	-0.43 (0.54)	0.67 (0.54)	0.08 (1.70)
Remittances (t-2)	0.40 (0.29)	-0.33* (0.18)	0.08 (0.35)	-0.15 (0.15)	-0.61 (0.55)	0.46 (0.43)	-0.45 (0.38)	-0.49 (1.06)
FDI (t-1)	0.01** (0.00)	-0.09 (0.15)	0.07 (0.14)	0.01** (0.00)	-0.00 (0.01)	-0.16 (0.54)	0.44** (0.23)	0.00 (0.01)
FDI (t-2)	0.01*** (0.00)	-0.02 (0.09)	0.08 (0.13)	0.01*** (0.00)	0.00 (0.00)	0.02 (0.13)	0.07 (0.22)	-0.00 (0.00)
PI (t-1)	-0.03* (0.02)	-0.05 (0.13)	-0.04 (0.17)	-0.02 (0.02)	-0.00 (0.04)	0.13 (0.37)	-0.10 (0.28)	0.00 (0.07)
PI (t-2)	-0.04* (0.02)	-0.03 (0.1)	0.09 (0.08)	-0.04* (0.02)	0.01 (0.05)	0.30 (0.28)	0.81* (0.43)	0.01 (0.05)
R2	31.6	23.2	18.6	46.7	34.0	58.9	30.1	43.0
N	294	180	195	279	178	116	131	163

The financial stability effect of remittance inflows appear to support higher solvency ratios with lags, when statistically significant, while showing mixed effects on region-dependent net FX mismatches. At the region level, the effect on remittances on capital levels is mainly concentrated in the EE region and Asia and takes place with delays. A one percentage point increase in remittances would lead to an initial decline in capital buffers that would be overcompensated overtime with an increase (0.2

percentage points net effect after two periods) in EE banks' actual regulatory capital ratios. This result is consistent with the increase in deposits when remittances increase in the EE. Also, EE banks appear to experience a relatively significant net effect (2.8 percentage points, i.e., 10 times higher impact, Table 6a) on their net open FX position ratios (albeit from a relatively low average level, Table 1). In the EE region, higher remittance inflows intermediated through the banking sector would lead to higher bank credit to the private sector relative to deposits (including FX-denominated), exacerbating EE banks' exposure to FX risk. In Asia, higher remittances appear to increase bank credit and capital ratios with a two-lag delay. FX predictability under peg regimes appear to reduce the need for bank buffers over time (Table 6b), while economies under floating exchange rate regimes, banks will try to expand their internal buffers (albeit the signs are not statistically significant) to manage potential market-driven risks.

The effect of FDI flows on banks' financial stability is mixed. Higher FDI flows appear to increase banks' capital ratios, with a lag for the full sample. In most regions, the coefficients are generally close to 0 or negative and nonsignificant (Table 6a). At the same time, in the WH region, FDI tends to increase FX exposures with higher net open positions. In Asia, the aggregated two period effect is also positive, even though, over time, FX mismatches become smaller. Portfolio inflows appear to reduce capital ratios, albeit with lags, and especially in Asia. In EE, portfolio inflows do not appear to have a significant effect on capital ratios but do appear to reduce FX open positions, supporting the notion of the temporality of these inflows in the banking sector.

The results depend on the exchange rate regime and remittance inflows dependence of the economies analyzed (Table 6b). For example, in economies with a pegged exchange rate regime, remittance inflows appear to reduce bank capital ratios overtime. Lack of FX risks reduce the need for additional buffers. In contrast, FDI appears to positively impact banks' capital ratios in economies with a floating exchange rate regime or receiving low remittance inflows. Dealing against FX uncertainty calls for building capital buffers. At the same time, portfolio inflows appear to be associated with lower capital ratios in economies with a flexible exchange rate regime or receiving low remittance inflows. In line with the portfolio flows literature on stability risks, in economies receiving large remittance inflows, additional FDI or portfolio inflows translate into higher FX exposures in the banking sector.

FXIs Interventions and Impact on the Depth of the Financial Sector

This section discusses the role of active policy (central bank purchases of FX) on whether financial inflows impact financial sector deepening and financial stability. We show that the use of FXIs, if statistically significant, has an overall negative impact on deposits. There is a case for FXIs, if remittances or FDI inflows, to a lesser extent, are very large, however.

FXIs and Remittances Inflows in the Financial Sector: Financial Development Costs

Do FXIs designed to help manage the pressures associated with remittance inflows help or hurt the banking sector by hindering financial deepening? The discussion below suggests they hurt because they encourage lower bank deposits and higher market return investment options, if statistically significant. The analysis looks at alternative specifications covering the full sample, regions, different foreign exchange regimes (floaters and peggers), and the size of remittance inflows.

The models tested expand specifications (1)-(2) to include variable $FXI_{i,t-1}$ to control for foreign exchange interventions-to-GDP on financial inflows as well as its interaction term with remittance, FDI and portfolio inflows to capture specific effects associated with each type of financial inflow.

Formally,

$$(3) \quad FD_{i,t} = \alpha + \phi_i + \sum_{k=1}^2 \phi_k^{Rem} Rem_{i,t-k} + \sum_{k=1}^2 \phi_k^{FDI} FDI_{i,t-k} + \sum_{k=1}^2 \phi_k^{PI} PI_{i,t-k} + \phi^{FXI} FXI_{i,t-1} + \phi^{Controls} X_{i,t-1} + \epsilon_{i,t};$$

and

$$(4) \quad FD_{i,t} = \alpha^* + \phi_i^* + \sum_{k=1}^2 \phi_k^{*Rem} Rem_{i,t-k} + \sum_{k=1}^2 \phi_k^{*FDI} FDI_{i,t-k} + \sum_{k=1}^2 \phi_k^{*PI} PI_{i,t-k} + (\phi^{Rem,FXI} \cdot \phi^{FDI,FXI} \cdot \phi^{PI,FXI}) * \begin{pmatrix} Rem_{i,t-1} \\ FDI_{i,t-1} \\ PI_{i,t-1} \end{pmatrix} FXI_{i,t-1} + \phi^{*FXI} FXI_{i,t-1} + \phi^{*Controls} X_{i,t-1} + \epsilon_{i,t}.$$

In these specifications, FX interventions imply the purchase of FXs and the associated accumulation of FX reserves. The coefficients $\{ \phi^{Rem,FXI}, \phi^{FDI,FXI}, \phi^{PI,FXI}, \text{ and } \phi^{FXI} \}$ capture the impact of FXI on financial depth when controlling for remittance, FDI and portfolio inflows and the generic effect, respectively. The different specifications are estimated using panel estimation with random effects.

The control variables in the vector $\{X\}$ are the same described under specification (1) in the previous non-policy analysis.

	Bank Deposits			Private Credit			Public Debt Securities		
	(1)	(2)	(3)	(1')	(2')	(3')	(1'')	(2'')	(3'')
Remittances (t-1)	0.5 (0.34)	0.88* (0.53)	0.7 (0.54)	0.4 (0.43)	0.74 (0.74)	0.58 (0.70)	4.3** (1.75)	4.6*** (1.65)	4.5** (1.84)
Remittances (t-2)	-0.27 (0.37)	-0.43 (0.68)	-0.42 (0.68)	-0.34 (0.30)	-0.46 (0.52)	-0.43 (0.50)	0.42 (1.92)	-0.15 (1.62)	-0.20 (1.73)
FDI (t-1)	-0.04*** (0.01)	-0.05*** (0.01)	-0.05*** (0.02)	0.01 (0.02)	0.00 (0.02)	-0.00 (0.03)	0.05 (0.04)	0.05 (0.04)	0.03 (0.03)
FDI (t-2)	-0.00 (0.01)	-0.01 (0.01)	0.00 (0.01)	0.03*** (0.01)	0.03*** (0.01)	0.04*** (0.01)	-0.02 (0.05)	0.00 (0.05)	0.01 (0.05)
PI (t-1)	0.03 (0.08)	0.10** (0.04)	0.13** (0.05)	-0.03 (0.09)	-0.00 (0.12)	0.02 (0.14)	-0.47* (0.28)	-0.19 (0.27)	-0.21 (0.28)
PI (t-2)	-0.04 (0.08)	0.03 (0.06)	-0.01 (0.10)	0.06 (0.10)	0.07 (0.11)	0.05 (0.13)	0.28 (0.26)	0.24 (0.25)	0.27 (0.27)
FXI (t-1)		-0.23** (0.12)	-0.33** (0.16)		-0.18 (0.12)	-0.30* (0.17)		-0.30** (0.14)	-0.24* (0.14)
Remittances (t-1) * FXI (t-1)			0.02** (0.01)			0.02* (0.01)			0.01 (0.03)
FDI (t-1) * FXI (t-1)			0.01* (0.01)			0.01 (0.01)			-0.02 (0.02)
PI (t-1) * FXI (t-1)			-0.03 (0.02)			-0.02 (0.02)			-0.02 (0.03)
R2	37.5	37.7	39.3	32.1	32.8	33.4	45.9	47.0	47.3
N	888	680	680	888	680	680	185	185	185

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

FXIs tend to negatively impact the banking sector deepening through lower deposits, loans to the private sector, and holdings of public debt securities (negative coefficients ϕ^{FXI} and ϕ^{*FXI} in Table 7a). The insurance function of remittance inflows makes these flows intermediated by banks largely temporary deposits in a first instance (coefficient $\phi_2^{Rem} < 0$, albeit statistically nonsignificant). By reducing or removing exchange rate uncertainty and preserving the value of financial inflows over time, remittance recipients face lower budget constraints, can consume more, and invest in higher-return assets (than fixed-income instruments, such as housing construction) without having to account for potential future exchange rate-related losses in their income. As a result, this stability allows them to downplay their consumption smoothing considerations in their intertemporal planning (see also footnote 1).

When distinguishing between financial flows, FXIs have distinct marginal effects. When controlling for FXIs, as the country receives more FDI inflows, FXIs help mitigate the negative impact of FDI on deposits (positive and significant coefficient of 0.01 percentage points in the interactive term $\phi^{FDI,FXI}$ in Table 7a). The price-smoothing effect of FX purchases reduces the urgency for profit

repatriation and the cost of holding balances (beyond operational needs) in the host country. In the case of portfolio inflows, FXIs tend to reduce the level of deposits in the banking sector. Bank credit to the economy appears to be statistically affected by FXIs when the remittance interactive variable is included. The excess liquidity in the banking system driven by large remittance inflows (directly and indirectly) is costly for banks and would prompt some further credit to private agents, albeit the effect is small. Banks seem to reduce their holdings of government debt securities (seen as a safe asset) with FX interventions regardless of the size of inflows, however.

	EE			WH			Asia		
	(1a)	(2a)	(3a)	(1b)	(2b)	(3b)	(1c)	(2c)	(3c)
Remittances (t-1)	1.32***	1.36***	1.07***	0.92*	0.98	1.04	0.62	0.47	0.56
	(0.42)	(0.40)	(0.40)	(0.56)	(0.63)	(0.70)	(1.05)	(0.99)	(0.98)
Remittances (t-2)	-0.63	-0.67	-0.52	-3.56***	-3.54***	-3.62***	1.45	1.65	1.54
	(0.44)	(0.44)	(0.43)	(1.31)	(1.31)	(1.34)	(1.41)	(1.32)	(1.20)
FDI (t-1)	-0.01	-0.01	-0.01	-0.82***	-0.80***	-0.85**	-0.05	-0.02	-0.03
	(0.03)	(0.02)	(0.03)	(0.28)	(0.30)	(0.33)	(0.07)	(0.06)	(0.06)
FDI (t-2)	0.02	0.03	0.02	-0.11	-0.12	-0.02	-0.13**	-0.18**	-0.18**
	(0.03)	(0.04)	(0.04)	(0.17)	(0.18)	(0.24)	(0.06)	(0.09)	(0.09)
PI (t-1)	0.16	0.26	0.35	-0.07	-0.02	-0.03	-0.37	-0.17	-0.15
	(0.16)	(0.19)	(0.22)	(0.23)	(0.21)	(0.25)	(0.29)	(0.32)	(0.37)
PI (t-2)	0.14	0.11	0.07	0.43*	0.43	0.44*	-0.00	-0.00	0.03
	(0.14)	(0.13)	(0.13)	(0.25)	(0.27)	(0.26)	(0.40)	(0.41)	(0.42)
FXI (t-1)		-0.13	-0.19**		-0.20*	0.11		-0.20	-0.23
		(0.10)	(0.09)		(0.12)	(0.21)		(0.25)	(0.35)
Remittances (t-1) * FXI (t-1)			0.02***			-0.00			0.01
			(0.00)			(0.01)			(0.05)
FDI (t-1) * FXI (t-1)			0.00			-0.07			0.00
			(0.00)			(0.05)			(0.01)
PI (t-1) * FXI (t-1)			-0.09*			0.01			-0.01
			(0.04)			(0.05)			(0.02)
R2	75.4	75.7	76.7	57.6	57.9	58.2	60.2	60.7	60.8
N	141	141	141	218	218	218	128	128	128

* p < 0.1; ** p < 0.05; *** p < 0.01

Table 7c: Bank Deposits by Region, with Central Bank Reserves

	ALL	EE	WH	Asia
Remittances (t-1)	0.38 (0.42)	1.16** (0.47)	0.77* (0.44)	-0.08 (1.50)
Remittances (t-2)	0.10 (0.27)	-0.39 (0.42)	-0.15 (0.37)	1.52 (1.49)
FDI (t-1)	-0.04*** (0.01)	-0.01 (0.03)	0.06 (0.17)	0.06 (0.09)
FDI (t-2)	-0.00 (0.01)	0.01 (0.04)	-0.11 (0.35)	-0.25*** (0.08)
PI (t-1)	0.09 (0.09)	0.24 (0.22)	-0.17 (0.14)	-0.28 (0.59)
PI (t-2)	-0.02 (0.07)	0.11 (0.11)	0.11 (0.23)	-0.24 (0.47)
FXI (t-1)	-0.22* (0.13)	-0.12 (0.11)	-0.02 (0.17)	-0.49* (0.27)
Remittances (t-1) * FXI (t-1)	0.02* (0.01)	0.01*** (0.00)	0.01 (0.01)	0.03 (0.03)
FDI (t-1) * FXI (t-1)	0.01** (0.00)	0.00 (0.00)	-0.08* (0.04)	0.01 (0.02)
PI (t-1) * FXI (t-1)	-0.03 (0.03)	-0.08* (0.04)	0.07** (0.03)	-0.02 (0.02)
Reserves (t-1)	0.21 (0.13)	0.10 (0.06)	-0.32 (0.87)	2.95 (2.03)
R2	57.2	76.8	78.1	62.0
N	591	139	195	107

* p < 0.1; ** p < 0.05; *** p < 0.01

Table 7d: Bank Deposits, by Size of Remittance Inflows and Exchange Rate Regime

	Low Remittance Inflows			Peggers		
	(1a)	(2a)	(3a)	(1b)	(2b)	(3b)
Remittances (t-1)	0.24 (0.64)	0.21 (0.69)	-0.38 (0.65)	0.78** (0.39)	1.59*** (0.54)	1.35* (0.69)
Remittances (t-2)	-0.26 (0.39)	-0.66** (0.31)	-0.39 (0.29)	0.25 (0.41)	0.17 (0.83)	0.30 (0.98)
FDI (t-1)	-0.04*** (0.01)	-0.04*** (0.01)	-0.03* (0.02)	0.09 (0.15)	0.04 (0.18)	-0.01 (0.17)
FDI (t-2)	0.00 (0.01)	0.01 (0.01)	0.02* (0.01)	-0.06 (0.13)	-0.28** (0.12)	-0.30** (0.13)
PI (t-1)	0.04 (0.07)	0.06 (0.04)	0.15** (0.07)	-0.05 (0.20)	0.27 (0.21)	0.36 (0.23)
PI (t-2)	-0.06 (0.08)	-0.07 (0.08)	-0.15 (0.09)	-0.22 (0.24)	-0.07 (0.23)	-0.09 (0.24)
FXI (t-1)		-0.37*** (0.13)	-0.48** (0.19)		-0.33** (0.14)	-0.52** (0.22)
Remittances (t-1) * FXI (t-1)			0.22* (0.13)			0.03 (0.02)
FDI (t-1) * FXI (t-1)			0.01 (0.00)			0.01 (0.02)
PI (t-1) * FXI (t-1)			-0.06** (0.03)			-0.03 (0.04)
R2	44.8	48.4	52.2	39.1	46.0	47.5
N	448	373	373	448	246	246

* p < 0.1; ** p < 0.05; *** p < 0.01

FXI policies have a negative (when statistically significant) effect on financial deepening by region (Table 7b). In WH, FXIs reduce the positive impact of remittances on bank deposits build in t-1. When considering a two-year lag, FXIs further accentuate the withdrawal of bank deposits (Table 7b, specification (2b)). The size of remittance inflows is relevant in EE, with bank deposits dropping but by a slightly smaller amount when applying FXIs in economies receiving large remittance inflows (specification (3a)). For Asian economies, FXIs and interacting variables with all financial flows remain statistically insignificant (Table 7c). Controlling for international reserve holdings, some of the additional funding from higher levels of remittance inflows is to stay in deposits, and the overall result that FXIs reduce deposits for the full sample remains valid. In economies that typically receive low remittance inflows, the negative effect of FXIs on remittances is moderated or can become positive if unexpectedly receiving large remittance inflows, similar to the results reported above (Table 7d). This result points to a positive role for FXIs in case of punctual large financial inflows.

FXIs also negatively affect portfolio investments in economies receiving low remittance inflows, with the larger the inflows the lower the deposits in the banking system. This result suggests that, by providing a degree of FX stability, FXIs increase the incentives to channel portfolio investments into higher-return opportunities. Controlling for the exchange rate regime, FXIs also appear to discourage holding deposits in the banking system.

	EE			WH			Asia		
	(1a)	(2a)	(3a)	(1b)	(2b)	(3b)	(1c)	(2c)	(3c)
Remittances (t-1)	4.98 (3.6)	5.3 (3.3)	12.1*** (2.4)	-2.98 (4.5)	-3.49 (4.2)	-3.68 (5.6)	1.95 (1.8)	2.34 (1.8)	1.96 (1.5)
Remittances (t-2)	5.76*** (2.1)	5.26*** (1.8)	1.27 (2.4)	2.43 (4.5)	1.73 (4.3)	1.34 (4.4)	-1.32 (2.1)	-1.80 (2.2)	-2.33 (2.3)
FDI (t-1)	0.10*** (0.03)	0.10*** (0.02)	0.07*** (0.02)	-1.69** (0.8)	-1.88** (0.8)	-1.41 (0.9)	-0.84*** (0.3)	-0.95** (0.4)	-1.18** (0.5)
FDI (t-2)	-0.01 (0.01)	-0.01*** (0.0)	-0.01 (0.02)	-1.01 (0.7)	-0.70 (0.6)	-0.81 (0.8)	-0.00 (0.4)	0.03 (0.4)	0.06 (0.5)
PI (t-1)	0.06 (0.09)	0.15 (0.1)	0.51 (0.3)	-0.80 (1.0)	-1.14 (1.0)	-1.77 (1.1)	-0.25** (0.1)	0.04 (0.3)	0.20 (0.4)
PI (t-2)	0.45 (0.3)	0.45 (0.3)	0.14 (0.2)	0.15 (0.9)	0.22 (0.9)	0.08 (0.7)	0.24 (0.3)	0.28 (0.3)	0.18 (0.3)
FXI (t-1)		-0.08 (0.1)	0.15 (0.2)		0.42*** (0.08)	-0.23 (0.55)		-0.20 (0.17)	-0.62 (0.62)
Remittances (t-1) * FXI (t-1)			-0.26* (0.15)			1.16*** (0.32)			0.04 (0.02)
FDI (t-1) * FXI (t-1)			0.00 (0.01)			-0.35 (0.23)			0.09 (0.14)
PI (t-1) * FXI (t-1)			-0.18*** (0.01)			0.32 (0.27)			0.03 (0.02)
R2	83.3	83.4	84.8	68.6	69.2	73.1	86.3	87.5	88.4
N	45	45	45	63	63	63	58	58	58

* p<0.1; ** p<0.05; *** p<0.01

Finally, in the WH region, FXIs seem to encourage holdings of government securities, and the higher the remittance inflows, the higher the holdings (Table 8). While FXIs remove risks, in bank-centered economies with limited capital markets, debt holdings may be the choice. In EE, FXIs do not seem to have a significant impact on the government bond market unless remittance or portfolio inflows are large enough. In this case, the insurance component of FXIs encourages the use of these inflows for other purposes.

Robustness Checks

We control for various economic and financial variables to account for a possible omitted variable bias problem. Table 1 in Annex III shows the complete results of the estimated regression for development costs (deposit-to-GDP levels) with random effects estimation. Similar results (not reported in the annex but available from the authors at request) were found under OLS pooled estimation.

The table shows that the level of economic development (log of GDP coefficient) is positively associated with the level of financial development, especially in the EE region, where the coefficient of GDP per capita is positive and statistically significant. The positive coefficient is preserved for Asia as well; however, its significance disappears. Similarly, the size of the economy also improves financial depth and the size of remittance inflows (not shown and available from the authors). On the contrary, inflation has a negative impact on financial development, especially in EE and pegger countries, given its hindrance to the efficacy of a financial system and, thus, financial depth. A similar observation is noticeable for FX volatility, as higher FX volatility penalizes deposits by increasing the financial market's uncertainty.

Various crisis episodes had different effects. For instance, the Global Financial Crisis had a negative impact on financial depth, as the financial system was heavily damaged during the GFC. The COVID-19 episode, in contrast, improved the level of financial development as captured by the level of deposits. The latter is explained by the fact that due to national lockdowns; economic agents were not able to spend on consumption and investment goods and services, and those funds stayed in a financial system. The same effect is observable for private credit and public debt securities. The regression also controls for the monetary policy rate to abstract from non-sterilized FX interventions, the effect of which varies by region. Lastly, although capital and trade openness appear to have a positive impact, they remain statistically insignificant.

We also re-estimated the models with a fixed effects estimator. The results shown on Table 2 (in Annex III) confirm the findings of the baseline analysis. The inclusion of time fixed effects also did not change the policy results of the paper, as illustrated on Table 3 (Annex III). We also tried instrumenting inflows with output growth and estimating regressions with the IV estimator. Nevertheless, the instrument was not strong enough to make any inference. The IV estimation results are available on request.

Finally, we used the Hausmann specification test to check for potential endogeneity of the explanatory variables. Remittance-receiving economies tend to have low levels of economic development and weak financial sectors, among other characteristics. The analysis confirmed no correlation between the explanatory variables and the error term. Furthermore, when comparing models, the random effects model appeared to be more robust than the fixed effects model. The Breusch-Pagan test also confirmed homoscedasticity of the residual of both models, financial depth and stability, i.e., regressions (1)-(6).

Foreign Exchange Intervention and Remittances Inflows in the Financial Sector: Stability Effects

Do positive FX interventions reduce the vulnerabilities in the banking sector by increasing regulatory capital ratios and reducing exposures to foreign currency? If statistically significant, the FXI “subsidization” effect resulting in lower FX volatility has the unintended consequence of further increasing FX risk exposures within the banking sector and reducing buffers in the system (moral hazard behavior).⁷

The baseline models used to analyze financial stability (*FS*) in country *i* at time *t* are equivalent to model (2), extended to cover the policy variables FXI and the interaction explanatory variable (financial flows * FXIs) in study:

⁷ FXIs are often a discretionary, non-conventional monetary policy tool used by authorities to smooth exchange rate volatility. However, these instruments are costly and may provide a false sense of comfort. Mishkin (1996) and Obstfeld (1998), among others, show that pegged exchange rate regimes could encourage foreign exchange risk taking by firms and banks by reducing the incentive to hedge. Kim, Mano, and Mrkaic (2020) study about 5,000 non-financial firms in 19 emerging markets during 2002-17 and find statistically significant evidence that the firm-level share of FX debt increases after intensive use of FXIs.

$$(5) FS_{i,t} = \beta + l_i + \sum_{k=1}^2 l_k^{Rem} Rem_{i,t-k} + \sum_{k=1}^2 l_k^{FDI} FDI_{i,t-k} + \sum_{k=1}^2 l_k^{PI} PI_{i,t-k} + l^{FXI} FXI_{i,t-1} + l^{Policies} \begin{pmatrix} Macropru_{i,t-1} \\ Mon policy_{i,t-1} \end{pmatrix} + l^{Controls} Z_{i,t-1} + \epsilon_{i,t}; \text{ and}$$

$$(6) FS_{i,t} = \beta^* + l_i^* + \sum_{k=1}^2 l_k^{*Rem} Rem_{i,t-k} + \sum_{k=1}^2 l_k^{*FDI} FDI_{i,t-k} + \sum_{k=1}^2 l_k^{*PI} PI_{i,t-k} + (l^{*Rem,FXI}, l^{*FDI,FXI}, l^{*PI,FXI}) * \begin{pmatrix} Rem_{i,t-1} \\ FDI_{i,t-1} \\ PI_{i,t-1} \end{pmatrix} FXI_{i,t-1} + l^{*FXI} FXI_{i,t-1} + l^* Policies \begin{pmatrix} Macropru_{i,t-1} \\ Mon policy_{i,t-1} \end{pmatrix} + l^* Controls Z_{i,t-1} + \epsilon_{i,t},$$

The model is estimated using panel regression techniques with a random-effects component. Table 9a, specifications (3-3') show that, for the sample of emerging markets and developing countries, FXIs (i) reduce current regulatory capital ratios, reducing the positive effect of remittances in strengthening banks' buffers, and (ii) exacerbate banks' net FX open positions, although the result is statistically insignificant. Results hold when controlling for the level of central bank reserves (lagged by one period). By reducing deposits, FXIs, reduce the required holdings of Common Equity Tier 1 capital and thus the institution's regulatory requirements under the Basel framework. By investing on high-quality public debt banks, banks are not required to hold higher buffers, reinforcing the result.

	Actual Regulatory Capital Ratio			Net Open FX Position		
	(1)	(2)	(3)	(1')	(2')	(3')
Remittances (t-1)	0.09 (0.16)	-0.13 (0.19)	-0.20 (0.24)	0.45 (0.55)	0.53 (1.31)	0.52 (1.28)
Remittances (t-2)	0.04 (0.26)	0.44 (0.30)	0.52 (0.35)	-0.11 (0.20)	0.21 (0.56)	0.26 (0.52)
FDI (t-1)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.01)	0.01 (0.01)	0.00 (0.01)
FDI (t-2)	0.01*** (0.00)	0.01*** (0.00)	0.01** (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.01* (0.00)
PI (t-1)	-0.02 (0.02)	-0.02 (0.01)	-0.02 (0.01)	0.01 (0.04)	0.01 (0.05)	-0.02 (0.05)
PI (t-2)	-0.04** (0.02)	-0.03** (0.02)	-0.04* (0.02)	0.04 (0.04)	0.03 (0.04)	0.07 (0.07)
FXI (t-1)		-0.05 (0.04)	-0.10** (0.04)		-0.09 (0.17)	-0.16 (0.19)
Remittances (t-1) * FXI (t-1)			0.01 (0.01)			0.01 (0.01)
FDI (t-1) * FXI (t-1)			0.00 (0.00)			-0.00 (0.00)
PI (t-1) * FXI (t-1)			-0.00 (0.01)			0.02 (0.02)
R2	25.0	30.8	31.8	29.7	31.0	31.6
N	474	442	442	294	269	269

* p < 0.1; ** p < 0.05; *** p < 0.01

	Actual Regulatory Capital Ratio						Net Open FX Position					
	EE			WH			EE			WH		
	(1a)	(2a)	(3a)	(1'a)	(2'a)	(3'a)	(1b)	(2b)	(3b)	(1'b)	(2'b)	(3'b)
Remittances (t-1)	-0.5*** (0.13)	-0.4*** (0.1)	-0.4*** (0.1)	-0.26 (0.16)	-0.19 (0.17)	-0.19 (0.4)	3.66*** (1.3)	3.49** (1.5)	2.35 (1.5)	-7.31 (10.0)	-7.38 (9.9)	-9.25 (10.6)
Remittances (t-2)	0.7*** (0.05)	0.6*** (0.07)	0.7*** (0.09)	0.2 (0.15)	0.17 (0.15)	0.24 (0.34)	-0.8 (0.5)	-0.77 (0.6)	0.09 (0.86)	10.4 (13.6)	10.15 (13.8)	11.6 (14.0)
FDI (t-1)	0 (0)	0 (0.01)	0 (0.01)	-0.09 (0.09)	-0.06 (0.08)	-0.06 (0.05)	-1.0 (2.4)	-0.69 (2.3)	0.00 (2.2)	0.48* (0.28)	0.44 (0.33)	0.56* (0.32)
FDI (t-2)	0 (0.01)	0.01** (0.01)	0.02 (0.01)	0.00 (0.05)	-0.02 (0.06)	-0.04 (0.05)	-0.57 (0.63)	-0.41 (0.91)	-0.14 (0.89)	0.57 (0.79)	0.56 (0.80)	0.50 (0.80)
PI (t-1)	-0.04 (0.11)	0.09 (0.14)	0.12 (0.18)	-0.02 (0.06)	0.02 (0.07)	0.04 (0.09)	-1.29** (0.57)	-1.26** (0.57)	-0.66 (0.50)	0.18 (0.48)	0.14 (0.58)	0.05 (0.63)
PI (t-2)	0 (0.10)	-0.01 (0.09)	0 (0.10)	-0.02 (0.07)	-0.04 (0.06)	-0.05 (0.06)	-1.97* (1.06)	-1.87** (0.94)	-1.85 (1.18)	0.45 (0.53)	0.48 (0.57)	0.50 (0.57)
FXI (t-1)		-0.2*** (0.04)	-0.2*** (0.04)		-0.06 (0.07)	-0.17* (0.09)		0.15 (0.35)	0.13 (0.49)		0.05 (0.24)	-0.06 (0.24)
Remittances (t-1) * FXI (t-1)			0.01*** (0.0)			0.00 (0.01)			0.09* (0.05)			0.09 (0.12)
FDI (t-1) * FXI (t-1)			-0.0 (0.0)		0.02*** (0.01)				-0.15*** (0.06)			-0.11 (0.13)
PI (t-1) * FXI (t-1)			-0.00 (0.03)			0.00 (0.03)			-0.13 (0.15)			0.19 (0.12)
R2	50.6	53.3	54.1	25.3	26.4	28.5	51.8	51.3	53.8	42.4	41.4	44.8
N	102	102	102	151	151	151	60	60	60	67	67	67

* b < 0.1; ** b < 0.05; *** b < 0.01

	FX Regime				Remittance Size			
	Floaters		Peggers		Large Remittance Inflows		Low Remittance Inflows	
	(1a)	(2a)	(1'a)	(2'a)	(1b)	(2b)	(1'b)	(2'b)
Remittances (t-1)	0.15 (0.20)	0.11 (0.20)	-0.34* (0.20)	-0.51* (0.27)	-0.42 (0.27)	-0.48* (0.25)	0.33 (0.25)	0.38 (0.26)
Remittances (t-2)	0.40 (0.30)	0.49 (0.36)	0.12 (0.26)	0.23 (0.36)	0.87*** (0.32)	0.92*** (0.28)	-0.22 (0.14)	-0.24* (0.13)
FDI (t-1)	0.01** (0.00)	0.01 (0.00)	-0.20 (0.14)	-0.21 (0.13)	-0.11 (0.13)	-0.13 (0.13)	0.01*** (0.00)	0.0** (0.00)
FDI (t-2)	0.01*** (0.00)	0.01*** (0.00)	0.04 (0.09)	0.01 (0.12)	0.16 (0.13)	0.22* (0.12)	0.01*** (0.00)	0.01*** (0.00)
PI (t-1)	-0.03 (0.02)	-0.04 (0.03)	0.10 (0.12)	0.12 (0.12)	0.05 (0.19)	0.38** (0.18)	-0.02* (0.01)	-0.03** (0.02)
PI (t-2)	-0.04* (0.02)	-0.04 (0.02)	-0.00 (0.11)	-0.02 (0.12)	0.15 (0.11)	0.15 (0.10)	-0.04** (0.02)	-0.04* (0.02)
FXI (t-1)	-0.01 (0.05)	-0.09 (0.06)	-0.15 (0.10)	-0.16 (0.12)	0.09 (0.09)	0.10 (0.23)	-0.11*** (0.03)	-0.09* (0.05)
Remittances (t-1) * FXI (t-1)		0.02 (0.01)		0.01 (0.01)		0.00 (0.01)		-0.02 (0.03)
FDI (t-1) * FXI (t-1)		0.00 (0.00)		-0.02 (0.03)		0.03* (0.02)		0.0** (0.00)
PI (t-1) * FXI (t-1)		0.00 (0.01)		0.01 (0.02)		-0.15** (0.07)		0.00 (0.00)
R2	31.7	33.4	30.6	32.4	38.6	43.4	49.2	49.4
N	294	294	148	148	163	163	279	279

* p < 0.1; ** p < 0.05; *** p < 0.01

At the regional level (Table 9b), specification (3) shows FXIs exacerbate banking sector stability risks while having little impact on FX exposures in banks. At the regional level, in the EE and WH regions, FXIs reduce banks' capital ratios with coefficients being negative and statistically significant. With large enough remittance inflows, however, the negative impact can be offset. FXIs appear to have positive but non-significant effect on banks' net open positions. However, using interaction terms, higher remittances to EE (controlling for FXIs) appear to increase banks' net open FX positions by about 0.1 percentage point (specification 3b). That is, in the EE region, FXIs reduce banks' capital ratios (specification 3a); and while large remittance inflows help mitigate banks' incentives to reduce capital buffers, FX mismatches would appear to be exacerbated (specification 3b). In the WH region results are non-statistically significant in the most part. In Table 9c we investigate if the exchange regime and the size of remittance inflows could play a role. The results are just confirmed; when statistically significant, FXIs result in lower banks' buffers (specifications 1'b-2'b in Table 9c).

Robustness Checks

Tables 1-3 (in Annex IV) report all the controls used to analyze the financial stability effects of FXIs using the actual regulatory capital ratio as dependent variable and applying random effects (Table 1) and fixed and time effects estimation (Tables 2 and 3). The estimated regressions using pooled OLS estimation show similar patterns.

Tables 1 and 2 include the controls. The coefficient associated with systemic banking crises is positive and statistically significant on the actual regulatory capital ratio. This result is explained by the risk-averse behavior of banks and tighter regulatory measures taken by financial supervisors following a banking crisis episode. Similarly, a higher debt-to-GDP ratio increases the regulatory ratio, suggesting the precautionary behavior of a financial system in response to higher fiscal risks. The level of economic development captured by GDP per capita also supports a higher actual regulatory ratio, implying that banks accumulate higher capital buffers in more developed economies with higher GDP. The monetary policy rate, used as a control to abstract from unsterilized FXIs, has a zero effect. Interestingly, the impact of macroprudential policy tightening is also zero and statistically insignificant. This result can be explained by the limited variation in the data for macroprudential policy before 2008 since most macroprudential tools, when available, were activated after the Global Financial Crisis. Lastly, the effect of the lagged regulatory capital ratio varies by the size of remittance inflows and is region-specific.

Results are robust to different estimation methods, i.e., pooled ordinary least squares, random (table 1) and fixed effects (Table 2). The Breusch-Pagan test also rejected homoscedasticity at the individual level.

Conclusions and Policy Implications

A growing body of literature has highlighted the trend of remittance inflows taking over from other financial inflows. At the same time, the macro policy debate has continued to revolve around capital flows and their impact on financial stability, while work on remittance inflows has mostly focused on the social implications (poverty and inequality) and micro aspects (transfer costs). The literature on remittances and the monetary and financial sector is limited. Barajas et al. (2016) is one of the few exceptions. They discuss how remittance inflows may affect monetary transmission differently than other financial inflows. Ebeke et al. (2014) find evidence that remittances improve credit quality (as measured by NPLs) in developing countries, especially during episodes of macroeconomic instability.

The cost-benefit policy analysis of capital flows points towards the IPF approach, which proposes using multiple policy tools based on shocks and country characteristics to address the challenges that capital inflows pose to the recipient countries. Tools include monetary policy, foreign exchange intervention, capital controls, and domestic macroprudential measures.

This paper first discusses the unique nature of remittance inflows compared to other financial inflows, namely foreign direct investment, and portfolio investment. All these inflows have some common features in that they inject foreign exchange, and liquidity, into the economy. However, these flows have different drivers, and their impact on the economy differs. The paper examines the impact of different financial inflows (remittances, FDI, and portfolio flows) on the banking sector's depth (proxied by bank deposits, bank credit to the private sector, and sovereign debt holdings) and on banks' financial stability (provided by the actual regulatory capital ratio and the net FX open position).

Our empirical analysis, based on 157 emerging market and developing economies from 2000 to 2022, shows that remittance inflows tend to increase the level of deposits, and sovereign debt holdings. At the aggregate, remittances do not appear to have a statistically significant effect on deposits. However, there is a strong regional component, with remittances having a positive and significant effect on bank deposits in EE and WH, and a strong FX regime effect, with peggers showing a large positive and significant effect, but with a lag. The impact of remittances on banks'

holdings of public debt holdings is also lagged in the EE region. When confronted with large inflows of remittances or a floating exchange regime, banks appear to opt for a safe bank deposit-to-government securities investment strategy. The analysis also shows that FDI inflows negatively impact bank deposits for the whole sample, possibly explained by profit repatriation. Portfolio inflows don't appear to have a significant effect except on sovereign debt holdings, with a drop.

On financial stability, remittances do not appear to impact significantly banks' regulatory capital ratios or banks' net open FX positions for the full sample, especially when seen as temporary. At the regional level, albeit with lags, remittances help increase capital buffers in EE and Asia. Also, while, FDI appears to have a positive impact on banks' buffers in economies with floating exchange rate regimes and on FX exposures in economies receiving large remittance inflows. Portfolio inflows show a more mixed result, except on government debt holdings, which decline.

The second part of the paper focuses on the use of policy to preserve the gains and lessen the costs. The safety net nature of remittances explains why policy tools such as capital controls, monetary policy, or domestic macroprudential tools can be applied to capital flows but are unfeasible for different reasons in managing the effects of remittance inflows. There is a large body of work pointing to structural policies as the medium-term approach to managing remittance inflows. In practice, however, authorities need to handle short-term pressures, and FXIs are the tool in hand to help them counter the appreciation pressures associated with these inflows. The literature on FXIs remains inconclusive on how effective FXIs are in practice, yet they continue to be used. This paper fills the gap and shows that FXIs have costs for the banking sector; FXIs reduce the level of deposits in the banking sector and encourage risk-taking away from the banking sector. However, when remittance inflows are quite large, FXIs can have a positive impact.

The analysis suggests that the remittance strategy should be geared towards the less use of FXIs while risk management tools are developed for the private sector to take over and hedge against FX volatility. However, in line with the IMF principles for the use of FX interventions (IMF 2023c), there is a case for FXIs, when remittance inflows are large enough to cause disorderly conditions in the economy. In any case, structural policies that can create the conditions to absorb the continued inflow of remittances are the longer-term and sustainable response to these flows.

References

- Acosta P, P. Fajnzylber, J. Lopez (2007). "The impact of remittances on poverty and human capital: evidence from Latin American household surveys," in: Ozden C, M. Schiff (eds) *International migration, economic development and policy*. World Bank and Palgrave Macmillan, Washington, pp 59–98.
- Adler, G., K. S. Chang, R. Mano (2021). "Foreign Exchange Intervention: A Dataset of Public Data and Proxies," IMF Working Paper 47. Washington D.C.
- Aggarwal, R., Demirguc-Kunt, A., Martinez-Peria, M. (2006). Do workers' remittances promote financial development? World Bank Policy Research Working Paper 3957. Washington.
- Aggarwal, R., A. Demirgüç-Kunt, and M.S. M. Peria (2011). Do remittances promote financial development? *J. Development Economics*, 96, 255–264.
- Alam Z., A. Alter, J. Eiseman, G. Gelos, H. Kang, M. Narita, E. Nier, N. Wang (2019). "Digging Deeper-- Evidence on the Effects of Macroprudential Policies from a New Database." IMF Working Paper 66.
- Anzoategui, D., A. Demirgüç-Kunt, and M.S. Martínez Pería (2011). "Remittances and Financial Inclusion: Evidence From El Salvador". World Bank Working Paper 5839. Washington D.C.
- Beck, T. and M.S.M. Peria (2009). "What Explains the Cost of Remittances? An Examination across 119 Country Corridors." The World Bank Development Research Group Finance and Private Sector Team. WPS 5072.
- Barajas, A., R. Chami, D. Hakura, and P. Montiel (2011). "Workers' Remittances and the Equilibrium Real Exchange Rate." *Economía*, 11(2), 45–94
- Barajas, A., R. Chami, C. Ebeke, and A. Oeking (2018). "What's Different about Monetary Policy Transmission in Remittance-Dependent Countries?" *Journal of Development Economics*, 134: 272-288.
- BIS (2022). FX interventions. Markets Committee Note, 17 May 2022.
- Brandão-Marques, L., Gelos, G., Narita, M., Nier, E. (2020). "Leaning Against the Wind: A Cost-Benefit Analysis for an Integrated Policy Framework." IMF Working Paper 123. Washington D.C.
- Chami R, C. Fullenkamp, S. Jahjah (2003) Are immigrant remittance flows a source of capital for development? IMF Working Paper 189. Washington, DC.
- Chami, R., A. Barajas, T. Cosimano, C. Fullenkamp, M. Gapen, and P. Montiel (2008). *Macroeconomic Consequences of Remittances*. IMF Occasional Paper 259. Washington D.C.
- Chinn, M. D. and H. Ito (2008). "A New Measure of Financial Openness". *Journal of Comparative Policy Analysis*, 10:3, p. 309 – 322.
- Demirgüç-Kunt, A., E. López Córdova, M.S. Martínez Pería, C. Woodruff. (2011) "Remittances and banking sector breadth and depth: Evidence from Mexico." *Journal of Development Economics* 95/2: 229-241.
- Ebeke; C., B. Loko, A. Viseth (2014). Credit Quality in Developing Economies: Remittances to the Rescue? IMF Working Paper 144. Washington, DC.
- Fagiolo, G. and T. Rugh (2023). Exploring the Macroeconomic Drivers of International Bilateral Remittance Flows: A Gravity-Model Approach. *Economies* 2023, 11:195.

- Giuliano, P. and M. Ruiz-Arranz (2009). “Remittances, financial development, and growth” *Journal Development Economics*, 90 (2009), pp. 144-152.
- Gupta, S., C. Pattillo, and S. Wagh (2007), “Making Remittances Work for Africa,” *Finance & Development*, 44, No. 2: 1-9.
- Hofmann, B., H. S. Shin, M. Villamizar-Villegas (2021). “FX Intervention and Domestic Credit: Evidence from High-frequency Micro Data.” *BIS Working Paper 774*.
- IMF (2020). “Managing External Volatility: Policy Frameworks in Non-Reserve Issuing Economies.” *IMF Working Paper 288*. Washington D.C.
- IMF (2021). “A Quantitative Microfounded Model for the Integrated Policy Framework.” *IMF Working Paper 292*. Washington D.C.
- IMF (2023a). “An Estimated DSGE Model for Integrated Policy Analysis.” *IMF Working Paper 135*. Washington D.C.
- IMF (2023b). “Guidance Note on The Liberalization and Management of Capital Flows.” *Policy Paper 55*. Washington D.C.
- IMF (2023c). “Integrated Policy Framework—Principles for the Use of Foreign Exchange Intervention.” *Policy Paper 61*. Washington D.C.
- IOM (2022). *The Survey on International Migration of Guatemalans and Remittances*. [Remittances Guatemala 2022 – Unidad de Información \(iom.int\)](https://www.iom.int/remittances-guatemala-2022)
- Jeanne, O and R. Ranciere (2006). “The Optimal Level of International Reserves for Emerging Market Countries: Formulas and Applications”, *IMF Working Paper 06/229*. Washington, DC
- King, R. G., and R. Levine (1993). “Finance and Growth: Schumpeter Might Be Right.” *Quarterly Journal of Economics* 108: 717-737.
- Minsuk K. R.C. Mano, and M. Mrkaic (2020). “Do FX Interventions Lead to Higher FX Debt? Evidence from Firm-Level Data” *IMF Working Paper 197*. Washington D.C.
- Laeven, L. and F. Valencia (2018). “Systemic Banking Crises Revisited,” *IMF Working Paper 18/206*. Washington, DC
- Levy Yeyati, E and F. Sturzenegger (2010). “Leaning against the wind: Exchange rate policy in emerging markets in the 2000s”, mimeo, Universidad Torcuato Di Tella.
- Lopez-Cordova E., and A. Olmedo (2006). “International Remittances and Development: Existing Evidence, Policies, and Recommendations. *Intal Occasional Paper 41*.
- Mishkin, F. (1996). “Understanding Financial Crises: A Developing Country Perspective,” *NBER paper, Working Paper 5600*.
- Orozco, M., and C. Ellis (2014). “Impact of Remittances in Developing Countries” In *Global Migration Issues*, Springer, IOM, Vol 3.
- Orozco, M., and R. Fedewa (2006). *Levering Efforts on Remittances and Financial Intermediation*. *Intal Occasional Paper 24*.
- Obstfeld, M. (1998). “The Global Capital Market: Benefactor or Menace?” *Journal of Economic Perspectives*, 12, pp: 9–3

- Patel, N. and P. Cavallino (2019). "FX intervention: goals, strategies and tactics." BIS Papers 104.
- Rahman, Md. M. and L. K. Fee (2014). Understanding Remittances: Theoretical and Methodological Issues. In *Remittances in South Asia*. International Political Economy Series (IPES), Springer.
- Rodrik, D (2006). "The social cost of foreign exchange reserves", NBER Working Paper No. 11952.
- Schoenholtz, K. and S. Cecchetti (2018). The stubbornly high cost of remittances. VOXEU
- Singer, D. (2010). "Migrant Remittances and Exchange Rate Regimes in the Developing World." *American Political Science Review* 104 (2): 307–323
- Vacaflares, D. E. 2012. Remittances, Monetary Policy and Partial Sterilization. *Southern Economic Journal* 79(2): 367-387.
- Vacaflares, D. E., and R. P. Kishan. (2014). Remittances, International Reserves, and Exchange Rate Regimes in 9 Latin American countries: 1997-2010. *Applied Econometrics and International Development* 14(2)
- Vacaflares, D. E. 2018. Are Remittances Helping Lower Poverty and Inequality Levels in Latin America? *The Quarterly Review of Economics and Finance* 68: 254–65.
- World Bank (2023). Report Chapters and Remittance Inflows and Outflows Data. Migration and Development Brief 39 | KNOMAD. Washington D.C.
- Yoshino, N. (2017). International Remittances and Poverty Reduction: Evidence from Asian Developing Countries. ADB Institute Working Paper 759.

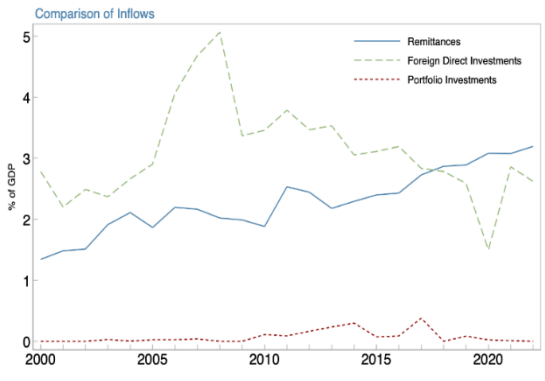
Annex I. Region and Country Sample

Table 1. Country Sample	
Region	Countries
Eastern Europe (EE)	Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Georgia, Hungary, Kosovo, Moldova, Republic of Montenegro, North Macedonia, Poland, Romania, Russia, Serbia, Turkey, and Ukraine.
Western Hemisphere (WH)	Antigua and Barbuda, Argentina, Aruba, The Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, and Venezuela.
Asia	Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Lao P.D.R., Macao SAR, Malaysia, Maldives, Marshall Islands, Micronesia, Mongolia, Myanmar, Palau, Papua New Guinea, Philippines, Solomon Islands, Sri Lanka, Taiwan Province of China, Thailand, Timor-Leste, Tuvalu, Vanuatu, and Vietnam.
Middle East, Caucasus, and Central Asia (MECCA)	Afghanistan, Algeria, Armenia, Azerbaijan, Bahrain, Djibouti, Egypt, Iran, Iraq, Jordan, Kazakhstan, Kuwait, Kyrgyz Republic, Lebanon, Libya, Mauritania, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, Sudan, Syria, Tajikistan, Turkmenistan, United Arab Emirates, and Uzbekistan, West Bank and Gaza, and Yemen.
Africa	Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Republic of Congo, Côte d'Ivoire, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Gabon, Gambia, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritius, Mozambique, Namibia, Nauru, Niger, Nigeria, Rwanda, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, South Sudan, Sri Lanka, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Sudan, São Tomé and Príncipe, Tanzania, Togo, Uganda, Zambia, and Zimbabwe.
Source: IMF Staff	

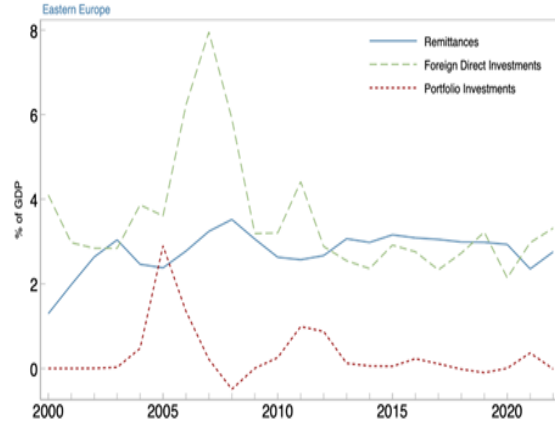
Annex II. Financial Inflows by Region, 2000-2020

Figure 1. Financial Inflows by Region

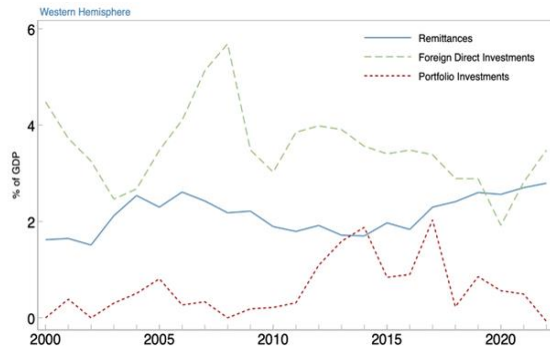
All Countries,



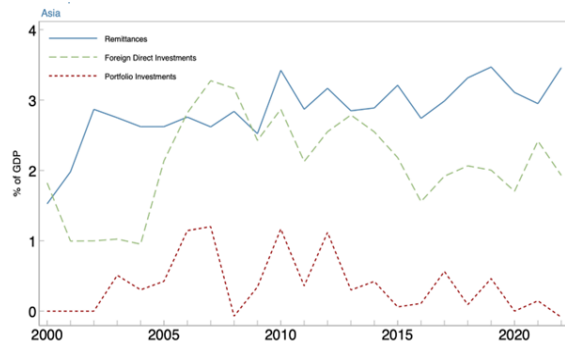
In Eastern Europe, FDI dominates all inflows in these past years....



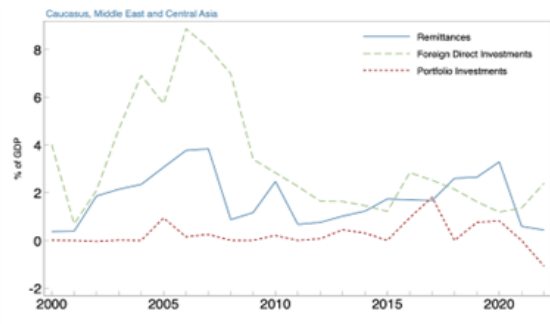
In WHD, remittances just caught up FDI



In Asia, remittances continue to dominate



Remittances have been declining in ME economies...



...and in Africa in favor of FDI in the recent years



Source: Authors and IMF database.

Annex III. Banking Sector Depth. Robustness Exercises

Table 1: Deposit Model with Controls, Random Effects Estimation

	Bank Deposits (Percentage of GDP)			
	ALL	EE	WH	Asia
Remittances-to-GDP (t-1)	0.88* (0.53)	1.36*** (0.40)	0.98 (0.63)	0.47 (0.99)
Remittances-to-GDP (t-2)	-0.43 (0.68)	-0.67 (0.44)	-3.54*** (1.31)	1.65 (1.32)
FDI-to-GDP (t)	-0.05*** (0.01)	-0.01 (0.02)	-0.80*** (0.30)	-0.02 (0.06)
FDI-to-GDP (t-2)	-0.01 (0.01)	0.03 (0.04)	-0.12 (0.18)	-0.18** (0.09)
Portfolio Inflows-to-GDP (t-1)	0.10** (0.04)	0.26 (0.19)	-0.02 (0.21)	-0.17 (0.32)
Portfolio Inflows-to-GDP (t-2)	0.03 (0.06)	0.11 (0.13)	0.43 (0.27)	-0.00 (0.41)
FXI-to-GDP (t-1)	-0.23** (0.12)	-0.13 (0.10)	-0.20* (0.12)	-0.20 (0.25)
GDP Per Capita, PPP thous. USD (t-1)	0.36 (0.52)	1.29*** (0.31)	-0.40 (0.39)	0.35 (1.74)
log of GDP in USD (t-1)	5.00* (2.68)	6.84*** (1.87)	4.04 (3.04)	4.62 (5.72)
Inflation (t-1)	-0.07 (0.07)	-0.35*** (0.10)	0.13 (0.09)	-0.40 (0.26)
Trade Openness (t-1)	0.02 (0.06)	0.04 (0.08)	0.08 (0.13)	-0.01 (0.06)
Capital Openness (t-1)	-0.13 (4.86)	3.46 (6.70)	-5.73 (7.08)	0.79 (6.70)
Monetary Policy Rate (t-1)	-0.03 (0.08)	0.50*** (0.11)	-0.42* (0.24)	-0.09 (0.60)
Exchange Rate Volatility (t-1)	-0.00 (0.00)	-0.00* (0.00)	-0.00 (0.00)	-0.00 (0.00)
GFC Dummy	-1.84** (0.88)	-2.50* (1.29)	2.11 (1.38)	-3.37* (1.78)
Taper Tantrum Dummy	-0.92 (0.98)	2.01 (1.23)	-0.60 (1.50)	4.59** (1.79)
Covid Dummy	8.92*** (1.36)	5.27* (3.09)	11.85*** (1.43)	8.55** (3.52)
R2	37.7	75.7	57.9	60.7
N	680	141	218	128

Table 2: Deposit Model with Controls, Fixed Effects Estimation

Bank Deposits (Percentage of GDP)

	ALL	EE	WH	Asia	Floater	Peggers
Remittances-to-GDP (t-1)	0.7 (0.5)	1.07** (0.4)	1.04 (0.7)	0.56 (0.95)	0.42 (0.5)	1.35** (0.6)
Remittances-to-GDP (t-2)	-0.42 (0.66)	-0.52 (0.42)	-3.6** (1.29)	1.5 (1.16)	-0.07 (0.23)	0.3 (0.90)
Remittances * FX Interventions (t-1)	0.02** (0.01)	0.02*** (0.00)	-0.0 (0.01)	0.01 (0.05)	0.01 (0.01)	0.03 (0.02)
FDI-to-GDP (t-1)	-0.05*** (0.02)	-0.01 (0.03)	-0.9** (0.32)	-0.03 (0.05)	0.01 (0.02)	-0.01 (0.16)
FDI-to-GDP (t-2)	0.0 (0.01)	0.02 (0.04)	-0.02 (0.23)	-0.18* (0.09)	0.01* (0.01)	-0.30** (0.12)
FDI * FX Interventions (t-1)	0.01* (0.01)	0.0 (0.00)	-0.07 (0.05)	0.0 (0.01)	-0.0 (0.01)	0.01 (0.02)
Portfolio Inflows-to-GDP (t-1)	0.13** (0.05)	0.35 (0.2)	-0.03 (0.25)	-0.15 (0.35)	-0.15 (0.1)	0.36* (0.2)
Portfolio Inflows-to-GDP (t-2)	-0.01 (0.1)	0.07 (0.1)	0.44 (0.25)	0.03 (0.4)	-0.16*** (0.05)	-0.09 (0.2)
FXI-to-GDP (t-1)	-0.33** (0.15)	-0.19* (0.09)	0.11 (0.2)	-0.23 (0.3)	-0.13 (0.16)	-0.52** (0.2)
GDP Per Capita, PPP thous. USD (t-1)	0.33 (0.48)	1.28*** (0.32)	-0.41 (0.39)	0.36 (1.66)	1.00*** (0.28)	-0.59* (0.30)
log of GDP in USD (t-1)	5.23** (2.55)	6.90*** (1.90)	4.09 (2.94)	4.59 (5.51)	6.21*** (1.63)	4.83* (2.46)
Inflation (t-1)	-0.07 (0.07)	-0.36*** (0.10)	0.12 (0.09)	-0.37 (0.3)	-0.05 (0.1)	-0.19** (0.09)
Trade Openness (t-1)	0.04 (0.06)	0.05 (0.07)	0.10 (0.1)	0.00 (0.06)	0.03 (0.06)	0.06 (0.07)
Capital Openness (t-1)	0.19	2.24	-6.39	0.88	-1.53	-8.29*

	(4.6)	(6.15)	(6.7)	(6.4)	(4.2)	(4.8)
Monetary Policy Rate (t-1)	-0.04 (0.08)	0.50*** (0.1)	-0.41 (0.2)	-0.17 (0.6)	0.07 (0.1)	0.12** (0.06)
Exchange Rate Volatility (t-1)	-0.0 (0.0)	-0.0 (0.0)	-0.0 (0.0)	-0.0 (0.0)	0.0* (0.0)	-0.0 (0.0)
GFC Dummy	-1.9** (0.9)	-3.28* (1.4)	2.06 (1.2)	-3.4* (1.7)	-1.13 (1.0)	-3.6** (1.7)
Taper Tantrum Dummy	-0.99 (0.9)	2.03 (1.3)	-0.47 (1.5)	4.4** (1.6)	-0.37 (0.75)	-0.03 (1.2)
Covid Dummy	8.7*** (1.25)	5.03 (3.0)	11.8*** (1.4)	8.4** (3.4)	9.5*** (1.5)	6.0*** (1.3)
R2	39.3	76.7	58.2	60.8	64.6	47.5
N	680	141	218	128	432	246

Table 3: Full Sample, with and without policy, with Time Fixed Effects

	Bank Deposits			Private Credit			Public Debt Securities		
	(1)	(2)	(3)	(1')	(2')	(3')	(1'')	(2'')	(3'')
Remittances (t-1)	0.4	0.7	0.6	0.4	0.6	0.5	-1.8	-0.9	-1.2
	(0.3)	(0.5)	(0.5)	(0.4)	(0.75)	(0.7)	(3.0)	(2.5)	(2.4)
Remittances (t-2)	-0.2	-0.3	-0.3	-0.3	-0.4	-0.4	2.6	3.9**	3.4
	(0.38)	(0.67)	(0.68)	(0.31)	(0.54)	(0.53)	(1.72)	(1.79)	(2.21)
FDI (t-1)	-0.04***	-0.05***	-0.05***	0.00	-0.00	-0.00	0.10***	0.13***	0.14***
	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.03)	(0.04)
FDI (t-2)	-0.00	-0.01	0.00	0.03***	0.03***	0.04***	0.01	-0.03	-0.03
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)	(0.03)
PI (t-1)	0.06	0.12**	0.14***	0.02	0.02	0.04	-0.01	0.00	0.02
	(0.06)	(0.05)	(0.06)	(0.13)	(0.13)	(0.15)	(0.25)	(0.26)	(0.27)
PI (t-2)	-0.03	0.03	-0.01	0.12	0.10	0.07	0.39**	0.20	0.15
	(0.06)	(0.06)	(0.10)	(0.14)	(0.13)	(0.14)	(0.17)	(0.20)	(0.24)
FXI (t-1)		-0.2*	-0.29*		-0.17	-0.27		-0.02	-0.16
		(0.11)	(0.16)		(0.11)	(0.17)		(0.15)	(0.16)
Remittances (t-1) * FXI (t-1)			0.02*			0.02			0.05***
			(0.01)			(0.01)			(0.02)
FDI (t-1) * FXI (t-1)			0.01*			0.01			0.00
			(0.01)			(0.01)			(0.02)
PI (t-1) * FXI (t-1)			-0.03			-0.02			0.03
			(0.03)			(0.02)			(0.02)
R2	43.9	41.0	42.3	34.1	35.2	35.8	65.0	79.0	79.5
N	888	680	680	888	680	680	185	185	185

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Annex IV. Banking Sector Stability Analysis. Robustness Exercises

Table 1: Actual Regulatory Capital Ratio Model with Controls, Random Effects Estimation

	Actual Regulatory Capital Ratio (Percent)			
	ALL	EE	WH	Asia
Remittances-to-GDP (t-1)	-0.13 (0.19)	-0.39*** (0.10)	-0.19 (0.17)	0.12 (0.42)
Remittances-to-GDP (t-2)	0.44 (0.30)	0.57*** (0.07)	0.17 (0.15)	0.68** (0.28)
FDI-to-GDP (t-1)	0.00 (0.00)	0.00 (0.01)	-0.06 (0.08)	-0.21 (0.26)
FDI-to-GDP (lagged twice)	0.01*** (0.00)	0.01** (0.01)	-0.02 (0.06)	-0.00 (0.15)
Portfolio Inflows-to-GDP (t-1)	-0.02 (0.01)	0.09 (0.14)	0.02 (0.07)	-0.10 (0.19)
Portfolio Inflows-to-GDP (lagged twice)	-0.03** (0.02)	-0.01 (0.09)	-0.04 (0.07)	-0.13* (0.07)
FXI-to-GDP (t-1)	-0.05 (0.04)	-0.16*** (0.04)	-0.06 (0.07)	-0.11 (0.09)
Export-to-GDP (t-1)	-0.02 (0.04)	-0.17** (0.09)	0.08 (0.06)	0.05 (0.13)
Import-to-GDP (t-1)	-0.01 (0.04)	0.08 (0.06)	0.01 (0.04)	0.02 (0.10)
Private Credit-to-GDP (t-1)	-0.14*** (0.03)	-0.16*** (0.03)	-0.01 (0.03)	-0.13*** (0.04)
Macroprudential Policy (t-1)	-0.02 (0.07)	0.03 (0.11)	-0.07 (0.07)	0.04 (0.03)
Monetary Policy Rate (t-1)	-0.02 (0.03)	0.06 (0.05)	0.02 (0.02)	-0.04 (0.17)
Systemic Banking Crisis Dummy (t-1)	2.05* (1.14)	3.42*** (1.25)		
Debt-to-GDP (t-1)	0.05*** (0.02)	0.05 (0.06)	0.03 (0.03)	0.15*** (0.02)
GDP Growth Rate (t-1)	-0.07* (0.04)	-0.12 (0.08)	-0.07 (0.04)	-0.11** (0.05)
GDP Per Capita, PPP thous. USD (t-1)	0.51*** (0.10)	0.72*** (0.07)	0.14 (0.15)	1.38** (0.64)
Central Bank Reserves-to-GDP (t-1)	0.22* (0.12)	0.33*** (0.10)	0.14 (0.22)	0.73*** (0.24)
Regulatory Capital (t-1)	-0.05 (0.11)	0.21** (0.08)	0.28 (0.21)	0.42** (0.19)
R2	30.8	53.3	26.4	75.7
N	442	102	151	68

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 2: Actual Regulatory Capital Ratio Model with Controls, Fixed Effects Estimation

Actual Regulatory Capital Ratio (Percent)

	ALL	EE	WH	Asia	Floaters	Peggers
Remittances-to-GDP (t-1)	-0.2 (0.23)	-0.4** (0.13)	-0.19 (0.35)	0.06 (0.4)	0.1 (0.19)	-0.5** (0.24)
Remittances-to-GDP (t-2)	0.52 (0.33)	0.69*** (0.09)	0.24 (0.33)	0.70** (0.26)	0.49 (0.35)	0.23 (0.32)
Remittances * FX Interventions (t-1)	0.01 (0.01)	0.01** (0.00)	0.00 (0.01)	-0.00 (0.01)	0.02 (0.01)	0.01 (0.01)
FDI-to-GDP (t-1)	0.0 (0.0)	0.0 (0.01)	-0.06 (0.05)	-0.29 (0.24)	0.01 (0.0)	-0.21* (0.12)
FDI-to-GDP (t-2)	0.01** (0.0)	0.02 (0.01)	-0.04 (0.05)	0.01 (0.12)	0.01*** (0.00)	0.01 (0.11)
FDI * FX Interventions (t-1)	0.00 (0.00)	-0.00 (0.00)	0.02*** (0.01)	0.01 (0.03)	0.00 (0.00)	-0.02 (0.03)
Portfolio Inflows-to-GDP (t-1)	-0.02 (0.01)	0.12 (0.17)	0.04 (0.09)	-0.10 (0.18)	-0.04 (0.03)	0.12 (0.11)
Portfolio Inflows-to-GDP (t-2)	-0.04* (0.02)	0.00 (0.10)	-0.05 (0.06)	-0.14 (0.08)	-0.04 (0.02)	-0.02 (0.11)
Portfolio Inflows * FX Interventions (t-1)	-0.0 (0.01)	-0.0 (0.03)	0.0 (0.03)	0.02* (0.01)	0.0 (0.01)	0.01 (0.01)
FXI-to-GDP (t-1)	-0.10** (0.04)	-0.22*** (0.04)	-0.17* (0.09)	-0.15 (0.14)	-0.09 (0.06)	-0.16 (0.11)
Export-to-GDP (t-1)	-0.02 (0.04)	-0.16* (0.08)	0.09 (0.05)	0.01 (0.16)	0.04 (0.05)	-0.05 (0.08)
Import-to-GDP (t-1)	0.01 (0.04)	0.07 (0.06)	0.01 (0.04)	0.06 (0.13)	-0.06 (0.06)	0.03 (0.08)
Private Credit-to-GDP (t-1)	-0.14*** (0.03)	-0.16*** (0.03)	-0.01 (0.04)	-0.11 (0.06)	-0.12*** (0.04)	-0.17*** (0.06)
Macroprudential Policy (t-1)	-0.02 (0.06)	0.02 (0.1)	-0.07 (0.07)	0.07* (0.03)	-0.01 (0.05)	0.23 (0.15)
Monetary Policy Rate (t-1)	-0.02 (0.03)	0.06 (0.05)	0.03 (0.02)	-0.07 (0.23)	-0.11 (0.08)	0.04 (0.07)
Systemic Banking Crisis Dummy (t-1)	2.12* (1.12)	3.53** (1.26)			3.72** (1.35)	0.91 (1.74)
Debt-to-GDP (t-1)	0.05*** (0.02)	0.06 (0.06)	0.03 (0.03)	0.16*** (0.03)	0.03 (0.04)	0.07*** (0.02)
GDP Growth Rate (t-1)	-0.07* (0.04)	-0.13 (0.08)	-0.06 (0.05)	-0.11 (0.06)	-0.09** (0.04)	-0.01 (0.07)
GDP Per Capita, PPP thous. USD (t-1)	0.50*** (0.09)	0.74*** (0.06)	0.12 (0.17)	1.25 (0.73)	0.48*** (0.11)	0.16 (0.25)
Central Bank Reserves-to-GDP (t-1)	0.2* (0.11)	0.3*** (0.09)	0.12 (0.23)	0.6* (0.29)	0.05 (0.15)	0.28*** (0.07)
Regulatory Capital (t-1)	-0.04 (0.11)	0.2** (0.08)	0.36 (0.20)	0.44* (0.19)	-0.04 (0.07)	-0.09 (0.13)
R2	31.8	54.1	28.5	77.2	33.4	32.4
N	442	102	151	68	294	148

 * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 3: Full Sample, with and without policy, with Time Fixed Effects

	Actual Regulatory Capital Ratio			Net Open FX Position		
	(1)	(2)	(3)	(1')	(2')	(3')
Remittances-to-GDP (lagged)	0.5 (0.49)	0.67 (1.25)	0.63 (1.20)	0.12 (0.19)	-0.10 (0.20)	-0.18 (0.24)
Remittances-to-GDP (lagged twice)	-0.21 (0.18)	-0.05 (0.6)	0.01 (0.55)	0.04 (0.25)	0.42 (0.29)	0.49 (0.3)
FDI-to-GDP (lagged)	0.0 (0.01)	0.00 (0.01)	-0.01 (0.01)	0.0 (0.0)	0.0 (0.0)	0.0 (0.00)
FDI-to-GDP (lagged twice)	-0.01* (0.01)	-0.01 (0.01)	-0.02* (0.01)	0.01*** (0.0)	0.01*** (0.0)	0.01*** (0.00)
Portfolio Inflows-to-GDP (lagged)	0.04 (0.04)	0.04 (0.05)	0.00 (0.04)	-0.01 (0.02)	-0.01 (0.02)	-0.01 (0.02)
Portfolio Inflows-to-GDP (lagged twice)	0.10 (0.06)	0.09* (0.05)	0.15* (0.09)	-0.03* (0.01)	-0.02* (0.01)	-0.02 (0.02)
Positive FXI-to-GDP (lagged)		-0.12 (0.2)	-0.21 (0.26)		-0.06 (0.04)	-0.11** (0.05)
Remittances * FX Interventions (lagged)			0.01 (0.01)			0.01 (0.01)
FDI * FX Interventions (lagged)			0.0 (0.0)			0.0 (0.0)
Portfolio Inflows * FX Interventions (lagged)			0.03 (0.02)			-0.0 (0.01)
R2	34.4	36.5	37.1	28.9	34.4	35.4
N	294	269	269	474	442	442

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$



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