You are worth that to me – Uncovering the hierarchy of central bank currency swap scale

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Abstract

Bilateral central bank currency swaps are crucial elements of the Global Financial Safety Net (GFSN). This paper examines whether the scale and distribution of swap provision reinforce US-dollar dominance and how the People's Bank of China (PBOC) resists dollar hegemony through its currency swap strategy. Using comparative descriptive statistics and a two-step Heckman selection model, we analyze a novel panel dataset covering all bilateral swaps between 2007 and 2023. We derive two main arguments: First, US Federal Reserve (Fed) swaps target systemically important financial core countries where dollar-denominated borrowing affects US financial stability. Second, periphery countries deemed unworthy of US Fed swaps rely on alternatives, mostly renminbi-denominated PBOC swaps. Our results show that the GDP per capita of countries receiving PBOC swaps is about half that of Fed swap recipients. China primarily targets periphery countries with which it has strong trade relationships. It appears that these swap provisions have contributed somewhat to the renminbi's internationalization; however, the PBOC's swap size is less than one-sixth of the Fed's. We conclude that the existing swap hierarchy nourishes US dollar dominance predominantly through swap scale. The current monetary system is therefore likely to persist for the foreseeable future, sustaining the dollar's international use in core financial markets.

Keywords: Global Financial Safety Net; Central Bank Swaps; international monetary system; international financial architecture; financial crises

JEL codes: E5; F3; F33; G01; G15

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1. Introduction

Central bank currency swaps, which are credit lines between central banks aimed at providing liquidity to stabilize markets during turmoil (Bahaj and Reis 2022b), have become a prominent topic in recent debates on international monetary policy. Swaps have garnered attention due to their pivotal role in maintaining global financial stability. For instance, during the 2007-9 global financial crisis, the US Federal Reserve (Fed) injected over $2 trillion into the international economy through swaps (Sahasrabuddhe 2019); during the COVID-19 pandemic, this monetary policy instrument was again used extensively (Aizenman 2021; Bahaj and Reis 2022b).

The Fed is not the only swap offering central bank though. Especially, the People's Bank of China (PBOC) offers currency swaps in an increasing number and scale. PBOC swap agreements have received increasing attention in academic and policy circles, pointing out that Chinese swaps compose an emerging system of cross-border bailouts (Horn et al. 2023; Kynge 2023). Further to Fed and PBOC, many other advanced and some emerging central banks have established bilateral currency swap agreements. As a result, swaps have become the most voluminous element of the so-called Global Financial Safety Net (GFSN).[4] The size of the GFSN reached approximately $4.2 trillion at the end of 2024, with swaps alone accounting for about $1.7 trillion, representing more than a third of the GFSN (Mühlich et al. 2025).

Their immediate and voluminous disbursement, along with the absence of conditionality, render bilateral currency swaps a particularly valuable source of external liquidity to prevent and backstop financial crises –attributes that are critical in crisis prevention, as second-generation balance of payments crisis models have shown (Obstfeld, 1996). At the same time, access to swaps is unevenly distributed among countries. Central bank currency swap provision has enhanced inequalities in access to emergency finance (Mühlich et al. 2022). Offering swaps is an option for central banks, not an obligation. Hence, swap agreements are made based on the idiosyncratic decisions of central banks. Extending the lender-of-last-resort role to liquidity-distressed countries abroad is related to national interests in financial stability or trade stimulus (see, e.g., on

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[4] The GFSN comprises all institutions and agreements that provide short-term emergency liquidity for countries in financial distress. Until the end of the Bretton Woods era, the GFSN was comprised only of the International Monetary Fund (IMF). Since then, various regional financial arrangements (RFAs) of different size and scope have been established as additional sources of third-party crisis finance (Mühlich and Fritz 2018), while bilateral central bank swap lines emerged as a third element in the crisis finance architecture predominantly following the 2007-09 Financial Crisis.

Fed: Sahasrabuddhe 2019; Pape 2022; on PBOC: Garcia-Herrero and Xia 2013; Liao and McDowell, 2015).

Despite their growing size and importance for global financial stability, existing literature does not provide a systematic comparative analysis of swaps. First, its focus is predominantly on the swap provision of either the US Federal Reserve Bank (Fed) (Aizenman et al., 2010, 2011, 2022; Eichengreen, 2013; Sahasrabuddhe 2019; Bahaj and Reis 2022a) or the Chinese Peoples Bank of China (PBOC) (Garcia-Herrero and Xia 2013; Liao and McDowell 2013; Lin et al. 2016; Horn et al. 2023). Second, it does not account for different currency denominations, treating them equally valuable for combating liquidity crunches.

Existing literature suggests that the US Fed and PBOC swap provisions are driven by distinct motives: while US Fed swaps are offered to countries with strong financial ties to the US, PBOC swaps are offered to countries with strong trade ties to China. Based thereon, this paper argues that the scale of swaps offered by the Fed and the PBOC is also driven by distinct motives for deeming countries to be worth receiving a swap and that these distinctions translate into swap size. We assume that the swap scale is determined at the same time by currency denomination and purpose of swaps. Why? Because core countries that are systemically relevant for the global economy –due to borrowing in US-dollar at a large scale– are bailed out by sizable swaps from the Fed or other central banks that have access to US-dollar swaps (mainly Japan).

In contrast, periphery countries that are not systemically important are not considered worthy of access to US-dollar swaps by the Fed. Only some peripheral countries have access to non-Fed provided US-dollar swaps. This is particularly true for Asian countries that seem to be part of a regional strategy to counter a renminbi dominance in the Asian region. At the same time, peripheral countries are considered worthy by the PBOC to receive RMB swaps to sustain the financing of Chinese exports and to enhance the renminbi's internationalization (e.g., Garcia-Herrero and Xia 2013; Liao and McDowell 2013; Lin et al. 2016). We expect swaps provided in RMB to be smaller than swaps provided in US-dollar since peripheral countries are much less financialized than core countries.

To verify this argument, we construct a novel panel dataset encompassing global central bank swaps from 2007 to 2023, which uses media reports and central bank communication to distinguish between trade- and finance-related swaps agreements, and

to distinguish the currency denomination of swaps. The data allows treating swaps distinctly, depending on purpose and denomination. Placing a particular emphasis on the differences between the two most dominant swap-providing central banks –the Fed and the PBOC–, we first use descriptive statistics to examine whether the swap currency denomination and their relative volume differ according to the stated purpose of a swap: trade-related versus financial stability-related swaps.

We then empirically explore the dynamics of inclusion and exclusion in the swap hierarchy by drawing on literature on the motives for swap provision in US-dollar (e.g., Sahasrabuddhe 2019 on the US Fed; Lee and Katada 2024 on India and Japan) and in RMB (Garcia-Herrero and Xia 2013; Liao and McDowell, 2015). Applying a two-step Heckman selection model, in the first stage, we test for the significance of different swap access determinants, comparing US-dollar and RMB-denominated swaps. In the second stage, we verify whether distinct motives influence the size of US-dollar and RMB swaps. We expect to find that US-dollar swap access and size are mainly driven by financial motives, whereas trade is the main determinant for RMB swap access and size.

Moreover, we utilize descriptive data on RMB swap provisions and foreign exchange rate (FOREX) over-the-counter (OTC) turnover to verify whether the provision of RMB swaps has fostered RMB internationalization. Armijo and Katada (2014), Liao and McDowell (2015), and Bahaj and Reis (2018) have highlighted the potential of currency swaps to promote the international use of currencies by encouraging their use in trade and financial transactions. On the other hand, Eichengreen et al. (2016) question the role of currency swaps in encouraging a currency's international use.

We expect to find a hierarchy of emergency finance that resembles the dynamics of international financial subordination as discussed by Alami et al. (2023) and Armijo and Katada (2014). At the top are infinite and unlimited US-dollar-denominated swaps that are accessible only to a handful of countries. The Fed offers foreign central banks access to US dollars in essentially unlimited quantities—at least in principle and for as long as needed (Fed 2013). At the bottom are small-sized currency swaps accessible for most emerging economies, denominated in other local currencies, primarily used for trade finance. In other words, by including all currency swap providing central banks in our empirical investigation over a more extended period than previous studies, we expect to find that access to sizeable key currency-denominated emergency liquidity for financial stability is exclusive. More than that, we expect to find that access to US-dollar swaps

also follows a systemic pattern of exclusion and inclusion: advanced economies have access to highly liquid crisis finance while the majority of emerging markets and developing countries do not have access to bilateral currency swaps at all or only to less liquid currencies and smaller amounts.

In addition, we assume that this central bank currency swap hierarchy nourishes US-dollar dominance through persistent differences in swap scale and by sustaining the dollar's international use in core financial markets. We therefore expect our findings to sustain the notion of a persistent US dollar dominance for the foreseeable future.

Uncovering these dynamics is important because they bias crisis finance in the GFSN in a way that allows more advanced economies to prevent and backstop liquidity crises more easily than emerging markets or developing economies, which are excluded from currency swaps altogether. Currency swaps, hence, support and exemplify the dynamics of international financial subordination (Alami et al. 2023) and US-dollar dominance. This matters because patterns of exclusion and inclusion in the international currency swap hierarchy determine the crisis response capacity of countries, given that any country in a temporary liquidity crisis requires highly liquid short-term finance in core country currencies, especially in US-dollar. When not all countries have access to the top of the pyramid, the effectiveness of global crisis prevention and backstop suffers from financial subordination, which is particularly concerning in financially integrated emerging markets.

2. Motives for central bank currency swap provisions

Empirical assessments of central bank currency swap arrangements by and large cover either the country level, by examining the economic and political determinants of central banks currency swap access (e.g., Aizenman & Pasricha 2010, Sahasrabuddhe 2019),or the global level by studying the impact of currency swaps on the systemic effectiveness of the GFSN to prevent and backstop balance of payments crises (e.g., Iancu et al. 2021, Destais 2016, IMF 2016). The present study the two strands of literature together by exploring determinants of the scale and currency denomination of crisis finance provided through currency swaps, which has not yet been explored extensively.

The overwhelming part of the literature is split up into either exclusively considering swaps provided by the Fed (Aizenman and Pasricha 2010; Sahasrabuddhe 2019;

Aizenman et al. 2022) or by the PBOC (Garcia-Herrero and Xia 2013; Liao and McDowell 2015; Lin et al. 2016; Horn et al. 2023). Very few papers offer broader country coverage (Aizenman et al. 2011; Perks et al. 2021), and no analysis encompasses advanced, emerging, and developing economies over an extended period.

Regarding the determinants for the provision of Fed swaps, Aizenman & Pasricha (2010) analyze the first round of Fed swaps provided to the most relevant advanced economies (Eurozone, United Kingdom, Switzerland, Canada, and Japan) and the four Fed-swap-receiving emerging market economies (EMEs) (Brazil, Mexico, Singapore, and South Korea). They find that US bank exposure is the most relevant variable. Aizenman et al. (2022) came to slightly different results when analyzing the selection of Fed swap partners that received a renewal of swap agreements during the pandemic; but their results indicate that financial links, measured as US bank exposure to the swap partner country, remained the key explanatory variable during the pandemic.

The political economy motives of currency swap provision by the Fed are examined with swap data from 2008 by Sahasrabuddhe (2019), who reaches similar conclusions to those of Aizenman et al. (2022). The author finds that financial ties, economic significance for the US, and political alignment with the US determine Fed swaps. The results suggest that the Fed strategically chose the only four emerging markets that have received swap lines (Brazil, Korea, Mexico, and Singapore) to reinforce US alliances in the global economy.

Regarding the motives for the PBOC swap provision, Garcia-Herrero and Xia (2013) find that trade relationships are more important than financial connections in determining the likelihood of providing a currency swap. Moreover, they conclude that countries with a history of default are more likely to sign a swap with the PBOC, a finding recently confirmed by Horn et al. (2023). They argue that China has established a new opaque system for cross-border rescue lending to bailout partner countries that are in debt distress. Liao and McDowell (2015), on the other hand, argue that, rather than balance of payment stress, renminbi internationalization is a key motive behind PBOC's swap provisions.

Concerning studies that consider more than one swap provider, Aizenman et al. (2011) draw on a sample of developed and developing countries that received swaps from the Fed, ECB, and PBOC during the global financial crisis. They find that trade ties determine swap provisions. Additionally, they indicate that high foreign exchange

reserves, as a sign of the overall macroeconomic soundness of the swap-receiving country, are a relevant factor for swap access.

Perks et al. (2021) is the only scholarly contribution that considers many swap providers. However, they only include emerging markets and developing countries as potential swap recipients and not as providers in their analysis. The authors do not find swaps to have a stabilizing effect on the international monetary system, but Fed currency swaps appear to have been effective at maintaining market stability during the COVID-19 shock. They also find that the likelihood of a recipient country signing a currency swap with the PBOC is higher when the country has strong trade ties with China, which resembles the abovementioned findings on the determinants of the PBOC offering a currency swap.

Only two contributions to the literature explicitly explore determinants of swap scale in contrast to access in relation to the characteristics of the partner central banks' countries: Lin et al. (2016) investigate the determinants of signing a swap agreement with the PBOC as well as its size with a Heckman two-stage method based on panel of 130 countries between 2003 and 2014. The authors aim to identify what determines swap size after an agreement has been signed. They find that once the PBOC makes a swap agreement decision, the swap line's size is mainly affected by the size of the economy, trade intensity, and the presence of a free trade agreement.

Koosakul & Miksjuk (2024) empirically investigate determinants of becoming a swap source country and of becoming a swap recipient, including the swap size. They consider 19 swap providing central banks at the end of 2022, using the data provided in Perks et al. (2021). They find the size of currency swaps to be determined by both bilateral trade volumes and financial linkages with the recipient country, but with the latter having a more significant effect. They conclude that the predominant motive for setting up a currency swap is reducing the risk of spillovers of default of the receiving central banks' economy in their own currency.

This literature review shows that both economic and political considerations shape the provision of currency swaps, and that the primary motives often vary across countries. However, comparative studies that examine these differences at a global scale remain scarce, and the few existing analyses do not systematically study size variations across swaps with distinct currency denominations. We aim to close this gap by examining why some countries are deemed worthy of receiving substantial emergency finance in US-

dollars while others are not, and whether differences in swap access and swap scale reinforce or challenge the dominance of the US-dollar.

3. Data and Methodology Utilized

a. *Central Bank Swap Agreements Data*

To explore the currency denomination and volume of central bank swap lines, as well as the determinants of swap size, we construct a novel panel data set covering all global bilateral swaps between 2007 and 2023. The data is gathered from central banks' websites and media reports. In contrast to existing datasets, our dataset distinguishes between the currency denomination of swaps, and between trade and finance-related swaps agreements. We categorize swap agreements between advanced (i.e., high-income) and developing (i.e., middle- and low-income) economies as unidirectional, assuming that advanced ones are providers and developing ones are recipients. Conversely, when both partners belong to the same income group, swaps are considered reciprocal (i.e., both partners are swap providers and receivers at the same time).

Swap agreements from the Fed and the PBOC are exceptions to this assumption. The PBOC swaps are treated the same way as those from advanced economies, reflecting China's important role in providing currency swaps. The Fed swaps are classified as unidirectional, irrespective of the partner country, as the US does not need to draw swap lines from other countries due to the US-dollar's distinct role as key currency. Furthermore, in line with Sahasrabuddhe (2019), we treat Eurozone countries as a single entity by aggregating member country data through averaging (e.g., GDP per capita) or summing (e.g., GDP). The rationale for this approach is that Eurozone countries participate in swap agreements collectively through the ECB, and introducing them as separate entities would lead to multiple counting of ECB agreements, thereby biasing the estimates. Moreover, some swap lines are of unlimited size (see, for example, the Bank of Canada with Bank of South Korea, BOC 2017). To compare the scale of unlimited swaps with limited swaps, we approximate their scale by the past maximum drawing on the respective swap line. The maximum drawing has been about 5.5% of GDP, which we apply to all unlimited swaps here.

Table 1: Central bank swap providers and receivers, 2007 -2023

Providers (34 countries)						Receivers (58 countries)					
Advanced (21)			Developing (13)			Advanced (23)			Developing (35)		
	Freq.	**% of total**		**Freq**	**% of total**		**Freq.**	**% of total**		**Freq**	**% of total**
USA	68	15.5%	CHN	128	29.1%	JPN	28	6.4%	CHN	52	11.8%
JPN	43	9.8%	TUR	6	1.4%	ECB	26	5.9%	IDN	19	4.3%
KOR	24	5.5%	IRN	3	0.7%	CHE	23	5.2%	MYS	12	2.7%
ECB	23	5.2%	LKA	3	0.7%	GBR	21	4.8%	TUR	12	2.7%
CHE	18	4.1%	IND	2	0.5%	KOR	21	4.8%	THA	9	2.0%
GBR	15	3.4%	PAK	2	0.5%	CAN	19	4.3%	IND	8	1.8%
AUS	14	3.2%	BGD	1	0.2%	AUS	15	3.4%	UKR	7	1.6%
SGP	14	3.2%	ETH	1	0.2%	SGP	14	3.2%	PAK	6	1.4%
CAN	13	3.0%	IDN	1	0.2%	DNK	10	2.3%	ARG	5	1.1%
ARE	9	2.0%	IRQ	1	0.2%	SWE	10	2.3%	BRA	5	1.1%
ISL	7	1.6%	MYS	1	0.2%	NZL	8	1.8%	LKA	5	1.1%
SWE	7	1.6%	SDN	1	0.2%	ISL	7	1.6%	MNG	5	1.1%
HKG	6	1.4%	UKR	1	0.2%	NOR	7	1.6%	EGY	4	0.9%
DNK	6	1.4%				QAT	7	1.6%	MEX	4	0.9%
HUN	5	1.1%				ARE	6	1.4%	PHL	4	0.9%
NZL	4	0.9%				HKG	6	1.4%	ALB	3	0.7%
QAT	4	0.9%				HUN	5	1.1%	BLR	3	0.7%
NOR	3	0.7%				CHL	4	0.9%	IRN	3	0.7%
POL	3	0.7%				POL	4	0.9%	KAZ	3	0.7%
LVA	2	0.5%				HRV	2	0.5%	RUS	3	0.7%
EST	1	0.2%				LVA	2	0.5%	ZAF	3	0.7%
						EST	1	0.2%	LAO	2	0.5%
						SAU	1	0.2%	SRB	2	0.5%
									SUR	2	0.5%
									TJK	2	0.5%
									ARM	1	0.2%
									BGD	1	0.2%
									BGR	1	0.2%
									ETH	1	0.2%
									IRQ	1	0.2%
									MAR	1	0.2%
									NGA	1	0.2%
									SDN	1	0.2%
									UZB	1	0.2%
									ZWE	1	0.2%
Total	**289**	**65.7%**	**Total**	**151**	**34.3%**	**Total**	**247**	**56.1%**	**Total**	**193**	**43.9%**

Our novel dataset records 440 bilateral central bank swap agreements. Table 1 shows that nearly two-thirds of these agreements involved advanced economies as providers (289 out of 440 agreements), with the Fed accounting for nearly one-fourth of these provisions (68). Notably, Mexico and Brazil were the only developing countries to

receive Fed swaps. More broadly, relatively few developing countries either received (35 out of 154 developing countries) or provided (13 countries) swap agreements, and most of them were upper-middle-income economies. Among the swap agreements issued by developing countries, RMB-denominated swaps are predominant, accounting for 85 percent of all such agreements (128 out of 151 agreements).

b. *Methodological Approach*

We begin with a comparative descriptive analysis to examine the currency denomination, relative size (as a percentage of recipient GDP), and stated purpose of the swaps, distinguishing between trade- and finance-related agreements. We assume that swap scale is simultaneously determined by both the currency denomination and the purpose of the arrangement. This analysis enables us to: (i) uncover detailed patterns of when and where US-dollar and RMB denomination dominate swaps, (ii) quantify the scale of these swaps relative to a country's GDP, highlighting variations between trade- and finance-related swaps, (iii) differentiate between swap providers and recipient income groups and regions, (iv) explore the claim that the PBOC uses swap agreements to establish the RMB as an international key currency.

We then econometrically explore the dynamics of inclusion and exclusion in the expected swap hierarchy by drawing on literature on the motives for swap provision in US-dollars (e.g., Sahasrabuddhe 2019 on the US Fed; Lee and Katada 2024 on India and Japan) and in RMB (Garcia-Herrero and Xia 2013; Liao and McDowell, 2015). Following Lin et al. (2016), we employ a two-stage Heckman selection model to analyze swap provision. Unlike Lin et al.'s single-country focus on China, we examine determinants across all bilateral agreements with a separate analysis of US-dollar and RMB swaps. The Heckman model addresses the sample selection problem inherent in analyzing swap sizes: factors influencing whether a country receives a swap (extensive margin) may also affect the swap's magnitude (intensive margin), creating a bias if one analyzes only countries with existing agreements.

Our sample includes all potential bilateral country-pair combinations from 2007 to 2023 for which data on our explanatory variables are available. The resulting dataset forms an unbalanced panel due to varying data availability across countries and periods. The first-stage probit estimation uses 181,191 country-pair-year observations, encompassing both country pairs with swap agreements and those without. The second

stage analyzes the observations where swap agreements exist. We estimate four separate specifications considering: (i) all 440 currency swap agreements, (ii) 68 USD agreements from the Fed, (iii) 17 USD agreements from other central banks, and (iv) 128 RMB agreements.

The first stage probit model establishes the determinants for the probability that country *i* signs a swap agreement with country *j* at time *t*. Swap agreements are measured as a binary indicator, where 1 implies the signing of a new swap agreement or the renewal of an existing one. In line with Lin et al. (2016), the explanatory variables (*X*) comprise proxies for trade, capital flows, economic size, institutional quality, and political ties (see Table 3 below for details). Additionally, we use time-fixed effects (δ_t) to control for any unobserved heterogeneity that varies over time but is constant across countries:

$$P\left(Swap_{i,j,t} = 1\right) = \Phi\left(\beta_0 + \beta_1 X_{i,j,t-1} + \cdots + \beta_n X_{i,j,t-1} + \delta_t + \in_{i,j,t}\right) \qquad (1)$$

Conditional on having a swap agreement, we then model the determinants of the log of swap size in current USD via:

$$SwapSize_{i,j,t} = \beta_0 + \beta_1 X_{i,j,t-1} + \cdots + \beta_n X_{i,j,t-1} + \theta \lambda_{i,j,t} + \delta_t + \in_{i,j,t} \qquad (2)$$

where λ represents the inverse Mills ratio calculated from the first-stage probit estimates, which corrects for potential selection bias arising from unobserved factors that influence both the probability of signing a swap agreement and the size of the swap.

We do not include country or country-pair fixed effects because our primary interest is in comparing country-pairs that signed a swap agreement with those that did not. Including country or country-pair fixed effects would be impractical, as it would exclude all country-pairs that did not sign a swap agreement (due to collinearity). Given that our dataset contains only 440 swap events across a limited number of country pairs, in this case most pairs would be excluded from the analysis.

Table 2 gives an overview of the explanatory variables and their data source. In line with our main argument, we are especially interested in trade and financial relevance-related variables. Concerning trade ties, we consider whether the country pairs have a free trade agreement, and we consider the relative size of exports from the swap providing country. We expect that free trade agreements increase the probability that countries will sign a swap agreement, while higher exports should lead to more sizable swap agreements.

Table 2: Summary of the Explanatory Variables

Variable name	Proxy for	Variable description	Source
FTA	Trade ties	Free trade agreement (FTA)	CEPII (2025)
Exports	Trade ties	Bilateral exports of origin country (as % of its GDP)	UNComtrade (2025)
Kopen	Financial relevance	Capital openness index (ranging from 0…1)	Chin-Ito (2025)
IIP	Financial relevance	International Investment Position of destination country (as % of its GDP)	World Bank (2025)
lnGDP	Economic size	Logarithm of GDP (in constant USD)	World Bank (2025)
GDPpc	Institutional quality	GDP per capita (in constant USD)	World Bank (2025)
UN Voting	Political ties	Disagreement in UN General Assembly resolution voting	Voeten et al. (2025)

Source: Compiled by the authors.

Note: This table lists the explanatory variables used in the regressions and cites the sources from which the data was retrieved.

Concerning financial relevance, we consider the capital openness and international investment position of (potentially) swap receiving countries. We expect that the probability of receiving a swap related to financial stabilization increases with capital account openness, while a larger international investment position leads to more sizable swap provisions. The reason for the latter is that larger investment positions imply that the country has a higher systemic relevance for the rest of the world and hence, swap-providing central banks may consider the need for more sizable swaps in order to prevent spillovers of a liquidity crunch to their home economy.

In addition, we use GDP to control for economic size, GDP per capita to control for economic development and institutional quality, and UN Voting similarity to control for political ties. These variables are commonly used in previous studies (see for example Lin et al. 2016, Aizenman et al. 2022) and, together with the inverse Mills ratio, should

prevent the results concerning trade linkages and financial relevance from being biased by omitted variables. All explanatory variables are introduced with a one-year lag to mitigate potential reverse causality and to lower the probability of endogeneity arising from omitted variable bias (by disrupting the contemporaneous correlation between variables), thereby enhancing the robustness of our causal inferences.

4. Results

a. *Denomination of swap lines and size of US-dollar and RMB swaps*

Figure 1 shows that the provision of swaps was relatively constant over time, with significant increases during major financial disruptions: the 2008/09 financial crisis, the European debt crisis, and the COVID-19 pandemic. The 2013 peak was an aftermath of the European debt crisis, involving swap agreements between the Eurozone, UK, Switzerland, and several Eastern European countries that were aimed at restoring confidence in the European financial markets.

Figure 1: Swap count per year of agreement by currency denomination
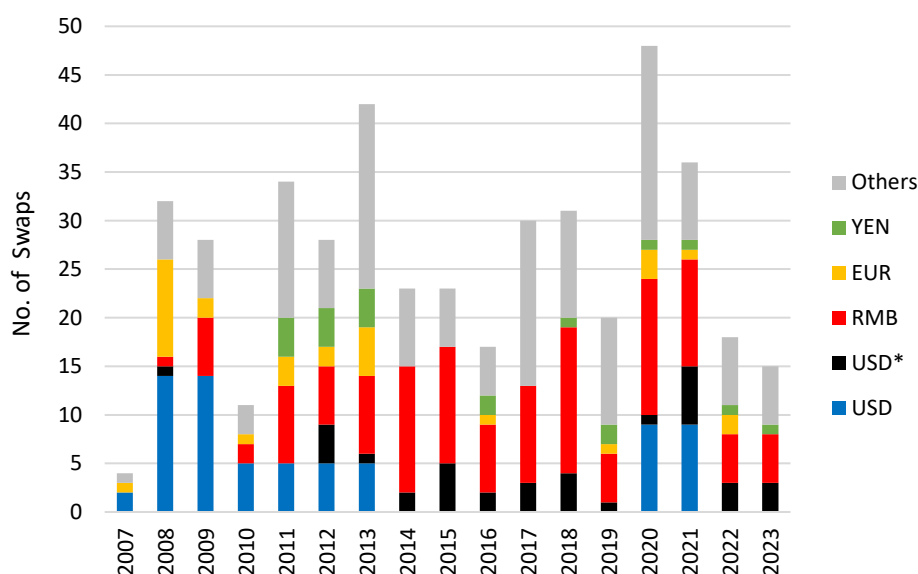
Source: Compiled by the authors.

*Note: The graph shows the number of new and renewed swap lines by year of signing. Unlimited infinite swap lines are counted only once, in the year of their initial agreement. *USD refers to USD-denominated swap agreements by non-Fed central banks.*

The figure also demonstrates a shift in currency composition over time: US-dollar swaps dominated between 2007 and 2012, while RMB swaps became the most prevalent

from 2014 onwards. This shift reflects the distinct strategic motivations behind different swap providers. The leading provider of US-dollar-denominated swaps outside the Fed was the Bank of Japan, which provided US-dollar swaps to seven Asian countries as part of a regional financial stability strategy. Other US-dollar offering central banks were Singapore, India, Poland, Sweden, Pakistan, Turkey, Bangladesh, and Sri Lanka. The category of other currency denominations was mainly comprised of the Canadian Dollar, British Pound, Australian Dollar, Korean Won, Swiss Franc, and Singapore Dollar.

Table 3 provides suggestive evidence that the intersection of currency denomination and underlying strategic purpose determines the swap scale. Fed swaps were approximately twice as large as RMB swaps (5.4% vs. 2.7% of recipients' GDP), excluding the huge swap lines extended by the PBOC to Hong Kong, China's Special Administrative Region. This size difference reflects fundamentally different motivations: Fed swaps target systemically important countries whose financial distress could trigger global crises, justifying substantial liquidity provision to maintain international financial stability. In contrast, RMB swaps primarily target countries excluded from the USD-dominated core financial network and serve mainly to facilitate trade transactions and to promote RMB internationalization. This distinct strategy requires smaller amounts tailored to commercial rather than systemic needs.

The recipient characteristics further support this argument. Countries receiving Fed swaps had more than twice as high GDP per capita ($43,200 vs. $20,300), reflecting the Fed's concentration on a core group of advanced economies. These countries receive large swaps not because of higher liquidity needs per se, but because their financial stability is crucial for preventing global contagion, including spillover to the US economy. US-dollar swaps provided by central banks other than the Fed follow a different logic. They have been much smaller (less than 1% of recipients' GDP) and involve mainly Asian emerging markets. The data further suggests that the Bank of Japan, as the main non-Fed provider of USD swaps, has pursued a regional strategy to maintain financial stability within Asia while potentially countering growing RMB influence in the region. However, these arrangements are necessarily limited in scope and scale, as non-Fed central banks lack the Fed's capacity for large-scale USD provision.

**Table 3: Swap size and recipients of USD vs. RMB swap lines**

SWAPS BY THE FED					RMB SWAPS BY THE PBOC				
Origin	Recipient	Mean GDPpc recipient	Mean swap size in USD million	Mean swap size in % of recipient GDP	Origin	Recipient	Mean GDPpc recipient	Mean swap size in USD million	Mean swap size in % of recipient GDP
USA	AUS	$ 55,996	$ 35,000	2.6%	CHN	ALB	$ 4,456	$ 305	2.00%
USA	BRA	$ 8,453	$ 45,000	2.8%	CHN	ARE	$ 42,970	$ 5,244	1.28%
USA	CAN	$ 41,804	$ 66,793	3.8%	CHN	ARG	$ 12,718	$ 14,261	3.00%
USA	CHE	$ 81,565	$ 29,558	4.6%	CHN	ARM	$ 3,512	$ 152	1.44%
USA	DNK	$ 54,987	$ 17,500	4.7%	CHN	AUS	$ 57,451	$ 30,692	2.09%
USA	ECB	$ 36,784	$ 444,489	3.4%	CHN	BLR	$ 5,778	$ 1,695	3.16%
USA	GBR	$ 42,772	$ 126,329	4.8%	CHN	BRA	$ 9,367	$ 30,654	1.24%
USA	JPN	$ 33,153	$ 235,205	4.1%	CHN	CAN	$ 44,114	$ 30,447	1.68%
USA	KOR	$ 27,997	$ 45,000	3.2%	CHN	CHE	$ 84,333	$ 22,719	3.15%
USA	MEX	$ 9,466	$ 45,000	3.9%	CHN	CHL	$ 13,482	$ 5,409	1.95%
USA	NOR	$ 75,444	$ 17,500	4.1%	CHN	ECB	$ 36,539	$ 53,578	0.41%
USA	NZL	$ 37,938	$ 22,500	12.4%	CHN	EGY	$ 3,754	$ 2,627	0.71%
USA	SGP	$ 53,679	$ 45,000	15.5%	CHN	GBR	$ 45,215	$ 47,522	1.61%
USA	SWE	$ 50,144	$ 35,000	6.2%	CHN	HKG	$ 41,084	$ 66,968	21.87%
		$ 43,584	$ 86,420	5.4%	CHN	HUN	$ 13,565	$ 3,012	1.99%
					CHN	IDN	$ 3,332	$ 24,394	2.54%
SWAPS IN USD BY OTHER CENTRAL BANKS					CHN	ISL	$ 51,824	$ 537	3.09%
LKA	BGD	$ 1,702	$ 250	0.06%	CHN	JPN	$ 35,920	$ 29,854	0.59%
JPN	IDN	$ 3,536	$ 22,760	2.20%	CHN	KAZ	$ 10,040	$ 1,079	0.55%
JPN	IND	$ 1,585	$ 43,600	1.68%	CHN	KOR	$ 27,304	$ 46,305	3.42%
LKA	IND	$ 1,639	$ 900	0.04%	CHN	LAO	$ 2,589	$ 864	4.98%
SGP	JPN	$ 35,600	$ 2,333	0.05%	CHN	LKA	$ 4,146	$ 1,544	1.81%
JPN	KOR	$ 34,121	$ 10,000	0.58%	CHN	MAR	$ 3,124	$ 1,498	1.34%
BGD	LKA	$ 4,361	$ 250	0.28%	CHN	MNG	$ 3,636	$ 1,844	15.23%
IND	LKA	$ 4,139	$ 900	1.04%	CHN	MYS	$ 9,412	$ 24,426	7.78%
JPN	MYS	$ 10,632	$ 3,000	0.86%	CHN	NGA	$ 2,432	$ 2,203	0.52%
TUR	PAK	$ 1,275	$ 1,000	0.40%	CHN	NZL	$ 38,303	$ 3,831	1.96%
JPN	PHL	$ 3,034	$ 10,500	3.24%	CHN	PAK	$ 1,423	$ 2,644	0.90%
JPN	SGP	$ 61,500	$ 12,000	3.21%	CHN	QAT	$ 67,247	$ 5,328	2.94%
JPN	THA	$ 6,171	$ 3,000	0.61%	CHN	RUS	$ 9,515	$ 22,719	1.35%
POL	UKR	$ 2,017	$ 1,000	0.59%	CHN	SAU	$ 23,332	$ 6,930	0.65%
SWE	UKR	$ 2,094	$ 500	0.55%	CHN	SGP	$ 57,647	$ 41,070	12.03%
PAK	TUR	$ 9,520	$ 1,000	0.11%	CHN	SRB	$ 6,275	$ 627	1.24%
		$ 11,433	$ 7,062	0.97%	CHN	SUR	$ 8,745	$ 150	3.33%
					CHN	THA	$ 5,703	$ 10,767	2.51%
					CHN	TJK	$ 1,026	$ 464	5.79%
					CHN	TUR	$ 11,523	$ 2,632	0.32%
					CHN	UKR	$ 2,277	$ 2,302	1.84%
					CHN	UZB	$ 2,271	$ 111	0.18%
					CHN	ZAF	$ 5,995	$ 3,509	0.87%
							$ 20,335	$ 13,823	3.13%

Source: Compiled by the authors.

Note: This table presents mean sizes of bilateral central bank currency swaps in current US-dollars and as a percentage of recipient GDP, and mean GDP per capita of recipient countries, distinguishing between US-dollar swaps from the Fed, US-dollar swaps from other central banks, and RMB swaps from the PBOC.

The increasing number of swap lines provided by the PBOC to countries without access to US-dollar liquidity has contributed to the international use of the RMB in foreign exchange markets. Figure 2 shows a strong parallel rise of RMB swap provisions and RMB use in the foreign exchange rate market (FOREX) over the counter (OTC) turnover: from 0.9% in 2010 to 7.0% in 2022. While this correlation does not establish causality, it provides indicative evidence supporting arguments about the political motivation behind the RMB swap provision.

Figure 2: Swap volume by currency denomination
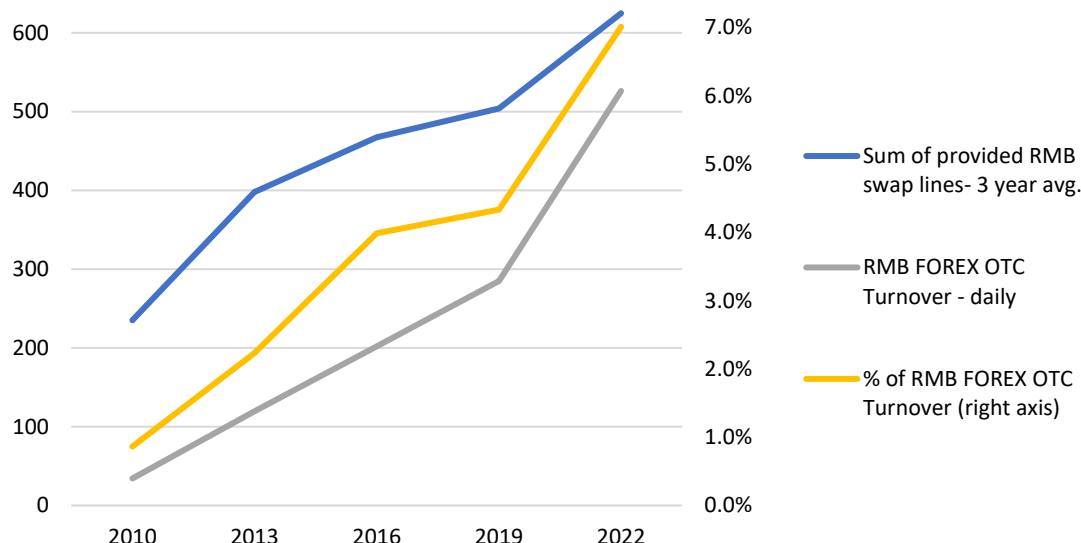
However, the rise of RMB use has not affected US-dollar dominance. While in 2010 the share of US-dollar in FOREX OTC transactions was approximately 85%, by 2022 this figure rose to 88%. This pattern is consistent with the Fed's continued provision of large swaps to systemically important core countries. Thereby, instead of challenging USD dominance, RMB internationalization has diminished the use of other currencies (such as the EURO, Yen, and Swiss Franc; see also Armijo et al. 2014).

One key reason why US-dollar dominance persists despite RMB internationalization is that swap scale systematically varies with the underlying strategic purpose. Figure 3 shows that Fed swaps had purely financial motives, offering emergency liquidity to core countries with strong financial ties to the US. The PBOC, conversely, typically states both financial stabilization and trade finance motives in its press statements about swap agreements, reflecting their dual role in trade facilitation and currency promotion.

**Figure 3: Motives for swap agreement by currency denomination**
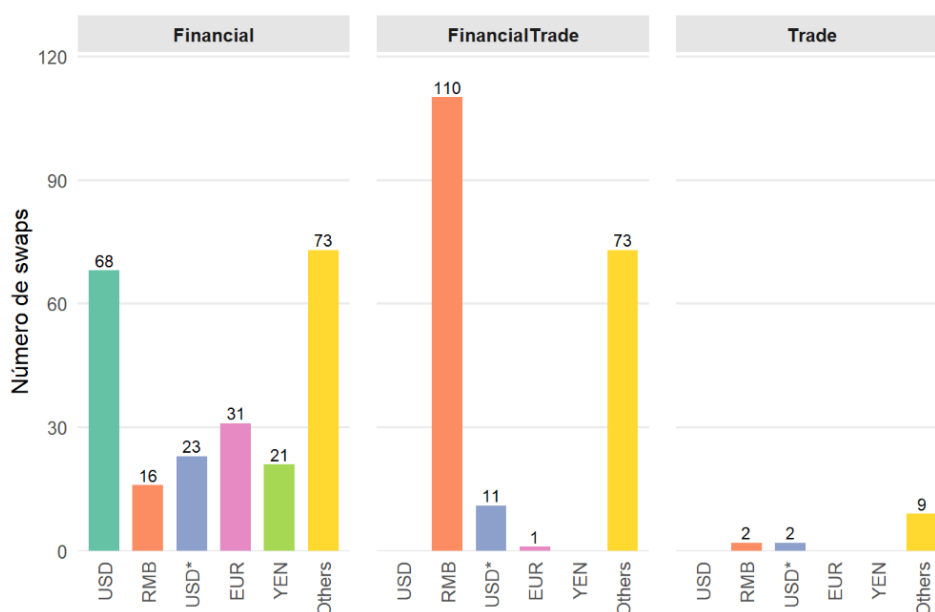
Source: Compiled by the authors.
Note: This graph shows the number of swap agreements by their stated purpose in the press release and their respective currency denomination.

Figure 4 demonstrates that this difference in stated purpose translates directly into size differentiation. Swaps combining financial and trade motives tend to be smaller than swaps with the sole aim of financial stabilization, partly because unlimited swaps are always purely financial. This pattern reflects the logic of our main argument: swap scale correlates with the intersection of currency denomination and strategic purpose.

Peripheral countries receiving trade-related swaps have access only to relatively small RMB swaps that are mainly aimed at commercial transactions. Core countries deemed systemically relevant for the global economy, by contrast, receive much larger swap lines denominated in US-dollars, calibrated to address potential systemic crises rather than routine commercial needs. This size differentiation reveals that access to large-scale liquidity remains concentrated among a few countries whose financial stability is deemed critical for global markets, reinforcing rather than challenging the hierarchical structure of international finance.

Figure 4: Swap size by motive
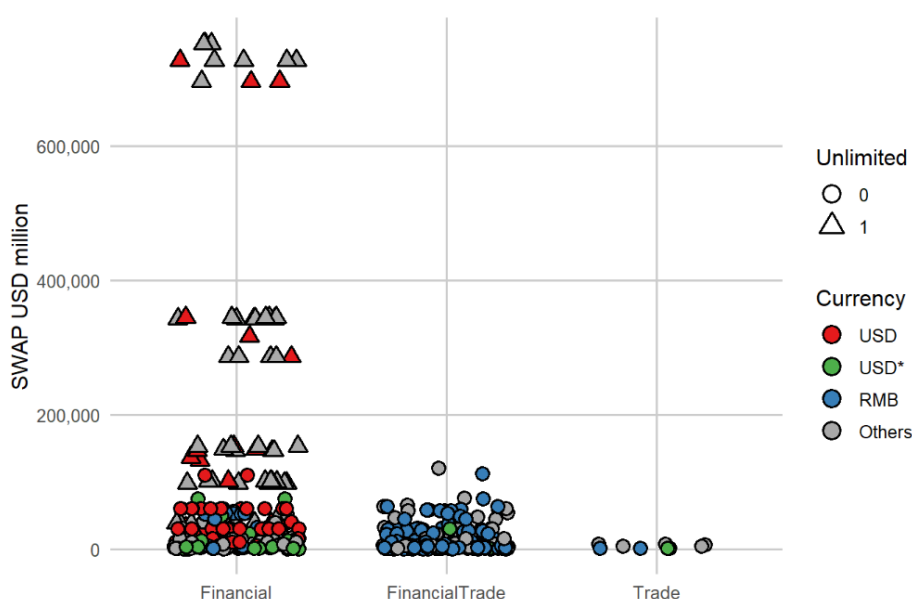
Source: Compiled by the authors from the swap data and BIS Triennial Central Bank Survey.

Note: This graph shows swap size in USD million categorized according to the stated purpose in the swap agreement or in the associated media reports. To compare the scale of unlimited swaps with limited swaps, we approximate their scale by the past maximum drawing on the respective swap line. The maximum drawing has been about 5.5% of GDP, which we apply to all unlimited swaps here.

b. *The Determinants of Swap Line Size*

Table 4 presents the results of the Heckman two-step regressions. Notably, the inverse Mills ratio is statistically significant in three of the four second-stage equations, indicating that the Heckman procedure is appropriate to correct for selection bias due to unobserved factors.

Regarding the control variables, as expected, economic size increases significantly both the probability of receiving a swap and the size of swaps. This holds across all specifications: when considering all swap agreements collectively, or when analyzing RMB, Fed USD, or non-Fed USD agreements separately.

GDP per capita shows more nuanced patterns. Countries with higher GDP per capita have a higher probability of receiving swaps, except for non-Fed USD swaps. This exception reflects the fact that most non-Fed USD swaps targeted Asian lower-middle income countries (Bangladesh, India, Indonesia, Sri Lanka, Pakistan, and the Philippines). Regarding swap size, GDP per capita increases the swap scale for all swaps collectively and for non-Fed USD swaps specifically. However, RMB and US-dollar

swap sizes are not significantly larger for higher GDP per capita recipients. For Fed swaps, this reflects the fact that nearly all recipients are already high-income countries, and the two countries receiving the largest Fed swaps have below-average GDP per capita relative to other Fed recipients. For RMB swaps, about 60% are provided to middle-income countries, many of which have received sizable swap lines relative to their economic size.

Table 4: Determinants of the size of USD and RMB swap lines

	First stage				Second stage			
	All swaps	*RMB swaps*	*FED swaps*	*USD* swaps*	*All swaps*	*RMB swaps*	*FED swaps*	*USD* swaps*
FTA_{t-1}	**0.5619*****	**0.3027*****	**0.3634*****	**1.1690*****				
	[0.0436]	[0.0699]	[0.1289]	[0.1457]				
$Exports_{t-1}$	**1.3151***	-6.344	-6.7322	-4.9507	-3.0582	**179.5812*****	-6.5132	**-74.0994*****
	[0.7450]	[4.6157]	[5.2682]	[3.7743]	[3.2638]	[34.0913]	[13.4083]	[19.3283]
$Kopen_{t-1}$	**-0.1511***	-0.1558	**0.8404*****	**-0.5589****				
	[0.0810]	[0.1081]	[0.2849]	[0.2482]				
IIP_{t-1}	0.0001	0.0001	-0.0003	0.0002	**0.0012*****	**0.0025*****	**0.0011*****	-0.0034
	[0.0001]	[0.0001]	[0.0003]	[0.0002]	[0.0004]	[0.0006]	[0.0003]	[0.0023]
$lnGDP_{t-1}$	**0.2108*****	**0.1008*****	**0.3471*****	**0.2187*****	**0.6211*****	**0.4281*****	**0.4872*****	**0.4437****
	[0.0126]	[0.0168]	[0.0512]	[0.0356]	[0.0738]	[0.0886]	[0.0881]	[0.1924]
$GDPpc_{t-1}$	**0.0000*****	**0.0000*****	**0.0000*****	0.0000	**0.0000*****	**-0.0000****	**-0.0000*****	**0.0001****
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
$UNVote_{t-1}$	**0.1772*****	0.0024	**0.6255*****	**0.1692****				
	[0.0264]	[0.0431]	[0.0731]	[0.0742]				
Lambda					-0.0188	**-1.6863*****	**-0.3783***	**-1.3887****
					[0.2829]	[0.6499]	[0.1950]	[0.6605]
No. Observ.	181,191	181,191	181,191	181,191	181,191	181,191	181,191	181,191
Selected					341	106	61	35

Note: This table summarizes the two-step Hausman panel regression results 2007-2023. All regressions include unreported time fixed effects. In the first stage, the dependent variable is a dummy that equals 1 when a country-pair (re-)signs a swap agreement. In the second stage, the dependent variable is the logarithm of the USD size of the swap line. The explanatory variables are a free trade agreement dummy variable, the bilateral export volume of the swap providing country (as % of GDP), the destination's capital openness, the destinations international investment positions (as % of GDP), the log of the destination's GDP, GDP per capita, and the pair's point distance in UN General Assembly resolution voting (see Table 2 for more details). Columns 2-11 report coefficients and robust standard errors. The significance of a coefficient at the 1%, 5% and 10% level is indicated by ***, ** and *, respectively.

The proxy for political alignment yields an unexpected result: the positive coefficient for UN Voting indicates that countries with greater disagreement in General Assembly resolution voting are more inclined to sign swap agreements. This counterintuitive finding likely stems from the fact that General Assembly votes primarily concern peace and security resolutions rather than economic issues (Bailey et al. 2017). Hence, UN Voting may not effectively capture political closeness related to economic interdependence between countries (Sahasrabuddhe 2019).

Turning to the variables of primary interest, free trade agreements emerge as important determinants for swap provisions regardless of currency denomination. This finding aligns with previous studies, suggesting that countries with established economic partnerships are more likely to sign swap agreements than those without such relationships.

Capital account openness, on the other hand, significantly increases access to Fed USD swaps, while having no impact on RMB swap probability and an adverse effect on both general swap provisions and non-Fed USD swaps. This pattern strongly supports our main argument: the Fed primarily targets highly financialized capital markets that are systemically important, while RMB swap provisions mainly serve less financialized peripheral countries. The negative coefficient for non-Fed USD swaps likely reflects their regional focus on emerging Asian economies, which have more restricted capital accounts.

The size effects provide further evidence for our theoretical argument. Bilateral export volumes significantly determine swap size only for RMB swaps, indicating that trade relationships drive RMB swap magnitude while playing no role in USD-denominated swaps. Conversely, for Fed swaps, the international investment position of the receiving country emerges as the primary driver of swap size (beyond the GDP controls). While the international investment position also significantly affects RMB swap size, trade ties appear more influential overall for PBOC arrangements.

These findings provide empirical support for our theoretical framework, which suggests that swap provision operates through fundamentally distinct channels. Fed swaps function primarily as financial stabilization tools for systemically relevant economies with deep financial integration. In contrast, PBOC swaps serve as trade facilitation instruments for peripheral economies where commercial relationships matter more than financial sophistication.

5. Conclusions

This paper explores swap scale using a novel panel data set covering 440 bilateral swap agreements between 2007 and 2023, their trade-related or financial stabilization-related purpose and currency denomination involving 34 providing and 58 receiving countries. The empirical results support our argument that current patterns of global

currency swap provision represent a hierarchy that supports and exemplifies the theoretical discussion on financial subordination.

The most liquid, sizeable US-dollar swaps are at the top of the swap hierarchy, to which only a handful of core economies that are systemically important to the US financial system have access. The second level of the hierarchy is non-Fed issued US-dollar currency swaps provided primarily by Japan, but also by India (see Lee and Katada 2024) and Singapore. These countries have access to US dollar liquidity and extend swap lines to states that, while not systemically important to the US, are politically relevant in the context of strategic rivalry with the Chinese RMB in international markets. The third level consists of RMB swaps by the PBOC, which serve a dual purpose: financing Chinese exports and promoting the internationalization of the renminbi. At the bottom of the hierarchy are the least liquid local currency-denominated swaps of smaller size provided by peripheral countries to peers.

We find swap scale to be strongly related to the purpose and the denomination of the swap provided: Fed US-dollar swaps provided for financial stabilization are about 6-fold as voluminous as PBOC's RMB swaps that are dedicated not only to financial stabilization but also to trade finance. Further, the average income per capita level of Fed swap recipients is nearly twice that of PBOC recipients. This reflects the Fed's concentration on a core group of advanced economies, whereas the PBOC increasingly extends swap lines to countries without access to US-dollar liquidity. Fourth, 39% of purely financial stability-oriented swaps are denominated in US-dollar, whereas 54% of trade-related swaps are denominated in RMB. Fifth, the economic size of countries receiving swaps aiming exclusively at financial stabilization is around 40% larger than the economic size of countries receiving swaps with the purpose of trade financing.

We find that the close correlation between swap scale and swap denomination, as well as the purpose of swap provision, fuels a hierarchy of bilateral currency swap provision in the GFSN: eligible for access to the top end of the swap hierarchy are advanced economies that are systemically important to the USA. At the bottom of the global swap hierarchy are developing countries that receive small-scale emergency liquidity denominated in less liquid local currencies. The PBOC serves the middle ground: emergency liquidity is tied mainly to trade purposes on a mid-size scale with strong Chinese trade relations.

PBOC liquidity provision is particularly important for peripheral countries in case of liquidity shortages when they are dependent on a liquidity injection from outside. As such, PBOC liquidity provision appears to have facilitated the international use of the RMB in foreign exchange markets. On the contrary, we do not find evidence that US-dollar swaps have had an impact on US-dollar currency use. This implies that US-dollar swaps likely have contributed to the ongoing US-dollar dominance in international trade and financial exchanges but do not seem to have enlarged its use. Rather, RMB use has expanded at the cost of other currencies. Taken together, our results highlight that the RMB has expanded its role in peripheral economies and Europe without affecting the continued dominance of the US-dollar in core financial markets.

Moreover, the results point to a twofold fragmentation of the GFSN that could endanger its effectiveness in responding to financial crises, in particular if a systemic financial crisis occurs. On the one hand, dominance of trade blocs and geo-economic factors that determine swap liquidity access may fuel bloc-building, which may detach crisis finance from economic spillovers. On the other hand, the swap hierarchy fragments emergency finance according to economic income levels, leaving liquidity shortages in solvent developing economies unanswered.

As a result, the overall effectiveness of the GFSN may suffer if fragmentation is not addressed through enhanced coordination in the GFSN. These findings underscore the importance of further diversifying the GFSN to reduce its dependence on the idiosyncratic interests of one dominant key currency emitter, thereby promoting a more equitable and resilient global financial architecture.

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