

Central Bank Swap Lines and Currency Choices in Trade: the Bank Risk Management Channel

Yang Jiao¹ Ohyun Kwon² Saiah Lee³ Shang-Jin Wei⁴

¹Singapore Management University

²University of Pennsylvania

³Ulsan National Institute of Science and Technology

⁴Columbia University and NBER

ABFER Webinar: Capital Market Development: China and Asia

Introduction

- An international currency can bring some benefits to the issuing country
 - ▶ seigniorage revenue
 - ▶ lower transaction cost
 - ▶ lower borrowing costs for its governments and firms
 - ▶ lower exchange rate risk
 - ▶ countering financial sanctions imposed by adversaries
 - ▶ etc.
- What does it take to become an international currency in cross-border transactions?
- We highlight
 - ▶ **commercial banks** shape firms' currency choices
 - ▶ a **central bank** can promote their currency's international use by altering **foreign commercial banks'** incentives to build balance sheets in that currency with the policy instrument **swap lines**

Introduction (cont.)

- Rising importance of swap lines as a global financial safety net, see Denbee et al (2016), Gopinath (2017), Bahaj, Fuchs and Reis (2024)
- Notably, China pushed local currency central bank swap lines since 2008 to promote the use of RMB
- South Korea provides a good case study for the role of swap lines
 - ▶ availability of detailed currency settlement/invoicing data in trade
 - ▶ Korea is a top trading partner for China, Japan, and USA, etc.
 - ▶ KRW does not have an international currency status
 - ▶ Korea has swap lines not only with China but also with several other countries, including discontinuation of swap lines with Japan

Literature Review

- **Endogenous choice of invoicing currency:** Engel (2006), Friberg (1998), Goldberg and Tille (2008), Devereux and Shi (2013), Goldberg and Tille (2016), Chung (2016), Mukhin (2022), Amiti, Itshoki and Konings (2022), Chahrour and Valchev (2022), Boz, Casas, Georgiadis, Gopinath, Mezo, Mehl and Nguyen (2022), Chahrour and Valchev (2022)
- **Dominant currency:** Shi and Xu (2010), Gopinath (2015), Gourinchas, Rey and Sauzet (2019), Gopinath, Boz, Casas, Díez, Gourinchas, and Plagborg-Møller (2020), Li and Meleshchuk (2020), Gopinath and Stein (2021), Chahrour and Valchev (2022), Eren and Malamud (2022), Mukhin (2022)
- **Impacts of central bank swap lines:** Obstfeld, Shambaugh and Taylor (2009), Goldberg, Kennedy and Miu (2010), Rose and Spiegel (2012), Bahaj and Reis (2021), Aizenman, Ito and Pasricha (2021), Goldberg and Ravazzolo (2022), Kekre and Lenel (2023)
- **China's central bank swap lines and RMB internationalization:** Bahaj and Reis (2025)
 - ▶ key difference: we use **micro data, go beyond China and propose a different mechanism**
 - ▶ unlike their mechanism, which relies on two-way traders, ours remains effective even when traders are only one-way

Roadmap

- Institutional Background
- Data Description
- Aggregate Currency Share Dynamics
- Micro-Level Analysis
- Mechanism
- Model (brief or skipped)
- Conclusion

Korea-China Local Currency Swap Lines

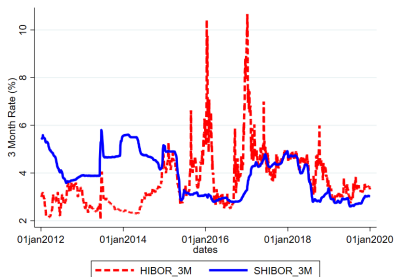
- South Korea is the first country that China signed a local currency swap line with
 - ▶ BoK holds an RMB account at the PBoC with a credit limit
 - ▶ the other way around similar arrangement

Effective Date	Amount	Duration	Note
2008.12.12	180 Billion RMB/38 Trillion KRW	3 years	
2011.10.26	360 Billion RMB/64 Trillion KRW	3 years	renewal
2014.10.11	360 Billion RMB/64 Trillion KRW	3 years	renewal
2017.10.11	360 Billion RMB/64 Trillion KRW	3 years	renewal

- Korea set up two programs : [Trade Settlement Support Program \(TSSP\)](#) and [RMB Liquidity Supply Program \(LSP\)](#)
- China signed with ECB, UK, Malaysia, Thailand, Indonesia, etc. afterward
- As of August 2024, China had signed 42 standing local currency swap lines (29 in effect) with total outstanding value of 4.1 trillion RMB

Trade Settlement Support Program Rarely Used

- Importers/exporters apply RMB trade finance through a participating commercial bank in Korea, passed to Bank of Korea for approval
- Woori is the largest user among Korean banks in the trade settlement support program
 - ▶ however, only 164 transactions (1.3 million USD) until May 2016
 - ▶ note RMB use in Korean exports to China already exceeded 4 billion USD in 2015)
- In Korea, the RMB trade settlement support program interest rate: SHIBOR (+ premium & bank collateral)



Korea-Japan Local Currency Swap Lines

Effective Date	Amount	Duration	Note
2005.05.27	3 Billion USD	expire 2007.07.03	swap line
2007.07.03	3 Billion USD	expire 2010.07.03	extension of swap line
2008.12.12	20 Billion USD	expire 2009.04.30	increase of swap line
2009.03.31	20 Billion USD	expire 2009.10.30	extension of the increase
2009.10.16	20 Billion USD	expire 2010.02.01	extension of the increase
2010.01.19	20 Billion USD	expire 2010.04.30	extension of the increase
2010.06.22	3 Billion USD	expire 2013.07.03	another extension of swap line
2011.10.10	30 Billion USD	expire 2012.10.31	second increase of swap line

- The 3 billion USD equivalent KRW-JPY swap line still under the name of CMI (CMI is a regional liquidity provision mechanism within the Southeast Asia + Korea, China, and Japan.)
- Political/diplomatic conflicts such as Dokdo/Takeshima (island) and other historical issues disrupted renewal of the swap lines

Korea-US Local Currency Swap Lines

Effective Date	Amount	Duration	Note
2008.10.30	30 Billion USD	6 month	
2009.02.04	30 Billion USD	expire 2009.10.30	extension
2009.06.26	30 Billion USD	expire 2010.02.01 (as scheduled)	second extension

- US Federal Reserve established central bank liquidity swap lines with many foreign central banks during the Global Financial Crisis
- Bank of Korea implemented USD lending to commercial banks using auctions

Korea Local Currency Swap Lines with Other Countries

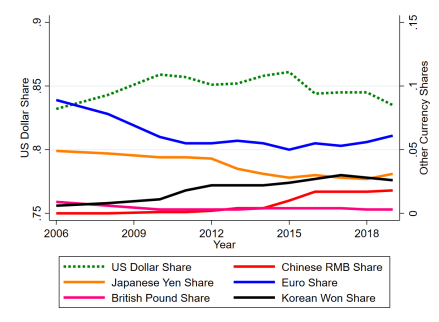
Partner	Effective Date	Amount	Duration	Note
Switzerland	2018.02.19	10B CHF/11.2T KRW	3 years	
Canada	2017.11.15	unlimited	standing	
Australia	2014.02.23	5B AUD/5T KRW	3 years	
	2017.02.28	10B AUD/9T KRW	3 years	amount increase
UAE	2013.10.13	20B AED/5.8T KRW	3 years	
	2019.04.13	20B AED/6.1T KRW	3 years	
Indonesia	2014.03.06	115T INR/10.7T KRW	3 years	
	2017.03.06	115T INR/10.7T KRW	3 years	renewal
Malaysia	2013.10.20	15B MYR/5T KRW	3 years	
	2017.01.25	15B MYR/5T KRW	3 years	renewal

- South Korea's swap lines with Indonesia and Malaysia also contain TSSP

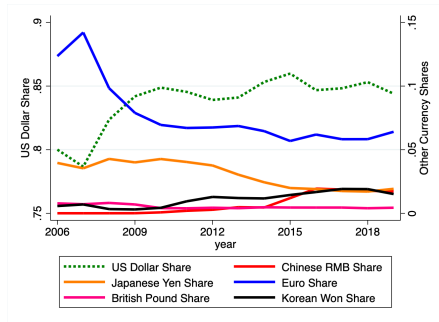
Main Datasets

- A sample of Korean Customs 2006-2019 of Korean exporting firms: firm-product-destination-year with [currency settlement](#) information (about 50% of Korean exports)
 - ▶ accessed from Korea Customs' statistics agency (KTSPI)
 - ▶ random 4000 firms from Korean Information Service (KIS) exporters
 - ▶ both their export and import information
- Korean Information Service (KIS): KIS-Value Database
 - ▶ both listed and private firms with assets > 12 billion won are required to report
 - ▶ other firms can also voluntarily report
 - ▶ information on sales, employment, debt, assets, [main bank](#), etc.
- Korean banks' balance sheets and deposit rates by different currencies

Currency Shares of Korean Export to the World

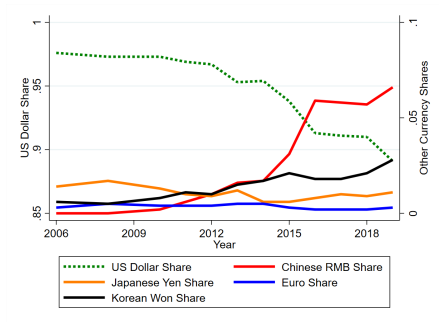


(a) Official Data

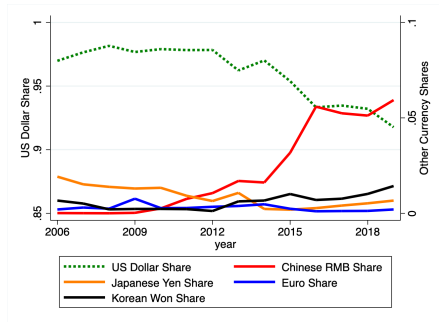


(b) Customs Sample Data

Currency Shares of Korean Export to China

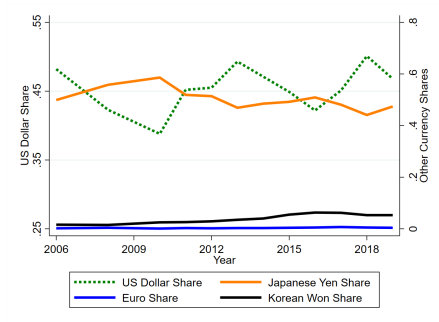


(a) Official Data

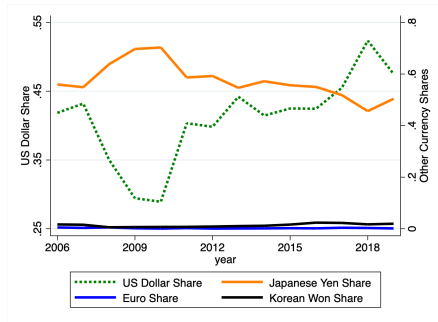


(b) Customs Sample Data

Currency Shares of Korean Export to Japan

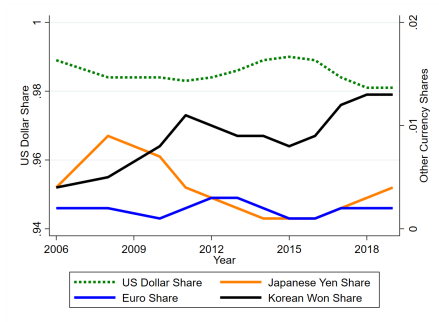


(a) Official Data

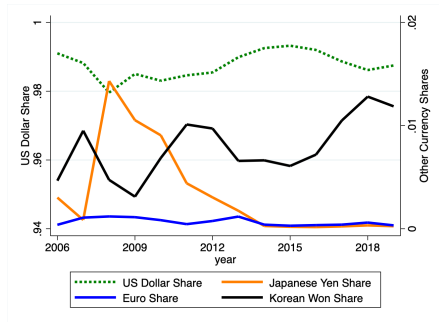


(b) Customs Sample Data

Currency Shares of Korean Export to the United States

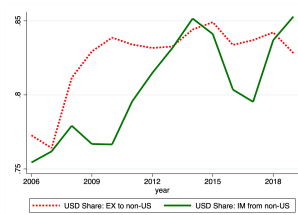


(a) Official Data

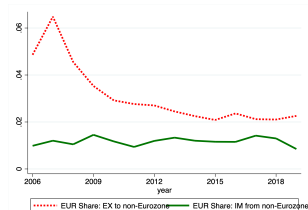


(b) Customs Sample Data

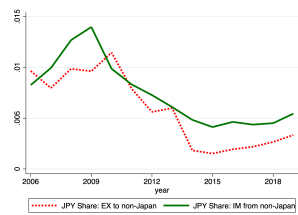
Regional Currencies Use Are Largely “Bilateral”



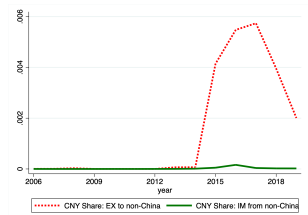
(a) USD Share in Korean Trade with Non-US Destinations



(b) EUR Share in Korean Trade with Non-Eurozone Destinations



(c) JPY Share in Korean Trade with Non-Japan Destinations



(d) RMB Share in Korean Trade with Non-China Destinations

Baseline Empirical Setting

- Construct firm-destination-year level currency shares

$$exsh_{fjt}^o = \frac{exvalue_{fjt}^o}{exvalue_{fjt}}.$$

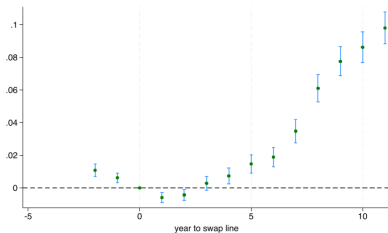
- Empirical setting (event-type analysis)

$$exsh_{fjt}^o = \alpha_{fj}^o + \delta_t^o + \sum_{j,\tau \neq 0} \beta_{j\tau}^o I(\text{swapline_event}_{jt} = \tau) + \epsilon_{fjt}^o$$

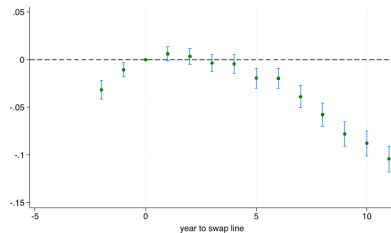
where o denotes local currency (LC), US dollar (USD), Korean Won (KRW), and others. $I(\text{swapline_event}_{jt} = \tau)$ is an indicator function that equals 1 if time t 's distance to the “swap line event” of destination country is τ .

- Swap line event as T if the swap line is signed in the second half of year T and $T - 1$ if the swap line is signed in the first half of T . For the swap line with Japan, set 2012 as the event year (also both sides decided not to extend).

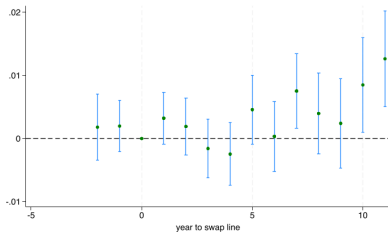
Firm Level Currency Shares of Korean Export to China



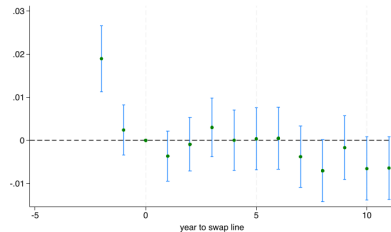
(a) RMB Share



(b) US Dollar Share

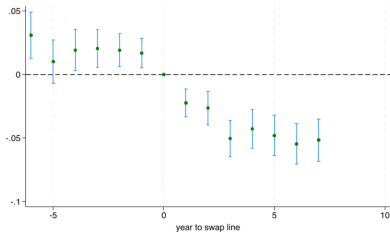


(c) Korean Won Share

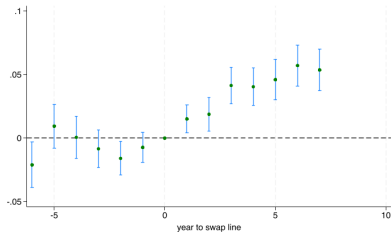


(d) Other Currencies' Share

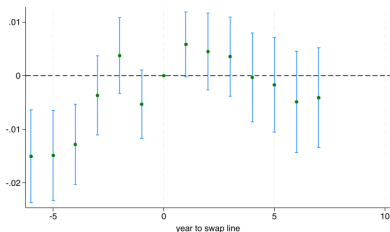
Firm Level Currency Shares of Korean Export to Japan



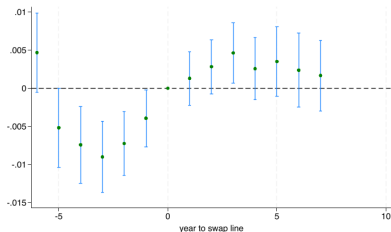
(a) Japanese Yen Share



(b) US Dollar Share

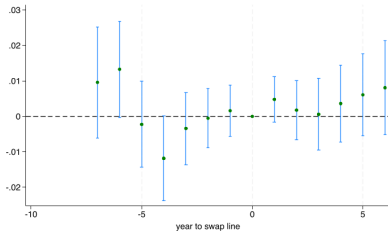


(c) Korean Won Share

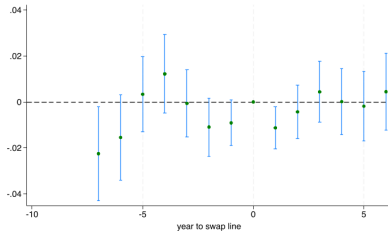


(d) Other Currencies' Share

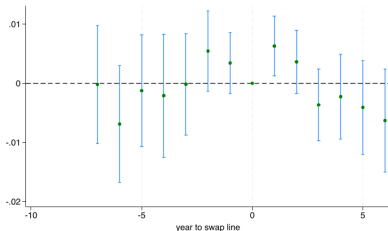
Firm Level Currency Shares of Korean Export to Australia



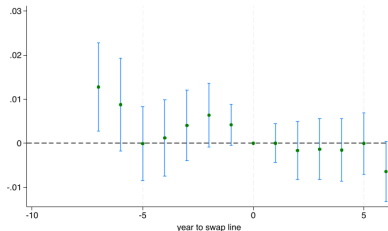
(a) Australian Dollar Share



(b) US Dollar Share

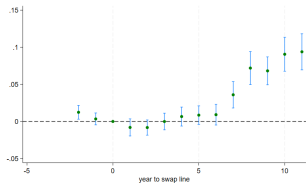


(c) Korean Won Share

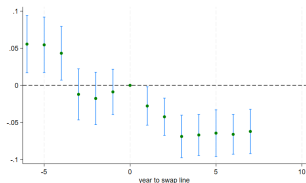


(d) Other Currencies' Share

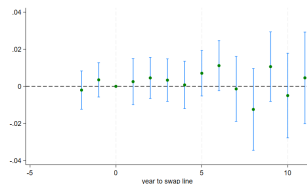
Import-Export Nexus in Currency Choice for Exporters



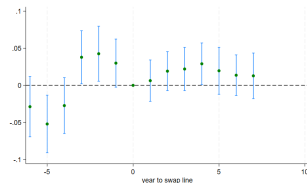
(a) RMB Share for Non-importers from China



(c) Japanese Yen Share for Non-importers from Japan



(b) Difference in RMB Share for Importers and Non-importers from China



(d) Difference in Japanese Yen Share between Importers and Non-importers from Japan

Additional Results

- Extensive margin of currency choice
- Firm-product-destination level
- The role of Chinese state-owned importers
- Additional controls, such as firm size (employment), market share, import LC dummies, import LC share
 - ▶ import LC dummies or share expected signs, but point estimate very small (0.02~0.03)

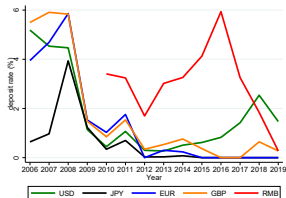
Summary of Key Baseline Results

- Signing (or discontinuation) of swap line with China (Japan) associated with increase (decrease) of local currency use
 - ▶ competition between dominant currency (USD) and local currency (RMB or JPY)
 - ▶ exporters who do not import using RMB still see a rise in RMB use
- The swap lines with other countries do not have significant impacts on the use of LC
 - ▶ not surprising if the [destination market size](#) is not large enough for Korean banks to cover fixed costs to expand business in these currencies

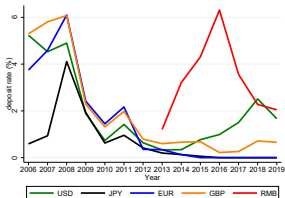
Our Mechanism Concerns RMB Liquidity Supply Program

- Central Bank: Lender of Last Resort
 - ▶ If a central bank (e.g., Bank of Korea) signs a swap line agreement (e.g., with China), then they become the lender of last resort in a foreign currency (e.g., RMB)
- Commercial Banks: Maturity mismatch
 - ▶ commercial banks accept short-term deposits and lend in longer terms
 - ▶ sudden withdrawal of deposits can create a liquidity shock
- Central bank swap line may incentivize banks to expand business and build balance sheets in the foreign currency
 - ▶ banks can provide favorable terms to firms/households in order to expand that foreign currency related balance sheets

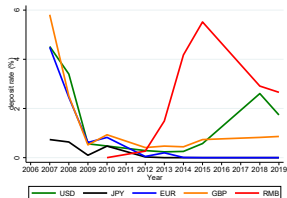
Korean Banks' Deposit Interest Rates



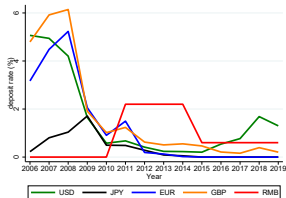
(a) Woori Bank 3-month Term Deposit Rate



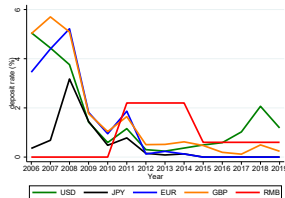
(b) Shinhan Bank 12-month Term Deposit Rate



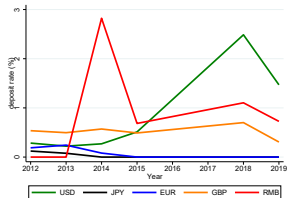
(c) Standard Chartered 3-month Term Deposit Rate



(d) Korean Exchange Bank 3-month Term Deposit Rate



(e) Hana Bank 3-month Term Deposit Rate



(f) Kookmin 3-month Term Deposit Rate

Deposit Interest Rates and Exporter Currency Invoicing

Bank Deposit Rates and Firm Currency Invoicing

	(1)	(2)
Dependent Variable:	LC share	USD share
LC rate minus USD rate	0.004* (0.002)	-0.007** (0.002)
Country-Year FE	Y	Y
Country-Firm-Product FE	Y	Y
Observations	112,743	112,743
R^2	0.798	0.774

Notes: This table shows how deposit rates impact firms' export invoicing at the firm-product-year level for China and Japan. Standard errors are two-way clustered at the firm and bank-destination level. We match firms with their main bank information and use corresponding deposit rates of their main bank.

Response of Deposit Amounts to Swap Line Agreement

- Hand-collect bank-level balance sheet in different currencies by bank (RMB, JPY, GBP, EUR)
- Construct *lc_deposit_ratio* as deposit in currency of destination *j* by bank *b* divided by export value to destination *j* of firms whose main bank is *b*
- Empirical specification

$$lc_deposit_ratio_{bjt} = \alpha_{bj} + \beta * SwapLineDummy_{jt} + \delta_t + \epsilon_{bjt}.$$

Bank Balance Sheet Response to Central Bank Swap Line

	(1)	(2)	(3)
Dependent Variable:	LC Deposit	LC Liability	LC Asset
Swap Line Dummy	0.434** (0.079)	4.138*** (0.380)	4.130*** (0.335)
Year FE	Y	Y	Y
Bank-Currency FE	Y	Y	Y
Observations	153	153	154

The Role of Pre-Swap Line Korean Bank Exposure

- Hand-collect Korean commercial banks' branches/offices in China, focusing on non-government-owned banks
- Use main bank information of Korean exporters recorded in KIS-Value

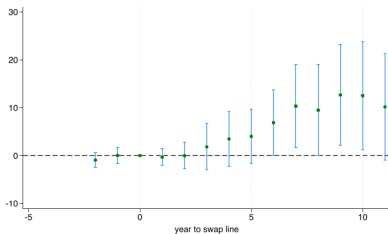
$$branch_initial_b = \frac{\text{number of Chinese cities bank } b \text{ has branches before 2008}}{\text{export values to China of exporters with main bank } b \text{ in 2006 (million USD)}}$$

- Empirical setting

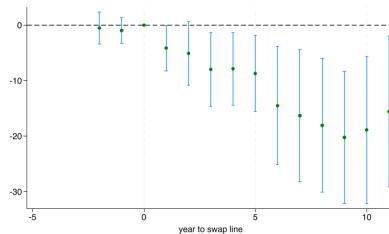
$$\begin{aligned} exsh_{fjpt}^o &= \alpha_{fjp}^o + \delta_t^o + \sum_{j, \tau \neq 0} \beta_{j\tau}^o I(\text{swapline_event}_{jt} = \tau) \\ &+ \sum_{\tau \neq 0} \xi_{China, \tau}^o I(\text{swapline_event}_{China, t} = \tau) * branch_initial_b + \epsilon_{fjpt}^o, \end{aligned}$$

where firm f 's main bank is bank b .

The Role of Pre-Swap Line Korean Bank Exposure (cont.)



(a) $\hat{\xi}_{China,\tau}^{RMB}$



(b) $\hat{\xi}_{China,\tau}^{USD}$

Discussions on Other RMB Internationalization Policies

- **RMB clearing banks**: in Korea, Bank of Communications of China was designated in July 2014
 - ▶ in November 2014, Bank of Communications formally started RMB clearing business, but no Korean exporters use it as a main bank
 - ▶ in June 2016, Woori Bank started to have local currency clearing cooperation with Bank of Communications
- **CIPS** (Phase I) was established in October 2015, no Korean banks are direct participants
 - ▶ Jiao and Wei (2025): CIPS for trade between Russia & China after SWIFT sanctions
- Both China and Korea introduced **direct RMB-KRW transactions and designated market-making banks**
 - ▶ in Korea, kicked off in mid-December of 2014
 - ▶ in China, June 2016

Exporters' Production and External Demand

- A continuum of Korean exporters country j (e.g., China)
 - ▶ production function

$$y = A\alpha^{-1}h^\alpha,$$

where A is productivity, h is domestic input

- ▶ Country j 's demand if the exporter chooses currency l

$$y_l = C_j \left(\frac{\xi_l p_l \tau_l}{\xi_j P_j} \right)^{-\lambda} \quad \text{for } l \in \{j, v\},$$

where $v = \text{USD}$, $\xi = \text{exchange rate}$, $P_j = \text{destination price index}$, $\tau = \text{FX transaction cost}$

- Exporters' profit is

$$\Pi_j = \xi_j p_j y_j [\pi_j + (1 - \pi_j)(1 + i_j)^2] - w h_j$$

$$\Pi_v = \xi_v p_v y_v (1 + i_v)^2 - w h_v.$$

where i_l denotes interest rate, π_j is exogenous probability that firms withdraw early

Exporters' Currency Choice

- Individual exporter i to maximize

$$\max_{l \in \{j, v\}} \mathbb{E}(\Pi_l) \cdot \epsilon_{il}^{-1},$$

where ϵ_{il} is an idiosyncratic preference shock for firm i using currency l

- Assume ϵ_{il} a random variable from Fréchet distribution with parameters (T_l, θ) , where T_l and θ are respectively location and shape parameters
- Currency l share increases with interest rates i_l offered by banks

$$s_l = 1 - \frac{T_l \mathbb{E}(\Pi_l)^{-\theta}}{\sum_{l'} T_{l'} \mathbb{E}(\Pi_{l'})^{-\theta}}.$$

Banks' Profit Maximization

- Korean banks' profit maximization

$$\max_{i_j, i_v} \Pi_B = \{ \mathbb{E}(g_j(D_j)) - (1 - \pi_j)(1 + i_j)^2 \mathbb{E}(D_j) - \pi_j((1 - \omega)\bar{l} + \omega \underline{l}) \mathbb{E}(D_j) \} s_j \\ + \{ \mathbb{E}(g_v(D_v)) - (1 + i_v)^2 \mathbb{E}(D_v) \} s_v,$$

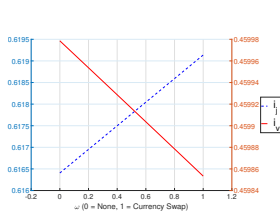
where $\mathbb{E}(g_l(D_l))$ is the expected return on the bank' loans to other sectors in the economy. **Importantly, there is maturity/liquidity mismatch**

- ω indicates whether there are swap lines available to Korean banks. When available, upon the withdrawal shock, swap lines reduce the cost of borrowing for banks, reflected in a low $\underline{l}$ provided by central banks.

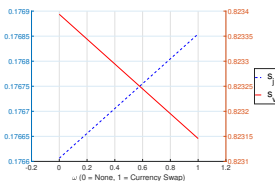
Swap line with country j reduces Korean banks' risk of borrowing and lending in j

From Swap Lines to Currency Choice

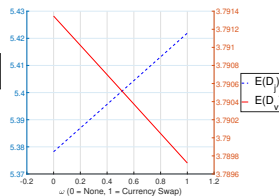
Proposition 1. The bank's optimal interest rate on currency j deposit increases (and that of currency v deposit decreases) if a currency swap agreement between currency j and home currency is in place, and exporters increase their use of the same currency.



(a) interest rates



(b) share of firms
invoicing in each currency



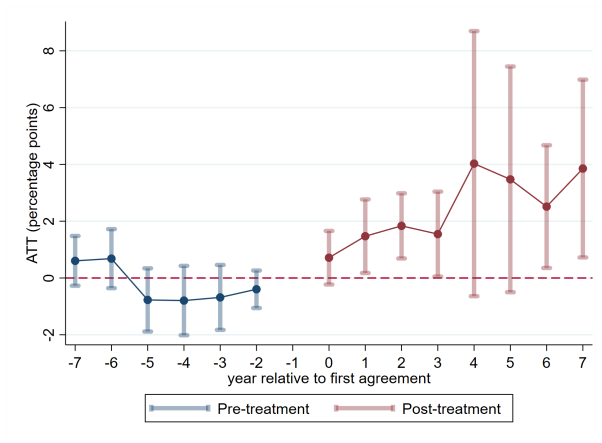
(c) expected deposit

Conclusion

- We study effects of **central bank local currency swap lines** on firms' **currency choice in trade** through **bank risk management channel**
- Firm level evidence from Korean swap lines with China and Japan
 - ▶ even exporters that do not use RMB in import see a rise in RMB use
- Evidence supporting our mechanism
 - ▶ Korean commercial banks' direct responses in their deposit rates in different currencies after swap line events with China and Japan
 - ▶ Korean exporter currency choice associated with commercial banks' deposit rates change
 - ▶ Korean commercial banks' balance sheets respond to swap line events
 - ▶ heterogeneous response of currency choice of exporters whose main banks' pre-swap line infrastructure in China differ
- New model to link central bank swap lines with currency choice highlighting the role of commercial banks

Appendix

RMB Swap Lines and RMB Invoicing at the Country Level



Notes: This figure displays the CSDID results of the effects of access to RMB swap lines on export RMB invoicing at the country level. RMB swap line data is from Bahaj, Fuchs, and Reis (2024). RMB invoicing data is from Boz et al. (2025).