Financial Interdependence and Currency Internationalization

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Introduction

- China is becoming more active in international lending and asset issuance.
- At the same time, China has sought to promote the international use of its currency.
- Does China's **financial development** require **currency internationalization**?
- Can China instead expand its influence within the dollar system?

This Paper: Financial Interdependence

- Study this issue through the lens of network effects.
- Microfound liquidity effects at both the **asset-market** level and the **currency-area** level — asset attractiveness increases in the size of asset market and the size of the currency area to which it belongs.
- This two-tier network effect allows sovereign issuers' currency choices to affect their asset desirability.
- We use the model to study China's optimal choice as its financial market develops, and the U.S. response.

Key Findings

- Asset market and currency market interact in **non-monotone** ways: at early stages of financial development, China has incentive to issue its asset in dollar; as it grows, it will eventually switch to RMB.
- U.S. financial sanction and financial repression policies influence China's incentives, with important **spill-back** to the U.S.
- More issuers lead to **multiple equilibria**, potentially amplifying volatility in the transition path.

Model

Set-Up

- An incumbent hegemon (U.S.) competes with a rising power (China) in the provision of reserve assets.
- The theoretical insight is broader and applies to other contexts that emphasize liquidity effects through the economy of scale:
  - choosing invoice currency in international trade
  - choosing currency denomination in international investments
  - choosing clearing system in cross-border payments

Set-Up

- Unit mass of global savers, allocate among three assets: (1) U.S., (2) China, and (3) an "outside asset" (e.g., gold, crypto, commodities).
- $s(i)$ denotes the size of asset i, and $s(currency_i)$ denotes the size of the currency area to which asset i belongs = total size of all assets issued in that currency.
- Each period is divided into two sub-periods, t and t^+.
  - At t, savers choose among assets. Frictionless market.
  - At t^+, a fraction λ of randomly selected savers experience a liquidity shock, which forces them to liquidate asset holdings. Trading is subject to search frictions.

Search with Intermediaries

- Usually, search occurs directly between buyers and sellers. We propose a two-stage search process intermediated by financial intermediaries.
- First stage: a seller searches for an intermediary.
- Second stage: the matched intermediary contacts a potential buyer.
- Key friction: intermediaries specialize by currency denomination.
  - e.g., different currency desks in different banks, segmented from each other.
  - Financial intermediation requires **expertise** in the legal and regulatory environment, **access** to funding resources and central bank liquidity facilities, and **relationships** with market participants, all of which are specific to the currency area.
  - This friction assigns a central role to currency denomination in determining asset liquidity. Currency size matters independently of asset market size.

Stage 1: Seller Finds Intermediary

- The mass of intermediaries for a given currency $\propto$ the size of that currency area.
- Standard search process (Duffie, Gârleanu, and Pedersen, 2005). The number of meetings between sellers and intermediaries is increasing in their masses:

$$n(match) = \kappa[\underbrace{\lambda s(i)}_{\text{mass of sellers}}]^{\phi} \cdot [\underbrace{s(currency_i)}_{\text{mass of intermediaries}}]^{\phi}.$$

$\phi > 1/2$: doubling the masses of sellers and intermediaries more than doubles the number of matches.

Stage 2: Intermediary Finds Buyer

- Once a seller is matched with an intermediary, the intermediary contacts a potential buyer.
- For a trade to occur, the buyer must
  - have been spared from the liquidity shock, and
  - hold the same asset — investing requires expertise and familiarity, which are more likely to be found among existing holders of that asset.
- We assume the probability of finding such a buyer is increasing in the share of that asset within the currency area:

$$p(\textit{contact}|\textit{match}) = \left(\frac{s(i)}{s(\textit{currency}_i)}\right)^{\psi}, \quad \text{with} \quad \psi > 0.$$

  - e.g., $\psi = 1$: the intermediary finds a random buyer within the currency area with equal probability.

Overall Probability of Finding a Buyer

$$p(\textit{success}) = p(\textit{match}) \cdot p(\textit{contact}|\textit{match}) = \kappa\lambda^{\phi-1} s(i)^{\psi+\phi-1} \cdot s(\textit{currency}_i)^{\phi-\psi}.$$

Special case: $\phi = \psi$

Intermediaries locate buyers with same intensity as sellers locate intermediaries.

$$p(\textit{success}) = \kappa\lambda^{\phi-1} s(i)^{2\phi-1}$$

- $p(\textit{success})$ only depends on asset size, not currency size. Intermediaries are pure passthroughs.
- Collapses to standard search between sellers and buyers. Identical to Duffie et al. (2005); Coppola, Krishnamurthy, and Xu (2023).

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Preferred case: $\phi > \psi$

Size confers greater advantage in currency market (stage 1) than in asset market (stage 2).

$p(\textit{success})$ increasing in asset and currency sizes.

Intuition: holding asset size constant, a larger currency area has two opposing effects.

- Stage 1: Sellers benefit from more intermediaries.
- Stage 2: Intermediaries face a larger pool of counterparties, within which actual buyers constitute a smaller share.
- $\phi > \psi$ ensures the thickening of the intermediary market dominates the dilution effect.
- Intermediaries possess greater expertise than investors. Search friction more severe in latter case.

Agent Utility

- Our search protocol implies that liquidity operates at two distinct levels: the sizes of the asset itself and the currency area to which the asset belongs.
- Saver k's utility from holding asset i:

$$u_k(i) = \alpha \log s(i) + \beta \log s(currency_i) + \theta(i) + \epsilon_k(i).$$

- $\theta(i)$ captures the level of financial sophistication/institutional quality of the issuing country. Historically, $\theta(us) > \theta(cn)$.
- $\epsilon_k(i)$ captures a saver-specific preference shock following Type I extreme value distribution.
  - Standard logit for tractability: $s(i) \propto \exp(\alpha \log s(i) + \beta \log s(currency_i) + \theta(i))$.

Asset Demand

- U.S. is committed to the dollar area; China chooses currency denomination to maximize its market share. Savers choose among assets to maximize their utility.
- If both countries issue in dollar:

$$s(i) = \frac{\exp(\alpha \log s(i) + \beta \log s(dollar) + \theta(i))}{1 + \sum_{j \in \{us,cn\}} \exp(\alpha \log s(j) + \beta \log s(dollar) + \theta(j))}, \quad i \in \{us, cn\},$$

  where $s(dollar) = s(us) + s(cn)$.
- If China issues in yuan:

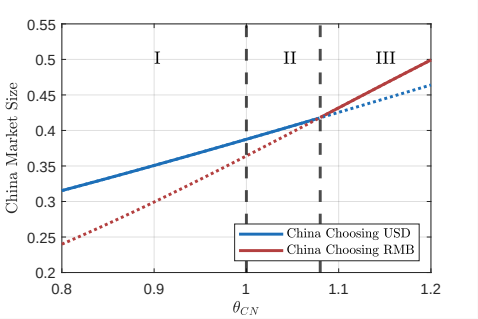
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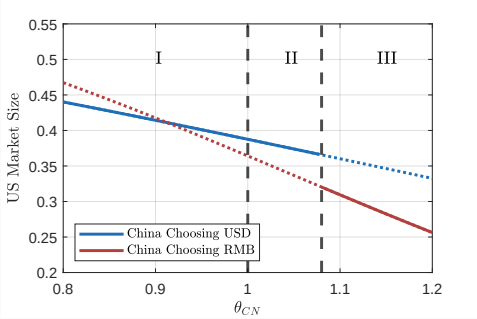
  where the size of the currency area coincides with the size of the asset market: $s(dollar) = s(us)$ and $s(yuan) = s(cn)$.

Equilibrium

- Visualize key results in this talk
  - fix the level of U.S. financial sophistication $\theta(us)$ to 1
  - vary China's financial sophistication $\theta(cn)$ from 0.8 to 1.2
- Prove the general case in the paper
  - rely on a Lipschitz argument combining algebraic and computational methods
  - show $f(x) > 0$ by showing $|f'(x)| < \epsilon$ and numerically confirming $f(x_i) > \epsilon\Delta$ for a grid of x_i points that are Δ apart

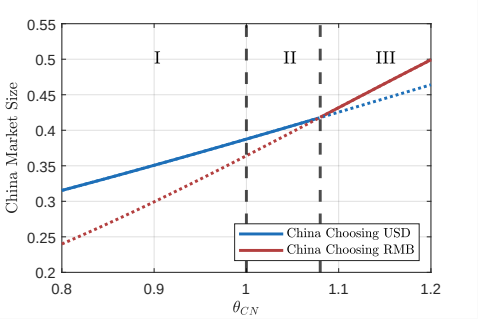
Region I: China Joins the Dollar System While Small

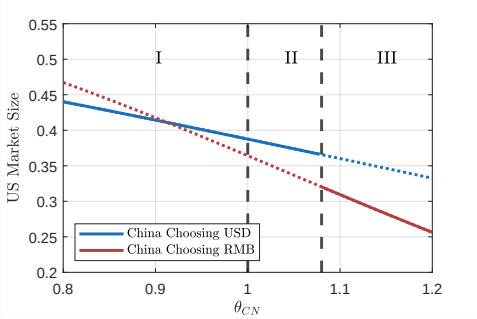




- When China is smaller than U.S., the best strategy is to join the dollar system.
  - Not only does China benefit from a stronger dollar system, its growth also benefits the dollar system.

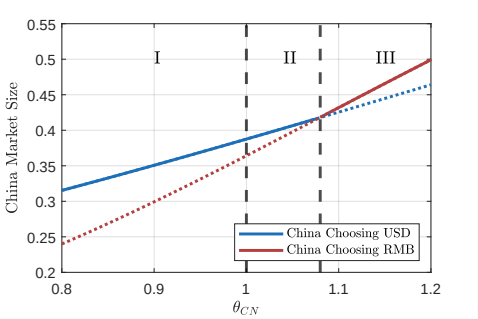
Region II: China Stays in Dollar System after Surpassing the U.S.

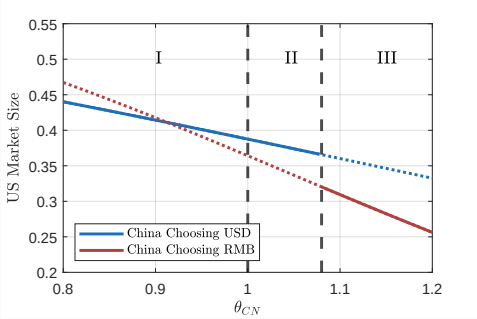




- Even after China's financial sophistication surpasses the U.S., China still finds it beneficial to remain in the dollar system.
  - Two margins of competition: "China+U.S. vs. outside" dominates "China vs. U.S."
  - Relative financial strength does not immediately translate into currency dominance. U.S. commitment to dollar confers a "first-mover" advantage.
  - Consistent with U.S.-U.K. experience in the 20th century?

Region III: China Will Eventually Switch to RMB





- When China's financial sophistication surpasses the U.S. by a large margin, it switches to RMB.
  - The U.S. benefits from China's participation in the dollar system more than China benefits from the U.S.
  - Investors choose assets based on the relative desirability of U.S. and Chinese assets.
  - This switch produces a discrete jump in the dollar system.

Financial Sanction and Financial Repression

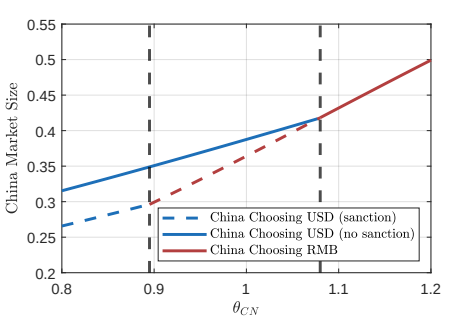
Financial Sanction

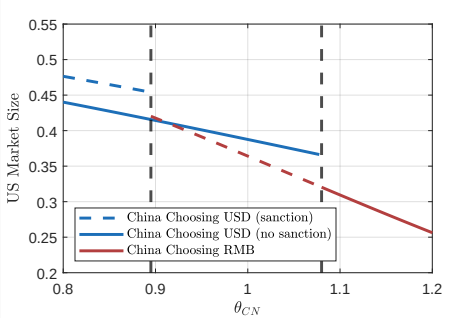
- Assume the U.S. can sanction China **within** the dollar system.
- The sanction reduces the desirability that Chinese assets derive from being part of the dollar system:

$$u_k(cn) = \alpha \log s(cn) + \kappa\beta \log s(dollar) + \theta(cn) + \epsilon_k(cn),$$

  with $\kappa < 1$, the dollar system becomes less convenient to China.
- Sanction does not affect China if it leaves the dollar system.

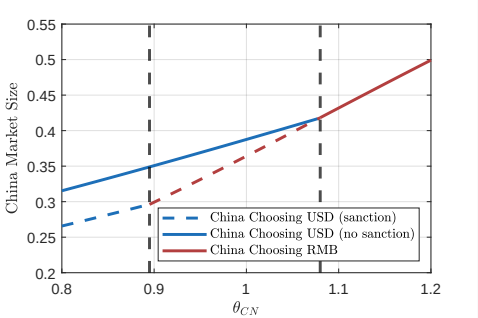
Sanction Accelerates De-dollarization

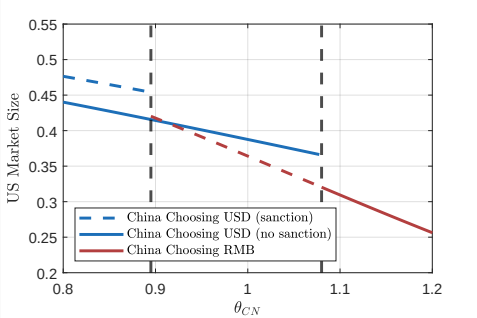




- Regime-dependent effects:
  - When China is small, sanction reduces China's market share and increases U.S.
  - As China grows, sanction incentivizes a premature switch to RMB, harming both countries.
  - When China is large, sanction has no effect as China chooses RMB anyway.

Sanction Accelerates De-dollarization





- "Intensive margin" vs. "extensive margin" (Clayton, Maggiori, and Schreger, 2023).
- Easier to "bully" a smaller country:
  - Smaller countries are more **captive** to the dollar system, because they would not leave the dollar system even under sanction.

Financial Repression

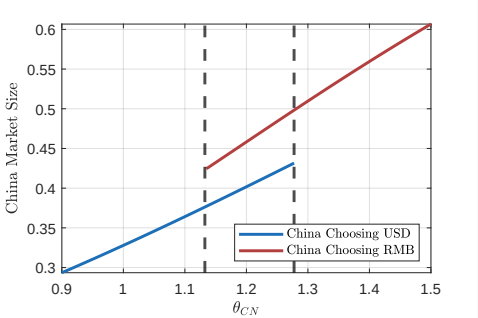
- What if some savers can only hold U.S. asset?
  - e.g., reserve requirements, investment mandates, regulatory constraints.
- If the fraction is large enough, China never leaves the dollar bloc, even when its financial sophistication is very high!
  - When a critical mass of captive investors are committed to dollar, their holdings sustain the dollar's liquidity and make it attractive also for active investors.
- Financial repression creates a funding advantage that cannot be undermined by the competitor's high financial sophistication
  - Potential rationale for using financial repression in conjunction with sanction?

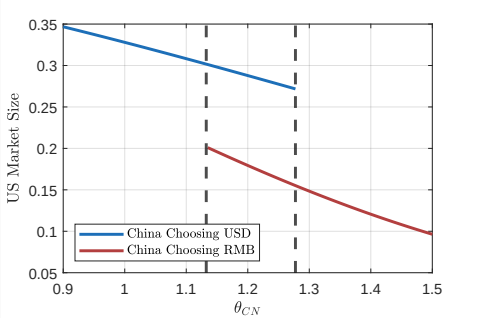
International Spill-Over

Three Issuers

- So far, two issuers.
- Introduce a third issuer (e.g., Europe). Suppose Europe can issue its asset in dollar, yuan, or euro.
- Fix U.S. and Europe's financial sophistication. Vary China's financial sophistication as before.

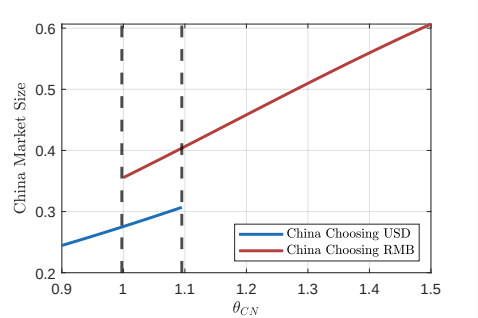
Multiple Equilibria

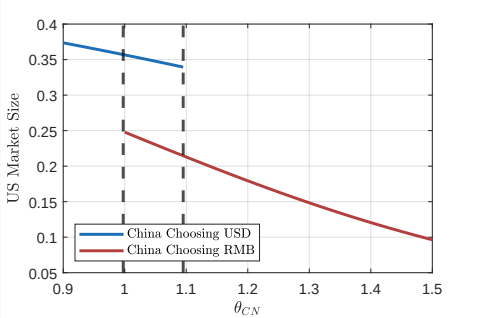




- Two equilibria coexist:
  - All countries issue in dollar (blue): the dollar system is strong, leaving little incentive for China or Europe to deviate.
  - China issues in yuan, joined by Europe (red): the dollar system is weak, making it attractive for China and Europe to form a separate currency bloc.

Sanction on China





- Two equilibria as before, but thresholds move left: the yuan-dominant equilibrium emerges earlier, while the dollar-dominant equilibrium ceases to exist earlier.
- Sanction weakens the dollar system as a whole.

Conclusion

Comparison to One-Tiered Liquidity Structure

- Remove currency-level liquidity and focus only on asset-market-level liquidity.

	Asset-Market Liquidity $\alpha > 0, \beta = 0$	**Two-Tiered Liquidity** $\alpha > 0, \beta > 0$
Transition Path	smooth, standard logit	discrete jump triggered by China's exit
Dollar-Area Sanction	no effect	premature fragmentation
Financial Repression	boost desirability	permanently trap China in dollar area
Third Issuer	unique eqm., smooth transition	multiple equilibria

Comparison to Coppola-Krishnamurthy-Xu

- Liquidity effects generate multiple equilibria both in CKX and this paper, but the mechanism is different.

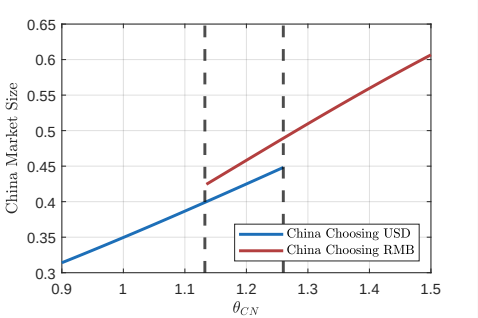
	CKX	**This Paper**
Liquidity Structure	one-tiered, currency blocs are fixed	two-tiered, sovereigns decide whether currency blocs are pooled
Locus of Strategic Interaction	continuum of atomistic private firms	few large sovereign issuers
What "Coordinates"	fraction of firms switching currency	decisions of individual sovereigns
Minimum Blocks for Multiplicity	2 currency areas	3 sovereign issuers

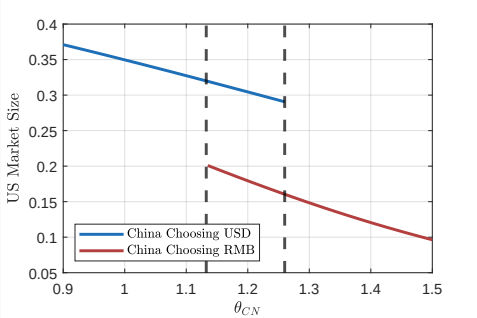
Final Thoughts

- The hegemon who controls the dominant currency system is powerful, but so are other players who can influence the desirability of the currency system. Power rests on countries' relative dependence on the system.
- Instead of treating U.S.-China financial relationship as inherently beneficial or zero-sum, it is better understood as a dynamic process with time-varying incentives.
- Further thoughts:
  - **Learning by doing**: China may want to promote RMB early on if doing so develops the RMB bloc.
  - **Intermediary quality**: the dollar's strength also comes from sophisticated dollar-specialized intermediaries. Incentive to develop the financial sector before currency internationalization.

Appendix

Sanction on the Third Issuer





- Sanction on the third country also precipitates the rise of the yuan-dominant equilibrium.
  - If China knows Europe wants to leave, it will form the yuan bloc earlier.
- U.S. sanction on Russia (SWIFT, trade, asset seizure) $\Rightarrow$ Russia adopt RMB financial system (CIPS, invoicing)

  $\Rightarrow$ accelerate the formation of the yuan-dominant bloc