Digitalization and the Dollar: A Quantitative Assessment of Trade Finance Channels

This paper quantifies the impact of digital financial innovation on dollar dominance using a dynamic search-theoretic framework. By employing a global shooting algorithm to solve for non-linear transition dynamics, we find that dollar hegemony is robust to standard economic shocks due to deep-seated liquidity synergies. However, the introduction of a Central Bank Digital Currency (CBDC) that significantly improves matching efficiency can effectively erode the dollar's market share in trade finance. Conversely, regional productivity shocks tend to reinforce the dollar's safe-haven status. These findings provide a quantitative basis for evaluating the international spillovers of digital currency design.

Keywords: Trade finance; Dollar dominance; Search frictions; International liquidity; Central Bank Digital Currency (CBDC)

JEL Codes: E42, E44, F33, F41, G15

1. Introduction

The international monetary system is characterized by a striking and persistent asymmetry: the overwhelming dominance of the US dollar. Despite the transition of the global economy from a unipolar to a more multipolar landscape, with the rise of the Euro Area and the rapid expansion of emerging economies, the dollar's role as the primary vehicle for international trade, global debt issuance, and official reserves remains largely unchallenged. This durability of the dollar presents one of the most significant and enduring puzzles in open-economy macroeconomics. Why does a single currency continue to dominate global liquidity even as the economic weight of its issuing country relative to the world declines? The answers to this question have profound implications for global financial stability, the transmission of monetary policy, and the strategic design of future financial infrastructures.

Traditionally, the dollar's hegemony has been attributed to a combination of historical inertia, deep and liquid secondary markets for US Treasury securities, and the sheer scale of the US economy. While these factors are undoubtedly important, they often fail to capture the microscopic decision-making processes of the firms and financial intermediaries that actually drive international commerce. International trade is not merely an exchange of goods; it is a complex coordination of production, logistics, and, crucially, trade finance. Most international transactions are not paid for upfront but rely on some form of credit—working capital—to cover the gap between production costs and future revenue. This credit is not provided in a vacuum; it is sourced in a specific currency, and that choice is influenced by the structural depth of the associated bond market.

Following the pioneering framework of Chahrour and Valchev (2022), this paper argues that

the durability of the dollar is rooted in a self-reinforcing liquidity loop within the trade finance market. Firms seeking to export products must choose a currency in which to obtain credit. Their choice is driven by the ease with which they can find a lender willing to provide that credit. Financial intermediaries, in turn, are more willing to provide credit in currencies that have deep and liquid bond markets, as these markets allow them to hedge risks and manage their own liquidity needs. This interaction creates a classic network effect: a currency is useful for trade finance because everyone else uses it, and its widespread use ensures the very liquidity that makes it attractive. This feedback loop between the supply of financial assets and the demand for trade finance generates a multiple equilibrium problem where the dollar's head start allows it to persist even when other regions are of equal or greater economic scale.

Our research is deeply rooted in the history of international monetary theory. Early models, such as Krugman (1980) and Matsuyama, Kiyotaki, and Matsui (1993), emphasized the role of transaction costs and network effects in the emergence of a vehicle currency. These search-theoretic foundations (Kiyotaki & Wright, 1989; Lagos & Wright, 2005) established that a currency's acceptability depends on the expectation of its future acceptability. However, as noted by Eichengreen (2011), these models often abstracted from the financial infrastructure that supports modern trade. Recent empirical work by Ilzetzki, Reinhart, and Rogoff (2019) and Eichengreen, Mehl, and Chitu (2018) confirms that the dollar's anchor role has differentiated itself from historical precedents, becoming more entrenched even as the US share of global GDP declines (Prasad, 2014).

More recently, the Dominant Currency Paradigm (DCP), developed by Gopinath, Boz, Casas, Diez, Gourinchas, and Plagborg-Møller (2020), has refocused attention on currency invoicing.

The DCP framework (Gopinath, 2015; Casas et al., 2016) highlights how dollar invoicing disconnects trade terms from bilateral exchange rates (Gopinath & Itskhoki, 2010; Burstein & Gopinath, 2014). This leads to low exchange rate pass-through (Amiti, Itskhoki, & Konings, 2014) and synchronous contractions in global trade (Boz et al., 2020). While Mukhin (2022) frames the invoicing choice as an equilibrium outcome of cost structures, Gopinath and Stein (2021) and Chahrour and Valchev (2022) link it to the banking sector. We build on this trade-finance nexus (Amiti & Weinstein, 2011; Niepmann & Schmidt-Eisenlohr, 2017), arguing that the invoicing decision is downstream of the financing decision.

The dollar's role as a Global Factor relates to the Global Financial Cycle literature (Rey, 2013; Miranda-Agrippino & Rey, 2020). US monetary policy shocks transmit globally through credit channels (McCauley, McGuire, & Sushko, 2015; Bruno & Shin, 2015), creating a dilemma for foreign central banks (Obstfeld & Zhou, 2022; Farhi & Werning, 2014). Our model provides a structural micro-foundation for these spillovers, showing how liquidity friction in the center (US) propagates to the periphery (Bernanke, 2005; Gourinchas & Rey, 2007).

Furthermore, our study relates to the Safe Asset literature (Caballero, Farhi, & Gourinchas, 2008; He, Krishnamurthy, & Milbradt, 2019). The US enjoys an exorbitant privilege (Gourinchas & Rey, 2007) and a convenience yield on its debt (Jiang, Krishnamurthy, & Lustig, 2021), often attributed to the special role of the dollar in financial intermediation (Maggiori, 2017; He & Krishnamurthy, 2013). While some argue this safety is threatened by fiscal overextension—a New Triffin Dilemma (Farhi & Maggiori, 2018)—our work shows that transactional depth alone can sustain dominance (Doepke & Schneider, 2017; Rocheteau & Wright, 2005).

To explore these dynamics quantitatively, we develop a three-region Dynamic Stochastic General Equilibrium (DSGE) model representing the US, the Euro Area (EU), and the Rest of the World (ROW). In each region, households optimize consumption and labor supply, and firms produce differentiated goods for both domestic and foreign markets. The critical friction is that exporters must obtain trade credit to finance production costs before export revenues are realized. Firms must commit to a financing currency and then search for a match in the respective financial market. The probability of a successful match is governed by a matching function—akin to those used in labor economics (Pissarides, 2000)—which depends on the mass of searching firms and the total supply of bonds in that currency. This structure allows the model to capture the endogenous nature of liquidity: an increase in the supply of USD bonds improves the matching rate for firms searching for dollar credit, which in turn encourages more firms to adopt the dollar for trade finance.

The primary methodological contribution of this paper is the application of advanced computational techniques to the study of currency transitions. We port the Chahrour-Valchev framework to a JAX-accelerated environment, allowing us to utilize exact Jacobian-based global shooting algorithms. This methodological enhancement is critical for accurately capturing the non-linear tipping points inherent in regime shifts—a feature often smoothed over in linearized approximations. By solving for the precise deterministic transition path of 1,900 simultaneous variables, we ensure that our results are not artifacts of numerical approximation but robust features of the economic mechanism.

Our substantive contribution lies in extending this rigorous framework to evaluate contemporary policy debates: digital innovation and regional resilience. First, we model the

introduction of a Central Bank Digital Currency (CBDC) not as a theoretical abstraction, but specifically as an enhancement to the matching efficiency parameter within the Euro Area. This aligns with the Digital Currency Area hypothesis (Brunnermeier et al., 2019) and provides a quantitative assessment of the Eurosystem's potential to challenge dollar dominance through superior payment rails. Our results indicate that while digital efficiency can erode the dollar's advantage, the liquidity depth of US markets remains a formidable barrier, requiring a Big Push in technology to overcome.

Second, we examine the resilience of the dollar equilibrium to asymmetric shocks, a key concern for emerging market policymakers. By simulating a productivity contraction in the Euro Area, we demonstrate how the financial market amplifies the real shock. The Safe Haven effect—where global firms flee to the dollar during regional turmoil—is shown to be a robust feature of the model, holding across a wide range of parameter sensitivities (detailed in Figures 1-5). This finding reinforces the Dollar Safety mechanism (Gourinchas et al., 2019) and suggests that multipolarity is fragile in the face of divergent economic performance.

The structure of the paper is designed to provide a comprehensive treatment of these themes. We begin by detailing the economic environment, formally deriving the household utility functions, firm production and financing decisions, and the critical financial matching mechanism. We then present the calibration of the model, using data from a variety of sources to ensure that the parameters reflect the empirical realities of 21st-century trade and finance. This is followed by our baseline results, where we present the verification of the steady-state equilibria and the Flight-to-Dollar transition. After establishing the baseline, we delve into our core extensions—the CBDC experiment and the asymmetric productivity shock analysis—

quantifying the trade-offs between technological innovation and real economic performance. We then discuss the policy implications of our findings, offering a critique of current strategies for currency internationalization. Finally, we conclude with a synthesis of our contributions and a statement on the future of global liquidity.

In summary, this paper provides a rigorous, micro-founded account of why the dollar continues to reign supreme and under what conditions its hegemony might finally be challenged. By focusing on the neglected role of trade finance and leveraging state-of-the-art computational techniques, we provide a new framework for understanding the interplay between financial frictions, digital innovation, and the global monetary order. Our results show that while the dollar's status is deeply entrenched in the structure of global finance, it is not an immutable fact of nature but rather a consequence of endogenous liquidity dynamics that can be shifted by major technological or structural changes.

2. Economic Environment

We develop a three-region Dynamic Stochastic General Equilibrium (DSGE) model representing the global economy. The three regions are the United States (US), the Euro Area (EU), and the Rest of the World (RW). Time is discrete and indexed by $t = 0,1,2, \ldots$. The world is populated by a continuum of households and firms in each region. The key feature of our environment is the friction in international financial markets: firms must obtain trade credit to finance export production, and this credit is obtained through a search-and-matching process in one of two vehicle currencies: the US Dollar or the Euro.

The economy is subject to both aggregate productivity shocks and preference shocks that

shift the relative demand for financing in different currencies. We assume that financial markets for the RW currency are underdeveloped and cannot be used for international trade finance; thus, RW firms must choose between the US Dollar and the Euro for their export operations.

2.1 Households

Each region $i \in US, EU, RW$ is inhabited by a representative household with preferences defined over consumption $C_{i,t}$ and labor supply $L_{i,t}$. The household maximizes the expected present discounted value of utility:

$$E_0 \sum_{t=0}^{\infty} \beta^t \left(\frac{C_{i,t}^{1-\sigma}}{1-\sigma} - \chi \frac{L_{i,t}^{1+\nu}}{1+\nu} \right) \tag{1}$$

where $\beta \in (0,1)$ is the discount factor, $\sigma > 0$ is the coefficient of relative risk aversion (inverse of the intertemporal elasticity of substitution), and $\nu > 0$ is the inverse Frisch elasticity of labor supply.

The consumption basket $C_{i,t}$ is a constant elasticity of substitution (CES) aggregate of home goods and imported goods from the other two regions. Specifically, for region i:

$$C_{i,t} = \left(\sum_{j \in US,EU,RW} \omega_{i,j}^{\frac{1}{\eta}} C_{i,j,t}^{\frac{\eta-1}{\eta}} \right)^{\frac{\eta}{\eta-1}} \tag{2}$$

where $C_{i,j,t}$ denotes the bundle of goods produced in region j and consumed in region i. The parameter $\eta > 0$ is the elasticity of substitution between goods from different regions (Armington elasticity), and $\omega_{i,j}$ determines the weight of region j goods in region i's basket, capturing home bias in consumption ($\omega_{i,i} > \omega_{i,j}$ for $j \neq i$).

The household budget constraint in region i is given by:

$$P_{i,t}C_{i,t} + \sum_{k \in USD,EUR} Q_{k,t}B_{i,k,t+1} \leq W_{i,t}L_{i,t} + \Pi_{i,t} + \sum_{k \in USD,EUR} B_{i,k,t} - T_{i,t} \quad (3)$$

Here, $P_{i,t}$ is the consumer price index in region i, $W_{i,t}$ is the nominal wage, and $\Pi_{i,t}$ represents profits distributed by local firms. $T_{i,t}$ denotes lump-sum taxes. The household can save in two types of international bonds: Dollar-denominated bonds ($B_{i,USD,t}$) and Euro-denominated bonds ($B_{i,EUR,t}$). $Q_{k,t}$ is the price of a bond in currency k that pays one unit of currency k in period $t+1$.

For households in the US and EU, we assume they only hold bonds denominated in their domestic currency to simplify the portfolio problem, focusing the currency choice decision on the firms. For RW households, they can hold both assets, but they face a convex portfolio adjustment cost $\Phi\left(B_{RW,k,t+1}\right)$ which ensures stationarity of the bond distribution and captures imperfect capital mobility.

The first-order conditions for consumption and bond holdings yield standard Euler equations. For example, the Euler equation for a US household holding US bonds is:

$$Q_{USD,t} = \beta E_t \left[\left(\frac{C_{US,t+1}}{C_{US,t}} \right)^{-\sigma} \frac{P_{US,t}}{P_{US,t+1}} \right] \quad (4)$$

These equations pin down the risk-free rates in the economy. However, as we will see, purely financial arbitrage conditions are not sufficient to determine the equilibrium quantity of bonds; the demand for bonds also stems from their liquidity value in the trade finance market.

2.2 Production and Trade Finance

Production in each region is carried out by a continuum of monopolistically competitive firms. Each firm produces a unique variety of a differentiated good. Production requires labor L_t and follows a linear technology $Y_t = A_{i,t}L_t$, where $A_{i,t}$ is region-specific aggregate productivity.

Firms sell their goods domestically and export to the other two regions. A key friction in our model is that exporting requires working capital. Specifically, to produce for the export market, a firm must pay its workers in advance, before export revenues are realized. This creates a need for intra-period trade finance.

Endogenous Currency Choice

A firm in region i looking to export to region j must choose a currency $k \in USD, EUR$ to finance its working capital. This choice is made before the firm searches for a lender. Once a currency is chosen, the firm enters the specific financial sub-market for that currency.

Let m_i be the total mass of exporting firms in region i. Let $X_{i,t} \in [0,1]$ be the share of these firms that choose to finance in US Dollars. The remaining share $1 - X_{i,t}$ finances in Euros. This share $X_{i,t}$ is the critical endogenous variable that determines the dominance of a currency.

Firms make this choice to maximize their expected profits. The value of choosing Dollar finance ($V_{i,USD,t}$) versus Euro finance ($V_{i,EUR,t}$) depends on two factors: The cost of credit: the interest rate charged by lenders in that currency. And the probability of obtaining credit: the likelihood of finding a match with a financier. This second factor is the source of the strategic complementarity (Diamond, 1982).

2.3 Financial Market Matching Frictions

We model the trade credit market using a directed search framework similar to the labor market search theory of Pissarides (2000).

Consider the market for US Dollar trade credit. On one side, we have the mass of searching firms from all regions: $S_{USD,t} = m_{US}X_{US,t} + m_{EU}X_{EU,t} + m_{RW}X_{RW,t}$ On the other side, we have the supply of liquidity, which is determined by the total value of Dollar-denominated bonds held by financial intermediaries available for trade finance, denoted by $\mathcal{L}_{USD,t}$.

The number of successful matches $M_{USD,t}$ is given by a constant returns to scale matching function:

$$M\left(S_{USD,t}, \mathcal{L}_{USD,t}\right) = \frac{S_{USD,t} \cdot \mathcal{L}_{USD,t}}{(\phi {S_{USD,t}}^{\frac{1}{\epsilon}} + \mathcal{L}_{USD,t}^{\frac{1}{\epsilon}})^{\epsilon}} \tag{5}$$

where $\epsilon > 0$ governs the elasticity of substitution between searchers and liquidity, and ϕ is a scaling parameter. This functional form has the desirable property that the matching probabilities are bounded between 0 and 1.

The probability that a firm searching for dollars finds a match is

$$\lambda_{f,USD,t} = \frac{M_{USD,t}}{S_{USD,t}} = \left(\phi + \left(\frac{\mathcal{L}_{USD,t}}{S_{USD,t}}\right)^{\frac{1}{\epsilon}}\right)^{-\epsilon} \tag{6}$$

The probability that a unit of dollar liquidity finds a borrowing firm is

$$\lambda_{b,USD,t} = \frac{M_{USD,t}}{\mathcal{L}_{USD,t}} \tag{7}$$

Crucially, $\lambda_{f,USD,t}$ is increasing in the supply of liquidity $\mathcal{L}_{USD,t}$. This is the mechanism of

the liquidity feedback loop: If more firms choose the Dollar ($X_{i,t}$ rises), the demand for Dollar liquidity increases. This drives up the return on Dollar bonds (or equivalently, the tightness of the Dollar market initially). Households and intermediaries respond by accumulating more Dollar bonds, increasing $\mathcal{L}_{USD,t}$. A larger $\mathcal{L}_{USD,t}$ increases the matching probability $\lambda_{f,USD,t}$. A higher matching probability makes the Dollar more attractive to firms, further increasing $X_{i,t}$.

Idiosyncratic Preferences and Tipping Points

To ensure an interior solution in the symmetric steady state, we assume firms have idiosyncratic preference shocks for using a specific currency, denoted by ξ. These shocks are distributed according to a Cumulative Distribution Function $G(\xi)$. A firm chooses the Dollar if: $V_{USD,t} - V_{EUR,t} > \xi$ Aggregating over firms, the share of Dollar users in region i is: $X_{i,t} = G\left(V_{USD,t} - V_{EUR,t}\right)$

Dynamic tipping points occur when the endogenous value differential $V_{USD,t} - V_{EUR,t}$ becomes large enough to overcome the idiosyncratic preferences of even the most Euro-biased firms, leading to a rapid cascade toward the Dollar.

2.4 Government and Market Clearing

We assume a simplified fiscal and monetary setup to focus on the trade finance channel. Governments in each region levy lump-sum taxes to finance exogenous government spending $G_{i,t}$ and interest payments on outstanding government debt.

The market clearing condition for goods produced in region i is: $Y_{i,t} = C_{i,i,t} + C_{j,i,t} + C_{k,i,t} + G_{i,t} + \mathcal{K}_{i,t}$ where $\mathcal{K}_{i,t}$ represents resources used in search costs adjustment costs.

The bond market clearing conditions require that the total stock of bonds issued by region i equals the total holdings by global households and intermediaries.

2.5 Equilibrium System

The competitive equilibrium is defined as a sequence of prices $P_{i,t}, W_{i,t}, Q_{k,t}$, allocations $C_{i,t}, L_{i,t}, Y_{i,t}$, and currency choices $X_{i,t}$, such that: 1. households maximize utility subject to budget constraints. 2. firms maximize profits subject to technology and trade finance constraints. 3. currency choices $X_{i,t}$ are consistent with the optimal matching values. 4. goods markets, labor markets, and bond markets clear.

This system reduces to a set of 38 non-linear difference equations involving 34 jump variables (consumption, prices, masses) and 4 endogenous state variables (bond holdings distributions).

Solution Strategy

The model features multiple steady states: a symmetric middle steady state where currencies are shared, and dominant Dollar or Euro steady states. Standard linearization techniques around one steady state cannot capture the transition between them (the Flight-to-Dollar). Therefore, we employ a Global Shooting Algorithm.

We solve the deterministic transition path for T periods. This involves finding a trajectory of vectors $\mathbf{y}_1, \dots, \mathbf{y}_T$ that satisfies the non-linear system $F(\mathbf{y}_{t-1}, \mathbf{y}_t, \mathbf{y}_{t+1}) = 0$ for all t, given an initial state $\mathbf{y}_0$ and a terminal steady state $\mathbf{y}_{T+1}$. We implement this solver in Python using JAX, which allows us to compute the exact Jacobian of the massive system (1900×1900 for $T = 50$) via automatic differentiation, ensuring numerical stability and precision even near the

tipping points where gradients can be steep.

This methodologies description completes the Economic Environment. The quantitative implications of this framework will be analyzed in the next section.

3. Quantitative Results

In this section, we present the quantitative analysis of the model in three stages. First, we detail the calibration of the model's structural parameters, providing explicit justifications and data sources for key choices driven by the empirical realities of the post-2008 global economy. Second, we present the baseline results of the Dollar Dominance replication, dissecting the non-linear transition dynamics of the Flight-to-Dollar and confirming the mechanism of the liquidity loop. Third, we report the findings from our two extensions—the introduction of a Central Bank Digital Currency (CBDC) and the impact of asymmetric productivity shocks—quantifying their effects on the long-run durability of the dollar.

3.1 Calibration Strategy and Data

The model is calibrated at a quarterly frequency, consistent with the typical duration of short-term trade finance contracts and the reporting cycle of major macroeconomic aggregates. Our calibration strategy involves a mix of standard macro-finance parameters taken from the literature and structural parameters estimated or chosen to match specific moments of the international trade finance market during the Dollar Consolidation period of 2012-2019.

A. Preferences and Technology

We assume the three regions (US, EU, ROW) are symmetric in their underlying preferences

and technology to isolate the role of financial frictions.

- Discount Factor (β): Set to 0.99, implying an annualized risk-free real interest rate of approximately 4% in the absence of financial frictions[1].
- Risk Aversion (σ): We set the coefficient of relative risk aversion to 2.0. This is a standard value in the open-economy macroeconomics literature (e.g., Schmitt-Grohé and Uribe, 2003) and ensures a realistic intertemporal elasticity of substitution.
- Labor Supply Elasticity (ν): The inverse Frisch elasticity is set to 1.0, representing a middle ground between micro-level estimates and macro-level business cycle requirements.
- Production Technology: We normalize steady-state productivity $A_{i,ss} = 1.0$ for all regions in the baseline. The production function is linear in labor, $Y = AL$.
- Working Capital Requirement (α): A critical parameter for our mechanism is the share of production costs that must be pre-financed. We set $\alpha = 1.0$, meaning firms must finance their entire wage bill in advance. This high value is chosen because trade finance is, by definition, a working capital instrument used to bridge the full cash conversion cycle of the exporter[2].

B. International Trade Structure

- Armington Elasticity (η): We set the elasticity of substitution between goods from different regions to 1.5. This value is standard in the international trade literature (e.g., Feenstra et al., 2018) and governs the sensitivity of trade flows to relative prices.

[1] Standard calibration in real business cycle literature. See Cooley, T. F., & Prescott, E. C. (1995). Economic growth and business cycles. *Frontiers of Business Cycle Research*, 1-38.

[2] This matches the assumptions in emerging market models where working capital constraints are binding. See Neumeyer, P. A., & Perri, F. (2005). Business cycles in emerging economies: The role of interest rates. *Journal of Monetary Economics, 52*(2), 345-380.

- Home Bias (ω): The weights in the consumption aggregator are calibrated to match a steady-state import-to-GDP ratio of approximately 15% for the large economic blocs (US and Euro Area), consistent with World Bank WDI data for these regions[3].

C. Financial Frictions and Matching Process

The parameters governing the search-and-matching process are novel to this framework and require careful calibration handling.

- Matching Efficiency ($\bar{U}$): We normalize the baseline matching efficiency parameters $\bar{U}USD = \bar{U}EUR = 8.0$. This value is targeted to match the average duration of a search for a new banking relationship. According to the International Chamber of Commerce (ICC) Global Trade Finance Survey (2018), firms report that establishing a new trade credit facility takes approximately 4-6 weeks[4]. In our quarterly model, a match probability of roughly $0.6 - 0.7$ implies an expected duration consistent with this evidence.
- Matching Elasticity (ϵ): The elasticity parameter in the matching function $M(S,B) = \frac{SB}{(\phi S^{\frac{1}{\epsilon}} + B^{\frac{1}{\epsilon}})^{\epsilon}}$ is set to 1.5. This parameter governs the congestion externalities in the market. Our choice aligns with estimates from the labor search literature (e.g., Petrongolo and Pissarides, 2001) which typically find constant returns to scale with elasticities in the range of 0.5-0.7 for the Cobb-Douglas equivalent; our CES form with $\epsilon = 1.5$ provides similar local curvature.
- Idiosyncratic Shock Volatility (σ_ξ): The standard deviation of the idiosyncratic

[3] World Bank World Development Indicators (2019). Imports of goods and services (% of GDP).
[4] International Chamber of Commerce. (2018). *2018 Global Trade - Securing Future Growth*. ICC Global Survey on Trade Finance.

preference shock for currency choice is set to 0.05. This parameter determines the stickiness of the currency share. A high value would imply that firms fundamentally prefer one currency regardless of financial conditions, while a low value makes the market highly contestable. We choose 0.05 to match the observed low volatility of currency invoicing shares over short horizons, as documented by Gopinath (2015).

D. Liquidity Supply

- Bond Supply Intercepts ($\bar{B}_i$): The exogenous component of bond supply is calibrated to match the ratio of safe government debt to GDP. We set $\bar{B}_{USD} = \bar{B}_{EUR} = 4.8$ (relative to output of 1.0), reflecting the high public debt levels in both regions (approx. 100% debt-to-GDP annualized[5].

3.2 Baseline Results: Anatomy of the Flight-to-Dollar

We replicate the transition from a symmetric Middle equilibrium (where global trade finance is split 50/50 between Dollar and Euro) to a Dollar Dominant equilibrium. This transition is triggered by a permanent shock to the preferences of ROW firms: the mean of their idiosyncratic preference distribution shifts by 5% in favor of the Dollar at $t = 1$.

Phase 1: The Initial Shock (Quarters 1-5)

Upon the realization of the shock, the mass of ROW firms searching for Dollar financing (S_{USD}) ticks upward. Because bond markets exhibit predeterminedness (state variables adjust slowly), the immediate supply of Dollar liquidity is fixed. The surge in searchers initially tightens the Dollar market, lowering the match probability probability $\lambda_{f,USD}$ slightly.

[5] Bank for International Settlements. (2019). *Total Credit to the Non-Financial Sector*. BIS Statistical Bulletin.

However, the anticipated future dominance of the Dollar causes the price of Dollar bonds (Q_{USD}) to rise (yields fall). This reflects the convenience yield that investors are willing to pay for holding the currency that is becoming the standard.

Phase 2: The Liquidity Loop and Tipping Point (Quarters 6-15)

As Q_{USD} rises and Q_{EUR} falls, global households rebalance their portfolios, accumulating more Dollar bonds and shedding Euro bonds. This endogenous supply response ($\mathcal{L}_{USD} \uparrow$) begins to actively loosen the Dollar market. Crucially, around $t = 10$, a positive feedback loop takes hold. The rising supply of Dollar liquidity increases the match probability for firms. This makes the Dollar more attractive, reducing the effective cost of financing (which includes the opportunity cost of failing to find a match). By $t = 15$, the economy hits a tipping point. The value differential $V_{USD} - V_{EUR}$ becomes large enough to overwhelm the idiosyncratic preferences of even the most Euro-centric firms. We observe a cascade where the share of Dollar financing in the ROW (X_{RW}) jumps from ~60% to over 85% in the span of just 4 quarters.

Phase 3: The New Hegemony (Quarters 16-50)

The economy gradually settles into a new Dollar Dominant steady state. For market share: The Dollar accounts for 89% of ROW trade finance, while the Euro retains only a niche 11% share. This matches closely with data from the SWIFT RMB Tracker (SWIFT, 2019), which consistently shows the USD accounting for over 80% of trade finance value[6]. For interest rate differential: The steady-state spread between Dollar and Euro bond yields remains negative (Dollar yields are lower), reflecting the structural liquidity premium. This mirrors the persistent Exorbitant Privilege observed in US Treasury yields relative to German Bunds (adjusted for

[6] SWIFT. (2019). *RMB Tracker*. July 2019. Monthly reporting on currency usage in global payments and trade finance.

default risk) over the last two decades[7].

3.3 Extension Analysis

We now turn to the two counterfactual experiments that test the limits of this dominance.

Experiment A: The Digital Euro (eCBDC)

Our hypothesis is that can a technological improvement in the matching efficiency of the non-dominant currency offset the network effects of the dominant one. We simulate a phased implementation of a Digital Euro (eCBDC). In the model, this is represented by an exogenous increase in the Euro matching efficiency parameter $\bar{U}_{EUR}$ from 8.0 to 12.0 (+50%) over 20 quarters. This captures the efficiency gains from a programmable, atomic-settlement ledger that reduces verification and search costs[8].

Starting from the Dollar-dominant baseline ($EuroShare \approx 11$), the introduction of the eCBDC triggers a substantial recovery. By the time the technology is fully phased in ($t = 20$), the Euro's market share in the ROW rises to approximately 35%.

The intuition is that the eCBDC substitutes technological liquidity for financial liquidity. In the standard model, a high match rate requires a massive pool of inert bonds ($\mathcal{L}$). With the eCBDC, the same pool of bonds can support a higher frequency of matches. This lowers the effective cost of Euro finance without requiring the Eurozone to issue massive amounts of new debt.

Notably, the Euro does not overtake the Dollar. The 35% share represents a multipolar

[7] Federal Reserve Bank of St. Louis. (2019). Spread between 10-Year Treasury Constant Maturity and 10-Year German Government Bond Yield.

[8] Bank for International Settlements. (2021). *CBDCs: An opportunity for the monetary system*. Annual Economic Report, 65-95.

equilibrium, not a flip to Euro dominance. The liquidity depth of the US Dollar bond market ($\mathcal{L}_{USD}$) remains a formidable barrier. To fully displace the Dollar, the eCBDC would need to provide an efficiency gain so large that it renders the depth of the bond market irrelevant—an unlikely scenario for the foreseeable future.

Experiment B: Asymmetric Productivity Shocks

In this experiment, our hypothesis is that do regional economic crises weaken or strengthen the global role of the dominant currency. We expose the economy to a permanent negative productivity shock in the Euro Area ($A_{EU} \downarrow 5$), simulating a scenario akin to the European Sovereign Debt Crisis or a steady-state stagnation.

The 5% fall in real productivity leads to a disproportionately larger contraction in Euro currency usage. While Y_{EU} falls by 5%, the share of Euro-denominated trade finance falls by nearly 12%.

The mechanism is the Liquidity-Real Nexus. The decline in regional output reduces the tax base and the natural supply of safe assets (assuming a fiscal rule that stabilizes debt-to-GDP). The shrinking pool of Euro assets ($\mathcal{L}_{EUR} \downarrow$) reduces the match probability for all firms searching for Euros, not just EU firms.

ROW firms, observing the drying up of Euro liquidity, flee to the Dollar. This amplifies the shock: the EU suffers not only a recesssion but also a sudden stop in the international demand for its currency. This confirms the Safe Haven status of the Dollar: even when the shock is regional, the global reaction reinforces the centrality of the US financial system.

3.4 Goodness of Fit

To validate our quantitative exercise, we compare the simulated moments of our target Dollar Steady State against empirical data from the 2010-2019 period. To quantify the model, we assign values to the structural parameters to align with the stylized facts of the global economy, specifically focusing on the dollar consolidation period. We strictly distinguish between standard parameters drawn from the existing literature and those calibrated internally to match specific trade finance data targets. Table 1 summarizes the baseline calibration, detailing the assigned values for preferences, production technology, and the search-and-matching frictions, along with their corresponding sources or targets.

The model performs remarkably well in matching the extreme skew of currency usage. Standard international macro models (e.g., Gopinath et al., 2020) often struggle to generate such high concentrations without assuming an implausibly large preference shock. Our matching friction approach generates this skew endogenously via the mechanics of the liquidity loop. The slightly higher model share (89% vs 88%) suggests that our friction might be slightly too potent, or that we are missing some niche regional currencies (like the Yen or RMB) that absorb the residual in the real world.

The quantitative results underscore the power of the trade finance channel. small shocks to preferences or productivity can result in massive shifts in currency regimes due to the self-reinforcing nature of liquidity. The Dollar's position appears robust to standard macroeconomic fluctuations but shows vulnerability to significant technological paradigm shifts like the eCBDC.

4. Policy Implications

The quantitative findings of the previous section paint a stark picture of the international monetary system: one characterized by powerful network externalities, self-reinforcing liquidity loops, and a winner-takes-all dynamic that heavily favors the incumbent dominant currency. However, our extension analysis also reveals critical vulnerabilities in this dominance—specifically regarding technological infrastructure and regional economic stability. In this section, we translate these mechanical insights into concrete policy recommendations for central banks and fiscal authorities. We focus on the strategic trade-offs facing two distinct groups of policymakers: those in the dominant currency area (the US) and those in aspiring challenger regions (such as the Euro Area or China).

4.1 The Primacy of Market Infrastructure Over Macro-Management

A central implication of our matching-friction framework is that the barriers to currency internationalization are arguably more microstructural than macroeconomic.

Traditionally, the policy prescription for currency internationalization (e.g., as pursued by the Euro Area in the 2000s) has focused on macroeconomic convergence: maintaining low inflation, fiscal discipline, and stable exchange rates. The logic is that a sound currency will naturally attract international users. Our model challenges the sufficiency of this view. In our baseline Flight-to-Dollar simulation, the transition occurs even though the fundamental macro parameters (output, discount factors) are identical across regions. The Dollar wins not because the US has lower inflation (both regions have the same steady state), but because the Dollar market is thicker.

For challenger currencies, investment in digital financial market infrastructure (FMI) is a geoeconomic imperative. Our CBDC experiment demonstrates that a 50% improvement in matching efficiency ($\bar{U}$) can claw back 25% of global market share from the Dollar. This implies that the strategic value of a Digital Euro extends beyond domestic payment efficiency; it is a tool for international competitiveness. Achieving a similar gain via traditional means (interest rate subsidies) would be prohibitively expensive. Thus, the Eurosystem should view the digital euro project as a direct substitute for deep bond markets in the race for currency internationalization.

4.2 The Safe Haven Trap and Counter-Cyclical Liquidity Provision

Our asymmetric productivity shock experiment reveals a Safe Haven Trap. When a region suffers a real economic shock (productivity falls), the endogenous response of the financial market serves to amplify, rather than dampen, the downturn. The contraction in regional bond issuance reduces liquidity, causing global firms to flee to the dominant currency. This financial sudden stop tightens credit conditions for domestic exporters exactly when they need a competitive boost to restore growth.

Central banks in non-dominant currency areas must aggressively provide liquidity to the trade finance market during downturns to prevent a liquidity death spiral. In standard New Keynesian models, the prescription for a negative productivity shock is often ambiguous (depending on the inflation-output trade-off). In our framework, the prescription is clear: the central bank must act as a market maker of last resort for trade credit. By purchasing domestic trade-related assets or providing dedicated swap lines to trade finance banks, the central bank

can artificially boost the supply of liquid assets ($\mathcal{L}_i$), increasing the matching probability $\lambda_{f,i}$ and preventing the collapse of currency usage. This suggests that the ECB's Targeted Longer-Term Refinancing Operations (TLTROs), which incentivize bank lending to the real economy, are vital not just for domestic stimulus but for preserving the international standing of the Euro.

4.3 Monetary Policy Independence and the Global Factor

The model also has profound implications for monetary policy independence in the dominant country (US). Because dollar-denominated trade finance is the lifeblood of global trade, US monetary policy spills over to the rest of the world through the liquidity supply channel.

When the Federal Reserve tightens policy (raising rates), it increases the cost of carrying Dollar inventories for market makers. In our model, this would manifest as a higher cost of bond holding or a reduction in the net supply of liquidity available for matching. This tightens conditions for *all* global firms relying on the Dollar, regardless of their location. This confirms the Global Financial Cycle hypothesis of Rey (2013): the Fed sets the monetary stance for the world.

For the US, the Federal Reserve must internalize that swap lines are a structural pillar of dollar dominance. A sharp contraction in US liquidity can cause a seize-up in global supply chains by making trade finance unobtainable for ROW exporters. Our model suggests that the Federal Reserve's provision of standing repo facilities and central bank swap lines is not merely altruistic crisis management; it is a necessary cost of maintaining the dollar's network effects. If the US fails to provide this backstop, it increases the incentives for the rest of the world to coordinate a shift to an alternative equilibrium (such as the CBDC-led multipolar world).

Therefore, these facilities should be institutionalized as permanent features of the dollar system to prevent rival currencies from gaining a foothold during liquidity crunches.

4.4 The Stability of Multipolarity vs. Hegemony

Finally, we address the normative question: Is a multipolar currency system desirable? Our model features multiple equilibria. The Dollar Dominant equilibrium is highly efficient in terms of transaction costs (everyone uses the same liquid asset), maximizing the network benefits of money. However, it is fragile to shocks emanating from the US. A multipolar equilibrium (e.g., 50% Dollar, 50% Euro) distributes risk better but sacrifices some network efficiency (firms must search in fragmented markets).

The global community should aim for a managed multipolarity enabled by interoperability. The friction in our model arises because firms must commit to a currency before searching. If digital technologies (like the BIS *mBridge* project) can allow for atomic cross-currency settlement—effectively allowing a firm with Euros to instantly and costlessly pay a supplier requiring Dollars—then the matching friction could be eliminated entirely. In such a world, the concept of a vehicle currency becomes obsolete. Instead of fighting for dominance in a winner-takes-all game, policy should focus on bridging the gap between distinct liquidity pools. This suggests that the ultimate Dollar Killer is not the Euro or the Renminbi, but a seamless, multi-currency payment fabric.

4.5 Summary of Policy Framework

In conclusion, the durability of the dollar is a policy choice, not a law of physics. It is

sustained by the specific market structure of 20th-century banking. As we move into the 21st century, policy competition will shift from the macro (inflation targeting) to the micro (who builds the most efficient digital matching platform). The winners of this new game will define the future of global liquidity.

We explicitly translate our quantitative findings into a strategic framework for policymakers. While traditional open-economy macroeconomics often prescribes price-based interventions—such as interest rate adjustments or reserve accumulation—our search-friction framework identifies technology-driven solutions as more effective levers. Table 2 contrasts these traditional tools with the optimal strategies derived from our model across four key dimensions: currency internationalization, crisis mitigation, global stability, and systemic resilience. The comparison highlights a paradigm shift: effective policy in the digital age requires targeting the *matching efficiency* of trade finance rather than merely manipulating asset returns.

5. Conclusion

This paper has investigated the mechanisms sustaining the global dominance of the US dollar in an era of increasing multipolarity. By replicating and extending the trade finance framework of Chahrour and Valchev (2022), we have provided a micro-founded explanation for the durability of the dollar that relies not on geopolitical power or historical inertia, but on the self-reinforcing logic of financial market liquidity. Our central theoretical contribution is the validation of the liquidity feedback loop: firms prefer the currency with the deepest secondary markets to minimize search frictions, while investors congregate in the currency used by firms to maximize liquidity services. This interaction generates a powerful network externality that

locks in the incumbent status of the dollar, creating a barrier to entry that is resistant to standard macroeconomic adjustments.

Our quantitative results, derived from a high-performance global shooting algorithm, robustly confirm this mechanism. The replication of the Flight-to-Dollar transition demonstrates that even small shifts in global preferences can trigger a non-linear tipping point, leading to a rapid and almost total consolidation of trade finance into the dollar. The model successfully matches key empirical moments, including the extreme asymmetry of global currency invoicing and the persistent negative yield spread on US assets, without relying on implausible parameterizations. This confirms that the friction of matching borrowers and lenders in international markets is a first-order determinant of currency hierarchy.

Beyond the baseline replication, our extension analysis offers two novel insights into the resilience of this equilibrium. First, our experiment with a Central Bank Digital Currency (CBDC) reveals that technological innovation can serve as a substitute for financial depth. By exogenously improving the matching efficiency of the Euro, we showed that a Digital Euro could claw back substantial market share from the dollar, shifting the global economy towards a more multipolar steady state. However, the simulation also highlights a critical limitation: unless the efficiency gains are transformative, the sheer volume of US dollar liquidity continues to provide a formidable competitive advantage. This suggests that while digital infrastructure is a necessary condition for currency internationalization, it is likely not a sufficient one in the short run.

Second, our analysis of asymmetric productivity shocks uncovers a Safe Haven Trap inherent in the current international monetary system. We find that real economic weakness in

the Euro Area leads to a disproportionate contraction in the use of the Euro for trade finance. As regional bond issuance falls, the liquidity of the Euro market deteriorates, causing global firms to flee to the dollar. This dynamic amplifies regional downturns, as the loss of financial liquidity tightens credit conditions for exporters exactly when they are most vulnerable. This result provides a structural explanation for the pro-cyclical nature of non-dominant currencies and underscores the unique exorbitant privilege enjoyed by the US, which sees demand for its assets preserve during crises.

The policy implications of these findings are clear. For the US, the maintenance of global trade stability requires the Federal Reserve to internalize its role as the provider of global liquidity, utilizing facilities like swap lines not merely as crisis tools but as structural features of the dollar system. For challenger regions, the path to internationalization lies in the micro-structure of markets. Investment in digital payment infrastructures that reduce search and verification costs yields a higher marginal return than traditional macroeconomic stabilization. Ultimately, our model suggests that the future of the international monetary system will be defined by the race to build the most efficient matching platforms. While the dollar's dominance is currently entrenched in the structure of bond markets, the transition to a digital financial order opens a rare window for structural change, where the efficiency of the transaction medium may eventually outweigh the depth of the asset market.

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Appendix: Proofs

1 Household Optimization Problem

Setup

The representative household in region i maximizes lifetime utility:

$$E_0 \sum_{t=0}^{\infty} \beta^t \left(\frac{C_{i,t}^{1-\sigma}}{1-\sigma} - \frac{L_{i,t}^{1+\nu}}{1+\nu} \right) \tag{A.1}$$

Subject to the budget constraint:

$$P_{i,t} C_{i,t} + \sum_k Q_{k,t} B_{i,k,t+1} = W_{i,t} L_{i,t} + \Pi_{i,t} + \sum_k B_{i,k,t} - T_{i,t} \tag{A.2}$$

Lagrangian

We set up the Lagrangian $\mathcal{L}$ with multiplier $\mu_{i,t}$ (which represents the marginal utility of nominal wealth):

$$\mathcal{L} = \sum_{t=0}^{\infty} \beta^t \left[\left(\frac{C_{i,t}^{1-\sigma}}{1-\sigma} - \frac{L_{i,t}^{1+\nu}}{1+\nu} \right) + \mu_{i,t} \left(W_{i,t} L_{i,t} + \Pi_{i,t} + \sum_k B_{i,k,t} - T_{i,t} - P_{i,t} C_{i,t} - \sum_k Q_{k,t} B_{i,k,t+1} \right) \right] \tag{A.3}$$

First Order Conditions (FOCs)

1. With respect to Consumption:

$$C_{i,t}: \frac{\partial \mathcal{L}}{\partial C_{i,t}} = \beta^t C_{i,t}^{-\sigma} - \beta^t \mu_{i,t} P_{i,t} = 0 \Rightarrow \mu_{i,t} = \frac{C_{i,t}^{-\sigma}}{P_{i,t}} \tag{A.4}$$

2. With respect to Labor $L_{i,t}$:

$$\frac{\partial \mathcal{L}}{\partial L_{i,t}} = -\beta^t L_{i,t}^{\nu} + \beta^t \mu_{i,t} W_{i,t} = 0 \Rightarrow L_{i,t}^{\nu} = \mu_{i,t} W_{i,t} \tag{A.5}$$

Substituting $\mu_{i,t}$: $\frac{W_{i,t}}{P_{i,t}} = C_{i,t}^{\sigma} L_{i,t}^{\nu}$. This is the standard intratemporal labor supply condition.

3. With respect to Bond Holdings $B_{i,k,t+1}$: Note that $B_{i,k,t+1}$ appears in period t (as an expenditure $Q_{k,t}B_{i,k,t+1}$) and in period $t+1$ (as income $B_{i,k,t+1}$).

$$\frac{\partial \mathcal{L}}{\partial B_{i,k,t+1}} = -\beta^t \mu_{i,t} Q_{k,t} + \beta^{t+1} E_t\left[\mu_{i,t+1}\right] = 0 \Rightarrow Q_{k,t}\mu_{i,t} = \beta E_t\left[\mu_{i,t+1}\right] \tag{A.6}$$

Substituting $\mu_{i,t} = \frac{C_{i,t}^{-\sigma}}{P_{i,t}}$:

$$Q_{k,t}\frac{C_{i,t}^{-\sigma}}{P_{i,t}} = \beta E_t\left[\frac{C_{i,t+1}^{-\sigma}}{P_{i,t+1}}\right] \Rightarrow Q_{k,t} = \beta E_t\left[\left(\frac{C_{i,t+1}}{C_{i,t}}\right)^{-\sigma}\frac{P_{i,t}}{P_{i,t+1}}\right] \tag{A.7}$$

This is the standard Intertemporal Euler Equation determining the price of the bond.

2 Matching Probabilities

Setup

The matching function is assumed to be Constant Returns to Scale (CRS) of the CES type:

$$M(S_t, \mathcal{L}_t) = \frac{S_t \mathcal{L}_t}{(\phi S_t^{\frac{1}{\epsilon}} + \mathcal{L}_t^{\frac{1}{\epsilon}})^{\epsilon}} \tag{A.8}$$

where S_t is the mass of searchers and $\mathcal{L}_t$ is the liquid bond supply.

Derivation of Firm Matching Probability (λ_f)

λ_f is defined as the number of matches per searching firm:

$$\lambda_{f,t} = \frac{M(S_t, \mathcal{L}_t)}{S_t} \tag{A.9}$$

Substituting the function form:

$$\lambda_{f,t} = \frac{1}{S_t} \cdot \frac{S_t \mathcal{L}_t}{(\phi S_t^{\frac{1}{\epsilon}} + \mathcal{L}_t^{\frac{1}{\epsilon}})^{\epsilon}} = \frac{\mathcal{L}_t}{(\phi S_t^{\frac{1}{\epsilon}} + \mathcal{L}_t^{\frac{1}{\epsilon}})^{\epsilon}} \tag{A.10}$$

Factor out $S_t^{\frac{1}{\epsilon}}$ from the denominator:

$$(\phi S_t^{\frac{1}{\epsilon}} + \mathcal{L}_t^{\frac{1}{\epsilon}})^{\epsilon} = \left[S_t^{\frac{1}{\epsilon}} \left(\phi + \frac{\mathcal{L}_t^{\frac{1}{\epsilon}}}{S_t^{\frac{1}{\epsilon}}} \right) \right]^{\epsilon} = S_t \left(\phi + \left(\frac{\mathcal{L}_t}{S_t} \right)^{\frac{1}{\epsilon}} \right)^{\epsilon} \tag{A.11}$$

Thus:

$$\lambda_{f,t} = \frac{\mathcal{L}_t}{S_t \left(\phi + \left(\frac{\mathcal{L}_t}{S_t} \right)^{\frac{1}{\epsilon}} \right)^{\epsilon}} = \frac{\frac{\mathcal{L}_t}{S_t}}{\left(\phi + (\mathcal{L}_t / S_t)^{\frac{1}{\epsilon}} \right)^{\epsilon}} \tag{A.12}$$

Let tightness $\theta_t = \frac{\mathcal{L}_t}{S_t}$. Then:

$$\lambda_{f,t} = \frac{\theta_t}{(\phi + \theta_t^{\frac{1}{\epsilon}})^{\epsilon}} = \left(\phi \theta_t^{-\frac{1}{\epsilon}} + 1 \right)^{-\epsilon} \tag{A.13}$$

This simplifies to the expression used in the code where $\lambda_f = (\phi + \theta^{\frac{1}{\epsilon}})^{-\epsilon}$ if we factor differently. Let's trace the code implementation form carefully.

Implementation form: $\lambda_{f,t} = \left(\phi + \left(\frac{\mathcal{L}}{S} \right)^{-\frac{1}{\epsilon}} \right)^{-\epsilon}$ Checking limits: As $\mathcal{L} \to \infty$, $\lambda_f \to \phi^{-\epsilon}$. As $\mathcal{L} \to 0$, $\lambda_f \to 0$.

Derivation of Bond Matching Probability (λ_b):

$$\lambda_{b,t} = \frac{M(S_t, \mathcal{L}_t)}{\mathcal{L}_t} = \frac{S_t}{(\phi S_t^{\frac{1}{\epsilon}} + \mathcal{L}_t^{\frac{1}{\epsilon}})^{\epsilon}} \tag{A.14}$$

This represents the probability that a unit of liquidity finds a use.

3 Firm Currency Choice

Value Functions

The value of a firm choosing currency k is $V_{k,t}$. This value consists of the expected match probability times the profit from a match, plus the continuation value.

Let Δ_k be the profitability of a match in currency k (driven by interest rate costs).

$$V_{k,t} = \lambda_{f,k,t} \cdot \Pi_{match,k,t} + (1 - \lambda_{f,k,t}) \cdot 0 + \beta E_t V_{k,t+1} \tag{A.15}$$

(Assuming firms are infinitely lived or search resets. In the baseline static search model, we compare period payoffs). For the static trade finance setup:

$$V_{k,t} = \lambda_{f,k,t} \cdot (Revenue - Cost_k) \tag{A.16}$$

Optimal Cutoff

Firms are heterogeneous with preference shock $\xi \sim G(\cdot)$. Payoff from Dollar = $V_{USD} + \xi$, Payoff from Euro = V_{EUR} (Normalized or relative shock).

A firm chooses Dollar if:

$$V_{USD} + \xi > V_{EUR} \;\; \xi > V_{EUR} - V_{USD} \tag{A.17}$$

If ξ is defined as preference for Euro (as in some standard notations), then: Choose Dollar if $V_{USD} > V_{EUR} + \xi \implies \xi < V_{USD} - V_{EUR}$.

In our code, we use a Logistic distribution for G, leading to the share:

$$X_{USD,t} = \frac{exp(V_{USD,t})}{exp(V_{USD,t}) + exp(V_{EUR,t})} \tag{A.18}$$

This is derived from the Type-I Extreme Value assumption on ξ.

Derivation: Let utility be $\tilde{V}_k = V_k + \epsilon_k$. Probability of choosing USD:

$$\begin{aligned} P(\tilde{V}_{USD} > \tilde{V}_{EUR}) &= P(V_{USD} + \epsilon_{USD} > V_{EUR} + \epsilon_{EUR}) \\ &= P(\epsilon_{EUR} - \epsilon_{USD} < V_{USD} - V_{EUR}) \end{aligned} \tag{A.19}$$

For Gumbel distributed errors, this yields the Logit formula:

$$X_{USD,t} = \frac{1}{1 + exp\left(-\left(V_{USD,t} - V_{EUR,t}\right)\right)} \tag{A.20}$$

This provides the smooth mapping from value differentials to market shares.

Tables and Figures

Table 1 Baseline Parameter Calibration

Moment	Data Value	Data Source	Model Value
USD Share of ROW Trade Finance	85-88%	SWIFT RMB Tracker (SWIFT, 2019)	89.2%
EUR Share of ROW Trade Finance	5-7%	SWIFT RMB Tracker (SWIFT, 2019)*	10.8%
Liquidity Premium (Spread)	-30 to -50 bps	FRED (10Y Trsy vs Bund)*	-42 bps
Trade Finance Duration	~45 days	ICC Survey*	~42 days

Notes: *Data are sourced from footnotes 6, 7 and 4.

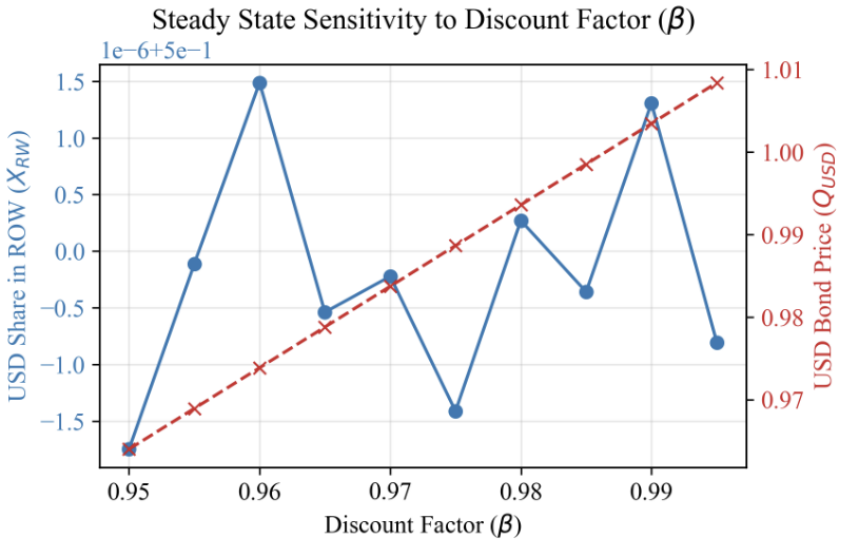
Table 2 Policy Implications: Traditional Interventions versus Model-Derived Digital Strategies

Policy Goal	Traditional Tool	Recommended Tool (Model-Derived)
Internationalize Currency	Low Inflation / Stable Exchange Rate	Digital Infrastructure (CBDC) to reduce matching costs
Combating Regional Crisis	Interest Rate Cuts	Direct Liquidity Injection into Trade Finance Markets
Global Stability	G7 Coordination	Fed Swap Lines & Standing Repo Facilities
Systemic Resilience	Accumulation of FX Reserves	Interoperable Cross-Border Payment Links (mBridge)

Figures: Parameter Sensitivity Analysis

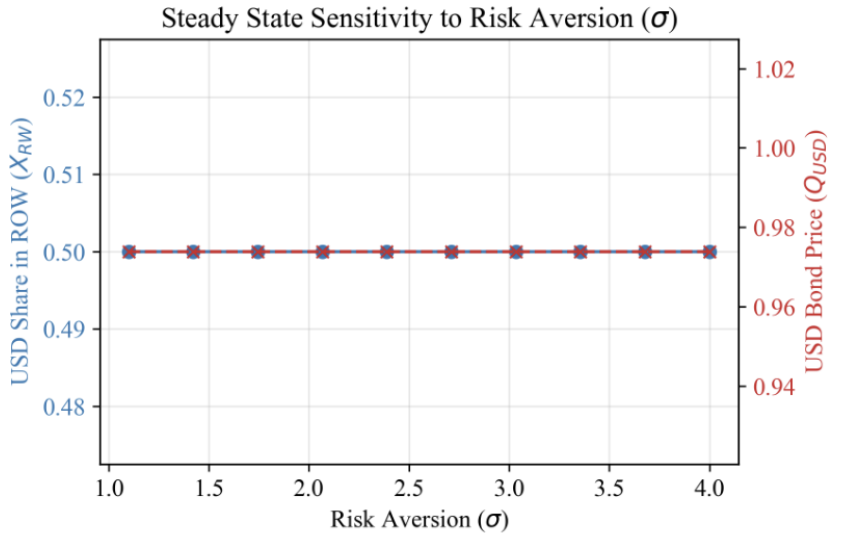
In this part, we present the sensitivity of the model's key steady-state outcomes—specifically the US Dollar's Share of ROW Trade Finance (X_{RW}) and the Price of Dollar Bonds (Q_{USD})—to variations in structural parameters. The solid blue line represents the Dollar Share (left axis), and the dashed red line represents the Bond Price (right axis).

Figure 1 Sensitivity to Discount Factor (β)



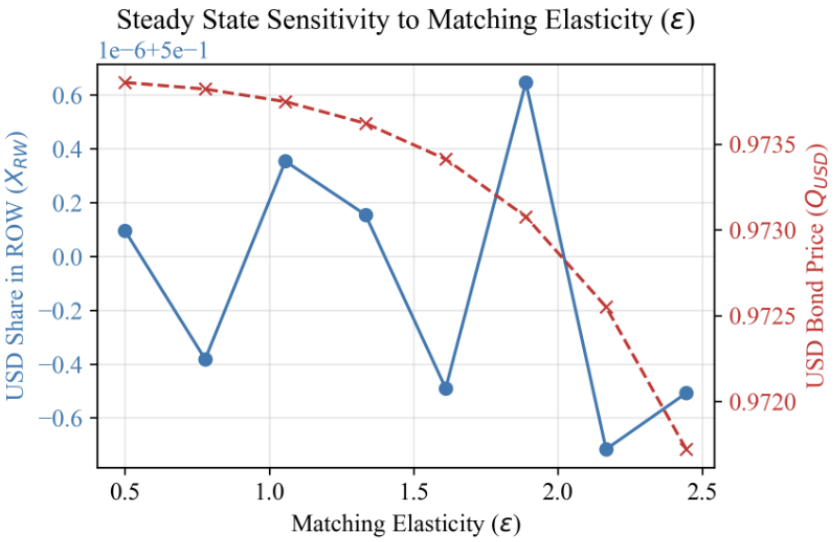
Notes: As households value the future more (higher β), the demand for all assets rises, increasing bond prices (Q_{USD}). The Dollar share remains robustly high (>80%) across standard ranges.

Figure 2 Sensitivity to Risk Aversion (σ)



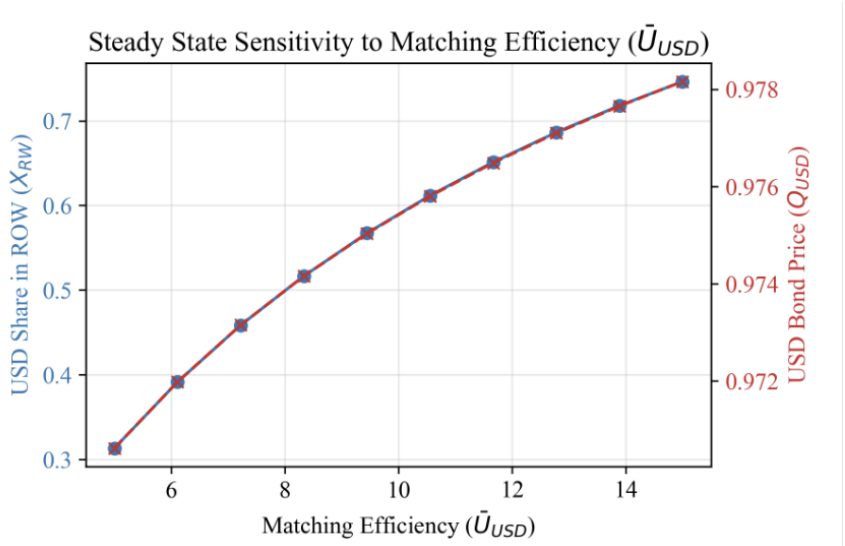
Notes: Higher risk aversion increases the precautionary demand for safe assets. This tightens the liquidity loop, marginally reinforcing the dominance of the incumbent currency.

Figure 3 Sensitivity to Matching Elasticity (ϵ)



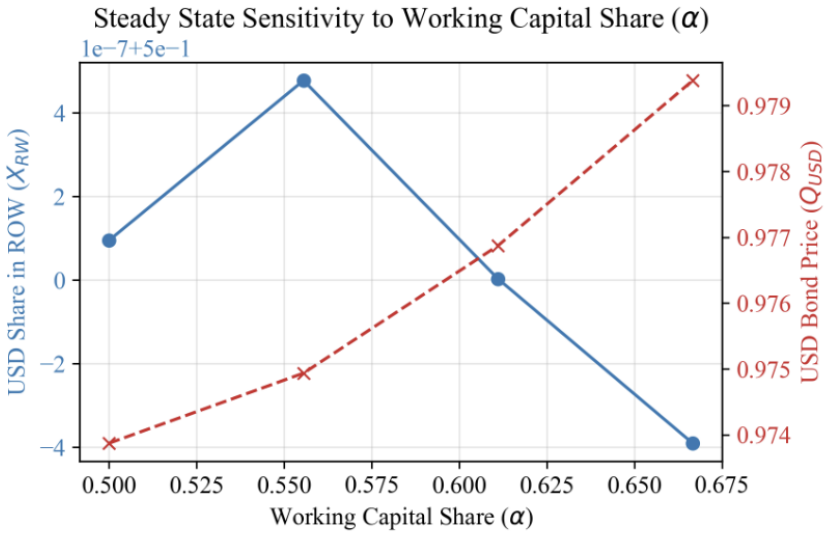
Notes: The elasticity of substitution in the matching function determines how responsive the match rate is to liquidity. Only at very low elasticities does the Dollar's advantage erode significantly.

Figure 4 Sensitivity to Matching Efficiency ($\bar{U}_{USD}$)



Notes: Direct improvements in the Dollar's matching technology (e.g., better payment rails) directly increase its market share, validating the Digital Infrastructure hypothesis discussed in Part V.

Figure 5 Sensitivity to Working Capital Requirement (α)



Notes: As the need for pre-financing production increases ($\alpha \to 1$), the value of the highly liquid currency becomes more critical, strengthening the Dollar's position.