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Currency Flowback and Opening Up Bond Markets

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Abstract: The internationalization of the Renminbi (RMB) has become a practical reality in global financial markets and economic dynamics. Understanding the mechanism of currency flowback, the movement of the RMB back to China's domestic financial system after being utilized abroad, is crucial in comprehending the evolving landscape of global finance and China's position within it. This article investigates the relationship between currency flowback and RMB internationalization through theoretical frameworks, empirical evidence, and model simulations. The opening of bond markets plays a pivotal role in facilitating currency flowback and promoting RMB internationalization by attracting foreign investors and increasing the liquidity of domestic bond markets. A Dynamic Stochastic General Equilibrium (DSGE) model incorporating bond market opening-up illustrates the potential for improved financial stability and economic resilience. However, the conclusions drawn from simulations are contingent on maintaining a moderate foreign holding ratio of domestic bonds to mitigate risks associated with excessive foreign ownership.

Keywords: currency flowback; bond market; currency internationalization

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1. Introduction

The internationalization of the Renminbi (RMB) has emerged as a focal point in discussions surrounding global financial markets and economic dynamics (Guo and Zhou, 2021). As China's economic influence continues to expand, facilitated by its robust trade relationships, burgeoning foreign investments, and ambitious financial reforms (Wei et al., 2023), the question of the RMB's role on the international stage becomes increasingly pertinent. Central to this discourse is the phenomenon of currency flowback, which encapsulates the movement of RMB back to China's domestic financial system after being utilized abroad.

Currency flowback represents a multifaceted process shaped by a myriad of economic, financial, and policy factors. It reflects the interaction between domestic and international market forces, impacting exchange rates, monetary policies, and capital flows. Understanding the dynamics of currency flowback is crucial for policymakers, economists, and market participants seeking to comprehend the evolving landscape of global finance and China's position within it.

This article aims to investigate the relationship between currency flowback and the internationalization of the RMB. By examining empirical evidence, theoretical frameworks, and case studies, we endeavor to shed light on the mechanisms driving currency flowback and its implications for the RMB's internationalization agenda. Furthermore, we seek to identify challenges, opportunities, and policy implications arising from the nexus between currency flowback and the RMB's global aspirations.

The structure of this article is organized as follows. First, we provide a comprehensive review of the literature on currency flowback and the internationalization of currencies, with a specific focus on the RMB. Next, we present an analytical framework, a Dynamic Stochastic General Equilibrium model, for understanding the drivers and determinants of currency flowback through empirical evidence and model simulation. Finally, we discuss policy implications and avenues for future research, aiming to contribute to the scholarly discourse on currency internationalization and global finance.

2. Literature Review

Currency flowback, also known as repatriation or repatriation flow, has garnered increasing attention in the realm of international finance and monetary economics. This phenomenon, which pertains to the movement of a currency back to its country of origin after being utilized abroad, holds significant implications for the internationalization of currencies, including the RMB. In this literature review, we explore key themes, theories, and empirical findings related to currency flowback and its intersection with the internationalization of currencies.

Currency internationalization refers to the process by which a currency gains acceptance and usage beyond its domestic borders. It encompasses various dimensions, including trade invoicing, international reserves, capital markets, and financial transactions. The seminal work of Cohen (2012) provides a comprehensive framework for analyzing currency internationalization, distinguishing between "usage" and "issuance" dimensions. According to Cohen, the internationalization of a currency involves not only its use in transactions but also its adoption as a reserve currency and its issuance in international financial markets.

Several factors drive currency flowback, spanning economic, financial, and policy domains. Economic fundamentals, such as trade balances, investment returns, and interest rate differentials, influence the demand for a currency and, consequently, the propensity for repatriation. Moreover, changes in investor sentiment, geopolitical developments, and macroeconomic policies can trigger shifts in capital flows, leading to currency flowback (Antonio-Ocampo, 2017).

Empirical studies have examined the determinants and patterns of currency flowback across different currencies and regions. Research by Camanho et al. (2022) finds that currencies of countries with large external imbalances are subject to higher repatriation flows, reflecting investors' risk aversion and concerns about exchange rate volatility. Similarly, Gopinath et al. (2020) document significant variations in currency flowback across emerging market economies, driven by changes in global risk appetite and monetary policy divergence among advanced economies.

The internationalization of the RMB has emerged as a focal point in China's economic and financial reforms. Scholars have explored various dimensions of RMB internationalization, including its role in trade settlement, offshore financial markets, and central bank reserves. Wang (2015) highlighted the importance of currency convertibility, financial market development, and policy coordination in advancing the RMB's internationalization agenda. Moreover, the establishment of offshore RMB centers, such as Hong Kong and Singapore, has facilitated the offshore use of the RMB and contributed to its global acceptance (Cheung, 2023).

The interplay between currency flowback and RMB internationalization is complex and dynamic. On the one hand, repatriation flows reflect investors' confidence in the stability and prospects of the RMB, bolstering its international standing. On the other hand, currency flowback may exert pressure on domestic monetary conditions and exchange rates, posing challenges for policymakers seeking to manage capital flows and maintain financial stability (Chinn and Ito, 2007).

The opening of bond markets plays a pivotal role in facilitating currency flowback and promoting the internationalization of currencies, including the RMB. Bond market liberalization allows foreign investors greater access to domestic debt securities, fostering cross-border capital flows and increasing the demand for the domestic currency. China's gradual opening of its bond market to foreign investors, through initiatives such as the Bond Connect program and the inclusion of Chinese bonds in global indices, has led to increased foreign participation in its bond market (Walker et al., 2021). Empirical evidence suggests that the opening of bond markets can spur currency flowback by attracting foreign capital seeking higher returns and portfolio diversification. Research by Wu et al. (2017) finds that the liberalization of bond markets in emerging economies leads to greater inflows of foreign capital, contributing to currency appreciation and repatriation flows. Moreover, the integration of domestic bond markets with global financial markets enhances the liquidity and depth of the bond market, making it more attractive to foreign investors (Claessens and Schmukler, 2007).

The opening of China's bond market has been instrumental in advancing the internationalization of the RMB. By allowing foreign investors greater access to Chinese bonds, policymakers aim to promote the use of the RMB in international transactions, enhance its status as a reserve currency, and integrate China into the global financial system. The inclusion of Chinese bonds in major global bond indices, such as the Bloomberg Barclays Global Aggregate Index and the FTSE World Government Bond Index, reflects China's efforts to increase the visibility and acceptance of the RMB in international capital markets (Frankel, 2012). Furthermore, the opening of China's bond market facilitates the offshore use of the RMB, particularly in offshore bond issuance and settlement. Offshore RMB bond markets, such as the Dim Sum bond market in Hong Kong, provide foreign investors with opportunities to invest in RMB-denominated assets outside mainland China, thereby promoting the international use of the RMB (Chey et al., 2019).

The interplay between bond market opening, currency flowback, and RMB internationalization underscores the complex dynamics shaping China's financial integration with the global economy. The liberalization of China's bond market attracts foreign capital inflows, contributing to currency appreciation and repatriation flows. These repatriation flows, in turn, reinforce the internationalization of the RMB by increasing its use in cross-border transactions and enhancing its attractiveness to global investors. However, policymakers must navigate challenges associated with capital mobility, exchange rate volatility, and financial stability in the process of opening bond markets and promoting currency internationalization. The effective coordination of monetary policy, capital account management, and financial market regulation is essential to mitigate risks and ensure the orderly integration of domestic bond markets into the global financial system.

In conclusion, the opening of bond markets plays a crucial role in facilitating currency flowback and advancing the internationalization of currencies, including the RMB. By attracting foreign investors and promoting the use of domestic currencies in international transactions, bond market liberalization contributes to the integration of domestic financial markets with the global economy. Understanding the interplay between bond market opening, currency flowback, and RMB internationalization is essential for policymakers and market participants navigating the complexities of China's financial reforms and its evolving role in the global financial system. The following Dynamic Stochastic General Equilibrium (DSGE) model incorporates bond market opening into the financial system.

3. The Model

Building on the review, we developed an open DSGE model with currency flowback mechanisms following the real business cycle paradigm (Canova and Ubide, 1998; Zhang and Zhou, 2021). Throughout this paper, variables with superscript d are the domestic demand for domestic products/bonds (e.g., C^d, B^d), and those with superscript f are the domestic demand for foreign products/bonds (e.g., C^f, B^f). All variables with a star * indicate the foreign counterparts (e.g., $C_t^*, i_t^*, s^*, \gamma^*$). The timing convention is such that the subscript t means the variable is determined at t or during period t (between $t-1$ and t), but it can take effect in period $t+1$ as a state variable (e.g., K_t).

[Consumer] The representative consumer maximizes her expected lifetime utility:

$$\max_{\{C_t, C_t^d, C_t^f, N_t, L_t, Z_t, B_t, B_t^f\}_{t=0}^{\infty}} \mathbf{E}_t \sum_{t=0}^{\infty} \beta^t U\left(C_t, L_t\right).$$

We assume a time-separable isoelastic utility function similar to McCallum and Nelson (2000), where θ is the relative utility weight of leisure (L_t) and ϵ_t^L is an exogenous preference shock with respect to leisure ($\epsilon_t^L > 0$ means leisure is more desirable).

$$U\left(C_t, L_t\right) = \ln C_t + \theta e^{\epsilon_t^L} \ln L_t$$

Furthermore, to introduce open economy, the composite consumption C_t is an aggregator between domestic and foreign products, where γ is the relative utility weight for imported foreign product $C_t^f \equiv M_t$ and ϵ_t^M is the exogenous preference shock with respect to C_t^f ($\epsilon_t^M > 0$ means that the imported foreign product is more desirable than usual), and s is the elasticity of substitution. Note that in steady state ($\epsilon_t^M = 0$), the utility weights of the domestic and foreign products are, respectively, equal to $\frac{1}{1+\gamma}$ and $\frac{\gamma}{1+\gamma}$.

$$C_t \equiv \left[\left(\frac{1}{1+\gamma e^{\epsilon_t^M}}\right)^{\frac{1}{s}} \left(C_t^d\right)^{\frac{s-1}{s}} + \left(\frac{\gamma e^{\epsilon_t^M}}{1+\gamma e^{\epsilon_t^M}}\right)^{\frac{1}{s}} \left(C_t^f\right)^{\frac{s-1}{s}}\right]^{\frac{s}{s-1}}$$

There are three constraints restricting the optimization process. First, time endowment is split between labor (N_t), financial activities (Z_t) such as working in the banking sector, and leisure (L_t).

$$N_t + Z_t + L_t = 1$$

Second, after a lump-sum tax T_t (net of any transfer payment) disposable income (including labor income at the rate of w_t, financial income at the rate of ω_t, and the dividend income per capita Π_t) is spent on consumption and financial investment (in both domestic and foreign bonds). The domestic bonds issued by the home country can be held by both domestic and foreign investors. The ratio held by foreign investors is set to be fixed at μ, so the ratio held by domestic investors is $1-\mu$. Here, the relative prices of financial assets are normalized to 1, so we need to interpret B_t^d and B_t^f as quantities (net holdings), respectively, denominated by domestic and foreign output units. Moreover, the real exchange rate χ_t is needed to account for the value difference between domestic and foreign output units (1 unit of foreign output is equal to χ_t units of domestic output). The world interest rate i_t^* is exogenous.

$$C_t^d + \chi_t C_t^f + (1-\mu)\left[B_t^d - \left(1+i_{t-1}\right) B_{t-1}^d\right] + \chi_t B_t^f - \chi_t\left(1+i_{t-1}^*\right) B_{t-1}^f = w_t N_t + \omega_t Z_t + \Pi_t - T_t$$

[Firm] The representative firm maximizes the sum of discounted future profit flows. The discount rate is equal to the market (real) interest rate $r_t = i_t$ and the discount factor $D_t = \frac{1}{(1+i_0)\ldots(1+i_{t-1})}$ for $t \geqslant 1$ and $D_0 = 1$. The output sector and the financial sector are consolidated to one composite firm, but this setup is equivalent to the decentralized two-sector model according to the First Fundamental Theorem of Welfare Economics.

$$\max_{\{Y_t, K_t, I_t, N_t, Z_t\}_{t=0}^{\infty}} \mathbf{E}_t \sum_{t=0}^{\infty} D_t \left(Y_t - I_t - w_t N_t - \omega_t Z_t \equiv \Pi_t\right).$$

There are four constraints. The first is the production function of the aggregate output Y_t, with A_t being the Harrod neutral (or labor-augmenting) technology and α being the income share of labor. The advantage of this specification is well documented: the growth rate of output is equal to the growth rate of technology in the balanced growth path.

$$Y_t = \left(A_t N_t\right)^{\alpha} K_{t-1}^{1-\alpha}$$

The second is to endogenize technological progress by financial depth in a similar way to other endogenous growth models (e.g., human capital, Lucas, 1988; knowledge capital, Romer, 1990). This feature creates the firm's optimization problem dynamic because the decision today (on Z_t) affects both the present and the future. A quadratic feature of the relationship between technological growth (g_A) and financial depth ($\widetilde{F}_t$) is supported by the empirical evidence and corporate finance theory (explained in the market clearing subsection). Given that our model follows a neoclassical paradigm, the contribution of capital (including financial capital) diminishes. This is the fundamental reason for this observed inverted-U relationship in data. $\widetilde{F}_t \equiv F_t / Y_t$, a standard measure of financial depth, is defined as the ratio between the total financial capital and GDP, delineating the relative abundance of financial instruments to facilitate the real economy. ϵ_t^A is an exogenous productivity shock.

$$g_{At} \equiv \frac{A_t}{A_{t-1}} - 1 = a_0 + a_1 \widetilde{F}_t + a_2 \widetilde{F}_t^2 + \epsilon_t^A$$

The third constraint describes the financial capital production function. In the light of the evidence, the financial depth is determined by both financial labor input and the previous relative financial capital in a similar fashion to the aggregate output production function. The difference is that we do not restrict it to constant returns to scale, so $\phi_1 + \phi_2$ can be greater than 1[1]. ϵ_t^F is an exogenous productivity shock specific to the financial sector.

$$\widetilde{F}_t = \Phi_0 \widetilde{F}_{t-1}^{\phi_1} Z_t^{\phi_2} e^{\epsilon_t^F} \Longleftrightarrow \ln \widetilde{F}_t \approx \phi_0 + \phi_1 \ln \widetilde{F}_{t-1} + \phi_2 \ln Z_t + \epsilon_t^F$$

Finally, the law of motion for physical capital is specified below. We grant that the ownership of capital is to firms rather than households, but according to the Coase theorem, it does not make any difference who owns the capital if there is no transaction cost.

$$K_t - (1-\delta) K_{t-1} = I_t$$

[Government] The government finances its expenditure G_t by a lump-sum tax T_t and government bond B_t (G1), while the expenditure is a fraction (ζ) of GDP disturbed by a fiscal policy shock ϵ_t^G.

$$G_t = T_t + B_t^d - (1 + i_{t-1}) B_{t-1}^d$$

$$G_t = (\zeta Y_t) e^{\epsilon_t^G}$$

[Rest of the World] The equations below describe the balance of payment, i.e., current account surplus (trade balance + factor income) on the left-hand side of the equation is equal to capital account deficit on the right-hand side. Note that the current account and capital account consider bond holdings between domestic $(1-\mu)$ and foreign (μ) investors. Import and export are derived from consumers' marginal conditions by symmetry:

$$\left[(X_t - \chi_t M_t) + \chi_t i_{t-1}^* B_{t-1}^f - \mu i_{t-1} B_{t-1}^d\right] = \chi_t \left(B_t^f - B_{t-1}^f\right) - \mu \left(B_t^d - B_{t-1}^d\right)$$

$$M_t \equiv C_t^f = \left(\frac{\gamma e^{\epsilon_t^M}}{1 + \gamma e^{\epsilon_t^M}}\right)^{-\frac{1}{s-1}} \left(1 + \frac{\chi_t^{s-1}}{\gamma e^{\epsilon_t^M}}\right)^{-\frac{s}{s-1}} C_t$$

$$X_t = \left(\frac{\gamma^* e^{\epsilon_t^X}}{1 + \gamma^* e^{\epsilon_t^X}}\right)^{-\frac{1}{s^*-1}} \left(1 + \frac{(1/\chi_t)^{s^*-1}}{\gamma^* e^{\epsilon_t^X}}\right)^{-\frac{s^*}{s^*-1}} C_t^*$$

Note that the first order conditions for C_t^f and C_t^d are used to obtain the M_t equation. Also, χ_t is inversed in the X_t equation because the real exchange rate facing the rest of the world is the reciprocal of that facing the domestic consumers. Moreover, ϵ_t^X is the exogenous preference shock with respect to domestic output in the world market ($\epsilon_t^X > 0$ means that the exported domestic output is more desirable). It is a common modeling choice to include a preference shock as such in the literature of international business cycles to match the persistence observed in the data (Rothert, 2020). C_t^* is the exogenous world consumption per capita, which is the counterpart of C_t.

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1 The estimated equation based on the US data is $\ln \widetilde{F}_t = \underset{(2.1344)}{0.8162} + \underset{(0.0543)}{0.9061} \ln \widetilde{F}_{t-1} + \underset{(0.5165)}{0.1571} \ln Z_t$. We will use the estimates to calibrate ϕ_1 and ϕ_2. It turns out that the financial capital production function is very close to constant returns to scale ($\hat{\phi}_1 + \hat{\phi}_2 = 1.0632$).

[Market Clearing] The clearing conditions hold for output markets, labor markets, capital markets and financial markets, both domestically and internationally. The two domestic labor markets (in the financial sector and nonfinancial sector) are competitive, and the two wages are equalized. Since capital is owned by firms, the cost of investment is internalized and there is no explicit capital market. Note that the consumer's budget constraint, the definition of the firm's profit, the government's budget constraint, and the balance of payment imply the domestic output market clearing condition $Y_t = C_t^d + I_t + G_t + X_t$. Moreover, under the small open economy assumption, the international output and financial markets are exogenous, so the demand and supply can always meet. The only relevant market clearing condition is therefore the domestic financial market:

$$F_t = (St_t + B_t^{pr} + Cr_t) + B_t^d$$

The left-hand-side F_t is the total domestic financial capital produced and maintained by the financial sector, and the right-hand-side includes the external finance demanded by the firm (St_t: stock market capitalisation; B_t^{pr}: private bond; Cr_t: bank credit/loan) and the public bond demanded by the government (B_t^d). According to the corporate finance literature (e.g., trade-off theory and pecking order theory), the demand for external finance $(St_t + B_t^{pr} + Cr_t)$ is a result of optimization leading to a ratio of the total capital (K_t). Panel data evidence (Rajan and Zingales, 1995) shows that this optimal ratio ranges from 20% in the US, 30% in Canada, and 36% in the UK to 50% in Japan. In our data, this ratio (κ) of external finance is derived to be 25.88%. The financial market clearing condition can therefore be rewritten as:

$$F_t = \kappa K_t + B_t^d$$

A summary of how to derive and stationarize the dynamic stochastic system of model equations can be found in the Appendix. The bottom line is that this system consists of $N_n = 21$ endogenous variables, $N_x = 8$ exogenous variables (i.e., stochastic shocks), and the same number of innovations. Mathematically, there is no technical difference between endogenous and exogenous variables, so let us group them together into a 29-by-1 vector $\mathbf{x}_t$. The 8 innovations are grouped into an 8-by-1 vector $\boldsymbol{\eta}_t$. The structural form of the equation system can be summarized as

$$\mathbf{E}_t \left[f \left(\mathbf{x}_t, \mathbf{x}_{t-1}, \mathbf{x}_{t+1}, \boldsymbol{\eta}_t \right| \boldsymbol{\theta}) \right] = 0, \text{ where } \boldsymbol{\theta} \in \Theta$$

4. Results

The model that is estimated and calibrated to match the data features is then solved and simulated using the perturbation method. Our analysis of the model will focus on the relationship between FD and growth rate. Table 1 summarizes implied steady states of the endogenous and exogenous variables. A particularly interesting implication is that the long-run steady state of FD level ($\overline{F} = 1.596$) is lower than the turning point of the quadratic equation, i.e., $-\frac{a_1}{2a_2} = 2.4$. In other words, the social welfare maximizing solution is different from the growth maximizing solution, under which the maximum growth rate is 6.75%, greater than the steady state growth rate of 2.62%. To understand this difference, remember that the equilibrium FD level is derived to maximize the consumer's utility, rather than to maximize the growth rate. Therefore, to maximize a different objective function, the FD level needs to deviate from the welfare-maximizing level. An economy can grow faster if the financial depth is distorted to a higher level at the cost of the social welfare.

One example is China, which has experienced unprecedented financial development and high economic growth over the last three decades. In 2016, the financial sector in China already accounted for over 10% of its GDP, much higher than 6.5% in the US. This is obviously a distortion of the economy, leading to higher risks of financial bubbles and a loss of welfare (Sun et al., 2020). This dynamic stochastic equation system can be solved and simulated using the perturbation method.

Table 1: The calibrated parameters and steady states of the baseline model.

Parameter	Meaning	Calibration		Variable	Meaning	Steady State	
θ	relative utility weight of leisure	4.492	D	$\overline{C}$	aggregate consumption	0.656	E
β	subjective discount factor	0.989	D	$\overline{C}^d$	domestic goods	0.513	D
γ	relative weight of foreign goods	0.279	D	$\overline{N}$	nonfinancial labor	0.197	E
s	elasticity of substitution	1.200	F	$\overline{Z}$	financial labor	0.014	E
α	income share of labor	0.737	D	$\overline{B}^d$	domestic bonds	0.360	E
a_0	constant term	-0.298	D	$\overline{B}^f$	foreign bonds	0.000	F
a_1	linear term	0.304	D	$\overline{K}$	physical capital stock	4.779	D
a_2	quadratic term	-0.063	D	$\overline{I}$	investment	0.210	E
ϕ_0	constant term	0.712	D	$\overline{Y}$	output	1.026	E
ϕ_1	income share of $\widetilde{F}_{t-1}$	0.906	E	$\overline{g}_Y$	growth rate of output	0.026	D
ϕ_2	income share of Z	0.157	E	$\overline{A}$	labor-augmented productivity	2.929	D
δ	capital depreciation rate	0.019	D	$\overline{g}_A$	growth rate of A	0.026	D
ζ	share of G	0.134	D	$\overline{F}$	financial depth	1.596	E
κ	optimal external finance rate	0.259	D	$\overline{\Pi}$	economic profit	0.000	F
ρ_A	AR(1) coefficient	0.815	E	$\overline{T}$	tax revenue	0.138	D
ρ_F	AR(1) coefficient	0.063	E	$\overline{G}$	government expenditure	0.134	D
ρ_L	AR(1) coefficient	0.063	F	$\overline{X}$	export	0.143	D
ρ_X	AR(1) coefficient	0.063	F	$\overline{M}$	import	0.143	E
ρ_M	AR(1) coefficient	0.063	F	$\overline{w}$	real wage	3.737	D
ρ_G	AR(1) coefficient	0.885	F	$\overline{i}$	interest rate	0.038	D
ρ_{i*}	AR(1) coefficient	0.683	E	$\overline{\chi}$	real exchange rate	1.000	F
$i*$	steady state $i*$	0.038	E	$\overline{C}*$	world consumption	0.656	F
ρ_{C*}	AR(1) coefficient	0.441	E	$\overline{i}*$	world interest rate	0.038	E
g_{C*}	steady state growth rate of $\overline{C}*$	0.026	E	$\overline{\epsilon}_A$	productivity shock	0.000	F
σ_A	standard deviation	0.066	E	$\overline{\epsilon}_F$	financial shock	0.000	F
σ_F	standard deviation	0.038	E	$\overline{\epsilon}_L$	leisure preference shock	0.000	F
σ_L	standard deviation	0.100	F	$\overline{\epsilon}_X$	export preference shock	0.000	F
σ_X	standard deviation	0.090	E	$\overline{\epsilon}_M$	import preference shock	0.000	F
σ_M	standard deviation	0.090	E	$\overline{\epsilon}_G$	government expenditure shock	0.000	F
σ_G	standard deviation	0.024	E				
σ_{i*}	standard deviation	0.023	E				
σ_{C*}	standard deviation	0.016	E				

Notes: "E" stands for estimated from data by GMM regression (with lagged endogenous variables as instruments), "F" stands for fixed based on the empirical DSGE literature (Zhang and Zhou, 2021), and "D" stands for derived from the equation system.

The *long-run* properties of the model can be analyzed by the variance decomposition. Figure 1 compares the contributions of the eight shocks to the variance of output growth under the four foreign holding ratios of domestic bonds (μ). It shows that as more bonds are held by foreign investors, the contributions of domestic productivity shock and world interest rate shock decrease, while the contribution of domestic financial shock rises.

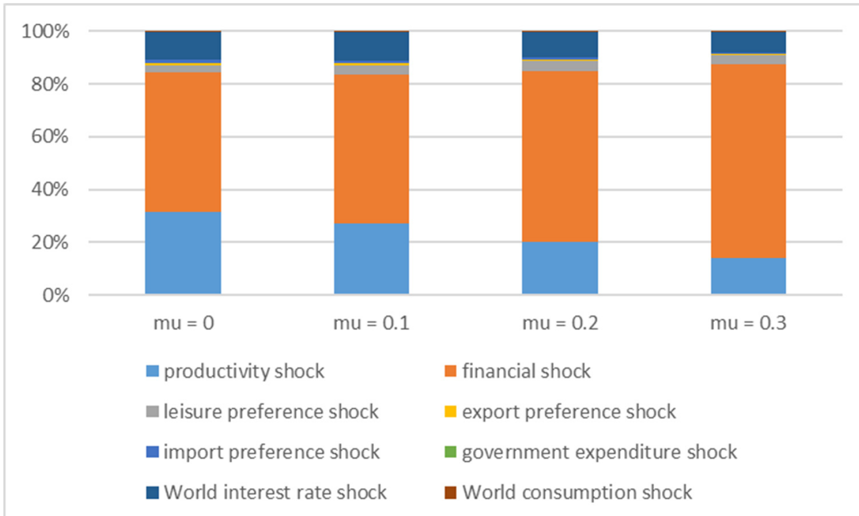

Figure 1: Variance decomposition of output growth under different foreign holding shares of domestic bonds.

The *short-run* properties of the estimated model are summarized by impulse response functions. Figure 2 shows the responses of output growth (g_Y) after productivity shock (η^A), financial shock (η^F), world interest rate shock (η^{i*}), and export preference shock (η^X), respectively. As the foreign holding ratio of domestic bonds (μ) rises, the effects become smaller because the shocks are absorbed by foreign economies.

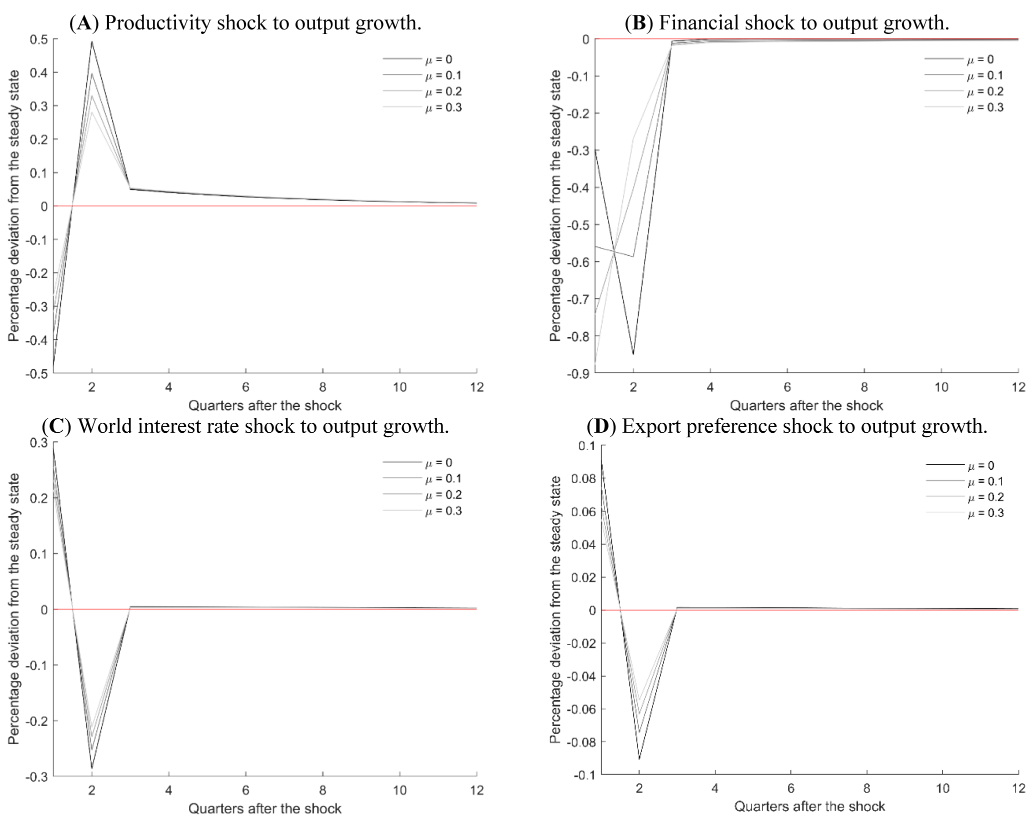

Figure 2: Impulse response functions of output growth.

The four impulse responses of Figure 3 focus on the financial depth (F) after the three shocks. Similar to output growth, the financial depth also undergoes smaller effects if the foreign bond holdings (μ) increase. Due to the dampening effects, the speed of convergence is also shorter. Moreover, it can also be seen that the convergence speed of financial depth is generally slower than that of output growth by comparing the horizontal axes of Figures 2 and 3. This is because financial depth is a stock, while output is a flow. It takes a longer time for a stock variable to adjust due to the accumulated deviations. Thus, opening up the bond markets to foreign investors can substantially improve the stability of domestic financial markets.

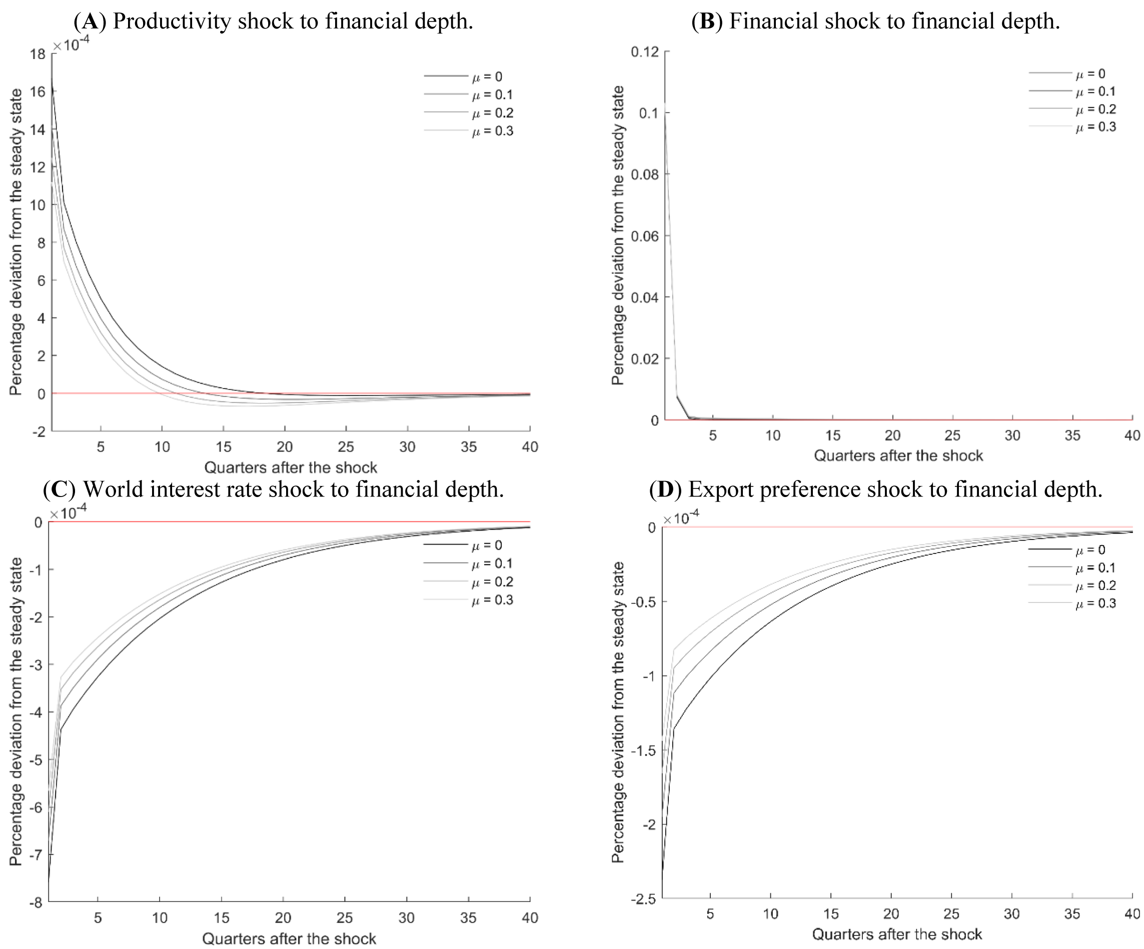

Figure 3: Impulse response functions of financial depth.

5. Conclusions

This paper has provided valuable insights into the drivers and determinants of currency flowback, as well as its implications for the internationalization of the RMB. Currency flowback, as the movement of a currency back to its country of origin after being utilized abroad, reflects a complex interplay of economic, financial, and policy factors. The literature suggests that economic fundamentals, including trade balances, investment returns, and interest rate differentials, are key drivers of currency flowback. Changes in investor sentiment, geopolitical developments, and macroeconomic policies also influence repatriation flows, highlighting the dynamic nature of capital movements in the global economy.

Specifically, the opening of bond markets has emerged as a significant factor in facilitating currency flowback and promoting the internationalization of currencies. By attracting foreign investors and increasing the liquidity of domestic bond markets, bond market liberalization contributes to capital inflows and enhances the attractiveness of domestic currencies, such as the RMB, on the global stage.

We have developed an open economy DSGE model with currency flowback mechanisms via the bond market. It is shown that the opening-up of domestic bond markets can improve financial stability and economic resilience when exogenous shocks hit the economy. Nevertheless, our simulations were carried out under a moderate foreign holding ratio (less than 30%), which is close to the ratio of the US-issued bonds. Our conclusion may not hold if there is an excessive foreign holding ratio of domestic bonds due to the monopsonic power of the big buyers and the importation of external shocks. That is also why the holding ratios in all developed economies are kept at a moderate level.

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