Economics Letters 255 (2025) 112458

Contents lists available at ScienceDirect

Economics Letters

journal homepage: www.elsevier.com/locate/ecolet

Macro-financial impacts of foreign digital money☆

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ARTICLE INFO

JEL classification:
E50
F30
F31
G15
G18
G23

Keywords:
Stablecoins
Open economy
Financial frictions
Optimal policy

ABSTRACT

We develop a two-country New Keynesian model with endogenous currency substitution and financial frictions to examine the impact on a small developing economy of a stablecoin issued in a large foreign economy. The stablecoin provides households in the domestic economy with liquidity services and an additional hedge against domestic inflation. Its introduction amplifies currency substitution, reducing bank intermediation and weakening monetary policy transmission, which exacerbates the impacts of recessionary shocks and increases banking sector stress.

1. Introduction

Developments in the international monetary system frequently raise concerns about spillover effects on developing countries (see, for instance, Eichengreen, 2012; Rey, 2013), and the emergence of new forms of digital money is no exception. Recent growth in the use of USD stablecoins has elevated concerns of 'digital dollarization' (Brunnermeier et al., 2021) or 'cryptoization' (IMF, 2021) where households choose to use them over their domestic currency. By reducing bank intermediation, this could in turn weaken monetary policy transmission and exacerbate the impact of recessionary shocks on developing countries.

However, recent work on the international spillovers of new forms of digital money has focused on the implications for large, rich countries. For instance, Cova et al. (2022) and Kumhof et al. (2023) consider spillovers from stablecoins or CBDCs in a foreign country to equally sized economies, while (Minesso et al., 2020, 2022) use US–Europe and US–Germany ratios in their calibrations.[1] This leaves open the question of the implications for those countries most exposed to harmful spillovers, namely small emerging markets and developing economies (IMF, 2021).

In this paper, we therefore construct a two-country New Keynesian model to assess the risks from a foreign stablecoin for a small developing country whose currency faces substitution. Our model features a small domestic economy, with financial frictions and a banking sector, that is connected through trade and financial flows to a large foreign economy in which a payments firm issues a stablecoin backed by foreign cash. This stablecoin is useful to domestic households as both a means of payment and a non-domestic-currency store of value, following (Henriksen and Kydland, 2010), and we allow for endogenous currency substitution as in Özbilgin (2012).

☆ We thank Itai Agur, Michael Binder, Damien Capelle, Yan Carrière-Swallow, Andrés Fernández Martin, Clemens Graf von Luckner, Annamaria Kokenyne Ivanics, Michael Kumhof, Tommaso Mancini-Griffoli, Soledad Martinez Peria, Alexander Meyer-Gohde, Valerio Nipsi Landi, Marco Reuter, Alasdair Scott, Ken Teoh, Toni Whited, Volker Wieland, and various seminar participants at the IMF for helpful comments and suggestions. This paper was mainly written when Anh H. Le was at the Goethe University Frankfurt. The views expressed herein are those of the authors and do not necessarily represent the views of the IMF, its Executive Board, or IMF management.

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[1] Ikeda et al. (2020) considers a small:large economy ratio of 1:99, but focuses only on the implications of digital money as a unit of account for pricing and does not include a financial sector. Moro and Nispi Landi (2023) also consider the implications of foreign CBDC for a small open economy, but do not allow for endogenous currency substitution.

https://doi.org/10.1016/j.econlet.2025.112458
Received 29 April 2025; Received in revised form 10 June 2025; Accepted 17 June 2025
Available online 16 July 2025

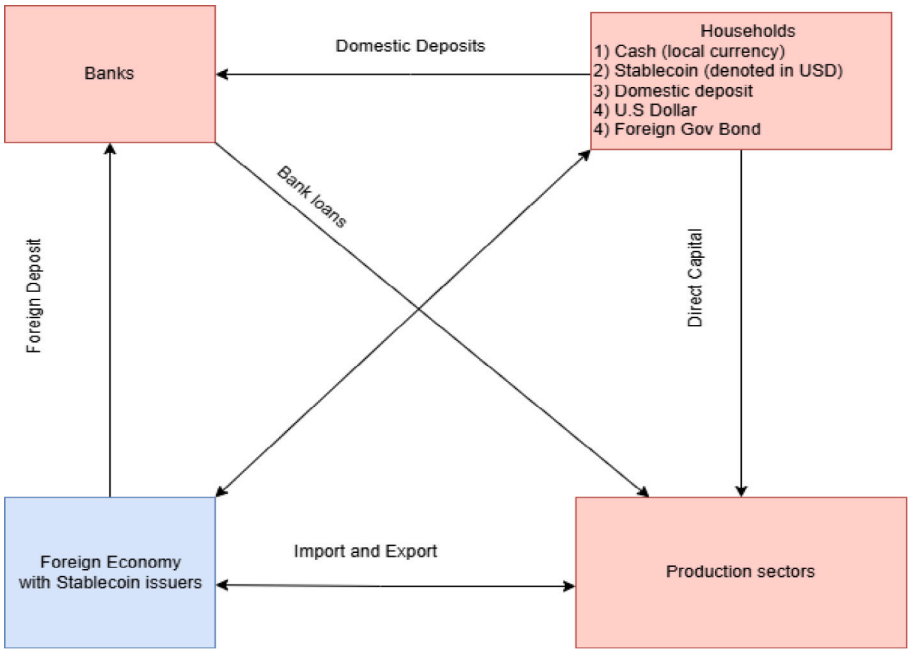

Fig. 1. A bird eye view of the model.

Faced with an inflationary shock, the domestic household faces a trade-off between diverting more assets out of the domestic currency (preserving their purchasing power) and being able to meet the liquidity demands of its desired consumption transactions. Our main result is that the addition of the foreign stablecoin to the menu of payment assets relaxes this trade-off, allowing households to shift more purchasing power away from domestic currency assets after the shock. As a result, currency substitution and capital outflows are amplified in response to negative shocks, which in turn magnifies domestic output losses.

A wide literature models the macroeconomic impact of digital money in closed economies.[2] Models addressing open-economy considerations include Barrdear and Kumhof (2016), George et al. (2021), Uhlig and Xie (2021) and Benigno et al. (2022). Our paper is most closely related to Cova et al. (2022), Ikeda et al. (2020), Kumhof et al. (2023), Minesso et al. (2022) and Moro and Nispi Landi (2023). We contribute by constructing a model that features all three of (i) asymmetric countries, (ii) endogenous currency substitution, and (iii) a financial sector, providing a rich environment to assess the macro-financial impacts of foreign digital money in small developing economies with bank-based financial systems.[3]

2. Model

The core framework is an NK-DSGE model with financial frictions and foreign funding in the financial sector, following Aoki et al. (2016), along with a stablecoin in the household payment basket. Fig. 1 provides an overview of the model. Our two main innovations are to introduce (i) endogenous currency substitution in domestic households' portfolio decision and (ii) a stablecoin issuer in the foreign economy. This section describes these features; remaining model details are provided in Appendix A.

2.1. Currency substitution

We introduce currency substitution in payment instruments, extending the framework of Özbilgin (2012) to incorporate stablecoins, SC_t. The household values the consumption of a continuum of goods $C_t(j)$ indexed by $j \in [0,1]$, with Leontief-type instantaneous utility from each equal to:

$$U_t = U\left(\min\left\{\frac{C_t(j)}{(1-\omega)j^{-\omega}}\right\}, L_t\right), \quad \omega \in \mathbb{R}_- \tag{1}$$

This implies that the consumption of each good satisfies:

$$\frac{C_t(j)}{(1-\omega)j^{-\omega}} = C_t, \quad j \in [0,1] \tag{2}$$

i.e., j indexes goods by quality—the household consumes more of low-j goods.[4] A share $\bar{j}_t$ of these goods is purchased using domestic cash, and the remainder is purchased using other liquid assets—specifically deposits, foreign cash, and stablecoins, if available.[5] The composite liquidity provided by these other liquid assets is:

$$\Omega(D_t, s_t M^*_{H,t}, s_t P^{sc}_t SC_t) = \Big((1-\mu^{SC}-\mu^D)\left(s_t M^*_{H,t}\right)^\rho + \mu^{SC}\left(s_t P^{sc}_t SC_t\right)^\rho + \mu^D (D_t)^\rho\Big)^{1/\rho} \tag{3}$$

where μ^{SC} and μ^D govern the share of stablecoins, foreign cash and deposits. ρ reflects the substitutability between the those assets. s_t is the real exchange rate. Intuitively, stablecoins provide a differentiated source of foreign-currency liquidity—reflecting, for instance, that their digital form provides greater convenience relative to foreign cash, or that their pseudonymity and decentralization preclude any withdrawal

[2] See, for instance: Andolfatto (2021), Agur et al. (2022), Asimakopoulos et al. (2019), Chang et al. (2023), Banet and Lebeau (2022), Barrdear and Kumhof (2016), Burlon et al. (2022), Chiu et al. (2019), Fernández-Villaverde and Sanches (2019), Jiang and Zhu (2021), Keister and Sanches (2022), Tan (2023b), Sockin and Xiong (2018).

[3] Contemporaneous work by Murakami and Viswanath-Natraj (2025) also includes elements of each of these dimensions, but they model their cryptoasset as a form of deposit at domestic banks, whereas in our model the stablecoin gives households direct access to a foreign asset, in line with widespread concerns that new digital assets could reduce bank intermediation (see, for example, Agur et al., 2022).

[4] Integrating from $j = 0$ to 1 will verify that total consumption in period t is C_t.

[5] Following Henriksen and Kydland (2010) and Özbilgin (2012), we assume the foreign bond and capital are illiquid and cannot be used for purchases.

limits or other regulatory constraints that may inhibit use of foreign currency held in traditional accounts.[6]

Following Freeman and Kydland (2000), the household chooses its distribution of asset holdings at the beginning of each period and maintains it until the beginning of the next. Keeping the proportions constant requires visiting the asset market n_t times at a small cost of κ units of time in each case. Households therefore base their payment decisions on a forward-looking consideration of inflation, exchange rates, interest rates, the price of stablecoins, and the cost of visiting the asset market. They will choose to use liquid assets if, as in Özbilgin (2012):

$$v_t^d R_t^D + v_t^{sc} \frac{P_t^{sc}}{P_{t-1}^{sc}} s_t + (1 - v_t^d - v_t^{sc}) De_t - \frac{n_t \tau \bar{r}_t^k}{C_t(j)} - \Delta_t \geq \frac{1}{\pi_t} \tag{4}$$

where v_t^i is the weight of each asset in the portfolio, De_t is the depreciation of the nominal exchange rate, $\bar{r}_t^k$ is the net return of capital adjusted for adjustment cost and Δ_t corrects for transformation between assets in the non-cash bundle and is independent of the amount of consumption goods purchased using it.

Intuitively, a higher rate of domestic inflation—holding constant the return on deposits, the price of the stablecoin, depreciation and transactions costs—encourages the household to shift away from domestic cash and toward other liquid assets that provide a better store of value.[7] Notably, the larger the purchase size $C_t(j)$—i.e., the higher the value of the good j—the more thinly spread across units of consumption is the fixed transactions cost of paying using liquid assets (reflected in the penultimate term on the left-hand side of Eq. (4)), and hence the greater the substitution away from domestic cash. This framework therefore matches empirical observations, noted in Özbilgin (2012), that in a context of rising inflation, currency substitution begins with foreign currency being adopted as a store of value, then becoming a means of exchange for big-ticket items, and finally being used for progressively smaller and more frequent transactions.

We can therefore define $\bar{j}_t$ as the threshold good, for which Eq. (4) holds with equality and the household is indifferent between payment options. The household's total demands for cash and liquid assets in period t are then:

$$\int_0^{\bar{j}_t} c_t(j)\, dj = n_t \frac{M_t}{P_t} \tag{5}$$

$$\int_{\bar{j}_t}^1 c_t(j)\, dj = n_t \frac{\Omega(D_t, e_t M_{H,t}^*, e_t P_t^{sc} SC_t)}{P_t} \tag{6}$$

Finally, we normalize the time endowment of the household to one unit, which they spend on labor, leisure and trips to the asset market:

$$L_t + H_t + \kappa n_t = 1 \tag{7}$$

2.2. The foreign stablecoin issuer

Building on Cova et al. (2022), the stablecoin issuer sells stablecoins that it produces from foreign cash according to the technology constraint:

$$SC_t^s = M_{SC,t}^* \tag{8}$$

where $M_{SC,t}^*$ is its holdings of USD.[8] The issuer is owned by the foreign household, who maximizes discounted profit in the form:

$$\max E_t \left(\sum_{j=0}^{\infty} \beta^j \frac{\Lambda_{t+j}^*}{\Lambda_t^*} \Omega_{t+j}^{SC} \right) \tag{9}$$

where

$$\Omega_t^{SC^s} = (P_t^{SC} SC_t^s - P_t^{SC} SC_{t-1}^s) - (M_{SC,t}^* - M_{SC,t-1}^*). \tag{10}$$

2.3. Calibration

Here we describe the calibration of the novel elements of our model. Further details on calibration are provided in Appendix B.

Stablecoin. The hypothetical nature of our exercise—exploring the potential macro-financial implications of the as-yet-nonexistent broad adoption of a new asset—precludes estimating the key parameters empirically. Instead, we set the main parameters such that the stablecoin comprises 35% of the non-cash payment portfolio in the steady state. This is less than for deposits but more than for foreign cash.[9] Intuitively, we consider our results to reflect a severe but plausible downside scenario in which foreign stablecoins are widely adopted and play a substantial role in domestic currency payments.

Relative sizes. We consider a small developing economy that is both smaller and poorer than the foreign economy. Specifically, we calibrate total domestic GDP to be approximately one fiftieth of the foreign economy, and the domestic population to be roughly one fifth the size.

3. Results

This section presents the dynamic responses of the economy to two shocks—a domestic productivity shock and a foreign monetary policy shock—and compares the outcomes in scenarios with and without the foreign stablecoin. Appendix C assesses the welfare implications of these shocks, finding that in both cases welfare declines by more after the shock in the world with the stablecoin.

3.1. Domestic TFP shock

First, we assess the impact on the domestic economy of a 1% negative shock to domestic total factor productivity (TFP). The black line in Fig. 2 presents the results under our baseline model without the stablecoin, which are relatively conventional and in line with existing models in the literature. Output falls as a result of the standard negative supply shock, as do both consumption and investment. Inflation rises due to the lower productivity of goods-producing firms. The central bank responds to inflation by raising the policy rate, which causes a recession in the real economy that lowers investment and asset prices.[10] In the banking sector, the negative TFP shock diminishes net worth (a measure of current and future profits) as it pushes down asset prices and increases the credit spread. As the cost of capital rises due to the risk premium, capital demand in the production sector decreases,

[6] In general, while stablecoins and US dollars both function as stores of value and means of payment, they differ on important dimensions that can lead households to hold a mix of both, such as privacy, security, programmability, transaction costs, and interoperability across platforms or borders (e.g., Agur et al., 2022, 2025; Caramichael and Liao, 2022; Jin et al., 2023; Lee, 2021).

[7] Note that foreign inflation is only relevant to the extent that it impacts the exchange rate since the household is concerned with the domestic purchasing power of the foreign currency.

[8] Unlike Cova et al. (2022), we do not include domestic bonds among the backing assets, reflecting that the domestic economy is a small developing country whose assets are not widely included in global reserves.

[9] I.e., we have $\mu^{M*} < \mu^{SC} < \mu^D$ where $\mu^{M*} = 1 - \mu^D - \mu^{SC}$ is the weight of foreign cash in the liquidity bundle. We consider this reasonable and in line with other work modeling a liquidity premium for digital money over cash based on convenience, potential programmability (Lee, 2021), or other opportunities for improvement as adoption and innovation reinforce each other (Cong and Mayer, 2022; Tan, 2023a). Nonetheless, we show in Appendix D that our results also hold under the alternative calibration $\mu^{M*} = \mu^{SC}$.

[10] Lower output and income also reduce imports, improving the trade balance.

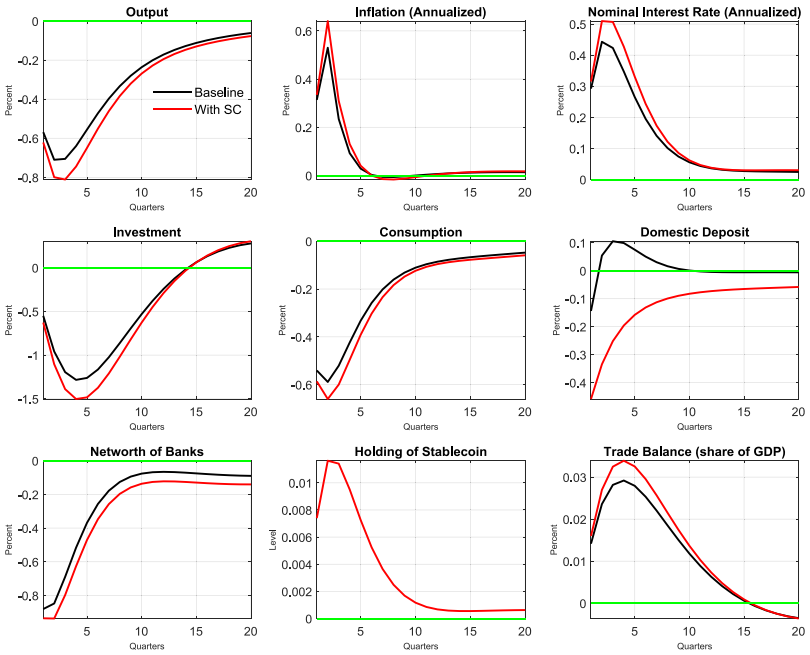

Fig. 2. Responses of selected variables in the domestic economy to a negative 1% TFP shock. Time is in quarters. The black line depicts the model without the stablecoin, and the red line depicts the model with the stablecoin.

exacerbating the decline in investment and asset prices. Additionally, demand for both domestic and foreign deposits falls, reducing domestic and foreign financing channels for the banking sector.

The red line plots outcomes when the stablecoin is available. As highlighted by Cova et al. (2022), households look forward, taking into account the expected stablecoin price for the next period. As a result, households tend to reallocate toward the stablecoin when they expect the price to rise and reallocate away from it when they expect the price to fall (relative to other sources of liquidity). While the price of the stablecoin in US dollars deviates very little, its price in domestic currency deviates substantially as the exchange rate changes, and this anticipation in turn drives households' decisions.

The availability of stablecoins exacerbates the impact of the negative TFP shock. In addition to a somewhat larger slump in output, consumption, and investment, there is a more pronounced decline in domestic cash usage and an increase in stablecoin holdings. This incremental currency substitution is also accompanied by a larger drop in domestic deposits, indicating bank disintermediation that worsens banking sector stress.

3.2. Foreign monetary shock

We now turn to a shock originating from outside the domestic economy. Given the small size of our domestic economy and the trade and financial linkages between countries, fluctuations in the larger economy take on particular significance, in line with the wide literature on the global financial cycle (e.g., Rey, 2013; Miranda-Agrippino and Rey, 2020).

Fig. 3 shows the responses to a contractionary shock in the foreign interest rate. The shock triggers a decline in domestic output. As the appeal of the domestic currency declines, the real exchange rate depreciates, bolstering exports through an expenditure-switching effect and supporting aggregate demand. However, the depreciation of the exchange rate also prompts an increase in the inflation rate by elevating the prices of imported goods. The central bank responds to these inflationary pressures by raising interest rates, which, in turn, boosts savings and reduces consumption. Although higher inflation helps alleviate the real burden of debt denominated in the home currency, the resulting deterioration in bank balance sheets and the decline in investment and asset prices (Tobin's Q) echo the findings of Kiyotaki and Moore (1997) and Gertler and Karadi (2015).

We observe a substantially larger spillover effect to the domestic economy when the stablecoin is available. Since it can be traded among three agents—domestic households, foreign households, and issuers—its availability strengthens the connection between the two economies. Importantly, the first order condition for the household's stablecoin holdings also involves the exchange rate, creating an additional cross-border transmission channel. The responses of output, consumption, and investment become more pronounced compared to the scenario without stablecoins. As highlighted by Minesso et al. (2022) for foreign central bank digital currencies (CBDCs), introducing this new digital asset adds a novel arbitrage condition that intertwines the domestic interest rate, the exchange rate, and the trajectory of stablecoin prices. This effect is reflected mainly in the first-order conditions on the household side. Deposits decline more in response to the foreign shock, and the domestic banking sector undergoes a period of stress, as evidenced by lower net worth. Meanwhile, holdings of the stablecoin decrease, indicating that the drop in consumption outweighs the substitution effect among payment tools.

4. Conclusion

We develop a large two-country DSGE model to examine the macro-financial implications of a foreign stablecoin for a small developing economy. We find that the presence of the stablecoin can amplify currency substitution by providing an additional asset through which domestic households can diversify away from the domestic currency. Bank intermediation declines and monetary policy transmission weakens further, exacerbating the impacts of recessionary shocks and increasing stress in the banking sector. For a shock originating abroad, we find that the presence of the stablecoin can intensify spillover effects from the foreign economy onto the domestic economy by creating an additional transmission channel, in a magnified form of the findings of Minesso et al. (2022) for a foreign central bank digital currency with near-symmetric economies.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.econlet.2025.112458.

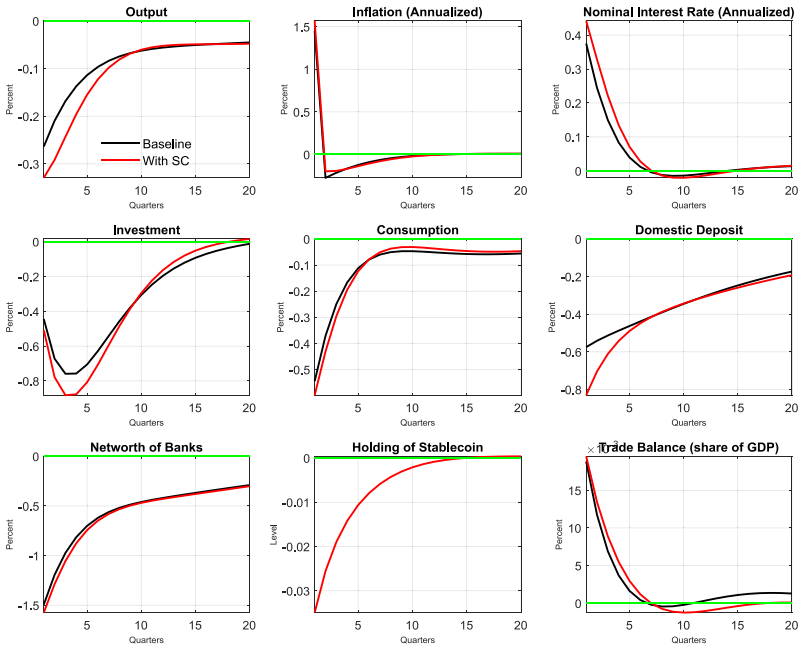

Fig. 3. Responses of selected variables in the domestic economy to a contractionary foreign monetary policy shock. Time is in quarters. The black line depicts the model without the stablecoin, the red line depicts the model with the stablecoin.

Data availability

Data will be made available on request.

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