Stablecoins vs. Tokenized Deposits: The Narrow Banking Debate Revisited.*

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Abstract

We study how the type of money used in blockchain-based trade affects interest rates, investment, and welfare. Stablecoins in our model are backed by safe assets, while banks issue deposits (both traditional and tokenized) to fund a portfolio of safe and risky assets. Deposit insurance creates a risk-shifting incentive for banks, and regulation increases banks' costs. If regulatory costs are large and risk-shifting is limited, we show that allowing only tokenized deposits to be used in crypto trade raises welfare by expanding bank credit. If regulation is lighter and the risk-shifting incentive is strong, in contrast, allowing only stablecoins is desirable despite crowding out credit. In between these cases, allowing stablecoins and tokenized deposits to compete is optimal. The tradeoffs between these policies are reminiscent of both historical and recent debates over the desirability of narrow banking.

Keywords: Stablecoins; Money Creation; Narrow Banking, Bank Regulation

JEL Codes: E42, G21, G28

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1 Introduction

As blockchain-based economic activity has developed in recent years, demand has grown for a blockchain-native or "tokenized" form of money denominated in a traditional unit of account, especially the U.S. dollar. A number of so-called stablecoins have emerged to play this role, and the market capitalization of these stablecoins exceeded $300 billion in November 2025. The rise of this new form of money has sparked a debate about how it should be created. What type of entities should issue tokenized money, and what assets should back their liabilities? We examine these questions using a dynamic general equilibrium model of money and exchange that highlights similarities between this current policy issue and historical debates in money and banking.

Some people argue that the new, tokenized money should be issued by specialized intermediaries and backed 100% by cash and short-term government bonds. For example, Jon Cunliffe, then Deputy Governor of the Bank of England, said "stablecoins will need to be backed with high quality and liquid assets ... [such as] deposits at the Bank of England or very highly liquid securities" (Cunliffe, 2023). Others argue that the demand for tokenized money should instead be met by commercial banks. Banks could issue a tokenized form of deposits to fund a portfolio of loans and securities in much the same way as they do with traditional bank deposits. Proponents of this view emphasize that banks promote the flow of credit in a way that stablecoins do not. Garratt et al. (2022), for example, argue that tokenized deposits are a better solution because they "support bank lending to the real economy and the transmission of monetary policy."

While the demand for blockchain-native money is new, the debate about how money should be created and what assets should back the supply of money has a long history. The comparison between stablecoins and tokenized bank deposits is, in many ways, a modern version of the narrow-banking debate. The argument that tokenized money should be required to take the form of stablecoins that are backed 100% by cash-like reserves resembles the Chicago Plan for banking reform of the 1930s, which advocated separating money from the process of credit creation.[1] This idea gained traction again following the global financial crisis of 2008; see, for example, Chamley et al. (2012) and Pennacchi (2012). Opponents of a narrow-banking requirement have argued that it would disrupt the flow of credit in the economy. They often advocate for focusing instead on policies that ensure the safety of bank deposits, including reforms to bank regulation and deposit insurance. Current arguments in favor of allowing banks to issue tokenized deposits echo this view.

[1] Classic references for the Chicago Plan include Simons (1933), Fisher (1936), and Douglas et al. (1939).

Arguments that tokenized money should be created *only* by traditional, credit-granting banks have a more recent parallel. In 2015, the Safe Deposit Bank of Norway (SDBN) began accepting deposits from customers and holding 100% cash reserves at the Norges Bank, Norway's central bank. In 2021, however, the Norges Bank announced that full reserve banks will no longer to allowed to hold accounts with it (Norges Bank, 2022, Section 8.2), and SDBN ceased operation. In the U.S., a state-chartered bank called TNB ("The Narrow Bank") aimed to use a similar business model, but its request for a master account at the Federal Reserve was denied. Among the concerns expressed by policymakers was the possibility that competition from narrow banks would undermine traditional banks' ability to provide credit to the real economy.[2] These episodes demonstrate that the effect of "narrow" types of money on credit provision is an important policy concern.[3]

In this paper, we study how the type of money used in blockchain-based transactions – stablecoins vs. tokenized deposits – affects trade, investment, and welfare using a New Monetarist model in the tradition of Lagos and Wright (2005).[4] Our model builds most directly on the setup in Keister and Sanches (2023), where bank deposits backed by private investment serve as a medium of exchange. We modify the environment by making this investment risky and allowing banks to also hold risk-free storage. We also introduce stablecoin issuers who can create a competing medium of exchange backed fully by goods in storage. Households engage in two types of decentralized trade: traditional and blockchain-based (or *crypto*). In traditional trade, a buyer must pay using a deposit issued by a bank. Our focus is on what type of money is used in crypto trade.

We begin our analysis with a positive question: if both stablecoins and tokenized deposits are available, which type of money will be used in equilibrium? As a first step, we study a special case of the model where investment is risk-free. We establish a neutrality result for this case: there is often a continuum of equilibria with different compositions of stablecoins and tokenized deposits but with the same consumption allocation. In the absence of additional frictions, the type of money used in crypto trade is irrelevant.

We then return to the general setting where investment is risky and some banks may

[2] For example, the Federal Reserve Board expressed concern that allowing a narrow bank to operate could "disrupt financial intermediation" and "diminish the availability of funding for commercial banks generally" (Federal Reserve System, 2019).

[3] While we emphasize the similarities between the policy issues related to stablecoins and narrow banks, there are important differences as well. The operation of narrow banks in the traditional financial and payment system raises concerns that are outside of the scope of our analysis, including for financial stability and monetary policy implementation.

[4] For an introduction to this literature, see Williamson and Wright (2010a), Williamson and Wright (2010b), and Lagos et al. (2017).

fail. Deposits are insured by the government, which allows them to be used for trade in all states. Deposit insurance creates a risk-shifting incentive, however, and encourages banks to fund too much risky investment. In response, the government introduces regulations that act as a tax on a bank's size. We interpret this tax as representing a range of policies that increase banks' cost of issuing deposits and expanding their asset holdings, including capital requirements, leverage restrictions, and deposit insurance premia. Stablecoins, in contrast, are backed by safe assets and do not require insurance or regulation.

With these frictions, the composition of money used in crypto trade between stablecoins and deposits matters for equilibrium allocations. We show that the form of the equilibrium depends critically on the regulatory cost faced by banks. When this cost is sufficiently high, only stablecoins are used in crypto trade. Both stablecoins and tokenized deposits are used in equilibrium when this cost is in an intermediate range, and only tokenized deposits are used when the cost is sufficiently low. The answer to our positive question thus depends on how banks are regulated. Tokenized deposits are used more when the cost of creating deposits is low, and stablecoins are used more when the cost of creating deposits is high.

Our normative analysis asks what types of tokenized money should be allowed. The baseline policy described above allows stablecoins and deposits to compete. We consider two alternatives. In the first, only banks are allowed to issue tokenized money. This policy is equivalent to subjecting stablecoin issuers to the same regulatory costs as banks, which makes stablecoins redundant. If stablecoins are used under the baseline policy, a deposits-only policy leads banks to expand and fund more risky investment. The equilibrium interest rate on deposits falls, which decreases both traditional and crypto trade. Whether this policy raises or lowers welfare depends, in part, on the social rate of return to the additional investment that banks fund. We show that the policy can raise welfare if banks' risk-shifting incentive is small and regulatory costs are in a moderate range. In this case, our model bears out the concern that allowing stablecoins to compete with banks leads to a decline in credit that makes the economy worse off.

The second alternative is to impose narrow banking for tokenized money, meaning only stablecoin issuers can create it. If tokenized deposits are used under the baseline policy, either alone or together with stablecoins, a stablecoins-only policy leads to a higher interest rate on traditional deposits and an increase in traditional trade. At the same time, however, total deposits decrease and banks fund fewer risky projects. The desirability of this policy depends on the social return to the investment banks no longer fund. We show that a stablecoins-only policy can raise welfare if banks' risk-shifting incentive is large and regulation is light. In this case, banks tend to overinvest in risky projects, and imposing narrow banking for tokenized money is desirable even though it crowds out bank-financed investment.

In between these two cases, the optimal policy is to allow stablecoins and tokenized deposits to compete. In these situations, the interest rate on deposits would be inefficiently low if stablecoin issuers were not allowed to operate. Because these issuers can efficiently intermediate safe assets into a medium of exchange, allowing them to compete raises the interest rate on deposits and decreases the incentive for banks to fund lower-return projects. At the same time, allowing banks to issue tokenized deposits enables them to fund some higher-return projects.

Our analysis draws on the parallels between the current policy debate and historical debates over narrow banking, but it also highlights an important difference: the scope of the reform. Traditional narrow-banking proposals, such as the Chicago Plan, applied to the entire banking system, meaning no institution would be allowed to both issue deposits and make loans. The current debate, in contrast, covers only the tokenized money used for blockchain-based transactions. Requiring stablecoins to be backed entirely by safe assets does not eliminate banks' ability to create credit, since they can still issue traditional deposits. In our model, this limited scope makes narrow banking policies relatively more attractive in the crypto context than in traditional form.

With this insight in mind, we ask how our results change if blockchain-based trade becomes a larger part of the economy. We consider two scenarios. One possibility is that trading shifts from traditional to blockchain-based. In this substitution-of-trade scenario, we show that the growth of crypto makes tokenized deposits more important. Because the demand for traditional deposits shrinks, banks are better able to compete with stablecoins in providing tokenized money. In the other scenario, blockchain-based trading increases while traditional trading remains unchanged. In this expansion-of-trade scenario, stablecoins become more important. As the total demand for money increases, it becomes costlier for banks to meet a given fraction of this demand, which pulls more stablecoins into the market.

The GENIUS Act in the U.S. and the Markets in Crypto-Assets (MiCA) Regulation in Europe each create a legal framework for payment stablecoins similar to those in our model, but with some differences. For example, these frameworks will allow (or require) stablecoins to hold bank deposits in addition to safe assets such as government debt. To the extent that banks back the deposits of stablecoin issuers with safe assets, our results would be largely unchanged. If these deposits are instead used to fund loans, the stablecoins in practice would be a hybrid of the stablecoins and deposits in our model. Our approach follows the classic work of Gurley and Shaw (1960) in emphasizing that aggregate outcomes depend on the assets that ultimately back money rather than the type of institution issuing the money. As long as stablecoins are backed more heavily by government debt and deposits are used more to fund credit, the tradeoffs highlighted in our model will be important in practice.

Related literature. The literature on the economics of stablecoins and of tokenized money more broadly is growing rapidly.[5] Our paper lies in the branch of this literature that uses dynamic general equilibrium models to study the impact of different types of money. It is closely related to Chiu and Monnet (2024), who study how a central bank digital currency (CBDC) would interact with stablecoins. They showed that a privacy-preserving CBDC would crowd out stablecoins, but a CBDC that offers less privacy could increase the use of (or "crowd in") stablecoins. Chiu et al. (2025) extend this framework to study whether a CBDC should be tokenized or used only for traditional exchange. They demonstrate how the policy choices for the crypto sector can spill over to the traditional banking system when the same collateral is used to back tokenized money and traditional deposits. The stablecoins in our model are privately issued, but a CBDC backed by safe assets would raise similar issues.[6] Rather than focusing on privacy or scarce collateral, however, we show how the best policy depends on the cost of creating deposits and the incentive to invest in risky projects.

Williamson (2024) also connects the policy issues surrounding stablecoins to the narrow banking debate. Our model has many similarities to his, but key differences that lead to distinct – and sometimes opposite – policy conclusions. In his model, deposit insurance is structured in a way that does not distort banks' incentives and, as a result, imposing narrow banking is never optimal. In our setting, a stablecoins-only policy is optimal precisely when banks' incentives are sufficiently distorted. Another key difference is that Williamson (2024) studies narrow banking for the entire economy, whereas we consider stablecoins/narrow banking only in tokenized transactions. As discussed above, this more limited scope can make narrow banking policies relatively more attractive in our model. Gorton and Zhang (2023) also focus on historical connections; they emphasize the similarities between stablecoins and nineteenth century bank notes and derive implications for the current debate.

[5] For interesting overviews, see Baughman et al. (2022), who describe the different types of stabilization mechanisms used by stablecoins, and Bank for International Settlements (2025), which offers a broad overview of tokenization and discusses some shortcomings of stablecoins as a form of money.

[6] For studies of how CBDC affects equilibrium in related settings, see Andolfatto (2021), Chiu et al. (2023), Cheng and Izumi (2025), Keister and Sanches (2023), Niepelt (2024), and Piazzesi and Schneider (2022), among others.

2 The model

In this section, we describe the environment of our model. We introduce risky investment and safe storage into the framework in Keister and Sanches (2023), which follows the tradition of Lagos and Wright (2005), Lagos and Rocheteau (2009), and many others. We also introduce competitive stablecoin issuers, and we derive the demand for and supply of money.

2.1 Environment

Time and commodities. Time is discrete and unbounded, with periods denoted by $t = 0, 1, 2, \ldots$. Each period has two subperiods with distinct perishable consumption goods. The first subperiod features a frictionless centralized market (CM) in which all agents can trade, while the second subperiod has a decentralized market (DM) with bilateral trade.

There are four types of private agents: buyers, sellers, bankers, and stablecoin issuers, in addition to a government. We describe each of these agents below.

Buyers and sellers. A measure 1 each of buyers and sellers are infinitely-lived and have a common discount factor β. Buyers value consumption in both subperiods and can produce the CM good using labor, but cannot produce in the DM stage. A buyer's period utility is

$$U^b(x_t^b, q_t) = x_t^b + u(q_t),$$

where $x_t^b \in \mathbb{R}$ denotes net consumption of the CM good in period t and $q_t \in \mathbb{R}_+$ denotes consumption of the DM good. The function $u : \mathbb{R}_+ \to \mathbb{R}_+$ is strictly increasing, strictly concave, and continuously differentiable, with $u(0) = 0, u'(0) = \infty$, and $u'(\infty) = 0$. A seller values consumption in the CM, but not in the DM, and can produce both goods using labor. Their period utility is

$$U^s(x_t^\ell, q_t) = x_t^\ell - w(q_t),$$

where $x_t^\ell \in \mathbb{R}$ is net consumption of the CM good and $q_t \in \mathbb{R}_+$ is production of the DM good. The function $w : \mathbb{R}_+ \to \mathbb{R}_+$ is strictly increasing, convex, and continuously differentiable, with $w(0) = 0$.

In the DM stage, anonymity and limited-commitment frictions make a medium of exchange essential for trade. This medium of exchange must have different characteristics in different types of meetings. A measure λ_1 of buyers and sellers are matched in a type 1 (*traditional*) meeting where the only medium of exchange that can be used is a bank deposit. A measure λ_2 of buyers and sellers are matched in a type 2 (*crypto*) meeting where a blockchain-native form of money must be used, which could be either a tokenized deposit or a stablecoin.[7] The remaining $1 - \lambda_1 - \lambda_2$ measure of buyers and sellers are not matched and do not trade. A buyer learns whether she will be matched with a seller and the type of meeting before making her portfolio choice in the CM stage.

Bankers. A mass $\eta > 0$ of risk-neutral bankers is born in each CM and lives until the following-period CM. Bankers participate only in the CM stage and consume only when old. At birth, a banker has no endowment but has access to a set of non-tradable, risky projects indexed by j.[8] Each project requires one unit of the CM good as input to operate. Project j generates output γ_j with probability $1 - \pi$ in the following-period CM. With probability $\pi \geq 0$, the project fails and generates zero output. A banker has access to a continuum of projects, one with each return $\gamma_j \in [0, \bar{\gamma}]$. We assume $(1 - \pi)\bar{\gamma} > \beta^{-1}$, meaning that some projects are socially efficient to operate, while others with lower returns are not. A banker's projects are perfectly correlated: either all succeed or all fail. This realization is independent across bankers, so a fraction π of bankers will fail in each period. The failure of a banker's projects is publicly observed before trade takes place in the DM. A banker can also invest in a risk-free storage technology with rate of return $1 + r^B$. We assume $1 + r^B < \beta^{-1}$ to capture the idea that safe assets are scarce and therefore have a low real return.

A young banker has no resources but can finance risky projects and safe assets by issuing deposits in the CM stage. A banker can issue *traditional deposits* that serve as a medium of exchange in type 1 meetings and *tokenized deposits* that can be used in type 2 meetings. Bankers are price-takers in the deposit market, and $1 + r_t^D$ denotes the gross interest rate on both types of deposit. A banker maximizes old-age consumption, which we denote x_t^k.

Stablecoin issuers. A measure 1 of competitive stablecoin issuers is also born in each CM and lives until the following-period CM. Like bankers, a stablecoin issuer has no endowment, participates only in the CM, and consumes only in old age. These issuers do not have access to risky projects, but can invest in risk-free storage by issuing interest-bearing stablecoins that serve as a medium of exchange in type 2 meetings. Issuers take the market interest rate on stablecoins, denoted $1 + r_t^S$, as given, and maximize old-age consumption, denoted x_t^s.

[7] Our approach of assuming some trades require a blockchain-native form of money follows Chiu and Monnet (2024) and Chiu et al. (2025), who describe these trades as featuring tokenized assets such as NFTs, decentralized services like cloud storage, or decentralized finance (DeFi) trading.

[8] As in Keister and Sanches (2023) and others, a banker here represents a combination of a depository institution and the productive firms that are funded by that institution.

Because stablecoin issuers are competitive and have a constant-returns-to-scale technology, this consumption will be zero in equilibrium.

Government. The government insures all bank deposits. A banker's portfolio must cover the promised payments to depositors (with interest) in the event their projects succeed. If a banker's projects fail, the government takes over the bank and uses the return from its storage plus lump-sum taxes collected in the CM as needed to repay the bank's depositors with interest. Deposit insurance is useful in our environment because it allows bankers to invest in risky projects while preventing DM trade from declining when those projects fail. However, it also distorts bankers' incentives and creates a role for regulation. We assume the government taxes banks at rate $\theta \geq 0$. Specifically, a banker whose projects succeed must pay a tax equal to a fraction θ of their total deposits (plus interest). We focus on $\theta < (\beta\bar{\gamma}-1)$, which implies the highest-return projects remain profitable for banks to operate. Stablecoin issuers do not invest in risky projects and, therefore, are not subject to the regulatory tax in our baseline policy. The government collects a lump-sum tax/transfer τ_t from buyers in the CM to balance its budget in each period.

Allocation and welfare. For discussions of the optimal policy in Section 5, we measure welfare using an equal-weighted sum of all agents' utilities. Aggregate welfare is, therefore, the discounted sum of total net CM consumption plus the gains from DM trade in each period,

$$\sum_{t=0}^{\infty} \beta^t \left\{ X_t + \lambda_1 \left[u(q_t^1) - w(q_t^1) \right] + \lambda_2 \left[u(q_t^2) - w(q_t^2) \right] \right\}. \tag{1}$$

where

$$X_t \equiv x_t^b + x_t^\ell + \eta x_t^k + x_t^s.$$

Feasibility of an allocation requires the net consumption of all agents in the CM to be no greater than the net output of investment in projects and storage in each period. We focus on symmetric allocations in which all bankers operate only those projects whose return is above a common cutoff $\hat{\gamma}_t$ in period t. Since a fraction $1-\pi$ of bankers will have successful projects, feasibility in period t requires

$$X_t \leq (1-\pi)\eta \int_{\hat{\gamma}_{t-1}}^{\bar{\gamma}} \gamma d\gamma + (1+r^B)(\eta b_{t-1}^k + b_{t-1}^s) - \eta \left[(\bar{\gamma} - \hat{\gamma}_t) + b_t^k \right] - b_t^s. \tag{2}$$

The right-hand side of this equation is the output from successful projects and matured storage in the current period minus investment in new projects and storage. It is clear from equations (1) and (2) that the distribution of CM consumption across agents does not affect welfare due to quasi-linear preferences. We therefore summarize an allocation by the sequence of DM consumption levels $\{q_t^1, q_t^2\}$, bankers' investment thresholds $\{\hat{\gamma}_t\}$, and safe asset holdings $\{b_t^k, b_t^s\}$ of bankers and stablecoin issuers.

2.2 Money demand

CM Portfolio choice. The problem facing a buyer in our model is standard. In the CM stage of each period, the buyer chooses a portfolio of money that will be used as a medium of exchange in the subsequent DM stage. Let $\mathbf{m} \equiv (d, s) \in \mathbb{R}_+^2$ denote the buyer's portfolio, where d is her bank deposit and s is her stablecoin holdings. The per-unit cost of acquiring each asset type is measured in the CM good and is set at one. We use $\mathbf{1} + \mathbf{r_t} \equiv \left(1 + r_t^D, 1 + r_t^S\right)$ to denote the vector of the real returns on deposits and stablecoins, respectively, that are issued in period t.

Let $V_t^i(\mathbf{m})$ denote the value function for a buyer entering the period-t CM holding portfolio $\mathbf{m}$, where $i = 1$ indicates the buyer will be in a traditional match in the subsequent DM, $i = 2$ indicates she will be in a crypto match, and $i = n$ indicates she will not be matched. The buyer's Bellman equation is

$$V_t^i(\mathbf{m}) = \max_{(x^i, \mathbf{m}') \in \mathbb{R} \times \mathbb{R}_+^2} \left[x^i + u\left(q_t^i(\mathbf{m}')\right) + \beta V_{t+1}\left(\mathbf{m}' - \mathbf{h_t^i}(\mathbf{m}')\right) \right]$$
$$\text{s.t. } x^i + \mathbf{p} \cdot \mathbf{m}' = (\mathbf{1} + \mathbf{r_{t-1}}) \cdot \mathbf{m} - \tau_t,$$

where $q_t^i(\mathbf{m}') \geq 0$ denotes the buyer's consumption of the DM good, $\mathbf{h_t^i}(\mathbf{m}') \in \mathbb{R}_+^2$ denotes her DM expenditure out of her vector of money holdings $\mathbf{m}'$, $\mathbf{p} \equiv (1, 1)$, and τ_t denotes the lump-sum tax. The function $V_{t+1}(\mathbf{m})$ on the right-hand side is the expected value of entering the CM stage before knowing whether she will meet a seller in the DM stage in the following period and the type of meeting, which is given by

$$V_{t+1}(\mathbf{m}) = \lambda_1 V_{t+1}^1(\mathbf{m}) + \lambda_2 V_{t+1}^2(\mathbf{m}) + (1 - \lambda_1 - \lambda_2) V_{t+1}^n(\mathbf{m}).$$

As is standard, quasi-linearity of buyers' preferences implies that this value function is linear in real money balances $\mathbf{m}$.

DM Bargaining. In a DM meeting, the buyer makes a take-it-or-leave-it offer to the seller. Using the linearity of V_{t+1}, this offer will solve

$$\begin{aligned} \max_{(q^i,\mathbf{h^i})\in\mathbb{R}^3_+} & [u(q^i) - \beta(\mathbf{1}+\mathbf{r_t})\cdot\mathbf{h^i}] \\ \text{s.t.} & \; -w(q^i) + \beta(\mathbf{1}+\mathbf{r_t})\cdot\mathbf{h^i} \geq 0 \\ & \mathbf{h^i} \leq \mathbf{f^i}(\mathbf{m}). \end{aligned}$$

The first constraint ensures the matched seller's participation. The second is the buyer's liquidity constraint, where the function $\mathbf{f^i}$ requires the buyer to pay with assets that can be used in this type of meeting. In a type 1 meeting, only bank deposits can be used, and we have $\mathbf{f^1}(\mathbf{m}) = (d, 0)$. In this section and the next, we allow both types of money to be used in a type 2 meeting: $\mathbf{f^2}(\mathbf{m}) = (d, s)$. In Section 5, we consider cases where legal restrictions are placed on $\mathbf{f^2}(\mathbf{m})$ that require either deposits or stablecoins to be used. We set $\mathbf{f^n}(\mathbf{m}) = (0, 0)$ to ensure that a buyer who is not matched is unable to consume the DM good.

Let q^* denote the first-best level of production in the DM stage, which solves $u'(q^*) = w'(q^*)$. The solution to the bargaining problem is then

$$q^i_t(\mathbf{m}) = \begin{cases} w^{-1}\left(\beta(\mathbf{1}+\mathbf{r_t})\cdot\mathbf{f^i}(\mathbf{m})\right) & \text{if } (\mathbf{1}+\mathbf{r_t})\cdot\mathbf{f^i}(\mathbf{m}) < \frac{w(q^*)}{\beta} \\ q^* & \text{otherwise} \end{cases} \tag{3}$$

and

$$(\mathbf{1}+\mathbf{r_t})\cdot\mathbf{h^i_t}(\mathbf{m}) = \begin{cases} (\mathbf{1}+\mathbf{r_t})\cdot\mathbf{f^i}(\mathbf{m}) & \text{if } (\mathbf{1}+\mathbf{r_t})\cdot\mathbf{f^i}(\mathbf{m}) < \frac{w(q^*)}{\beta} \\ \frac{w(q^*)}{\beta} & \text{otherwise.} \end{cases}$$

If the value of the buyer's real money balances are large enough to induce efficient production of the DM good by the seller, the first-best level of trade occurs. If not, the buyer spends all of her money, and the seller produces an amount smaller than q^*.

Given this solution of the bargaining problem, a type i buyer's portfolio problem in the CM stage can be simplified to

$$\max_{\mathbf{m'}\in\mathbb{R}^2_+} \quad -\mathbf{p}\cdot\mathbf{m'} + u\big(q^i_t(\mathbf{m'})\big) + \beta(\mathbf{1}+\mathbf{r_t})\cdot\big(\mathbf{m'} - \mathbf{h^i_t}(\mathbf{m'})\big). \tag{4}$$

Recall that the buyer knows whether she will meet a seller in the following DM and the type of match. The slope of the objective function in equation (4) with respect to a given type of money depends not only on whether the seller accepts the money but also on whether the buyer is liquidity constrained. As is standard, we define the function $L : \mathbb{R}_+ \to \mathbb{R}_+$ as

$$L(x) = \max\left\{\frac{u'\big(w^{-1}(\beta x)\big)}{w'\big(w^{-1}(\beta x)\big)}, 1\right\}.$$

This function measures the expected benefit of holding an extra unit of spendable money. If the buyer's current money balances x are below $\beta^{-1}w(q^*)$, they are insufficient to purchase the efficient quantity q^*. In this case, increasing x will allow the buyer to consume more in the DM, and the first term in the max operator is the marginal increase in her utility. If she already has enough money to purchase q^*, she holds the extra until the subsequent CM.

Demand. Using the L function, we can characterize buyers' money demand. For a buyer entering a traditional match, we have $\mathbf{f^1}(\mathbf{m}) = (d, 0)$. The buyer's demand in this case is characterized by the first-order condition

$$L\left((\mathbf{1} + \mathbf{r_t}) \cdot \mathbf{f^1}(\mathbf{m})\right) = L\big((1 + r_t^D)d_t^1\big) = \frac{1}{\beta\,(1 + r_t^D)}. \tag{5}$$

If $1 + r_t^D < \beta^{-1}$, we can solve this equation for a traditional buyer's demand for deposits,

$$d_t^1 = \frac{L^{-1}\left(\frac{1}{\beta(1+r_t^D)}\right)}{1 + r_t^D} \equiv \mathcal{D}\left(1 + r_t^D\right). \tag{6}$$

We assume preferences are such that $xL(x)$ is strictly increasing in x, which implies that this demand is strictly increasing in the rate of return up to β^{-1}.[9] Quasilinear utility implies that a buyer is willing to hold additional deposits in any quantity if the return equals β^{-1}. We use $\mathcal{D}(\cdot)$ to denote a buyer's entire demand correspondence, including this vertical segment.

A buyer entering a crypto match can pay with any combination of deposits and stablecoins, that is, $\mathbf{f^2}(\mathbf{m}) = (d, s)$. It is straightforward to see from the portfolio problem in equation (4) that she will choose to hold whichever form of money offers a higher return. If $1 + r_t^D > 1 + r_t^S$, a crypto buyer holds only tokenized deposits and her demand functions are

$$d_t^2 = \mathcal{D}\left(1 + r_t^D\right) \qquad \text{and} \qquad s_t = 0. \tag{7}$$

[9] If $u(q)$ is CRRA and $w(q)$ is linear, as in our examples below, this assumption holds if and only if the coefficient of relative risk aversion is less than 1, which implies that the substitution effect of a change in the interest rate dominates the income effect.

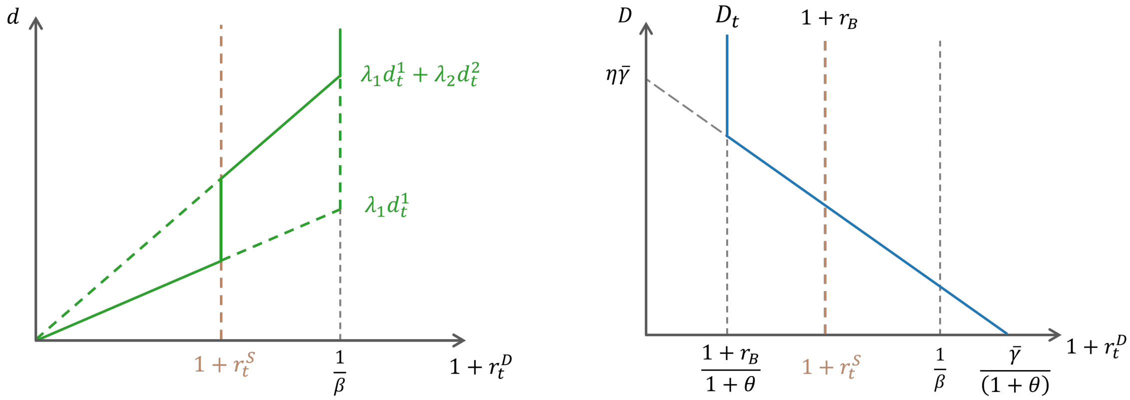
If $1+r_t^D < 1+r_t^S$, a crypto buyer only holds stablecoins her demands are

$$d_t^2 = 0 \qquad \text{and} \qquad s_t = \mathcal{D}\left(1+r_t^S\right). \tag{8}$$

If $1+r_t^D = 1+r_t^S$, a crypto buyer is indifferent as to the composition of her portfolio and holds any mixture of tokenized deposits and stablecoins satisfying

$$d_t^2 + s_t = \mathcal{D}\left(1+r_t^S\right). \tag{9}$$

Figure 1(a) depicts the total demand for deposits for a given stablecoin interest rate $1+r_t^S$. When the deposit rate is below the stablecoin rate, this demand comes only from the measure λ_1 of type 1 buyers. When the deposit rate is higher than the stablecoin rate, this demand comes from both types of buyers. The demand curve has a vertical segment when the two rates are equal, reflecting the indifference of type 2 buyers between stablecoins and tokenized deposits.



(a) Buyers' demand for deposits

(b) Bankers' supply of deposits

Figure 1: Deposit demand and supply

2.3 Money supply

Deposits. A banker born in period t chooses a quantity of deposits to issue D_t and an asset portfolio consisting of risky projects and safe storage. The investment decision is summarized by a threshold $\hat{\gamma}_t$ such that the banker operates all projects with return $\gamma_j \geq \hat{\gamma}_t$. A banker will make these choices to solve

$$\max_{\left\{\hat{\gamma}_t, b_t^k, D_t\right\}} (1-\pi)\left\{\int_{\hat{\gamma}_t}^{\bar{\gamma}} \gamma \, d\gamma + (1+r^B)b_t^k - (1+r_t^D)(1+\theta)D_t\right\} + \pi \cdot 0$$

$$\text{s.t.} \qquad D_t = (\bar{\gamma} - \hat{\gamma}_t) + b_t^k.$$

As the objective function indicates, the banker's projects succeed with probability $1-\pi$ and her consumption in this case is the difference between the return on her assets and payments to depositors plus the regulatory tax. With probability π, the banker's projects fail and her consumption is zero due to limited liability.

The solution to this problem sets

$$\hat{\gamma}_t = (1+\theta)(1+r_t^D) \tag{10}$$

and

$$b_t^k = \begin{cases} 0 & \text{if } 1+r_t^D > \frac{1+r^B}{1+\theta} \\ \in [0,\infty) & \text{if } 1+r_t^D = \frac{1+r^B}{1+\theta}. \end{cases} \tag{11}$$

A banker will operate any project whose return exceeds the cost of deposits, including the regulatory tax, and is willing to hold storage when its return meets this threshold. If $1+r_t^D < (1+r^B)/(1+\theta)$, the problem has no solution; this pattern of rates clearly cannot hold in equilibrium.

All bankers face the same decision problem and, therefore, choose the same threshold $\hat{\gamma}_t$ and safe asset holdings b_t^k. The aggregate supply of deposits is then

$$D_t = \begin{cases} \eta\big(\bar{\gamma} - (1+\theta)(1+r_t^D)\big) & \text{if } 1+r_t^D > \frac{1+r^B}{1+\theta} \\ \in \big[\eta\big(\bar{\gamma} - (1+\theta)(1+r_t^D)\big), \infty\big) & \text{if } 1+r_t^D = \frac{1+r^B}{1+\theta} \end{cases} \tag{12}$$

The blue curve in Figure 1(b) depicts this aggregate supply of deposits. As the deposit rate decreases, more projects meet the threshold identified in equation (10) and, therefore, banks create more deposits. When the deposit rate is sufficiently low, banks become willing to intermediate safe assets into deposits at any scale and the supply of deposits becomes vertical, as shown in the figure.

Stablecoins. A stablecoin issuer takes the market interest rate on coins $1+r_t^S$ as given and is not subject to the regulatory tax θ. It chooses its size to solve

$$\max_{b_t^s, S_t} \; (1+r^B)b_t^s - (1+r_t^S)S_t$$
$$\text{s.t.} \qquad S_t = b_t^s. \tag{13}$$

The solution to this problem sets

$$S_t = \begin{cases} 0 & \text{if } 1 + r_t^S > 1 + r^B \\ \in [0, \infty) & \text{if } 1 + r_t^S = 1 + r^B. \end{cases} \tag{14}$$

The supply of stablecoins is perfectly elastic at the return on storage. In equilibrium, the interest rate on stablecoins equals this return, and stablecoin issuers earn zero profit. When the regulatory tax θ on banks is positive, this return is higher than the deposit rate at which banks are willing to intermediate safe assets into deposits, as shown in Figure 1(b).

2.4 Government budget constraint

In each CM, a fraction π of the mass η of bankers have unsuccessful projects, fail, and are taken over by the government. The government repays their depositors with interest, which costs $(1 + r_t^D)D_t$ per bank for the deposits issued in period t. The government collects the matured storage $(1 + r^B)b_t^k$ from the failed banks. It also collects a tax $\theta(1 + r_t^D)D_t$ from each surviving bank. It balances its budget in period $t + 1$ by collecting a tax τ_{t+1} from each buyer in the CM equal to

$$\tau_{t+1} = \pi\eta\big((1 + r_t^D)D_t - (1 + r^B)b_t^k\big) - \eta(1 - \pi)\theta(1 + r_t^D)D_t.$$

If $\tau_{t+1} < 0$, buyers receive a transfer from the government.

2.5 Market clearing and equilibrium

An equilibrium is a sequence of interest rates $\left\{r_t^D, r_t^S\right\}_{t=0}^{\infty}$ together with quantities of DM trade $\{q_t^1, q_t^2\}$ and portfolio choices for buyers $\{d_t^1, d_t^2, s_t\}$, bankers $\{D_t, \hat{\gamma}_t, b_t^k\}$ and stablecoin issuers $\{S_t, b_t^s\}$, satisfying equations (3), (6) – (12), (14) and the market-clearing conditions for deposits and stablecoins:

$$\lambda_1 d_t^1 + \lambda_2 d_t^2 = D_t \tag{15}$$

$$\lambda_2 s_t = S_t. \tag{16}$$

2.6 Discussion

Bank regulation. The regulatory tax θ in our model represents the collection of policies that increase banks' cost of issuing deposits to fund additional assets, including capital and liquidity requirements, leverage restrictions, and deposit insurance premia. The key assumption we make is that this cost is tied to the bank's total deposits (or, equivalently in our framework, to its total assets) and not to only its risky investment. A tax on risky investment alone would allow policymakers to offset the incentive distortion in investment without increasing the cost for banks to intermediate safe assets into deposits. In such cases, stablecoins would be redundant, and allowing them to compete with tokenized deposits would have no effect. Our assumption instead creates a tradeoff: stablecoins are a more efficient way to create money from safe assets, but they may crowd out productive investment. This tradeoff has often been central to policy debates over narrow banking.

Deposit rates. The interest rates $1 + r_t^D$ and $1 + r_t^S$ should be interpreted as capturing a range of design features that affect the value of a medium of exchange to users, in addition to direct interest payments. A rewards program, for example, or a more convenient user interface would correspond to a higher rate of return in our framework. In this way, our model is consistent with deposits or stablecoins that do not pay explicit interest, as long as competition leads banks and issuers to spend on providing features their users value.

In principle, the interest rates on traditional and tokenized deposits could differ since they have distinct properties. However, because bankers are price takers and can back both types of deposits with the same assets, the equilibrium interest rates will be the same. To see why, suppose the interest rate on tokenized deposits was lower. Bankers would then want to issue only tokenized deposits, and the supply of traditional deposits would be zero. This zero supply would push the gross interest rate on traditional deposits to zero (see Figure 1(a), contradicting the assumption that the tokenized deposit rate is lower. There could be equilibria where the traditional deposit rate is lower than the tokenized deposit rate, banks issue only traditional deposits, and type 2 buyers hold only stablecoins. However, there is always another equilibrium with the same allocation in which the two deposit rates are equal. To economize on notation, we use $1 + r_t^D$ to denote the gross return on both types of deposits throughout.

Safe assets. We model safe assets as a linear storage technology for simplicity. An alternative approach would be for the government to issue bonds in the CM and to repay the bonds with interest in the following CM. Our results below would carry over to that case if (i) the government sets the quantity of bonds in each period to fix the interest rate on the debt at $1 + r^B$, and (ii) collecting taxes to pay the interest on the debt is socially costly (because the taxes are distortionary, for example). The important feature for our purposes is that government debt is costly to create and, therefore, carries a real return below β^{-1}.

The (exogenous) gap between β^{-1} and $1 + r^B$ in our model captures this cost in a simple, reduced-form way.

Assuming a constant return on safe assets is useful for isolating the mechanisms we focus on in this paper. Chiu et al. (2025) use a similar framework but assume that fiscal policy is used to keep the size of the government's debt constant. They focus on how the type of money used in crypto trade (stablecoins vs. CBDC) affects the equilibrium bond yield and thereby affects the *supply* of deposits. By fixing $1 + r^B$, we shut down this (interesting) spillover channel. Our focus is instead on how the use of stablecoins vs. tokenized deposits in crypto trades affects the total *demand* for deposits and, through this channel, equilibrium investment and trade. Integrating these two channels and evaluating their relative impacts may be an interesting area for future research.

3 A special case

In this section, we study the special case where bankers' projects are not risky ($\pi = 0$) and there is no regulatory tax ($\theta = 0$). We first study equilibrium assuming stablecoin issuers are inactive and only banks issue tokenized money. We show that an equilibrium exists and is unique. We then show that stablecoins are redundant in this special case: they may circulate in equilibrium, but they do not affect equilibrium allocations. This result motivates our inclusion of risk and regulation in Section 4 to create a meaningful tradeoff.

3.1 Equilibrium with only deposits

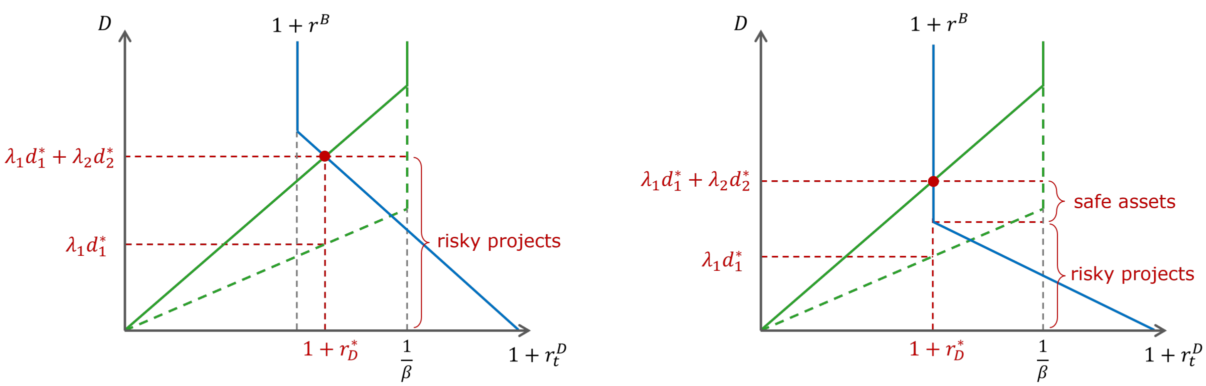
Suppose only tokenized deposits are used in crypto meetings. An equilibrium of the model is then summarized by the market-clearing condition for deposits in equation (15), where the demands d_t^1 and d_t^2 are given by equations (6) and (7). Let $1 + \hat{r}_D$ denote the solution to the following equation, which would be the market-clearing condition in the absence of safe assets,

$$(\lambda_1 + \lambda_2)\mathcal{D}\left(1 + r_t^D\right) = \eta\left[\bar{\gamma} - (1 + r_t^D)\right]. \tag{17}$$

The left-hand side of the equation is the sum of the money demand from all buyers. The right-hand side is the supply of deposits as in equation (12) but with $\theta = 0$ and assuming bankers cannot hold safe assets. Our assumptions above imply that this equation has a unique solution $1 + \hat{r}_D \leq \beta^{-1}$. This fact, together with the constant return $1 + r^B$ on storage, implies that an equilibrium when bankers *can* hold safe assets is unique and stationary. The interest rate on deposits in this equilibrium is

$$1 + r_D^* = \begin{cases} 1 + \hat{r}_D & \text{if } 1 + \hat{r}_D \geq 1 + r^B \\ 1 + r^B & \text{if } 1 + \hat{r}_D < 1 + r^B. \end{cases} \tag{18}$$

The first line of equation (18) is illustrated in Figure 2(a). Because all buyers use deposits in this baseline case, the total demand for deposits equals the sum of money demands from both types. In this panel, the mass of bankers η is large enough that high-return projects are only moderately scarce. The market-clearing interest rate in the absence of safe assets is then high enough that banks would choose not to hold them, and the solution to equation (17) is the equilibrium deposit rate $1 + r_D^*$. The second line in equation (18) is illustrated in panel (b), which corresponds to a situation with fewer bankers (lower η). In this case, the deposit rate that solves equation (17) is below $1 + r^B$, which is the rate that makes bankers indifferent about intermediating safe assets into deposits. The equilibrium deposit rate is then $1 + r^B$, and the equilibrium quantity of deposits is determined by total demand at that rate. The following proposition formalizes this characterization of equilibrium in the special case when only bankers operate. Proofs of results are provided in the appendix.



(a) Moderate η (b) Smaller η

Figure 2: Equilibrium with only deposits

Proposition 1. *If $q = \theta = 0$ and only bankers operate, there is a unique equilibrium. This equilibrium is stationary, and bankers hold a positive quantity of safe assets if and only if*

$$(\lambda_1 + \lambda_2)\mathcal{D}\left(1 + r^B\right) > \eta\left[\bar{\gamma} - (1 + r^B)\right]. \tag{19}$$

3.2 Stablecoins are redundant

Now suppose both stablecoins and tokenized deposits can be used in type 2 DM meetings. Proposition 1 shows that, if condition (19) is satisfied, some of the demand for tokenized money will be backed by safe assets in equilibrium. When $q = \theta = 0$, bankers and stablecoin issuers have the same cost of intermediating these assets. As a result, the composition of tokenized money between deposits and stablecoins is indeterminate.

Proposition 2. *Suppose $q = \theta = 0$ and both bankers and stablecoin issuers can operate. If condition (19) holds, there exists a continuum of stationary equilibria with*

$$\eta b_k^* + b_s^* = (\lambda_1 + \lambda_2)\mathcal{D}\left(1 + r^B\right) - \eta\left[\bar{\gamma} - (1 + r^B)\right].$$

The equilibrium quantities of DM trade and CM consumption are the same in all equilibria.

This result is illustrated in Figure 3, which introduces stablecoin issuers into the situation in Figure 2(b). The ability to hold stablecoins creates a vertical segment in the deposit demand curve, as shown in Figure 1(a). In between the two red dots in Figure 3, this vertical segment coincides with the deposit supply curve, meaning that each of these points represents an equilibrium. These equilibria differ in the composition of tokenized money between stablecoins and deposits.

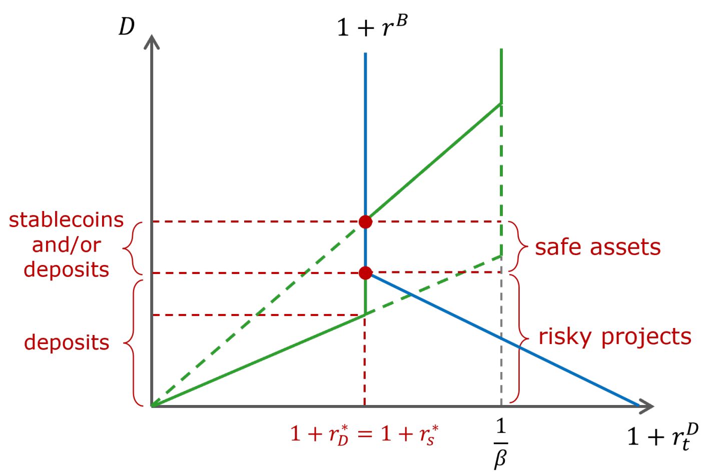


Figure 3: Redundant stablecoins

Proposition 2 and Figure 3 show that our model pins down the quantity of safe assets used to back money in equilibrium, $\eta b_k^* + b_s^*$. In the terminology of Gurley and Shaw (1960), this corresponds to the quantity of *outside money*, because we interpret these assets as originating outside the private sector. The quantity of *inside money* is also uniquely determined by using the equilibrium deposit rate $1+r_D^*$ in equation (10) to derive the equilibrium investment cutoff $\hat{\gamma}^*$. While our model pins down unique equilibrium quantities of inside and outside money, it does not pin down what type of institution will issue the outside money. In this sense, Proposition 2 can be interpreted as a neutrality result: it does not matter whether the outside money used in crypto transactions takes the form of stablecoins or tokenized deposits in this special case. Policymakers can allow stablecoins to be used or prohibit them; the equilibrium allocation is the same either way. A meaningful analysis of stablecoins vs. tokenized deposits requires introducing frictions into the framework that break this neutrality. In the next section, we reintroduce the moral hazard problem for bankers and the regulatory tax.

4 Equilibrium with moral hazard and regulation

We now return to the general case where π and θ may be positive, and we assume both bankers and stablecoin issuers can operate. Money demand does not depend on these parameters and remains unchanged from the special case above; see equations (6) – (9). In this section, we first study how these parameters affect deposit supply, and then derive the equilibrium composition of tokenized money when there is moral hazard and regulation. We show that what type of money is used depends critically on the regulatory tax θ, and we explore how the equilibrium composition of money varies with the size of the crypto sector.

4.1 Change in deposit supply

Because of limited liability, a banker aims to maximize profit conditional on their projects succeeding. Deposit insurance implies that the interest rate a banker pays to depositors is independent of the probability of success. Together, these two assumptions imply that the supply of deposits does not depend on the probability π – see equation (12). The tax rate θ, in contrast, affects deposit supply in two ways. First, a higher tax implies fewer projects are profitable at any given deposit rate $1 + r_t^D$, which corresponds to the shift of the downward-sloping part of the supply curve shown in Figure 4. Second, a higher tax also makes intermediating safe assets into deposits more expensive. As a result, the deposit rate at which banks become willing to hold safe assets also decreases, which shifts the vertical part of the supply curve to the left, as shown in the figure.

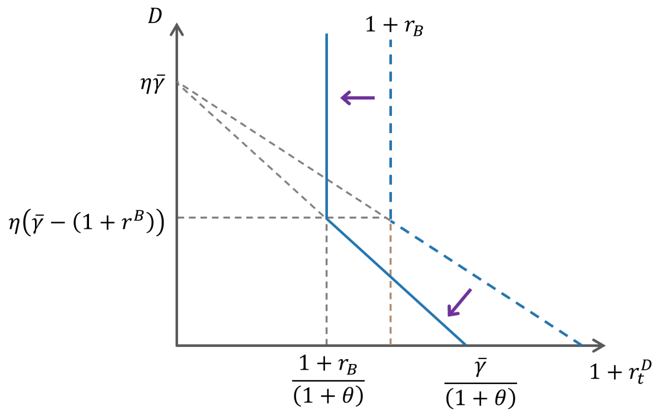


Figure 4: Effect of regulation on deposit supply.

4.2 Equilibrium composition of money

The next result shows that the indeterminacy of equilibrium established in Proposition 2 disappears when $\theta > 0$.

Proposition 3. *If $\theta > 0$ and both banks and stablecoin issuers are allowed to operate, there is a unique equilibrium. There exist thresholds $\bar{\theta}_2 \geq \bar{\theta}_1 \geq 0$ such that, in this equilibrium,*

(i) only tokenized deposits are used in type 2 meetings if $\theta \leq \bar{\theta}_1$;

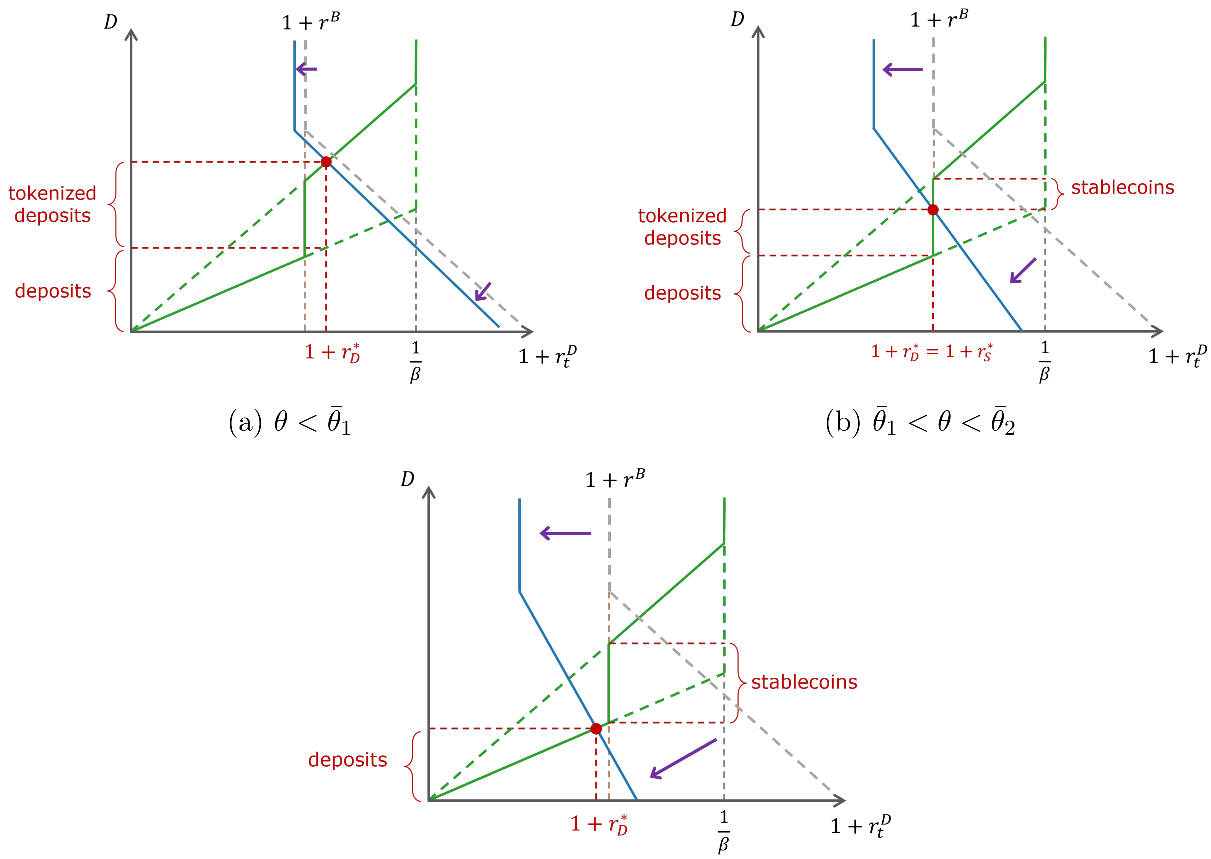
(ii) both tokenized deposits and stablecoins are used in type 2 meetings if $\bar{\theta}_1 < \theta < \bar{\theta}_2$;

(iii) only stablecoins are used in type 2 meetings if $\theta \geq \bar{\theta}_2$.

If the inequality in condition (19) is strictly reversed, the thresholds satisfy $\bar{\theta}_2 > \bar{\theta}_1 > 0$.

Explicit expressions for the thresholds $\bar{\theta}_1$ and $\bar{\theta}_2$ are provided in the proof in the appendix.

The result is illustrated in Figure 5, which corresponds to the case depicted in Figure 2(a). In that case, the equilibrium deposit rate was high enough that bankers held no safe assets when $\theta = 0$. In Figure 5(a), θ is positive but small enough that the outcome is qualitatively unchanged. In particular, the equilibrium deposit rate is high enough that neither bankers nor stablecoin issuers choose to hold safe assets and only tokenized deposits are used for crypto trade, which corresponds to the first scenario in Proposition 3. Figure 5(b) presents the second scenario, where the tax rate θ is higher and, therefore, the supply of deposits has shifted further down and to the left. The deposit rate is now low enough for stablecoin issuers to be active. The equilibrium deposit rate equals the interest rate on stablecoins, and the figure shows how the equilibrium mix of stablecoins and tokenized deposits is determined. Bankers back tokenized deposits with risky projects only, and all safe assets are held by stablecoin issuers. The third scenario in the proposition is depicted in Figure 5(c), where



(a) $\theta < \bar{\theta}_1$

(b) $\bar{\theta}_1 < \theta < \bar{\theta}_2$

(c) $\theta > \bar{\theta}_2$

Figure 5: Equilibrium with regulation

the tax θ is higher still, which further restricts the supply of deposits. The deposit rate is now lower than the interest rate on stablecoins, and the two sectors are segmented: crypto trade uses only stablecoins, and all deposits are used in traditional trade.[10]

Figure 6 provides another view of the result in Proposition 3. For each combination of (π, θ), the figure shows what type of money is used in crypto trades.[11] As discussed above, the equilibrium composition of money does not depend on π, and the three regions in the figure correspond to the three scenarios identified in Proposition 3. Changes in parameters such as the λ_i (which affect money demand) and η (which affects money supply) shift the boundaries of these regions. For example, if the measure of bankers η decreases so that condition (19) holds, the lower threshold $\bar{\theta}_1$ becomes zero and the region where only tokenized deposits are

[10] Note that traditional buyers would prefer to use stablecoins in this case if doing so were possible, but we assume it is not. It may be interesting to study what happens when stablecoins can be used for traditional exchange, creating a "backdoor" for narrow banks to enter the traditional banking system.

[11] The parameter values for Figure 6 are $\beta = 0.96, u(q) = \sqrt{q}, w(q) = q, \lambda_1 = 0.5, \lambda_2 = 0.05, \bar{\gamma} = 1.15, r^B = 0.01$, and $\eta = 4$.

used disappears from the figure. If η decreases further, the upper threshold $\bar{\theta}_2$ also becomes zero and only stablecoins are used in crypto meetings for all (π, θ).

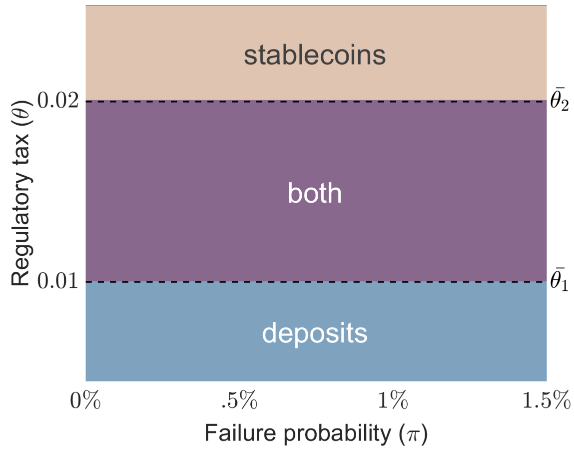


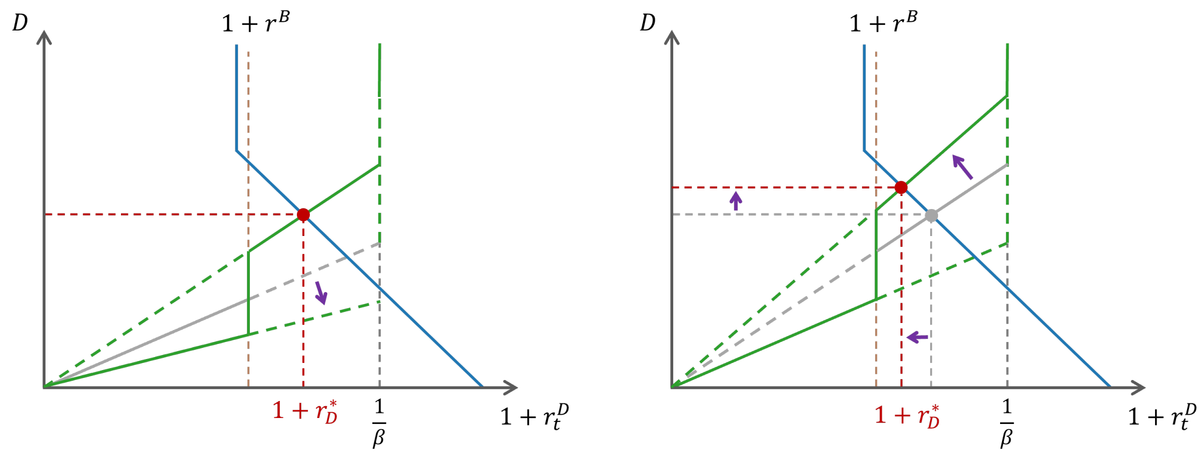
Figure 6: Type of money used in crypto meetings

4.3 Growth of crypto

Blockchain-based trade is still relatively new and has the potential to grow considerably in size. We can use our framework to study how the growth of crypto trade will affect equilibrium outcomes, including traditional trade and investment. An important question in this exercise is to what extent a growth in crypto trade would represent a shift from traditional means of payment to using a blockchain-native money and to what extent it would instead represent an increase in total trade.

We study two scenarios. The first is a *substitution* of trade: λ_2 increases and λ_1 decreases, leaving the sum $\lambda_1+\lambda_2$ unchanged. This case is depicted in Figures 7(a) and 8(a). Figure 7(a) is based on parameter values for which only tokenized deposits are used in crypto meetings. It shows that the equilibrium interest rate and quantity of deposits are unchanged; the only difference is that more of the deposits are in tokenized rather than traditional form. Figure 8(a) shows that the threshold $\bar{\theta}_1$, below which only tokenized deposits are used in crypto meetings, is also unchanged. However, the upper threshold $\bar{\theta}_2$ increases. Intuitively, the smaller demand for traditional deposits in this scenario allows banks to create tokenized deposits at lower cost. In some cases where previously only stablecoins were used in crypto trade, the shift leads to both stablecoins and tokenized deposits being used. In these cases, the growth of crypto pulls banks (and their tokenized deposits) into the crypto market.

The second growth-of-crypto scenario we consider is an overall expansion of trade: λ_2 increases with λ_1 unchanged. This case is depicted in Figures 7(b) and 8(b). Figure 7(b)

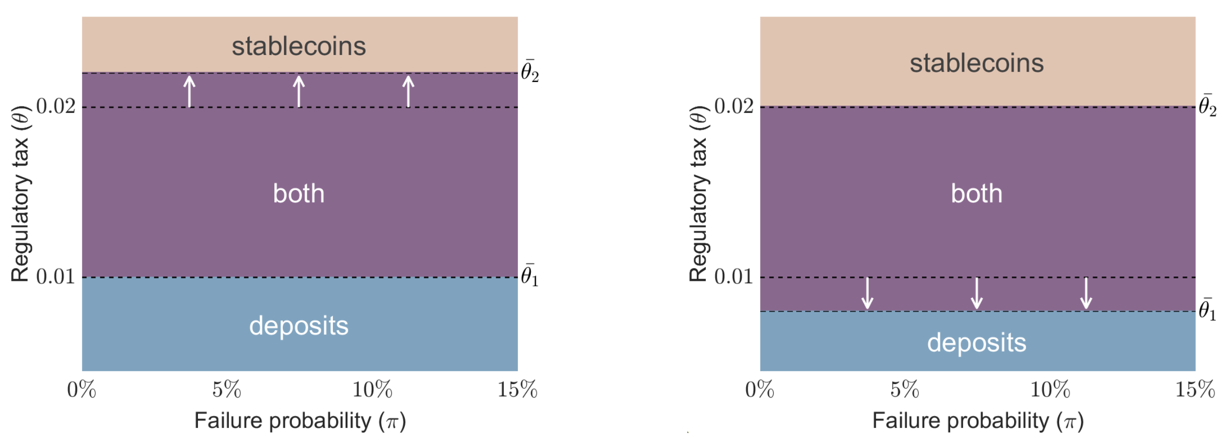


(a) Substitution of trade

(b) Expansion of trade

Figure 7: Impact of growth in crypto trade

shows that the deposit rate decreases and total deposits increase in this case. Figure 8(b) shows that the upper threshold $\bar{\theta}_2$ remains unchanged, but the threshold $\bar{\theta}_1$ below which only tokenized deposits are used decreases. Intuitively, when total money demand is larger, it is more costly for bankers to fully meet this demand. In some cases where previously only tokenized deposits were used, this type of crypto growth pulls stablecoins into the market. The following proposition formalizes these patterns.



(a) Substitution of trade

(b) Expansion of trade

Figure 8: Crypto growth and the composition of money

Proposition 4. *If λ_2 increases with $\lambda_1 + \lambda_2$ unchanged, $\bar{\theta}_1$ does not change and $\bar{\theta}_2$ increases (strictly if $\bar{\theta}_2 > 0$). If λ_2 increases with λ_1 unchanged, $\bar{\theta}_1$ decreases (strictly if $\bar{\theta}_1 > 0$) and $\bar{\theta}_2$ does not change.*

5 Legal restrictions

The analysis above assumes that both bankers and stablecoin issuers are allowed to issue tokenized money. There has, however, been substantial debate about restricting money creation to one type of entity or the other. In this section, we examine two such policies: one that allows only bankers to issue tokenized money and the other which allows only stablecoin issuers. We ask how each policy affects welfare compared to the baseline policy of allowing stablecoins and tokenized deposits to compete. Finally, we explore how the growth of crypto trade would affect the desirability of each policy.

5.1 Tokenized deposits only

Some people have argued that deposits and similar forms of money should be created only by banks, that is, by institutions that grant loans and thereby provide credit to the real economy. One way to map the policies they propose into our framework is to apply the regulatory tax θ to stablecoin issuers as well as to banks. Under this policy, stablecoins become redundant as in Proposition 2, and the equilibrium allocation is the same as if only bankers are allowed to issue tokenized money. How does this "deposits-only" policy affect equilibrium allocations and welfare?

If $\theta \leq \bar{\theta}_1$, Proposition 3 shows that only tokenized deposits are used under the baseline policy, so a deposits-only policy would clearly have no effect. If $\theta > \bar{\theta}_1$, in contrast, stablecoins circulate under the baseline policy, and the policy will change the equilibrium allocation. Our next proposition establishes the directions of change.

Proposition 5. *If $\theta > \bar{\theta}_1$, a deposits-only policy weakly decreases the equilibrium deposit rate. Total safe asset holdings strictly decrease, and risky investment weakly increases. The quantity traded weakly decreases in type 1 meetings and strictly decreases in type 2 meetings.*

This result is illustrated in Figure 9, where parameter values are such that $\theta \in \left(\bar{\theta}_1, \bar{\theta}_2\right)$. Equilibrium quantities under the baseline policy, where stablecoin issuers are untaxed, are marked in gray. When the tax is applied, the stablecoin supply curve shifts leftward. The interest rate on deposits falls, and bankers expand to provide all of the money demanded at the new, lower interest rate. The outside money previously provided by stablecoins is thus replaced with inside money issued by bankers. Because the opportunity cost of holding money has increased, buyers' holdings of both traditional deposits and tokenized money decrease, which causes the level of DM trade to fall in both types of meetings. However, total deposits (traditional plus tokenized) increase as the lower deposit rate induces bankers to operate more projects. In this way, the model captures a key element of the argument people make for this policy: discouraging stablecoin use leads to an increase in bank credit and higher investment.

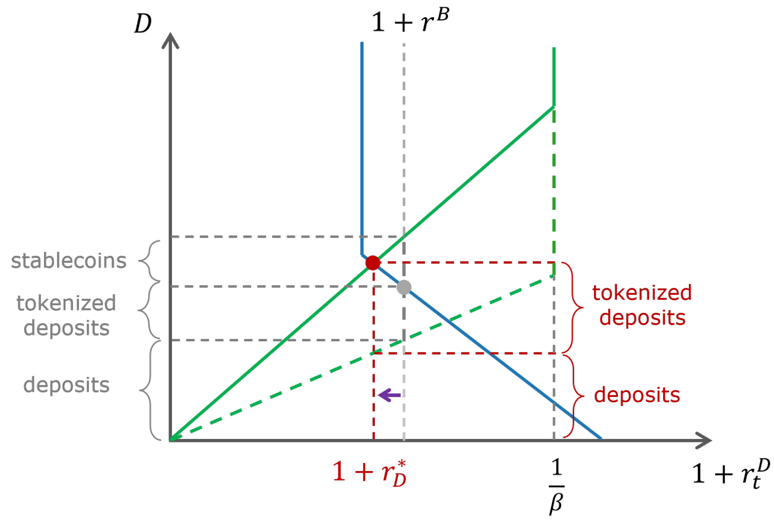


Figure 9: Requiring tokenized deposits for crypto exchange

Welfare. The discussion above hints at a possible tradeoff: a deposits-only policy leads to less DM trade, but more investment in CM projects. Might this policy increase welfare? In equilibrium, welfare from equation (1) is proportional to

$$W = \eta \int_{\hat{\gamma}^*}^{\bar{\gamma}} \left[(1-\pi)\beta\gamma - 1\right] d\gamma + \left[\beta(1+r^B) - 1\right](\eta b_k^* + b_s^*) \\ + \lambda_1 \left[u(q_1^*) - w(q_1^*)\right] + \lambda_2 \left[u(q_2^*) - w(q_2^*)\right]. \tag{20}$$

This expression uses the fact that the equilibrium allocation is stationary from period 1 onward under all of the policies we study. Welfare is, therefore, proportional to the sum of the discounted net returns from CM investment (risky projects and safe assets) and the gains from DM trade in each period. To determine whether a deposits-only policy increases welfare, it is useful to look at the social return on the lowest-return project operated by banks in equilibrium. Recall that this project will produce $\hat{\gamma}^*$ if successful, and banks choose this cutoff to satisfy Equation (10). The social return takes into account that the project only succeeds with probability $1 - \pi$ and can be written as

$$\rho(\hat{\gamma}^*) \equiv (1-\pi)\hat{\gamma}^* = (1-\pi)(1+\theta)(1+r_D^*). \tag{21}$$

If this return is lower than that on safe assets, $1 + r^B$, a deposits-only policy is clearly undesirable. In that case, the policy would both (i) decrease DM trade and (ii) shift CM investment from safe assets to risky projects with a lower social return. The following proposition formalizes this logic.

Proposition 6. *If $\rho(\hat{\gamma}^*) \leq 1 + r^B$ when stablecoins and tokenized deposits compete, a deposits-only policy cannot raise welfare.*

This result, together with equation (21), demonstrates that a deposits-only policy will always be undesirable if the failure probability π is sufficiently large and the regulatory tax θ is sufficiently small. If the moral hazard problem in banks is large enough, it is desirable to allow (untaxed) stablecoins to compete with them. Because the equilibrium deposit rate under the baseline policy is bounded above by $1 + r^B$, the condition in Proposition 6 necessarily holds if $(1 - \pi)(1 + \theta) < 1$. We record this result as a corollary.

Corollary 1. *If $\theta \leq \frac{\pi}{1-\pi}$, a deposits-only policy cannot raise welfare.*

When the condition in Proposition 6 is not met, a trade-off emerges. A deposits-only policy decreases DM trade, as shown in Proposition 5, but it shifts CM investment from safe assets to at least some projects that have a higher social return and thereby increases net CM consumption. Figure 10 shows there is a region in our example (in dark blue) where a deposits-only policy raises welfare. This region lies where the failure probability π is small and the regulatory tax θ is relatively high. In this region, the increased social return on CM investment outweighs the drop in DM trade, increasing welfare.

The intuition for the slope of the boundary of this region can be understood as follows. When $\bar{\theta}_1 < \theta < \bar{\theta}_2$, an increase in θ leads to a larger use of stablecoins in the baseline model, which results in more investment in safe assets. Since these assets have a lower social return than projects when π is small, a policy that shifts investment toward projects becomes more attractive. Consequently, as θ increases toward $\bar{\theta}_2$, the set of values for π for which a deposits-only policy raises welfare becomes larger. When $\theta > \bar{\theta}_2$, however, only stablecoins are used in type 2 meetings under the baseline policy. As θ rises further in this region, the quantity of stablecoins and the asset portfolio of stablecoin issuers remain unchanged. Under a deposits-only policy, however, the equilibrium deposit rate and the quantities of DM trade are decreasing in θ. Further increases in θ thus make a deposits-only policy less attractive, and the set of values of π for which it raises welfare becomes smaller.

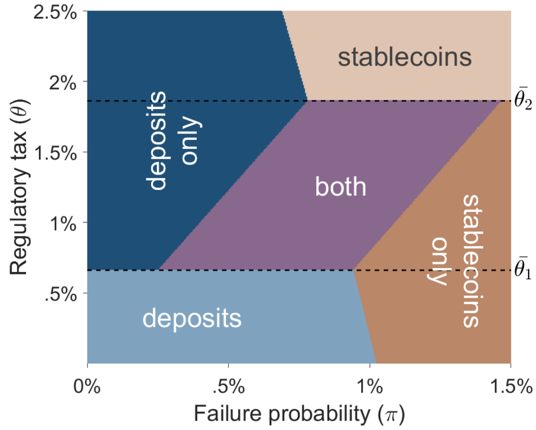


Figure 10: When are legal restrictions desirable?

5.2 Stablecoins only

We now consider the second alternative, which allows only stablecoin issuers to create tokenized money. This policy can be viewed as imposing narrow banking for the creation of blockchain-native money. If $\theta < \bar{\theta}_2$, so that tokenized deposits are used under the baseline policy, a stablecoins-only policy will change the equilibrium allocation. The following proposition documents the directions of change.

Proposition 7. *If $\theta < \bar{\theta}_2$, a stablecoins-only policy strictly increases the equilibrium deposit rate. Total safe asset holdings strictly increase, and risky investment strictly decreases. The quantity traded strictly increases in type 1 meetings and weakly decreases in type 2 meetings.*

This result is illustrated in Figure 11, which depicts the case where $\theta \in (\bar{\theta}_1, \bar{\theta}_2)$. Under the baseline policy, $1 + r_D^* = 1 + r_S^*$ holds in this case, and a mix of stablecoins and tokenized deposits is used in crypto trade. When buyers are required to use stablecoins, issuers expand to meet the entire demand for tokenized money at the rate $1 + r_S^*$. The deposit rate $1 + r_D^*$ rises, and the banking sector shrinks as it only serves type 1 buyers. Relative to the baseline, a stablecoins-only policy leads to an economy with less inside money and more outside money. Because the deposit rate increases, type 1 buyers hold larger balances and buy more of the DM good. Because the stablecoin rate is unchanged, the balances of type 2 buyers and their DM purchases are unchanged. When $\theta < \bar{\theta}_1$, in contrast, a stablecoins-only policy strictly decreases the interest rate available to type 2 buyers (see Figure 5(a)), causing them to decrease their money balances and DM purchases.

Welfare. A stablecoins-only policy affects welfare through several competing channels. Traditional DM trade increases toward the first-best level, which by itself would increase welfare.

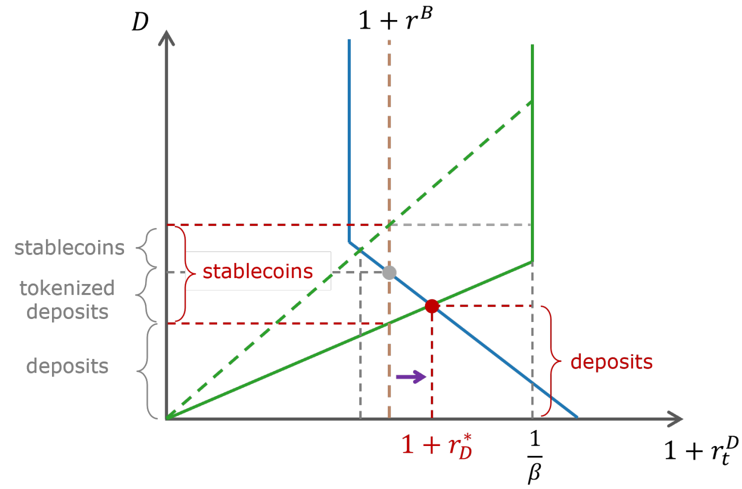


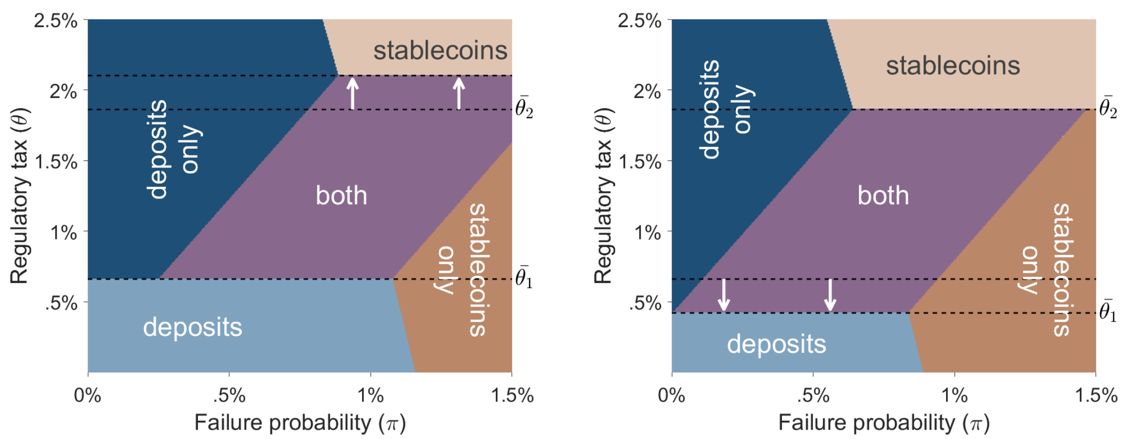
Figure 11: Requiring stablecoins for crypto exchange

At the same time, however, total CM investment increases. Because the return on safe assets and the marginal risky project are both below β^{-1}, more investment by itself would decrease welfare. Finally, Proposition 7 shows that a stablecoins-only policy shifts the composition of CM investment away from risky projects and toward safe assets. The welfare effect of this shift depends on whether the social returns of the projects no longer funded are above or below $1 + r^B$.

Looking back at equation (21), the social return on the marginal project will be lower when the failure probability π is large and the regulatory tax θ is small. Figure 10 shows that a stablecoins-only policy does indeed raise welfare in this region in our example. The shape of the boundary of the region where stablecoins-only is desirable can be understood as follows. When $\theta < \bar{\theta}_1$, only tokenized deposits circulate under the baseline policy, as Figure 5(a). As shown in Proposition 7, imposing a stablecoins-only policy in this region lowers the rate of return available to type 2 buyers and therefore decreases DM trade. As θ increases in this region, the gap between the returns earned by type 2 buyers under the two policies shrinks. As a result, the stablecoins-only policy becomes more attractive, and the size of the region in which it raises welfare increases. When $\theta > \bar{\theta}_1$, in contrast, both stablecoins and tokenized deposits are used in equilibrium under the baseline policy, and imposing a stablecoins-only policy no longer leads to a decrease in DM trade. As θ increases further, the return on the marginal project in the baseline equilibrium, $\hat{\gamma}^*$ increases (see equation 21), which implies that the benefit of shifting investment from projects to safe assets is smaller. For this reason, the region where a stablecoins-only policy raises welfare shrinks.

5.3 Growth of crypto revisited

As a final exercise, we examine how the policy prescriptions of our model change if the measure of crypto buyers increases. We consider the same two scenarios as in Section 4.3. Figure 12(a) shows how the optimal policy changes in the substitution-of-trade scenario, where some buyers shift from traditional to crypto trade. Compared to the case in Figure 10, a deposits-only policy is optimal for a wider range of parameter values, and the region where a stablecoins-only policy is optimal shrinks. Intuitively, the smaller demand for traditional deposits allows banks to create tokenized deposits at lower cost, which makes having deposits used in crypto trade more attractive. Figure 12(b) illustrates the expansion-of-trade scenario, where traditional trade is unchanged as crypto trade increases. In this case, a stablecoins-only policy is optimal for a larger set of parameter values. Intuitively, the larger total demand for money balances implies that bankers would need to operate lower-return projects to meet this demand. This fact makes requiring stablecoins be used in crypto trade optimal for smaller values of the failure risk π.



(a) Substitution of trade (b) Expansion of trade

Figure 12: How crypto growth changes the optimal policy

6 Concluding remarks

Our analysis highlights how the policy choices surrounding stablecoins and tokenized deposits echo aspects of both historical and contemporary debates about narrow banking. Historically, narrow-banking proposals have called for requiring institutions that create money to hold only safe, liquid assets. More recently, some narrow banks have attempted to operate alongside traditional banks. In both cases, policymakers and others have expressed concern about how narrow banks affect credit provision. A similar concern arises with the creation of tokenized money. Our model captures an inherent tradeoff in this setting: stablecoins promote the efficient intermediation of safe assets into a medium of exchange, but they limit banks' ability to use tokenized money to create credit. We show that allowing stablecoin issuers to operate is desirable when traditional banks' risk-shifting incentive is strong, and allowing only stablecoins as tokenized money can be desirable when regulation does not sufficiently correct this distortion. When the risk-shifting incentive is small and regulation is costly, in contrast, allowing only banks to create tokenized money is optimal.

The key difference between stablecoins and tokenized deposits in our model is the type of asset that backs the money – safe vs. risky credit. In practice, other differences are important as well. For example, stablecoins are typically designed as bearer instruments that can be held by any wallet, without prior permission from the issuer. Holding a tokenized deposit, in contrast, may require the holder to have an existing relationship with the issuing bank. Such differences have implications for how widely each type of money can circulate, for privacy and data security, and for the prevention of illicit activities. Incorporating these differences into the exchange process to see how they interact with the forces we have studied may be an interesting avenue for future research.

We have abstracted from other important issues as well, including financial stability considerations. The extent to which stablecoins can maintain their peg and avoid runs without public support is an open question; see, for example, Georgiadis-Harris et al. (2025), Ma et al. (2025), Gorton et al. (2025) and van Buggenum et al. (2023). There is also concern that stablecoins could be adopted for uses outside of blockchain-based trade, which would put them in competition with traditional bank deposits and potentially lead to runs into stablecoins in times of banking distress. Finally, the international use of US dollar stablecoins also raises interesting issues, as studied in Azzimonti and Quadrini (2025). Our analysis has focused on tokenized money used domestically in normal times. Extending our framework to include financial stability and issues related to dollarization may be may also be natural directions for future work.

Appendix: Proofs of Propositions

Proof of Proposition 1. Given buyers' demand for deposits in equations (6) - (7) and banks' supply of deposits in equation (12), the market-clearing condition in equation (15) can be written as

$$(\lambda_1 + \lambda_2)\mathcal{D}\left(1 + r_t^D\right) = \eta\big[\bar{\gamma} - \left(1 + r_t^D\right) + b_t^k\big], \tag{22}$$

where b_t^k is banks' demand for safe assets from equation (11). Note that this demand is zero if $1 + r_t^D > 1 + r^B$, in which case this expression reduces to equation (17).

Our assumptions on the functions u and w, and that $xL(x)$ is increasing in x, imply the left-hand side of equation (22) is a continuous, strictly increasing function of $1 + r_t^D$ and approaches $(\lambda_1 + \lambda_2)w(q^*)$ as $1 + r_t^D \to \beta^{-1}$. Demand becomes vertical when $1 + r_t^D = \beta^{-1}$, including all points greater than or equal to $(\lambda_1 + \lambda_2)w(q^*)$.

For the right-hand side of equation (22), when $1 + r_t^D = 1 + r^B$, equation (11) shows the supply curve is vertical, including all points greater than or equal to $\eta\left[\bar{\gamma} - (1 + r^B)\right]$. When $1+r_t^D > 1+r_B$, banks hold no safe assets and the supply curve is a decreasing, linear function of $1 + r_t^D$ that starts at $\eta\left[\bar{\gamma} - (1 + r^B)\right]$ and continues to zero. Because $1 + r^B < \beta^{-1}$, these two curves intersect exactly once and, therefore, equation (22) has a unique solution. This solution is the equilibrium deposit rate in every period and, therefore, the equilibrium is both unique and stationary. The intersection occurs on the vertical part of the supply curve, where banks hold a positive amount of safe assets, if and only if the total demand at $1 + r^B$ is greater than $\eta\left[\bar{\gamma} - (1 + r^B)\right]$, that is, if and only if inequality (19) holds. □

Proof of Proposition 2. Adding equations (15) and (16) yields a market-clearing equation for all types of money,

$$\lambda_1 d_t^1 + \lambda_2(d_t^2 + s_t) = D_t + S_t.$$

When $q = \theta = 0$, using buyers' demand in equations (6) - (9) and the supply of deposits in equation (12), we can write this equation as

$$(\lambda_1 + \lambda_2)\mathcal{D}\left(1 + r_t^D\right) = \eta\left[\bar{\gamma} - \left(1 + r_t^D\right)\right] + \eta b_t^k + b_t^s, \tag{23}$$

where b_t^k and b_t^s are as defined in equations (11) and (13) – (14). When condition (19) holds, the proof of Proposition 1 establishes that the equilibrium deposit rate is $1 + r_D^* = 1 + r^B$.

Substituting this value into equation (23) and rearranging terms yields

$$\eta b_t^k + b_t^s = (\lambda_1 + \lambda_2)\mathcal{D}\left(1 + r^B\right) - \eta\left[\bar{\gamma} - (1 + r^B)\right], \tag{24}$$

which Proposition 1 shows is strictly positive if and only if condition (19) holds. At $1+r_D^* = 1 + r^B$, equation (9) shows that type 2 buyers are indifferent between tokenized deposits and stablecoins. It follows that any non-negative sequence $\left\{b_t^k, b_t^s\right\}$ satisfying equation (24) in every period is also consistent with the separate market-clearing conditions for deposits and stablecoins in equations (15) – (16) and, therefore, is part of an equilibrium. In other words, there is a continuum of equilibria in which b_t^k and b_t^s are constant over time, as well as many equilibria in which they vary over time but the sum $\eta b_t^k + b_t^s$ is constant. Because the deposit rate is the same in all of these equilibria, the levels of DM trade and the CM investment cutoff are the same as well, with

$$q_1^* = q_2^* = w^{-1}\left(\beta L^{-1}\left(\frac{1}{\beta(1+r^B)}\right)\right) \qquad \text{and} \qquad \hat{\gamma}^* = 1 + r^B.$$

Equation (2) then shows that total CM consumption is the same in all of the equilibria as well. Since all assets offer the same return across equilibria, individual CM consumption is also the same across equilibria. □

Proof of Proposition 3. Suppose $\theta > 0$ and both banks and stablecoin issuers are allowed to operate. The equilibrium can take one of three forms. The first possibility is that only tokenized deposits are used in type 2 meetings. Because type 2 buyers have the option to hold stablecoins, the equilibrium deposit rate must be at least $1 + r^B$, and banks will not hold safe assets (see equation 11). The market-clearing condition for deposits would then be

$$(\lambda_1 + \lambda_2)\mathcal{D}\left(1 + r_t^D\right) = \eta\left[\bar{\gamma} - \left(1 + r_t^D\right)(1 + \theta)\right]. \tag{25}$$

The unique solution to this equation is part of an equilibrium if and only if it satisfies $1+r_D^* \geq 1+r^B$, which justifies the decision of type 2 buyers to hold only tokenized deposits. This condition can be written as

$$(\lambda_1 + \lambda_2)\mathcal{D}\left(1 + r^B\right) \leq \eta\left[\bar{\gamma} - \left(1 + r^B\right)(1 + \theta)\right]. \tag{26}$$

The left-hand side if this inequality is independent of θ, and the right-hand side is strictly decreasing. If condition (19) is strictly reversed, the inequality holds at $\theta = 0$. Define $\bar{\theta}_1$ to be the value where (26) holds with equality in this case; otherwise, define $\bar{\theta}_1 = 0$ so we have

$$\bar{\theta}_1 = \max\left\{0, \frac{1}{1+r^B}\left[\bar{\gamma} - \frac{\lambda_1+\lambda_2}{\eta}\mathcal{D}\left(1+r^B\right)\right] - 1\right\}. \tag{27}$$

It follows that, for all $0 < \theta \leq \bar{\theta}_1$, the solution to equation (25) is the unique equilibrium deposit rate, and only tokenized deposits are used in type 2 meetings. This case is depicted in panel (a) of Figure 5.

The second possibility is that both tokenized deposits and stablecoins are used in type 2 trade. In this case, $1 + r_D^* = 1 + r_S^* = 1 + r^B$ must hold, and market clearing requires

$$(\lambda_1 + \lambda_2)\mathcal{D}\left(1+r^B\right) = \eta\left[\bar{\gamma} - \left(1+r^B\right)(1+\theta)\right] + b_s^*$$

or

$$b_s^* = (\lambda_1 + \lambda_2)\mathcal{D}\left(1+r^B\right) - \eta\left[\bar{\gamma} - \left(1+r^B\right)(1+\theta)\right]. \tag{28}$$

In words, stablecoin issuers meet the difference between total money demand and the deposits supplied by banks when the deposit rate is $1 + r^B$. This solution is part of an equilibrium in which both tokenized deposits and stablecoins are used if it satisfies two conditions. First, b_s^* must be strictly positive, which requires the inequality in (26) to be reversed, or $\theta > \bar{\theta}_1$. Second, $b_s^* < \lambda_2\mathcal{D}(1 + r^B)$ must hold, meaning some of the money used by type 2 buyers is provided by banks. We can write this condition as

$$(\lambda_1 + \lambda_2)\mathcal{D}(1+r^B) - \eta\left[\bar{\gamma} - (1+r^B)(1+\theta)\right] < \lambda_2\mathcal{D}(1+r^B)$$

or

$$\lambda_1\mathcal{D}(1+r^B) < \eta\left[\bar{\gamma} - (1+r^B)(1+\theta)\right]. \tag{29}$$

Define $\bar{\theta}_2$ to be the value where (29) holds with equality if the solution is positive; otherwise, define $\bar{\theta}_2 = 0$. We then have

$$\bar{\theta}_2 = \max\left\{0, \frac{1}{1+r^B}\left[\bar{\gamma} - \frac{\lambda_1}{\eta}\mathcal{D}\left(1+r^B\right)\right] - 1\right\}. \tag{30}$$

It follows that, for all $\bar{\theta}_1 < \theta < \bar{\theta}_2$, the unique equilibrium has both tokenized deposits and stablecoins being used in type 2 meetings. The equilibrium size of the stablecoin sector is given by equation (28) and is illustrated in panel (b) of Figure 5.

The final possibility is that only stablecoins are used in type 2 trade. The market-clearing condition for deposits in this case would be

$$\lambda_1 \mathcal{D}\left(1+r_t^D\right) = \eta\left[\bar{\gamma} - \left(1+r_t^D\right)(1+\theta) + b_t^k\right], \tag{31}$$

where banks' demand for safe assets b_t^k is from equation (11). It is straightforward to show that $\theta \geq \theta_2$ implies the unique solution to this equation satisfies $1+r_D^* \leq 1+r^B$, which justifies the decision of type 2 buyers to hold only stablecoins. The unique equilibrium in this case has only type 1 buyers holding deposits, as shown in panel (c) of Figure 5, and the equilibrium size of the stablecoin sector is $b^s = \lambda_2 \mathcal{D}(1+r^B)$. □

Proof of Proposition 4. This result follows directly from the definitions of $\bar{\theta}_1$ and $\bar{\theta}_2$ in equations (27) and (30). □

Proof of Proposition 5. We first show that a deposits-only policy decreases the equilibrium interest rate on deposits. Under this policy, the market-clearing condition for deposits becomes

$$(\lambda_1+\lambda_2)\mathcal{D}\left(1+r_t^D\right) = \eta\left[\bar{\gamma} - (1+\theta)\left(1+r_t^D\right) + b_t^k\right], \tag{32}$$

where b_t^k satisfies equation (11). The assumption $\theta > \bar{\theta}_1$ implies that the solution to this equation satisfies $1+r_D^* < 1+r^B$. If $\bar{\theta}_1 < \theta \leq \bar{\theta}_2$, Proposition 3 implies that the equilibrium deposit rate under the baseline policy is $1+r^B$, which is clearly higher. If $\theta > \bar{\theta}_2$, the equilibrium deposit rate under the baseline policy solves equation (31). If this solution is larger than $\frac{1+r^B}{1+\theta}$, so that banks hold no safe assets, then $\lambda_2 > 0$ implies the solution to equation (32) is smaller and prohibiting stablecoins again causes the deposit rate to strictly decrease. If the solution to equation (31) is $\frac{1+r^B}{1+\theta}$, then the equilibrium deposit rate when stablecoins are prohibited is the same. Together, these steps show that prohibiting stablecoins at least weakly decreases the equilibrium deposit rate, and it strictly decreases this rate if banks do not hold safe assets under the baseline policy.

Following the same steps as in equation (23), total safe asset holdings can be written as

$$\eta b_t^k + b_t^s = \lambda_1 \mathcal{D}(1+r_t^D) + \lambda_2 \mathcal{D}(1+r_t^2) - \eta\left[\bar{\gamma} - \left(1+r_t^D\right)(1+\theta)\right], \tag{33}$$

where $1+r_t^2$ denotes the interest rate on whichever type of money type 2 buyers hold in equilibrium. Note that the right-hand side of this equation is strictly increasing in both $1+r_t^D$

and $1 + r_t^2$. The analysis above shows that a deposits-only policy causes the equilibrium deposit rate to weakly decrease. In addition, the interest rate received by type 2 buyers strictly decreases when they must switch from holding stablecoins to deposits. It follows from equation (33) that total safe assets strictly decrease.

The investment threshold $\hat{\gamma}_t$ in equation (10) is strictly increasing in the deposit rate $1 + r_t^D$. If prohibiting stablecoins causes the deposit rate to decrease, therefore, banks respond by operating more risky projects.

Finally, the quantity of DM trade in a type j meeting is directly linked to the interest rate on the type of money that type j buyers hold,

$$q_t^j = w^{-1}\left(\beta L^{-1}\left(\frac{1}{\beta(1+r_t^j)}\right)\right), \tag{34}$$

where our assumptions imply that the right-hand side is strictly increasing in $1+r_t^j$ whenever this rate is below β^{-1}. A decrease in the equilibrium deposit rate thus implies a decrease in the quantity of type 1 DM trade, and type 2 DM trade strictly decreases when buyers are forced to switch from stablecoins to tokenized deposits. □

Proof of Proposition 6. Prohibiting stablecoins has no effect when $\theta \leq \bar{\theta}_1$, so the result is trivially true in this case. We focus on $\bar{\theta}_1 < \theta < \bar{\theta}_2$ in the proof because the notation is slightly simpler in this case. The proof for $\theta \geq \bar{\theta}_2$ follows similar steps.

When $\bar{\theta}_1 < \theta < \bar{\theta}_2$, deposits and stablecoins offer the same return, and the quantity q^j traded is the same in all DM meetings. In any such allocation, the welfare measure in equation (20) can be written as

$$\begin{aligned} W = \eta \int_{\hat{\gamma}}^{\bar{\gamma}} \left[(1-\pi)\beta\gamma - 1\right] d\gamma + \left[\beta(1+r^B) - 1\right](\eta b_k + b_s) \\ + (\lambda_1 + \lambda_2)\Big\{u\big(q\left[\mathcal{D}(1+r)\right]\big) - w\big(q\left[\mathcal{D}(1+r)\right]\big)\Big\}, \end{aligned} \tag{35}$$

where the quantity of DM trade satisfies $q\big[\mathcal{D}(1+r)\big] = w^{-1}\big[\beta(1+r)\mathcal{D}(1+r)\big]$ from equation (3). Similar to equation (23), we can write the joint market-clearing equation for stablecoins and deposits as

$$\eta b^k + b^s = (\lambda_1 + \lambda_2)\mathcal{D}(1+r) - \eta\left(\bar{\gamma} - \hat{\gamma}\right).$$

The total quantity of safe assets must equal total money demand minus the part of the money supply that is backed by risky projects. Substituting this expression into equation (35) and rearranging terms, we have

$$W = (\lambda_1+\lambda_2)\underbrace{\Big\{\left[\beta(1+r^B)-1\right]\mathcal{D}(1+r)+u\big(q\left[\mathcal{D}(1+r)\right]\big)-w\big(q\left[\mathcal{D}(1+r)\right]\big)\Big\}}_{\equiv F(1+r)}$$

$$\eta\underbrace{\left\{\int_{\hat{\gamma}}^{\bar{\gamma}}\left[(1-\pi)\beta\gamma-1\right]d\gamma-\left[\beta(1+r^B)-1\right](\bar{\gamma}-\hat{\gamma})\right\}}_{\equiv G(\hat{\gamma})}.$$

This expression measures welfare as a function of two equilibrium variables: the interest rate $1+r$ received by buyers, which determines the total quantity of money and the amount of DM trade, and the cutoff $\hat{\gamma}$ that determines how many risky projects are operated. It is convenient to divide welfare into two components, as indicated above. The first part, labeled $F(1+r)$, measures the net social benefit from producing money and exchange when the return on money is $1+r$ *if* that money were entirely backed by safe assets. The second part, labeled $G(\hat{\gamma})$, is the adjustment needed because some of the money is backed by risky projects rather than safe assets.

The proof proceeds in three steps. We first provide conditions under which F is strictly decreasing in $1+r$ and under which G is strictly decreasing in $\hat{\gamma}$. We then use these steps together with Proposition 5 to establish the result.

Step (i) : When if F increasing in $1+r$?

Differentiating the definition of F yields

$$F'(1+r) = \big(\beta(1+r^B)-1\big)\mathcal{D}' + \frac{u'\left[\beta(1+r)\mathcal{D}(1+r)\right]}{w'\left[\beta(1+r)\mathcal{D}(1+r)\right]}\left[\beta\mathcal{D}+\beta(1+r)\mathcal{D}\right]-\beta\mathcal{D}-\beta(1+r)\mathcal{D}'.$$

Using the buyer's first-order condition in equation (5) and combining terms, we can write this derivative as

$$\begin{aligned} F'(1+r) &= \beta\left(r^B-r\right)\mathcal{D}'-\mathcal{D}'+\frac{1}{\beta(1+r)}\left[\beta\mathcal{D}+\beta(1+r)\mathcal{D}'\right]-\beta\mathcal{D} \\ &= \beta\left(r^B-r\right)\mathcal{D}'+\left(\frac{1}{1+r}-\beta\right)\mathcal{D} \\ &\geq 0 \qquad \text{if} \qquad r\leq r^B. \end{aligned}$$

The last line uses the fact that the interest rate on money always satisfies $1+r\leq\beta^{-1}$. This step shows that, if we hold the cost of creating money at fixed at $1+r^B$ and the interest rate buyers receive on money is below this cost, increasing the interest rate toward $1 + r^B$ would raise welfare. The intuition behind this step is a standard Friedman-rule argument.

Step (ii) :When is G increasing in $\hat{\gamma}$?

Differentiating the definition of G yields

$$\begin{aligned}
G'(\hat{\gamma}) &= -\left((1-\pi)\beta\hat{\gamma} - 1\right) + \left(\beta(1+r^B) - 1\right) \\
&= \beta\left(1 + r^B - (1-\pi)\hat{\gamma}\right) \\
&\geq 0 \qquad \text{if} \qquad (1-\pi)\hat{\gamma} \leq 1 + r^B.
\end{aligned}$$

Holding the total stock of money fixed, increasing the threshold $\hat{\gamma}$ implies that less of the money is backed by risky projects and more is backed by safe assets. The calculation above shows that this shift raises welfare if and only if the expected return on the marginal project, $(1-\pi)\hat{\gamma}$, is less than the return on safe assets.

Step (iii) : Establishing the result.

The equilibrium deposit rate when both banks and stablecoin issuers operate is $1 + r_D^* = 1 + r_S^* = 1 + r^B$, which satisfies the condition of step (i) above. The statement of the proposition assumes the equilibrium investment threshold $\hat{\gamma}^*$ when both banks and stablecoin issuers operate sanctifies

$$(1-\pi)\hat{\gamma}^* \leq 1 + r^B,$$

so the condition of step (ii) is also satisfied. If stablecoins are prohibited, Proposition 5 shows that both $\hat{\gamma}$ and the interest rate on deposits (which will be used by all buyers) weakly decrease. The two steps above then show that welfare must also weakly decreases. □

Proof of Proposition 7. We first show that allowing only stablecoins in type 2 trade increases the equilibrium deposit rate. For any $\theta < \bar{\theta}_2$, the equilibrium deposit rate under the baseline policy where both types of money are allowed satisfies $1 + r_D^* \geq 1 + r^B$. If $\theta < \bar{\theta}_1$, this inequality is strict and $1 + r_D^*$ and satisfies the market-clearing equation (25). If $\bar{\theta}_1 \leq \theta < \bar{\theta}_2$, the equilibrium deposit rate equals $1 + r^B$. Under a stablecoins-only policy, the market-clearing equation for deposits in both cases becomes

$$\lambda_1 \mathcal{D}\left(1 + r_t^D\right) = \eta\left[\bar{\gamma} - (1+\theta)\left(1 + r_t^D\right)\right].$$

Equations (29) – (30) show that the unique solution to this equation is strictly larger than $1 + r^B$ for all $\theta < \bar{\theta}_2$. In addition, $\lambda_2 > 0$ implies that the solution is larger than that to equation (25). Therefore, that equilibrium deposit rate is strictly higher under a stablecoins-only policy. Intuitively, the policy decreases the demand for deposits, which makes deposits a more expensive funding source for banks.

Total safe asset holdings are zero under the baseline policy when $\theta \leq \bar{\theta}_1$ and strictly positive under a stablecoins-only policy, which is clearly an increase. When $\theta > \bar{\theta}_1$, safe assets are held only by stablecoin issuers and under the baseline policy are equal to

$$b_s^* = (\lambda_1 + \lambda_2)\mathcal{D}(1 + r^B) - \eta\big[\bar{\gamma} - (1 + \theta)(1 + r^B)\big].$$

Combining inequality (29), which holds for all $\theta < \bar{\theta}_2$, with the equation above implies

$$b_s^* < \lambda_2 \mathcal{D}(1 + r^B).$$

In other words, safe asset holdings under the baseline policy are smaller than total money demand from type 2 buyers, because some of this demand is being met by deposits that are backed by risky projects. Under a stablecoins-only policy, all of this demand is met by stablecoins backed by safe assets. When $\bar{\theta}_1 < \theta < \bar{\theta}_2$, type 2 buyers earn the same return under both policies and, hence, their money demand is unchanged. As a result, total safe asset holdings must increase.

The investment threshold $\hat{\gamma}_t$ in equation (10) is strictly increasing in the deposit rate $1 + r_t^D$. Becasue a stablecoins-only policy causes the deposit rate to strictly increase, this threshold also increases and fewer risky projects are funded.

Finally, the quantity of DM trade in a type j meeting is a strictly increasing function of the interest rate on the type of money type j buyers hold, as shown in equation (34). The strict increase in the equilibrium deposit rate thus implies that the quantity traded in type 1 meetings strictly increases. If $\theta < \bar{\theta}_1$, the policy requires type 2 buyers to switch from higher-yielding deposits to lower-yielding stablecoins, which causes q_2^* to strictly decrease. If $\bar{\theta}_1 \leq \theta < \bar{\theta}_2$, type 2 buyers earn the return $1 + r^B$ under both policies and, therefore, q_2^* is unchanged. □

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