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CAPITAL FLOWS IN A WORLD STARVED FOR LIQUIDITY: ANALYSIS AND POLICY IMPLICATIONS

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ABSTRACT

We propose a framework for studying financial and macroeconomic dynamics in an environment where liquid assets have a productive use but their supply is limited (i.e., the economy is starved for liquidity). The private demand for financial assets arises from the need to hold them for production. The private supply of financial assets is limited and unstable because of borrowing constraints and default risk. We discuss open-economy applications that analyze the accumulation of foreign reserves by emerging economies, the increase in public debt issued by advanced economies, the rapid growth of emerging economies, structural changes in financial markets, and financial globalization. A key result is that most of these developments led to a decline in interest rates and an increase in global macroeconomic volatility, driven by riskier borrower portfolios.

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1 Introduction

A defining feature of the world economy over the last 35 years has been the significant integration of global financial markets. Strikingly, during this era of financial globalization we observed considerable growth in the demand for liquid assets that far exceeded the growth in their supply. Figure 1 shows that this was associated with (a) large, secular decline in the world real interest rate; (b) fast growth of credit to the private sector in both emerging economies (EMEs) and advanced economies (AEs); (c) larger cross-country holdings of financial assets (and liabilities); (d) and a large decline in the net foreign assets position of AEs.

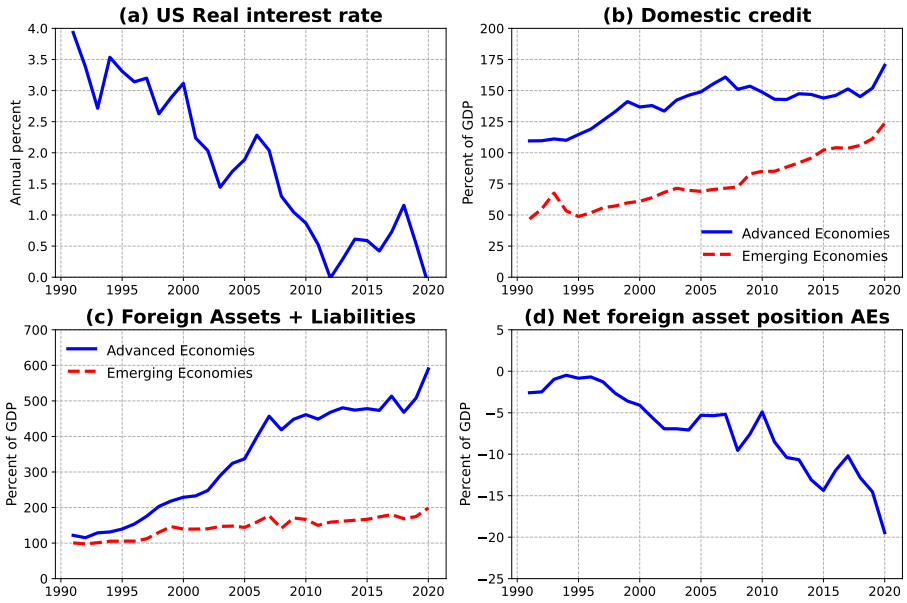

Figure 1: Empirical trends in 1991-2020

During this period, we also observed additional trends illustrated in Figure 2: (a) emerging economies grew faster than advanced economies; (b) emerging economies accumulated large stocks of foreign reserves; and (c) financial crises occurred more frequently in both emerging and advanced economies.

In this article, we propose a simple framework that sheds light on the underlying factors that could lead to these changes and their

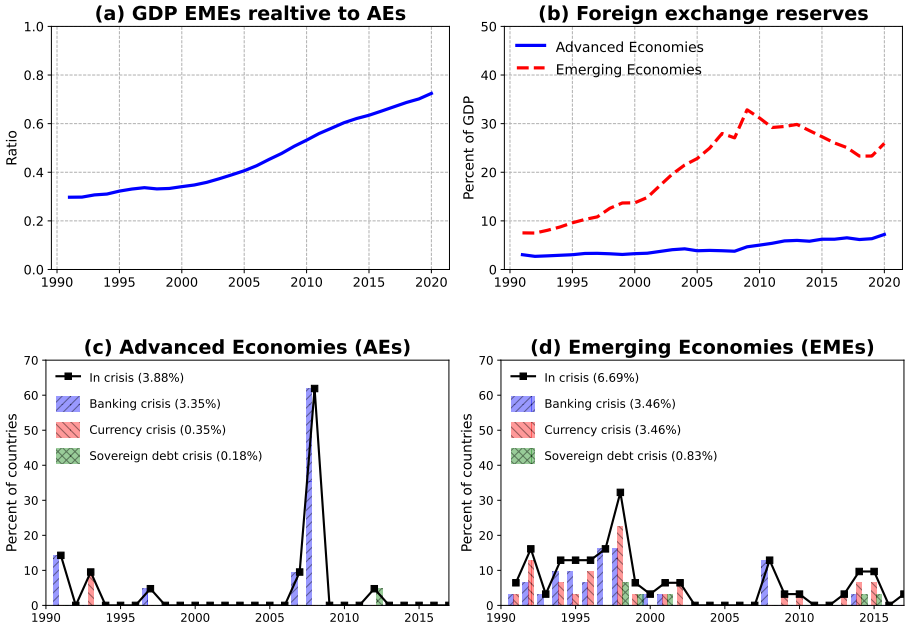

Figure 2: Empirical trends in 1991-2020

implications for macro/financial stability. We then review three applications in which this framework is extended to study the effects of the faster growth of EMEs and the structural changes in world financial markets, the implications of the sharp increases in foreign reserves of EMEs and the public debt of advanced economies, and the risk-sharing and risk-exposure effects of financial globalization.

The motivation and the focus of this research follow from several important strands of the finance and international macro literature. In particular, studies on the global saving glut and global imbalances (e.g., Servén and Nguyen (2010), Mendoza, Quadrini, and Ríos-Rull (2009)), the shortage of liquid assets (e.g., Gorton and Metrick (2012), Caballero, Farhi, and Gourinchas (2017)), corporate cash hoarding (e.g., Riddick and Whited (2009), Bebczuk and Cavallo (2016)), the surge in foreign reserves of EMEs (e.g., Bianchi and Lorenzoni (2022), Kondo and Hur (2016)), sudden stops of capital inflows (e.g., Bianchi and Mendoza (2020), Perri and Quadrini (2018)), and convenience yields on risk-less bonds and the supply of assets of currency-reserve countries (e.g., Jiang, Krishnamurty, and

Lustig (2021), Krishnamurthy and Vissing-Jorgensen (2012), Zhang, Mendoza, and D'Erasmo (2016)).

2 A Model of Liquid Asset Scarcity

We approach the notion of scarcity or shortage of liquid assets in a similar way as in the line of studies following the early work by Caballero, Farhi, and Gourinchas (2008). This study posits that an economy may be unable to create a sufficient supply of saving instruments, leading to their scarcity. By scarcity of assets, we do not mean that savers cannot find suitable financial instruments in which to allocate their savings. Rather, we refer to a market condition in which the price of these instruments is high—due to strong demand—and their return is low. Moreover, this market return may be considered lower than ideal from an efficiency standpoint.

Why does this matter in our framework? The reason is that the creation of assets ends up determining the volume of feasible savings. Savings, in turn, affect production. To illustrate the significance of this mechanism and the implications in an international context, we introduce first a simple closed-economy model. We then extend it to incorporate multiple countries or regions.

2.1 Model

Consider an economy populated by two types of agents, A and B, that live for two periods, 1 and 2. They are both endowed with z units of consumption goods in each of the two periods. Production takes place only in period 2: agents of type A can transform one unit of endowment into $R^A > 1$ consumption goods, while agents of type B can transform one unit of endowment into $R^B > 1$ consumption goods. We assume that $R^A > R^B$. For simplicity, there is no discounting.

When production takes place in period 2, the assumption that $R^A > R^B$ implies that it is efficient for type-A agents to purchase the endowment of type-B and transform it into consumption goods, together with their own endowment. However, the purchase of the endowment from type-B agents requires advanced payment, which in turn requires type-A agents to carry financial assets into period 2 (i.e.,

it requires "liquidity"). In particular, we assume that the purchase of a quantity x of endowment from type-B agents requires financial assets ϕx. The parameter ϕ plays an important role in determining the demand for financial assets.

In anticipation of that, type-A agents use the endowment obtained in period 1 to purchase financial liabilities m issued by type-B agents. For type-A agents, these liabilities represent financial assets that can be carried to period 2. The total liabilities that type-A agents can purchase depend on the ability or capacity of type-B agents to issue them, that is, on their ability to borrow.

Suppose that type-B agents can issue liabilities in period 1 for up to a fraction κ of their endowment. Thus, the maximum amount of liabilities they can issue is κz. The parameter κ plays a key role in determining the supply of assets. Importantly, this imposes a limit on the maximum financial assets that type-A agents can accumulate in period 1, that is, $m \leq \kappa z$. Competition for the acquisition of liabilities issued by type-B agents will result in their price being $q = 1/R^A$. At that price, type-A agents will be indifferent between saving an extra unit of endowment to acquire financial assets in period 2, and at equilibrium we have $m = \kappa z$.

If $\kappa \geq \phi$, the equilibrium is efficient, in the sense that, in period 2, the aggregate endowment of the economy will be used in production by the most productive agents (type A). However, if $\kappa < \phi$, the equilibrium is inefficient because only a fraction κ/ϕ of the endowment of type-B agents will be used in production by the more productive type-A agents.

2.2 Shortage of liquid assets

The case with $\kappa < \phi$ captures a situation of shortage of financial assets. The shortage of assets is a relative concept: it depends on the easiness with which the economy can create assets (supply), but also on the need for those financial assets (demand). In the model, the supply is determined by the parameter κ and the demand by the parameter ϕ. Thus, the ratio ϕ/κ is an indicator of the degree of asset shortage in the model. The higher is this ratio, the higher is the demand for assets relative to the supply. In the context of our model, this ratio affects the allocation of endowments into more productive uses and it has real effects: the higher is the ratio (higher shortage of

assets), the lower is production efficiency.

2.3 Financial crises

The ability to issue liabilities, captured by the parameter κ, improves allocation efficiency because it allows for the creation of financial assets (debt of type-B agents) that can be accumulated by savers. However, the possibility that this debt could be defaulted on, introduces financial and real instability.

Suppose that, with some probability λ, type-B agents default on their debt at the beginning of period 2 and repay zero. To keep the model simple, we take this event as purely exogenous (in the applications, we explain how this could be the result of self-fulfilling expectations). What we would like to show here is that default generates a macroeconomic downturn in period 2.

In absence of default, aggregate production in period 2 is

$$Y^{Pay} = \left[z + z\left(\frac{\kappa}{\phi}\right)\right] R^A + \left[z - z\left(\frac{\kappa}{\phi}\right)\right] R^B.$$

The first term on the right-hand-side is the production of type-A agents and the second term is the production of type-B agents. Collecting terms, the above expression can be rewritten as

$$Y^{Pay} = z\big(R^A + R^B\big) + z\frac{\kappa}{\phi}\big(R^A - R^B\big). \tag{1}$$

In the event of default, instead, production in period 2 is

$$Y^{Def} = z\big(R^A + R^B\big). \tag{2}$$

In this case, type-A agents lose their financial wealth and are unable to purchase any endowment from type-B agents. As a result, production is the sum of the production of the two types of agents when each uses their own endowments as inputs.

The difference in the level of aggregate output between repayment and default is given by

$$Y^{Pay} - Y^{Def} = z\frac{\kappa}{\phi}\big(R^A - R^B\big), \tag{3}$$

which is positive because $R^A > R^B$.

The expected production is given by

$$\overline{Y} = z\big(R^A + R^B\big) + (1-\lambda)z\frac{\kappa}{\phi}\big(R^A - R^B\big). \tag{4}$$

Notice that the expected efficiency gain—the second term on the right-hand-side—*decreases* in the degree of asset shortage ϕ/κ.

As a measure of volatility we can use the production difference between repayment and default, over expected production, that is,

$$\frac{Y^{Pay} - Y^{Def}}{\overline{Y}} = \frac{1}{1-\lambda+\frac{\phi}{\kappa}\left(\frac{R^A+R^B}{R^A-R^B}\right)}. \tag{5}$$

This shows that output volatility also decreases with asset shortage ϕ/κ. Thus, as the shortage of assets increases, average output and volatility both decline, potentially establishing a trade-off between macroeconomic growth and volatility (i.e., if the shortage of assets falls, mean output rises but so does output volatility).

2.4 Financial development

The parameters κ and ϕ reflect the structure of the financial system which evolves over time. In general, while κ is expected to grow over time as financial development offers new opportunities to borrow and improved conditions for contract enforcement, the expected evolution of ϕ is less obvious. On the one hand, we would think that financial development should facilitate direct or intermediated trade credit, reducing the need to hold financial assets as working capital. On the other hand, however, the growing importance of intangible capital makes it more difficult to promise credible ex-post payments, which could increase the need of financial assets. Thus, whether financial development leads to an increased or reduced shortage of assets is an empirical question.

We will return to this point later but, as we noted at the outset, the observation that the world interest rate has declined sharply since 1990 suggests that the increase in κ—supply of assets—may have been outpaced by the increase in ϕ—demand for assets.

2.5 Public supply of assets

So far we have considered only private issuance of financial liabilities. But governments also issue financial liabilities that, at least in certain countries, play an important role in providing liquid assets. How does the equilibrium change if the government borrows?

Suppose that the government issues public debt by the amount $b = \gamma z$ in period 1, and repays it in period 2. The funds raised in period 1 are redistributed equally to agents of types A and B. Then, in period 2, the government raises lump-sum taxes from both agents to pay back the debt.

Since type-A agents are more productive in period 2, they will be the ones buying the public debt. Thus, the financial assets accumulated by agents A are now $m = \kappa z + \gamma z$. This implies that, in period 2, type-A agents will be able to purchase endowment goods from agents B by the quantity $(\kappa + \gamma)z/\phi$.

Aggregate output in absence of default is

$$\begin{aligned} Y^{Pay} &= \left[z + z\left(\frac{\kappa+\gamma}{\phi}\right)\right] R^A + \left[z - z\left(\frac{\kappa+\gamma}{\phi}\right)\right] R^B \\ &= z\big(R^A + R^B\big) + z\left(\frac{\kappa+\gamma}{\phi}\right)\big(R^A - R^B\big). \end{aligned} \tag{6}$$

An increase in public debt—higher γ—increases aggregate output. In the event of private default, aggregate output is

$$Y^{Def} = z\big(R^A + R^B\big) + z\left(\frac{\gamma}{\phi}\right)\big(R^A - R^B\big). \tag{7}$$

The drop in output due to default, in absolute value, is the same with and without public debt. In percentage of output, though, the drop is smaller. In fact, as a ratio of expected output, the drop is

$$\frac{Y^{Pay} - Y^{Def}}{\overline{Y}} = \frac{1}{(1-\lambda)\left(1+\frac{\gamma}{\kappa}\right) + \frac{\phi}{\kappa}\left(\frac{R^A+R^B}{R^A-R^B}\right)}. \tag{8}$$

Thus, public debt increases aggregate output and lowers its volatility. Provided, of course, that public debt is safe.

3 Open Economy Model

We now extend the model to an open economy with two regions: Advanced Economies (AEs) and Emerging Economies (EMEs). The two regions have the same structure as described earlier. In particular, the agent-specific returns R^A and R^B are the same in each region. However, they could differ in endowment, z, and in financial parameters, κ and ϕ. We will use the "hat" symbol to denote the endowments and financial parameters of EMEs.

3.1 Global spillovers

In period 1, type-B agents in advanced and emerging economies issue debt by the amounts κz and $\hat{\kappa}\hat{z}$, respectively. These liabilities are purchased by type-A agents. The demand will drive the price to $1/R^A$ so that type-A agents are indifferent in the acquisition of these liabilities: even if the liabilities pay an expected return of $1/R^A - 1$, each unit allows type-A agents to generate an expected profit of $1 - 1/R^A$.

This indifference implies that the equilibrium is undetermined. Agents of type A in AEs may acquire more liabilities (domestic and foreign) than the same agents of type A in EMEs or viceversa. It also means that domestic and foreign liabilities are the same for these agents. This is because the simple model considered here abstracts from concavity in the utility and production functions. With concavities, indeterminacies are eliminated but the model maintains the properties outlined here. Concavities will be considered in the extensions presented in the next section.

To break the indeterminacy, we assume an exogenously given portfolio structure. Specifically, we impose that type-A agents in AEs purchase the following share of domestic and foreign liabilities,

$$s = \frac{\phi z}{\phi z + \hat{\phi}\hat{z}}. \tag{9}$$

The share purchased by type-A agents in EMEs is the complement, $1 - s$. Thus, we have

$$m = s(\kappa z + \hat{\kappa}\hat{z} + \gamma z + \hat{\gamma} z) \tag{10}$$

$$\hat{m} = (1 - s)(\kappa z + \hat{\kappa}\hat{z} + \gamma z + \hat{\gamma} z) \tag{11}$$

Aggregate production in each of the two regions is

$$Y = z\Big(R^A + R^B\Big) + \left(\frac{m}{\phi}\right)(R^A - R^B) \quad (12)$$

$$\hat{Y} = \hat{z}\Big(R^A + R^B\Big) + \left(\frac{\hat{m}}{\hat{\phi}}\right)(R^A - R^B). \quad (13)$$

These expressions illustrate the importance of global financial markets for macroeconomic spillovers. A credit expansion in advanced economies—a higher κ—increases both m and $\hat{m}$, leading to a macroeconomic expansion in both advanced and emerging economies. An increase in ϕ has the opposite effects. The impact of changes in $\hat{\kappa}$ and $\hat{\phi}$ in emerging economies has an equivalent regional and global impact.

The local issuance of public debt also has global consequences: an increase in public debt issued by advanced economies generates a macroeconomic expansion in both advanced and emerging economies. Similarly, an increase in public debt issued by emerging economies generates a macroeconomic expansion in both advanced and emerging economies. Provided, of course, that these countries have the ability to issue riskless, liquid public debt.

A local financial crisis also has global consequences. Suppose that emerging economies default on their private debt. The post-default value of financial assets held by type-A agents are

$$m = s(\kappa z + \gamma z + \hat{\gamma} z), \quad (14)$$

$$\hat{m} = (1-s)(\kappa z + \gamma z + \hat{\gamma} z), \quad (15)$$

which are both smaller by the factors $s\hat{\kappa}\hat{z}$ and $(1-s)\hat{\kappa}\hat{z}$, respectively. Note that a similar effect would arise if it is the government that defaults on public debt.

While financial integration introduces macroeconomic interdependence, it also allows for risk-sharing. In fact, if emerging economies were not integrated, their output decline would have been $\hat{\gamma}\hat{z}$, instead of $(1-s)\hat{\gamma}\hat{z}$.

3.2 Global imbalances

How does the model reconcile the large and negative net foreign asset positions of advanced economies? This could be the consequence of

lower shortage of assets in advanced economies compared to emerging economies (ϕ/κ is lower than $\hat{\phi}/\hat{\kappa}$). It could also be the consequence of higher public borrowing.

The net foreign asset position of advanced economies is

$$NFA = m - \kappa z - \gamma z.$$

To simplify matters, suppose that the two regions have the same endowments, that is, $z = \hat{z}$, and there is no public debt issued by either region, that is, $\gamma = \hat{\gamma} = 0$. We can then show that $NFA < 0$ if $\phi/\kappa < \hat{\phi}/\hat{\kappa}$. In other words, advanced economies have a negative net foreign asset position if they face lower shortage of assets.

Now suppose that $z = \hat{z}$, $\kappa = \hat{\kappa}$ and $\phi = \hat{\phi}$, but the two regions issue public debt, that is, γ and $\hat{\gamma}$ are non-zero. It is easy to show that, under these simplified assumptions, the net foreign asset position of advanced economies is negative if $\gamma > \hat{\gamma}$. In other words, advanced economies accumulate a negative net foreign asset position if the region issues more public debt than emerging economies.

Note also an important caveat of this simple open-economy setup: The equilibrium interest rate or yield on the privately-issued debt is the exogenous return R^A. Hence, our analysis of global spillovers and global imbalances abstracts from potentially important general equilibrium effects operating because of the endogenous response of the world real interest rate. For example, financial development could increase ϕ and/or $\hat{\phi}$ and lead to faster growth in the global demand for liquid assets. This, in turn, increases the price of liquid assets and reduces the world real interest rate. The lower interest rate, then, incentivizes type-B agents to issue more debt. But with more debt, output would fall more in the event of default.

In the extension of our framework that we discuss next, the model accounts for the observed reduction in the world real interest rate as a result of changes that cause the demand for liquid assets to grow more than the supply. We show that these changes result in higher private leverage and higher output volatility globally, even if the source of the changes comes only from one country.

4 Model Extensions & Applications

In this Section we review three extensions of the simple framework. In these extensions, we conduct quantitative experiments to assess the implications of changes in productivity and financial structure, the growth in foreign reserves of EMEs and the public debt of AEs, and the effects of financial globalization driven by risk sharing and risk exposure.

4.1 The dynamics of asset shortage

The parameters κ and ϕ are not fixed but they change over time due to financial development. The endowments z and $\hat{z}$ also change due to economic development. Importantly, the changes experienced by the two regions may differ. This has an impact on global allocations and aggregate volatility.

In Mendoza and Quadrini (2023), we explore how the changes in z, κ and ϕ experienced by advanced and emerging economies affected aggregate volatility caused by financial crises. We developed a dynamic model that is more complex than the one described here.[1] However, the nature of the exercise and the results can be illustrated, intuitively, with the simple model.

The first step is to construct time series for z, κ and ϕ for both regions based on actual data. Since we do not observe these variables directly, we derive them indirectly so that the model replicates the observed time series of a set of empirical variables for the 1991-2020 sample period (which captures the financial globalization period). In particular, we ask the model to replicate the observed evolution of GDP and domestic credit in advanced and emerging economies, as well as the evolution of the net foreign asset position of advanced economies and the world real interest rate. This provides a total of six empirical time-series targets that allow us to identify the model

[1] Type-B agents are capital-intensive producers of a subset of intermediate goods that pay dividends to households. The parameter κ corresponds to the liquidation price of capital in case of default. The price fluctuates between this value and a "normal" price of 1 as a result of self-fulfilling expectations. Type-A agents are labor-intensive entrepreneurs with logarithmic utility that produce the other subset of intermediate goods. The parameter ϕ is a working capital coefficient that represents the fraction of the wages bill they need to pay in advance. Productivity z is perfectly correlated across the two sectors. Households have standard CRRA preferences and supply labor without a wealth effect.

parameters, z, κ and ϕ for advanced economies and $\hat{z}$, $\hat{\kappa}$ and $\hat{\phi}$ for emerging economies in the years 1991-2020. After constructing the time series for these six parameters, we conduct counter-factual simulations in which we allow only one parameter to change over time. This allow us to explore the contribution of each parameter to the observed data dynamics and to changes in aggregate output volatility.

We find that the changes in z and $\hat{z}$ contributed about one third of the increase in volatility over the 1991-2020 period. This is due to the fact that $\hat{z}$, which captures the economic size of emerging economies, increased much more than in advanced economies. Moreover, in this richer version of the model the real interest rate is an endogenous variable that also changes over time. Since emerging economies have a higher shortage of assets (higher ϕ/κ), the increase in the relative size of these two regions leads to a reduction in the interest rate. This, in turn, increased leverage worldwide.[2]

4.2 Public debt and accumulation of reserves

In Mendoza and Quadrini (2024), we explore how the accumulation of reserves by emerging economies and the issuance of public debt by advanced economies affected the world interest rate and aggregate volatility.

Our stylized model can be used to shed light on the implications of the accumulation of foreign reserves. Denoting by ζz and $\hat{\zeta}\hat{z}$ the accumulation of reserves by advanced and emerging economies, respectively, the financial assets acquired by type-A agents in the two regions are

$$m = s\Big[\kappa z + \hat{\kappa}\hat{z} + (\gamma - \zeta)z + (\hat{\gamma} - \hat{\zeta})\hat{z}\Big] \tag{16}$$

$$\hat{m} = (1-s)\Big[\kappa z + \hat{\kappa}\hat{z} + (\gamma - \zeta)z + (\hat{\gamma} - \hat{\zeta})\hat{z}\Big] \tag{17}$$

The accumulation of reserves is similar to negative issuance of public debt. While the issuance of public debt provides additional assets that the private sector can accumulate and use in production, the accumulation of reserves reduces the quantity of assets available to the

[2] In the simple model presented here, leverage increases only if κ increases. However, in the model developed in Mendoza and Quadrini (2023), borrowing changes endogenously with the interest rate.

private sector. Thus, the accumulation of reserves have a contractionary effect on world production.

Mendoza and Quadrini (2024) consider a more general model and assess the quantitative implications of both the large increase in public debt issued by advanced economies and the large increase in reserves accumulated by emerging economies.[3] They find that the impact of public debt issuance (supply) outpaced the impact of reserves (demand for public debt). In absence of other changes, we would have observed an increase in the interest rate over the 1991 period and a decline in aggregate volatility associated with financial crises.

The analysis conducted in Mendoza and Quadrini (2024) takes the observed pattern of public debt and reserves as exogenous and then it studies their macroeconomic implications. We also explored in that paper an extension considering the possibility that governments could use their reserves to cover some of the unpaid debt for the creditors in case of default. If reserves are large relative to the defaultable debt, these "bailouts" can significantly weaken the adverse effects of the surge in EME reserves on their own volatility (in a counterfactual where only the observed changes in reserves are allowed, but with the bailouts).

We can infer from these findings that acting in isolation, a single EME may want to accumulate reserves to reduce macro instability, but when this is done by all EMEs simultaneously, it also causes a reduction in the world interest rate that increases leverage and macro volatility. That is, the accumulation of reserves by EMEs that ignore the external effect of their larger reserves on the world interest rate and financial fragility would be excessive.

Another possible extension is to consider the optimal choice of both reserves and public debt. Since both can be viewed as policy instruments, it would be natural to explore how they are chosen by governments. Because the action of governments of large countries

[3] The governments of both regions accumulate reserves exogenously, and the government of the AEs issues riskless public debt also exogenously. Type-B agents are again capital-intensive producers who pay dividends to households and κ is the liquidation price of their capital in case of default, but now they produce intermediate goods with capital and labor. Type-A agents produce final goods using the inputs produced by type-B agents. The parameter ϕ represents the fraction of the cost of the inputs they need to pay in advance. Households have standard CRRA preferences without wealth effect on the supply of labor, but now they also pay lump-sum taxes to the government.

affect the world equilibrium, something that they internalize, we can expect large countries to act strategically. On the one hand, large countries that accumulate reserves may have an incentive to limit the accumulation of reserves to prevent a decline in the interest rate they earn on those reserves. On the other, the reserve currency countries (those issuing public debt purchased as reserves by other countries) may have an incentive to reduce the issuance of public debt to prevent an increase in the interest rate. The end result could be too little issuance of public debt (and too little accumulation of reserves).

4.3 Financial integration: Risk sharing or risk exposure?

Our framework can also be used to examine the implications of financial integration. As documented in Mendoza et al. (2009), both de-facto and de-jure measures of international capital mobility indicate significant increases in the degree of international capital mobility over the 1990-2020 period. The framework we proposed sheds light on the macro-financial implications of this major liberalization in international capital flows. Specifically, it yields predictions about how financial integration creates (deeper) world markets where borrowers and lenders engage in cross-border transactions, and prices of both risky private assets and risk-less public debt of AEs are determined.

One implication of the financial integration we just discussed is that surges in foreign reserves in EMEs and increases in public debt in AEs have general equilibrium effects that influence the world real interest rate. These effects generate spillovers across countries—characterized by pecuniary externalities—that affect output volatility worldwide. These global spillovers would not be present under financial autarky.

Our framework also predicts that financial globalization poses a tradeoff between risk-sharing and risk-exposure. Risk-sharing benefits via the international diversification of portfolios have been widely discussed as an important benefit of financial globalization. For example, if emerging economies hold financial assets issued by advanced economies, their portfolio is less exposed to a local crisis. In our setup, however, it is also true that by so doing, emerging economies become exposed to the risk of financial crises in advanced economies. To the extent that the likelihood of crises is similar in advanced and

emerging economies, they should both benefit from financial globalization. But if there is heterogeneity in the likelihood of crises, it is not obvious whether globalization brings significant risk-sharing to both regions. That is, financial liberalization induces a tradeoff between risk-sharing benefits and risk-exposure costs. This question is addressed in Mendoza and Quadrini (2025).

Mendoza and Quadrini (2025) document that the frequency of crises is significantly higher in emerging economies compared to advanced economies. This implies that, if at equilibrium advanced economies exchange their own liabilities—which are safer—for liabilities issued by emerging economies—which are riskier—their portfolio may become more volatile.

The heterogeneity is captured in our model by the assumption that the probability of default in advanced economies, λ, is smaller than in emerging economies, $\hat{\lambda}$.

Denote by x the stochastic variable that takes the value of κ with probability $1-\lambda$ and zero with probability λ. Similarly, denote by $\hat{x}$ the stochastic variable that takes the value of $\hat{\kappa}$ with probability $1-\hat{\lambda}$ and zero with probability $\hat{\lambda}$. Under financial autarky, the values of financial assets acquired by type-A agents in period 2 are

$$m = xz, \tag{18}$$
$$\hat{m} = \hat{x}\hat{z}. \tag{19}$$

In contrast, under financial integration their values are

$$m = s(xz + \hat{x}\hat{z}), \tag{20}$$
$$\hat{m} = (1-s)(xz + \hat{x}\hat{z}). \tag{21}$$

With financial integration, advanced economies hold both domestic and foreign assets with values determined by the stochastic variables x and $\hat{x}$. If these two variables are not perfectly correlated, m would be less volatile. This is the effect of portfolio diversification. However, if $\hat{x}$ is more volatile than x, this effect could be counterbalanced by the fact that part of the assets included in the portfolio are riskier. For emerging economies, instead, both effects reduce the volatility of $\hat{m}$.

The quantitative application of this model that we study in Mendoza and Quadrini (2025) considers comparisons richer than just

contrasting full financial autarky with perfect international capital mobility. To this end, we introduced transactions costs that make trading in foreign assets costlier than trading domestic asses (e.g., for lenders of AEs, buying assets issued by firms in EMEs is costlier than buying those issued by firms in AE). These parametric costs are calibrated to match the observed degree of home bias in portfolio structures, and their values are then altered to examine the implications of different capital-mobility regimes. In particular, we conducted a counterfactual exercise in which we compared the macro volatility generated by the baseline model (with calibrated cross-border trading costs that match observed portfolios) with that generated by the model under financial autarky. The results show that financial integration allowed emerging economies to reduce significantly their macroeconomic volatility while for advanced economies volatility also declined but much less.

5 Conclusions & Future Research

This paper proposes a framework for analyzing capital flows in an environment in which economic agents are "starved for liquidity," that is, the demand for liquid assets outpaces the supply. In this environment, the capacity of borrowers to provide (produce) liquid assets determines the stock of liquid financial wealth that lenders can hold. Borrowers may default on their liabilities, while lenders have a productive use for those liabilities. The ratio of the financial parameter driving the lenders' demand for assets to the one driving the debtors' borrowing capacity characterizes the degree of asset shortage. A tradeoff between efficiency and volatility emerges because higher shortage reduces both the average level of output and its volatility during a financial crisis.

Global capital flows supporting cross-border holdings of financial liabilities act as a vehicle for the international contagion of financial crises: Default by debtors of one country or region hurt the productive capacity of foreign lenders. Global imbalances in the form of a negative net foreign asset position in advanced economies vis-a-vis emerging economies can result from higher asset shortage in emerging economies and/or higher government debt issuance in advanced economies or increased demand for foreign reserves by governments

of emerging economies.

We reviewed extensions of this framework aimed at analyzing the implications of the faster growth of emerging economies and the estimated changes in financial structure parameters of emerging and advanced economies, the effects of the sharp increases in foreign reserves of emerging economies and public debt of advanced economies, and the risk-sharing v. risk-exposure effects of financial globalization. A common thread of these extensions is that volatility increases globally as a result of forces that cause global demand for liquid assets to increase at a faster pace than the supply. This volatility is caused in part by a pecuniary externality that causes the world interest rate to drop and the leverage of the private sector to increase, and by endogenous changes that make the portfolios of lenders riskier.

We view this framework as a compelling platform for pursuing research in different directions. One direction is to examine normative implications. In particular, it would be very appealing to study the global optimality of public debt issuance and accumulation of foreign reserves. Our findings suggest that emerging economies acting atomistically may over-accumulate foreign reserves because they do not internalize the effect of the pecuniary externality resulting from a systemic surge in reserves by all emerging economies. Individual countries may accumulate reserves during "good times" in order to engage in bailouts that stabilize their own economies during financial crises, but if a sufficient mass of these countries do it simultaneously, the result is a drop in the world interest rate that induces higher leverage and makes financial crises larger and more likely (i.e., macroeconomic volatility worsens). Hence, global coordination or cooperation in the provision of liquidity during episodes of financial distress may be more efficient. A similar argument suggests that large economies acting strategically as issuers or holders of the debt of advanced economies may produce outcomes where the supply of this debt is inefficiently low, as both issuers and holders of the debt aim to keep the debt small to move its price in their favor.

A second important direction for future research is to conduct a detailed cross-country empirical investigation splitting the business sector into net lenders and net borrowers, and aiming also to determine the size of the domestic relative to international financial positions of firms. These data could be used to test the model's predic-

tions regarding the connections between financial integration, credit activity, interest rates and macroeconomic volatility, as well as its differential implications for advanced relative to emerging economies. The data could also be used to discipline model calibrations for quantitative research.

Finally, there are also important model innovations that could be examined. For instance, in the versions of the model we have studied, countries only trade final goods. Hence, modifications to incorporate trade in intermediate goods would be worth considering. This would not only add realism, because of the sizable share of trade in intermediate goods in actual world trade, but also would introduce other vehicles for global spillovers. Changes in the prices and quantities of inputs produced by a region in which borrowers default would affect producers in other countries not only because of haircuts in cross-border holdings of financial assets owned by foreign entrepreneurs, but also via linkages in world production chains and input prices. Another set of valuable model innovations could relax the assumptions that we have imposed so far in order to support the sequential equilibrium structure that facilitates the numerical solutions. Introducing CRRA preferences, endogenous capital accumulation, or stochastic productivity shocks, would require adopting more complex solution technologies both to solve the models and to bring them to the data. The benefit would be to allow us to study the interaction of the mechanisms we discussed here with precautionary saving incentives, investment dynamics, and cross-country differences in productivity shocks.

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