RETHINKING THE EFFECTS OF FINANCIAL GLOBALIZATION*

FERNANDO BRONER AND JAUME VENTURA

During the past three decades, many countries have lifted restrictions on cross-border financial transactions. We present a simple model that can account for the observed effects of financial globalization. The model emphasizes the role of imperfect enforcement of domestic debts and the interactions between domestic and foreign debts. Financial globalization can lead to a variety of outcomes: (i) domestic capital flight and ambiguous effects on net capital flows, investment, and growth; (ii) capital inflows and higher investment and growth; or (iii) volatile capital flows and unstable domestic financial markets. The model shows how the effects of financial globalization depend on the level of development, productivity, domestic savings, and the quality of institutions. *JEL* Codes: F34, F36, F43, G15, O19, O43.

I. INTRODUCTION

During the past three decades, many countries have lifted restrictions on cross-border financial transactions, fueling a new wave of financial globalization. There is a strong and well-justified theoretical presumption that increased trade opportunities should be welfare improving. Yet many observers have noticed that the incidence of domestic financial crises has grown alongside financial globalization.[1] With historical perspective, this is not surprising. Figure I (which is taken from Reinhart and Rogoff's 2009 seminal book on financial crises) shows that this relationship between financial globalization and the incidence of financial crises is also present in earlier periods.

The goal of this article is to improve our understanding of this relationship and its implications. In particular, we explore the view that the increased instability of domestic financial

*Previous versions of this article circulated under the title "Rethinking the Effects of Financial Liberalization." We thank Francisco Queiros, Jagdish Tripathy, and Robert Zymek for excellent research assistance. We also thank the editor, Elhanan Helpman; three anonymous referees; Fernando Alvarez, Yan Bai, Vasco Carvalho, Michael Devereux, Aitor Erce, Nicola Gennaioli, Giacomo Ponzetto, Romain Ranciere; and participants at various conferences and seminars for their valuable comments. We acknowledge financial support from the International Growth Centre, the Spanish Ministry of Science and Innovation (ECO2008-01666), and the European Research Council (ERC263846-KF&EM).

1. See Demirgüç-Kunt and Detragiache (1998), Kaminsky and Reinhart (1999), Reinhart and Rogoff (2009, 2011), and Bonfiglioli (2008).

The Quarterly Journal of Economics (2016), 1497–1542. doi:10.1093/qje/qjw010.
Advance Access publication on March 7, 2016.

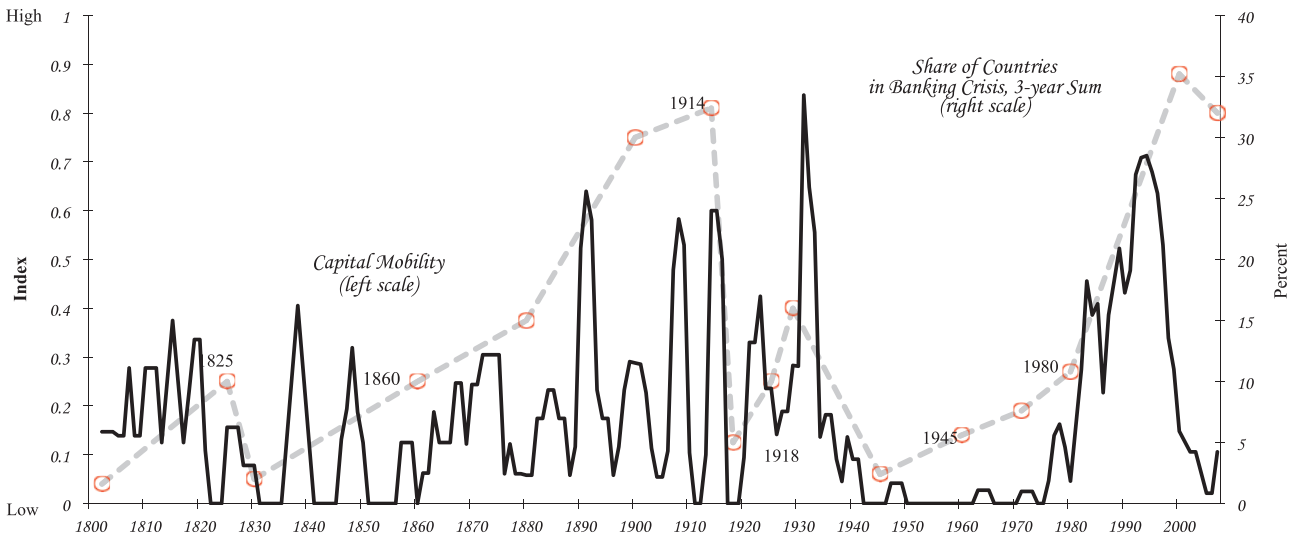

FIGURE I

Capital Mobility and Incidence of Banking Crises

Sources: Reinhart and Rogoff (2009), who combine own data with Kaminsky and Reinhart (1999), Bordo et al. (2001), Obstfeld and Taylor (2004), and Caprio et al. (2005). The index of capital mobility is the subjective index from Obstfeld and Taylor (2004).

markets can be partly explained by a change in government behavior resulting from financial globalization. This view is based on three observations. The first is that the probability of financial crises depends on the nature of financial regulations and the judicial system's ability and resolve to enforce contracts. Governments can take actions that affect this probability. For instance, they can lower it by insuring deposits or bailing out financial institutions. Or they can raise this probability by suspending bank payments, redenominating the terms or currency of existing financial contracts, and/or imposing capital controls.

The second observation is that governments cannot fully discriminate between domestic and foreign residents when undertaking these actions. In the case of bonds and stocks, discriminating against foreigners is difficult because they can resell these assets to domestic residents in secondary markets.[2] Even when trade is intermediated by banks and other financial institutions, discrimination is difficult because it is usually not possible to know the nationality of the clients of these intermediaries or how default losses would be distributed among them. Finally, courts often abide by equal treatment rules that limit the possibility of discrimination based on nationality.

The third observation is that financial globalization changes the mix of creditors, raising the number of foreign holders of domestic debts. Since governments typically care more about the welfare of domestic debtholders, if their share remains high enough, governments continue taking actions that result in a low probability of financial crises. If instead the share of domestic debtholders drops sufficiently, governments stop taking those actions. As a result, financial globalization raises the probability of financial crises.

What makes the analysis interesting is that the mix of creditors depends not only on the extent of financial globalization but also on the probability of financial crises itself. Indeed, the main contribution of this article is to develop a framework to study how the interplay between the mix of creditors and the probability of financial crises is affected by financial globalization.[3] Despite its

2. See Broner, Martin, and Ventura (2008, 2010).

3. In our theory, a financial crisis is a state of generalized default on financial contracts. This represents well many aspects of real-world crises. Examples include instances in which governments were expected to bailout financial institutions but failed to do so ex post (e.g., the East Asian crisis of the late 1990s) and in which

simplicity, this framework turns out to be a rich source of testable hypotheses linking the success or failure of financial globalization to observable country characteristics, such as initial income, savings, the level of productivity, the quality of enforcement institutions, and luck. It also suggests simple explanations for a number of observed effects of financial globalization that conventional models have had a hard time explaining.[4]

Perhaps the most noticeable aspect of the recent wave of financial globalization is that despite the large increase in gross capital flows around the world, net capital flows to emerging markets have often been quite small and sometimes even negative. Conventional models recognize that foreign sources of financing can be risky, as the temptation for opportunistic default combined with low-quality institutions can generate recurrent foreign debt crisis. But they also assume that domestic savings stay at home, and that new foreign sources of financing constitute a net addition to overall development financing. If enforcement institutions cannot discriminate between domestic and foreign debtholders however, foreign debt crisis might bring about domestic debt crises. Anticipating this, domestic savers might find it optimal to send part or all of their savings abroad. This detrimental "capital flight" effect means that financial globalization not only adds new foreign sources of financing that are cheap but risky, it also subtracts domestic sources of financing that were expensive but safe. This tends to raise gross capital flows but has an ambiguous effect on net capital flows and overall development financing.

Another aspect of financial globalization is that emerging markets receiving substantial net capital flows have been those that are already somewhat rich and have substantial domestic savings. Conventional models predict that these countries should benefit from financial globalization less than poorer countries that have low domestic savings. The reason, of course, is that their needs for foreign financing are less acute. But in our framework, domestic savings might foster capital inflows rather than

governments redenominated the terms of financial contracts (e.g., the pesificación of Argentine bank assets and liabilities in 2001–2002).

4. For a thorough review of the effects of financial globalization, see the surveys by Prasad, Rajan, and Subramanian (2007), Kose, Prasad, Rogoff, and Wei (2009), and Obstfeld (2009). In Section VII, we describe how our theoretical results relate to the main findings of the empirical literature. The interested reader will find many additional references there.

the opposite. The key observation again is that enforcement institutions might not be able to discriminate between domestic and foreign debtholders. If domestic markets are deep enough, the desire to enforce domestic debts reduces or eliminates the temptation for opportunistic default on foreigners. This beneficial "financial depth" effect lowers the risk of foreign borrowing and raises capital inflows.[5]

Another aspect of financial globalization is that it has led to capital flows that are volatile and procyclical. The two effects discussed here suggest that two equilibria are possible, depending on investor sentiment. If domestic savers are pessimistic and think the probability of default is high, they prefer to send most of their savings abroad. In this case, default affects mostly foreign debts and countries prefer to default ex post, confirming the pessimistic beliefs. This equilibrium with small or negative capital inflows always exists. If instead domestic savers are optimistic and think that the probability of default is small, they keep their savings at home. In this case, default affects mostly domestic debts and countries prefer not to default ex post, confirming the optimistic beliefs. This equilibrium with substantial capital inflows exists only if domestic savings are high relative to foreign borrowing. We describe these equilibria and show how changes in investor sentiment can generate macroeconomic volatility and procyclical capital flows.

Our theory provides an example of how globalization strains existing institutions. We start from a situation in which, despite imperfect enforcement institutions, domestic debts are enforced and financial crises never occur. After financial globalization, and despite no institutional change, domestic debts might no longer be enforced and the probability of financial crises increases. The basic point is that globalization affects policy incentives,

5. Although in our model the financial depth effect depends literally on domestic savings, more generally what matters is the extent to which those savings are intermediated. This is usually referred to in the literature as financial development. Our theory accounts for rich interactions between financial development and capital flows, which depend especially on whether the capital flight or financial depth effect dominates. Interestingly, Lane and Milesi-Ferretti (2001) find that the relationship between financial development and capital flows is different for industrial and developing countries. In the former, capital inflows are positively related to financial development, whereas in the latter this is not the case. This suggests that the financial depth effect might be stronger in industrial countries.

sometimes accentuating the shortcomings of imperfect institutions. This is a main theme of this article.[6]

Our study is another step forward in the development of a modern theory of financial globalization. The underpinnings of this theory were laid out by the maximizing models that took over the field of international economics in the early 1980s. These models were designed to study the pattern of capital flows and their macroeconomic consequences. They sprang from two sources that made opposite assumptions regarding the costs of international risk sharing. The so-called intertemporal approach (IA) to the current account assumed that these costs are prohibitive. And the open-economy versions of the real business cycle (RBC) model assumed that these costs are negligible. See Obstfeld and Rogoff (1996) for a textbook treatment of these models.

In the case of industrial countries, Kraay and Ventura (2000, 2003) and Ventura (2003) showed that the IA models perform quite well empirically. Instead, RBC models predict much more international risk sharing than observed in the data. This is why a lot of research in the field has focused on explaining why risk sharing is so low among industrial countries. See the surveys by Lewis (1999), Karolyi and Stultz (2003), and Sercu and Vanpée (2007).

In the case of emerging markets, it was recognized early on that neither the IA nor the RBC models were appropriate.[7] Recall that these models were developed in the 1980s against the background of the worst sovereign debt crisis since the 1930s. Consequently, a new class of models was developed emphasizing the role of strategic default on foreign debts (also called sovereign risk). See the important papers by Eaton and Gersovitz (1981), Grossman and Van Huyck (1988), Bulow and Rogoff (1989a, 1989b), and Atkeson (1991), and the surveys by Eaton and Fernández (1995) and Aguiar and Amador (2014).[8] The predictions of these models for financial globalization are largely the

6. In this regard, this article can be seen as a contribution to a large literature on the relationship between institutions, financial development, and economic growth. See the surveys of Levine (2005) and Beck and Levine (2005).

7. See Aguiar and Gopinath (2007) for a recent contrarian view.

8. Other influential papers include Cole and Kehoe (1997), Kletzer and Wright (2000), Wright (2002), Aguiar and Gopinath (2006), Amador (2008), Arellano (2008), Aguiar, Amador, and Gopinath (2009), Bai and Zhang (2010), and Chang (2010).

same as those of the IA models.[9] Strategic default reduces the size of the effects, but it does not change their nature.[10]

A number of papers have shifted the focus away from macroeconomic or sovereign risk and toward microeconomic frictions in financial markets. In a seminal paper, Gertler and Rogoff (1990) showed that if wealth plays a role as collateral when borrowing (as it is often the case when various microeconomic frictions are present), autarky interest rates might be lower in capital-scarce countries than in capital-abundant ones, even if the marginal product of capital is higher. This might reverse the predictions of the IA models regarding the pattern of capital flows. Boyd and Smith (1997) and Matsuyama (2004, 2008) used this insight in related dynamic models to show that financial liberalization can reduce investment and growth in capital-scarce countries. These models have the ability to explain why capital flows toward countries that are already somewhat rich and have developed financial markets.[11]

Sovereign risk and microeconomic financial frictions are both important features of real economies. Our work here, and also that in Tirole (2003) and Broner and Ventura (2011), build on both traditions and shows how the sovereign's behavior worsens as a result of globalization, making microeconomic frictions more severe. Two recent papers, Brutti (2011) and Gennaioli, Martin, and Rossi (2014) have proposed related models in which

9. An interesting exception is Aguiar and Amador (2011). In their model, sovereign risk interacts with the incentives to expropriate capital so that reductions in public debt are associated with higher private capital inflows, investment, and growth.

10. It might, however, explain the composition of capital flows. See Kraay et al. (2005).

11. Focusing on the macroeconomic effects of microeconomic frictions when studying international capital flows has become quite popular recently. See Burnside, Eichenbaum, and Rebelo (2001), Caballero and Krishnamurty (2001), Shleifer and Wolfenzon (2002), Aoki, Benigno, and Kiyotaki (2006), Jeske (2006), Caballero, Farhi, and Gourinchas (2008), Antràs and Caballero (2009), Mendoza, Quadrini, and Rios-Rull (2009), Martin and Taddei (2013), and Castiglionesi, Feriozzi, and Lorenzoni (2015), among others. Another interesting line of research is that followed by Acemoglu and Zilibotti (1997), who develop a model in which investments are indivisible. In their framework, financial globalization reduces investment and growth in capital-scarce countries if the world is poor enough, but this trend reverses as the world grows richer. Martin and Rey (2006) have shown that in this framework, changes in investor sentiment can also generate macroeconomic volatility and procyclical capital flows.

nondiscriminatory defaults on sovereign debt reduce the net worth of investors and thus create turmoil in domestic financial markets.

The rest of the article is organized in seven sections. Section II develops the basic analytical framework used throughout the article. Section III solves the model in autarky and shows that enforcement problems do not arise when all debts are domestic. Section IV solves the model after financial globalization. Section V analyzes the model for the particular case in which there is a representative agent and/or enforcement is discriminatory. Section VI analyzes the general case. Section VII describes how our main results relate to the findings of the empirical literature. Section VIII concludes with some remarks on the role of policy.

II. A Simple Model of Credit, Investment, and Growth

Consider a small country inhabited by an infinite sequence of two-period overlapping generations indexed by $t \in (-\infty, \infty)$. All generations contain a continuum of individuals of size one that maximize the utility function

$$U^i_{t,t} = \ln c^i_{t,t} + \beta \cdot E_t \ln c^i_{t,t+1}, \tag{1}$$

where $\beta > 0$ and $c^i_{t,t}$ and $c^i_{t,t+1}$ are the consumptions of individual i of generation t in periods t and $t + 1$.

The output of the country is given by a Cobb-Douglas production function: $f(k_t) = A \cdot k_t^{\alpha} \cdot l_t^{1-\alpha}$ with $\alpha \in (0, 1)$ and $A > 0$, where k_t and l_t are the country's capital stock and labor force. The young supply one unit of labor inelastically, so that $l_t = 1$ for all t. The capital is supplied by the old and fully depreciates during production. A fraction ϵ of members of each generation, the "entrepreneurs," can produce one unit of capital per unit of output. The rest of the generation, the "savers," can only produce $\rho > 0$ units of capital per unit of output. We focus throughout on the case $\rho \approx 0$. Let I_t be the set of all members of generation t, and I^E_t and I^S_t be the subsets of entrepreneurs and savers.

Factor markets are competitive and factors of production are paid their marginal products:

$$w_t = (1 - \alpha) \cdot A \cdot k_t^{\alpha} \text{ and } r_t = \alpha \cdot A \cdot k_t^{\alpha-1}, \tag{2}$$

where w_t and r_t are the wage and the rental rate. Equation (2) shows how output is split between the young generation who owns the labor and the old generation who owns the capital stock.

The focus of our analysis is the credit market. In this market, noncontingent debt contracts are traded.[12] Before financial globalization, only domestic residents participate in this market. Financial globalization allows residents from other, unspecified countries whose combined size is much larger than that of our country to participate in this market. These "foreigners" are willing to buy or sell debt contracts offering an expected gross return of one. We refer to debt contracts issued and held by domestic residents as *domestic debts*. We refer to debt contracts issued by domestic residents and held by foreigners as *foreign debts*. Finally, we refer to debt contracts issued by foreigners and held by domestic residents as *foreign assets*.

Foreign assets are always enforced. But domestic and foreign debts might not be. In particular, we assume that the country's enforcement institutions are imperfect and succeed only with probability $\pi \in [0, 1]$. When institutions succeed, all outstanding debts are enforced. When institutions fail, the old generation chooses whether to enforce outstanding debts. The parameter π measures the quality of the country's institutions.

We do not model explicitly how generations make collective decisions when institutions fail. Instead, we assume that these decisions are consistent with two principles: (i) an increase in the consumption of any member of the generation is desirable, and (ii) a redistribution that reduces consumption inequality within the generation is also desirable. Define $c_{t,t+1}$ as the average old-age consumption of the members of generation t, that is, $c_{t,t+1} = \int_{i \in I_t} c^i_{t,t+1}$. Then we assume that generation t chooses enforcement in period $t + 1$ to maximize the expected value of

$$W_{t,t+1} = c_{t,t+1} - \frac{\omega}{2} \cdot \int_{i \in I_t} \left| c^i_{t,t+1} - c_{t,t+1} \right|, \tag{3}$$

12. As most of the literature, we do not justify why debt contracts are not contingent. Introducing contingencies would eliminate default, but most of the results in terms of quantities and welfare would survive. See Broner and Ventura (2011) for a model of financial globalization with contingent debt contracts.

where ω is the weight on the second principle. We assume that $\omega \in (0, 1)$ so that an increase in the consumption of any individual is desirable even if this raises inequality.[13]

We introduce two restrictions on enforcement decisions. The first is that it is not possible to discriminate among debts held by creditors of the same type. Thus, there are three relevant enforcement states, $z_{t+1} \in \{E, D, N\}$. If $z_{t+1} = E$, all debts are enforced. If $z_{t+1} = D$, domestic debts are enforced but foreign debts are not. If $z_{t+1} = N$, neither domestic nor foreign debts are enforced. Let p_t^E, p_t^D, and p_t^N be the probability as of period t that z_{t+1} takes the corresponding value.[14] The second restriction is that it is sometimes not possible to discriminate between domestic and foreign debts. If generations enforce domestic debts, attempts to default on foreign ones succeed only with probability $\delta \in [0, 1]$. Thus, when institutions fail, generations choose among $z_{t+1} = E$, $z_{t+1} = N$, and a "discrimination lottery" that delivers $z_{t+1} = D$ with probability δ and $z_{t+1} = E$ with probability $1 - \delta$. The parameter δ measures how easy it is to discriminate against foreigners.

We define a competitive equilibrium as a sequence of prices and quantities such that individuals choose their capital and debtholdings so as to maximize their utility in equation (1), generations choose enforcement so as to maximize their welfare in equation (3), factor prices are given by equations (2), and the credit market clears. The goal of the next few sections is to study how financial globalization affects the workings of the credit market and the shape of competitive equilibria.

III. Equilibrium Dynamics before Financial Globalization

Before financial globalization, only domestic residents participate in the credit market. Thus, enforcement states D and E are identical and there is no loss of generality in assuming that $p_t^D = 0$. Let R_{t+1} be the contractual interest rate on domestic debts, and let d_{t+1}^i and k_{t+1}^i be the domestic debts issued (or held if negative) and the capital stock of individual i. Then, his or her budget constraints are given by

13. We choose this particular welfare function for analytical convenience. All our results would go through with any welfare function satisfying the two principles mentioned. We shall return to this point in a later note.

14. As will become clear soon, a generation would never choose to enforce foreign debts and not domestic ones. Thus, we disregard this possibility.

$$c^i_{t,t} + q^i \cdot k^i_{t+1} \leq w_t + \frac{d^i_{t+1}}{R_{t+1}}, \tag{4}$$

$$c^i_{t,t+1} = \begin{cases} r_{t+1} \cdot k^i_{t+1} - d^i_{t+1} & \text{if } z_{t+1} = E, \\ r_{t+1} \cdot k^i_{t+1} & \text{if } z_{t+1} = N, \end{cases} \tag{5}$$

where q^i is the cost of capital. This cost equals 1 for all $i \in I^E_t$ and ρ^{-1} for all $i \in I^S_t$. Both entrepreneurs and savers receive a wage when young and consume. The only difference is that the cost of capital is higher for savers. As usual, we refer to aggregate variables by omitting the individual superscript. For instance, $k_{t+1} = \int_{i \in I_t} k^i_{t+1}$.

Savers and entrepreneurs maximize utility in equation (1) subject to the budget constraints in equations (4) and (5). The solution to this problem is

$$c^i_{t,t} = \frac{1}{1+\beta} \cdot w_t, \tag{6}$$

$$c^i_{t,t+1} = \begin{cases} \dfrac{\beta \cdot p^E_t}{1+\beta} \cdot w_t \cdot R_{t+1} & \text{if } z_{t+1} = E, \\ \dfrac{\beta \cdot p^N_t}{1+\beta} \cdot w_t \cdot \dfrac{1}{\dfrac{q^i}{r_{t+1}} - \dfrac{1}{R_{t+1}}} & \text{if } z_{t+1} = N. \end{cases} \tag{7}$$

To understand equations (6) and (7), note that there are three relevant consumptions for individual i: consumption during youth, consumption during old age if $z_{t+1} = E$, and consumption during old age if $z_{t+1} = N$. Given existing assets, it is possible to "purchase" these three consumptions at prices 1, $\frac{1}{R_{t+1}}$, and $\frac{q^i}{r_{t+1}} - \frac{1}{R_{t+1}}$, respectively. Individual i has income equal to w_t and allocates share $\frac{1}{1+\beta}$, $\frac{\beta \cdot p^E_t}{1+\beta}$, and $\frac{\beta \cdot p^N_t}{1+\beta}$ of this income to purchase the respective consumption.

The following proposition describes the equilibrium dynamics of our country in autarky:

PROPOSITION 1. In autarky, there is a unique equilibrium in which $p^E_t = 1$ and $p^D_t = p^N_t = 0$. The interest rate and the capital stock are

$$R_{t+1} = \alpha \cdot A \cdot k_t^{\alpha-1}, \tag{8}$$

$$k_{t+1} = s \cdot A \cdot k_t^{\alpha}, \tag{9}$$

where $s \equiv \frac{\beta}{1+\beta} \cdot (1-\alpha)$ is the savings rate of the economy.

Proof. If $z_{t+1} = E$, old savers and entrepreneurs share the economy's capital income when old and consume the same. If instead $z_{t+1} = N$, old entrepreneurs consume the entire capital income and old savers consume nothing (recall that $\rho \approx 0$). Thus, $z_{t+1} = E$ lowers consumption inequality without affecting its average, and it is therefore preferred ex post when institutions fail. Thus, $p_t^E = 1$ and competition in the credit market implies that $R_{t+1} = \alpha \cdot A \cdot k_{t+1}^{\alpha-1}$. Savers do not invest and lend all their savings to entrepreneurs. Hence, $k_{t+1} = \frac{\beta}{1+\beta} \cdot w_t = s \cdot A \cdot k_t^{\alpha}$. □

Proposition 1 says that there is no enforcement risk in autarky. Savers lend their savings to entrepreneurs, and the latter invest these and their own savings. Old generations consume the economy's capital income. Enforcing domestic debts ensures that this capital income is equally shared by entrepreneurs and savers, whereas defaulting on these debts would allow entrepreneurs to keep all the capital income for themselves. Thus, enforcing debts reduces consumption inequality without affecting average consumption and it is therefore preferred. Despite weak enforcement institutions, the credit market works well. Entrepreneurs compete for the savings of savers until the interest rate equals the return to investment.

Figure II shows the law of motion of the capital stock in autarky. The dynamics of the capital stock are those of the standard neoclassical model. From any initial condition, the economy converges to a steady state with the capital stock

$$k_{\infty}^{A} = (s \cdot A)^{\frac{1}{1-\alpha}}.$$

We assume that $s < \alpha$ so that the steady-state interest rate in autarky is above 1, that is, the country is capital poor and a natural borrower even in the long run. This streamlines the discussion by ruling out a number of straightforward cases.

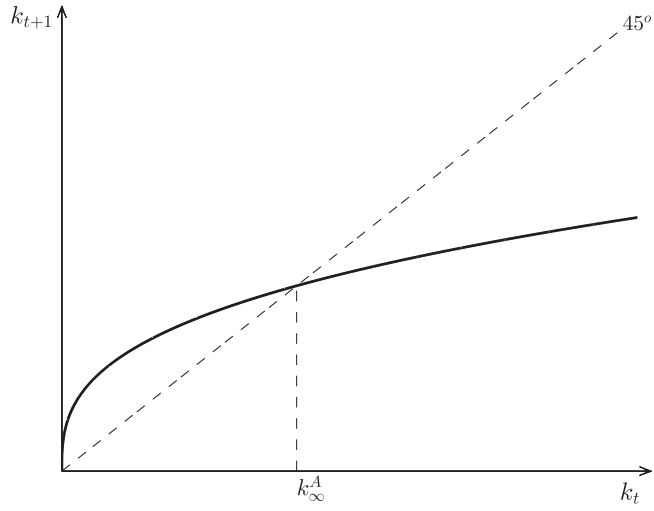

FIGURE II

The Autarky Economy

The solid line shows the law of motion of the capital stock in autarky, for parameters $\{\alpha = 0.3, \beta = 0.9, \rho = 0.1, \omega = 0.2, A = 1, \delta = 0.6, \epsilon = 0.8, \pi = 0.7\}$. All figures in the article are based on variations of $\{\delta, \epsilon, \pi\}$ while sharing the same values of $\{\alpha, \beta, \rho, \omega, A\}$.

IV. EQUILIBRIUM DYNAMICS AFTER FINANCIAL GLOBALIZATION

Financial globalization allows foreigners to participate in the credit market. Let R^*_{t+1} be the contractual interest rate on foreign debts, and let d^{*i}_{t+1} and a^i_{t+1} be the foreign debts issued and the foreign assets held by individual i. Naturally, $d^{*i}_{t+1} \geq 0$ and $a^{*i}_{t+1} \geq 0$. Then, his or her budget constraints after financial globalization become

$$c^i_{t,t} + q^i \cdot k^i_{t+1} + a^{*i}_{t+1} \leq w_t + \frac{d^i_{t+1}}{R_{t+1}} + \frac{d^{*i}_{t+1}}{R^*_{t+1}}, \tag{10}$$

$$c^i_{t,t+1} = \begin{cases} r_{t+1} \cdot k^i_{t+1} + a^{*i}_{t+1} - d^i_{t+1} - d^{i*}_{t+1} & \text{if } z_{t+1} = E, \\ r_{t+1} \cdot k^i_{t+1} + a^{*i}_{t+1} - d^i_{t+1} & \text{if } z_{t+1} = D, \\ r_{t+1} \cdot k^i_{t+1} + a^{*i}_{t+1} & \text{if } z_{t+1} = N. \end{cases} \tag{11}$$

The difference between equations (10)–(11) and (4)–(5) is that now domestic residents can hold foreign assets and issue foreign debts.[15]

In autarky, there is no enforcement risk. After financial globalization, this need not be the case. Enforcing domestic debts reduces consumption inequality as before globalization and this generations like. But enforcing foreign debts reduces their average consumption and this they dislike. Thus, generations would like to enforce domestic debts and default on foreign ones ex post. But their inability to discriminate perfectly between domestic and foreign debts creates the trade-off that lies at the heart of all our results. Some generations might choose to enforce foreign debts to enforce domestic ones. But others might instead choose not to enforce domestic debts to avoid enforcing foreign ones. We examine these cases in turn.

IV.A. Enforcing Domestic Debts Leads to Enforcement of Foreign Debts

We start the analysis of the enforcement trade-off by constructing an equilibrium in which generations choose the discrimination lottery. We conjecture that market participants expect the discrimination lottery when institutions fail and then check whether the resulting trade is consistent with generations preferring the discrimination lottery if institutions fail. We refer to this equilibrium as optimistic because domestic debts are always enforced and default on foreign debts is minimized.

In the optimistic equilibrium, domestic debts are enforced with probability 1, while foreign debts are enforced only with probability $\pi + (1 - \pi) \cdot (1 - \delta)$. Thus, interest rates on domestic and foreign debts differ. Competition among entrepreneurs ensures that the contractual interest rate on domestic debts equals the return to investment. Foreigners require an expected return

15. We allow domestic and foreign debt contracts to offer different contractual interest rates. Whether this is a good assumption depends on the context. It seems appropriate here since borrowing by entrepreneurs is often intermediated by banks and other financial institutions that can price discriminate among their clients. This assumption would not be appropriate, for instance, if we focused on borrowing by sovereigns since sovereign debt can easily be retraded in secondary markets. This is why we assumed instead that price discrimination is not possible in Broner et al. (2014). In any case, we have worked out this alternative case as well in the present context. Although the algebra is more cumbersome, all the results still go through.

of 1 and this is why the contractual interest rate on foreign debts is $\frac{1}{p_t^E}$. Thus, we have that

$$R_{t+1} = \alpha \cdot A \cdot k_{t+1}^{\alpha-1} \text{ and } R_{t+1}^* = \frac{1}{\pi + (1-\pi)\cdot(1-\delta)}. \tag{12}$$

Then, maximization of utility in equation (1) subject to the budget constraints in equations (10) and (11) generates the consumptions

$$c_{t,t}^i = \frac{1}{1+\beta} \cdot w_t, \tag{13}$$

$$c_{t,t+1}^i = \begin{cases} \dfrac{\beta}{1+\beta} \cdot w_t & \text{if } z_{t+1} = E, \\ \dfrac{\beta \cdot p_t^D}{1+\beta} \cdot w_t \cdot \dfrac{1}{\dfrac{1}{\alpha \cdot A \cdot k_{t+1}^{\alpha-1}} - \pi - (1-\pi)\cdot(1-\delta)} & \text{if } z_{t+1} = D. \end{cases} \tag{14}$$

Once again, equations (13) and (14) can be understood by noticing that there are three relevant consumptions for individual i: consumption during youth, consumption during old age if $z_{t+1} = E$, and consumption during old age if $z_{t+1} = D$. Given existing assets, it is possible to "purchase" these three consumptions at prices 1, $\frac{1}{R_{t+1}^*}$, and $\frac{1}{R_{t+1}} - \frac{1}{R_{t+1}^*}$, respectively. Individual i has income equal to w_t and allocates a share $\frac{1}{1+\beta}$, $\frac{\beta \cdot p_t^E}{1+\beta}$, and $\frac{\beta \cdot p_t^D}{1+\beta}$ of this income to purchase the respective consumption.

The following proposition describes the equilibrium dynamics of our country after financial globalization when market participants are optimistic:

PROPOSITION 2. After financial globalization, there may exist an optimistic equilibrium in which $p_t^E = \pi + (1-\pi)\cdot(1-\delta)$, $p_t^D = (1-\pi)\cdot\delta$, and $p_t^N = 0$. The law of motion of the capital stock is given implicitly by

$$\alpha \cdot A \cdot k_{t+1}^{\alpha-1} = \begin{cases} 1 + \dfrac{(1-\pi)\cdot\delta}{\pi + (1-\pi)\cdot(1-\delta)} \cdot \dfrac{k_{t+1} - s \cdot A \cdot k_t^{\alpha}}{k_{t+1}} & \text{if } k_t < \kappa, \\ 1 & \text{if } k_t \geq \kappa, \end{cases} \tag{15}$$

where $\kappa \equiv (\alpha \cdot A)^{\frac{1}{(1-\alpha)\cdot\alpha}} \cdot (s \cdot A)^{-\frac{1}{\alpha}}$. The optimistic equilibrium exists if and only if $k_t \geq \overline{\kappa}$, where

$$k_t \geq \overline{\kappa} = \begin{cases} 0 & \text{if } \dfrac{\omega\cdot(1-\epsilon)}{1-\delta} \geq 1, \\ \left[1 - \dfrac{\omega\cdot(1-\epsilon)}{1-\delta}\right]^{\frac{1}{\alpha}} \cdot \left[1 - (1-\pi)\cdot\delta\cdot\dfrac{\omega\cdot(1-\epsilon)}{1-\delta}\right]^{\frac{1}{1-\alpha}} \cdot \kappa & \text{if } \dfrac{\omega\cdot(1-\epsilon)}{1-\delta} < 1. \end{cases} \tag{16}$$

Proof. Assume the probabilities as stated in the proposition. To obtain the law of motion of the capital stock, simply notice that, if $k_t < \kappa$, $\int_{i\in I_t} c_{t,t+1}^i = \alpha \cdot A \cdot k_{t+1}^{\alpha}$ if $z_{t+1} = D$ and use equation (14). Finally, the condition for the equilibrium to exist follows from substituting consumptions into the welfare function and checking that the discrimination lottery is preferred to $z_{t+1} = N$ ex post. □

The law of motion in Proposition 2 describes the relationship between the return to investment and the expected return on foreign debts. To understand this relationship, note that the foreign borrowing and lending of the country is given by

$$\frac{d_{t+1}^*}{R_{t+1}^*} = \max\left\{0, k_{t+1} - s \cdot A \cdot k_t^{\alpha}\right\},$$

$$a_{t+1}^* = \max\left\{0, s \cdot A \cdot k_t^{\alpha} - k_{t+1}\right\}.$$

Also note that κ is the value of the capital stock such that the country neither borrows nor lends: $s \cdot A \cdot \kappa^{\alpha} \equiv (\alpha \cdot A)^{\frac{1}{1-\alpha}}$. If $k_t \geq \kappa$, the country invests up to the point at which the return to investment equals 1 and it lends the rest of its savings abroad: $d_{t+1}^* = 0$, $a_{t+1}^* \geq 0$, and $\alpha \cdot A \cdot k_{t+1}^{\alpha-1} = 1$. If $k_t < \kappa$, the country borrows and invests up to the point at which the return to investment equals 1 plus a risk premium that compensates for the fact that investment financed by foreign borrowing is risky: $d_{t+1}^* > 0$, $a_{t+1}^* = 0$, and $\alpha \cdot A \cdot k_{t+1}^{\alpha-1} = 1 + (1-\pi)\cdot\delta\cdot\frac{d_{t+1}^*}{k_{t+1}}$. This risk premium increases both with enforcement risk, that is, $(1-\pi)\cdot\delta$, and with leverage or exposure to this risk, that is, $\frac{d_{t+1}^*}{k_{t+1}}$.

In the optimistic equilibrium, the credit market works relatively well. With some probability, the country defaults on its foreign debts. But domestic debts are always enforced. Since the domestic interest rate equals the return to investment, savers and entrepreneurs effectively have the same budget sets and make the same choices. Before financial globalization, savers lend their savings to entrepreneurs and the latter invest these savings for them. After financial globalization, savers and entrepreneurs borrow from abroad the same amount. Then, savers lend to entrepreneurs not only their own savings but also their foreign borrowing. Entrepreneurs invest their own savings and foreign borrowing, plus the savings and foreign borrowing of the savers. This pattern of trade allows savers and entrepreneurs to share default risk. This is why the risk premium depends on the foreign borrowing of the country and not on the foreign borrowing of entrepreneurs.

Proposition 2 also states that the optimistic equilibrium exists if and only if the country has a capital stock above a threshold level. This reflects the enforcement trade-off faced by generations when institutions fail. On one hand, the discrimination lottery leads to foreign payments that reduce the average consumption of the generation. On the other hand, the discrimination lottery leads to domestic payments that reduce inequality within the generation. The higher the capital stock, the higher the fraction of investment financed with domestic savings. This lowers foreign payments and raises domestic ones, increasing the incentives to enforce. Thus, there exists a threshold level for the capital stock such that the discrimination lottery is preferred for all capital stocks above that threshold and not preferred for all capital stocks below it.

This threshold depends on how easy it is to discriminate against foreigners and on the distaste for the inequality that would be created by not enforcing domestic debts. This is why the threshold depends on δ, ϵ, and ω. If discrimination is very likely, that is, $\delta \to 1$, the threshold drops to zero. If default leads to extreme inequality, that is, $\epsilon \to 0$, and this inequality is perceived as a very serious problem, that is, $\omega \to 1$, then the threshold also drops to zero.[16]

16. If a generation chooses not to enforce debts when market participants expected the discrimination lottery, savers have zero consumption. This is because their only source of income when old are domestic debts. With any welfare function that penalizes infinitely zero consumption (e.g., average utility) generations would always choose the discrimination lottery and the threshold would be zero. This is not a robust result, however, if individuals have other sources of income. For

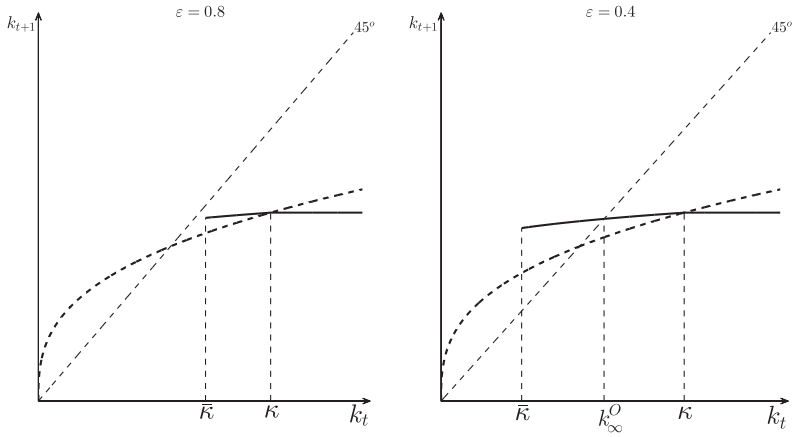

FIGURE III

Financial Globalization: Optimistic Equilibrium

The dashed line shows the law of motion of the capital stock in autarky and the solid line shows the law of motion in the optimistic equilibrium in the integrated economy. The left panel is for parameters $\{\delta = 0.6, \epsilon = 0.8, \pi = 0.7\}$, and the right panel is for parameters $\{\delta = 0.6, \epsilon = 0.4, \pi = 0.7\}$.

Figure III shows the laws of motion of the capital stock before (dashed line) and after (solid line) financial globalization if market participants are optimistic, that is, equations (9) and (15), respectively. The two panels are drawn for different values of ϵ. Since savings is unaffected by financial globalization, for each level of capital, the difference between these two lines equals the net foreign asset position of the country. If the country is capital poor (i.e., $k_t < \kappa$), the law of motion after financial globalization is above that of autarky, indicating that the country imports capital. If the country is instead capital rich (i.e., $k_t > \kappa$), the law of motion after financial globalization is below that of autarky, indicating that the country exports capital. From any initial value above the threshold, the capital stock monotonically converges to a steady state with the capital stock

example, individuals might receive wages or pension payments when old. Also, they might want to hold foreign assets if there are sources of risk other than enforcement risk.

$$k_{\infty}^{O} = ([(\pi + (1-\pi)\cdot(1-\delta))\cdot\alpha + (1-\pi)\cdot\delta\cdot s]\cdot A)^{\frac{1}{1-\alpha}}$$

if $k_{\infty}^{O} \geq \overline{\kappa}$, as in the right panel of Figure III. Our assumption that $s \leq \alpha$ implies that this new steady state is higher than that of autarky and it is such that the country imports capital. If $k_{\infty}^{O} < \overline{\kappa}$, as in the left panel of Figure III, from any initial value above the threshold, the capital stock monotonically declines. Once the threshold has been crossed, the optimistic equilibrium no longer exists.

IV.B. Defaulting on Foreign Debts Leads to Default on Domestic Debts

We continue our analysis of the enforcement trade-off by constructing an equilibrium in which all debts are enforced with probability π. We conjecture that market participants believe debts will not be enforced when institutions fail and, once again, check whether the resulting trade is consistent with generations choosing not to enforce debts when institutions fail. We refer to this equilibrium as pessimistic.

In the pessimistic equilibrium, domestic and foreign debts are perfect substitutes because they are both enforced with probability π. Thus, these contracts offer the same interest rate so that their expected gross return is 1:

$$R_{t+1} = R_{t+1}^{*} = \frac{1}{\pi}. \tag{17}$$

Then, maximizing utility in equation (1) subject to the budget constraints in equations (10) and (11) generates the consumptions

$$c_{t,t}^{i} = \frac{1}{1+\beta}\cdot w_t, \tag{18}$$

$$c_{t,t+1}^{i} = \begin{cases} \dfrac{\beta}{1+\beta}\cdot w_t & \text{if } z_{t+1} = E, \\ \dfrac{\beta}{1+\beta}\cdot w_t \cdot \dfrac{1-\pi}{\min\left\{\dfrac{q^i}{r_{t+1}}, 1\right\} - \dfrac{1}{R_{t+1}^{*}}} & \text{if } z_{t+1} = N. \end{cases} \tag{19}$$

There are again three relevant consumptions for individual i: consumption during youth, consumption during old age if

$z_{t+1} = E$, and consumption during old age if $z_{t+1} = N$. Given existing assets, it is possible to "purchase" these three consumptions at prices 1, $\frac{1}{R^*_{t+1}}$, and $\left\{\frac{q^i}{r_{t+1}}, 1\right\} - \frac{1}{R^*_{t+1}}$, respectively. Individual i has income equal to w_t and allocates a share $\frac{1}{1+\beta}$, $\frac{\beta \cdot p^E_t}{1+\beta}$, and $\frac{\beta \cdot p^N_t}{1+\beta}$ of this income to purchase the respective consumption.

The following proposition describes the equilibrium dynamics of our country after financial globalization when market participants are pessimistic:

PROPOSITION 3. After financial globalization, there is a pessimistic equilibrium in which $p^E_t = \pi$, $p^D_t = 0$, and $p^N_t = 1 - \pi$. The law of motion of the capital stock is given implicitly by

$$\alpha \cdot A \cdot k^{\alpha-1}_{t+1} = \begin{cases} 1 + \dfrac{1-\pi}{\pi} \cdot \dfrac{k_{t+1} - \epsilon \cdot s \cdot A \cdot k^{\alpha}_t}{k_{t+1}} & \text{if } k_t < \epsilon^{-\frac{1}{\alpha}} \cdot \kappa, \\ 1 & \text{if } k_t \geq \epsilon^{-\frac{1}{\alpha}} \cdot \kappa. \end{cases} \tag{20}$$

The pessimistic equilibrium always exists.

Proof. Assume the probabilities stated in the proposition. To obtain the law of motion of the capital stock, simply notice that, if $k_t < \epsilon^{-\frac{1}{\alpha}} \cdot \kappa$, $\int_{i \in I^E_t} c^i_{t,t+1} = \alpha \cdot A \cdot k^{\alpha}_{t+1}$ if $z_{t+1} = N$ and use equation (19). Finally, the equilibrium always exists because, after substituting consumptions into the welfare function, it is possible to check that $z_{t+1} = N$ is always preferred to the discrimination lottery ex post when institutions fail. □

The law of motion in Proposition 3 describes again the relationship between the return to investment and the expected return on foreign debts. Savers prefer to hold safe foreign assets than risky domestic debt since both offer the same expected return. As a result, entrepreneurs only issue foreign debts and the foreign borrowing and lending of the country is given by

$$\frac{d^*_{t+1}}{R^*_{t+1}} = \max\left\{0, k_{t+1} - \epsilon \cdot s \cdot A \cdot k^{\alpha}_t\right\},$$

$$a^*_{t+1} = (1-\epsilon)\cdot s\cdot A\cdot k_t^{\alpha} + \max\left\{0, \epsilon\cdot s\cdot A\cdot k_t^{\alpha} - k_{t+1}\right\}.$$

Note now that $\epsilon^{-\frac{1}{\alpha}}\cdot\kappa$ is the value of the capital stock such that entrepreneurs neither borrow nor lend. If $k_t \geq \epsilon^{-\frac{1}{\alpha}}\cdot\kappa$, entrepreneurs invest up to the point at which the return to investment equals 1 and they lend the rest of their savings abroad: $d^*_{t+1} = 0$, $a^*_{t+1} \geq (1-\epsilon)\cdot s\cdot A\cdot k_t^{\alpha}$, and $\alpha\cdot A\cdot k_{t+1}^{\alpha-1} = 1$. If $k_t < \epsilon^{-\frac{1}{\alpha}}\cdot\kappa$, entrepreneurs borrow and invest up to the point at which the return to investment equals 1 plus a risk premium: $d^*_{t+1} > 0$, $a^*_{t+1} = (1-\epsilon)\cdot s\cdot A\cdot k_t^{\alpha}$, and $\alpha\cdot A\cdot k_{t+1}^{\alpha-1} = 1+(1-\pi)\cdot\delta\cdot\frac{d^*_{t+1}}{k_{t+1}}$. Now the risk premium depends on the foreign borrowing of entrepreneurs and not that of the whole country.

In the optimistic equilibrium, savers purchase riskless debts from entrepreneurs. Thus, the total amount of "riskless" funding available for investment consists of the country's total savings, that is, $s\cdot A\cdot k_t^{\alpha}$. In the pessimistic equilibrium, savers purchase foreign assets. Thus, the total amount of "riskless" funding available for investment consists only of the entrepreneurs' own savings, $\epsilon\cdot s\cdot A\cdot k_t^{\alpha}$. This raises the risk premium and lowers investment and the capital stock.

Proposition 3 also says that the pessimistic equilibrium exists for all levels of capital. The intuition is clear: in the pessimistic equilibrium, all debts are foreign. Thus, default on all debts is always preferred to the discrimination lottery.

Figure IV shows the laws of motion of the capital stock before (dashed line) and after (solid line) financial globalization if market participants are pessimistic, that is, equations (9) and (20), respectively. The two panels are drawn for different values of ϵ. For low levels of capital, financial globalization shifts the law of motion upward, indicating that the country imports capital. For higher levels of capital, financial globalization shifts the law of motion downward, indicating that the country exports capital. Interestingly, there is always a set of capital stocks lower than κ for which the country exports capital even though it is capital-scarce. From any initial value, the capital stock monotonically converges to a steady state with the capital stock

$$k^P_{\infty} = ([\pi\cdot\alpha + (1-\pi)\cdot\epsilon\cdot s]\cdot A)^{\frac{1}{1-\alpha}}.$$

As shown in the left panel of Figure IV, the steady state after globalization is above that of autarky if ϵ is large. This is not

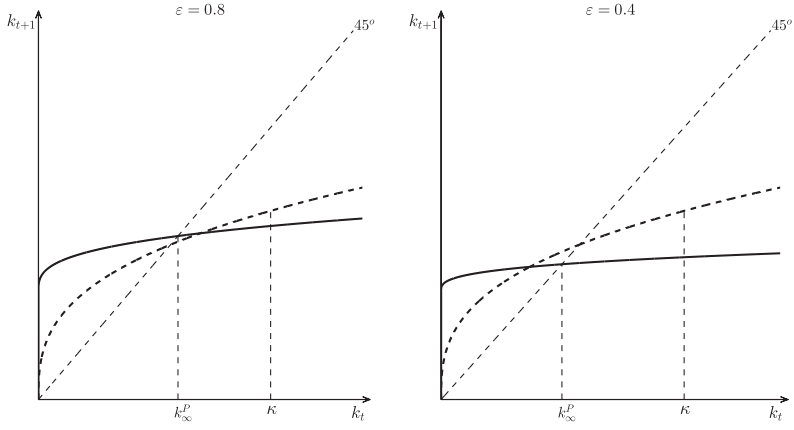

FIGURE IV

Financial Globalization: Pessimistic Equilibrium

The dashed line shows the law of motion of the capital stock in autarky and the solid line shows the law of motion in the pessimistic equilibrium in the integrated economy. The left panel is for parameters $\{\delta = 0.6, \epsilon = 0.8, \pi = 0.7\}$, and the right panel is for parameters $\{\delta = 0.6, \epsilon = 0.4, \pi = 0.7\}$.

surprising. More surprising perhaps is the right panel where ϵ is small and the steady state after globalization is below that of autarky. To understand how this might happen, consider the limiting case in which $\pi \to 0$. After financial globalization, entrepreneurs cannot borrow from foreigners. Even worse, now they can no longer borrow from savers since these prefer to purchase foreign assets. The capital stock and welfare fall.

IV.C. Multiple Equilibria and Sunspots

The economy can have multiple equilibria. As usual, we assume that there is a "sunspot" that determines which equilibrium is played. The variable x_t denotes the equilibrium played at t, where $x_t = P$ or $x_t = O$ if the equilibrium is pessimistic or optimistic respectively.[17] Let q_t be the transition probability, that is,

17. The optimistic and pessimistic equilibria are both equilibria in pure strategies. In the optimistic equilibrium generations strictly prefer ex post the discrimination lottery and in the pessimistic equilibrium they strictly prefer ex post to default on all debts. In addition, it can be shown that when both optimistic and pessimistic equilibria exist there is an additional, mixed-strategy equilibrium in which market participants expect generations to choose the discrimination lottery with probability m_t and to default on all debts with probability $1 - m_t$. The

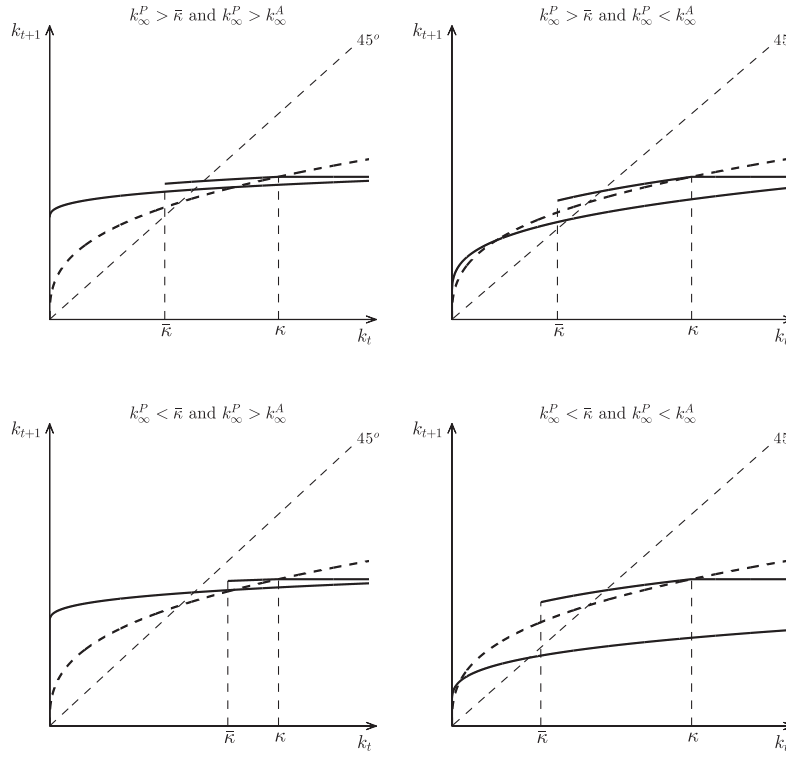

FIGURE V

Multiple Equilibria

The dashed line shows the law of motion of the capital stock in autarky and the solid lines show the optimistic (upper line) and pessimistic (bottom line) equilibria in the integrated economy. The top left panel is for parameters $\{\delta = 0.8, \epsilon = 0.8, \pi = 0.8\}$, the top right panel is for parameters $\{\delta = 0.8, \epsilon = 0.8, \pi = 0.3\}$, the bottom left panel is for parameters $\{\delta = 0.5, \epsilon = 0.8, \pi = 0.8\}$, and the bottom right panel is for parameters $\{\delta = 0.5, \epsilon = 0.6, \pi = 0.3\}$.

$q_t = \Pr[x_t \neq x_{t-1}]$. If $k_t < \bar{\kappa}$, we have that $q_t = 0$ if $x_{t-1} = P$ and $q_t = 1$ if $x_{t-1} = O$. If only the pessimistic equilibrium exists, market participants must be pessimistic. If $k_t \geq \bar{\kappa}$, the theory does not impose any restriction on q_t. However, we assume from now on that in this case $q_t \in (0, 1)$. This rules out artificial absorbing states and it seems quite natural in this context. If both equilibria

probability m_t is such that it induces savers to hold enough domestic debts to make generations indifferent ex post between the discrimination lottery and defaulting on all debts. We disregard this equilibrium from now on.

exist, market participants can always experience a change in expectations.

Figure V shows the laws of motion of the capital stock before (dashed line) and after (solid line) financial globalization in these sunspot equilibria. The top panels show cases in which $k_\infty^P \geq \overline{\kappa}$, and the bottom panels show cases in which $k_\infty^P < \overline{\kappa}$. The left panels show cases in which $k_\infty^P \geq k_\infty^A$, and the right panels show cases in which $k_\infty^P < k_\infty^A$. These panels show all the relevant or generic cases.

The steady state of the economy can have two shapes. If $k_\infty^P \geq \overline{\kappa}$, the capital stock converges to the steady-state interval $\left[k_\infty^P, k_\infty^O\right]$. Once this interval is reached, the capital stock fluctuates forever within it. From any initial capital stock, convergence to the steady-state interval is monotonic. If $k_\infty^P \geq k_\infty^A$, the capital stock and welfare grow as a result of financial globalization. If instead $k_\infty^P < k_\infty^A$, whether the capital stock and welfare grow or fall depends on the fraction of time the country spends in the optimistic and pessimistic states.

If $k_\infty^P < \overline{\kappa}$, the capital stock converges to k_∞^P. If the initial capital stock is below the threshold this convergence is monotonic. If the initial capital stock is above the threshold, it is possible for fluctuations in investor sentiment to generate fluctuations in the capital stock until a long enough sequence of pessimism eventually takes the economy below the threshold. After this, optimism is no longer possible and the capital stock monotonically converges to k_∞^P. Whether the capital stock and welfare finally grow or fall as the country settles in the new steady state depends on whether k_∞^P is above or below k_∞^A.

V. A Classic Benchmark: The Representative-Agent Economy

It is common to use representative-agent models to study the effects of financial globalization. In our framework, this is akin to focusing on the limiting case $\epsilon \to 1$. In this limit, all debts are foreign and this has two important implications. The first one is that the optimistic equilibrium vanishes when the country is capital poor, that is, $\overline{\kappa} \to \kappa$. This is intuitive because, in the absence of domestic debts, defaulting on all debts is always preferred over the discrimination lottery. The second implication is that the law of motion of the pessimistic equilibrium (equation (20)) is always

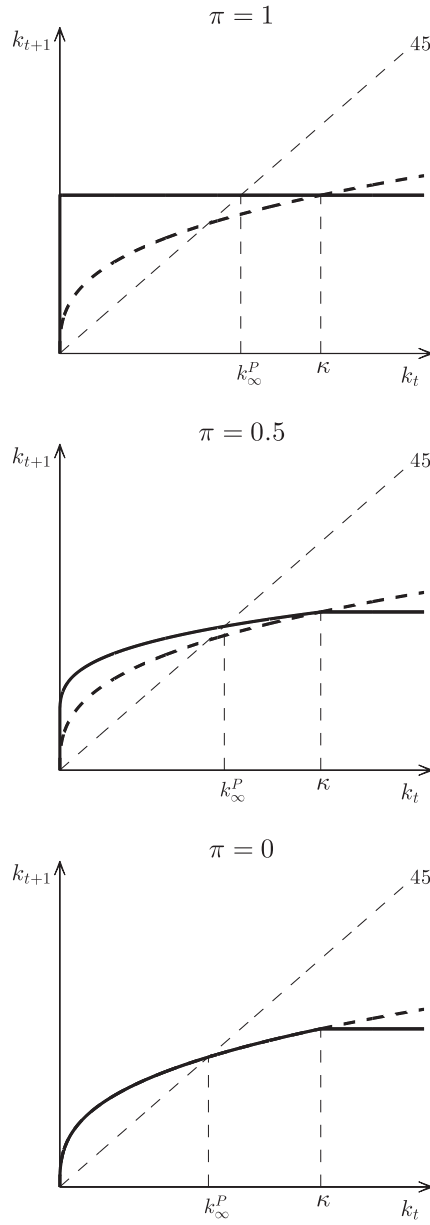

FIGURE VI

Representative-Agent Economy and Quality of Institutions

The dashed line shows the law of motion of the capital stock in autarky and the solid line shows the law of motion in the pessimistic (and unique) equilibrium in the integrated economy. The top panel is for parameters $\{\delta = 0.6, \epsilon = 1, \pi = 1\}$, the middle panel is for parameters $\{\delta = 0.6, \epsilon = 1, \pi = 0.5\}$, and the bottom panel is for parameters $\{\delta = 0.6, \epsilon = 1, \pi = 0\}$.

above that of autarky (equation (9)) when the country is capital-poor. This is also intuitive since all the country's savings are owned by entrepreneurs who invest rather than purchase foreign assets.

Figure VI shows the laws of motion of the capital stock before (dashed line) and after (solid line) financial globalization in the representative-agent benchmark for different values of π. After financial globalization, the capital stock and the return to investment monotonically converge to a steady state with a higher capital stock and welfare. Weak enforcement institutions reduce the effects of financial globalization on the steady-state capital stock and also slow down the transition toward it. This can be seen by comparing the different panels of Figure VI. If $\pi = 1$, as in the top panel, the growth effect is maximized and the whole transition takes place in a single generation. If $\pi = 0$, as in the bottom panel, the growth effect vanishes and the economy remains in the autarky steady state. If π is between 0 and 1, as in the middle panel, there is some growth and the transition takes a few generations.

Figure VII shows a simulation of financial globalization for an intermediate value of π. In this simulation we start the economy at a level of capital below the autarky steady state and assume that financial globalization takes place in period 2. The different panels of Figure VII show the evolution of some key variables for 20 periods.[18]

The young generation in period 2 borrows up to the point at which the return to capital equals the world interest rate plus the appropriate risk premium. Initially savings are low, so gross and net international borrowing are high. This leads to a high risk premium so capital is below its new steady state in the adjustment process. As the capital stock grows, so does the savings of subsequent generations, reducing the risk premium and further increasing the capital stock. In the steady state, the country permanently enjoys a higher capital stock. The country remains an international borrower permanently.

Financial globalization raises the country's income (output net of depreciation and foreign debt payments) permanently. It also brings standard distributional effects. The welfare of the young generation in period 2 falls as the return to its savings

18. Panel A shows the capital stock: k_t. Panel B shows the gross and net foreign asset positions of the country, a_t^*, $-d_t^*$, and $a_t^* - d_t^*$. Panel C shows domestic asset trade d_t. Note that these variables reflect decisions made at $t - 1$.

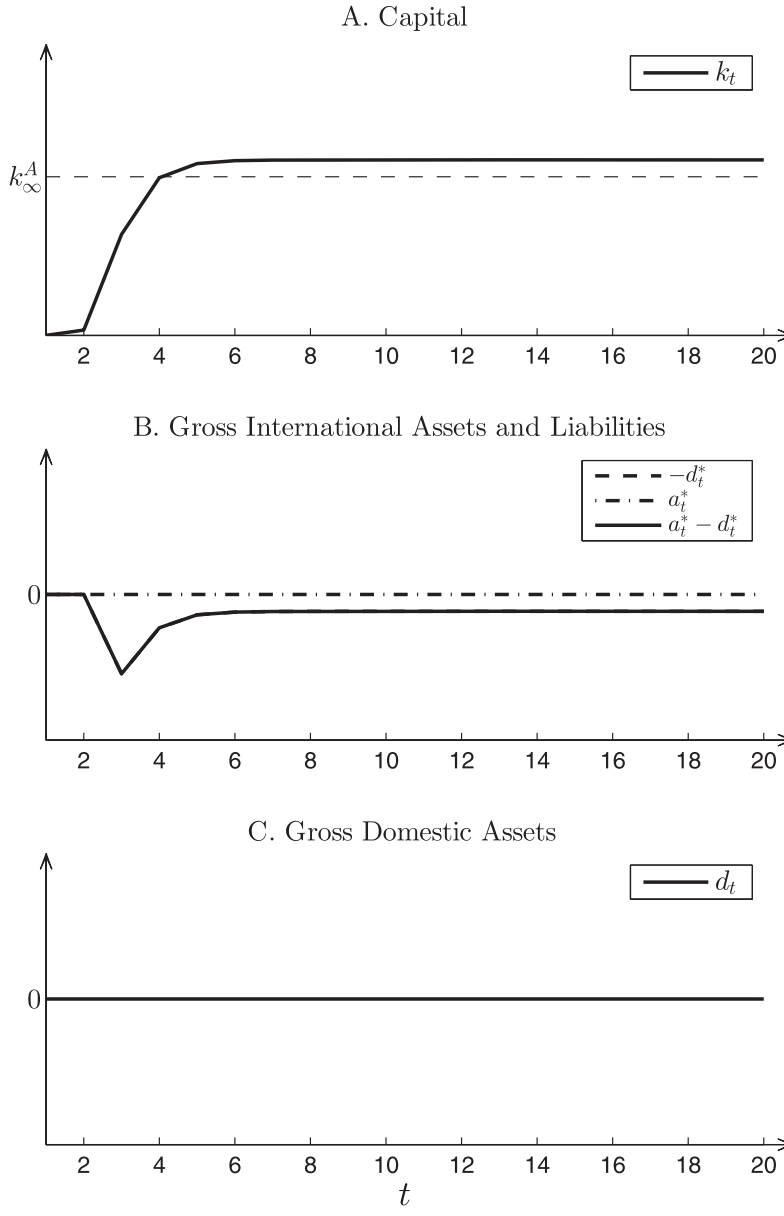

FIGURE VII

The Effects of Financial Globalization in the Representative-Agent Economy

Financial integration takes place at $t = 2$, in an economy characterized by parameters $\{\delta = 0.6, \epsilon = 1, \pi = 0.5\}$. The laws of motion of the capital stock are those in the middle panel of Figure VI.

declines. The welfare of future generations grows as the increase in their wages more than compensates for the decline in the return to their savings. As usual, it would be possible to achieve a Pareto improvement by complementing financial globalization with a set of intergenerational transfers that compensate the initial generation and still leave future generations better off.

Many researchers working with representative-agent models would object to a literal interpretation of their models as assuming that there is no domestic trade. Instead, they interpret their models more loosely as assuming that domestic and foreign debts are somehow segmented and their interactions can be neglected. There is another limiting case of our model that makes this loose interpretation "almost" literal. This is the case of perfect discrimination in which $\delta \to 1$. It seems intuitive that in this limiting case, domestic debts are enforced independently of the size of foreign debts and foreign debts are defaulted on independently of the size of domestic debts.

Indeed, with perfect discrimination the laws of motion in Figure VI also apply. But the limit is reached through a different route. As $\delta \to 1$ the optimistic equilibrium always exists, that is, $\overline{\kappa} \to 0$. Even if domestic debts are arbitrarily small, it is always preferred to enforce them and reduce inequality if default on foreign debts is guaranteed. Note then that as $\delta \to 1$, the law of motion of the optimistic equilibrium converges to that of the representative-agent benchmark in Figure VI. As $\epsilon \to 1$, we reach this law of motion as the best possible pessimistic equilibrium. As $\delta \to 1$, we reach the same law of motion as the worst possible optimistic equilibrium.[19]

Whether we interpret the representative-agent benchmark literally ($\epsilon \to 1$) or as the case of perfect discrimination ($\delta \to 1$), the message that arises from this benchmark is clear: financial globalization in developing countries should lead to capital inflows, raise investment and growth, and lead to a steady state with a higher capital stock and welfare. In this benchmark the quality of enforcement institutions determines the size but not

19. The perfect discrimination limit would exactly take us to the representative-agent benchmark if, in this limit, the pessimistic equilibrium did not exist. But it still does. We think, however, that this is a case in which it is justified to disregard the pessimistic equilibrium and focus exclusively on the optimistic one. Choosing to default on all debts when there is the option of defaulting only on foreign debts is a knife-edge result. It would not survive, for instance, simple extensions that generate a small amount of domestic trade.

the sign of these effects. But the representative-agent benchmark ignores the interactions between domestic and foreign debts which, as we argue next, can be quite misleading.

VI. A New Benchmark: Interacting Domestic and Foreign Debts

As we move away from the representative-agent benchmark, we find two key interactions between domestic and foreign debts. The first one is that domestic debts support foreign debts. This "financial depth" effect, which makes the optimistic equilibrium possible, allows the country to sustain more foreign borrowing than in the representative-agent benchmark and more domestic borrowing than in autarky. The second interaction is that foreign debts destroy domestic debts. This "capital flight" effect, which makes the pessimistic equilibrium possible, means that the country can sustain less domestic borrowing than in autarky, less foreign borrowing than in the representative-agent benchmark, and possibly negative net foreign borrowing. The financial depth and capital flight effects combine in complex and interesting ways to deliver a much richer view of the effects of financial globalization.

Recall the laws of motion of the capital stock illustrated in Figure V. The effects of financial globalization on total borrowing by entrepreneurs, and thus investment and growth, depend on whether the equilibrium is optimistic or pessimistic. In the optimistic equilibrium, the financial depth effect implies that total borrowing by entrepreneurs is not only higher than in autarky but also higher than in the representative-agent benchmark. In the pessimistic equilibrium the net effect on total borrowing by entrepreneurs depends on the balance of two forces. The positive one is that foreigners are now present in the credit market offering a new source of financing that is cheap but risky. The negative force is that savers are no longer present in the credit market, and this eliminates an existing source of financing that was expensive but safe. The first force dominates if the capital stock is sufficiently low. But there is always a range of intermediate capital stocks in which the second effect dominates and there are net capital outflows even though the return to investment is higher than the international interest rate.

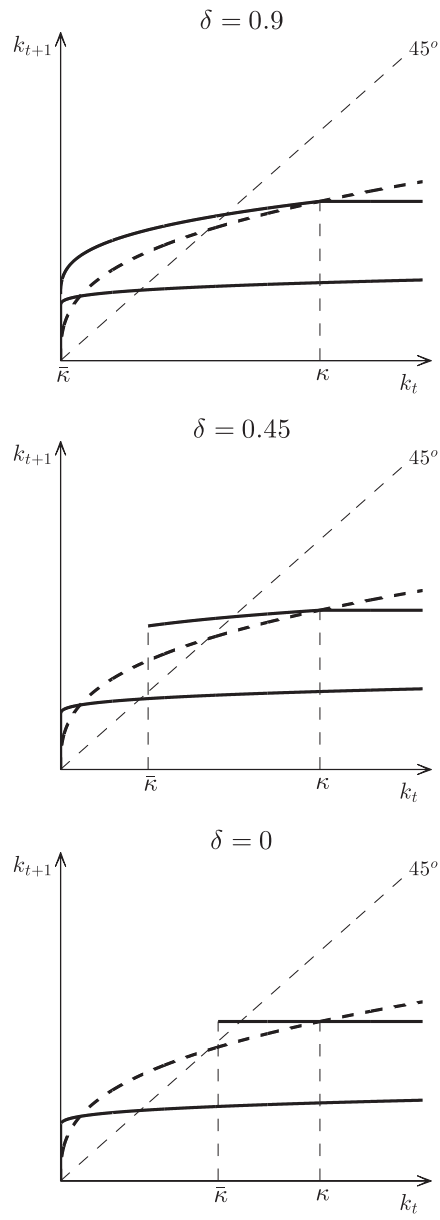

FIGURE VIII

New Benchmark and the Degree of Discrimination

The dashed line shows the law of motion of the capital stock in autarky and the solid lines show the optimistic (upper line) and pessimistic (bottom line) equilibria in the integrated economy. The top panel is for parameters $\{\delta = 0.9, \epsilon = 0.2, \pi = 0.5\}$, the middle panel is for parameters $\{\delta = 0.45, \epsilon = 0.2, \pi = 0.5\}$, and the bottom panel is for parameters $\{\delta = 0, \epsilon = 0.2, \pi = 0.5\}$.

VI.A. *The Role of Nondiscrimination*

Figure VIII shows how the laws of motion depend on the degree of discrimination. Discrimination affects both the position of the optimistic law of motion and the range of capital stocks for which the optimistic equilibrium exists.

As discussed in Section V, if discriminatory enforcement is likely (i.e., high δ), the optimistic law of motion is close to the one with a representative agent. This is because domestic debts are always enforced and foreign debts are enforced with probability close to π. Also, since there is a low risk of having to enforce foreign debts if the discrimination lottery is chosen, and in any case those payments are not very large, the discrimination lottery is very attractive and the threshold $\overline{\kappa}$ is low. This case is illustrated in the top panel of Figure VIII, in which δ is so high that $\overline{\kappa}$ is in fact 0.

If enforcement is likely to be nondiscriminatory (low δ), the optimistic law of motion is far above the one with a representative agent. This is because foreign debts are enforced with high probability, reducing borrowing risk and increasing investment. But this comes at a cost. Choosing the discrimination lottery implies making enforcing foreign debts with a high probability. As a result, the optimistic equilibrium only exists when the country is rich enough that domestic debts are so high that it is worthwhile to make foreign payments so as to preserve domestic ones. So $\overline{\kappa}$ is high. This case is illustrated in the middle panel.

An interesting limiting case is the one in which $\delta = 0$. In this case the optimistic equilibrium takes a particularly simple form:

LEMMA 1. After financial globalization, if $\delta = 0$ there may exist an optimistic equilibrium with $p_t^E = 1$ and $p_t^D = p_t^N = 0$. The interest rates and the return to investment are

$$R_{t+1} = R_{t+1}^* = A \cdot \alpha \cdot k_{t+1}^{\alpha-1} = 1. \tag{21}$$

The optimistic equilibrium exists if and only if

$$k_t \geq \overline{\kappa} = [1 - \omega \cdot (1 - \epsilon)]^{\frac{1}{\alpha}} \cdot \kappa, \tag{22}$$

where $\kappa \equiv (A \cdot \alpha)^{\frac{1}{(1-\alpha)\cdot\alpha}} \cdot (A \cdot s)^{\frac{-1}{\alpha}}$.

Since foreign and domestic debts are enforced with probability 1, there is no borrowing risk and investment is such that the

return to investment equals the international interest rate. The optimistic equilibrium is more likely to exist if ϵ is low because in this case there is more domestic borrowing. It is also more likely to exist if ω is high since in this case generations value more the redistribution that results from domestic enforcement. This case is illustrated in the bottom panel of Figure VIII.

VI.B. Financial Globalization and Economic Fundamentals

Figure IX shows a simulation of financial globalization once we move away from the representative agent benchmark and allow for a mix of domestic and foreign debtholders. We choose parameters so that a variety of effects can be observed. In particular, if we let $\hat{\kappa}$ be the capital stock at which the pessimistic law of motion intersects the autarky law of motion, Figure IX is drawn for a case in which $k_0 < \hat{\kappa} < \overline{\kappa} < k_\infty^P$. Financial globalization takes place in period 2, and Figure IX shows the evolution of some key variables for 20 periods.[20]

The effects of financial globalization take place along three "phases." At the time of globalization only the pessimistic equilibrium exists. In the first phase, even though there is capital flight, domestic savings are so low that gross capital inflows more than compensate for gross capital outflows and investment and growth increase.

In period 4, the second phase begins, in which $\hat{\kappa} < k_t < \overline{\kappa}$. In this phase domestic savings have become large enough to make gross outflows greater than gross inflows. The net foreign asset position of the country is positive even though it is capital-scarce, and investment and growth are lower than they would be if the economy were closed. Because we assumed $\overline{\kappa} < k_\infty^P$, growth remains positive in this second phase until $\overline{\kappa} < k_t$ and the optimistic equilibrium becomes possible in period 5.

From then on the third phase takes place, in which the economy transitions between periods of optimism, with net capital inflows and high investment and growth, and periods of pessimism, with net capital outflows and low investment and growth. In this phase income might be on average higher or lower than the one in autarky depending on the fraction of time

20. Panel A shows the capital stock: k_t. Panel B shows the gross and net foreign asset positions of the country, a_t^*, $-d_t^*$, and $a_t^* - d_t^*$. Panel C shows domestic asset trade d_t. Panel D shows the equilibrium played x_t. Note that k_t, a_t^*, d_t^*, and d_t reflect decisions made at $t-1$.

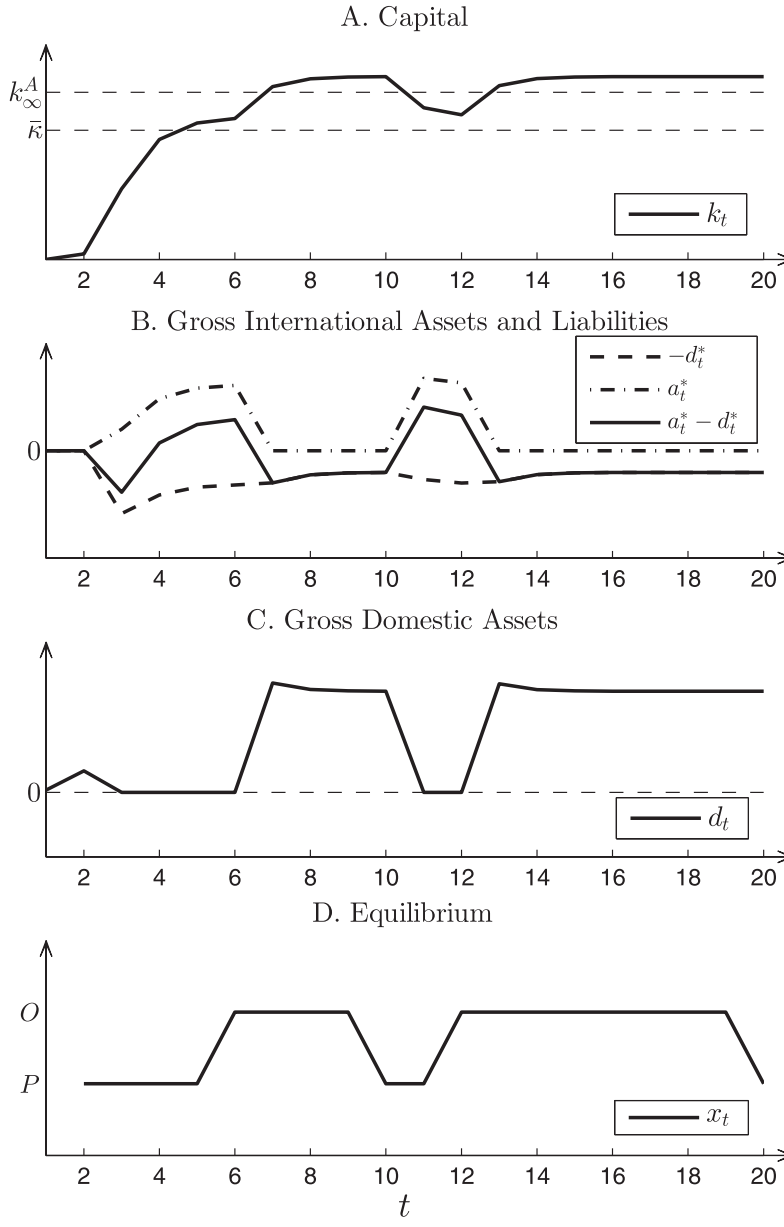

FIGURE IX

Effects of Financial Globalization in the New Benchmark

Financial integration takes place at $t = 2$, in an economy characterized by parameters $\{\delta = 0.8, \epsilon = 0.8, \pi = 0.3\}$ and $Pr[P|O] = 0.15$ and $Pr[O|P] = 0.5$. Under these parameters $k_0 < \hat{k} < \bar{k} < k_\infty^P$.

the economy spends in the optimistic equilibrium. Volatility is unambiguously higher than in autarky.

How do these effects depend on fundamentals?

(i) (*Initial level of development*) Figure IX shows the case of a country that liberalizes at a low level of development and goes through three different phases. During the initial phase, the country imports capital and growth accelerates. If financial globalization takes place at an intermediate level of development, that is, if $\hat{\kappa} < k_0 < \overline{\kappa}$, the country skips this phase and enters directly into the second phase. Thus, financial globalization leads to net capital outflows and slows down growth. If financial globalization takes place instead at high levels of development, that is, $\overline{\kappa} < k_0$, the country skips the first two phases and moves directly to the third phase in which both the pessimistic and optimistic equilibria exist. In this case, financial globalization leads to capital imports and higher growth if beliefs are optimistic, but to capital exports and lower growth if beliefs are pessimistic. Financial globalization also creates a recurrent cycle of high- and low-growth periods.

(ii) (*Productivity*) In this model, A scales up all laws of motion by the same factor and therefore does not fundamentally affect the results. As is common in growth theory, we could have expressed the capital stock adjusted by productivity (i.e., $\hat{k}_t = A^{-\frac{1}{1-\alpha}} \cdot k_t$). All the results derived in the previous point for the initial capital stock would apply to this quantity. That is, what matters for the dynamics of the economy is the productivity-adjusted capital stock, and not the capital stock by itself.

(iii) (*Savings*) As s increases, the law of motion under pessimism becomes closer to that under optimism, and as a result, the average capital stock increases and its volatility decreases. As s decreases relative to the case in Figure IX, the opposite occurs. If s falls enough, eventually we find that $\hat{\kappa} < k^P_{SS} < \overline{\kappa}$ or even $k^P_{SS} < \hat{\kappa} < \overline{\kappa}$. That is, the country reaches the new steady state and stops growing before leaving the second or even the first phase.

(iv) (*Quality of enforcement institutions*) An increase in π has a similar effect as an increase in s. It raises the pessimistic law of motion, making it more likely than the steady state

is in phase III, and within this phase it increases average income and decreases its volatility.

(v) (*Probability of discrimination*) As discussed in Section VI.A., a reduction in δ raises the optimistic law of motion but increases the threshold $\overline{\kappa}$. Thus, as long as the capital stock at the time of globalization is high and expectations remain optimistic, a reduction in δ increases the benefits of globalization. However, this comes at the cost of higher volatility and a higher likelihood that the economy reaches its steady state in phases I or II.

As this discussion shows, it is not generally the case that financial globalization in a capital scarce country raises the steady-state capital stock and consumption and speeds up the convergence process toward this steady state. The effects of financial globalization on the growth process are much richer than this and depend in a subtle but quite clear way on the specific characteristics of the country that is liberalizing.

VII. Rethinking the Effects of Financial Globalization

There is a vast empirical literature on the effects of financial globalization. However, this literature is subject to important data limitations. In particular, there is a relatively small number of liberalization episodes, financial globalization is often accompanied by other policy reforms, and countries probably take into account the potential effects of globalization when deciding whether to lift restrictions on international financial transactions. As a result of these limitations, there is no strong consensus regarding the detailed effects of financial globalization. Still, there are four broad aspects of financial globalization about which there is growing empirical support:

(i) (*Threshold effects*) The effects of financial globalization are heterogeneous, depending on a variety of well-identified country characteristics. In particular, Arteta, Eichengreen, and Wyplosz (2001), Edwards (2001), Bekaert, Harvey, and Lundblad (2005), Alfaro, Kalemli-Ozcan, and Volosovych (2008), Papaioannou (2009), and Kose, Prasad, and Taylor (2011) have found that financial globalization leads to capital inflows and higher investment and growth in

developing countries with relatively strong institutions, developed domestic financial markets, and high initial income.[21] These threshold effects are absent in the representative-agent benchmark, which predicts that financial globalization should always lead to capital inflows in developing countries. The reason is that even though foreign sources of financing might be risky, they nonetheless constitute a net addition to overall financing since under perfect discrimination domestic sources remain safe. Our theory can account for the heterogeneous effects of financial globalization because the optimistic equilibrium only exists beyond a threshold. In particular, in developing countries that are sufficiently rich and have deep enough domestic financial markets, the optimistic equilibrium exists and financial globalization is more likely to lead to capital inflows and higher investment and growth. This is the financial depth effect. In developing countries that are poor or have shallow domestic financial markets, the optimistic equilibrium does not exist and financial globalization results in domestic capital flight. Among these countries, in those that are very poor or have very shallow domestic financial markets, the capital flight effect is weak and globalization still results in net capital inflows. For intermediate levels of income and domestic financial development the capital flight effect is so strong that financial globalization results in net capital outflows and lower investment and growth.

(ii) (*Allocation puzzle*) Capital often flows to developing countries with low productivity growth and away from developing countries with high productivity growth. This is shown by Prasad, Rajan, and Subramanian (2007), Gourinchas and Jeanne (2013), and Alfaro, Kalemli-Ozcan, and Volosovych (2014). Gourinchas and Jeanne (2013) argue that this correlation reflects higher savings in high growth countries, whereas Alfaro, Kalemli-Ozcan, and Volosovych (2014) argue that the correlation reflects mostly public transactions, which might be driven

21. Regarding volatility effects, there is also some evidence that financial liberalization increases macroeconomic volatility and that this effect is subject to similar threshold effects. See Kose, Prasad, and Terrones (2003), Bekaert, Harvey, and Lundblad (2006), and Broner and Rigobon (2006).

by political as opposed to economic factors.[22] The representative-agent benchmark cannot account for the negative correlation between capital inflows and productivity growth, as higher productivity always increases the return to capital and thus investment and capital inflows. In our theory the link between productivity growth and capital inflows is more subtle. Within a given equilibrium, higher productivity growth increases the incentives to borrow from foreigners. But higher productivity growth, by increasing the amount that entrepreneurs would want to borrow in the optimistic equilibrium, makes it harder for this equilibrium to exist. As a result, there is always a range of capital stocks for which an increase in productivity growth destroys the optimistic equilibrium and leads to a reduction in capital inflows.[23]

(iii) (*Collateral effects*) Financial globalization, in addition to providing a new, cheaper source of funding for emerging markets, can have indirect effects by affecting the workings of domestic financial markets. Demirgüç-Kunt and Detragiache (1998), Kaminsky and Reinhart (1999), Bonfiglioli (2008), and Reinhart and Rogoff (2009, 2011) show that the incidence of domestic financial crises increases with financial globalization and Gennaioli, Martin, and Rossi (2014) show that defaults on foreign debts are associated with domestic financial crises.[24] These collateral effects of financial globalization cannot

22. Relatedly, Aguiar and Amador (2011) show that reductions in public debt are associated with faster economic growth (they do not focus on productivity). They argue that causality may run from public savings to investment and growth as reductions in public debt reduce governments' incentives to default and expropriate private capital.

23. A similar argument implies that an increase in the savings rate, by increasing the range of capital stocks for which the optimistic equilibrium exists, can lead to an increase in capital inflows.

24. The literature has often used the term "collateral effects" to refer to seemingly positive effects of financial globalization on productivity. See Edwards (2001), Gourinchas and Jeanne (2006), Bonfiglioli (2008), and Kose, Prasad, and Terrones (2009) for empirical evidence and a quantification of these effects. Our theory as it stands cannot account for these effects since productivity is affected neither directly by globalization nor indirectly via its effects on domestic financial markets. It would be easy to extend the model so that savers inefficiently invest in capital when domestic financial markets deteriorate. Interestingly, Kose, Prasad, and Terrones (2009) find that while foreign direct investment and portfolio equity are positively correlated with total factor productivity growth, the opposite is true for debt flows.

be accounted for by the representative agent benchmark, since its assumption of perfect discrimination in enforcement implies that domestic financial markets remain insulated from defaults on foreign lenders. Once the assumption of perfect discrimination is abandoned, there are important interactions between foreign and domestic debts. One of these is that default on foreign debts might lead to defaulting on domestic ones. As a result, the probability of domestic defaults can increase with financial globalization. In the model this happens in the pessimistic equilibrium, in which the higher incidence of domestic financial crises leads to the detrimental capital flight effect, shallow domestic financial markets, and the possibility of net capital outflows and lower investment and growth.[25]

(iv) (*Sudden stops*) Developing countries that have lifted restrictions on international financial transactions, that is, emerging markets, are subject to episodes in which there is a sudden reversal of capital inflows and large drops in investment and growth. Dornbusch, Goldfajn, and Valdés (1995) was the first to refer to these events as sudden stops. They have been analyzed empirically by Milesi-Ferretti and Razin (2000), Calvo and Reinhart (2000), Calvo, Izquierdo, and Talvi (2006), and Benigno, Converse, and Fornaro (2015) and theoretically by Calvo (1998), Caballero and Krishnamurty (2001), Choi and Cook (2004), Gopinath (2004), Martin and Rey (2006), and Mendoza (2010), among others.[26] The classic benchmark cannot account for these events. The reason is that in this benchmark there is a unique equilibrium and defaults, although random, do not affect future default probabilities and are not associated with sudden stops.[27] Our theory can account for sudden stops because there are

25. The other interaction between foreign and domestic debts is that enforcing domestic debts sometimes leads to enforcement of foreign debts with higher probability than in the representative-agent framework. In the model, this happens in the optimistic equilibrium, and it is associated with the financial-depth and the threshold effects described already.

26. See Lorenzoni (2014) for a recent survey.

27. In models of sovereign risk such as Aguiar and Gopinath (2006) and Arellano (2008), defaults are sometimes associated with reductions in capital inflows as a result of the assumption that defaults trigger punishments that take the form of exclusion from international markets.

multiple equilibria and self-fulfilling expectations. A seemingly successful emerging market might suddenly face a shift from optimism to pessimism that results in capital outflows and a reduction in investment and growth. The model predicts that sudden stops should be more prevalent in middle-income emerging markets, since in very poor ones the optimistic equilibrium does not exist and in richer ones the distance between the optimistic and pessimistic laws of motion is smaller.

VIII. On How to Manage Financial Globalization

The representative-agent benchmark predicts that lifting restrictions on cross-border financial transactions in developing countries should be beneficial and lead to capital inflows and higher investment and growth. The theory developed here qualifies these results in a fundamental way by shifting the emphasis toward the importance of domestic asset trade. Whether financial globalization is beneficial hinges on keeping this trade, and this in turn depends on country characteristics and luck.[28]

Even if other policy instruments are not available, countries must still decide whether to lift restrictions on cross-border transactions. Thus, the first and most rudimentary policy choice we consider is the timing of removing these restrictions. The representative-agent benchmark has a clear implication regarding this choice: the earlier the better! After all, this model predicts all financial globalizations to be successful. Is there an equally simple and clear-cut prediction coming from the theory developed here? At the risk of oversimplification, we would argue that this is indeed the case and that our theory says: unless the country is very poor, wait until it is ready! With pessimism, financial globalization destroys domestic trade and creates capital flight. If the country is very poor, this does not matter much because this trade

28. An important country characteristic, which we take as exogenous, is the quality of institutions. Structural reforms that raise this quality would of course be desirable. Less obviously, the theory shows that financial globalization increases the importance of institutions. In particular, in the model the quality of enforcement institutions does not matter in autarky but becomes crucial after financial globalization. It would be interesting to formally model the process of institutional development taking into account these forces. We leave this task for future research.

was small to start with. Thus, financial globalization still leads to capital inflows and raises investment and growth in very poor countries. If the country is not very poor, capital flight is sizable and leads to capital outflows that lower investment and growth. In this case, a country should wait to remove restrictions on capital flows until optimism is possible. Even then, the theory warns us that financial globalization might have negative effects if investor sentiment turns out to be pessimistic. Being ready is a necessary but not sufficient condition for success.

Waiting until the country has reached a sufficiently high level of development to remove restrictions on capital flows might not be too useful as policy advice for countries that are eager to raise the living standards of their populations now and not later. Thus, a question we must ask is: is there any policy that can be used to sustain optimism and give financial globalization a chance to succeed when fundamentals suggest that the country should wait? We also know that even if the country is ready, financial globalization might be unsuccessful if investor sentiment turns out to be pessimistic. Thus, we must also ask: is there any policy that can be used to rule out pessimism and ensure that financial globalization is successful? These two questions, of course, ask whether there exist policies that make the optimistic equilibrium possible and rule out the pessimistic one.

The answers to these questions are positive under certain conditions. In the model there exist two externalities associated with financial transactions. First, entrepreneurs borrow too much from foreigners, which increases the incentives to default. This is why the optimistic equilibrium does not always exist. It is easy to show that by imposing controls on capital inflows, the country can always make the optimistic equilibrium possible. In particular, regardless of how low domestic savings are, foreign borrowing can be reduced to a low enough level so that if domestic savings stay at home, enforcement is preferred ex post.[29] Second, savers do not lend enough domestically, which also increases the incentives to default. This is why they sometimes send their savings abroad leading to the pessimistic equilibrium. It is obvious that, by imposing controls on capital outflows, the country can

29. Even if feasible, such a policy might be counterproductive in countries with very low savings. The reason is that in these countries net capital inflows in such constrained optimistic equilibrium are in fact lower than in the unconstrained pessimistic equilibrium.

always rule out the pessimistic equilibrium. Thus, a careful combination of controls on capital inflows and outflows would ensure that globalization leads to capital inflows and higher investment and growth without increasing volatility as a result of multiple equilibria.[30]

Finally, it is worth commenting on policies that affect the degree of discrimination. During the 1970s and early 1980s, in emerging markets most foreign borrowing was done by governments through foreign banks using syndicated loans, while the private sector was largely shut out from international financial markets. This facilitated discrimination, as countries could choose not to pay to foreign banks without interfering with domestic trade. This institutional setup changed in the 1990s and 2000s. In particular, emerging markets lifted restrictions on the access of the private sector to international markets and encouraged the development of secondary markets where domestic assets can be traded. This has made discrimination much more difficult. This shows that to some extent, countries can design their financial systems so as to achieve a certain degree of discrimination.

The theory proposed in this article has clear implications regarding the degree of discrimination that makes financial globalization more likely to succeed. At an early stage of development, countries should adopt financial systems that facilitate discrimination, since this leads to higher capital inflows, investment, and growth. The reason is that discrimination isolates domestic financial markets from enforcement problems affecting foreign debts and the capital flight effect is minimized. At later stages of development, countries should adopt financial systems that make

30. Capital controls seem feasible only if countries implement sweeping controls on all foreign financial transactions. But in a world in which there is also scope for international trade in goods, this would introduce additional distortions. See Broner, Martin, and Ventura (2010) and Broner and Ventura (2011) for a discussion of the effects of capital controls and trade policy in such an environment. See also Magud, Reinhart, and Rogoff (2011) for a survey of the empirical literature on capital controls and their limitations. Note that in this model borrowing limits would have the same effect as controls on capital inflows. But this is only because the marginal lender is foreign. In general, borrowing limits affect both foreign and domestic borrowing, so their effect on enforcement is ambiguous. See Broner and Ventura (2011). Note also that borrowing limits are in general superior to borrowing taxes, since taxes generate distortions in the pessimistic equilibrium.

discrimination difficult as this leads on average to higher capital inflows, investment, and growth.[31] In this case, the financial depth effect dominates, and the country can leverage on its domestic financial markets to take better advantage of its access to international financial markets. Interestingly, this might be a possible explanation for the change in the institutional setup for emerging market borrowing observed in the early 1990s, which has been taken largely as exogenous by the previous literature.

CREI, UNIVERSITAT POMPEU FABRA, AND BARCELONA GSE
CREI, UNIVERSITAT POMPEU FABRA, AND BARCELONA GSE

REFERENCES

Acemoglu, Daron, and Fabrizio Zilibotti, "Was Prometheus Unbound by Chance? Risk, Diversification and Growth," *Journal of Political Economy*, 105 (1997), 709–751.
Aguiar, Mark, and Manuel Amador, "Growth in the Shadow of Expropriation," *Quarterly Journal of Economics*, 126 (2011), 651–697.
———, "Sovereign Debt," in *Handbook of International Economics Volume 4*, Gita Gopinath, Elhanan Helpman, and Kenneth Rogoff, eds. (Amsterdam: Elsevier, 2014), 647–687.
Aguiar, Mark, Manuel Amador, and Gita Gopinath, "Investment Cycles and Sovereign Debt Overhang," *Review of Economic Studies*, 76 (2009), 1–31.
Aguiar, Mark, and Gita Gopinath, "Defaultable Debt, Interest Rates, and the Current Account," *Journal of International Economics*, 69 (2006), 64–83.
———, "Emerging Market Business Cycles: The Cycle Is the Trend," *Journal of Political Economy*, 115 (2007), 69–102.
Alfaro, Laura, Sebnem Kalemli-Ozcan, and Vadym Volosovych, "Why Doesn't Capital Flow from Rich to Poor Countries? An Empirical Investigation," *Review of Economics and Statistics*, 90 (2008), 347–368.
Alfaro, Laura, Sebnem Kalemli-Ozcan, "Sovereigns, Upstream Capital Flows, and Global Imbalances," *Journal of the European Economic Association*, 12 (2014), 1240–1284.
Amador, Manuel, *"Sovereign Debt and the Tragedy of the Commons,"* Mimeo, Stanford University, 2008.
Antràs, Pol, and Ricardo Caballero, "Trade and Capital Flows: A Financial Frictions Perspective," *Journal of Political Economy*, 117 (2009), 701–744.
Aoki, Kosuke, Gianluca Benigno, and Nobuhiro Kiyotaki, *"Adjusting to Capital Account Globalization,"* Mimeo, London School of Economics, 2006.
Arellano, Cristina, "Default Risk and Income Fluctuations in Emerging Economies," *American Economic Review*, 99 (2008), 690–712.

31. Broner, Martin, and Ventura (2010) show that there are conditions under which the ability to retrade assets in secondary markets has even stronger effects than making discrimination among creditors difficult. In particular, by allowing assets to be retraded before enforcement decisions are made, secondary markets have the potential to redistribute assets in a way that maximizes the incentives to enforce. This suggests that by encouraging even further the development of liquid secondary markets, enforcement problems might be ameliorated at all stages of development, thereby increasing growth and lowering volatility.

Arteta, Carlos, Barry Eichengreen, and Charles Wyplosz, "When Does Capital Account Liberalization Help More than It Hurts?," in *Capital Flows and Crises, Barry Eichengreen*, ed. (Cambridge, MA: MIT Press, 2001), 71–96.
Atkeson, Andrew, "International Lending with Moral Hazard and Risk of Repudiation," *Econometrica*, 59 (1991), 1069–1089.
Bai, Yan, and Jing Zhang, "Solving the Feldstein-Horioka Puzzle with Financial Frictions," *Econometrica*, 78 (2010), 603–632.
Beck, Thorsten, and Ross Levine, "Legal Institutions and Financial Development," in *Handbook of New Institutional Economics*, Claude Ménard and Mary Shirley, eds. (Dordrecht: Springer Netherlands, 2005), 251–278.
Bekaert, Geert, Campbell Harvey, and Christian Lundblad, "Does Financial Liberalization Spur Growth?," *Journal of Financial Economics*, 77 (2005), 3–55.
———, "Growth Volatility and Financial Liberalization," *Journal of International Money and Finance*, 25 (2006), 370–403.
Benigno, Alessandra, Converse Nathan, and Fornaro Luca, "Large Capital Inflows, Sectoral Allocation, and Economic Performance," *Journal of International Money and Finance*, 55 (2015), 60–87.
Bonfiglioli, Alessandra, "Financial Integration, Productivity and Capital Accumulation," *Journal of International Economics*, 76 (2008), 337–355.
Bordo, Michael, Barry Eichengreen, Daniela Klingebiel, and Maria S. Martinez-Peria, "Is the Crisis Problem Growing More Severe?," *Economic Policy*, 16 (2001), 51–82.
Boyd, John H., and Bruce D. Smith, "Capital Market Imperfections, International Credit Markets, and Nonconvergence," *Journal of Economic Theory*, 73 (1997), 335–364.
Broner, Fernando, Aitor Erce, Alberto Martin, and Jaume Ventura, "Sovereign Debt Markets in Turbulent Times: Creditor Discrimination and Crowding-Out Effects," *Journal of Monetary Economics*, 61 (2014), 114–142.
Broner, Fernando, Alberto Martin, and Jaume Ventura, "Enforcement Problems and Secondary Markets," *Journal of the European Economic Association*, 6 (2008), 683–694.
———, "Sovereign Risk and Secondary Markets," *American Economic Review*, 100 (2010), 1523–1555.
Broner, Fernando, and Roberto Rigobon, "Why Are Capital Flows So Much More Volatile in Emerging than in Developed Countries?," in *External Financial Vulnerability and Preventive Policies*, Ricardo Caballero, César Calderón, and Luis Céspedes, eds. (Santiago: Central Bank of Chile, 2006), 15–39.
Broner, Fernando, and Jaume Ventura, "Globalization and Risk Sharing," *Review of Economic Studies*, 78 (2011), 49–82.
Brutti, Filippo, "Sovereign Defaults and Liquidity Crises," *Journal of International Economics*, 84 (2011), 65–72.
Bulow, Jeremy, and Rogoff Kenneth, "A Constant Recontracting Model of Sovereign Debt," *Journal of Political Economy*, 97 (1989a), 155–178.
———, "Sovereign Debt: Is to Forgive to Forget?," *American Economic Review*, 79 (1989b), 43–50.
Burnside, Craig, Eichenbaum Martin,, and Sérgio Rebelo, "Prospective Deficits and the Asian Currency Crises," *Journal of Political Economy*, 109 (2001), 1155–1197.
Caballero, Ricardo, Emmanuel Farhi, and Pierre-Olivier Gourinchas, "An Equilibrium Model of 'Global Imbalances' and Low Interest Rates," *American Economic Review*, 98 (2008), 358–393.
Caballero, Ricardo, and Arvind Krishnamurthy, "International and Domestic Collateral Constraints in a Model of Emerging Market Crises," *Journal of Monetary Economics*, 48 (2001), 513–548.
Calvo, Guillermo, "Capital Flows and Capital-Market Crises: The Simple Economics of Sudden Stops," *Journal of Applied Economics*, 1 (1998), 35–54.
Calvo, Guillermo, Alejandro Izquierdo, and Ernesto Talvi, "Sudden Stops and Phoenix Miracles in Emerging Markets," *American Economic Review Papers and Proceedings*, 96 (2006), 405–410.

Calvo, Guillermo, and Carmen Reinhart, "When Capital Inflows Come to a Sudden Stop: Consequences and Policy Options," in *Key Issues in Reform of the International Monetary and Financial System*, Peter Kenen and Alexander Swoboda, eds. (Washington, DC: International Monetary Fund, 2000), 175–201.
Caprio, Gerard, Daniela Klingebiel, Luc Laeven, and Guillermo Noguera, "Banking Crisis Database," in *Systemic Financial Crises: Containment and Resolution*, Patrick Honohan and Luc Laeven, eds. (Cambridge: Cambridge University Press, 2005).
Castiglionesi, Fabio, Fabio Feriozzi, and Guido Lorenzoni, *"Financial Integration and Liquidity Crises,"* Mimeo, Northwestern University, 2015.
Chang, Roberto, "Elections, Capital Flows, and Politico Economic Equilibria," *American Economic Review*, 100 (2010), 1759–1777.
Choi, Woon, and David Cook, "Liability Dollarization and the Bank Balance Sheet Channel," *Journal of International Economics*, 64 (2004), 247–275.
Cole, Harold L., and Patrick J. Kehoe, "Reviving Reputation Models of International Debt," *Federal Reserve Bank of Minneapolis Quarterly Review*, 21 (1997), 21–30.
Demirgüç-Kunt, Asli, and Enrica Detragiache, "Financial Liberalization and Financial Fragility," IMF Working Paper 98/83, 1998.
Dornbusch, Rudiger, Ilan Goldfajn, and Rodrigo O. Valdés, "Currency Crises and Collapses," *Brookings Papers on Economic Activity*, 26 (1995), 219–270.
Eaton, Jonathan, and Raquel Fernández, "Sovereign Debt," in *Handbook of International Economics*, vol. 3, Gene Grossman and Kenneth Rogoff, eds. (Amsterdam: Elsevier, 1998), 2032–2077.
Eaton, Jonathan, and Mark Gersovitz, "Debt with Potential Repudiation: Theory and Empirical Analysis," *Review of Economic Studies*, 48 (1981), 289–309.
Edwards, Sebastian, "Capital Mobility and Economic Performance: Are Emerging Countries Different?," in *The World's New Financial Landscape: Challenges for Economic Policy*, Horst Siebert, ed. (Kiel, Germany: Kiel Institute, 2001), 219–244.
Gennaioli, Nicola, Alberto Martin, and Stefano Rossi, "Sovereign Default, Domestic Banks, and Financial Institutions," *Journal of Finance*, 69 (2014), 819–866.
Gertler, Mark, and Kenneth Rogoff, "North-South Lending and Endogenous Domestic Capital Market Inefficiencies," *Journal of Monetary Economics*, 26 (1990), 245–266.
Gopinath, Gita, "Lending Booms, Sharp Reversals and Real Exchange Rate Dynamics," *Journal of International Economics*, 62 (2004), 1–23.
Gourinchas, Pierre-Olivier, and Olivier Jeanne, "The Elusive Gains from International Financial Integration," *Review of Economic Studies*, 73 (2006), 715–741.
———, "Capital Flows to Developing Countries: The Allocation Puzzle," *Review of Economic Studies*, 80 (2013), 1484–1515.
Grossman, Herschel I., and John B. Van Huyck, "Sovereign Debt as a Contingent Claim: Excusable Default, Repudiation, and Reputation," *American Economic Review*, 78 (1998), 1088–1097.
Jeske, Karsten, "Private International Debt with Risk of Repudiation," *Journal of Political Economy*, 114 (2006), 576–593.
Kaminsky, Graciela, and Carmen Reinhart, "The Twin Crises: The Causes of Banking and Balance-of-Payments Problems," *American Economic Review*, 89 (1999), 473–500.
Karolyi, George A., and René M. Stultz, "Are Financial Assets Priced Locally or Globally?" in *Handbook of the Economics of Finance*, vol. 1, George Constantinides, Milton Harris and René M. Stulz, eds. (Amsterdam: Elsevier, 2003), 975–1020.
Kletzer, Kenneth M., and Brian D. Wright, "Sovereign Debt as Intertemporal Barter," *American Economic Review*, 90 (2000), 621–639.
Kose, M. Ayhan, Eswar S. Prasad, Kenneth Rogoff, and Shang-Jin Wei, "Financial Globalization: A Reappraisal," *IMF Staff Papers*, 56 (2009), 8–62.

Kose, M. Ayhan, Eswar S. Prasad, and Ashley D. Taylor, "Thresholds in the Process of International Financial Integration," *Journal of International Money and Finance*, 30 (2011), 147–179.
Kose, M. Ayhan, Eswar S. Prasad, and Marco E. Terrones, "Financial Integration and Macroeconomic Volatility," *IMF Staff Papers*, 50 (2003), 119–142.
———, "Does Openness to International Financial Flows Raise Productivity Growth?," *Journal of International Money and Finance*, 28 (2009), 554–580.
Kraay, Aart, Norman Loayza, Luis Servén, and Jaume Ventura, "Country Portfolios," *Journal of the European Economic Association*, 3 (2005), 914–945.
Kraay, Aart, and Jaume Ventura, "Current Accounts in Debtor and Creditor Countries," *Quarterly Journal of Economics*, 115 (2000), 1137–1166.
———, "Current Accounts in the Long and Short Run," *NBER Macroeconomics Annual 2002*, 17 (2003), 65–94.
Lane, Philip R., and Gian M. Milesi-Ferretti, "External Capital Structure: Theory and Evidence," in *The World's New Financial Landscape: Challenges for Economic Policy*, Siebert Horst, ed. (Kiel, Germany: Kiel Institute, 2001), 247–284.
Levine, Ross, "Finance and Growth: Theory and Evidence," in *Handbook of Economic Growth*, vol. 1, Philippe Aghion and Steven Durlauf, eds. (Amsterdan: Elsevier, 2005), 865–934.
Lewis, Karen K., "Trying to Explain Home Bias in Equities and Consumption," *Journal of Economic Literature*, 37 (1999), 571–608.
Lorenzoni, Guido, "International Financial Crises," in *Handbook of International Economics*, vol. 4, Gita Gopinath, Elhanan Helpman, and Kenneth Rogoff, eds. (Amsterdam: Elsevier, 2014), 689–740.
Magud, Nicolas, Carmen Reinhart, and Kenneth Rogoff, "Capital Controls: Myth and Reality—A Portfolio Balance Approach," NBER Working Paper No. 16805, 2011.
Martin, Alberto, and Filippo Taddei, "International Capital Flows and Credit Market Imperfections: A Tale of Two Frictions," *Journal of International Economics*, 89 (2013), 441–452.
Martin, Philippe, and Hélène Rey, "Globalization and Emerging Markets: With or without Crash?," *American Economic Review*, 96 (2006), 1631–1651.
Matsuyama, Kiminori, "Financial Market Globalization, Symmetry-Breaking and Endogenous Inequality of Nations," *Econometrica*, 72 (2004), 853–884.
———, "Aggregate Implications of Credit Market Imperfections," *NBER Macroeconomics Annual 2007*, 22 (2008), 1–60.
Mendoza, Enrique G., "Sudden Stops, Financial Crises, and Leverage," *American Economic Review*, 100 (2010), 1941–1966.
Mendoza, Enrique G., Vincenzo Quadrini, and José Ríos-Rull, "Financial Integration, Financial Development, and Global Imbalances," *Journal of Political Economy*, 117 (2009), 371–416.
Milesi-Ferretti, Gian M., and Assaf Razin, "Current Account Reversals and Currency Crises: Empirical Regularities," in *Currency Crises*, Paul Krugman, ed. (Chicago: University of Chicago Press, 2000), 295–323.
Obstfeld, Maurice, "International Finance and Growth in Developing Countries: What Have We Learned?," *IMF Staff Papers*, 56 (2009), 63–111.
Obstfeld, Maurice, and Kenneth Rogoff, *Foundations of International Macroeconomics* (Cambridge, MA: MIT Press, 1996).
Obstfeld, Maurice, and Alan M. Taylor, *Global Capital Markets: Integration, Crisis, and Growth* (Cambridge: Cambridge University Press, 2004).
Papaioannou, Elias, "What Drives International Financial Flows? Politics, Institutions and Other Determinants," *Journal of Development Economics*, 88 (2009), 269–281.
Prasad, Eswar S., Raghuram G. Rajan, and Arvind Subramanian, "Foreign Capital and Economic Growth," *Brookings Papers on Economic Activity*, 17 (2007), 153–209.
Reinhart, Carmen, and Kenneth Rogoff, *This Time Is Different: Eight Centuries of Financial Folly* (Princeton, NJ: Princeton University Press, 2009).
———, "From Financial Crash to Debt Crisis," *American Economic Review*, 101 (2011), 1676–1706.

Sercu, Piet, and Rosanne Vanpée, *"Home Bias in International Equity Portfolios,"* Mimeo, Leuven School of Business and Economics, 2007.
Shleifer, Andrei, and Daniel Wolfenzon, "Investor Protection and Equity Markets," *Journal of Financial Economics*, 66 (2002), 3–27.
Tirole, Jean, "Inefficient Foreign Borrowing: A Dual- and Common-Agency Perspective," *American Economic Review*, 93 (2003), 1678–1702.
Ventura, Jaume, "Towards a Theory of Current Accounts," *World Economy*, 26 (2003), 483–512.
Wright, Mark, *"Reputations and Sovereign Risk,"* Mimeo, University of California–Los Angeles, 2002.