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Inefficient Foreign Borrowing: A Dual- and Common-Agency Perspective

By JEAN TIROLE*

Studying the implications of uncoordinated borrowing, the paper first looks at whether and when countries borrow too much in the aggregate. It then revisits the "original sin" debate, analyzing whether and when equity portfolio investment, international portfolio diversification, domestic currency denomination and longer maturities enhance borrowing countries' access to international lending. The paper thereby relates a country's level and quality of access to international capital markets to a variety of institutional features such as the level of domestic savings, their location, the extent of control rights held by political authorities, and the interests of dominant domestic political forces. (*JEL* D82, F33, F34)

The paper addresses a few familiar questions related to capital account liberalization: What makes a country attractive to foreign investors? Do countries borrow enough? Should one add some "sand in the wheels" of international capital markets, or, rather, should international diversification be further encouraged? And should incentives be provided to the private sector to avoid "dangerous forms of finance"?

Regarding level issues, the evidence overwhelmingly points in the direction of underborrowing. Almost all countries have small gross asset positions,[1] invest most of their equity portfolio at home,[2] and exhibit a high sensitivity of consumption to domestic production.[3] Thus, the potential benefits from capital account liberalization seem to have gone largely unreaped. Poor countries seem to borrow only a small fraction of what their development needs or cost advantages would vindicate, while rich countries hardly diversify their portfolios internationally. Standard attempts at explaining the home biases have proved unsatisfactory.[4]

On structure issues, a majoritarian view has emerged in the wake of the recent twin currency and banking crises. Commentaries have expressed much concern about a trilogy of dangerous forms of financial structures: debt finance,[5] short maturities, and foreign currency denomination of liabilities. In particular, a widespread consensus has developed in favor of

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[1] Aart Kraay et al. (2000).

[2] Kenneth R. French and James M. Poterba (1991) estimate that over 90 percent of U.S. and Japanese financial portfolios are invested in domestic assets (the corresponding percentages are 89 percent for France and 85 percent for Germany).

[3] See Karen Lewis (1999). A related fact is that the cross-country correlation of consumptions is typically less than 0.5, and smaller than that of outputs.

[4] See Lewis (1999) for a review. These standard attempts consist in introducing (a) purchasing power parity failures, (b) nontraded wealth, (c) indirect diversification through domestic stocks of multinationals, and (d) costs associated to foreign portfolio investment.

[5] The debt finance bias is not specific to emerging markets. Kraay et al.'s (2000) estimates for industrial countries are that foreign equity assets and liabilities account for about 3.3 percent and 3.9 percent of wealth, respectively. The corresponding percentage on the loan side is approximately 11 percent.

encouraging equity portfolio and foreign direct investment and discouraging short-term capital inflows and of promoting better risk management so as to prevent large corporate exposures to a depreciation of the currency.

Beneath the debates on borrowing level and structure lies an implicit assumption of a capital market failure. Somehow, capital account liberalization per se does not induce financial markets to generate the right economic signals. There is no arguing that short-term, dollar-denominated debt constitutes a poor hedge against liquidity and currency risks. (For an empirical analysis and a questioning of the causal link, see Enrica Detragiache and Antonio Spilimbergo, 2001.) But, presumably, borrowers design their financial structures to their own benefit, and one cannot presuppose that dangerous forms of debt constitute suboptimal liability structures.

This paper identifies and focuses on a specific market failure, stemming from a dual- and common-agency problem. In contract economics, dual agency, also called "moral hazard in teams," refers to a situation in which the welfare of a principal is affected by the combined actions of two agents. Common agency in contrast arises when a single agent's action affects the welfare of multiple principals. The paper's take is that, in a private lending arrangement, the investor's prospect of recouping his investment depends on the behavior of the borrower, with whom he contracts, and of the borrower's government, with whom he does not. That is, investor returns depend on government policy as well as the firm's managerial choices. This dual-agency problem translates into a common-agency one in which pairwise optimal contracts exert externalities on each other through their impact on country incentives: The government is a common agent of all firms (borrower-investor pairs), and its policy choice depends on a representative financial contract, but not, with a large number of private sector players, on the financial contract of any single firm.[6]

The model has three dates. Date 0 is the financing stage, in which borrowing levels and structures are specified by pairwise optimal contracts between foreign and domestic lenders and private sector companies. Domestic capital is limited, and thus the benefit from capital account liberalization is the firms' access to foreign capital (I will occasionally invoke risk diversification as well). Profits accrue and are distributed according to contractual commitments at date 2.

The date-2 outcomes depend on a policy selected by the government at date 1. Following the international economics literature,[7] the government favors domestic interests over foreign ones. And, when arbitrating among domestic interests, it may either put equal weights on domestic constituencies' surpluses or engage in redistributive politics.

The government impacts the foreign investors' return through the exercise of its many control rights. A first set of control rights held by the government affects both domestic and foreign investors' returns as in the case of a change in corporate governance and bankruptcy laws or in the resources affected to their enforcement, or a change in tax and labor laws.[8] A second set of control rights affects the tradable-nontradable mix and international collateral. Foreigners are ultimately reimbursed in tradables. Any government policy that reduces the amount of tradable goods that can be returned to foreigners can exert a negative externality on foreign investors. Examples of government moral hazard with respect to the mix includes encouraging excessive investments in the nontradable sector, most commonly in real estate, failing to sink export promoting investments, for example investments in public infrastructure for tourism, depleting international reserves, failing to diversify exports, thus making repayment to foreigners riskier, and, when foreigners hold domestic currency denominated assets, failing to take steps that would reduce the risk

[6] More generally, this common-agency externality exists as long as there are at least two private sector borrowers.

[7] See for example the terms-of-trade literature (Harry Johnson, 1954; Avinash Dixit, 1987; Kyle Bagwell and Robert Staiger, 2000).

[8] Another example is poor infrastructure management due to nepotism, clientelism or corruption. A more indirect impact operates through increases in public liabilities through regulatory forbearance and fiscal deficits, that affect the likely exercise of government control rights in the future.

of depreciation of the currency. All these behaviors reduce the return to foreign investors.[9]

The model embodies two possible sources of time inconsistency. First, as in the sovereign debt literature, domestic interests prevail over foreign ones which, if anticipated, result in scant or more expensive foreign borrowing.[10] Second, when domestic firms are subject to agency costs, the date-1 policy choice no longer internalizes the possibility that an investor-friendly course of action alleviates credit rationing and attracts capital.

Attempts to alleviate the cost of time inconsistency belong to two distinct categories. The first refers to the abandonment of sovereign rights and has received much attention in the literatures on trade (e.g., joining the World Trade Organization [WTO]) and central banking (e.g., making the central bank independent). The second addresses common agency and the resulting lack of coordination in foreign borrowing by altering private sector incentives. I focus on this latter and newer aspect.[11]

The paper first looks at aggregate borrowing. Section I studies whether and when partial capital account liberalization benefits countries in the presence or absence of credit rationing. While no strong case can be built on a priori grounds that countries over- or underborrow, the section identifies some factors that call for or against capital controls.

The paper then shifts attention to structure issues and analyzes whether and when equity portfolio investments and home biases (Section II), longer maturities (Section III) and domestic currency denomination (Section IV) enhance borrowing countries' access to international lending. Section V summarizes and concludes.

A general theme of the analysis of borrowing structure is that dangerous forms of finance are also "policy resistant;" they make the government more accountable, ultimately to the benefit of the country. Encouraging foreign direct and equity portfolio investment and promoting international diversification do not encourage accountability. Some match between stakeholders and political constituencies must be achieved. Debt financing and small frictions inducing a home bias, therefore, should not be the object of widespread opprobrium, even though, as Section II shows, they will be encouraged by politicians eager to favor their corporate friends and then may have perverse consequences.

Closely related insights apply to what Barry Eichengreen and Ricardo Hausmann (1999) call the original sin, referring to emerging markets' widespread practice of borrowing short and in foreign currency. Section III develops a general-equilibrium model of independent interest, in which domestic firms optimally design the term structure of their liabilities in anticipation of future government policies and the government responds to these privately optimal, but uncoordinated financial structures when selecting a domestic-welfare maximizing policy. It shows that forcing private borrowers to tilt the maturity structure toward the long term reduces welfare. Section IV studies the choice of currency

[9] To these must be added, of course, less subtle ways of reducing foreigners' returns, as when the Argentinian government pleases local firms through "peso-ification" of dollar debts.

Commentaries often downplay the role of moral hazard in recent crises, on the grounds that following a crisis incumbent politicians may lose office and that IMF programs further erode their power. There are two issues with this argument. First, excluding government moral hazard on the ground that no finance minister would voluntarily provoke a crisis is like saying that fire insurance does not create moral hazard because homeowners do not usually set fire to their house once insured. The problem with governments and homeowners is not that they will set fire to their homes but rather that they will be less cautious at the margin. Governments will not take the actions that reduce the probability of a crisis ten years from now from 5 percent to, say, 1 percent, if they entail an immediate political cost.

Second, "government moral hazard" is usually given a narrow definition and related to the investors' expectation of a banking bailout. Actions that directly impact the value of foreign investors' assets are less likely to generate a backlash.

[10] To be certain, the U.S. government also impacts the return of investors in GM, Intel or a Silicon Valley startup. However, dual agency is much more relevant in a financially integrated economy than in a financially isolated economy, for two reasons: First, the government has much less incentive to defend the investors' interests when these investors do not vote or more generally have limited political leverage. Second, the government has many more degrees of freedom in the open economy context as it can impact the tradable-nontradable mix.

[11] The control rights implications are discussed from a corporate finance perspective in Tirole (2002).

denomination and again shows that risk exposure is the flip side of policy resistance.

By focusing on a specific market failure (lack of coordination of private sector borrowing), the paper delivers strong results and sharp (though potentially controversial) policy prescriptions. While I view the particular market failure as important and the public policy effects as first order, I also acknowledge that a broader view embodying other well-grounded market failures is warranted. In this respect, the paper's analysis can be read from a different perspective, namely that of a complementarity between "corporate finance reform" and "government governance reform."[12] Public policies that counter dangerous forms of finance, such as taxes on short-term capital inflows or foreign currency borrowing[13] or the subsidization of foreign direct investment, have more appeal when the country's constitutional design, institutional features (such as the creation of pension funds), domestic politics, and residents' pattern of investment (home versus abroad) concur to put investor protection reasonably high on the rulers' priority list. Conversely, banning dangerous forms of finance is likely to be more costly when the government's commitment toward investors is weak. With this perspective, the reader can take along the highlighted effects without necessarily embracing all policy implications.

Related Literature.—This paper builds on a number of disjoint literatures. Technically, it is most related to the literature on common agency with moral hazard, pioneered by Mark Pauly (1974) and B. Douglas Bernheim and Michael Whinston (1986). For example, Pauly's celebrated insight is that nonexclusive insurance contracts give rise to externalities between insurers, who do not internalize the impact of the reduction in the insuree's care on the other insurers; this inefficiency is ultimately borne by the insuree who ends up overinsured.

Several research lines have emphasized the cost of the governments' time inconsistency problem in an international context. The literature on sovereign debt (Jeremy Bulow and Kenneth Rogoff, 1989a, b; Jonathan Eaton and Raquel Fernández, 1995), like this paper, emphasizes domestic preferences of governments. Bulow and Rogoff (1989b) show how creditor country governments may be gamed into contributing to rescheduling agreements. Kraay et al. (2000) argue that countries minimize their exposure to sovereign risk by keeping small net asset positions, and even small gross asset positions if transfers of ownership involve large transaction costs. Jeffrey Sachs (e.g., 1989) and others have argued that countries with high levels of sovereign debt are subject to debt overhang and invest too little because part of the benefits from this investment accrue to foreigners (which implies that the sovereign and foreign lenders can reach a Pareto improvement by renegotiation); Application 1 in Section II, subsection B, makes a similar point in the context of private sector borrowing and general public policies (although renegotiation is less credible in our context since individual borrower-lender pairs have no private incentive to renegotiate). In contrast with the sovereign debt literature, this paper emphasizes uncoordinated borrowing and its policy implications; it also takes a much broader view of "repudiation" as it applies to the exercise of all control rights held by governments; last, it focuses on rather different issues, such as original sin.

The international trade literature on time inconsistency and excessive protection (Staiger and Guido Tabellini, 1987; Kiminori Matsuyama, 1990; Aaron Tornell, 1991) is also relevant here; it for example shows that the socially optimal policy—free trade, say—is often time inconsistent and that the time-consistent policy frequently leads to (*ex ante*) excessive protection. Giovanni Maggi and Andrés Rodríguez-Clare (1998) add capture-by-interest groups as in Gene Grossman and Elhanan Helpman (1994); politicians may want to commit to free trade (join the WTO) in order to avoid an *ex ante* misallocation of investment in favor of the sector that will receive protection *ex post,* even though this implies forgoing future contributions by interest groups.

My analysis also complements Tornell and Andres Velasco's (1992) and Velasco's (1996)

[12] I am grateful to a referee for suggesting this interpretation.

[13] Assuming these taxes are effective in reaching their goal.

modeling of capital flights, in which domestic residents decide how much to invest at home and abroad in the presence of domestic redistributive policies or increasing fiscal returns.[14] These contributions focus on capital flows from poor to rich countries; I focus on moral hazard by a borrowing rather than lending country. The implications accordingly differ. For example, the domestic residents' ability to invest abroad acts as a disciplining device in Tornell-Velasco, while a home bias tends to be beneficial in my analysis. Furthermore, a major concern of this paper is the impact of borrowing structure on government moral hazard, which requires modeling capital inflows and composition. Wolf Wagner (2001) shows how a home bias can reduce government moral hazard in a world in which investors want to diversify internationally, and governments tax their residents (for their own sake) in order to discourage them from competing to supply (investment) inputs that partly benefit foreign investors.

There are few corporate finance approaches to international finance. Mark Gertler and Rogoff (1990) is a notable exception. This paper however is primarily interested in the size of capital flows, and has no government moral hazard, and a fortiori no dual- and common-agency problem. Government moral hazard in contrast plays an important role in Olivier Jeanne's work (1999, 2000a, b, 2002). Jeanne shows that a lack of domestic monetary credibility may induce private borrowers to borrow in foreign currency. While foreign currency debt is dangerous in the event of bad shock, it reflects optimal risk management by firms conditional on the lack of domestic monetary credibility. This may arise because of the interaction between government's moral hazard and commitment and signaling problems at the level of entrepreneurs (Jeanne, 1999, 2000a) or bankruptcy costs (Jeanne, 2002).

Last, a number of themes developed in this paper are to some extent part of the "folk wisdom" in the international economics community, rather than related to a specific literature. Relative to this, the paper's contribution is twofold. First, the corporate finance techniques and the dual- and common-agency formulation allow me to build a formal framework to validate the insights and identify their limits. Second, a formal model takes the folk wisdom in new directions, most notably by incorporating political economy considerations.

I. Inefficient Borrowing Level

A. *Bare-Bones Framework*

The bare-bones framework abstracts from the issues of domestic incidence and redistributive politics by focusing on entrepreneurs and foreign investors (so, it ignores domestic savings, and assumes that the incidence of government policy is entirely on firms and foreign investors).

A small country is populated by a large number (technically, a continuum of mass 1) of identical, risk neutral "entrepreneurs," who more generally stand for domestic firms or insiders. There is a single (tradable) good and three dates, $t = 0, 1, 2$.

Date 0: At the initial date, the representative entrepreneur borrows I_f from foreign investors. In exchange of I_f, the representative entrepreneur issues financial claims (debt, equity) on the date-2 proceeds of her firm.

The capital market is competitive. Investors are risk neutral and the world's rate of interest is normalized to zero. That is, domestic entrepreneurs can borrow as much as they want as long as their lenders break even on average.

Date 1: At date 1, the country's government chooses an action or policy $a \in \mathcal{A} \subseteq \mathbb{R}$. The policy is chosen so as to maximize the entrepreneurs' (*ex post*) welfare.

Date 2: The proceeds from investment accrue at the final date, date 2. The expected total

[14] An earlier contribution to capital flights and increasing fiscal returns is Eaton (1987). In that paper, foreign lenders require a government guarantee on their loans (as the latter is the only entity able to enforce their contracts, say). Domestic residents have an incentive to invest their money abroad and thereby escape taxation if other residents also do, since then foreign lending and concomitant government guarantees increase. The process may result in multiple equilibria.

surplus or value created by the investment is denoted $V(I_f, a)$ and embodies both the costs and benefits for entrepreneurs and foreign investors of the government's policy. Let $V_f(I_f, a)$ [smaller than $V(I_f, a)$] denote the foreigners' expected date-2 income from their financial claims.

Letting I_f^* and a^* denote the equilibrium investment and policy choice, the competitive capital market assumption implies that foreign investors just break even:

$$V_f(I_f^*, a^*) = I_f^*; \tag{1}$$

equivalently, the firms' net present value (NPV) is captured by the domestic entrepreneurs, who receive utility

$$U^* \equiv U(I_f^*, a^*) \equiv V(I_f^*, a^*) - I_f^*. \tag{2}$$

In the following, I will assume that objective functions have the required concavity properties and that choices are governed by first-order conditions. I will interpret the policy in the following way:

ASSUMPTION 1: *Policy a is an investor-friendly policy: In the relevant range*

$$\frac{\partial V_f}{\partial a} > 0.$$

For example, a higher policy choice may correspond to an improvement in the corporate governance legal framework or enforcement, to lower taxes on capital, to a more investor-friendly labor environment, or to a public investment in complementary infrastructure financed through taxes on domestic residents.[15]

[15] "In the relevant range" refers to the fact that at some point, even V_f may end up decreasing as a increases. For example, an excessively harsh corporate governance environment may prevent managers from acting or may involve public expenditures that can only be financed by taxing foreign investors.

B. *Country Borrowing in the Absence of Agency Cost*

Let us first assume that borrowing is not subject to any agency cost and so there is no credit rationing. The first-best investment I^{FB} and policy a^{FB} respectively equalize the marginal benefit and marginal cost of investment:[16]

$$\frac{\partial V}{\partial I_f}(I_f^{FB}, a^{FB}) = 1, \tag{3}$$

and maximize value:

$$\frac{\partial V}{\partial a}(I_f^{FB}, a^{FB}) = 0. \tag{4}$$

When selecting her investment level at date 0, the representative entrepreneur rationally anticipates and takes the government policy as given and thus solves

$$\max_{I_f}\{V(I_f, a^*) - I_f\}$$

yielding an equilibrium value I_f^* equalizing marginal benefit and marginal cost of investment:

$$\frac{\partial V}{\partial I_f}(I_f^*, a^*) = 1. \tag{5}$$

At date 1, the government acts when the foreigners' investment I_f^* has already been committed; and so the government maximizes the entrepreneurs' *ex post* payoff, which is equal to the total pie minus what is returned to foreigners:

$$\max_{a}\{V(I_f^*, a) - V_f(I_f^*, a)\},$$

yielding

[16] To implement the first-best policy, the government need choose only a at date 0. As equation (5) below shows, the investment policy can then be left to the firms' discretion. The same remark holds for the second-best policy analyzed in Section I, subsection C. In contrast, I show that the government wants to control I_f when it is unable to commit to a.

$$(6) \qquad \frac{\partial V}{\partial a}(I_f^*, a^*) = \frac{\partial V_f}{\partial a}(I_f^*, a^*).$$

Unsurprisingly, the government underinvests—from an *ex ante* perspective—in the investor-friendly action ($\partial V/\partial a > 0$). An equilibrium is a pair (I_f^*, a^*) satisfying (5) and (6).

As discussed in the introduction, the analysis from there on can either analyze external constraints[17] that alleviate the time inconsistency problem, as is done in the literature, or address the common-agency problem so as to alter the government's incentives. I focus on the latter. So, I ask, does the country borrow too much or too little from abroad? Suppose that, starting from laissez-faire, foreign borrowing can be encouraged (e.g., through subsidies) or restrained (e.g., through a capital control). Using the Envelope theorem, a small increase or decrease in the representative firm's investment has the following impact on the entrepreneur's welfare:

$$(7) \qquad \frac{d}{dI_f}(V(I_f, a) - I_f) = \frac{\partial V}{\partial a}\frac{da^*}{dI_f},$$

where $a^*(I_f)$ is given by condition (6):

$$\frac{\partial V}{\partial a}(I_f, a^*(I_f)) = \frac{\partial V_f}{\partial a}(I_f, a^*(I_f)).$$

The right-hand side of (7) will be called the *commitment effect.* We then obtain the following simple result:

PROPOSITION 1: *In the absence of credit rationing, a capital control (a reduction in I_f starting from the no-capital-control benchmark) raises welfare if and only if*

$$\frac{da^*}{dI_f} < 0 \Leftrightarrow \frac{\partial}{\partial a}\left(\frac{\partial V_f}{\partial I_f}\right) > \frac{\partial}{\partial a}\left(\frac{\partial V}{\partial I_f}\right).$$

While we would often expect less care to be exerted by the government as foreign investment and therefore foreign ownership in the country increase ($da^*/dI_f < 0$), it is equally easy to find circumstances under which, in the absence of credit rationing, a capital control lowers welfare. For example, if the policy is subject to increasing returns to scale,[18] as may be the case for some types of supporting infrastructure, a more massive capital inflow may actually result in a more investor-friendly outcome. Relatedly, suppose that here are increasing fiscal returns to scale as in Olivier Blanchard and Lawrence Summers (1987) and Velasco (1996); that is, the country must rely on capital taxes to fund an incompressible level of government expenditures. A capital control shrinks the tax base and raises per-unit capital taxes, with potentially detrimental effects (for example, a reduction in domestic savings, if these are introduced into the picture).[19] Before putting more structure on the model, let us look at the general impact of credit rationing.

C. *Credit Rationing*

Borrowing is usually subject to substantial agency costs. The study of the concomitant problem of credit rationing and of the various ways in which firms attempt to reduce its impact has spawned a large variety of models. Fortunately, these corporate finance models have many common implications. For the purpose of this paper the common feature of interest is that borrowing is constrained by the maximal expected income that can be promised to investors. The latter is called the "pledgeable income" and (for an anticipated policy a^*) will be denoted $\bar{V}_f(I_f, a^*)$. In corporate finance models, $\partial \bar{V}_f/\partial I_f < 1$ for the equilibrium investment (for, if the pledgeable income increased faster than investment, investors would benefit from a higher investment level and so there would be no credit rationing!). Section II, subsection A, provides an illustration of the notion of pledgeable income.

In corporate finance, the unconstrained borrowing condition (5) is replaced by the twin

[17] These can be seen as shrinking the government's choice set $\mathcal{A}$.

[18] In which case the first-order approach used here needs to be amended.

[19] I am grateful to Pierre-Olivier Gourinchas for providing this example.

conditions that firms borrow as much as they are able to:

$$I_f = \bar{V}_f(I_f, a^*), \tag{8}$$

and would like to borrow more if they could:

$$\frac{\partial V}{\partial I_f}(I_f, a^*) > 1. \tag{9}$$

How is our conclusion about country borrowing level affected? Because condition (6) is unaffected (taking $V_f = \bar{V}_f$),

$$\frac{d}{dI_f}(V(I_f, a) - I_f) = \left[\frac{\partial V}{\partial I_f} - 1\right] + \left[\frac{\partial V}{\partial a^*}\frac{da^*}{dI_f}\right]. \tag{10}$$

The second term on the right-hand side of equation (10) is the same commitment effect as in the absence of credit rationing. The difference relates to the first term. The Envelope theorem no longer applies, and a capital control implies a direct loss in net present value since $\partial V/\partial I_f > 1$.

It is also worth pointing out that under credit rationing the optimal commitment or second best policy no longer satisfies $\partial V/\partial a = 0$. Rather, this policy (I_f^{SB}, a^{SB}) solves:

$$\max_{\{I_f, a\}}\{V(I_f, a) - I_f\}$$

s.t.

$$I_f = \bar{V}_f(I_f, a), \tag{11}$$

or

$$\frac{\partial V}{\partial a} = -\left(\frac{\partial V}{\partial I_f} - 1\right)\frac{dI_f}{da} < 0,$$

where $I_f(a)$ solves equation (11).

The time-consistent policy a^* (which satisfies $\partial V/\partial a = \partial \bar{V}_f/\partial a > 0$) thus is doubly biased relative to the commitment policy a^{SB}. First, and as in the absence of credit rationing, it does not internalize the foreigners' welfare. Second, and a specificity of credit rationing, an investor-friendly policy helps attract capital, which motivates a distortion relative to the first-best rule (4). Once this capital is in place, though, the distortion is no longer needed, and the government has a diminished incentive to be investor friendly. This second effect would exist even if investors were domestic residents. Both effects point in the same direction: The policy is not investor friendly enough, and the cost of this distortion is ultimately borne by the country itself.[20]

PROPOSITION 2: *Under credit rationing, a positive commitment benefit from a capital control, if it exists, may be offset by the direct NPV loss.*

Because credit rationing is pervasive in all economies, and especially in borrowing countries, the analysis suggests that beneficial attempts at addressing government moral hazard are more likely to act on the structure of borrowing than on its level.[21] We therefore turn to a more structured version of this general model to investigate such policies.

II. Inefficient Borrowing Structure

A. *Framework*

Let us now specialize the model and analyze externalities in the structure of borrowing agreements.

The representative entrepreneur is risk neutral, is protected by limited liability, has initial wealth A, and invests $I > A$. Domestic savings per entrepreneur are fixed at level $I_d \geq 0$, and, like foreign investments, demand an expected

[20] In this bare-bones model, foreigners would have an incentive to lobby in favor of investor-friendly policies only at date 1. They would have an incentive to do so at date 0 if they already had some stake in the country at date 0.

Note further that even if international investors have no stake at date 0, investor-friendly measures in (or a better commitment by) a number of borrowing countries would raise the demand for capital and the world interest rate and ultimately benefit these investors.

[21] Policy intervention alternatively may relax the credit constraint, as in the case, considered in Section II, subsection B, of an improvement in corporate governance.

rate of return equal to 0.[22] The entrepreneur finances the shortfall from foreigners: $I - A - I_d = I_f$.

At date 2, a firm either succeeds and then yields RI, or fails, that is yields nothing. Only a fraction of income is pledgeable: Investors receive $rI \leq RI$ in case of success, while the entrepreneur appropriates $(R - r)I$. Neither gets anything in case of failure.

The probability of success is $p + \tau$, where τ is determined by the government after the investments are sunk. (So τ is the action a of the previous section.) Enhancing the probability of success of domestic firms by τ involves an increasing and strictly convex lump-sum cost $\gamma(\tau)$ per unit of investment. This cost is borne by domestic residents.[23] The assumption that the cost γ is proportional to investment is purely for analytical convenience. For example, the theory would carry through if γ included a fixed component. The cost γ may be incurred by the firms' insiders—as in the case of a strengthening in corporate governance or more flexible labor laws—or by the population as a whole—as in the case of investments in infrastructure financed by taxation or a reduction in public expenditures. I will discuss incidence shortly.

For equilibrium value τ^*, the pledgeable income is

$$\bar{V} \equiv (p + \tau^*)rI,$$

and the entrepreneur's date-2 expected payoff

$$(p + \tau^*)(R - r)I.$$

Example: The wedge between the full value RI and the pledgeable part rI, which is a distinctive feature of corporate finance, can for example be derived from a classic moral hazard problem. Suppose that the entrepreneur can obtain private benefit BI, proportional to investment, by misbehaving (and no such benefit when behaving). The probability of success then falls from $(p + \tau^*)$ to $(q + \tau^*)$, where $q < p$. The incentive constraint then requires that the entrepreneur's stake, R_b, in success be substantial enough so as to deter misbehavior:

$$(p + \tau^*)R_b \geq (q + \tau^*)R_b + BI, \quad \text{or}$$

$$R_b \geq \frac{BI}{p - q}.$$

Then

$$r \equiv R - \frac{B}{p - q}.$$

The fraction $B/[(p - q)R]$ measures the agency cost.

Incidence.—The section proceeds in two steps. First, it assumes that the government chooses the date-1 policy so as to maximize domestic welfare. Then, it generalizes the analysis to redistributive politics by allowing the government to put different weights on entrepreneurs and domestic investors/consumers. While incidence does not affect the date-1 policy choice under domestic-welfare maximization, it impacts the date-0 investment; in particular, suppose that the date-1 cost of the policy is $x\gamma(\tau)I$ for entrepreneurs, and $(1 - x)\gamma(\tau)I$ for domestic investors/consumers.[24] Entrepreneurs,

[22] For example, there is an alternative storage technology with which the domestic investors can obtain a zero rate of return.

Even with fixed domestic savings, it might be the case that the amount invested at home not be inelastic because the domestic investors invest abroad. Note, though, that, unlike Tornell-Velasco (1992) and Velasco (1996), we focus on borrowing countries. And so, provided that foreign investors are willing to lend to the country *and* (unlike in Eaton, 1987) domestic investors are not discriminated against relative to foreign investors, risk-neutral domestic investors have no strict incentive to invest abroad. Risk aversion and portfolio diversification, by contrast, provide incentives to invest abroad: see Application 2.

[23] It is straightforward to allow for taxes on foreigners' portfolio income. See also the discussion of capital inflow taxation below.

[24] The *ex post* incidence coincides with the *ex ante* (date-0) incidence under our assumption that γ is lump-sum. If the cost were not lump-sum, then the *ex ante* incidence y would in general exceed the *ex post* incidence x; in particular, a tax on capital decided at date 1 but anticipated at date 0 would be passed through to entrepreneurs via an increase in the interest rate.

Note also that the fraction $x\gamma(\tau)I$ borne by entrepreneurs can be viewed either as a nonmonetary cost imposed on

if they can secure funding, invest if $(p + \tau^*)R - 1 - x\gamma(\tau^*) > 0$. They do not internalize the general population's investment-support cost $(1 - x)\gamma(\tau^*)I$. We will return to this point in Applications 3 and 4.[25]

B. *Government Maximizes Domestic Welfare*

For a given anticipation τ of the policy choice, the representative entrepreneur's investment is limited by the extent of pledgeable income:

$$I - A = \bar{V} = (p + \tau)rI.$$

Hence

$$(12) \qquad I = I(\tau) = \frac{A}{1 - (p + \tau)r}.$$

[We will assume that $1 > (p + \tau)r$ in the relevant range. That is, an extra unit of investment creates less than one unit of pledgeable income; otherwise investment would be infinite in this constant-return-to-scale model.]

Commitment Policy.—The first-best optimal policy τ^{FB} solves:

$$\max_{\tau}\{(p + \tau)RI - \gamma(\tau)I\}, \quad \text{or} \quad \gamma'(\tau^{FB}) = R.$$

However, and as was pointed out in Section I, subsection C, the first-best policy is not the proper benchmark in the presence of credit rationing. The second-best commitment policy should aim not only at increasing *ex post* total surplus but also at *ex ante* attracting capital in a situation in which the latter is insufficient. The second-best policy τ^{SB} maximizes date-0 total surplus:

$$\max_{\tau}\{[(p + \tau)R - 1 - \gamma(\tau)]I(\tau)\},$$

where $I(\tau)$ satisfies (12). Assuming that investment is socially desirable,[26] that is, $(p + \tau)R - 1 - \gamma > 0$, the second-best commitment policy satisfies

$$\gamma'(\tau^{SB}) > R.$$

Time-Consistent Policy.—Consider now an equilibrium policy τ^*. That is, at date 0, economic agents correctly anticipate that the policy choice at date 1 will be τ^*, and so the investment level is $I(\tau^*)$. At date 1, the foreign investors' stake is, for actual policy choice τ,

$$V_f = \left(\frac{I_f}{I_d + I_f}\right)\bar{V} = \left(\frac{I_f}{I_d + I_f}\right)[(p + \tau)rI(\tau^*)].$$

At date 1, the government chooses τ so as to maximize domestic welfare $V - V_f$:

$$\max_{\tau}\left\{\left[(p + \tau)\left[(R - r) + \left(\frac{I_d}{I_d + I_f}\right)r\right] - \gamma(\tau)\right]I(\tau^*)\right\},$$

and so

$$(13) \qquad \gamma'(\tau^*) = R - \left(\frac{I_f}{I_d + I_f}\right)r.$$

As expected, firms are less profitable, the higher the foreigners' stake in the firms. An equilibrium is a pair (τ^*, I_f^*) satisfying (13) with $I_f = I_f^*$ and

$$I_f^* + I_d = \frac{(p + \tau^*)rA}{1 - (p + \tau^*)r}.$$

I now derive a few implications of this analysis.

Application 1: Impact of Domestic Savings.—The policy inefficiency decreases with the share of domestic savings. As domestic savings

entrepreneurs or as a tax on entrepreneurial income that cannot be pledged to investors.

[25] This point bears some resemblance with the "soft-budget constraint" problem, under which a benevolent social planner may rescue distressed, but viable investments and possibly encourage *ex ante* investments with negative social value.

[26] This is necessarily the case if the incidence falls primarily on entrepreneurs (x close to 1).

grow, foreign investment is crowded out and so τ^* increases: Domestic savings act as a shield for foreign investment. Policies favoring domestic savings through tax incentives, pension funds or privatization targeted to investors therefore have a positive impact on government behavior (although they may involve costs of their own) and may increase not only total investment, but also foreign investment.

A related idea can be found in Bruno Biais and Enrico Perotti's (2002) model of privatization. There, a government lacking commitment power over its future policy allocates sufficiently many shares to its constituency in order to commit not to follow an expropriation policy. The common thread is that the government may want to alter the distribution of financial assets in order to manipulate its own incentives.

Application 2: International Diversification.—A closely related point can be made with respect to international risk sharing. Suppose that there is aggregate risk in the country—that is, the realizations of the domestic firms' profits are not independent. Suppose further that domestic savers, instead of being risk neutral, exhibit at least a tiny bit of risk aversion. Then provided there is no worldwide risk, the domestic investors' optimal portfolio choice is to put all their money abroad, and so

$$I_d = 0.$$

Governmental moral hazard is then extreme:

$$\gamma'(\tau^*) = R - r.$$

This illustration does not aim at realism—if anything portfolios exhibit a very strong home bias, the reasons for which have been extensively discussed.[27] Rather, it leads us to a more general point: Keeping domestic investment at home benefits the country (and actually the world in our model, since foreign investors always break even) as long as the corresponding policies do not create a substantial misallocation of investment. Put differently, small frictions inducing a home bias raise welfare.

[27] See, e.g., Lewis (1999).

Application 3: Capital Controls.—Let us return momentarily to the question posed in Section I regarding the efficient level of foreign borrowing. Consider for instance a unit tax t on capital inflows at date 0. The proceeds of this tax, $tI_f = t(I - I_d - A)$, are redistributed in a lump-sum fashion to domestic residents (and do not affect domestic savings, say). The tax on foreign borrowing raises the return to domestic savings by t. The representative entrepreneur's borrowing capacity is then given by

$$(1 + t)(I - A) = (p + \tau^*)rI,$$

since foreigners and domestic savers then expect an average return equal to $1 + t$. Condition (13) still holds:

$$\gamma'(\tau^*) = R - \left(\frac{I_f}{I_d + I_f}\right)r.$$

However, foreign investment decreases with the tax on capital inflows despite a favorable disciplining effect on policy choice.[28] Domestic welfare is then

$$W = [(p + \tau^*)R - 1 - \gamma(\tau^*)]I(\tau^*, t).$$

The impact of the tax on capital inflows can be decomposed into two terms:

$$\frac{dW}{dt} = [(p + \tau^*)R - 1 - \gamma]\frac{dI}{dt}$$

$$+ [(R - \gamma')I]\frac{d\tau^*}{dt}.$$

The first term on the right-hand side of this equation is the counterpart of that in equation (10). If the entrepreneurs bear the full cost of the policy ($x = 1$), as in Section I, then

[28] Suppose that I (and I_f) increases as t increases. Then τ^* decreases, and so does

$$I = \frac{A}{1 - \dfrac{(p + \tau^*)r}{1 + t}},$$

a contradiction.

$(p + \tau^*)R - 1 - \gamma$ is unambiguously positive if there is investment and so the reduction in investment brought about by the tax has a negative welfare impact. This need not be the case if part of the incidence falls on the general population ($x < 1$). Investments may then be sunk, that have a negative NPV ($(p + \tau^*)R < 1 + \gamma(\tau^*)$). We are arguably more interested in situations in which investment is socially desirable. The second term is the commitment effect: The capital control reduces foreign investment and disciplines the government, with positive welfare consequences. This commitment effect is negligible if the share of foreign investment is small;[29] then, the impact of a capital control is unambiguously negative provided that investment is socially desirable. For large levels of foreign investment, though, the commitment effect may dominate the first effect and capital controls may then increase welfare.

Application 4: Debt-Equity Composition. —Last, but not least, let us turn to the foreigners' mix between loans and equity investments. The basic two-outcome, no-income-in-case-of-failure framework made no distinction between debt and equity. A simple variation allows us to discuss debt and equity in an easy way. Suppose now that, for investment level I, the firm yields $R^F I \geq 0$ in case of failure. One can think of $R^F I$ as the (pledgeable) salvage value of assets, or collateral. Success, as earlier, yields an extra income RI, and so overall income

$$R^S I = (R + R^F)I.$$

Firms issue (*safe*) *debt* corresponding to the salvage value $R^F I$ of its assets, and the rest represents *equity* claims. It is easily seen that it is optimal for the entrepreneurs to own equity and no debt since this arrangement maximizes their incentives and they have no demand for insurance. Thus the entire debt is held by domestic and foreign investors. Let $[R^F + (p + \tau^*)r]I$ denote the pledgeable income.[30] The per-unit-of-investment value of debt is therefore $r^D = R^F$, and that of equity $(p + \tau^*)r^E = (p + \tau^*)r$. Foreigners hold fractions α_f^E and α_f^D of the domestic equity and debt. The break-even constraints are:

$$I_f = [\alpha_f^E(p + \tau^*)r^E + \alpha_f^D r^D]I$$

and

$$I_d = [(1 - \alpha_f^E)(p + \tau^*)r^E + (1 - \alpha_f^D)r^D]I.$$

Being risk neutral, both foreigners and domestic residents are indifferent as to the claim they hold. Thus, the overall break-even constraint,

$$I - A = [(p + \tau^*)r^E + r^D]I$$

is compatible with a continuum of possible foreign equity stakes.

But, while investors *individually* are indifferent as to which claim they hold, they *collectively* are not. Indeed, the government selects its policy at date 1 so as to solve:

$$\max_{\tau}\{[(p + \tau)[(R - r) + \alpha_d^E r] - \gamma(\tau)]I(\tau^*)\}.$$

Thus, an increase in the foreigners' equity holdings/value at stake, or equivalently in α_f^E, reduces discipline and country welfare.[31]

Again, I wish to emphasize the broader implications of this analysis rather than its details. The investors' indifference between domestic debt and equity only offers analytical convenience and can be broken in several ways. For example, a favorable capital adequacy treatment encouraging foreign banks to hold debt or an implicit deposit insurance in domestic banks pushes toward a low α_f^E. Similarly, the resort to high-powered monitoring by domestic conglomerates encourages equity

[29] Since $\gamma' \simeq R$ if $I_f \simeq 0$.

[30] In the moral hazard illustration, again

$$r = R - \frac{B}{p - q}.$$

[31] For the now familiar reason the conclusion on country welfare hinges on the entrepreneurs' bearing enough of the cost γ.

holdings by domestic residents. Conversely, investor risk aversion would encourage domestic investors to avoid the domestic stock market if there are country shocks.

The broad point is that *at the margin* the basic externality applies: When a foreigner substitutes equity for debt, he does not internalize the change in the government's incentives and therefore the domestic entrepreneurs' increase in the cost of funds. In this sense, the conclusion is robust to a more sophisticated description of portfolio allocation.[32]

The following proposition summarizes our analysis:

PROPOSITION 3: *In comparison to the first-best government policy (for which the marginal cost of the policy is equal to its marginal benefit), the equilibrium policy under a domestic-welfare maximizing government is more investor-friendly under commitment, and less investor-friendly in the time-consistent solution. Furthermore, provided that most of the cost of the policy is borne by the productive sector, country welfare increases when*

(*a*) *domestic savings increase and/or exhibit a stronger home bias,*
(*b*) *a capital control is relaxed, provided that foreign ownership is small,*
(*c*) *marginal incentives are provided to foreigners to hold debt rather than equity.*

C. *Redistributive Politics*

Suppose next that the government weighs domestic constituencies unequally. Namely, entrepreneurs receive weight k and non-entrepreneurs weight $1 - k$. For example, one would expect k to be large under "crony capitalism"; in contrast, $1 - k$ should increase with the creation of pension funds, which make the median voter more concerned about portfolio returns. For simplicity I make no distinction between domestic savers and the median voter, although such a distinction would be warranted in many applications (indeed, the point on pension funds I just made implicitly rests on such a distinction. Pension funds imply that the median voter has a higher portfolio stake).

I assume that the government is stable in that the weights do not change between dates 0 and 1. This calls for two comments. First, even more so than previously, outside judgments on the government's policy are hard to formulate. As we will see, the latter may have very unpalatable features, which raises the usual moral dilemma of whether the international community ought to adopt a paternalistic attitude vis-à-vis a democratically elected government.[33] Second, it would be interesting to study how the strategic choice of date-0 public policies affecting borrowing structure and level is affected by the possibility of government turnover.[34]

Under redistributive politics ($k \neq 1/2$), the incidence of the effort, $\gamma(\tau)I$, incurred to boost profitability impacts the date-1 choice. As described earlier, I assume that a fraction x of this cost is borne by entrepreneurs and a fraction $1 - x$ by domestic savers. Let us focus on the two polar cases:

(a) *Crony capitalism* ($k \simeq 1$)—Under crony capitalism, the government cares solely about the welfare of entrepreneurs. For $k = 1$, its date-1 choice solves:

$$\max_{\tau}\{(p + \tau)(R - r) - x\gamma(\tau)\},$$

yielding

$$\gamma'(\tau^*) = \frac{R - r}{x}.$$

[32] A caveat, though: Government moral hazard may also affect the value of debt, in contrast with our depiction. A reduced budget for the enforcement of property rights in bankruptcy processes reduces the value r^D obtained by debtholders in case of failure. A more general analysis thus trades off the negative impacts of an increase in foreign equity holdings and debt holdings on the two forms of moral hazard. The market allocation however has no reason to be efficient in that respect.

[33] Relatedly, Jeanne and Jeromin Zettelmeyer (2001) discuss the moral dilemma involved in some bailouts, that may allow domestic extortion while easing the overall pain of a crisis.

[34] Along the lines of the pioneering work of Torsten Persson and Lars Svensson (1989), Guido Tabellini and Alberto Alesina (1990), and Philippe Aghion and Patrick Bolton (1991) in closed-economy settings.

As expected, if only a small fraction x is borne by the entrepreneurs (one can think of severe austerity measures or labor laws imposed on the population), the high emphasis on profitability may result in policies that are more investor-friendly than even the second-best policy under domestic-welfare maximization.[35]

Turning now to date 0, the government internalizes

$$[(p + \tau^*)(R - r) - x\gamma(\tau^*)]I(\tau^*).$$

Because the date-1 policy is fixed, the government has no instrument to boost investment, which is its date-0 goal. It contents itself with laissez-faire,[36] yielding, for salvage value R^F per unit of investment, investment $I(\tau^*)$ given by:

$$I(\tau^*) - A = [R^F + (p + \tau^*)r]I(\tau^*).$$

Suppose next that k is close to, but smaller than 1. The date-1 policy choice then solves:

$$\max_{\tau}\Bigg\{k[(p + \tau)(R - r) - x\gamma(\tau)] + (1 - k)\Bigg[(p + \tau)\left(\frac{I_d}{I_d + I_f}\right)r - (1 - x)\gamma(\tau)\Bigg]\Bigg\}.$$

At date 0, the government optimally forces domestic investors to (a) invest at home, and (b) invest in stocks. This date-0 policy raises τ^* and allows the government's entrepreneurial friends to borrow more.

(b) *Median voter politics* ($k \simeq 0$)—Let us in contrast assume that entrepreneurs carry little weight in the government's objective function. When $k = 0$, the government's date-1 policy solves:

$$\max_{\tau}\left\{(p + \tau)\left(\frac{I_d}{I_d + I_f}\right)r - (1 - x)\gamma\right\},$$

yielding

$$\gamma'(\tau^*) = \frac{\left(\frac{I_d}{I_d + I_f}\right)}{1 - x}\, r.$$

The policy choice is not investor-friendly if the burden falls mainly on savers (x small).

Full capital-account liberalization is never optimal under median-voter politics if $x < 1$. Domestic savers never gain anything on their savings, that compete against a perfectly elastic supply of foreign funds $[(p + \tau^*)(I_d/(I_d + I_f))rI = I_d]$, and they bear the cost $(1 - x)\gamma I$. As losers, domestic savers are better off with strict capital controls, and, if their government is unable to impose capital controls, with date-0 policies that encourage a high foreign equity stake in the country and a capital flight of domestic savings, so as to *ex post* minimize τ.

However, the government can at date 0 transform domestic savers into winners by capturing the entrepreneurs' rent through capital controls and taxes on capital inflows. Capital controls (forcing I_f down) provide domestic savers with a supranormal rate of return. Furthermore, if I_d is small, domestic savers do benefit from some capital inflows as long as these can be taxed with proceeds redistributed to domestic savers. Either way, domestic savers' conversion into winners may alter their attitude toward investor-friendly policies.

PROPOSITION 4: (*a*) *The government's policy may be more investor-friendly under crony capitalism than in the second best. Furthermore, crony capitalism leads to a* (*policy induced*) *home bias and to a* (*policy induced*) *composition tilted toward debt-holding by*

[35] This provides a formulation of the classical argument according to which implicit guarantees represent a policy distortion. Indeed, bailouts by domestic taxpayers are mathematically very similar to a high level of τ in a context in which x is small.

[36] The government would like to subsidize date-0 investment, but I have not allowed this instrument.

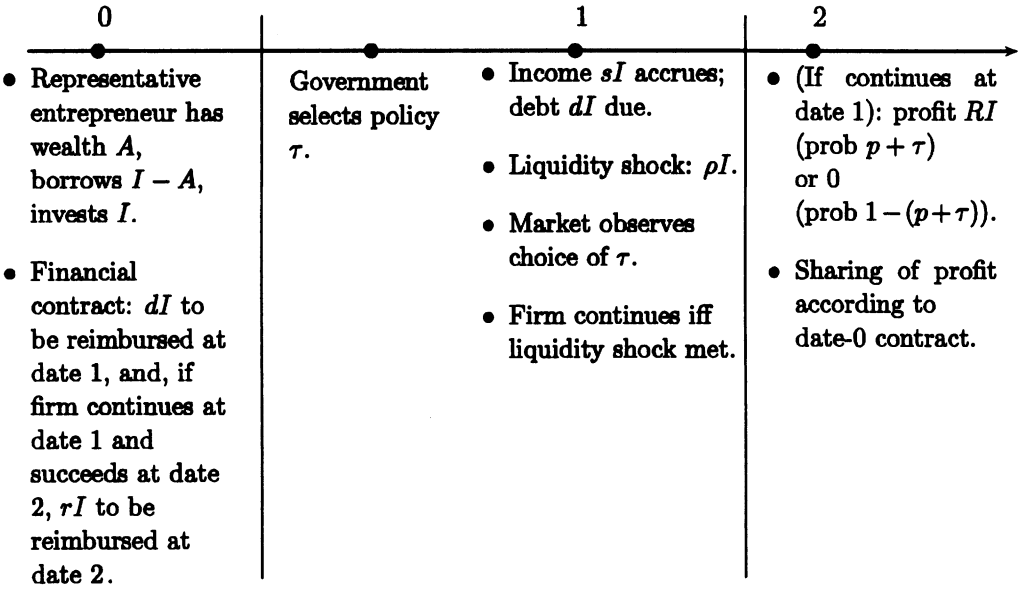

FIGURE 1. TIMING

foreigners. And while these biases are beneficial when the government maximizes domestic welfare, they result in an excessive concern for profitability when austerity measures aimed at benefiting the government's entrepreneurial friends are mainly borne by the population at large.

(b) Median-voter politics lead to investor-unfriendly policies, and to resistance to capital-account liberalization.

III. Maturity of Liabilities

A. *Framework*

I now analyze the possibility of a short-term bias in foreign borrowing. To do so, I need to employ a multistage financing framework in which firms optimally trade off the costs and benefits of short-term liabilities. Let us enrich the framework of Section II, subsection A, by adding an intermediate income and an intermediate liquidity shock. The intermediate income enables firms to reimburse some short-term debt while the intermediate shock introduces a liquidity-shortage cost of such debt. The timing is summarized in Figure 1.

The only new feature is the management of date-1 liquidity. The firm receives deterministic income sI, out of which short-term debt $dI \leq sI$ is repaid. Furthermore, the firm faces a liquidity shock: It must then spend an overrun expenditure equal to ρI in order to continue. It is liquidated and no surplus accrues to any party if it does not spend this money. The liquidity shock ρ is distributed (independently across firms) according to cumulative distribution $F(\rho)$ with density $f(\rho)$ on $[0, \infty)$. This distribution has a monotone hazard rate:

$$\frac{f(\rho)}{F(\rho)} \text{ is decreasing.}$$

The monotone hazard rate condition is satisfied by almost all familiar distributions[37] and will guarantee the concavity of the government's objective function.

If the firm continues, it delivers as earlier at date 2 and with probability $p + \tau$, profit RI, of which rI is pledgeable to investors.

[37] E.g., uniform, normal, logistic, chi-squared, exponential, and Laplace.

I assume that the country bears cost $\gamma(\tau)I$ per continuing firm and that this cost (or the fraction borne by entrepreneurs) is viewed as a lump-sum cost by the entrepreneurs (none of these assumptions is important). I also abstract from the issue of domestic- versus foreign-borrowing composition by assuming away domestic savings ($I_d = 0$). This simplification implies that *in the absence of liquidity shocks,* a domestic-welfare maximizing government would choose $\tau = \hat{\tau}$, where

$$\gamma'(\hat{\tau}) = R - r.$$

Let us first solve for the representative firm's optimal liquidity management.[38] Introduce the following notation:

$$\rho_1 \equiv (p + \tau^*)R \quad \text{and} \quad \rho_0 \equiv (p + \tau^*)r.$$

In words, ρ_1 and ρ_0 are the expected date-2 value and pledgeable income per unit of investment when the policy is expected to be τ^* (the equilibrium policy).

Optimal liquidity management commands that the firm withstands the liquidity shock if and only if $\rho \leq \hat{\rho}$ for some threshold $\hat{\rho}$ to be determined. The representative entrepreneur's utility is equal to the NPV (ignoring the lump-sum cost of the policy):

$$U = \left[[s + F(\hat{\rho})\rho_1] - \left[1 + \int_0^{\hat{\rho}} \rho f(\rho) d\rho \right] \right] I, \tag{14}$$

where the investment I is given by the investors' break-even constraint:

$$[s + F(\hat{\rho})\rho_0]I = (I - A) + \left(\int_0^{\hat{\rho}} \rho f(\rho) d\rho \right) I. \tag{15}$$

[38] The analysis here follows that of Bengt Holmström and Tirole (1998).

Substituting I into U yields:

$$U = \frac{\rho_1 - c(\hat{\rho})}{c(\hat{\rho}) - \rho_0} A,$$

where

$$c(\hat{\rho}) \equiv \frac{1 - s + \int_0^{\hat{\rho}} \rho f(\rho) d\rho}{F(\hat{\rho})}$$

is the average cost of bringing investment to completion [a unit of investment costs on average $1 + \int_0^{\hat{\rho}} \rho f(\rho) d\rho$, yields s at date 1, and is maintained until date 2 with probability $F(\hat{\rho})$]. Simple computations yield the optimal threshold $\hat{\rho} = \rho^*$:

$$\int_0^{\rho^*} F(\rho)\, d\rho = 1 - s \quad \text{and} \quad c(\rho^*) = \rho^*.$$

It must be the case that $\rho^* > \rho_0$ (if for some value of $\hat{\rho}$, $c(\hat{\rho}) \leq \rho_0$, then the firm could borrow an infinite amount) and $\rho^* < \rho_1$ (otherwise, no investment would be made).

This optimal liquidity management is implemented by issuing short-term debt level d^*I satisfying:[39]

$$\rho^* = s - d^* + (p + \tau^*)r = s - d^* + \rho_0. \tag{16}$$

To understand (16), note that the firm can at date 1 raise up to $(p + \tau^*)r$ by issuing new securities, thereby diluting incumbent claimholders;[40] for, capital markets will never bring more money at date 1 than what they will get back on average at date 2. The nondistributed

[39] This assumes that the short-term income is large enough: $s \geq \rho^* - \rho_0$. Otherwise, the firms would need to hoard liquidity as described in Holmström-Tirole (1998). Similar insights could then be obtained with respect to this hoarded liquidity.

[40] These claimholders would be willing to be diluted in order to raise cash to meet the liquidity shock, since they receive nothing if the firm is liquidated.

liquidity $s - d^*$ is needed to cover the shortfall between ρ^* and ρ_0.[41] Note also that an increase in its short-term debt makes the firm more likely to default. The firm optimally arbitrates between scale (which calls for high short-term debt) and inefficiency from default (an effect that calls for low short-term debt).

Let us now turn to the government's choice of date-1 policy. An out-of-equilibrium choice τ implies that firms that continue are those firms with shocks satisfying[42]

$$\rho \leq s - d^* + (p + \tau)r, \quad \text{or}$$

$$\rho \leq \rho^* + (\tau - \tau^*)r.$$

The fraction of firms that are not liquidated, $F(\rho^* + (\tau - \tau^*)r)$, increases with τ: An investor-friendly policy encourages foreign investors to refinance frail firms.

The government maximizes *ex post* domestic welfare:

$$\max_{\tau}\{F(\rho^* + (\tau - \tau^*)r)[(p + \tau)(R - r) - \gamma(\tau)]\}.$$

The monotone hazard rate assumption implies that this objective function is concave. The first-order condition is:

$$(17) \quad \gamma'(\tau^*) = R - r + [(p + \tau^*)(R - r) - \gamma(\tau^*)]r \frac{f(\rho^*)}{F(\rho^*)}.$$

Compared with a situation without liquidity shocks, the government adopts a more investor-friendly policy so as to reduce liquidation.

Equation (17), together with the monotone hazard rate property, yields the main insight of this section. Consider a small increase in the short-term debt from the privately optimal value d^*. This amounts to an equal reduction in the threshold ρ^* for a given government policy. From (17), and using the monotone-hazard-rate property, the government partly offsets the shortage in liquidity through an increase in τ:

$$0 < \left| \frac{d(r\tau)}{d(d^*)} \right| < 1.$$

In words, domestic firms do not internalize the disciplining effect of an increase in the level of their short-term debt level on the government's policy. Short-term debt fragilizes firms and forces the government to help them secure refinancing. This increased discipline in turn generates two welfare benefits that are ultimately reaped by domestic entrepreneurs. First, it improves the date-1 policy choice τ^*, and therefore financing conditions for a given level of investment. Second, it increases borrowing capacity, which is valuable given the presence of credit rationing.

B. *Contingent Debt*

Issuing noncontingent short-term debt is *privately* optimal in the deterministic equilibrium of Section III, subsection A. Thus the previous analysis is indeed an equilibrium analysis. More generally, though, optimal short-term debt ought to be state-contingent so as to react to macroeconomic news accruing at date 1 (in practice this flexibility is provided for example by indexed debt or by preferred equity).

This sensitivity to macroeconomic conditions in turn impacts the government's incentives. The Appendix checks that the insights obtained in Section III, subsection A, still hold when firms more generally issue state-contingent short-term debt. The only difference is that state-contingent debt generates more policy discipline.

More precisely, when τ is random, the optimal refinancing decision is shown to be sensitive to prospects:

$$\rho^*(\tau) = (p + \tau)\hat{r},$$

where

[41] Note that it is crucial for this section to employ a corporate finance rather than an Arrow-Debreu model. In the absence of agency cost, the firm would not face liquidity problems and so leverage would be irrelevant.

[42] This assertion is true only locally. If τ differs from τ^* so much that the right-hand side of this inequality exceeds ρ_1 or falls below ρ_0, the contract between financiers and the entrepreneur is renegotiated. But we are here interested in deriving the first-order condition.

$$\hat{r} = \frac{R + \mu r}{1 + \mu} \in (r, R)$$

(and μ is the shadow price of the financing constraint). Because $\hat{r} > r$ and the firm can raise only up to $(p + \tau)r$ by issuing new securities, the optimal short-term debt $d^*(\tau)$ is linearly decreasing in τ. Intuitively, improved prospects for date 2 boost not only the pledgeable income (as reflected by an increased access to refinancing), but also the nonpledgeable income, vindicating lower short-term obligations.

The randomness of τ can be endogenized for example by letting the marginal cost of the investor-friendly policy depend on the realization of a state of nature ε with continuous distribution with a large support:

$$\gamma(\tau) + \varepsilon\tau.$$

When the distribution of ε is close to a spike at date 0[43] (to make the analysis comparable to that of Section III, subsection A), then the date-1 government policy can be shown to converge to that given by

$$(18)\quad \gamma'(\tau^*) = R - r + [(p + \tau^*)(R - r) - \gamma(\tau^*)]\hat{r}\frac{f(\rho^*)}{F(\rho^*)}.$$

The only difference between (17) and (18) is that an investor-friendly policy rescues more firms when debt is state-contingent ($\hat{r} > r$). The insights of Section III, subsection A, carry over to contingent debt.

PROPOSITION 5: *Suppose that the firms optimally trade off the cost and benefit of short-term debt, namely the increased probability of being illiquid and the enhanced borrowing capacity. A fixed level of short-term debt d^* is optimal when the private sector has perfect foresight about the government policy. By contrast, an (optimal) state-contingent government policy calls for a contingent debt contract $d^* = a - b\tau$, that takes advantages of new information about the firm's prospects. State-contingent debt makes the government policy more investor-friendly.*

In either case, a small increase in the short-term debt from the privately optimal level raises country welfare.

[43] Keeping the support of the distribution constant.

IV. Liability Dollarization

A. *Framework*

To illustrate the impact of the choice of liability denomination in the simplest possible manner, let us ignore credit rationing.

The model is a real exchange rate one. There are two goods, a tradable good, valued by both domestic residents and foreigners, and a nontradable good, valued only by domestic residents.

As earlier, there are three periods, $t = 0, 1, 2$. Date 0 is the financing stage and date 2 the return period. Date 1 is the intermediate date at which the government chooses its policy. Foreigners' preferences value the date-0 and date-2 tradable goods equally (and so the world rate of interest is zero):

$$W^* = c_0^* + c_2^*,$$

where a "star" indicates a tradable good and "no star" a nontradable one. Domestic residents have utility from consumptions c_2 of nontradables, c_2^* of tradables, and g^* of public good (see below) equal to:

$$W = c_2 + u_2(c_2^*) + v(g^*)$$

where u_2 and v are strictly concave. (We could add date-0 consumption. This would not affect the results.)

We will let e_2 denote the date-2 price of tradables in terms on nontradables (note: a depreciation corresponds to an increase in e_2). The date-2 consumption function is given by

$$u_2'(c_2^*(e_2)) = e_2.$$

The domestic consumption of tradables decreases as the exchange rate depreciates.

The representative domestic resident is an

entrepreneur who transforms a tradable input I_f^* into a deterministic nontradable output $y(I_f^*)$ at date 2. The date-0 input I_f^* is borrowed from foreigners, as the entrepreneur is not endowed with tradables. The production function $y(I_f^*)$ is strictly concave and satisfies the Inada conditions.

The entrepreneur commits to reimbursing d_2^* in tradable goods and d_2 in nontradables. The amount d_2 will be paid directly from $y(I_f^*)$, and foreign investors will then need to convert it into tradables. In contrast, to reimburse d_2^*, it will be incumbent on the entrepreneur to convert nontradable production at the going exchange rate.

While the theory below is purely one of the real exchange rate, I will, by a substantial leap of faith, interpret the denomination of debt in the tradable good as one in foreign currency (dollars). Note, though, that a similar story could be told in a monetary model, in which "depreciation" would be replaced by "nominal devaluation."[44]

Last, I formalize the common concern that recipients of large capital inflows may use them to finance large fiscal deficits or consumption booms by assuming that the government selects at date 1 a level of public good $g^* \in [0, R^*]$ (so the discretionary action a is here g^*). The key assumption is that a higher level of public good comes at the expense of "country reserves." The total amount of uncommitted domestic (privately and publicly owned) tradables available for trade at date 2 is $R^* - g^*$. While one can think of R^* as the government's initial endowment of foreign reserves, R^* should be given a much broader interpretation; for example, an increase in g^* may come at the expense of new activities and production in another, export sector.

B. *Analysis*

Let us begin with a derivation of the time-inconsistent policy. The first-best policy maximizes the utility of the representative entrepreneur:

$$\max_{\{g^*, I_f^*\}} \{y(I_f^*) + u_2(R^* - g^* - I_f^*) + v(g^*)\},$$

where use is made of the fact that the entrepreneur will have to reimburse, one way or the other, the borrowed amount in tradables. This yields:

$$y' = u_2' = v' = e_2.$$

Let us now turn to the time-consistent policy. Fixing (d_2^*, d_2), the date-2 exchange rate clears the market for tradable goods:

$$c_2^*(e_2) + d_2^* + \frac{d_2}{e_2} = R^* - g^*. \tag{19}$$

The exchange rate $e_2(g^*)$ is an increasing function of g^*. Note also that: $\left|\frac{dc_2^*(e_2(g^*))}{dg^*}\right| \leq 1$, with strict inequality unless $d_2 = 0$.
In words, it is only when foreign debt is denominated in tradables, that is when the foreigner's stake $V_f = d_2^* + (d_2/e_2)$ is insensitive to the exchange rate, that an increase in the public good is offset one-for-one by a reduction in consumption.

At date 1, the government selects g^* so as to solve:

$$\max_{g^*} \{u_2(c_2^*(e_2(g^*))) + v(g^*)\},$$

[44] The type of moral hazard formalized in this section, though, need not be viewed as the government's action of expanding the monetary base to deflate the nominal value of foreigners' domestic currency claims through inflation. As for example Eichengreen-Hausmann (1999) and Marcos Chamon (2001) note, many emerging markets have inflation indexed instruments; furthermore foreign currency borrowing applies even to countries with no recent history of high inflation. And so the problem is much deeper than that of surprise inflation.

Chamon (2001) develops a model of foreign currency denomination in the absence of government moral hazard, but in the presence of aggregate productivity shocks. Domestic entrepreneurs invest and produce tradables, and issue debt liabilities labeled in tradables or nontradables. Entrepreneurial risk aversion implies that debt denominated in nontradables offers a hedge against macroeconomic shocks; however, if the share of output that can be collected by foreigners in bad states of nature is assumed to grow with total face value (expressed in tradables), then denomination in tradables facilitates private borrowing. See Aghion et al. (2001) for a model of foreign currency borrowing in the presence of nominal rigidities.

which yields:

$$v' = u_2' \left| \frac{dc_2^*}{dg^*} \right|. \tag{20}$$

The time-inconsistent policy coincides with the time-consistent one if and only if foreign debt is fully denominated in tradables:

$$d_2 = 0.$$

The government overconsumes international reserves when part of the debt is labelled in nontradables. Forcing firms to engage in risk management reduces country welfare.

In this model, firms are *individually* indifferent as to the "currency" denomination of their liabilities. Of course, they would not be indifferent in richer models. For example, one could combine this analysis and that of Section III to look at optimal risk management when firms face liquidity shocks at the intermediate date.[45]

The general point, though, is that *at the margin* the firms do not label enough their liabilities in tradables, as they do not internalize the disciplining effect of the denomination on government policy.

Remark: The assumption that the foreigners have no value at risk under foreign currency denomination is of course extreme. In practice, they have value at risk not only because governments may renege and directly expropriate a fraction of foreign holdings (a strategy not allowed here), but also because some of this foreign currency denomination is fictitious. Typically, individual firms' profit is random and the collateral received by foreigners in case of failure may be nontradable, as in the case of real estate.

PROPOSITION 6: *In the liability-denomination model, encouraging at the margin domestic entrepreneurs to hedge their currency risk reduces country welfare.*

C. *Redistributive Politics*

Let us conclude with a few thoughts about the redistributive politics of exchange rate policies. Relaxing the assumption that domestic residents are a single (entrepreneur/consumer) constituency, note that consumers and entrepreneurs may be hurt differently by a depreciation. Suppose that the government puts weights k on entrepreneurs and $1 - k$ on consumers. Assuming that the leftover reserves $R^* - g^*$ are distributed fairly in the population, and letting $K \equiv 2(1 - k)$, the government solves at date 1:

$$\max_{g^*} \{K[y - (d_2 + d_2^* e_2)] + e_2[R^* - g^*] + [u(c_2^*) - e_2 c_2^*] + v(g^*)\},$$

where e_2 is still given by (19). This yields first-order condition:

$$v' = u_2' \left| \frac{dc_2^*}{dg^*} \right| + (K - 1) d_2^* \frac{de_2}{dg^*}. \tag{21}$$

Comparing (20) and (21), the incentive to consume reserves is now affected in two ways. First, and as in the absence of redistributive politics, if $d_2 > 0$, the reduced availability of tradables hurts foreigners as well as residents. This international burden sharing leads to an excessive depreciation from a date-0 viewpoint.

The second effect is specific to redistributive politics ($K \neq 1$). Public good provision depreciates the currency ($de_2/dg^* > 0$), raising the debt burden on entrepreneurs if $d_2^* > 0$. This effect induces the government to keep the currency appreciated if it favors entrepreneurs over

[45] The prospect of a government bailout may also affect this choice. In Martin Schneider and Tornell (2001), domestic firms (or banks) optimally denominate their foreign debt in tradable goods. That paper assumes that the government undertakes "systemic bailouts," i.e., bailouts are granted only if a critical mass of firms default. Tradable-good debt denomination is a gamble that increases the probability of receiving the bailout subsidy; in effect, it increases the probability that the firm goes bankrupt when other firms also do (i.e., when the price of nontradables over tradables is low), and so the government grants a bailout. A bailout policy on the other hand helps the credit-constrained domestic firms to borrow more.

More generally, "original sin features" that are induced by the prospect of domestic bank bailout or by Basle criteria on the lending-banks side are probably better addressed by a proper prudential regulation of domestic and foreign banks than by a broader prohibition of the features.

consumers ($K > 1$) and to depreciate it further if the government favors consumers ($K < 1$).

The analysis provides theoretical ammunitions in support of Eichengreen and Hausmann's (1999) suggestion as to why original sin applies to all non-OECD countries while some developed countries are able to borrow in their own currencies. They propose that the latter countries "developed their domestic markets first, creating a political constituency that opposed opportunistic depreciation."

V. Concluding Remarks

An analysis of countries' lack of access to attractive levels and forms of financing must build on a description of why capital markets fail. This paper focuses on uncoordinated private sector borrowing. Borrowers and lenders have no individual incentive to internalize the impact of their private financing arrangement on country incentives; the resulting inefficiency is borne by the country itself. Three broad conclusions emerge:

(1) No strong case can be made on a priori grounds that countries over- or underborrow. Forces conducive to overinvestment include (a) a reduction in the quality of policy brought about by an increase in foreign ownership in the country, as well as two forces that are unrelated to international borrowing: (b) the incidence on domestic third parties of public policies supporting private sector borrowers, an incidence that (c) is exacerbated under crony capitalism. In contrast, (d) capital controls impose a substantial cost to the extent that firms are subject to credit rationing and therefore are deprived by controls of access to highly productive capital, and (e) median voter politics result in an insufficient internalization of the country's benefits from capital accounts liberalization.

(2) As to the form of liabilities, "dangerous forms of debt" cannot be presumed to be suboptimal for those who issue them. The analysis of the externalities involved in the choice of financial structure points at the flip side of risk exposure: dangerous forms of debt are also "policy resistant"; they make the government more accountable, ultimately to the benefit of the country. Encouraging foreign direct and equity portfolio investment and promoting international diversification do not encourage accountability. Some match between stakeholders and political constituencies must be achieved. Debt financing and small frictions inducing a home bias therefore should not be the object of widespread opprobrium, even though they will be encouraged by politicians eager to favor their corporate friends and then may have perverse consequences.

The critique concerning short maturities can be analyzed in a multistage framework in which firms optimally trade off the cost (liquidity shortage) and benefit (better access to capital) of short-term liabilities. Short-term liabilities unambiguously improve policy-making by a domestic-welfare maximizing government; this "public good" is not internalized by firms, whose maturity structure is therefore tilted toward long-term borrowing. While further effects must be accounted for (see below), this shows that strong views concerning short-terminism in capital flows may not be warranted.

The third member of the vulnerability trilogy, foreign currency denominated liabilities, is subject to a similar conclusion. Again, at the margin, borrowers do not internalize the disciplining impact of such borrowing.

(3) One cannot assess a country's ability to borrow and terms of borrowing without accounting for internal politics. The conclusions are reinforced or weakened depending on whether the interests of foreigners are aligned or dissonant with those of dominant domestic interest groups.

Overall, a country's level and quality of access to international capital depends not only on its level of international collateral,[46] but also on a variety of institutional features such as the level of domestic savings, their location (home versus abroad), the extent of control rights held by political authorities, and the interests of dominant domestic political forces. These institutional features probably are part of the reason why the United States, in which the government has limited control rights and key political con-

[46] An aspect investigated thoroughly in the work of Ricardo Caballero and Arvind Krishnamurthy (1999, 2001a, b, c).

stituencies' interests are aligned with investors' interests (e.g., through the pension fund system), can borrow so much; and why many poor African countries, which have a much more pressing need for foreign capital but whose wealth is often appropriated by a small group and invested abroad, and whose leaders have substantial control over economic life, have almost no access to the international capital market. A systematic analysis transcending this anecdotal evidence and connecting institutional features and foreign borrowing would be very useful.

The paper focused on a common-agency externality through the impact of firms' financial structure on government behavior. One should not restrict analysis to this externality among borrowers. For example, firms may take socially insufficient precautions against distress if the social cost of unemployment is convex in the rate of unemployment or if a soft asset market leads to fire sales in downturns. Furthermore, I have not allowed for potential externalities, such as financial contagion externalities, among countries. Such externalities may lead to a qualification of some policy implications of the common-agency perspective;[47] as discussed in the introduction, the broader point made in this paper will then be the complementarity between "corporate finance reform" and "government governance reform."

Last, let me broaden the perspective. The paper took sovereign rights as given and looked at policies altering private sector behavior. A complementary approach, more in the tradition of the trade and central banking literatures, would focus on the devolution of sovereign rights.[48] Clearly, many of the control rights listed in the introduction cannot be transferred to foreign investors, who, in contrast with governments, are excessively preoccupied with profitability and would impose large welfare costs on the population. As suggested in Tirole (2002), corporate finance sheds some light on the tradeoffs in the allocation of control rights; but this allocation is a complex issue, that deserves a thorough treatment of its own.

Appendix: Contingent Debt

Noncontingent debt contracts were optimal in the context of Section III. More generally, though, contingent debt is an optimal reaction to a random environment. In particular, the threshold ρ^* of Section III, subsection A, ought to be contingent on the realization of policy τ; this in turn affects the choice of government policy. Let us check that the analysis of Section III, subsection A, is robust to contingent debt. To this purpose let us derive the optimal liquidity-management policy $\rho^*(\tau)$ when τ is random. Letting E_τ denote expectations with respect to τ, the generalizations of equations (14) and (15) are:

$$\text{(A1)} \quad U = \left[[s + E_\tau[F(\hat{\rho}(\tau))\rho_1(\tau)]] - \left[1 + E_\tau\left[\int_0^{\hat{\rho}(\tau)} \rho f(\rho) d\rho \right] \right] \right] I$$

and

$$\text{(A2)} \quad [s + E_\tau[F(\hat{\rho}(\tau))\rho_0(\tau)]] = (I - A) + E_\tau\left[\int_0^{\hat{\rho}(\tau)} \rho f(\rho) d\rho \right] I,$$

where $\rho_1(\tau) \equiv (p + \tau)R$ and $\rho_0(\tau) \equiv (p + \tau)r$.

Proceeding through the same steps as in Section III, subsection A, the optimal state-contingent threshold satisfies:

$$\rho^*(\tau) = \frac{\rho_1(\tau) + \mu\rho_0(\tau)}{1 + \mu} \quad \text{with} \quad \mu > 1,$$

[47] Another objection to foreign currency denominated debt is that, in a pegged exchange rate regime, it makes it hard for countries to resort to devaluation in order to address a balance-of-payments crisis. For example, Anne Krueger (2000) advocates delinking financial and balance-of-payments crises by making foreign currency obligations incurred by domestic entities unenforceable in court or by having developed countries force their financial institutions to accept liabilities abroad only in local currencies.

[48] The devolution can take many forms, such as joining a multilateral organization, entering a monetary union or a free-trade agreement, and devolving authority for bankruptcy and corporate governance to independent courts.

or

$$\rho^*(\tau) = (p + \tau)\left[\frac{R + \mu r}{1 + \mu}\right] \equiv \alpha + \tau\hat{r}$$

where $\hat{r} \equiv [R + \mu r]/[1 + \mu]$ and $\alpha \equiv p\hat{r}$.

Consequently, the sensitivity of the refinancing decision to prospects is higher than with noncontingent debt:

$$d\rho^*/d\tau = \hat{r} > r.$$

The optimal state-contingent debt is

$$d^*(\tau) = \hat{r} - (p + \tau)\left(\frac{R - r}{1 + \mu}\right).$$

It decreases with the expected nonpledgeable income $(p + \tau)(R - r)$. [The increase in the value of the pledgeable income brought about by an increase in τ is addressed through date-1 market refinancing]. We can perform the same analysis as in Section III, subsection A, but with contingent debt. To introduce some noise and thereby justify contingent debt, suppose that the analyzed cost of the policy is

$$\gamma(\tau) + \varepsilon\tau;$$

the case treated in Section III, subsection A, is therefore the case in which the random variable ε (realized at date 1) converges to a spike at 0. At date 1 the government, knowing the realization of ε, solves:

$$\max_{\tau} \{F(\rho^*(\tau))[(p + \tau)(R - r) - [\gamma(\tau) + \varepsilon\tau]]\},$$

and so,

$$\gamma'(\tau(\varepsilon)) = R - r + [(p + \tau(\varepsilon))(R - r) - [\gamma(\tau(\varepsilon)) + \varepsilon\tau(\varepsilon)]]\frac{\hat{r}f(\rho^*(\tau(\varepsilon)))}{F(\rho^*(\tau(\varepsilon)))} - \varepsilon.$$

For ε small, the only difference with (17) is that "r" is replaced by "$\hat{r}$." State-contingent debt creates more discipline. Last, one can perform the same exercise as in Section III, subsection A: a small uniform increase in the debt level (i.e., a decrease in α) increases τ for each ε.

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