Financial (Des)Integration.

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Abstract

This paper addresses the macroeconomic impact of international financial integration. I first provide empirical evidence that foreign banking penetration can be associated with a contraction of banking credit, especially in countries with poor credit markets. Second I present a model in which the presence or the absence of foreign lenders endogenously modifies firms credit constraints and hence the volume of credit extended in the economy. Specifically, I show that foreign lenders consider loans from domestic lenders as a firm collateral. This implies that their lending supply is positively associated with the volume of capital a firm is able to borrow from domestic lenders. Two different cases are then possible. If foreign lenders are able, in spite of the collateral effect, to extend a large volume of loans even when domestic lenders lending capacity has shrinked (due to increased competition on the capital market), then the economy benefits at the steady state both from a large capital supply and a low cost of capital. Integration then raises the economy's growth rate. On the contrary, if foreign lenders are not able, due to the collateral effect, to extend a large volume of loans when domestic lenders lending capacity has shrinked, then competition reduces domestic lenders lending capacity and the collateral effect prompts foreign lenders to reduce their capital supply. Integration then depresses the economy's growth rate, firms cost of capital and the volume of credit extended in the economy.

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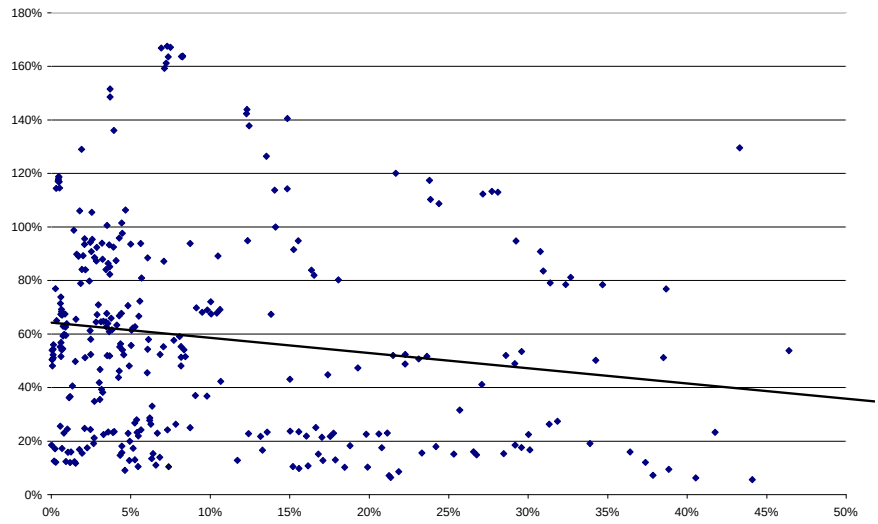
1. Introduction.

In the last years, a large empirical literature has emerged on the impact of foreign banking penetration (Claessens, Demirgüç-Kunt and Huizingua [1998], Goldberg, Crystal and Dages [2002] or Bayraktar and Wang [2004]). While a consensus exists in this literature on the positive effects of foreign banking penetration on the behavior of domestic banks as well as on the functioning of the capital market, almost all these papers have focused on efficiency spillovers while much less attention have been devoted to lending behavior effects. In this paper we try to shed light on this point. We aim at understanding whether the presence of foreign financial institutions contributes to increasing the global volume of credit extended in the economy. In other words do loans from foreign lenders substitute or complement loans from domestic lenders and if there is substituability, how does the global volume of loans react to changes in the presence of foreign financial institutions? More generally does financial integration contribute to relax or tighthen credit constraints? To explore these questions, we focus on the relationship between credit and foreign banking penetration[1].



Foreign Banking Assets in total Banking Assets vs. Private Banking Credit to GDP.

[1] The credit variable we use represents the claims on the private sector by deposit money banks divided by GDP for a given year in a given country. It isolates credit issued to the private sector as opposed to credit issued to governments and public enterprises. The foreign banking assets variables is computed among foreign banks which are defined as banks for which at least 50% of the equity is owned by foreigners.

At first glance, it seems that if any, this correlation is significant and negative. To investigate more deeply this relation, we run a number of regressions to estimate the determinants of private credit to GDP[2]. From these estimations, we derive two main results. First, the negative correlation between foreign banking penetration and banks private credit to GDP is significant and robust. Second, this correlation between foreign banking penetration and banks private credit to GDP seems to catch a causal effect from foreign banking ownership on the volume of credit the banking system delivers[3]. In this paper we try to provide a theory for why foreign banking penetration may induce a reduction in the global amount of credit extended in the economy and thereby on investment and growth[4].

1.1. The mechanism of the model.

The model is based on two building blocks. First, an economy which opens to international capital flows undergoes a positive change in competition on its capital markets. Financial opening is therefore likely to lower domestic lenders profits and, because profits determine to a large extent the resources available for lending[5], to consequently reduce the lending capacity of domestic financial intermediaries. This can indeed be positive for the economy as a whole if foreign capital flows constitute a good substitute for domestic finance[6].

The second building block the model is based upon, aims precisely at determining the conditions under which loans provided by foreign lenders may be good substitutes to loans provided by domestic lenders. To do so, we make two core assumptions. First, we assume the existence of two types of imperfections on

[2] c.f. appendix for more details about econometric estimations. We especially aim at understanding whether this correlation could be spurious, the foreign ownership variable catching other effects such as financial under-development.

[3] There is a third result we do no stress due to its econometric fragility: the contemporanous correlation between foreign banking penetration and banking credit to GDP depends upon the global size of the banking sector: it is negative in economies where banks assets constitute a small fraction of GDP while it is positive in economies where banks assets constitute a large fraction of GDP.

[4] While not addressing directly this question, Rodrik [1998] shows very intuitively that foreign savings brought by financial liberalization-integration are unlikely to have a first order effect on investment and growth: *"In practice, there have been few cases of high-investment countries, perhaps none at all, where foreign saving has accounted for more than 20 percent of investment over long stretches of time. In an economy investing, say, 30 percent of its GDP, relying on foreign saving beyond this limit would imply running a persistent current account deficit in excess of 6 percent of GDP, which would be courting with disaster."*

[5] In the model, we assume that the only source of capital for domestic lenders consists in their profits of the previous period.

[6] If this is the case, international capital flows are positive because the decrease in domestic lenders profits simply reflects that foreign lenders intermediation technology is more efficient than that of domestic lenders. This means that foreign lenders are able to provide any quantity of capital domestic lenders would provide at a lower interest rate.

financial markets, an ex post and an ex ante moral hazard problem[7]. Second we assume that domestic financial intermediaries are only confronted to the ex post moral hazard problem while foreign financial intermediaries are confronted to both ex ante and ex post moral hazard problems. This last assumption implies that domestic lenders have an informational advantage on foreign lenders[8]. Based on these two assumptions we show that foreign and domestic capital supply are negatively related for large levels of domestic debt but positively related for low levels of domestic debt. This means that in the latter case -low domestic capital supply-, a reduction in the domestic capital supply is followed by a drop in the foreign capital supply while in the former case -large domestic capital supply-, a reduction in the domestic capital supply is offset by an increase in the foreign capital supply. The intuition for these correlations is straightforward: when the volume of domestic loans is low then the ex ante moral hazard problem for foreign lenders is binding because the costs for firms to adopt the inefficient technology increase with the volume of domestic loans. An increase in the volume of domestic loans delivered therefore reduces the incentives for firms to take the inefficient project and foreign lenders can then increase their supply of capital without destroying firms incentives to adopt in the efficient project. On the contrary for large levels of domestic debt, the cost for firms to adopt ex ante the inefficient projects are so large that the binding constraint is the ex post moral hazard constraint. In this case an increase in domestic lending prompts foreign lenders to reduce their capital supply because the costs for firms to default ex post decrease with the total volume of loans.

Given these two building blocks, openness to international capital flows first has a direct positive effect on firms profits because firms benefit from a new source of capital to finance their investments. Consequently firms modify their debt portfolios (in favor of foreign loans). This reduces the demand for domestic loans and hence the equilibrium interest rate on domestic loans and hence domestic lenders profits. Secondly however, because firms profits grow more rapidly, the demand for domestic loans also increases more rapidly while the supply for domestic loans grows less rapidly due to the decrease in the equilibrium interest rate on domestic

[7] The ex post moral hazard problem implies that financial contracts are imperfectly enforceable: lenders need to rely on incentives to have borrowers repay their debts. The ex ante moral hazard problem implies that lenders cannot observe how borrowers use the funds they have borrowed.

[8] This assumption is confirmed by Kaufman, Mehrez and Schmulkler [2005] which provide empirical evidence that resident firms have an informational advantage about the countries where they work. Similarly, Mian [2006] shows that greater cultural and geographical distance between a foreign bank's head quarter and the local branches, leads it to further avoid lending to "informationally difficult" yet fundamentally sound firms.

loans. This dynamic effect will imply an increase in the interest rate on domestic loans. Then depending upon which of the direct or the dynamic effect prevails, two different cases are possible at the steady state. If the decrease in the demand for domestic loans is compensated by an increase in the growth rate of firms profits, then the interest rate on domestic loans increases and the economy's growth rate is larger under financial integration. On the contrary, if the decrease in the demand for domestic loans is *not* compensated by a sufficient increase in the growth rate of firms profits, then the interest rate on domestic loans decreases and the economy's growth rate is lower under financial integration. Financial integration can possibly be growth decreasing here because firms which cannot borrow capital from domestic lenders do not benefit from a large foreign capital supply. Therefore if these firms have a very limited access to foreign capital markets, then it is likely that the decrease in the demand for domestic loans following integration be not compensated by a sufficient increase in firms profits. This is why financial integration is then unambigiously growth reducing. Similarly it is easy to understand why the presence of foreign financial intermediaries can contribute to reduce the global volume of credit extended in the economy: due to the direct competition effect, the supply for domestic loans decreases compared to the closed economy case. Moreover since the supply for foreign loans depends positively on the volume of domestic credit, the reduction in the supply for domestic loans will also imply a decrease in the supply for foreign loans. Financial integration eventually leads to a desintegration of the credit market.

From a theoretical point of view, our model implies that financial integration can generate increasing returns to scale between the growth rate of the economy and the size of the domestic financial sector. While intuitively, a larger domestic financial sector would imply less productive investments at the margin and hence a lower growth rate, financial integration reverses this relation due to the collateral effect of domestic loans. When firms can borrow both from domestic and foreign lenders, firms reduce their demand for domestic capital. This reduces the interest rate on domestic loans and the size of the domestic financial system. Then due to the collateral effect (the foreign lending supply is positively related to the volume of domestic loans) the reduction in the size of the domestic financial sector is followed by a fall in the agregate loan supply. This prompts a decrease in investment and thereby a decrease in growth.

1.2. Related literature: International financial integration stylized facts.

This paper is related to three different strands of literature. It first relates to the literature dealing with the effect of financial openness and capital flows on domestic savings and investment. In their seminal paper, Feldstein and Horioka [1980] show that among OECD countries, the correlation between investment and domestic savings is very large and hence difficult to reconcile with a view of capital being higly mobile. Rodrik [1998] shows that foreign savings cannot account for a large share of investment even in countries with a large financial openness degree. More generally a number of papers have tried to determine the effect of financial integration on domestic savings and investment (Obstfeld [1998], Bosworth and Collins [1999] or Razin Sadka and Yuen [1999]). Similarly, Caballerro and Krishnamurthy [2001] focuses on the effects of exogenously given domestic and international borrowing constraints on real and financial variables. In this paper, we try to go one step further to show how openness to international capital flows can endogenously modify firms credit constraints based on the interaction between competition and collateral effects. We also show that financial integration is likely to increase the dependence of investment and aggregate credit and domestic savings due to the collateral effect.

Secondly this paper relates to the literature on the cost of capital effects of financial liberalization. Bekaert, Harvey and Lundblad [2001], Bekaert, Harvey and Lumsdaine [2002] or Blair Henry [2003] all show that financial liberalization-integration reduces significantly the cost of capital for firms, this being a first order channel to account for the increase in investment and growth that can follow financial integration. Kose, Prasad and Terrones [2003] show for instance that financial integration has positive growth effects in developed countries. Bekaert, Harvey and Lumbald [2004] show that equity market liberalization is followed by a decrease in growth volatility. Here the contribution of the paper consists in showing that the decrease in the cost of capital is not necessarily an indicator of financial integration success since it can happen with a decrease in the global volume of credit and investment.

Finally this paper relates to the empirical literature on foreign banking penetration. Claessens, Demirgüç-Kunt, and Huizinga [2001] show that it can prompt a reduction in profitability and margins. Beck [2000] asserts that foreign banking penetration increases the volatility of capital flows. Finally banking competition

is shown to be positive for growth only in developed financial system (Claessens and Laeven [2003]).

1.3. Road map of the paper.

The paper is organized as follows. The following section describes how the credit market operates when firms can borrow from both domestic and foreign lenders. Section 3 lays down firms financial optimal choices. In section 4 we set up the macroeconomic model main assumptions. Section 5 describes the closed economy and section 6 the open economy. Finally conclusions are drawn in section 7.

2. The capital market.

The capital market is characterized by two types of imperfections. First financial contracts are not perfectly enforceable. Borrowers can default strategically on their liabilities. We model this possibility of strategic default as an ex post moral hazard problem. Second borrowers face an ex ante moral hazard problem, they can choose to invest in two different technologies, one of the two producing only private benefits and allowing borrowers to default on their liabilities at no cost.

Figure 1: Timing of the model.

To determine incentive compatible contracts, let us consider an entrepreneur with one unit of own capital (equity) who borrows μ_l units of capital from domestic lenders at a gross interest rate r_l, μ_f units of capital from foreign lenders at a gross interest rate r_f and invests in the production technology with a marginal return noted R. Then the entrepreneur's end-of-period profit is equal to

$$\pi = \left(1 + \mu_l + \mu_f\right) R - r_l \mu_l - r_f \mu_f \tag{2.1}$$

On the contrary if the entrepreneur decides to default[9] on his liabilities then his end-of-period profit then writes as

$$\pi_1 = \left(1 + \mu_l + \mu_f\right)(R - r_1) - p_l r_l \mu_l - p_f r_f \mu_f \tag{2.2}$$

where r_1 represents the marginal cost to default and p_l (resp. p_f) is the proportion of loans domestic (resp. foreign) lenders manage to be reimbursed upon when the defaulting entrepreneur has invested in the production technology. The entrepreneur can also decide to invest ex ante in the private benefit technology whose marginal return is equal to $R - r_2$. With this technology he can default on his liabilities at no cost. In this case his end-of-period profit writes as

$$\pi_2 = \left(1 + \mu_l + \mu_f\right)(R - r_2) - q_l r_l \mu_l - q_f r_f \mu_f \tag{2.3}$$

where q_l (resp. q_f) is the proportion of loans domestic (resp. foreign) lenders manage to be reimbursed upon when the defaulting entrepreneur has invested in the private benefit technology. Then we make three assumptions:

1. There is ex ante moral hazard: $R - r_1 < R - r_2 < R$. If an entrepreneur does not (resp. does) default, then the production technology is more (resp. less) efficient than the private benefit technology.

2. Domestic (resp. foreign) lenders' technology to recover defaulted claims on entrepreneurs who have invested in the production technology is such that recovering a proportion p of claims of size L costs $-c_l \ln(1 - p_l) L$ (resp. $-c_f \ln(1 - p_f) L$) with $r_1 < \min\{c_l; c_f\}$. When an entrepreneur invests in the production technology and defaults, then the marginal cost to recover defaulted claims for domestic and foreign lenders is always larger than the marginal cost to default for the entrepreneur[10].

3. Domestic (resp. foreign) lenders' technology to recover defaulted claims on entrepreneurs who have

[9] In this case it can be shown that defaulting on both types of liabilities (domestic and foreign) is equivalent to defaulting on only one type of liabilities as regards incentive compatibility constraints. In other words, there is no loss of generality in considering that borrowers default on both types of liabilities.

[10] There is no particular consequence to the assumption that lenders' technologies to recover claims write as $c_i \ln(1 - p_i)$ apart from the fact it yields borrowing constraints which do not depend upon the interest rate. This helps simplifying the analysis. A different assumption (if for instance interest rates made borrowing constraints stronger) would certainly reinforce the mechanism of the model.

invested in the private benefit technology is such that recovering a proportion p of claims of size L costs $-b_l \ln(1-q_l) L$ (resp. $-b_f \ln(1-q_f) L$) with $b_l < r_2 < b_f$. When an entrepreneur invests in the private benefit technology and defaults, then the marginal cost to recover defaulted claims for foreign (resp. domestic) lenders is always larger (resp. lower) than the marginal cost to default for entrepreneurs[11].

Proposition 1. *Noting μ_l the domestic debt equity ratio and μ_f the foreign debt equity ratio for a given entrepreneur, then domestic and foreign lenders supply capital to this entrepreneur in a way consistent with the conditions*

$$\begin{aligned} (\alpha_f - 1)\,\mu_f + (\alpha_l - 1)\,\mu_l &\leq 1 \\ (\beta_f - 1)\,\mu_f - (1 - \beta_l)\,\mu_l &\leq 1 \end{aligned} \tag{2.4}$$

where $\alpha_l = c_l/r_1$, $\alpha_f = c_f/r_1$, $\beta_l = b_l/r_2$ and $\beta_f = b_f/r_2$.

Proof. In the case of the production technology, domestic and foreign lenders will respectively choose p_l and p_f such that $(1-p_l)\,r_l = c_l$ and $(1-p_f)\,r_f = c_f$ while in the case of the private benefit technology, lenders will choose q_l and q_f such that $(1-q_l)\,r_l = b_l$ and $(1-q_f)\,r_f = b_f$. Plugging these equalities in expressions (2.2) and (2.3), and solving the incentive constraints $\pi \geq \pi_1$ and $\pi \geq \pi_2$ we end up with (2.4).

■

[11] Here this cost corresponds to r_2 since the cost to default on the private benefit technology is simply zero.

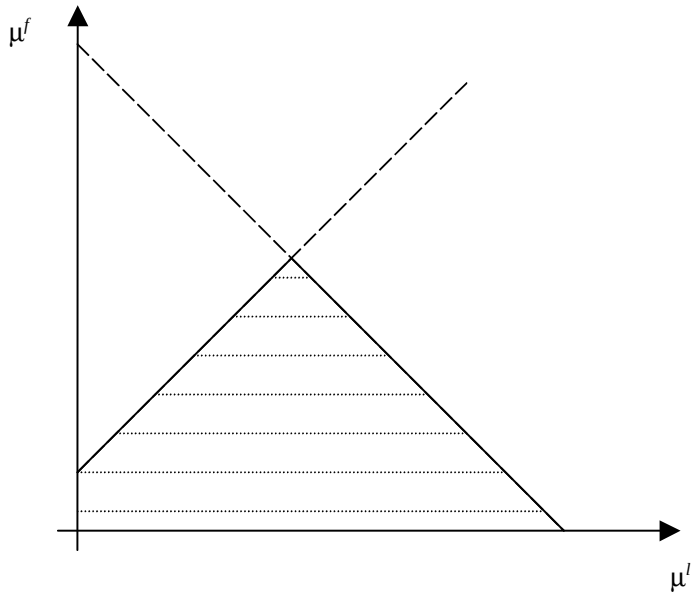


Figure 2: Entrepreneurs borrowing constraints.

There are two remarks about conditions (2.4). First domestic and foreign loans are negatively correlated at the frontier of the constraint which solves the ex post moral hazard problem. This is because the solution to the ex post moral hazard problem consists in a limit on the overall amount of capital entrepreneurs can borrow. If entrepreneurs can borrow large amounts of capital, they will default, irrespective of the identity of the lender. On the contrary in the second constraint, domestic and foreign loans are positively correlated at the frontier. Since domestic lenders are relatively efficient in recovering their claims from entrepreneurs who choose the private benefit technology, entrepreneurs who borrow large amounts of capital from domestic lenders will incur large losses if they invest in the private benefit technology and choose to default. This implies that an entrepreneur who borrows large amounts of capital from domestic lenders is more likely to choose the production technology and less likely to default on his debts. Therefore foreign lenders can supply larger amounts capital without destroying entrepreneurs' incentives to repay their loans. This explains the positive correlation which can be interpreted as evidence that foreign lenders consider domestic loans as some form of informational collateral[12].

[12] Within this framework, one can note that the volume of capital foreign lenders accept to extend to firms is a quasi-concave function of the volume of capital domestic firms borrow from domestic lenders. This characteristic plays a key role in the stability of the open economy. Removing it or allowing for a local quasi-convexity opens the door to the examination of credit cycles and capital flows reversals.

3. Agents decisions.

3.1. Entrepreneur's optimal borrowing choices.

An entrepreneur's choices consist in choosing a debt portfolio (μ_l, μ_f) which maximizes the profit function (2.1) given the constraints (2.4) on financial capital supply. Entrepreneurs' program therefore writes as

$$\begin{aligned} &\max_{\mu_l,\mu_f} (R - r_l)\,\mu_l + (R - r_f)\,\mu_f \\ \text{s.t. } &\begin{cases} (\alpha_f - 1)\,\mu_f + (\alpha_l - 1)\,\mu_l \leq 1 \\ (\beta_f - 1)\,\mu_f - (1 - \beta_l)\,\mu_l \leq 1 \end{cases} \end{aligned} \tag{3.1}$$

where r_l (resp. r_f) is the expected gross interest rate on domestic (resp. foreign) debt a firm faces. Let us then note $\overline{\mu_l} = [\alpha_l - 1]^{-1}$, $\overline{\mu_f} = [\alpha_f - 1]^{-1}$ and μ_l^* (resp. μ_f^*) the optimal amount of capital borrowed from domestic (resp. foreign) lenders. We then have the following result.

Proposition 1. *Assuming that $r_f < R$ and $\alpha_f < \beta_f$, there exists a threshold value $q(R) = R - \frac{\overline{\mu_f}}{\overline{\mu_l}}(R - r_f)$ such that:*

Entrepreneurs borrow exclusively from domestic lenders: $\mu_l^* = \overline{\mu_l}$ and $\mu_f^* = 0$ if and only if $r_l \leq q(R)$.

Entrepreneurs borrow from foreign and domestic lenders: $\mu_l^* = \underline{\mu_l} \equiv \frac{\beta_f - \alpha_f}{\beta_l + (1-\beta_l)\alpha_f - \left[\alpha_l + (1-\alpha_l)\beta_f\right]}$ and $\mu_f^* = \underline{\mu_f} \equiv \frac{\alpha_l - \beta_l}{\beta_l + (1-\beta_l)\alpha_f - \left[\alpha_l + (1-\alpha_l)\beta_f\right]}$ if and only if $q(R) < r_l \leq R$

Entrepreneurs borrow exclusively from foreign lenders: $\mu_l^* = 0$ and $\mu_f^* = \underline{\underline{\mu_f}} \equiv \left[\beta_f - 1\right]^{-1}$ if and only if $r_l > R$.

Proof. Evident. ■

These results are completely standard. Since the program of the firm and the constraints the firm faces are all linear, we simply need to compute a quantity-profitability trade-off: firms borrow from the most efficient source of capital. Moreover since borrowing exclusively from foreign lenders may not be optimal, there are situations ($q(R) < r_l \leq R$) where entrepreneurs prefer to borrow from both types of lenders.

4. The model.

4.1. Main assumptions.

We consider a single good competitive economy with non overlapping generations. In each generation, there are two types of agents. One half of the population are entrepreneurs and the other half are (domestic) financial intermediaries. All agents live for one period[13]. At the end on their lives, agents make a bequest to their off-spring and take a consumption decision. Preferences of agents born at time t write as $u_t = b_{t+1}^{\gamma} c_{t+1}^{1-\gamma}$ where b_{t+1} is the bequest made at time $t+1$ and c_{t+1} is the consumption at time $t+1$. Entrepreneur i can invest his capital in a (production) technology with a marginal return R_i or in a private benefit technology with a marginal return B_i. We assume that R_i is uniformly distributed among entrepreneurs on $\left[\underline{R}; \overline{R}\right]$. We note $m = \frac{\underline{R}+\overline{R}}{2}$, $\sigma = \frac{\overline{R}-\underline{R}}{2}$ and F the cumulative function of R_i. Entrepreneur i can default on his liabilities: the cost to default on the production technology is equal to r_1 and the cost to default on the private benefit technology is zero. Moreover we assume that both the cost to adopt the private benefit technology $r_2 \equiv R_i - B_i$ and the cost to default on the production technology r_1 to be constant among entrepreneurs[14]. Entrepreneurs can borrow capital from domestic financial intermediaries at a domestic gross interest rate r_l. They can also borrow capital from foreign financial intermediaries at a domestic gross interest rate r_f. To simplify the exposition of the model, we assume that $r_f \leq \underline{R}$. This implies that all firms have access to international capital markets[15]. The capital market is exactly similar to that of section 2.

4.2. Inter-temporal decisions and dynamics of the economy.

Given the assumption about agents preferences, agents spend a proportion $1-\gamma$ of their end-of-life profits in consumption and a proportion γ in bequests to the next generation. Therefore if $\pi_{e,t}$ represents entrepreneurs

[13] The results of the model are not dependent on the assumptions that there is an equal number of entrepreneurs and financial intermediaries in each period, nor that agents live for one period. The one period life assumption could for instance be replaced by an infinite horizon assumption where agents hold preferences of the form $\sum_s \beta^s \ln(c_s)$ without any qualitative change in the results of the model.

[14] With this assumption, we restrict firms heteregeneity to dimensions where lenders inability to observe individual productivities R_i does not produce any market failure.

[15] We take this view to show that even in the implausible case of a "universal" access to international capital markets, capital market, integration may have negative effects. As a consequence of this assumption, capital supplied by foreign lenders is always cheaper than capital supplied by domestic lenders.

profits at date t and $\pi_{fi,t}$ domestic financial intermediaries profits at date t then we have $\pi_{fi,t+1} = r_l \gamma \pi_{fi,t}$ and

$$\frac{\pi_{e,t+1}}{\pi_{e,t}} = \gamma \int \left[\left(1 + \mu_l^* (R) + \mu_f^* (R) \right) R - r_l \mu_f^* (R) - r_f \mu_f^* (R) \right] dF (R)$$

where $\mu_l^* (R)$ (resp. $\mu_f^* (R)$) is the optimal domestic (resp. foreign) debt equity ratio for an entrepreneur of productivity R. Finally noting $y_t = \pi_{fi,t-1}/\pi_{e,t-1}$ the dynamics of the economy writes as

$$y_{t+1} = \frac{r_l (y_t) y_t}{\int \left[\left(1 + \mu_l^* (R) + \mu_f^* (R) \right) R - r_l (y_t) \mu_f^* (R) - r_f \mu_f^* (R) \right] dF (R)} \tag{4.1}$$

5. The closed economy.

5.1. Equilibrium of the capital market.

Let us consider that the economy is closed to foreign capital flows (lenders). Then, the demand for domestic loans at any date t in the economy L_t^d writes as

$$L_t^d = [1 - F (r_l)] \overline{\mu_l} \gamma \pi_{e,t-1}$$

This demand for capital is completely standard: it is a decreasing function of the domestic gross interest rate r_l. The supply for domestic loans[16] at any date t in the economy L_t^s writes as

$$L_t^s = \gamma \pi_{fi,t-1}$$

Then the equilibrium of the capital market defines a gross interest rate r_l. This yields

$$r_l (y_t) = \begin{cases} m + \sigma - 2\sigma \frac{y_t}{\overline{\mu_l}} \text{ if } y_t \leq \overline{\mu_l} \\ m - \sigma \text{ if } y_t > \overline{\mu_l} \end{cases}$$

[16] The domestic capital supply is non elastic to the domestic interest rate r_l. While not crucial, this is an important assumption. The crucial assumption is that the foreign capital supply be more elastic than the domestic one.

Entrepreneurs whose productivity R_i is larger (resp. lower) than $m + \sigma - 2\sigma \frac{y_t}{\overline{\mu_l}}$ have a debt equity ratio equal to $\overline{\mu_l}$ (resp. 0).

5.2. Dynamics of the closed economy.

Using the expression (4.1) indicating how financial intermediaries profits evolve relatively to those of entrepreneurs, the dynamics of the closed economy follows the law of motion

$$y_{t+1} = \frac{r_l(y_t)\, y_t}{\int_{R<r_l(y_t)} \underline{\pi_l}(R)\, dP(R) + \int_{R>r_l(y_t)} \overline{\pi_l}(R)\, dP(R)}$$

with $\underline{\pi_l}(R) = R$ and $\overline{\pi_l}(R) = (1+\overline{\mu_l})R - r_l\overline{\mu_l}$. Simplifying the last expression yields the following dynamics

$$y_{t+1} = \begin{cases} \frac{[(m+\sigma)\overline{\mu_l} - 2\sigma y_t] y_t}{m\overline{\mu_l} + \sigma y_t^2} \text{ if } y_t \leq \overline{\mu_l} \\ \frac{(m-\sigma)\overline{\mu_l}}{m+\sigma\overline{\mu_l}} \text{ otherwise} \end{cases}$$

The closed economy has two steady states. In the first one, $y^* = 0$, all the capital stock belongs to entrepreneurs. This is a steady state because domestic lenders cannot generate profits if they have no own capital (equity). However, any positive change in the amount of lenders' own capital would get the economy out of the steady state $y = 0$, because the marginal productivity of firms would then be equal to m while the marginal productivity of domestic lenders r_l would be equal to $m + \sigma$. The steady state $y = 0$ is therefore unstable since by definition $\sigma > 0$.

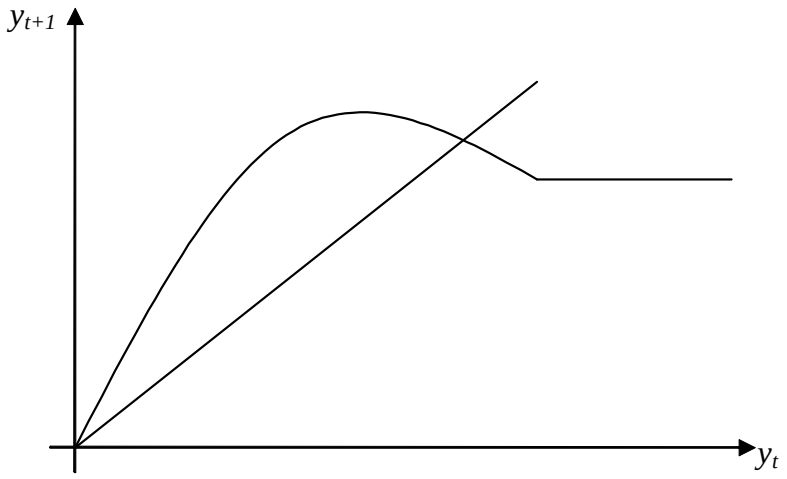


Figure 3: Dynamics of the closed economy.

A second steady state exists for

$$\frac{y_c^*}{\overline{\mu_l}} = \left[1 + \sqrt{1 + \overline{\mu_l}}\right]^{-1}$$

This steady state is stable and therefore represents the only long run situation of the closed economy. The steady state interest rate r_l^* is

$$r_l^* = m + \sigma - 2\sigma y_c^* / \overline{\mu_l}$$

The interest rate r_l^* is the steady state growth rate of entrepreneurs and domestic lenders profits and the steady state growth rate of the economy while $y_c^*/\overline{\mu_l}$ is the proportion of firms which are able to borrow from domestic capital markets. As is clear domestic capital market development understood as an increase in $\overline{\mu_l}$ has two effects. First firms which are able to borrow from domestic capital markets make larger investments because their borrowing capacity is larger. This has a positive effect on growth. Second an increase in $\overline{\mu_l}$ raises the domestic interest rate r_l because it raises the demand for capital and therefore reduces the proportion of firms which are effectively able to borrow[17]. This has a negative effect on growth. However the first positive effect always dominates and domestic financial development is always associated with higher growth when the economy is closed to international capital flows although the marginal return to domestic

[17] The share of firms whose productivity is larger than the steady state interest rate is equal to $y_c/\overline{\mu_l}$ and is a decreasing function of $\overline{\mu_l}$.

financial development on growth decreases with the level of domestic financial development.

6. The open economy.

6.1. Equilibrium of the capital market.

Let us now consider the case of an economy opened to international capital flows. To simplify the exposition of this section let us suppose that $\overline{\mu_l} < \overline{\mu_f}$. This last assumption and the assumption that $r_f \leq m - \sigma$ imply that foreign lenders are more efficient than domestic ones on both quantities and prices. Then in based on section 3.1, the demand for domestic capital L_t^d is such that

$$L_t^d = \gamma \pi_{e,t-1} \left[1 - F\left[r_l\right]\right] \underline{\mu_l}$$

The supply for domestic capital at any date t L_t^s writes as $L_t^s = \gamma \pi_{fi,t-1}$ Let us as previously note $y_t = \pi_{fi,t-1}/\pi_{e,t-1}$, the equilibrium of the capital market then defines a gross interest rate r_l such that

$$y_t = \left[1 - F\left[r_l\right]\right] \underline{\mu_l}$$

The interest rate r_l on domestic loans is then equal to

$$r_l\left(y_t\right) = \begin{cases} m + \sigma - 2\sigma \frac{y_t}{\underline{\mu_l}} \text{ if } y_t \leq \underline{\mu_l} \\ m - \sigma \text{ if } y_t > \underline{\mu_l} \end{cases} \tag{6.1}$$

Entrepreneurs whose productivity R_i is larger than $m + \sigma - 2\sigma \frac{y_t}{\underline{\mu_l}}$ have a debt equity ratio equal to $\underline{\mu_l} + \underline{\mu_f}$ while entrepreneurs whose productivity R_i is lower than $m + \sigma - 2\sigma \frac{y_t}{\underline{\mu_l}}$ have a debt equity ratio equal to $\underline{\underline{\mu_f}}$. The dynamics of the economy then writes as

$$y_{t+1} = \frac{r_l\left(y_t\right) y_t}{\int_{R<r_l(y_t)} \underline{\pi_f}\left(R\right) dP\left(R\right) + \int_{R>r_l(y_t)} \overline{\pi_f}\left(R\right) dP\left(R\right)}$$

where $\underline{\pi_f}(R) = \left(1+\underline{\underline{\mu_f}}\right)R - r_f\underline{\underline{\mu_f}}$, $\overline{\pi_f}(R) = \left(1+\underline{\mu_l}+\underline{\mu_f}\right)R - r_l\underline{\mu_l} - r_f\underline{\mu_f}$. Simplifying the last expression, and noting $\Delta\mu_f = \underline{\mu_f} - \underline{\underline{\mu_f}}$ we obtain the following law of motion:

$$y_{t+1} = \begin{cases} \frac{\left(m+\sigma-2\sigma y_t/\underline{\mu_l}\right)y_t}{m+\underline{\underline{\mu_f}}(m-r_f)+(m+\sigma-r_f)\Delta\mu_f\left(y_t/\underline{\mu_l}\right)+\sigma\left[\underline{\mu_l}-\Delta\mu_f\right]\left(y_t/\underline{\mu_l}\right)^2} & \text{if } y_t \leq \underline{\mu_l} \\ \frac{(m-\sigma)\underline{\mu_l}}{m+\sigma\underline{\mu_l}+\underline{\mu_f}(m-r_f)} & \text{if } y_t > \underline{\mu_l} \end{cases} \tag{6.2}$$

6.2. Efficient financial integration.

Proposition 1. *The economy has a unique steady state if and only if* $\underline{\underline{\mu_f}} > \frac{\sigma}{m-r_f}$. *Moreover if* $\underline{\underline{\mu_f}} > \frac{\sigma}{m-r_f}$ *then financial openness increases welfare and growth and decreases the firm cost of capital.*

Proof. A fixed point to the law of motion of the economy (6.2) verifies $y = 0$ or

$$\sigma\left[\underline{\mu_l} - \Delta\mu_f\right]\left(y/\underline{\mu_l}\right)^2 + \left[2\sigma + (m+\sigma-r_f)\Delta\mu_f\right]\left(y/\underline{\mu_l}\right) + \underline{\underline{\mu_f}}(m-r_f) - \sigma = 0 \tag{6.3}$$

As is clear this equation has no solution for $y \in \left[0;\underline{\mu_l}\right]$ if and only if $\underline{\underline{\mu_f}}(m-r_f) - \sigma > 0$. Moreover $y = 0$ is a stable fixed point if and only if $\underline{\underline{\mu_f}}(m-r_f) - \sigma > 0$. Consequently the economy has a unique steady state for $y = 0$ if and only if $\underline{\underline{\mu_f}} > \frac{\sigma}{m-r_f}$. At the steady state, the growth rate of the economy is given by

$$g_o = \left(1+\underline{\underline{\mu_f}}\right)m - r_f\underline{\underline{\mu_f}}$$

The cost of domestic capital is equal to $m+\sigma$ and the firm cost of capital is equal to r_f. Comparing this case to the closed economy where growth and the firm cost of capital are both equal to

$$g_c = m + \frac{\sigma\overline{\mu_l}}{\left[\sqrt{1+\overline{\mu_l}}+1\right]^2}$$

it is straightforward to note that financial openness reduces firms cost of capital since by definition $r_f \leq m-\sigma$ and $m-\sigma < m+\sigma\overline{\mu_l}\left[\sqrt{1+\overline{\mu_l}}+1\right]^{-2}$. Moreover if $\underline{\underline{\mu_f}} > \frac{\sigma}{m-r_f}$ then $g_o > g_f$. Openness therefore raises growth and therefore welfare. ■

When the economy opens to international capital flows, there is first a significant decrease in the cost of domestic capital due to a sharp reduction in the demand for domestic loans: The most productive firms switch partly to foreign loans and the least productive firms turn to foreign lenders exclusively. The decrease in the cost of domestic capital prompts a decrease in domestic lenders profits and an increase in domestic firms profits. Consequently at the next period the lending capacity of domestic lenders is reduced relatively to firms demand for domestic loans. This has two different effects: first the cost of domestic capital (the interest rate on domestic loans) increases. Second entrepreneurs which are excluded from the domestic capital market face a reduction in foreign lenders capital supply. However because $\underline{\underline{\mu_f}}$ (entrepreneurs lowest borrowing capacity w.r.t. foreign lenders) is sufficiently large, entrepreneurs profits still increase on average at a faster pace than those of domestic lenders. In other words the negative externality produced by the increase in the domestic interest rate on entrepreneurs access to international capital market is sufficiently small. As a result, during the transition to the steady state, entrepreneurs profits grow durably faster than those of domestic lenders. At the steady state, the interest rate on domestic loans r_l is equal to $m + \sigma$, firms borrow exclusively from foreign lenders and the growth rate of firms profits (which is also the steady state growth rate of the economy) is equal to $m + \underline{\underline{\mu_f}}\,(m - r_f)$.

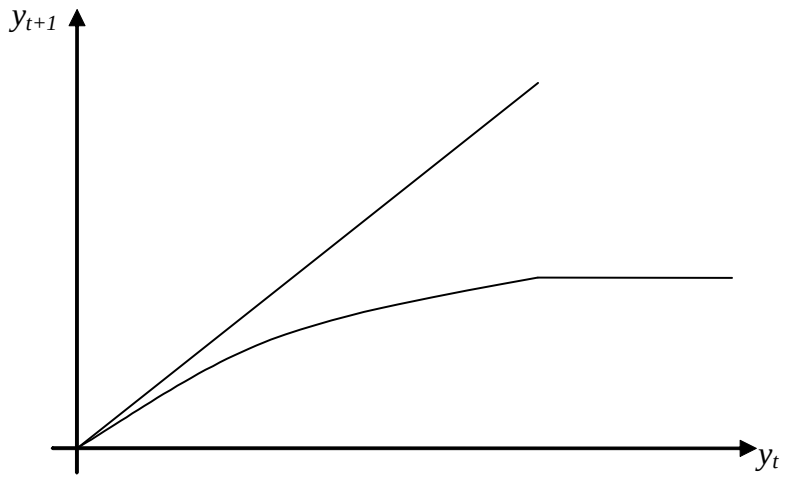


Figure 4: Dynamics of the open economy with a unique steady state.

This case rests on the assumption that $\underline{\underline{\mu_f}}$ is sufficiently large. This implies that, every thing else equal, the difference $\underline{\mu_f} - \underline{\underline{\mu_f}}$ is small which means that entrepreneurs access to domestic capital markets does not have a large impact on entrepreneurs borrowing capacity vis-à-vis foreign lenders. In other words, domestic and foreign finance are relatively good substitutes. In this case, given that foreign lenders have been assumed to be more efficient than domestic lenders, it is straightforward that the economy is better-off under financial integration. Openness basically provides a cheaper source of capital while negative externality effects are relatively small. Foreign lenders efficiency advantage compensates for their informational disadvantage.

However it is not clear that a large degree of substituability between domestic and foreign capital is the most accurate description of what happens in a number of emerging market economies. We therefore examine the low substituability case in more detail in the next paragraph.

6.3. The case for inefficient financial integration.

Proposition 2. *If* $\underline{\underline{\mu_f}} < \frac{\sigma}{m-r_f}$ *then the open economy has a steady state for* $y^* = 0$ *and a steady state* y^{**} *defined by*

$$\frac{y_o^{**}}{\underline{\mu_l}} = \frac{\sigma - \underline{\underline{\mu_f}}\,(m - r_f)}{\sigma + \frac{m+\sigma-r_f}{2}\Delta\mu_f}\left[1 + \sqrt{1 + \frac{4\sigma\left[\sigma - \underline{\underline{\mu_f}}\,(m - r_f)\right]\left[\underline{\mu_l} - \Delta\mu_f\right]}{\left[(m + \sigma - r_f)\,\Delta\mu_f + 2\sigma\right]^2}}\right]^{-1}$$

Proof. Solving for the fixed points to equation (6.2) yields proposition 2. ■

When $y = 0$, i.e. the relative supply for domestic capital is zero, then the interest rate on domestic loans r_l is equal to $m+\sigma$. In this case all entrepreneurs borrow from foreign lenders $\underline{\underline{\mu_f}}$ per unit of own capital. The growth rate of entrepreneurs profits is equal to $m + \underline{\underline{\mu_f}}\,(m - r_f)$ while the growth rate of domestic lenders profits is equal to $m + \sigma$. As is clear $\underline{\underline{\mu_f}} < \frac{\sigma}{m-r_f}$ is equivalent to $m + \underline{\underline{\mu_f}}\,(m - r_f) < m + \sigma$. This implies that when the relative domestic capital supply y is zero, it strictly increases with time since the supply for domestic capital increases at a faster pace than the demand for domestic capital. The steady state $y^* = 0$ is therefore unstable and we can disregard this case. At the non degenerate steady state y^{**}, the interest rate on domestic loans is equal to

$$r_l = m + \sigma - 2\sigma\frac{y_o^{**}}{\underline{\mu_l}}$$

It also represents the steady state growth rate of domestic lenders and domestic entrepreneurs profits. We then have the following proposition.

Proposition 3. *In the open economy, growth and welfare are larger at the steady state compared to the closed economy if and only if* $\overline{\mu_l}$ *is sufficiently small and/or* $\underline{\mu_f}$ *is sufficiently large and/or* $\underline{\mu_l}$ *is sufficiently large.*

Proof. Financial integration is welfare improving if and only if it raises the steady state cost of domestic capital. At the steady state, the cost of domestic capital is larger in the open economy if and only if $y_o^{**}/\underline{\mu_l} < y_c^*/\overline{\mu_l}$ which simplifies as

$$1+\sqrt{1+\overline{\mu_l}} < \frac{\sigma+\frac{m+\sigma-r_f}{2}\Delta\mu_f}{\sigma-\underline{\underline{\mu_f}}\left(m-r_f\right)}\left[1+\sqrt{1+\frac{4\sigma\left[\sigma-\underline{\underline{\mu_f}}\left(m-r_f\right)\right]\left[\underline{\mu_l}-\Delta\mu_f\right]}{\left[\left(m+\sigma-r_f\right)\Delta\mu_f+2\sigma\right]^2}}\right]$$

The LHS of this inequality is a increasing function of $\overline{\mu_l}$ while the RHS is an increasing function of $\underline{\mu_l}$, $\underline{\mu_f}$ and $\underline{\underline{\mu_f}}$. This condition is therefore more likely to be satisfied when $\overline{\mu_l}$ is low, $\underline{\mu_l}$ is large and/or $\underline{\mu_f}$ is large. ■

At the steady state, financial integration has two opposite effects on the interest rate on domestic loans r_l. It first has a negative effect because entrepreneurs reduce their demand for domestic loans (from $\overline{\mu_l}$ to $\underline{\mu_l}$). Secondly it has a positive effect because it raises entrepreneurs profits by offering them new financing opportunities and therefore increasing the growth rate of the demand for domestic loans. In the case where $\overline{\mu_l}$ is large, the drop in the demand for domestic loans following financial integration is large. Then to be Pareto improving, there should be a large increase in entrepreneurs profits following financial integration. Likewise the growth rate of firms demand for domestic loans would be large and thereby raise the domestic interest rate. However since $\underline{\underline{\mu_f}}$ is assumed to be sufficiently small, ($\underline{\underline{\mu_f}} < \frac{\sigma}{m-r_f}$) all entrepreneurs whose productivity is not sufficiently high to borrow from domestic capital markets have a very limited access to international capital markets. Consequently while entrepreneurs profits do increase following financial integration, the increase remains modest and may be insufficient to compensate for the decrease in the demand for domestic

loans. The steady state interest rate on domestic loans r_l then ends up being lower when the economy is opened to international capital flows. In this case integration reduces the growth rate of the economy and is welfare decreasing.

For the same reasons it is easy to understand why financial integration raises the interest rate on domestic loans r_l and thereby increases growth and welfare in the case where $\underline{\mu_l}$ and/or $\underline{\mu_f}$ is large. In the first case, a larger value for $\underline{\mu_l}$ reduces the decrease in the demand for domestic loans following integration and it raises entrepreneurs profits when entrepreneurs are able to borrow from the domestic capital market. For these two reasons, it is likely that integration is Pareto improving when $\underline{\mu_l}$ is large. In the second case, a larger value for $\underline{\mu_f}$ increases the borrowing capacity of firms which can borrow from both domestic and foreign lenders. Hence, a larger $\underline{\mu_f}$ increases firms profits and the interest rate on domestic loans is more likely to increase following financial integration due a larger difference in profit growth between firms and domestic lenders.

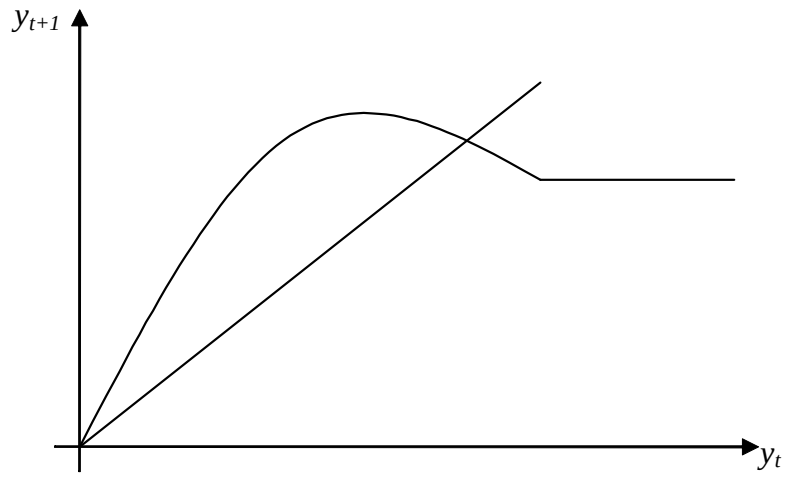


Figure 5: Dynamics of the open economy.

In this model, financial integration modifies both the relative size of the domestic financial sector y and the growth rate of the economy r_l. Intuitively, financial integration, because it raises competition on financial markets, should benefit the non financial sector, reduce the size of the domestic financial sector and thereby increase the growth rate of the economy. This happens when all firms have an identical access to international capital markets. More precisely in the absence of the collateral effect, and under the assumptions made up to

now ($r_f \leq m-\sigma$ and $\overline{\mu_f} \geq \overline{\mu_l}$) the steady state growth rate of the open economy is equal to $\left(1+\overline{\mu_f}\right) m - r_f \overline{\mu_f}$ while the relative size of the domestic financial sector is equal to 0. Then integration raises both the growth rate of the economy and reduces the relative size of the domestic financial sector. One can then observe that there exists a negative relationship between the growth rate of the economy and the relative size of its domestic financial sector y when comparing the closed to the open economy. However in the presence of the collateral effect of domestic loans on the foreign capital supply, there may be on the contrary a positive relationship, i.e. financial integration can reduce both the size of the domestic financial system and the growth rate of the economy.

7. Back to the empirical puzzle.

In the introduction we motivated this paper through the existence of a negative correlation between the volume of credit extended in the economy and the share of foreign assets in the global banking assets of the economy. In this section our aim is to show that this negative correlation can be accounted for within the framework we have considered. At any time t, the global volume of credit lenders accept to extend to firms is given by

$$\mu_t = \left(\underline{\mu_l} + \underline{\mu_f}\right) \frac{y_t}{\underline{\mu_l}} + \underline{\underline{\mu_f}} \left(1 - \frac{y_t}{\underline{\mu_l}}\right)$$

where $y_t/\underline{\mu_l}$ is the measure of firms which are able to borrow from both domestic and foreign lenders at time t. As is clear from the last expression, μ_t is an increasing function of y_t because an increase in the relative supply in domestic credit will reduce the interest rate on domestic loans, thereby allowing some new firms to enter on the market for domestic loans which will eventually raise the borrowing capacity of these firms vis-à-vis foreign lenders. At time t the share of foreign loans in the total volume of loans λ_t is given by

$$\lambda_t = \frac{\underline{\mu_f} \frac{y_t}{\underline{\mu_l}} + \underline{\underline{\mu_f}} \left(1 - \frac{y_t}{\underline{\mu_l}}\right)}{\left(\underline{\mu_l} + \underline{\mu_f}\right) \frac{y_t}{\underline{\mu_l}} + \underline{\underline{\mu_f}} \left(1 - \frac{y_t}{\underline{\mu_l}}\right)}$$

As is clear from this expression, λ_t is a decreasing function of the relative domestic capital supply y_t. Firms debt portfolio incorporates proportionally more foreign loans when the size of the global debt portfolio is

smaller. For instance when firms are unable to borrow from domestic lenders, then their debt portfolio is made exclusively of foreign debt. On the contrary when all firms are able to borrow from domestic lenders, then the share of foreign debt in their debt portfolio is equal to $\frac{\underline{\underline{\mu_f}}}{\underline{\mu_l}+\underline{\underline{\mu_f}}}$. Therefore as the relative domestic capital supply y_t increases the share of domestic firms which can borrow from foreign lenders increases and the share of foreign loans in the global volume of credit decreases. We therefore end up with a negative relation between the global volume of credit and the share of foreign loans in the global volume of credit extended. This means that countries which rely more on foreign lenders to finance domestic firms do not benefit from a larger volume of credit. On the contrary, the larger the share of foreign lenders in the capital market, the lower the volume of credit extended. Thus the collateral effect is a good candidate to account for the empirical relationship raised in the introduction.

Similarly one can study the effect of a change in the relative domestic capital supply on growth. Noting g_t the growth rate of the economy (i.e. the growth rate of aggregate wealth) at time t writes as

$$g_t = \frac{m + \underline{\underline{\mu_f}}\,(m - r_f) + \frac{y_t}{\underline{\mu_l}}\left[(m+\sigma)\,\underline{\mu_l} + (m+\sigma-r_f)\,\Delta\mu_f\right] - \sigma\left(\frac{y_t}{\underline{\mu_l}}\right)^2\left[\underline{\mu_l} + \Delta\mu_f\right]}{1+y_t}$$

Then an increase in the relative domestic capital supply y_t raises the growth rate of the economy if and only if

$$y_t < \sqrt{1 + \frac{\underline{\mu_l}}{\underline{\mu_l} + \Delta\mu_f}\left[\left[1 - \underline{\underline{\mu_f}}\frac{m-r_f}{\sigma}\right]\underline{\mu_l} + \left(1 + \frac{m-r_f}{\sigma}\right)\Delta\mu_f\right]} - 1$$

This can be easily explained: for low values of y an increase in the relative domestic capital supply is reduces domestic lenders productivity since the interest rate on domestic loans decreases. However the increase in the relative domestic capital supply has a large positive impact on firms profits since it raises the measure of firms which can borrow from domestic capital markets and thereby raises the agregate borrowing capacity of the economy w.r.t. foreign lenders. We can therefore conclude that there is a positive correlation between the extent to which investment is domestically financed and the growth rate of the economy when domestic finance represents a small share of GDP. However when y is large then the negative effect on domestic lenders productivity becomes larger than the positive effect on firms profits since domestic lenders are much larger

relative to the firm sector. This implies that for large values of y, an increase in the relative domestic capital supply reduces the growth rate of the economy.

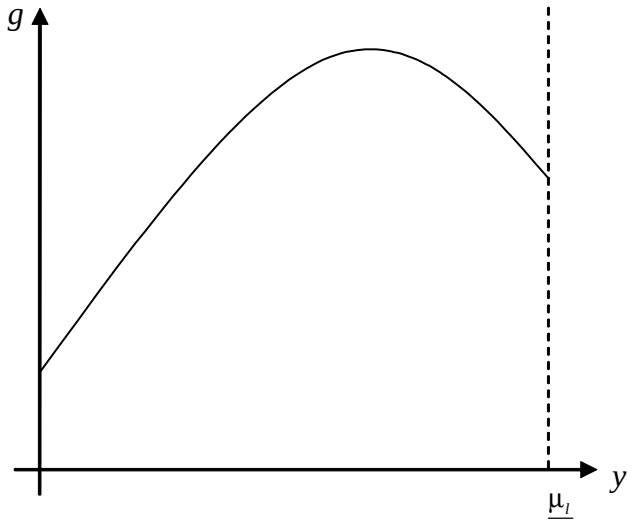


Figure 6: Domestic capital supply and Growth.

8. Conclusion.

We have built a model of financial integration where the main idea consists in noting that under imperfect capital markets, loans from domestic lenders can act as collateral to foreign lenders when firms try to borrow from international capital markets. We have shown that this property can be derived in a simple capital market model where domestic lenders have an informational advantage over foreign lenders. Then based on this mechanism we have shown that financial integration creates opposite forces: one the one hand, it reduces the cost of domestic capital because financial integration brings new financing sources to firms. On the other hand it deteriorates domestic lenders profits which in a dynamic framework reduces domestic lenders capital supply and through the collateral effect also reduces foreign lenders capital supply. We have shown that this framework can account for the fact that financial integration may enhance or reduce growth depending upon the intensity of credit constraints. In particular, there are cases where financial integration reduces both the supply of credit from domestic lenders and the interest rate on domestic loans which depresses economic growth. With this model, we have also shown that we can account for the negative empirical relationship

between the volume of credit financial intermediaries accept to extend and the share of loans coming from foreign lenders. This model therefore illustrates two ideas: first the decrease in the cost of capital following financial integration (liberalization) may not come for free as it reduces domestic lenders capital supply which creates a negative informational externality on foreign lenders and can thereby translate into a reduction in the global volume of capital lenders accept to lend. Second, because firms with different productivities do not have the same borrowing capacity w.r.t. foreign lenders, financial integration has a qualitative effect on the relation between the growth rate of the economy and the size of its financial sector. We have shown that economies may end up with smaller domestic financial systems as a result of increased competition and financial integration while not reaping the benefits in terms of an enhanced growth performance.

9. Appendix.

To investigate the relationship between the volume of credit (private credit by banks to GDP) and foreign banking penetration (the share of foreign bank assets in total banking sector assets). we run a number of regressions to estimate the determinants of private credit to GDP. More precsiely we estimate the following equation

$$pc_{i,t} = \alpha_i + \beta_t + \gamma x_{i,t} + \delta fb_{i,t} + \eta fb_{i,t}x_{i,t} + \varepsilon_{i,t}$$

Banking private credit to GDP is pc, x is a vector of control variables, fb is an indicator of foreign banking penetration and α and β are respectively time and fixed effects. As control variables, we include measures of financial markets size and macroeconomic indicators. Finally, we add the share of foreign banking assets in total banking assets and an interaction term between an indicator of the banking sector size and the share of foreign assets in total banking assets. The next tables summarize the results we obtain.

Table 2a. Dependent variable: Private Credit by banks to GDP						
bagdp	0.91^a	0.89^a		0.63^a	0.60^a	0.63^a
cbagdp	-0.00					
ofiagdp	0.03^b	0.04^a				
llgdp			0.50^a	-0.04		-0.06
fba	**-0.12**^{a}	**-0.11**^{b}	**-0.14**^{b}	**-0.06**^{b}	**-0.14**^{a}	**-0.15**^{a}
fba×bagdp					**0.12**^{b}	**0.14**^{b}
controls	yes	yes	yes	yes	yes	yes
fixed Effects	yes	yes	yes	yes	yes	yes
time Effects	yes	yes	yes	yes	yes	yes
N° obs.	168	175	293	293	293	293

Note: *bagdp* stands for banking assets to GDP, *cbagdp* stands for central bank assets to GDP, *ofiagdp* stands for other financial intermediaries assets to GDP, *llgdp* stands for liquid liabilities to GDP. The share of foreign banking assets in total banking assets is *fba* and *fba*×*bagdp* is an interaction term between *fba* and *bagdp*. Controls include the log of GDP per worker, the GDP growth rate, the log of population, the log of CPI inflation and the openness to trade ratio measured as the sum of imports and exports to GDP. All the estimations contain fixed and time effects and have been carried out under the assumption of heteroscedactic residuals. All data are drawn from Beck, Demirgüç-Kunt, and Levine [1999] "A New Database on Financial Development and Structure" for financial variables and from World Bank World Development Indicators for macroeconomic variables. The time period of the sample is 1990-1997. Countries in the sample: Argentina, Australia, Austria, Belgium, Brasil, Canada, Switzerland, Chili, China, Costa Rica, Germany, Ecuador, Egypt, Spain, France, United Kingdom, Greece, Honk-Kong, Indonesia, India, Italy, Japan, Netherlands, Norway, Pakistan, Peru, Philippines, Poland, Portugal, Singapore, Sweden, Thailand, Tunisia, Turkey, Uruguay, USA, Venezuela, South Africa.

Table 2b. Dependent variable: Private Credit by banks to GDP						
pcogdp	0.05	0.06	0.13^a	0.07^a	0.07^b	0.07^a
bagdp	0.90^a	0.88^a		0.62^a	0.60^a	0.62^a
cbagdp	0.06					
ofiagdp	-0.01	-0.05				
llgdp			0.49^a	-0.01		-0.06
fba	**-0.11**^{a}	**-0.11**^{a}	**-0.14**^{a}	**-0.06**^{b}	**-0.14**^{a}	**-0.14**^{a}
fba×bagdp					**0.11**^{b}	**0.14**^{b}
controls	yes	yes	yes	yes	yes	yes
Fixed Effects	yes	yes	yes	yes	yes	yes
Time Effects	yes	yes	yes	yes	yes	yes
N°.obs.	168	175	293	293	293	293

Note: *pcogdp* stands for private credit to GDP by non-bank financial intermediaries, *bagdp* stands for banking assets to GDP, *cbagdp* stands for central bank assets to GDP, *ofiagdp* stands for other financial intermediaries assets to GDP, *llgdp* stands for liquid liabilities to GDP. The share of foreign banking assets in total banking assets is *fba* and *fba*×*bagdp* is an interaction term between *fba* and *bagdp*. Controls include the log of GDP per worker, the GDP growth rate, the log of population, the log of CPI inflation and the openness to trade ratio measured as the sum of imports and exports to GDP. All the estimations contain fixed and time effects and have been carried out under the assumption of heteroscedactic residuals. All data are drawn from Beck, Demirgüç-Kunt, and Levine [1999] "A New Database on Financial Development and Structure" for financial variables and from World Bank World Development Indicators for macroeconomic variables. The time period of the sample is 1990-1997. Countries in the sample: Argentina, Australia, Austria, Belgium, Brasil, Canada, Switzerland, Chili, China, Costa Rica, Germany, Ecuador, Egypt, Spain, France, United Kingdom, Greece, Honk-Kong, Indonesia, India, Italy, Japan, Netherlands, Norway, Pakistan, Peru, Philippines, Poland, Portugal, Singapore, Sweden, Thailand, Tunisia, Turkey, Uruguay, USA, Venezuela, South Africa.

Table 3a. Dependent variable: Private Credit by banks to GDP						
$bagdp_{-1}$	0.87^a	0.47^a	0.52^a		0.48^a	0.52^a
$cbagdp_{-1}$	0.15^b					
$ofiagdp_{-1}$	0.04	0.11^a				
$llgdp_{-1}$			-0.14^c	0.42^a		-0.15^c
$\mathbf{fba_{-1}}$	$\mathbf{-0.18^a}$	$\mathbf{-0.10^b}$	$\mathbf{-0.08^c}$	$\mathbf{-0.16^b}$	**-0.08**	$\mathbf{-0.10^c}$
$\mathbf{fbabagdp_{-1}}$					**0.03**	**0.03**
controls	yes	yes	yes	yes	yes	yes
Fixed Effects	yes	yes	yes	yes	yes	yes
Time Effects	yes	yes	yes	yes	yes	yes
N°.obs.	146	247	247	248	247	247

Note: *bagdp* stands for banking assets to GDP, *cbagdp* stands for central bank assets to GDP, *ofiagdp* stands for other financial intermediaries assets to GDP, *llgdp* stands for liquid liabilities to GDP. The share of foreign banking assets in total banking assets is *fba* and *fba*×*bagdp* is an interaction term between *fba* and *bagdp*. Controls include the log of GDP per worker, the GDP growth rate, the log of population the log of CPI inflation and the openness to trade ratio measured as the sum of imports and exports to GDP. The subcript $_{-1}$ indicates that the variable is lagged one period. All the estimations contain time and fixed effects and have been carried out under the assumption of heteroscedactic residuals. All data are drawn from Beck, Demirgüç-Kunt, and Levine [1999] "A New Database on Financial Development and Structure" for financial variables and from World Bank World Development Indicators for macroeconomic variables. The time period of the sample is 1990-1997. The countries in the sample are: Argentina, Australia, Austria, Belgium, Brazil, Canada, Switzerland, Chile, China, Costa Rica, Germany, Ecuador, Egypt, Spain, France, United Kingdom, Greece, Honk-Kong, Indonesia, India, Italy, Japan, Netherlands, Norway, Pakistan, Peru, Philippines, Poland, Portugal, Singapore, Sweden, Thailand, Tunisia, Turkey, Uruguay, USA, Venezuela, and South Africa.

Table 3b. Dependent variable: Private Credit by banks to GDP						
$pcogdp_{-1}$	0.13	0.10^b	0.11^b	0.12	0.10^b	0.11^b
$bagdp_{-1}$	0.85^a	0.46^a	0.49^a		0.46^a	0.49^a
$cbagdp_{-1}$	0.15^b					
$ofiagdp_{-1}$	-0.07					
$llgdp_{-1}$			-0.10	0.41^a		-0.10
$\mathbf{fba_{-1}}$	$\mathbf{-0.18^a}$	$\mathbf{-0.09^b}$	$\mathbf{-0.08^c}$	$\mathbf{-0.15^b}$	**-0.08**	**-0.09**
$\mathbf{fba \times bagdp_{-1}}$					**0.03**	**0.01**
controls	yes	yes	yes	yes	yes	yes
Fixed Effects	yes	yes	yes	yes	yes	yes
Time Effects	yes	yes	yes	yes	yes	yes
N°.obs.	146	254	254	254	254	254

Note: *pcogdp* stands for private credit by non-bank financial intermediaries to GDP, *bagdp* stands for banking assets to GDP, *cbagdp* stands for central bank assets to GDP, *ofiagdp* stands for other financial intermediaries assets to GDP, *llgdp* stands for liquid liabilities to GDP. The share of foreign banking assets in total banking assets is *fba* and $fba \times bagdp$ is an interaction term between fba and bagdp. Controls include the log of GDP per worker, the GDP growth rate, the log of population the log of CPI inflation and the openness to trade ratio measured as the sum of imports and exports to GDP. The subcript$_{-1}$ indicates that the variable is lagged one period. All the estimations contain time and fixed effects and have been carried out under the assumption of heteroscedactic residuals. All data are drawn from Beck, Demirgüç-Kunt, and Levine [1999] "A New Database on Financial Development and Structure" for financial variables and from World Bank World Development Indicators for macroeconomic variables. The time period of the sample is 1990-1997. The countries in the sample are: Argentina, Australia, Austria, Belgium, Brazil, Canada, Switzerland, Chile, China, Costa Rica, Germany, Ecuador, Egypt, Spain, France, United Kingdom, Greece, Honk-Kong, Indonesia, India, Italy, Japan, Netherlands, Norway, Pakistan, Peru, Philippines, Poland, Portugal, Singapore, Sweden, Thailand, Tunisia, Turkey, Uruguay, USA, Venezuela, and South Africa.

We can derive two results from these estimations. First, the negative correlation between foreign banking penetration and bank private credit to GDP is significant and robust. Second, this result seems to depend upon the global size of the banking sector. In other words, the negative correlation is relevant for economies where banks assets constitute a small fraction of GDP. On the contrary in economies where banks assets constitute a large fraction of GDP, the correlation between banks private credit and foreign bank penetration becomes positive. Moreover as is clear from the preceeding estimations, these correlations are not accounted for by the fact that foreign banking penetration could lead to more non banking credit and less banking credit. Nor is it accounted for by the fact that rich countries may both have a larger use of credit and a lower banking penetration.

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