Risk Aversion, Financial Development and Economic Growth*

Luca G. Deidda
Department of Finance and Management, SOAS (University of London)
and
CRENoS (University of Cagliari and University of Sassari)

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Abstract

This paper analyzes the growth effect of financial development in an economy where savers are risk averse and the efficiency of financial exchange depends on the level of financial expertise achieved in the economy. It shows that whenever financial expertise is sufficiently low, the development of a financial sector induced by financial liberalization might initially fail to boost growth. This may result in a slowdown of the growth process, or even cause a recession. This proposition also holds for financial development occurring endogenously at some critical stage of economic development. Financial development is therefore not always a sustainable process.

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1 Introduction

By improving risk diversification, financial institutions allow productive but risky investment projects to be financed. Hence, the standard theoretical proposition is derived that financial development promotes economic growth.[1] This paper shows that if savers are averse to risk, a system of financial transactions might successfully develop even if the allocation of financial resources is less efficient as a result. Consequently, the proposition is derived that in economies populated by risk-averse savers, financial development (a) has an ambiguous effect on growth and (b) it is not always a sustainable process.

Since the influential work by Levine and King (1993) a substantial amount of empirical literature has been produced, documenting the existence of a positive correlation between financial development and long run growth.[2] If accurate, this evidence would certainly be enough to reduce the case of the negative effects of financial development on growth to a mere theoretical curiosity. However, a closer look at the data reveals a more complex picture than just a straightforward monotonic positive relationship between finance and growth.

For instance, Deidda and Fattouh (2002) show that the cross-country data used by King and Levine (1993) offers no significant evidence of any positive correlation between financial development indicators and growth when it comes to the group of countries with initial income per capita lower than the endogenously determined critical value of either \$756 or \$852, depending on the estimated model. Only for the sub-sample of countries with per capita income greater than that threshold is the correlation between finance and growth positive and significant. In the same vein, based on a sample of forty nine countries, Harris (1997) finds evidence of a significant positive association between indexes of stock market development and growth only within a sub-sample including those relatively highly developed economies. Again, no association between finance and growth is found for the relatively less developed economies in the sample. Further support to the hypothesis that the growth effect of financial development is ambiguous and might vary with the level of economic development comes from various time series studies. All the fourteen less developed countries in the sample of forty-one countries analyzed by Xu (2000) exhibit negative long-run cumulative effects of permanent financial development on economic growth.[3]

[1] Examples of models where risk diversification plays a crucial role include Bencivenga, Smith and Starr (1995), Deveraux and Smith (1994), Obstfeld (1994), Saint Paul (1992) and Bencivenga and Smith (1991). For a general discussion, see Pagano (1993).

[2] A survey of the empirical literature is provided by Levine (1997). More recent contributions include, Benabib and Spiegel (2001), Levine, Loayza and Beck (2000), Beck, Levine and Loayza (2000) and Levine (1999).

[3] Also, Demetriades and Hussein (1996) find no clear cut evidence that financial development induces growth in a sample of sixteen developing countries. The VAR analysis by Shan, Morris and Sun (2001), conducted on nine OECD countries plus China, does not offer much empirical support

Given the above empirical findings, explaining why financial development might fail to promote the growth process or even be harmful becomes an important issue rather than just a matter of intellectual curiosity. To address this issue, an overlapping generations economy is modeled, which operates either under financial autarky or financial exchange. In the first régime, capital accumulation is self-financed by households who bear all associated risks. In the second, households are able to fully diversify risk by means of financial transactions. Risk diversification allows more productive and more risky projects to be financed. However, because of unspecified market frictions, part of the potential returns that investment would have generated in a frictionless environment is destroyed through financial transactions. The assumption is that risk diversification carries an implicit cost: there is misallocation and waste of resources in the process of financial exchange associated with risk diversification, which results in the destruction of part of the potential return on investment. The magnitude of this implicit cost depends upon the level of financial expertise within the economy. The lower the level of financial expertise, the higher the portion of forgone return on investment.

Being risk averse, households value protection against risk. Because of that, households might decide to engage in financial transactions even when the return they get is lower than the expected return they would obtain under financial autarky, as long as by doing so they are able to reduce their exposure to risk. This explains why, according to this paper, financial development might still take place even when, because of the poor level of financial expertise, it worsens the allocation of financial resources compared to financial autarky. Once constant returns to scale on physical capital are introduced, the same intuition offers a theoretical explanation of the observed fact that the growth effect of financial development is not always positive.

In financially repressed economies, the financial sector plays little role in the allocation of financial resources. Financial expertise tends to be low or virtually absent, and so one could expect financial institutions to be rather inefficient.[4] If it takes time for financial institutions to accumulate expertise correspondingly improving their efficiency, then the immediate expansion of a financial sector following a liberalizing reform might well be associated with a period of deterioration of allocative efficiency. Indeed, according to Fry (1995), one of the reasons why the rapid expansion of the financial sector after financial liberalization might worsen the allocation of financial resources is that "[...] there are likely to be acute shortages of trained personnel in the financial sector [...]" and, "[...] obviously expertise cannot be acquired overnight [...]",

either to the view that finance fosters growth.

[4]Referring to the East European countries Calvo and Coricelli (1996) note that "[...] The information capital necessary for the functioning of credit markets and the concomitant banking skills were absent in the prereform regime. Moreover, private credit markets did not exist in highly centralized economies [...]". Indeed, "[...] in the prereform regime banks mainly served the role of accounting firms [...]", (ibid., page 75).

(ibid. page 454).[5] But then, why should market forces encourage financial exchange even when financial institutions are so inefficient that they worsen the allocation of financial resources? This paper offers a simple intuitive answer to this question: risk averse savers are willing to accept a productivity loss in exchange for insurance against risk.

The literature on finance and growth has often identified the provision of better diversification opportunities as one of the reasons why financial institutions improve the allocation of financial resources thereby enhancing growth. While compatible with this standard result, the analysis conducted in this paper calls attention to the reverse possibility. Devereux and Smith (1994) and Obstfeld (1994) have both shown that risk diversification might retard growth when it reduces the propensity to save. The economics behind their result, which is in the trade off between income and substitution effects induced by risk diversification, is fundamentally different from that of the model analyzed in this paper. Here, the argument that financial development has an ambiguous growth effect is made under the assumption that financial development does not affect the propensity to save but only the allocation of savings toward investment.[6]

The model further assumes that the level of financial expertise increases over time due to a learning by doing externality. Obviously, because of that, financial development could eventually become a leading factor in the development process at some stage even if initially detrimental to it. More interestingly, the possibility of financial institutions having adverse growth effects, raises the issue of whether financial development is always a sustainable process. Indeed, unlike existing models such Greenwood and Jovanovic (1990) and Saint-Paul (1992), this paper concludes that endogenous financial development occurring at some threshold level of economic development might be non-sustainable.

The structure of the paper is as follows. Section 2 discusses an example of the possibility of a trade off between productivity and risk diversification. Section 3 presents the model. Section 4 analyzes the impact of financial development resulting from liberalization within the model. Section 5 extends the analysis to the case of endogenous financial development. A last section presents the conclusions.

[5] A similar point is raised by Blanchard et al. (1992) in their discussion about the reforming of East Europe countries: "[...] the building of both competence and expertise in banking is nearly by essence a process of learning by doing that takes years [...]", (ibid. page 78). See also Blanchard (1997).

[6] This also implies that, differently from Obsfeld (1994) and Deveraux and Smith (1994), our result is robust to the empirical evidence, which suggests that the effects of financial development on the propensity to save might be ambiguous.

2 The trade off between productivity and risk diversification: an example

Consider an economy populated by a continuum of size 1 of identical risk averse households. Each household derives utility from consumption according to c^γ where c is consumption, and $\gamma \in (0,1)$ measures aversion to risk: the higher γ the lower the degree of risk aversion. Each household is endowed with w units of financial resources that convert into physical capital on a one to one basis. The consumption good is produced by plants owned by households. Each household owns one plant. The production technology converts k units of capital into zk units of consumption good, where z equals ϕ with probability p and zero otherwise.

Households decide how to allocate their financial resources in order to obtain the physical capital necessary to produce and consume. One possible strategy is autarky: each household self-finances its own plant and retains full property of it. However, for a risk averse household, autarky might not be the best financial strategy because of the risk involved. Alternatively, households could achieve full risk diversification through capital market transactions, which we generally refer to as financial transactions. In particular, each household could either: (i) use financial resources to finance the continuum of production plants owned by the other households in exchange for equity shares (or debt contracts such as bonds); or (ii) self-finance its own plant and then exchange equity shares with the other households. In the first case the capital market functions as a primary market where financial resources are exchanged for newly issued equity shares (or bonds), while in the second case it works as a secondary market, where existing equity shares are exchanged. In both cases, households can achieve a fully diversified portfolio of investments. With perfect markets and costless financial transactions, in equilibrium, the certain return per unit of financial resources generated by such a portfolio , call it r, would equal the expected marginal productivity of the financed capital, $p\phi$. However, we assume that, because of capital market frictions, a fraction δ of the marginal product of capital is destroyed. Consequently, the equilibrium value r equals the average expected productivity of capital discounted by δ, i.e. $r = \delta p\phi$, where δ measures the severity of market frictions: the lower δ the higher the fraction of return on capital forgone, $1 - \delta$.

Let us assume that households' choice is restricted to these two alternatives: (a) Financial autarky; (b) full risk diversification through the capital market. The expected value of the uncertain utility associated with strategy (a) is $p(\phi w)^\gamma$. By contrast, the certain utility associated with strategy (b) is equals $(rw)^\gamma$. Comparing the two one finds that whenever $r \geq p^{\frac{1}{\gamma}}\phi$ holds, households prefer to diversify risk by means of financial transactions rather than incur any risk by staying autarkic. Given that, in equilibrium, $r = \delta p\phi$, this inequality implies that risk diversification is the equilibrium optimal strategy so long as $\delta \geq p^{\frac{1-\gamma}{\gamma}}$ holds.

Since $p^{\frac{1-\gamma}{\gamma}}$ is continuous and increasing in γ with value one when $\gamma = 1$ and limit value zero when $\gamma = 0$, for a given $\delta > 0$, there will always be values of $\gamma \in (0, 1)$ such that the above described inequality is satisfied. This is so even though it is always true that the net certain return to capital in the presence of financial transactions, $p\phi\delta$, is strictly lower than the expected return to capital under financial autarky, $p\phi$.

In the absence of a capital market, autarkic production is the only available option. The certain aggregate level of output associated with such an option would be equal to $p\phi w$, where we note that risk is completely idiosyncratic and therefore vanishes at the aggregate level. With financial transactions, the level of output is $p\phi\delta w$. Financial exchange always entails a productivity loss which results in a lower level of output compared to autarky. Yet, so long as households are sufficiently risk averse, they are willing to trade off production for protection against risk.

The above result suggests the following analysis of the growth effects of financial liberalization as well as, more generally, of endogenous financial development.

3 The model

The economy is populated by overlapping generations of two period living households. Each generation t consists of a continuum of size 1 of identical households who derive utility from consumption in their second period of life only, according to the individual utility function $c_{2,t}^{\gamma}$, where $c_{2,t}$ is the consumption level of an old household from generation t and, as in the previous section, $\gamma < 1$ measures risk aversion. Each young household is endowed with one unit of labor which is supplied inelastically in exchange for a salary w_t. The salary is entirely saved to finance consumption in the second period. Production is undertaken by households. Each young household undertakes physical investment to set up a production plant in order to be able to produce when old. Production plants are classified into two types, S and R, depending on which technology they use. Type-S plants' technology is described by the production function $y_t = \phi_S K_t^{\alpha} A_t l^{1-\alpha}$, where y_t is output, K_t is capital, l is labor, $A_t = k_t^{(1-\alpha)}$, with $k_t = K_t/l$, is a standard learning by doing externality and ϕ_S is the plant–specific productivity scale parameter. Similarly the production function of type-R plants is $y_t = \phi_R K_t^{\alpha} A_t l^{1-\alpha}$. We assume $\phi_R > \phi_S$: in equilibrium, the marginal productivity of capital per unit of labor is higher in technology R than in technology S.

Setting up a production plant is risky. The probability of success is less than one. If the setting up fails, the plant is not able to produce and the investment is entirely lost. Plants can be set up and operated autarkically, in which case each household self-finances capital accumulation, retaining full property and bearing all associated risks. Alternatively, households could engage in financial transactions in order to diversify risk. As discussed in the previous section, we can think either of (i) A primary market where households issue either equity or bonds to finance their

production or (ii) A secondary market where equity shares of self-financed investments are exchanged. Any of the alternatives guarantees the same outcome: households are able to fully diversify risk by pooling a continuum of investments with independently and identically distributed individual returns.

Under financial autarky, the probability of success of an individual plant is p_S for type-S plants and p_R for type-R plants. We impose $p_S > p_R$. This assumption implies that when adopting technology S, autarkic households are exposed to less risk than when relying on technology R. However, we also impose the expected productivity of type-R plants to be higher than that of type-S plants, i.e. $p_S\phi_S < p_R\phi_R$.

Differently, if households engage in financial exchange, the probability of success when setting up a type-i plant is f_t^i, with $i = S, R$. We assume that if, on the one hand, financial transactions create value by allowing risk-diversification, because of the presence of market frictions that we choose not to model explicitly, they also destroy part of the returns that investments would generate in a frictionless environment. We model these implicit costs of financial exchange by assuming that, all other things being equal, the probability of success in setting up a production plant of any type is lower in the presence of financial financial transactions than in their absence. Formally, $f_t^i < p_i$ for any time t. So long as financial transactions are taking place, the economy accumulates financial expertise. This learning by doing effect is modeled by assuming that, in the presence of financial transactions, f_t^i evolves through time according to the following exogenous process

$$f_{t+1}^i = v(f_t^i); \qquad v'(f_t^i) \equiv \frac{dv}{df_t^i} \geq 0. \tag{1}$$

It is imposed that f_{t+1}^i converges to a unique steady state value $\overline{f}^i$, with $\overline{f}^i \leq 1$. The learning process is technology specific. In particular, the model assumes that financial expertise evolves over time only with respect to financial transactions related to the adopted technologies. Hence, if only technology R is adopted, only f_t^R will change over time according to (1). If no financial transactions take place, the economy does not accumulate any financial expertise, i.e. f_t^i does not change over time when households are autarkic.

Finally, similar to the example discussed in the previous section, young households are restricted to two options: either they fully diversify risk or they pursue an autarkic (risky) investment strategy. That is, we do not allow households to diversify only part of the risk associated with investment activity.[7] Correspondingly, there are only

[7]In principle, such mixed portfolio strategy would be optimal whenever the expected return associated with risk exceeds the safe rate of return associated with full risk-diversification. It is a well known principle that "[...] if a risk is actuarially favorable, then a risk averse agent will always accept a small amount of it [...]" (Mas-Colell, Wiston and Green (1997), page 189). However, this model does not allow for that strategy, since it would just complicate the analysis without altering the main results.

two possible régimes: financial autarky, and financial exchange. In both régimes, households work and accumulate capital when young and then hire labor to produce - this only if their production plant is successful - and consume when old. The only difference between the two régimes lies in the households' exposure to risk. Under financial autarky each household bears all risks, while under financial intermediation all production risk is being diversified away.

4 Financial autarky and the growth effect of financial liberalization

In the real world, financial repression takes various forms such as ceilings on deposit or loan interest rates, and/or loan-size, reserve requirements, trading-restrictions in the financial markets, and the like. A consequence of financial repression which is relevant to this paper is that it "[...] reduce(s) the overall availability of loanable funds to investors [...]", Fry (ibid., page 38). Following this observation and in line with other finance and growth models where the state of financial markets is set exogenously as for instance in Bencivenga and Smith (1991), financial repression is modeled as the extreme case in which financial transactions are totally prevented by the government.

Under financial repression, the only saving option available to young households is to self-finance production bearing all associated risks. At any time t, each household invests an amount of savings equal to the equilibrium salary, $w_t = (1-\alpha)y_t$. The associated expected utility for an individual household is either $p_S\left[(1-\alpha)y_t\alpha\phi_S\right]^\gamma$ or $p_R\left[(1-\alpha)y_t\alpha\phi_R\right]^\gamma$, depending on whether the household chooses to operate a type-S or a type-R plant, respectively. Comparing the two values of the expected utility, one finds that households of generation t adopt plants of type S (R) whenever

$$\beta_S p_S \phi_S > (<) \beta_R p_R \phi_R, \tag{2}$$

where,

$$\beta_i = p_i^{\frac{1-\gamma}{\gamma}}, \qquad with \quad i = R, S, \tag{3}$$

is the technology-specific risk discount factor. That is, β_i is the risk-discount factor that applies to the expected return to capital used in type-i plants, as given by $p_i\phi_i$. Inequality (2) says that households invest in the technology which yields the highest risk-discounted, or risk-adjusted, expected return to capital. Since technology S is safer ($p_S > p_R$) savers will choose technology S rather than R if sufficiently risk-averse. This is so, in spite of the fact that, by assumption, technology R guarantees a higher expected return to capital per unit of labour since, by assumption, $\phi_R p_R > \phi_S p_S$.

In general, given that technology $i = R, S$ is chosen, the equilibrium growth rate of per capita income is

$$g_i^{FA} = p_i\phi_i(1-\alpha) - 1. \tag{4}$$

Having assumed $p_S\phi_S < p_R\phi_R$, whenever technology S is chosen -which happens whenever agents are sufficiently risk averse- the economy experiences a productivity loss and a lower rate of growth than if technology R had been chosen.

4.1 The effects of financial liberalization

What are the effects of the liberalization of domestic financial transactions, under the assumption that because of the relatively high degree of risk aversion, the autarkic economy is adopting technology S, which is the less productive one?[8]

At the time (T) financial liberalization takes place, the degree of financial expertise is measured by the probability of success of an individual plant operating technology i under financial exchange, which is f_T^i. Under financial exchange, then, the time T equilibrium expected return from financing technology S is $\alpha\phi_S f_T^S$ while the expected return from financing technology R is $\alpha\phi_R f_T^R$. Financial transactions enable households to hold a portfolio of investments in a continuum of identical risk-independent projects, which implies they achieve full risk diversification. In other words, the expected return on households' financial assets equals its ex post realization with probability one. Accordingly, households' individual utility equals $(\alpha\phi_R f_T^R w_T)^\gamma$ if technology R is financed, and $(\alpha\phi_S f_T^S w_T)^\gamma$ if technology S is financed, where w_T is the amount of (labor) income being invested at the time of financial liberalization. Hence, so long as

$$\phi_R f_T^R > \phi_S f_T^S \tag{5}$$

following financial liberalization, only type-R plants are financed. Only type-S plants would be financed if the reverse inequality holds. Note that, unlike in the autarkic régime, financial exchange ensure that financial resources are allocated to the investments which yield the highest expected return, given the level of financial expertise. Assuming that (5) holds at time T, the economy will keep financing technology R in all subsequent periods.[9]

At time T, autarkic households' individual utility when operating a type-S plant is $p_S(w_T\alpha\phi_S)^\gamma$, while assuming that if engaging in financial exchange households would adopt technology R (i.e. inequality (5) holds) each of them would get $\left(f_T^R w_T\alpha\phi_R\right)^\gamma$. Comparing the expected utility of savers under the two financial régimes, we find that households choose to engage in financial transactions if and only if the condition

$$\beta_S \leq \theta_T, \tag{6}$$

[8] In order to assess the effect of financial development we take a conservative approach. We consider the most favorable case for financial development to yield a positive growth effect, which is when the autarkic economy produces using technology S that is the less productive technology.

[9] This is ensured by the assumption that learning by doing is technology specific.

applies, where

$$\theta_T = \frac{f_T^R \phi_R}{p_S \phi_S} \tag{7}$$

is the ratio of the expected returns per unit of capital-labor ratio under financial exchange and financial autarky, respectively. [10]

Clearly, as can be seen from equation (6), if the level of financial expertise is too low, financial liberalization does not generate financial exchange at all. However, the same equation also shows that households might still be willing to operate financial transactions even when the expected productivity of the resulting investments is lower under financial exchange than it would be under financial autarky. This happens whenever inequality (6) holds, in spite of θ_T being less than one.

At time T, savings (and investment) of the individual household are equal to the equilibrium salary, $(1-\alpha)y_T$, where y_T is time T income per unit of labor. Let us assume that condition (6) is satisfied so that households engage in financial transactions. Accordingly, having assumed that (5) holds, and given households' savings, we have $y_{T+1} = (1-\alpha)y_T f_T^R \phi_R$. Correspondingly, the growth rate initially induced by financial liberalization is

$$g_T = (1-\alpha)\phi_R f_T^R - 1. \tag{8}$$

Then,

Proposition 1

i. If financial expertise is sufficiently low ($\theta_T < 1$):

a. Financial liberalisation still leads to financial development if households are sufficiently risk averse ($\beta_S \leq \theta_T$), driving the economy into a slowdown or a recession depending on whether f_T^R is greater or lower than $1/(1-\alpha)\phi_R$;

b. Generally, no financial development occurs otherwise, i.e. if $\beta_S > \theta_T$.

ii. If financial expertise is sufficiently high ($\theta_T > 1$) financial liberalisation always induces financial development, with beneficial consequences for the growth process.

The above proposition results immediately from the comparison between the expressions of the growth rates under financial autarky, g_S^{FA}, (see equation (4), with $i = S$) and at the time of financial liberalisation, g_T, (see equation (8)).

The economy's growth rate is maximized when savings are allocated to the investments which yield the highest expected rate of return to capital per unit of labor.

[10] To be precise, if $\beta_S = \theta_T$ the financial régime is indeterminate: we could either have financial transactions or not. We solve this (innocuous) indeterminacy by assuming that, if indifferent, households still choose to diversify risk by means of financial transactions.

Being risk averse, households choose the allocation of savings that maximizes the certainty equivalent to the return on savings. Highest expected rate of return does not necessarily mean highest expected utility, when savers are risk averse. Hence, the saving preferences of risk-averse households might well be incompatible with the maximization of the economy's growth rate. This explains why financial liberalization might reduce growth compared to financial autarky.

With financial transactions, households can achieve full insurance against risk thereby guaranteeing themselves a safe return on savings. By contrast, when adopting an autarkic strategy households face undiversifiable risk. For a risk averse household, risk reduces the utility associated to the investment's payoff. Hence, risk averse households might prefer to engage in financial transactions in order to diversify risk away, even when the safe rate of return they get from doing so is lower than the expected value of the uncertain return they would get by staying autarkic. When this happens, financial development resulting from liberalization will depress growth. Yet, savers are better off.

Under financial autarky, risk aversion might lead the choice of less productive but safer production technologies. The same motive might justify the emergence of inefficient financial exchange that has a negative effect on productivity and growth. This result offers a novel theoretical justification of why the growth in financial transactions following financial liberalization might not be associated with a higher GDP growth rate, especially in the early stages of the process. As a limiting case, the transformation of the system of production guaranteed by financial transactions might even bring in a phase of recession, which indirectly calls attention to the issue of sustainability of the transformation process itself. This issue will be analysed in section 5.

As the level of financial expertise increases due to learning by doing, this might improve the expected return on capital under financial exchange, which positively affects growth. The growth rate of the economy at period $T+n$, which is given by

$$g_{T+n} = \phi_R(1-\alpha)f_n^R - 1, \qquad \forall n \geq 0 \tag{9}$$

is a monotonically increasing function of n, provided that $v'(f_t^R) > 0$ for all $t \geq T$, with $g^* = (1-\alpha)\overline{f}^R\phi_R - 1$.[11] Proposition 1 suggests that financial liberalization might initially result in a slowdown or even recession. However, as long as $\overline{f}^R\phi_R > p_S\phi_S$, the ultimate growth effects of financial liberalization will eventually become positive (they would never become positive otherwise). Through time, the economy might accumulate financial expertise, and this results in more efficient financial transactions (a more efficient financial exchange régime). So long as $\overline{f}^R\phi_R > p_S\phi_S$, this ultimately leads a more efficient resource-allocation under the financial exchange régime than

[11] Clearly enough, the growth rate will not increase over time if there is no learning, i.e. if $v'(f_t^R) = 0$ for all $t \geq T$.

under financial autarky, which reflects itself in a higher growth rate for the economy.

An interesting question concerns the length of the slowdown or recession phase that the economy might experience with the liberalization period. Assume, for instance, a linear specification for the difference equation governing the evolution of f_t^R for $t \geq T$ such as

$$f_{t+1}^R = f_t^R + \lambda[\overline{f}^R - f_t^R], \tag{10}$$

where the initial condition is the degree of financial expertise at time T, f_T^R. Given equation (10), assuming $\overline{f}^R \phi_R > p_S \phi_S$, financial development starts contributing positively to the growth process only after n^* periods from the time of the transition, where

$$n^* = Int\left(\max\left(\frac{1}{\ln(1-\lambda)}\ln\left(\frac{\phi_R\overline{f}^R - \phi_S p_S}{\phi_R(\overline{f}^R - f_T^R)}\right) + 1, 0\right)\right), \tag{11}$$

where if $n^* = 0$ then financial development would be growth inducing from the very beginning.

Moreover, whenever

$$f_t^R \phi_R (1-\alpha) < 1 \tag{12}$$

, the economy experiences a recession that lasts for $n^{**} \geq 1$ periods, where

$$n^{**} = Int\left(\max\left(\ln\frac{(1-\alpha)\phi_R\overline{f}^R - 1}{(1-\alpha)\phi_R(\overline{f}^R - f_T^R)}\frac{1}{\ln(1-\lambda)} + 1, 1\right)\right). \tag{13}$$

It can be verified that condition (12) is a necessary and sufficient condition for a recession to occur, i.e. for $n^{**} \geq 1$ to hold.

According to conditions (11) and (13) The length of possible slowdowns depends on the parameters ϕ_S, ϕ_R, λ, $\overline{f}^R$ and f_T^R in an interesting way. For instance, the smaller is the maximum potential expected productivity difference between plants of type R and S, $\phi_R\overline{f}^R - \phi_S p_s$, the longer would last the slowdown phase possibly triggered by financial liberalization, given the speed at which the economy accumulates financial expertise, as measured by λ, and the initial level of financial expertise, $\overline{f}^R$. Intuitively, as long as the potential productivity gains associated with technology R as opposed to technology S are relatively small, financial expertise becomes relatively more crucial. Relatively more financial expertise might be needed for the system to be able to materialize some of the potential productivity gains associated with the adoption of technology R, made possible by financial exchange, rather than to incur a net productivity loss. Similarly, accumulation of financial expertise becomes a relatively more crucial factor to drive the economy out of a possible recession following financial liberalization, the lower is the value of the maximum value of expected productivity of capital per unit of labor associated with the best technology available, i. e. $\overline{f}^R \phi_R$.

In environments where the quality of investment opportunities available is generally low, whether financial liberalization will result in a productivity increase and a positive effect on growth it depends more crucially on the financial expertise/efficiency of financial exchange, than in contests in which the potential productivity gains associated with some of the investment opportunities are high.

5 Endogenous financial development

In the growth and finance literature there are quite a few examples of models which tackle the issue of endogenous financial development. In most of the cases, the endogenous emergence of financial transactions is derived from the existence of some explicit fixed cost.[12]

Building on the existing literature, the issue of endogenous financial development and its sustainability is explored by augmenting the basic model developed in the previous section with the assumption of costly financial transactions. In particular, similar to Saint-Paul (1992), it is assumed that each household incurs a fixed cost c (measured here in units of period 2 forgone consumption) when participating in financial transactions. Since the economy is populated by a continuum of agents of mass 1, c also measures the aggregate cost of financial transactions when all agents engage in financial exchange.

For a given initial level of financial expertise f_T^R, and assuming that if financial transactions take place, technology R will be financed the rate of return on the resulting portfolio would be $\alpha f_T^R \phi_R - c/(1-\alpha)y_T$.

The comparison with the rate of return on self-financing, $\beta_S \alpha \phi_S$, directly suggests that endogenous financial development occurs at $y_T \in [y^*, y^*(1-\alpha)\phi_S p_S]$, where[13]

$$y^* \equiv \frac{c}{\alpha[f_T^R \phi_R - \beta_S p_S \phi_S](1-\alpha)}. \tag{14}$$

This, provided that $\beta_S \leq \theta_T$. In fact, we already know from previous analysis that if such a condition were not satisfied, then financial development would never take place.

In case of financial development, at time T, the growth rate of the economy will still be given by expression (8) and the possible growth effect of financial development is still described by Proposition 1. Hence, a prime conclusion is that, in this model, unlike the existing literature, endogenous financial development is not necessarily growth inducing. In other words, the sign of the growth effect of endogenous financial development is ambiguous.

[12] See for instance, Greenwood and Jovanovic (1990) and Saint-Paul (1992).

[13] Again, for $y_t = y^*$ households are indifferent between engaging in financial exchange or not so that, for such a value of GDP the financial régime would be technically indetermined. However, as done previously, we assume that if indifferent, households choose financial exchange.

The fact that the immediate consequence of the emergence of financial transactions could be a phase of recession (see Proposition 1), calls attention to the issue of sustainability of endogenous financial development. Given expression (9), the dynamics of income subsequent to the emergence of financial exchange is described by the following equation:

$$y_{T+n+1} = f^R_{T+n}(1-\alpha)\phi_R y_{T+n}. \tag{15}$$

For the financial development process to be sustainable, $y_{T+n} \geq y^*$ should be satisfied for any $n > 0$. It is important to note that the most favorable condition for sustainability is when financial development emerges at $y_T = y^*(1-\alpha)\phi_S p_S$. In this special case the sustainability condition becomes:

$$\prod_{i=0}^{n-1} f^R_{T+i} > \frac{1}{(1-\alpha)^{n+1}\phi^n_R p_s \phi_S} \qquad \forall n \geq 1. \tag{16}$$

It can be easily proved that

Proposition 2 *Endogenous financial development might be non-sustainable, in which case the economy will revert to financial autarky after a phase of recession.*

Assume there is no accumulation of financial knowledge so that f^R_T is constant over time. In this case the growth effect of financial development does not change over time. Hence, if financial development leads to a recession in period 1 it will always be not a sustainable process. The continuity argument then implies that, whenever the initial effect of financial development is to induce a recession, if f^R_T does not increase rapidly enough, the economy's level of development will always fall below the minimum threshold required for financial transactions to exist, before financial development induces any positive growth rate, which proves the proposition.

6 Conclusion

The notion that financial development should improve the allocation of savings with positive long run growth effects is dominant in the finance and growth literature of the 1990's. Accordingly, liberalization policies aimed at promoting financial development are widely believed to be capable of fostering the growth process. Yet, there are historical examples of transition and developing economies where the financial institutions emerging after liberalization were not efficient enough to promote growth, especially in the early stages of the process. More generally, empirical evidence suggests that financial development does not always exert a significant and positive impact on economic growth. This paper presented a model which offers a simple theoretical justification of why a financial sector might develop following financial liberalisation, even though

the involved process of financial exchange is so inefficient that its net contribution to the growth-process is a negative one. It also shows that endogenous financial development might be a non-sustainable process. Yet, when sustainable, financial deepening could eventually generate positive growth effects as financial institutions accumulate expertise.

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