Financial Institutions' Expertise and Growth Effects of Financial Liberalisation*

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May 2001

Abstract

This paper analyses the real effects of financial development subsequent to financial liberalisation in an economy with risk averse savers and learning by lending. Transition from full financial repression to full financial liberalisation might initially slow down the growth process or even induce a recession, whenever the initial level of valuable investments known by the financial instutions (*informed capital*) is sufficiently scanty. However, lending activity leads to accumulation of information (*learning by lending*) regarding valuable investments. This way, as intermediaries become experts, the allocative efficiency they are able to guarantee ameliorates so that, in the long run, the effects of financial liberalisation are eventually positive.

JEL Classification: E44, O14, O16

Keywords: Financial Repression; Financial Liberalisation; Information Capital, Learning by Lending, Economic Growth.

*I am highly indebted to Laurence Harris and Pasquale Scaramozzino for their detailed suggestions. I also wish to thank Andrea Caggese, Bassam Fattouh, Aubhik Khan for valuable comments and interesting conversations about this subject, as well as seminar participants at Crenos (University of Cagliari and Sassari), and Cefims (Soas, University of London). All errors are, of course, my responsability. Correspondence address: Centre for Financial and Management Studies, School of Oriental and African Studies, Thornhaugh Street, London WC1H 0XG. E-mail: ld1@soas.ac.uk.

1. Introduction

In the last 30 years the analysis of the growth effects of financial repression, and more generally of financial underdevelopment has become a crucial issue on the agenda of researchers and policy makers. The dominant view dates back to Mckinnon (1973) and Shaw (1973) and suggests that financial repression is bad for growth since it worsen both quantity and quality of investment. This accustomed proposition has been generally confirmed by more recent literature on financial development and growth.[1] Cross sectional econometric studies, like those of Jose De Gregorio and Guidotti (1995), King and Levine (1993) and Roubini and Sala-i-Martin (1992) are to a large extent supportive of the leading view in so far they show that measures of financial repression are negatively correlated with subsequent growth rates. These findings are consistent with other cross sectional econometric analyses on finance and growth showing that measures of financial development tend to be positively correlated with subsequent growth, see for instance King and Levine (1993a, b).[2] Yet, there is additional evidence which points to a negative relationship between financial liberalisation and growth. For instance, De Gregorio and Guidotti (1995) show that in the case of Latin American countries financial development, as measured by the ratio between domestic credit to the private sector and GDP, is significantly negatively correlated with subsequent growth.[3] This is consistent with Xu (2000) who shows that 14 out of the 41 countries in his sample exhibit negative long-term cumulative effects of permanent financial development on economic growth. Interestingly enough, the number of countries displaying negative effects declines as the level of economic development increases suggesting that the growth effects of financial devel-

[1] Khan (2001), Acemoglu and Zilibotti (1997), King and Levine (1993), Saint-Paul (1993), Bencivenga and Smith (1992), Levine (1991), Greenwood and Jovanovic (1990), are key examples of this strand of literature. Excellent surveys on the topic are those by Levine (1997) and Pagano (1993).

[2] Note however that as pointed out by Rajan and Zingales (1997) cross country regression do not offer solid insights about causality. Moreover, as discussed by Ram (1999) cross country samples are likely to be characterised by huge parametric heterogeneity across countries, which cast doubts on the legitimacy of conclusions drawn about subgroups of countries on the basis of full sample statistics.

[3] According to their interpretation this finding might "[..] reflect the effects of experiments of extreme liberalisation of financial markets followed by their collapse [..]" (De Gregorio and Guidotti, page 443).

opment change depending on the conditions of the real sector of the economy.[4] Fry (1995) brings historical examples where financial liberalisation has failed to boost economic growth and argues that: "[..](developing countries) have made various changes in the structure and operations of their financial systems under the rubric of financial development, financial liberalisation, or reform. The experience of these efforts has been disappointing in the extreme [..]", [Fry (1995), page 452]. In Fry's view, if the financial sector rapidly expands after financial liberalisation this might worsen the allocative efficiency of the financial institutions. Among the possible causes, one is that "[..] there are likely to be acute shortages of trained personnel in the financial sector [..]" and, "[..] obviously expertise cannot be acquired overnight [..]" (Fry 1995, page 454). A similar point is raised by Blanchard et al. (1992) who in their discussion about the reforming of east European countries argue that "[..]the building of both competence and expertise in banking is nearly by essence a process of learning by doing that takes years [..]", (Blanchard et al, 1992, page 78).

We reckon that in reality transitions caused by reforms develop according to many factors. Yet, the point we develop in this paper is that, even abstracting from those other factors, possible temporary slowdowns/recessions induced by financial development fostered by financial liberalisation can be explained as the result of a transformation process in which an old system of production is abandoned for a new and untried one. The basic idea is similar to the concept of *transformational recessions* (or slowdowns) applied by Blanchard et al (1992, 1997) in the analysis of East European Countries.

As financial liberalisation triggers financial development the economy moves from an initial situation in which financial institutions play little role to new equilibria in which financial institutions can be key to the allocation of financial resources. Financial development ensures risk pooling and mobilisation of savings. Correspondingly, a larger set of investment opportunities becomes feasible and attractive to savers. The result should be that financial resources are allocated toward more productive investments. However, this crucially depends upon the

[4]Furthermore, econometric evidence of a negative relationship between finance and growth in the case of low-grow, or medium-grow economies, is found by Ram (1999) in a cross sectional study. In our view the possibility of a non monotonic relationship between finance and growth is a candidate explanation of why Demetriades and Hussein (1996) fail to find robust cointegration between financial deepening and the level of economic development in one third of the developing countries in their sample. Indeed, Demetriades and Hussein argue that the evidence they reach provides "[..] little support to the view that finance is a leading sector in the process of economic development [..]"; (Demetriades and Hussein, 1996, page 385).

ability of the financial sector to identify the valuable investment opportunities. In a world in which information about investments' quality is imperfect, such ability is, at least partly, the outcome of a *learning by lending* process through which financial institutions accumulate relevant knowledge, i.e. *information capital*. Yet, in financially repressed economies, the active role of the financial system in the allocation of credit is reduced or virtually absent. Hence, financial institutions tend to have low expertise, i.e. the level of information capital tends to be low,[5] which jeopardies the allocative efficiency that can be guaranteed by the financial system, at least soon after liberalisation. The argument then is that, at least in the early stages, the gains associated with the transition process might be not strong enough to compensate for the productivity losses associated with the dismantling of the old production system.

To investigate this idea we build a simple OLG model with risk-averse individuals, in which financial liberalisation, inducing saving mobilisation, allows both for risk diversification and the adoption of a more productive *industrial technology* which requires an initially high level of investment. Production can be run by industrial firms or by individual simple firms. Information about firms' quality is fully observed by third investors one period after investment. Under these premises, we consider two extreme regimes: full financial repression and full financial liberalisation. Under the first regime, there are no financial transactions. Each individual is engaged in self-production and carries all associated risks which cannot be diversified in any way. Under the second regime, funds can be intermediated by the financial sector. Within this set up we show that the financial system emerging because of financial liberalisation could still offer a higher safe return than the certainty equivalent savers would get under financial repression, thereby attracting savings, even in cases in which the overall productivity of financed investment is, due to the poor allocation achieved by the non expert intermediaries, lower than that under financial repression. Correspondingly, financial development sparked off by financial liberalisation can be initially detrimental for growth so that, in the early stages, the transition process might be characterised by a slowdown or even a recession.

The key to this result is that financial intermediaries ameliorate risk diver-

[5] In some extreme cases of financial repression as those of the EE countries under the prereform regime, the level of information capital was almost zero. As Calvo and Coricelli (1996) note, "[..] The information capital necessary for the functioning of credit markets and the concomitant banking skills were absent in the financial 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 [..]", (Calvo and Coricelli, 1996, page 75).

sification. The literature on finance and growth has often identified the provision of better diversification opportunities as one of the reasons why financial intermediaries improve the allocation of financial resources, thereby enhancing productivity of investments. Indeed, this intuition has been formally modelled by various authors like, for instance, Acemoglu and Zilibotti (1997), Saint-Paul (1993) and Greenwood and Jovanovic (1990). Our result calls attention to the reverse possibility. The provision of risk diversification here justifies why after financial liberalisation, financial institutions might start playing a central role in the allocation of financial resources even though, being not learned enough, they are inefficient to such an extent that they are actually detrimental for growth. Other studies, like for instance, Devereux and Smith (1994) and Obstfield (1994) have shown that risk diversification might retard growth when it affect adversely the propensity to save. This result is obviously fundamentally different from the one we propose here as it relies entirely on the income and substitution effects induced by risk-diversification. Indeed, in our model, the fact that financial institutions improve risk-diversification justifies the development of growth-harming financial institutions independently of the effects on individuals' propensity to save.[6]

In the model, financial institutions are able to accumulate information about valuable firms through lending activity. Accordingly, as the credit market starts playing a central role in the allocation of savings, this induces a process of accumulation of information capital which ameliorates the allocative efficiency achieved by the credit market so that at some stage financial liberalisation would eventually start bringing positive growth effects. Therefore, the model we propose predicts a relationship between financial development triggered by financial liberalisation and economic growth which might be possibly non monotonic, i.e. negative in the early stages of the transition process, and positive later on.

The structure of the paper is as follows. Section 2 presents the model. Section 3 solves the model in case of full financial repression. Section 4 analyses the impact of financial liberalisation focusing both on immediate consequences and ultimate long run effects. A last section is left for conclusions.

[6] As it becomes clearer from the description of the model, we assume that agents, who live for two periods, derive utility only from second period consumption, and therefore always save all their first period income. In other words the marginal propensity to save is constant and equal to 1.

2. The model

The economy consists of a continuum size H of individuals and atomistic infinitely lived *industrial firms*. The population of individuals as a standard OLG structure with individuals living for two periods. Individuals have identical preferences and derive utility from consumption in the second period of life according to $U_t = c_{2,t}^{1-\rho}$, where, for each member of generation t, $c_{2,t}$ is the consumption level in the second period of life, and ρ is a given parameter greater than zero. Each young individual is endowed with one unit of labour which s/he supplies inelastically to producers earning a salary w_t in her/is first period of life. Given individual's preferences, the salary is entirely saved to finance consumption in the second period.[7] Production is carried out by industrial firms, and/or *simple firms* set up by individuals. All firms are perfectly competitive. Individuals invest directly in production or finance industrial firms' investment activity via the credit market. Newly set firms, both simple and industrial, are of type G with probability λ and of type B with probability $1-\lambda$. Type B never makes to become mature and able to produce while type G always manage. Mature firms live for ever. In the case of simple firms, those that are mature at time t are inherited by young individuals of generation t.

Accumulation of capital requires 1 period and we assume full capital depreciation. Therefore, in every period, $K_{t+1} = I_t$ holds. The technology used in production by mature firms is of two types: a *cottage* technology and an *industrial* one. The latter is available only to industrial firms. The cottage technology combines labour, l, and capital, K_t, according to $y_t = x(\phi)K_t^{\alpha}l^{1-\alpha}A_t$, where $A_t = (k_t)^{1-\alpha}$, with $k_t = K_t/l$; where y_t is the level of production, $x(\phi)$ is a normally distributed stochastic productivity shock, with expected value equal to ϕ and variance $Var(x(\phi)) = \sigma^2$. Note that the assumption of normality is tenable as long as, given ϕ and σ^2, the probability attached to negative realisations of $x(\phi)$ is negligible, so that $x(\phi)$ takes virtually only positive values, i.e. the mass of firms experiencing negative productivity tends to zero.[8] The realisation of $x(\phi)$

[7] While the adopted assumptions concerning the structure of preferences and the related saving/consumption decisions are not strictly necessary to any of the main results of the model, they allow for a great deal of simplification in the analytical solution of the model, and therefore they help obtaining clear cut results.

[8] The assumption of normality is needed only in order to legitimate the concept of certain equivalent straightaway, when analysing saving choices. Alternatively we could assume that $x(\phi)$ is distributed identically and independently across firms, and is such that its higher moments are negligible compared to σ^2 so that the use of the certainty equivalent would be legitimate

is known one period after investment. Returns to capital associated to cottage production are not verifiable. We further assume that the cottage technology is subject to a maximum feasible scale of physical capital to produce at time $t+1$ is $\overline{K}_{t+1} = kM_t$, where k is a positive constant and M_t is the state of technical knowledge at time t. Moreover, we assume that a fraction p of mature simple firms can be converted to become industrial firms able to operate the industrial technology.

The industrial technology entails $y_t = v(\psi)K_t^{\beta}l^{1-\beta}A_t$ where $A_t = (k_t)^{1-\beta}$, with $k_t = K_t/l$, = where $v(.)$ has the same properties of $x(.)$, with $E(v(\psi)) = \psi$, and $Var(v(\psi)) = \sigma^2$. Differently from cottage production returns to capital in industrial production are perfectly verifiable, while, similarly to the cottage technology, we assume that the industrial technology is subject to a maximum feasible scale of physical capital to produce at time $t+1$ is $\overline{K}_{t+1} = KM_t$, with $K > k$. We also assume that the industrial technology has a minimum feasible scale $K_{t+1}^{\min} > w_t$ so that individuals inheriting a simple firm which could be converted to industrial production cannot do so unless they have access to external finance.

Technical knowledge M_t is assumed to be a public good, and accumulates over time according to $M_t = \max\{M_{t-1}G_t, M_{t-1}\}$, where G_t is the mass of successful firms at time t. According to this specification, technology is a by-product of production activity.[9]

3. Growth under financial repression

In the real world, financial repression comes under various forms such as ceilings on deposit or lending interest rates, loan size ceilings, reserve requirements and so on.[10] As far as we are concerned here, the main consequence of financial repression

as an approximation. Finally, the use of the certain equivalent could be legitimate also if we were to assume a quadratic utility function. We adopted a CRRA specification to simplify the exposition of the key results of our model.

[9] We would like to stress here that the model's main results do not hinge on the specific assumptions introduced regarding firms' technology. The only crucial assumptions which are needed are: *i)* The existence of constant aggregate returns to capital accumulation, which implies long run growth; *ii)* The fact that the size of firms is bounded from above so that the financial system cannot always place all resources in successful firms, which provides a rationale for funding newly operating firms.

[10] These are few example of the possible forms types of discriminatory taxation imposed on the financial system. For a systematic discussion of the issue see Fry (1995).

is to "[..] reduce the overall availability of loanable funds to investors [..]", Fry (1995, page 38). Consequently, we model financial repression as the extreme case in which financial transactions are totally prevented.[11] It is worth noting that, in the model we present, such a situation would indeed by generated as an equilibrium as long as the interest rate ceiling on loans (or deposits) imposed by the authority is lower than the certainty equivalent associated with self-financing cottage production.[12] If financial transactions are totally prevented, production is undertaken directly by individuals who self-finance simple firms.[13] Note that, since we assume that, in each period, $w_t < K_{t+1}^{\min}$ holds, under financial repression individuals have only access to the cottage technology even though their firm might possibly be converted to industrial production if there is sufficient funding. Recalling that newly set firms are successful with probability λ in their first period of life and that once successful in one period they will be successful in every other period, the number of mature simple firms operating in the economy at time $t+1$ is

$$G_{t+1} = G_t + \lambda[H - G_t],$$

where G_t is the number of mature firms at period t. The above equation implies a unique stable steady state $G_{FR}^* = H$. In steady state, then, each individual inherits a successful simple firm. Individual savings at time t are given by $w_t = y_t(1-\alpha)$. Since we assume that $w_t < \overline{K}_{t+1}$ holds for all t, it follows that individuals invest all their savings. Finally, considering that productivity, $x(\phi)$, is i.i.d across firms with $E(x(\phi)) = \phi$, aggregate product at time $t+1$ is given by $Y_{t+1} = H(1-\alpha)y_t\phi$, so that, since $Y_t = Hy_t$, the steady state growth rate of the economy

[11] This is a standard assumption in the literature on financial development and economic growth. For instance, Pagano and Jappelli (1994) use this assumption to model the stage of development of consumption credit. Another example is Bencivenga and Smith (1991) who compare the equilibria of the economy with and without financial transactions respectively, in order to assess the growth impact of financial development. We note that in their model, the dominant equilibrium generated by market forces is one with financial transactions. Consequently, the only tenable justification for their absence is the existence of regulations which prevent them.

[12] Given our assumptions the expected utility derived from the uncertain return to self-financing is equal to the utility attached to its certain equivalent. Therefore, as long as loans pay an interest rate lower than the certain equivalent to the return on self-financing agents never engage in financial transactions.

[13] Fry (1995) points out that credit shortage induced by financial repression encourages low yielding self-financed investment.

is $g^*_{FR} = (1-\alpha)\phi - 1$. Finally we note that in steady state the certainty equivalent to the return on self-investment is $R^{c^*} = R^{c*} = \alpha\phi(1 - \rho\alpha^2\sigma^2/2)$.[14]

For simplicity, in the following of the paper we study the effects of the endogenous transition toward industrial production supported by financial development sprung by financial liberalisation, under the hypothesis that the financially repressed economy is operating at steady state.[15]

4. Credit market under full financial liberalisation

Suppose that internal financial markets are fully liberalised so that financial transactions can freely take place. For instance, we could assume that the authority abolishes the interest rate ceilings which might be the determinant of the financial autarky equilibrium which characterises the financially repressed economy.

The specific shape the financial sector of the liberalised economy takes depends on the assumptions about the lending ability of individuals. In particular, if we assume that all agents have the ability to process the information available in the economy about lending opportunities, then financial transitions could either occur directly between savers and investors, or through intermediaries. Under these circumstances the financial sector cannot be uniquely defined. If, on the other hand, we postulate that processing information relevant for lending requires some skills peculiar to specific institutions, namely financial intermediaries, then savings would be intermediated by these institutions which issue deposit contracts and fund firms via loan contracts. As long as we assume that in both cases, the credit market retains a perfectly competitive structure, the above issue is, at least for the purposes of this work, not particularly relevant.[16] In fact, under the hypothesis of perfect competition both cases lead to the same result in terms of allocation of funds and (therefore) returns to savers. Having said that, for

[14] In steady state, all young individual inherit a mature firm. Therefore, they know that by self-financing their simple firm they will be surely able to produce. Yet, according to our assumptions, productivity is a stochastic variable,$x(\phi)$, so that, in equilibrium, also the return to capital $\alpha x(\phi)$ is uncertain, with $E(\alpha x(\phi)) = \alpha\phi$, and $Var(\alpha = x(\phi)) = \alpha^2\sigma^2$. Given agents' preferences, then, the certainty equivalent to $\alpha x(\phi)$ is given by $R^{c*} = \alpha\phi(1 - \rho\alpha^2\sigma^2/2)$.

[15] The effects of financial liberalisation are qualitatively similar in the case the financial repressed economy has not reached the steady state $G^* = H$.

[16] If we assume the existence of intermediaries this requires that are not tied up to the bank which discover them so that accumulation information provides no rents and the credit market operates in a perfect competition fashion. We note that this is the case in our model since exp-post returns to investment in the industrial technology are fully verifiable.

expositional convenience we stick to the interpretation according to which the link between savers and investors is guaranteed by financial intermediaries, which we simply call banks.

Since returns to cottage technology are not verifiable, banks fund only industrial firms. At the time (T) financial liberalisation takes place, there are $pG^*_{RF} \equiv G_T$ simple mature firms suitable for conversion to industrial production. We note that as long as the intermediary will guarantee a return R^d_T higher than the certainty equivalent to self-financing the cottage technology, $R^{c*} = \alpha\phi(1-\rho\alpha^2\sigma^2/2)$, individuals will find it convenient to diversify risk saving via deposits offered by the bank. Unknown industrial firms offer an expected return $\lambda\alpha\psi$. The G_T mature firms converted to industrial production offer an expected return $\alpha\psi$. Since banks operate under perfect competition and face zero costs, all returns are redistributed to depositors. Therefore as long as $\lambda\alpha\psi$ is greater than R^c, savers will find it convenient to save in form of deposits. If so, all savings are channelled toward banks. In turns, under these premises, banks will have incentive to maximise the level of funding channelled toward the G_T existing mature industrial firms. The maximum amount of investment in the G_T firms is $\overline{K}_{T+1}G_T$, which also measures the maximum level of investment in known valuable opportunities at time T, i.e. the level of *informed capital* at time T. The overall mass of firms that can be funded at period T is $D_T/\overline{K}_{T+1}$. As long as $D_T/\overline{K}_{T+1} > G_T$ banks also engage in lending to infant industrial firms whose probability of success is therefore λ.

Since the size of the loan allocated to each firm is $\overline{K}_{T+1}$, the mass of successful firms at period $T+1$ will be given by

$$G_{T+1} = G_T + \lambda[D_T/\overline{K}_{T+1} - G_T].$$

Note that the banks know that all the G_{T+1} firms (successful at time $T+1$) will be successful at period $T+2$ as well as in any other period with probability 1. The new level of informed capital at period $T+1$ will be therefore equal to $G_{T+1}\overline{K}_{T+2}$. As it will become clearer later on in the discussion, the equation for G_{T+1} shows a process of learning by lending according to which lending activity results in accumulation of informed capital.[17] Note that the interest rate on deposits guaranteed by the intermediary is

$$R^d_{T+1} = \frac{G_T\overline{K}_{T+1}}{D_T}\alpha\psi(1-\lambda) + \lambda\alpha\psi$$

[17] A similar learning structure is presented by Lee (1996) although in this model the level of information capital does not have any impact oneconomic growth.

where $G_T\overline{K}_{T+1}/D_T$ is the ratio between the level of informed capital and deposits. Note that the interest rate is a growing function of $G_T\overline{K}_{T+1}/D_T$ reflecting the fact that the more informed are intermediaries the higher is their allocative efficiency, with minimum value $\lambda\alpha\psi$ for G_T, maximum value for $G_T\overline{K}_{T+1} = D_T$.

4.1. Immediate growth effects of liberalisation

According to previous analysis, provided that the condition $\lambda \geq R^{c*}/\alpha\psi$ holds, all savings flow (in form of deposits) toward industrial firm's production via intermediaries. Assuming that the level of per capita income at time T is Y_T the mass of deposits will be $D_T = (1-\alpha)Y_T$. Assuming $G_T < D_T/\overline{K}_{T+1}$, the mass of successful firms at period $T+1$ is given by $G_{T+1} = G_T + \lambda[(1-\alpha)Y_T/\overline{K}_{T+1} - G_T]$. Correspondingly, the aggregate level of income at time $T+1$ is $Y_{T+1} = G_{T+1}\overline{K}_{T+1}\psi$. Hence, the growth rate initially induced by financial liberalisation will be equal to

$$g_T = \psi\theta_T(1-\lambda) + (1-\alpha)\psi\lambda - 1$$

where $\theta_T = G_T\overline{K}_{T+1}/Y_T$ is the ratio between the level of investment in firms successful at the time of transition and the level of income, and can be thought of as a measure of the level of informed capital at time T relative to the level of economy activity. Note that the growth rate reaches its maximum, $(1-\alpha)\psi$, for $G_T\overline{K}_{T+1} = D_T$, and its minimum, $\lambda(1-\alpha)\psi$, for $\theta_T = 0$.

A crucial question is whether this growth rate is greater or lower than that associated with financial repression provided that the condition $\lambda \geq R^{c*}/\alpha\psi$, necessary for all savings to flow toward industrial firms via intermediaries, holds. Comparison between g^*_{FR} and g_T yields:

Proposition 1. *i)* Given $\rho > 0$, for values of $\lambda : \lambda \in [\frac{R^c}{\alpha\psi}, \frac{\phi}{\psi})$, financial liberalisation leads to industrial production with ambiguous immediate growth effects. For values of the stock of information capital relative to the level of economic activity, θ_T, lower than a critical level θ^*, the growth rate g_T, is initially lower than the steady state growth rate under financial repression, g^*_{FR}, while the opposite is true for $\theta_T > \theta^*$. *ii)* For $\lambda > \phi/\psi$, financial liberalisation yields unambiguously positive immediate growth effects independently of the level of θ_T.

Proof of Proposition 1. The growth rate under financial autarky is $(1-\alpha)\phi-1$. Comparison with g_T yields:

$$g_T < (>) g^*_{FR} \Rightarrow \theta_T < (>) \frac{(1-\alpha)[\phi - \lambda\psi]}{\psi(1-\lambda)} \equiv \theta^*$$

Note that $\theta^* > 0$ holds for $\lambda < \phi/\psi$. Since $\theta_T = G_T \overline{K}_{T+1}/Y_T$ is always greater or equal to zero, it then follows that, according to the above inequality, the growth rate under financial intermediation might possibly be lower than under financial repression if and only if θ^* is positive which implies that the condition $\lambda < \phi/\psi$ has to hold (otherwise g_T is surely greater than g^*_{FR}, as stated in part *ii* of the proposition). As we already know, the minimum value of λ compatible with an equilibrium in which all savings are in form of deposits is equal to $R^c/\psi\alpha$. Since $R^c = \alpha\phi(1-\sigma^2\alpha^2\rho/2)$, it then follows that as long as $\rho > 0$, $R^c/\psi\alpha < \phi/\psi$ follows, so that there exist values of λ such that $\lambda \in [R^c/\alpha\psi, \phi/\psi]$. For these values of λ as a consequence of financial liberalisation all savings flow toward firm-production with immediate negative effects on growth.■

Proposition 2 suggests that an economy which experiences positive growth rates under financial repression, might possibly face an immediate recession as a consequence of financial liberalisation:

Proposition 2. *i)* Given $\rho > \widehat{\rho} \equiv \frac{[(1-\alpha)\phi^2-1]}{(1-\alpha)\alpha^2\sigma^2}$, there exist values of $\lambda : \lambda \in [\frac{R^c}{\alpha\psi}, \frac{1}{(1-\alpha)\psi})$, such that financial liberalisation leads to industrial production with an immediate recession effect on the economy, as long as $\theta_T < \theta^{**} \equiv [1-\lambda(1-\alpha)\psi]/\psi(1-\lambda)$. *ii)* For $\lambda > \frac{1}{(1-\alpha)\psi}$, financial liberalisation yields always non negative growth rates irrespectively of the value of ρ. *iii)* For values of $\rho < \widehat{\rho}$, financial development induced by financial liberalisation induces always non negative growth rates irrespectively of the value of ρ.

Proof of Proposition 2. Given the expression for the growth at time T we have:

$$g_T < 0 \Leftrightarrow \theta_T < \frac{[1-\lambda\psi(1-\alpha)]}{(1-\lambda)\psi} = \theta^{**}.$$

Note that $\theta^{**} > 0$ holds as long as $\lambda < 1/(1-\alpha)\psi$. Since θ_T cannot be negative, it then follows that financial intermediation can have recessional effects if and only if $\lambda < 1/(1-\alpha)\psi$. Otherwise, as stated in part ii of the proposition, financial liberalisation yields always non negative growth rates. As we know from previous discussion, in order for savings to flow toward unknown firms $\lambda > R^{c*}/\alpha\psi$ has to

hold. Finally $R^c/\alpha\psi < 1/(1-\alpha)\psi$ is satisfied provided that $\rho > \widehat{\rho} \equiv \frac{2[(1-\alpha)\phi-1]}{(1-\alpha)\alpha^2\sigma^2}$,[18] so that, for $\rho > \widehat{\rho}$, there surely exist values of $\lambda : \lambda \in [\frac{R^{c*}}{\psi\alpha}, \frac{1}{(1-\alpha)\psi})$. Otherwise financial development results always in non negative growth rates, see part iii of the proposition. For these values of λ all savings flow to firm-production, and this results in a negative growth rate.■

Discussion. Proposition 1 states that if the probability of success of new firms λ is lower than$\frac{\phi}{\psi}$, financing industrial production brings in a lower contribution to per capita growth compared to self-investment in cottage production whenever the level of information about valuable industrial investments relative to the level of economic activity, measured by θ_T, is lower than some critical value θ^*. Yet, as long as $\lambda \geq R^c/\alpha\psi$ holds, individuals find it convenient to save in the form of deposits which are then channelled toward industrial production by the financial intermediaries and hence to industrial production, rather than engage in self-financing cottage production. In words, for any value of λ such that $\lambda \in [\frac{R^c}{\alpha\psi}, \frac{\phi}{\psi})$, in the event that the level of informed capital is sufficiently low, there is a discrepancy between the allocative choices made by the individuals, and the allocation of savings that would guarantee the highest return to capital at the aggregate level as well as the highest growth rate for the economy. The possibility of that kind of inconsistency hinges on the circumstance that, under the hypothesis of risk aversion, individual allocative choices are triggered by the goal of maximising the certainty equivalent of the return to savings, while the growth rate is maximised if savings allocated toward the highest expected return investments. Recall that the certainty equivalent in case of self-funding of investment activity is $R^{c*} = \alpha\phi(1 - \rho\sigma^2\alpha^2/2)$, while the expression for the return on deposits is $R^d_T = \theta_T\alpha\psi(1-\lambda) + \lambda\alpha\psi$. Suppose θ_T is equal to 0, so that $R^d_T = \lambda\alpha\psi$ follows. In this case, the growth rate under financial intermediation would be $(1-\alpha)\psi\lambda - 1$, while the growth rate under financial autarky would be $(1-\alpha)\phi - 1$. It can be easily seen that, as long as agents are risk averse, $\lambda\alpha\psi > R^{c*}$ is compatible with $\phi > \lambda\psi$. That is, in the above example, deposits might guarantee a safe return higher than the certainty equivalent to the return of self financed investment even though the expected return as well as the total average productivity of investments funded by intermediaries (*social productivity of capital*), respectively equal to $\lambda\alpha\psi$ and $\lambda\psi$, are lower than those associated with self-financed investment in cottage firms. Correspondingly, the example shows a case in which agents saving

[18] Note that $\widehat{\rho}$ is positive since we assume that $(1-\alpha)\phi - 1$, which is also the expression for the steady state growth rate under financial repression, is positive.

choices adversely affect the growth rate of the economy. It is worth noting that the more agents are risk averse, the lower is the minimum level of return that intermediaries have to guarantee in order to attract deposits.[19] Since rates of return on deposits is a function of investments' productivity this also means that the higher is the degree of risk aversion the lower is the minimum level of productivity of investments that intermediaries should guarantee. Henceforth, the higher is the risk aversion, the higher is the possibility that even very inefficient and growth detrimental financial institutions are be able to attract deposits.

The literature on finance and growth often advocates risk management as one of the key features which justifies why financial intermediaries should guarantee that funds are channelled toward most productive uses. These results call attention to the reverse possibility. The provision of risk diversification here justifies why after financial liberalisation, financial institutions might start playing a central role in the allocation of financial resources even though, being not learned enough, they are inefficient to such an extent that they are actually detrimental to the growth process.

Interestingly enough the critical value of informed capital, θ^* varies negatively with the probability of success λ and positively with $\phi - \lambda\psi$. The higher is the probability of success λ the less the expected productivity of investment funded by intermediaries is affected by their ability to identify successful firms. In other words, the issue of information about which firms will be successful becomes less relevant as the probability that a newly financed firm will be successful increases. On the contrary, financial intermediaries expertise becomes a more crucial element the higher is the expected productivity difference, $\phi - \lambda\psi$, between investments in already successful cottage firms and those in newly financed industrial firms.[20]

The above discussion indicates why the level of expertise of intermediaries is the crucial determinant of their effects on growth. In the next section we analyse how, as financial institutions start playing a central allocative role, they accumulate information about valuable investment opportunity via a process of learning by lending through which they become more expert; and how this learning process affects the growth rate of the economy.

[19] This follows from the fact that the higher is the degree of risk aversion, measured by ρ, the lower is certain equivalent to the return to self-financing, R^{*c}, which constitutes the only alternative to deposits.

[20] This, provided that $\phi - \lambda\psi > 0$, otherwise financial liberalisation always has always positive growth effects, independently of the initial level of expertise of intermediaries.

4.2. Post-liberalisation phase: the effects of learning by lending

In the post transition phase the mass of funded projects is given by $Y_{T+1}(1-\alpha)/\overline{K}_{T+2}$, where $\overline{K}_{T+2}$ is the maximum size of physical capital embedded in a firm at time $T+2$. Period $T+2$ income is given by $Y_{T+2} = G_{T+2}\overline{K}_{T+2}\psi$, where G_{T+2} is the stock of successful firms at time $T+2$. Since $G_{T+2} = G_{T+1} + \lambda[(1-\alpha)Y_{T+1}/\overline{K}_{T+2} - G_{T+1}]$, we can write $Y_{T+2} = \psi\overline{K}_{T+2}[G_{T+1} + \lambda[(1-\alpha)Y_{T+1}/\overline{K}_{T+2} - G_{T+1}]$. Assuming that $G_T > 1$ so that $M_{T+1} = \max[M_T G_{T+1}, M_T] = M_T G_{T+1}$, it then follows directly from our assumptions that $\overline{K}_{T+2} = \overline{K}_{T+1}G_{T+1}$. Using this equality together with $Y_{T+1} = \psi\overline{K}_{T+1}G_{T+1}$, we can compute the growth rate at period $T+1$, as

$$g_{T+1} = \frac{Y_{T+2} - Y_{T+1}}{Y_{T+1}} = G_{T+1}(1-\lambda) + \lambda(1-\alpha)\psi - 1. \tag{4.1}$$

We note that this growth rate is an increasing function of the stock of good firms discovered at time $T+1$. This reflects that the more information is available in the market about good firms, the higher is the allocative efficiency achieved by the financial sector. The accumulation equation summarising the learning by lending process in the post-transition phase can be written as:

$$\begin{aligned} G_{T+n+1} = &\quad G_{T+n}(1-\lambda) + \lambda(1-\alpha)\psi \\ = &\quad [G_{T+1} - (1-\alpha)\psi](1-\lambda)^n + (1-\alpha)\psi. \end{aligned}$$

so that, correspondingly, we have:

$$g_{T+n} = [G_{T+1} - (1-\alpha)\psi](1-\lambda)^{n-1} + (1-\alpha)\psi - 1$$

In fact, it follows directly from the above expression that $dg_{T+n+1}/dn > 0$ and that $g_{T+\infty} = g^*(1-\alpha)\psi - 1$, which directly implies that financial liberalisation yields ultimate positive growth effects (recall that $\psi > \phi$).

Proposition 1 and 2 suggest that financial liberalisation might initially result in a "slowdown" of the growth process. However, the above analysis leads to the conclusion that, as long as $\psi > \phi$[21] the ultimate growth effects of financial liberalisation are positive. By playing a central role in the allocation of savings

[21] We recall that if this condition is not satisfied, funds will never flow toward industrial production.

financial institutions maturate expertise which ultimately enables them to promote a more efficient allocation of financial resources than the one feasible under financial repression.

An interesting question concerns the length of the slowdown phase which might possibly characterise the economy in the early stages after liberalisation. Similarly one could ask about the length of the recession phase which might possibly be triggered by financial liberalisation. Given the expressions for the growth rate of the economy before and after financial liberalisation we have:

Proposition 3. In the post-transition phase, the following is true: *i)* For any $\lambda : \lambda \in [\frac{R^c}{\alpha\psi}, \frac{\phi}{\psi})$, the growth rate under financial repression is higher (lower) than the growth rate n periods after financial liberalisation, g_{T+n}, for $n < (>) \max\{0, int[n^*]\}$, where $n^* = \frac{\log\{(1-\alpha)[\phi-\psi]/[G_{T+1}-(1-\alpha)\psi]\})}{\log(1-\lambda)} - 1$. *ii)* Provided that λ is lower than ϕ/ψ, the growth rate n periods after transition is positive for n: $n > \max\{0, int[n^{**}]\}$, with $n^{**} = \frac{\log\{\frac{1-(1-\alpha)\psi}{[G_{T+1}-(1-\alpha)\psi]}\}}{\log[(1-\lambda)}$ and negative otherwise.

Proof of Proposition 3. Comparison with financial autarky yields:

$$g_{T+n} < (>) g_{FA} \Rightarrow G_{T+n} < (>) \frac{(1-\alpha)[\phi - \lambda\psi]}{(1-\lambda)} \equiv \overline{G}.$$

Similarly to proposition 1 we note that: *i)* the g_{T+n} can be lower than g^*_{FR} if and only if $\lambda < \phi/\psi$ holds; *ii)* All savings are channelled to industrial production if and only if $\lambda > R^{c*}/\alpha\psi$. Then, as long as $R^c/\alpha\psi$ is lower than ϕ/ψ, which is always true provided agents are risk averse, there exist values of $\lambda \in [\frac{R^c}{\alpha\psi}, \frac{\phi}{\psi})$ such that under financial liberalisation, only industrial production is being funded while the economy suffers lower growth rates than under financial repression until G_{t+n} reaches the value $\overline{G}$. Then, we recall that, for $n \geq 1$, G_{T+n} can be expressed as:

$$G_{T+n} = [G_{T+1} - (1-\alpha)\psi][(1-\lambda)^{n-1} + (1-\alpha)\psi - 1.$$

Comparing this expression with $\overline{G}$ we have:

$$G_{T+n} < \overline{G} \Leftrightarrow (1-\lambda)^{n-1} < \frac{(1-\alpha)[\phi-\psi]}{[G_{T+1} - (1-\alpha)\psi]}$$

We note that the RHS of this inequality is positive if and only if the initial value G_{T+1} is lower than its steady state level $(1-\alpha)\psi$, which in turns is always true

provided the initial level of information G_T is lower than the same steady state value. Provided this condition is satisfied, it can be identified a value of n^* such that for $t > (<)T + \max\{0, int[n^*]\}$ full financial development yields positive growth effects compared to financial autarky, where

$$n^* = \frac{\log\{\frac{(1-\alpha)[\phi-\psi]}{[G_{T+1}-(1-\alpha)\psi]}\}}{\log(1-\lambda)} - 1$$

Note that there exist values of the relevant parameters such that $n^* > 1$ holds. This concludes part *i*. As for part *ii* we know that the economy experiences a recession as a consequence of financial liberalisation as long as $g_{T+n} < 1$. Given the expression for the growth rate at time $T + n$ we have:

$$g_{T+n+1} < 1 \Leftrightarrow [G_{T+1} - (1-\alpha)\psi][(1-\lambda)]^n + (1-\alpha)\psi < 1,$$

which implies that the growth rate is negative for $n < int[n^{**}]$, where n^{**} is defined as:

$$n < \frac{\log\{\frac{1-(1-\alpha)\psi}{[G_{T+1}-(1-\alpha)\psi]}\}}{\log[(1-\lambda)]} \equiv n^{**}.$$

It is easy to verify that for some combinations of the relevant parameters, $n^* > 1$ holds. Note that if $G_{T+1} = 0$, the expression reduces to $\log(1-\frac{1}{(1-\alpha)\psi})/\log(1-\lambda)$. This expression has a value greater than 1, so that a recession occurs at least at time $T + 1$, if and only if $\lambda < \frac{1}{(1-\alpha)\psi}$. A confirmation of this comes from the fact that if $G_{T+1} = 0$, the growth rate g_{T+1} is equal to $\lambda(1-\alpha)\psi$ which is negative if and only if the above condition is satisfied.■

Discussion. Proposition 1 and 2 suggest that, depending on the level of initial knowledge about good firms, full financial liberalisation might induce an immediate "slowdown" of the growth process or even a recession. Proposition 3 suggests that recessions and slowdowns are temporary phenomena, although they might persist for a long time. As intermediaries gain expertise this ameliorates their allocative efficiency so that eventually financial liberalisation results in higher growth compared to financial repression. Yet, the possibility of temporary adverse growth effects suggest that the generations closer to the transition period might suffer a welfare loss from a full liberalisation policy. For instance if at time T, the growth rate is lower than it would have been under financial repression,

with financial liberalisaiton individuals born at time $T+1$ will earn lower salaries. They would have been therefore surely better off if financial liberalisation did not take place at time T. On the other hand, "later" generations will surely gain from an early liberalisation. In our view this is suggestive of the possibility, which we leave for future research, of gradualist policies designed on the basis of the optimal trade off between potential welfare losses of the earlier generations compared to the welfare gains of future generations.

Under the hypothesis that both n^*, and n^{**} are greater than or equal to 1, the length of possible slowdowns and recessions depends on the parameters ϕ,ψ, and λ in an interesting way. For instance, the lower is the expected productivity difference between industrial and cottage firms, $\psi - \phi$, the higher would be the length of possible slowdowns triggered by financial liberalisation. Intuitively enough, as long as industrial production does not guarantee substantial productivity gains, the inefficiency induced by initially incompetent financial institutions becomes relatively more important. Not only that, the level of expertise that institutions should reach in order to guarantee a more productive allocation of savings than under financial repression becomes higher. In other words, in environments where the quality of investment opportunities feasible under financial liberalisation is generally low, financial institutions have to be comparatively more expert in order to be growth conducive, than in cases in which the quality of investment opportunities is high. A similar reasoning explains why as the probability of success of newly funded firms increases, the length of slowdowns with ϕ and decreases with ψ. Slow down phases tend to be more persistent the lower is the probability of success λ. A lower probability of success for newly funded firms implies two things: *i)* it worsen the overall productivity of investment funded by inexpert financial institutions; *ii)* it slows the learning by lending process. Correspondingly, uniformed financial intermediaries will be more inefficient the lower is λ and moreover it will take them longer to develop expertise. Similar results apply to the possibility of recessions which tend to be longer the lower are ψ and λ. Finally, the length of both recessions and slowdowns is reduced as the initial level of knowledge about valuable investment opportunities, G_{T+1}, increases.

5. Conclusion

It is a general view in the literature that financial liberalisation, by promoting financial development, could guarantee a better allocation of savings compared to financial repression, thereby inducing positive long run growth effects whenever

conditions for endogenous growth are satisfied. Yet, many historical examples of transition and developing economies show that while the existence of financial services is a precondition for economic development, in many instances, the financial institutions spontaneously generated by the market economy subsequently to financial liberalisation were not efficient enough to promote growth. We presented a theoretical model in which transformational recessions/slowdowns might occur as, after financial liberalisation, the economy moves toward the use of more productive technologies while developing the financial sector which guarantees the necessary mobilisation of savings due to the fact that financial institutions have a sufficiently scarce ability of identifying valuable investment opportunities. Therefore, the model offers a simple theoretical justification of why non growth inducing financial institutions might emerge at the early stages of the post-liberalisation phase. We also show how as the credit market starts playing an active role in the allocation of funds, financial intermediaries acquire expertise in the form of information about the quality of firms. This process of accumulation of information ameliorates the allocative efficiency guaranteed by the credit market with positive effects on the growth rate of the economy. Via this mechanism, financial liberalisation eventually yields positive effects on the level of income as well as on the growth rate of the economy, as the financial institutions gain the sufficient level of expertise. In our view these results are suggestive of further investigations on the possibility of gradualist liberalisation policies taylored on the optimal trade off between adverse welfare effects of liberalisation for early young generations and the correspondent welfare gains of later generations.

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