

Intermediation and Growth in Financially Open Economies*

Alessandra Dal Colle Stievano[†]

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Abstract

This article aims to offer a contribution to the debate on the pros and cons of higher financial openness with respect to growth. It analyses two closed economies instantaneously open to trade and financial movements. Openness to trade is without frictions and entails a built-in positive shock to capital productivity.

Internationalisation of banking may be allowed either under Commercial Presence (*CP*) mode - whereby banks of any origin can establish anywhere but at a higher set up costs - or under the Cross Border (*CB*) mode, whereby banks offering their services over the phone or other media, can only count on the domestic saving pool to finance their activity. The point of view in the paper is that of a benevolent risk-averse regulator who cares for her own costs in terms of recapitalisation of the financial system in case of crisis.

Results show that the financially open economy may show a higher growth than the financially autarkic one after a certain capital per capita threshold, depending on the asymmetric impact on fixed and variable costs in the different modes of operation, but the net regulatory burden, defined as the bail-out costs in case of a crisis, always increases. Also a low capital per capita former autarkic country wishing to integrate with a higher capital per capita country should choose the *CB* mode of operation to reap the benefit of a higher growth at earlier stage of development.

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[†]IntesaBci Research Division - email: alessandradalcolle@intesabci.it

1 Introduction

The aftermath of the Asian crisis of Autumn 1997 and the subsequent repeat episodes of high volatility in emerging markets have been characterised by a renewal in the public and academic debate on the pros and cons of financial openness. This is a particularly thorny issue for China where, in the words of Dornbusch - Giavazzi (1999), "[...] the opening of the capital account surely must not happen until the banking problem has been resolved. The worst possible situation is one where banks that have balance sheet problems already attempt resolve them by borrowing at low rates offshore to lend at high rates in the national market, oblivious of currency and credit risks. Asia's financial crisis is a monument to just this kind of problem".

Against this well supported opinion, and the repeated assessment by the Chinese authorities of their intention to strengthen the domestic financial system before allowing the full convertibility of the capital account, the financing needs to support development in China are extremely pressing¹. The November 11, 2001 agreement for the accession of China to the World Trade Organisation grants foreign banks almost free access to the corporate market immediately after WTO entry but allow them to engage in retail operations, i.e. underwriting deposit contracts in *renminbi* with private citizens, only gradually in selected areas at a time. Geographic restrictions², that will be totally removed only from January 1, 2005, could prove extremely binding for foreign banks that will have to keep on relying on bilateral agreements with Chinese banks for funding. The role of interbank bilateral agreements for the supply of liquidity, and of segregated access to deposits in the near future, as sole source of *renminbi* liquidity is also reinforced by the lack of an explicit provision for access to *renminbi* interbank market by foreign banks in the above mentioned protocol of accession.

While financiers, politicians and trade negotiators alike seem just to fret about the legal and regulatory outline, more attention should be devoted to the capital cost of alternative frameworks both for China and for the international financial system as a whole. No saver and no investor would in fact like to see her scarce funds being drained down by the structure costs of the banking industry although in a perfectly frictionless and safely regulated world.

Policy-oriented literature has outlined the risks in terms of capital flows from a weak financial system stemming from different degrees of financial liberalisation with Kono - Shuknecht (1998) warning against cross-border supply of financial services. On the other hand, Tamirisa et al. (2000) point out that "the liberalization of commercial presence (...) raises questions about strategic and cultural implications of foreign ownership in the financial sector, financial stability and cherry-picking". These works, however, although analytical, do not employ an economic growth framework leaving a gap in the analysis of the

¹Mr Chen Xing Dong, chief economist of Bnp Paribas Peregrine declared that in the next 10 years China will need US\$ 6500 bn (over euro 7200 bn) to finance its development. Source: Il Sole 24 Ore, November 20, 2001

²See paragraph 3 for further details.

potential gains rather than dangers of an integrated financial intermediation.

Detragiache (1999), although in a model that stresses the role of the deposit rather than the lending market, emphasises the features of different degrees of integration of these segments of the banking activity in an international setting. Her work retains a dynamic focus, but, again advantages are not formalised.

In the theoretical field the literature has been focusing on the relationship between financial development and economic growth since the early Nineties. This particular branch of financial macroeconomics took endogenous growth on board - with Bencivenga - Smith (1991) as the milestone for its financial implications - and the justification of financial intermediation based on economies of scale in overcoming asymmetric information in the credit market. One of the paths of the latter strand of research compares economies that are identical except for the structure of the banking system. Among them, Cetorelli (1997) concludes that although monopoly may decrease the equilibrium quantity of credit, it allows a better allocation because of better screening. In his work monopoly is imposed and offers an optimal answer to a game where the strategy involves the decision to costly screen/not to screen.

Rather than being imposed upon, in this paper, following Deidda (2000), the competition regime results from the mechanics of the model and in particular from the interplay between fixed costs and economies of specialisation. The power of these two opposing driving forces is scaled differently by the various ways in which financial openness is allowed.

The paper will instead to diverge from Deidda (2000) in the focus of the analysis. While Deidda's aim is to show endogenous dynamics of the transition from a self-finance economy to a financial one, here the next step, i.e. the challenge of banking globalisation, will be investigated³. This paper in fact aims to model the scenario analysis of a benevolent planner-regulator asking herself "is it more efficient to open the banking sector under a Cross-Border (*CB*) or a Commercial Presence (*CP*) mode of operation?", or "will the resulting competition regime matter more or less in different modes of operations?" or last, but definitely not least, "should something go horribly wrong how much will it cost be to keep financial intermediation afloat?".

The main result is that the way in which the banking sector is allowed to open internationally may grant the economy a higher growth path, after a certain capital per capita threshold. Financial autarky is preferable, i.e. it grants faster growth, for low level of capital per capita. Also, the open economy may also prove more burdensome in terms of minimum capital to keep the financial system afloat in case of a crisis. A benevolent regulator, interested in increasing growth for all citizen and in minimising future tax loads, should therefore weigh efficiency and capital intensity carefully before making a commitment to a financially open economy.

A secondary result is that the monopoly growth rate depends only on capital

³In other words it is assumed that financial intermediation is a good *per se* in so far it unequivocally enhances growth with respect to self-finance. The result that financial development has a positive relationship with real per capita GDP growth and total factor productivity growth has also gained some support from empirical studies such as Beck et al. (2000).

productivity and not on the specific mode of operation in the open economy. Local monopoly may also yield either an infinite number of steady states or none at all. In the former case local monopoly results the most efficient regime of competition, i.e. it yields the highest growth rate, for low level of k , such threshold becomes lower with financial openness. Therefore, monopolistic competition will be more probable in an open economy rather than in financial autarky if capital per capita is low.

Section 2 will briefly summarise the results of Deidda (2000) in *FA* and in section 3 different modes of financial liberalisation will be sketched out. Among them, Commercial Presence and Cross Border mode of operations will be embodied in a formal model in sections 4 and 5 respectively.

2 The economy with domestic financial intermediation (Financial Autarky)

2.1 Agents behaviour

2.1.1 Households

Starting from Deidda (2000) the domestic economy is composed by a continuum of size H (F for the Foreign country) of individuals, modelled as a standard 2-period OLG structure. Individuals inelastically supply labour during the first period of life and receive a salary w_t which is partly saved and partly consumed according to

$$\begin{aligned} U(c_{1t}, c_{2t}) &= \lg c_{1t} + \frac{1}{1+\rho} \lg c_{2t+1} \\ c_{1t} &= w_t - d_t \\ c_{2t+1} &= (1 + R_t^d) d_t \end{aligned}$$

where c_{1t} is the consumption of the presently young generation, d_t is young people's saving that is entirely deposited, c_{2t+1} is consumption of the same people when old at $t+1$, ρ is the discount rate and R_t^d is the return on deposits from t to $t+1$. Such assumption yields a constant saving rate environment⁴.

2.1.2 Firms

Since accumulation of physical capital requires one period, the old generation acts as the actual employer/producer according to the production function

$$Y_t = \psi A_t K_t^\beta l_t^{1-\beta} \text{ for country } H \text{ and } Y_t = \varphi A_t K_t^\beta l_t^{1-\beta} \text{ for country } F \text{ with } \varphi, \psi < 1 \text{ and } \frac{1}{3} < \beta < 1$$

where $A_t = k_t^{1-\beta}$ with $k_t = \frac{K_t}{l_t}$ is an externality effect associated with capital accumulation. φ, ψ are the exogenous productivity coefficients. It is assumed that $H > F$ and $\varphi > \psi$, i.e. that the more densely populated country has a lower level of endogenous productivity.

⁴ $d_t = (2 + \rho)^{-1} w_t = s w_t$ and $\frac{c_{2t+1}}{c_{1t}} = \frac{1 + R_t^d}{1 + \rho}$

The representative firm's demand for loans stems from the equilibrium equation for the yield on loans

$$b_t \Big|_{R_t^i = \frac{\partial Y_{t+1}}{\partial K_{t+1}}} = l_{t+1} k_{t+1} = \left(\frac{R_t^{l,i}}{\beta j A_{t+1}} \right)^{\frac{1}{\beta-1}} \quad (2.1)$$

for $i = F, H$ and $j = \begin{cases} \varphi & \text{if } i = F \\ \psi & \text{if } i = H \end{cases}$

Equilibrium condition in the labour market requires

$$w_t = (1 - \beta) j k_t^{1-\beta} K_t^\beta l_t^\beta = (1 - \beta) j k_t \quad (2.2)$$

2.1.3 Banks

Since firms have no capital endowment, they operate if and only if they are externally funded, implicitly assuming a sort of cash-in-advance constraint. Banks in turn fund themselves by issuing deposit contracts to households. The representative bank's balance sheet can be thought of as

$$D_t^i = \int_0^{z_t^i} b_t^i dz + \int_0^{z_t^i} c(z) b_t^i dz + E^i = \int_0^{z_t^i} [1 + c(z)] b_t^i dz + E^i \quad (2.3)$$

where D_t^i are deposits originated in country i , b_t^i is the amount of loans per firm, z_t^i is the bank's market size in the loan market and E^i is the fixed amount of physical resources consumed each period t .

The banking technology also involves the consumption of a fraction c , per unit of allocated loans. This fraction of cost is subject to economies of specialisation of the type

$$c(z) = 3\alpha z^2 + v - 1 \quad (2.4)$$

with

$$0 < {}^5 v < \beta s(1 - \beta)\psi < 1$$

$$c'(z) = 6\alpha z > 0$$

$$\lim_{z \rightarrow 0} c'(z) = 0$$

$$\lim_{z \rightarrow 0} c(z) = v - 1 > 0$$

The economies of specialisation have a quadratic form and are always positive. In other words it is assumed that even the minimal market share has positive variable costs. This is easily justifiable when one thinks about credit analysis and paperworks that must be carried out before actual lending and has a cost even if lending is not actually granted, i.e. $z_t = 0$.

⁵The last condition characterises endogenous growth since $\lim_{k \rightarrow \infty} \frac{k_{t+1}}{k_t} = \lim_{z_t \rightarrow 0} \frac{\text{constant}}{\int_0^{z_t} [3\alpha z^2 + v] dz} = \lim_{z \rightarrow 0} \frac{\text{constant}}{\alpha z^2 + v} = \frac{\text{constant}}{v}$

2.1.4 Summary of Hypotheses

Before proceeding, it is useful to summarise the above mentioned hypotheses and add those that will be useful for developing the model in the following sections of the paper. Please note that the *mode of operations* will be indicated as $MO = CBi$ (Cross Border mode of $i = F, H$ origin), CP (Commerical Presence), FAi (Financial Autarky of $i = F, H$ origin). Regimes of competition will be indicated as $r = m$ (local monopoly) and $r = mc$ (monopolistic competition).

$$i) \quad H > F, \frac{E^H}{H} > \frac{E^F}{F} \text{ with } F, H, E^F, E^H > 0 \text{ with } F > \left(\sqrt{\frac{(1-\beta)v}{\alpha(3\beta-1)}} \right)$$

It is assumed that the (relatively) more densely populated is the country, the (relatively) higher are per capita establishment costs. It is easy to exemplify this hypothesis by thinking of costs to rent premises that are likely to be higher, i.e. property is scarce in more densely populated countries. $\left(\frac{F}{E^F} > \frac{H}{E^H} \right)$ also implies that, given the same level of capital per capita k , the number of banks in Financial Autarky will be higher in F than in H .

$$ii) \quad E^H > E^F, \varphi > \psi \text{ but } \frac{\varphi}{E^F} > \frac{\psi}{E^H} \text{ with } 0 < \beta, \varphi, \psi < 1$$

The country with higher fixed cost, i.e. H ($E^H > E^F$), is less productive in absolute ($\varphi > \psi$) and in relative terms $\left(\frac{\varphi}{E^F} > \frac{\psi}{E^H} \right)$. Also $\frac{\varphi}{\psi} < \frac{(HE^F + FE^H)}{H(E^H - E^F)}$

$$iii) \quad R_t^{l,FAH} = \beta\psi < R_t^{l,FAF} = \beta\varphi < R_t^{l,CB} = R_t^{l,CP} = \beta(\varphi + \psi)$$

Please note that the main focus of the paper is the regulator role *beside* the market and not at all the planner's one *on behalf of* the market. Hence, the consequences of the externality generally embodied in this kind of endogenous growth framework, i.e. $\frac{\partial Y_t^{\text{market}}}{\partial K_t} < \frac{\partial Y_t^{\text{planner}}}{\partial K_t}$, will not be pursued and only the market's equilibrium as represented in the above definitions of R_t^l will be considered.

$$iv) \quad b_t^{CB} = b_t^{CP} \left| \frac{\partial Y_{t+1}^{CB}}{\partial K_{t+1}^{CB}} = 0 \right. \longrightarrow b_t^{CB} = b_t^{CP} = k_{t+1} l_{t+1} = \left[\frac{R_t^{l,CB}}{\beta A_{t+1}(\psi + \varphi)} \right]^{\frac{1}{\beta-1}}$$

$$v) \quad w_t = w_t \left| \frac{\partial Y_{t+1}^{CB}}{\partial l_{t+1}} = 0 \right. \longrightarrow w_t = (1 - \beta)(\psi + \varphi)k_t$$

iv) and v) are the factor remunerations stemming from the open-economy-a-single-country production function

$$vi) \quad k > k_{MIN}^{MO} = \left[s(1 - \beta)^2 \xi^{MO} \right]^{-1} > 1 \text{ where } \xi^{MO} = \frac{i^{MO} j^{MO}}{E^{MO}}$$

The existence of a positive minimum capital is ensured by the assumption of a benevolent-regulator with an additional lender-of-last-resort role. Also $k^\# > k_{MIN}$ by i).

2.1.5 Equilibrium with Financial Autarky

Now, starting from one of Deidda's results, it will be assumed that each country is initially endowed with sufficient capital to develop financial intermediation as defined in vi).

In both countries each representative bank maximises its own profit without taking notice of other banks' actions, given that it is assumed that the minimum number of banks is such that banks' market sizes clash is very large⁶.

The bank's problem in country i is:

$$\begin{aligned} \max_{R_t^{l,FAi}, z_t^{FAi}} \pi^{FAi} &= \int_0^{z_t^{FAi}} R_t^{l,FAi} b_t(R_t^{l,FAi}, z_t^{FAi}) dz - R_t^{d,FAi} D_t^{FAi} \\ \text{s.t. } z_t^{FAi} &\leq \frac{i}{n_t^{FAi}} 2.5 \end{aligned} \quad (1)$$

where $R_t^{u,i}$ with $u = l, d$ are returns on loans or deposits and n_t^{FAi} the total number of operating banks originating in country i .

Hence FOCs result in

$$R_t^{d,FAi,r} = \frac{R_t^{l,FAi} \beta}{\mu_t^{FAi,r}} \quad (2.6)$$

$$z_t^{FAi,r} = \begin{cases} \frac{i}{n_t^{FAi}} & \text{if } r = mc \\ \frac{\int_0^{z_t^{FAi,m}} (1+c(z)) dz}{[1+c(z^{FAi,m})] \beta} = \sqrt{\frac{(1-\beta)v}{\alpha(3\beta-1)}} & \text{if } r = m \end{cases} \quad (2.7)$$

where

$$\mu^{FAi,r} = \frac{\int_0^{z_t^{FAi,r}} (3\alpha z_t^2 + v) dz}{z^{FAi,r}} = \begin{cases} (\alpha z_t^2 + v) & \text{if } r = mc \\ \frac{2\beta v}{(3\beta-1)} & \text{if } r = m \end{cases} \quad (2.8)$$

is the variable costs per unit of market size⁷.

Please note that both $z^{FAi,m}$ and $\mu^{FAi,m}$ depend on the economy's deep parameter β or the cost structure (α, v) only and their size is therefore invariable to the level of capital per capita.

⁶This comes with using Deidda's (2000) framework. In more formal terms it means $\beta c'(z) < [c(z) - \bar{c}] \forall z \in (0^+, \infty)$

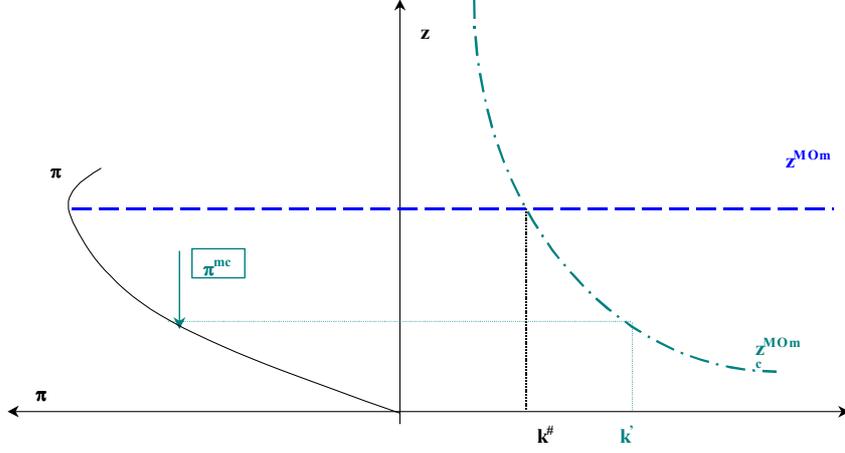
⁷It is easy to see that

$$\frac{\partial \mu}{\partial z} = \frac{3\alpha z_t^2 - \alpha z_t^2}{z^{MO,r}} \forall k > 0$$

since by definition of economies of specialisation $(1 + c(z_t^{MO,r})) > \mu_t^{MO,r}$

■

Chart 1: Representative Bank's optimal market size



As shown in chart 1, if $k > k^{FAi\#} = \left(\sqrt{\frac{(1-\beta)v}{\alpha(3\beta-1)}} \right)^{-1} \frac{E^i}{s(1-\beta)^2 j}$ the constraint will be binding and the resulting regime of competition will be monopolistic competition (mc) otherwise the regime of competition will be local monopoly (m). Hence market structure will be composed of a mode of operation - FA in this case - and a regime of competition, either m or mc , at a time. Differently from z^{FAim} and μ^{FAim} , $k^{FAi\#}$ is a function of $\frac{E^i}{j}$ which varies in the different modes of operations.

System-wise the accumulation equation becomes

$$S^i = id_t^i = n_t^{FAi} D_t^i \quad (2.9)$$

which generates a number of banks equal to

$$n^{FAi} = \xi^{FAi} s(1-\beta)^2 k_t \quad (2.10)$$

where $\xi^{FAi} = \begin{cases} \frac{\varphi^F}{E^F} & \text{if } MO = FAF \\ \frac{\psi^H}{E^H} & \text{if } MO = FAH \end{cases}$
irrespective of the competition regime.

Solving (2.9) and substituting (2.10) and (2.8) one obtains a growth rate of⁸

⁸Please note that in the state state consumption grows at the same rate since
 $C_t = c_{1t} + c_{2t} = (1-s)(1-\beta)jk_t + (1+s(1-\beta)g_t)sjk_{t-1}$
 $C_{t+1} = c_{1t+1} + c_{2t+1} = (1-s)(1-\beta)jk_{t+1} + (1+s(1-\beta)g_{t+1})sjk_t$
 $g_c = \frac{C_{t+1}}{C_t} = g_{k_t} \frac{(1-\beta)[(1-s+s^2)g_{k_{t+1}}] + s}{(1-\beta)[(1-s+s^2)g_{k_t}] + s} = g_{k^*}$ if $g_{k_{t+1}} = g_{k_t} = g_{k^*}$

$$\frac{k_{t+1}}{k_t} = g_{t+1}^{FAi,r} = \begin{cases} \frac{\beta s(1-\beta)j}{\alpha z_t^{FAi,r^2} + v} & \text{if } r = mc \\ \frac{\beta s(1-\beta)j(3\beta-1)}{2\beta v} & \text{if } r = m \end{cases} \quad (2.11)$$

$$\text{where } j = \begin{cases} \varphi & \text{if } MO_r = FAFr \\ \psi & \text{if } MO_r = FAHr \end{cases}$$

As shown in (2.11) while the growth rate under mc depends on the level of the capital per capita, that in m is constant and proportional to the exogenous capital productivity j .

Furthermore, the growth rate is always positive and can be bigger or smaller than one if

$$g_{t+1}^{MO,r} > 1 \begin{cases} k > \frac{E^i}{s(1-\beta)j[\beta s(1-\beta)j-v]} \sqrt{\frac{\alpha}{[\beta s(1-\beta)j-v]}} & \text{if } r = mc \\ j > \frac{2v}{s(1-\beta)(3\beta-1)} & \text{if } r = m \end{cases}$$

which is easily recognised as the condition for curvature of k_{t+1} .

Consequently, the steady state equilibrium is

$$k^{FAir^*} = \begin{cases} \frac{E^i}{s(1-\beta)^2 j} \sqrt{\frac{\alpha}{(\beta s(1-\beta)j-v)}} & \text{if } r = mc \\ \forall k \text{ if } s(1-\beta)j(3\beta-1), \neq \text{otherwise if } r = m \end{cases} \quad (2.12)$$

which is positive for (2.4) and ii). It is also unique since $\frac{\partial^2(k_{t+1}^{mc})}{\partial^2 k_t} > 0$ $\forall k > k_{MIN}^9$ for vi).

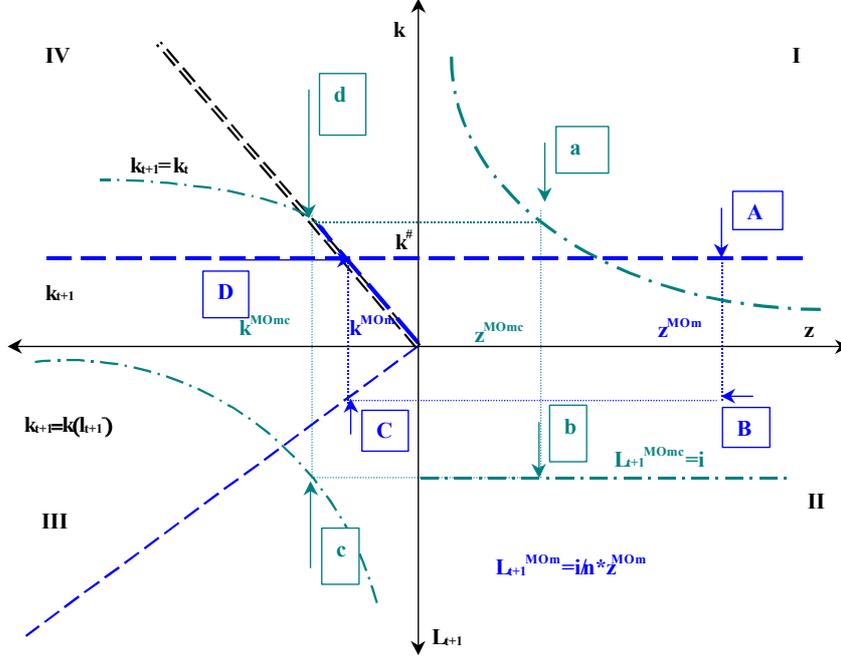
The overall mechanics of the model in FA mode, that will basically be replicated for CB and CP mode of operations, are illustrated in chart 2.

$$^9 \frac{\partial(k_{t+1}^{mc})}{\partial k_t} = \beta s(1-\beta)j \frac{\alpha z_t^2 \left(1 + \frac{2}{k_t}\right) + v}{(\alpha z_t^2 + v)^2} > 0.$$

Hence

$$\frac{\partial^2(k_{t+1}^{mc})}{\partial^2 k_t} = 2\beta s(1-\beta)j \left(-\frac{z_t}{k_t}\right) (\alpha z_t^2 + v) \alpha z_t \frac{-\alpha z_t^2 \left(1 + \frac{3}{k_t}\right) - v \left(1 - \frac{1}{k_t}\right)}{(\alpha z_t^2 + v)^4} > 0 \quad \forall k > 1$$

Chart 2: Financial Intermediation and growth



The top right hand quadrant (*I*) is the same as on the right-hand side of Chart 1 and shows how initial capital will determine the number of banks and hence market size via the bank's profit maximisation. Given that the profit function is first increasing and then decreasing in the market size z_t^{MO} , two possible cases emerge. If the size constraint is binding as in \boxed{a} the representative bank operates as a monopolistic competitor with a market size of $z_t^{MO,mc} = \frac{i}{n_t^{MO}}$. If, on the other hand, the constraint is not binding, the bank will choose the unbounded maximum and operate as a local pure monopolist with $z_t^{MO,m}$ at \boxed{A} , which is independent of k . In the bottom right quadrant (*II*) the choice of $z_t^{MO,r}$ translates via the inverse of the employment function - which is a constant equal to i for $r = mc$ and $l_{t+1}^{MO,m} = \frac{i}{z_t^{MO,m} n_t^{MO}}$ for $r = m$ - in the level of activity (\boxed{b} or \boxed{B}). Through the bottom left quadrant (*III*), via the accumulation function, $z_t^{MO,r}$ generates the level of investment per capita k_{t+1} (\boxed{c} or \boxed{C}). The top left quadrant (*VI*) shows the typical saving locus of OLG models and the steady state equilibrium in monopolistic competition \boxed{d} . Since the local monopoly saving locus is linear it can either show only one steady state at $k^* = 0$ or an infinite number if it stretches over the bisetrix $k_{t+1} = k_t$ locus (one of such points is \boxed{D}). Please note that because of hypotheses vi)

$k = 0$ cannot be considered an equilibrium for m . The saving locus will therefore coincide with the local monopoly one up to $k^\#$ - i.e. left of point \boxed{d} - and hence with the monopolistic competition one.

As anticipated in the Introduction the paper will be focusing on the concepts of *efficiency* and *net regulatory burden* (NBR). More specifically we propose to define a higher growth path as more efficient than a low one. More specifically, a competition regime within a mode of operation (for example MOm v. $MOmc$) will be considered as *internally more efficient* if it supports a *higher growth path* and, similarly, by defining a mode of operation within a competition regime (for example $MO'mc$ v. $MO''mc$) as *externally more efficient* if it supports a *higher growth path*.

As shown the main driver of efficiency in different modes of operations are z and j . A setting will be more efficient the lower is $\mu(z^{MO,r})$ and the higher are labour productivity and the saving coefficient. Also, because of the quadratic form of variable costs a higher growth path will necessarily result in a lower capital per capita steady state; such finding is not necessarily inconsistent with efficiency if a concept of non-wastefulness is implied. An equilibrium with a lower level of k will in fact support a lower number of banks, thereby freeing more capital for "productive" use. A high equilibrium level of k may in fact be linked to too high fixed costs or too steep economies of specialisation.

The trade-off between small market size and high fixed costs is underlined in the *NRB* as well. *NRB* is defined the product of the number of banks times E^{MO} . The higher the *NRB*, the higher the bill to foot by the benevolent regulator to keep the financial system afloat in case of failure. The *NRB* criterion in fact implicitly assumes a "risk-averse" regulator who cares for the bottom line when the worse comes to worst. This hypothesis would also fit the framework of a supernational authority - who has eventually to pay for the bail out of formerly autarkic financial systems once they open to the integration with the international market - and could prove promising for further development in bordering areas of research. Such theme does not lack supporting evidence when considering the recent debate over the IMF role in some Asian countries, Russia, Brazil, Turkey and Argentina that will undoubtedly weigh on China's policy of financial liberalisation.

Efficiency is also linked to $\mu^{MO,r}$ via the representative bank's maximisation problem where FOCs imply

$$R_t^{l,MO,r} = R_t^{d,MO,r} \frac{\int_0^{z_t^{MO,r}} (1 + c(z)) dz}{\beta z^{MO,r}} = \frac{R_t^{d,MO,r} \mu_t^{MO,r}}{\beta} \quad (2.13)$$

Banks are individually price-makers on $R_t^{l,MO,r}$ even if the yield on loans is determined system-wide by the productivity of capital. (2.13) says that in order to gain non negative profits in equilibrium the mark up of $R_t^{l,MO,r}$ over $R_t^{d,MO,r}$ must be higher the larger is $\mu^{MO,r}$ - hence the riskier are loans as measured by $z^{MO,r}$ and the deeper is the extent of the economies of specialisation $c(z^{MO,r})$ - and the lower is the private share of the return to capital β .

The link low costs \implies low mark-up \implies higher return on deposits \implies higher growth can also be shown as

$$R_t^{d,FAir} = R_t^{l,FAi,r} \frac{\beta}{\mu_t^{MO,r}} = s(1-\beta)g_{t+1}^{MO,r} \text{ where } g_{t+1}^{MO,r} = \frac{k_{t+1}}{k_t}, r = m, mc$$

For a given yield on loans, slow economies of specialisation translate into a lower μ that supports a higher deposit remuneration, finally yielding higher output and consumption growth.

Such mechanism in FA mode yields the following results:

Proposition 1 *In the FAi mode*

$g_t^{FAi,mc} > g_t^{FAi,m}$ for

$$k > k^{FAi\#} = \frac{E^i}{s(1-\beta)^2 j} \sqrt{\frac{\alpha(3\beta-1)}{v(1-\beta)}}$$

and

$$k^{FAi,m^*} < k^{FAi,mc^*} \quad \forall k : k_{MIN}^{FAi} < k < k^{FAi,mc^*}$$

if $\mu^{FAim} = \beta s(1-\beta)j = 1$ and

$\nexists k > k_{MIN}^{FAi} : k = k^{FAi,m^*}$ if $\mu^{FAim} \neq 1$

Proposition 2 *In the FAi mode*

$$g^{FAF,r} > g^{FAH,r} \quad \forall r, k$$

and

$$k^{FAF,mc^*} = \frac{E^F}{s(1-\beta)^2 \varphi} \sqrt{\frac{\alpha}{\beta s(1-\beta)\varphi - v}} < k^{FAH,mc^*} = \frac{E^H}{s(1-\beta)^2 \psi} \sqrt{\frac{\alpha}{\beta s(1-\beta)\psi - v}}$$

Proofs are immediate from (2.11) - (2.12) and from $z^{FAFmc} < z^{FAHmc} \quad \forall k$.

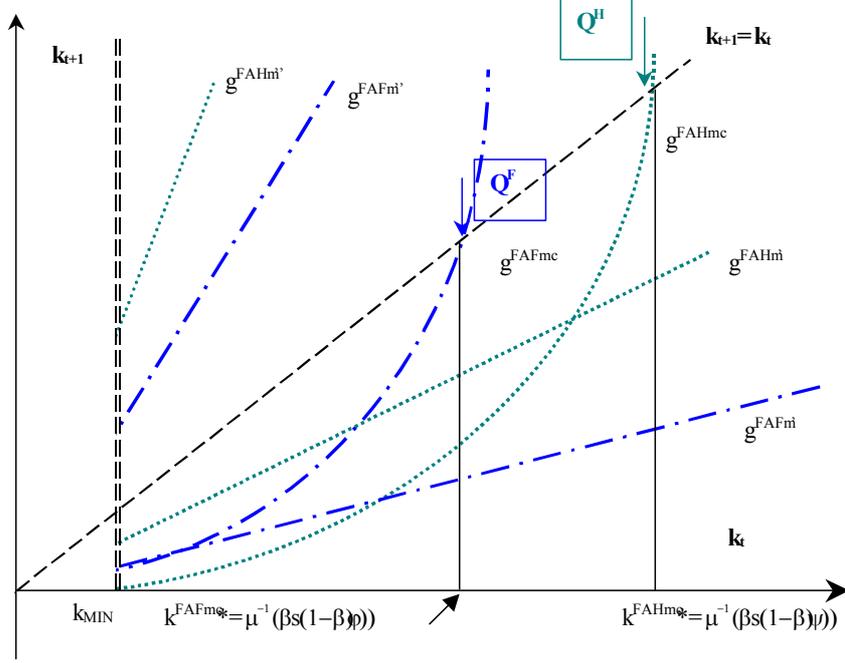
Proposition 3 $NRB^{FAi} = n^{FAi} E^i$ ordering will be

$$n^{FAH} E^H < n^{FAF} E^F \text{ if } H\psi \geq F\varphi \quad \forall k$$

Discussion. Proposition 1 and 2 characterise respectively internal and external efficiency in the FA mode. The former singles out local monopoly as the most internally efficient competition regime for low levels of k if $\mu^{FAim} = \beta s(1-\beta)j = 1$ while monopolistic competition is more efficient for high level of k . Also, since μ^{FAim} is independent of k , the model does not support any meaningful steady state when $\mu^{FAim} \neq 1$. Proposition 2 similarly identifies FAF as the most externally efficient mode of operation under monopolistic competition while FAF and FAH coincides under local monopoly.

A graphical illustration of propositions 1 and 2 is given in Chart 3.

Chart 3: Steady States and Efficiency in FA mode



Given that under monopolistic competition the saving locus is convex, only one steady state Q^i ($i = F, H$) is supported. In local monopoly the saving locus is linear therefore if $\mu^{FAim} > \beta s(1-\beta)j$, $k^* = 0$ no steady state is supported for $k > k_{MIN}$ as shown in $g^{FAim'}$ lines (dotted for H and dash-dotted for F). If $\mu^{FAim} = \beta s(1-\beta)j$ the steady state saving locus in local monopoly for both countries is the same as the quadrant I bisetrix (dashed line). All points left of Q^i belong to the straight part of the saving locus and are therefore meaningful steady states. Hence internal efficiency, i.e. the highest rate of growth, will be in favour of monopolistic competition for $k^* > k^{FAi,mc^*}$, and will be in favour of local monopoly for levels of capital per capita left of Q^i . External efficiency is always in favour of F in monopolistic competition and coincident under monopolistic competition if $\mu^{FAFm} = \mu^{FAHm}$.

Finally, Proposition 3 highlights both that the more externally efficient country (F) may not be the less capital intensive one.

Even from this oversimplified model, the benevolent regulator might find some food for thought in terms of policy implications. First of all, if local monopoly exhibits an infinite number of steady states monopolistic competition should be promoted for low- k countries. Secondly, this setting is characterised by overcapacity and the only way in which the regulator could correct over-underfinanciarisation would therefore involve acting on the cost structure of the economies of specialisation, hence on z . The analysis of such policy runs however

outside the definition of regulation adopted in this paper and is therefore left to further research.

3 Modes of Financial services' liberalisation

Before attempting to set up models of growth that differ by restrictions to financial openness it is worthwhile looking into details at the definitions of various modes of operations. More precisely, modes of operations that actually imply an increase in banking competition are to be singled out from the generic term "financial liberalisation"

Table 1: Modes of financial liberalisation

Source of Capital↓	Loan provided by		
	Domestic Supplier	Foreign supplier abroad	Foreign supplier established in the country
Domestic Capital	(I) Financial Autarky	(II) Financial Services trade only	(III) Financial Services trade + Foreign Direct Investments to "set up shop"
Foreign Capital	(IV) Capital flows only	(V) Financial Services trade + Capital flows	(VI) Financial Services trade + Foreign Direct Investments + Capital flows

Adapted from Kono - Shuknecht (1998)

Table 1 summarises the various modes of financial liberalisation and underlines how trade in financial services happens when lending is allowed through a foreign supplier either established in the country or not, quite independently from the source of capital (cells II, III, V and VI). Hence capital flows are an indication of financial liberalisation in the sense of directly increasing competition in the banking sector only when the supplier of the loan is foreign.

In what follows cases (II) and (V) from table 1 will be considered as "Cross Border" (*CB*) mode and a mix of cases (III) and (VI) for "Commercial Presence" (*CP*) mode. In the *CB* mode foreign entrant banks basically channel domestic deposits to finance foreign loans without sustaining further costs to set up a "foreign" branch network. In this mode of operation a firm can arrange a loan with a foreign bank abroad via telephone or some other way of communication. This is usually the case when the domestic retail market receives protection as a "strategic infant industry". In the *CP* mode of operation a foreign entrant

bank needs to acquire a domestic subsidiary or to establish a branch incurring in higher fixed costs, but it gains access to foreign funding through retail activities. In this mode of operation a firm can arrange a loan with a foreign bank locally. The case of China can be identified with the *CB* mode since gathering deposits is still off-limits for foreign establishments even after WTO entry¹⁰ even if higher set up cost for foreign entrant banks have been enforced as well from February 1, 2002¹¹.

The main reason why a mixture of cells of the above table, rather than a single one, is needed to exemplify the types that will be encompassed by the formal models of sections 4 and 5 is that, as will be clearer in what follows, presence of capital movements as transfers of money between different jurisdictions, or lack thereof, will be cleared out by the assumption of open-economy-as-a-single-country, as embodied in hypotheses iii)-v). This strong assumption - resulting in absence of transaction costs in international trade leading to a new unique production function - has been introduced in order to maintain the focus of the analysis on different options for international banking rather than on the real side. Finally, a model for cell (IV) will not be provided since access to the international interbank market is not contemplated by the model.

The opening of the real side of the economy will be modelled as if the open economy were a single country with a population of $(H + F)$. The production function and the demand for investments by the representative firm are the sum of those of the two single countries. This means that contemporary real and financial openness implies a positive productivity shock. The latter amounts to an increase in the demand for loans and provides a symmetric stimulus, in direction rather than in amount given that $\varphi > \psi$, for financial systems of both countries to be willing to participate in the openness of this sector.

The adjustment process from *FA* to open-economy-as-a-single-country could be thought of as following these steps:

1. both the "autarkic" economies H and F have the minimum capital to sustain a financially open economy since

¹⁰According to the "US-China WTO Market Access Agreement - Section II: Services Commitments" as last updated on 14 April 2000 and available from <http://www.uschina.org/public/wto/market/204-226.pdf>:

"For local currency business, the geographic restriction [for foreign banks] will be phased out as follows:

Year	Area subject to liberalisation
Upon accession	Shanghai, Shenzhen, Tianjin, Dailan
Starting no later than 1/1/2001	Guangzhou, Qingdao, Nanjing, Wuhan
Starting no later than 1/1/2002	Jinan, Fuzhou, Chengdu, Chongquin
Starting no later than 1/1/2003	Beijing, Kunming, Zhuhai, Xiamen
Starting no later than 1/1/2004	Shantou, Ningpo, Shenyang, Xian
Starting no later than 1/1/2005	No geographic restriction

¹¹Solely foreign-funded banks must maintain a minimum registered capital of RMB 1 bn (euro 156 mn). Furthermore, each operating branch will have to maintain an amount of capital in excess of the international 8% risk-weighted standard depending on the type of activity it is willing to pursue. Such excess balances go from RMB 100 mn (euro 15.6 mn) for institutions lending foreign exchange to authorised Chinese firms to RMB 600 mn (euro 94 mn) for those willing to engage in *renminbi* lending with any counterparty.

$$k_{MIN}^{FAF} + k_{MIN}^{FAH} = \frac{E^H F \varphi + E^F H \psi}{HF s(1-\beta)^2 \varphi \psi} > k_{MIN}^{CB} = \frac{FE^H + HE^F}{HF s(1-\beta)^2 (\varphi + \psi)} > k_{MIN}^{CP} = \frac{E^H + E^F}{(H+F)s(1-\beta)^2 (\varphi + \psi)}$$

2. the real economy opens and both the "autarkic" economies H and F receive a positive external shock in capital productivity and both H - and F -national banks have an incentive to enter the open financial market given by iii). No region, i.e. former autarkic state F and H , of the open economy sees its capital drained out since the opening of the real sector has transformed the production function of the representative firm. However, should a monopoly competition regime prevail in financial services, some firms all over the open-economy territory will have to close down;
3. demand for investment increases because of such shock (hypothesis iv)) and so does labour productivity (hypothesis v));
4. on the supply side the maximum market share z^{MO} changes for $MO = CB, CP$ but the structure on variable costs remains the same. In other words the possibility that financial openness changes the structure of variable costs - for example by making risk assessment procedures more costly - is assumed away. Also, the financial opening of the economy will affect both the threshold capital per capita over which mc will be prevailing and k^{MOmc^*} , both being function of $\frac{E^{MO}}{j^{MO}}$;
5. access by banks to a larger pool of savings is (CP mode) or it is not (CB mode) allowed. This is decided by the regulators and optimising bankers take it as given. The possibility that one country opens in the CB mode and the other one in the CP mode is ruled out assuming the principle of reciprocity, as it is often the case with international trade agreements. Moreover, the perfect integration in goods market also support a high degree of coordination between the two countries;
6. banks face a new optimisation problem and work out their market size in the new setting, taking other banks' decision as given. In the CP mode analysed in section 4, each bank will have to pay $(E^H + E^F)$ on *every* branch irrespective of its origin. In the CB mode each bank cannot open branches in the other formerly autarkic region and "remembers" its national origin of the bank in the form of fixed costs, as shown in section 5.

4 Financial openness under Commercial Presence or "Set up shop" abroad

In the Commercial Presence (CP) mode both the loan and the deposit markets are perfectly integrated. Provided that banks of whatever origin are willing to

pay $(E^H + E^F)$ to participate in the CP market, they can borrow from and lend to whomever in the open-economy-as-a-single-country environment. The main reason behind higher start up costs could be a higher minimum capital requirements but also upgrade expenditure, possibly in systems and procedures for new loans and retail activity under a foreign jurisdiction, is necessary on both formerly autarkic sides. Consequently, the maximisation problem for a representative bank is:

$$\max_{R_t^{l,CP}, z_t^{CP}} \pi = \left\{ \int_0^{z_t^{CP}} \left[R_t^{l,CP} - R_t^{d,CP} (3\alpha z_t^{CP^2} + v) dz \right] \right\} * b_t^{CP} - R_t^{d,CP} (E^H + E^F) \quad (4.1)$$

s.t.

$$z_t^{CP} = \frac{H + F}{n_t^{CP}} \quad (4.2)$$

and equation (2.11), (2.12) and (2.10) are transformed into

$$g_{t+1}^{CP,r} = \frac{\beta s (1 - \beta) (\varphi + \psi)}{\alpha z_t^{CP,r^2} + v} = \begin{cases} \frac{\beta s (1 - \beta) (\varphi + \psi)}{\alpha z_t^{CP,r^2} + v} & \text{if } r = mc \\ \frac{\beta s (1 - \beta) (\varphi + \psi) (3\beta - 1)}{2\beta v} & \text{if } r = m \end{cases} \quad (4.3)$$

$$k^{CP,r*} = \frac{E^H + E^F}{s(1 - \beta)^2 (\varphi + \psi)} \sqrt{\frac{\alpha}{(\beta s (1 - \beta) (\varphi + \psi) - v)}} \quad (4.4)$$

and

$$n^{CP} = \xi^{CP} s (1 - \beta)^2 k_t \quad (4.5)$$

The internal efficiency results are perfectly analogous to those of Proposition 1 where $i^{CP} = (H + F)$, $j^{CP} = (\varphi + \psi)$, $E^{CP} = (E^H + E^F)$ and $k^{CP,r*}$ substitute the correspondent FA values hence will not be repeated. The only point worth making is that in CP the internal efficiency threshold identified by (4.4) might be lower than that defined by (2.12) if $\frac{E^H + E^F}{(\varphi + \psi)} < \frac{E^i}{j}$. Hence, should $\mu^{CP,r} = 1$ in the CP -open economy, local monopoly is more internally efficient than monopolistic competition up to a lower level of k than FAi .

Proposition 4 *In the CP mode*

$$g^{CP,mc} > g^{FAH,mc} \quad \forall k$$

$$g^{CP,mc} > g^{FAF,mc} \quad \text{if}$$

$$k > k^{\S} = \frac{\sqrt{\psi v \alpha [\varphi^3 (E^H + E^F)^2 - (\varphi + \psi)^3 E^F]^2}}{s(1 - \beta)^2 \varphi \psi v (\varphi + \psi)}$$

$$g^{CP,m} > g^{FAi,m} \quad \forall k, i$$

Proposition 5 *NRB^{MO} ordering will be*
 $NRB^{CP} = n_t^{CP} (E^H + E^F) > \sum_i NRB^{FAi} = \sum n_t^{FAi} E^i \forall k, i$

Proofs are immediate from the definitions and $z^{FAFmc} < z^{CP} < z^{FAHmc}$
 $\forall k$.

Discussion. Benchmarking with *FAi* modes of operations underlines that *CP* is always more externally efficient than *FAH* while when compared with *FAF* external efficiency is granted only for high level of capital per capita. Also, NRB^{CP} is larger than in the *FA* world, signalling a higher burden in the open economy.

In the end an impartial regulator with jurisdiction over *FAF* and *FAH* in autarky might find scarce support for financial openness through *CP*, given that gains for *F*'s citizens depends on k . Some support in term of lower risk may come if the structure of economies of specialisation is such that *NRB* is lower than in *FA*.

5 Financial openness under Cross-Border Trade in Financial Services

In the Cross Border (*CB*) mode of operation, banks face the larger open-economy demand for loans but, given that they cannot access retail deposit taking activity in the other region of the open economy, they are constrained within the pool of savings of the *FA* mode. This framework, however, allows some savings with respect to the *CP* mode. In fact, banks have a lower set-up cost here than in the *CP* mode, since there is no need to set up "abroad". The seclusion of saving pools also implies that two optimisation problems, rather than one as in the formalisation of the *CP* mode, will have to be solved simultaneously in the *CB* mode and their solutions must also satisfy aggregate equilibrium conditions. This difference will have major critical implications for the results.

The maximisation problem for a representative i -origin bank in the *CB* framework hence becomes:

$$\max_{R_t^{l,CB}, z_t^{CB}} \pi^{CB,i} = \left\{ \int_0^{z_t^{CBi}} \left[R_t^{l,CB} - R_t^{d,CB} (3\alpha z_t^{CB^2} + v) dz \right] \right\} b_t^{CBi} - R_t^{d,CB} E^i \quad (5.1)$$

s.t.

$$z_t^{CB} \leq \frac{H + F}{(1 + \vartheta)n^{CBF}} \quad (5.2)$$

(5.2) stems from deposit market seclusion yielding two no-entry conditions of the type

$$\left\{ R_t^{l,CB} z_t^{CB} - R_t^{d,CB} \int_0^{z_t^{CB}} (1+c(z)) dz \right\} b_t^{CBi} = R_t^{d,CB} E^i \text{ for } i = F, H$$

$$\text{where } b_t^{CBi} = \frac{i(1-\beta)(\psi+\varphi)k_t - n^{CBi} E^i}{n^{CBi} \int_0^{z_t^{CB}} (1+c(z)) dz}$$

originating a condition similar to (2.10) as

$$n^{CBi} = \xi^{CBi} s(1-\beta)^2 k_t \quad (5.3)$$

$$\text{where } \xi^{CBi} = \frac{i(\varphi+\psi)}{E^i} \text{ and } n^{CBH} = \frac{\xi^{CBH}}{\xi^{CBF}} n^{CBF} = \vartheta n^{CBF}$$

The condition equivalent to (2.5) is the system-wise one that is the sum of the two no-entry ones¹² and it yields

$$k_{t+1} = \frac{(H+F)s(1-\beta)(\psi+\varphi)k_t - \sum_i n^{CBi} E^i}{l_{t+1} \sum_i n^{CBi} \int_0^{z_t^{CB}} (1+c(z)) dz} = \frac{(H+F)}{(1+\vartheta)n^{CBF}} \frac{\beta s(1-\beta)(\psi+\varphi)k_t}{l_{t+1} \int_0^{z_t^{CB}} (1+c(z)) dz}$$

Consequently, equations (2.6), and (2.8) are transformed into

$$g^{CB,r} = \frac{\beta s(1-\beta)(\varphi+\psi)}{\alpha z_t^{CB^2} + v} \quad (5.4)$$

$$k^{CB,r*} = \frac{(H+F)E^F}{(1+\vartheta)Fs(1-\beta)^2(\varphi+\psi)} \sqrt{\frac{\alpha}{(\beta s(1-\beta)(\varphi+\psi) - v)}} \quad (5.5)$$

The solution of the optimisation problems in this mode of operation will yield internal efficiency results that are perfectly analogous to those of the other modes of operations. The only point worth making is that in *CB* the internal efficiency threshold identified by (5.5) is the lowest. Hence, should $\mu^{CB,r} = 1$ in the *CB*-open economy, local monopoly is more internally efficient than monopolistic competition up to the lowest level of k than both *FAi* and *CP*.

Proposition 6 *In the CB mode*

$$g^{CB,mc} > g^{FAF,mc} \text{ for } k > k^{\S\S} = \frac{E^F \sqrt{\alpha\psi v[(H+F)^2\varphi^3 - (\varphi+\psi)^3(1+\vartheta)^2]}}{(1+\vartheta)Fs(1-\beta)^2(\varphi+\psi)\varphi\psi v}$$

$$g^{CB,mc} > g^{CP,mc} > g^{FAH,mc}$$

and

$$g^{CB,m} = g^{CP,m}$$

Proposition 7 *In the CB mode*

$$\sum_i NRB^{FAi} E^i < NRB^{CP} = n^{CP} (E^H + E^F) = \sum_i n^{CBi} E^i = NRB^{CB}$$

$$\overset{12}{\frac{1-\beta}{\beta} \int_0^{z_t^{CB}} (1+c(z)) dz} \sum_i b_t^{CBi} = \sum_i E^i$$

$$\frac{1-\beta}{\beta} \int_0^{z_t^{CB}} (1+c(z)) dz \frac{1}{\int_0^{z_t^{CB}} (1+c(z)) dz} \sum_i \frac{\beta i s(1-\beta)(\varphi+\psi)k_t}{n^{CBi}} = \sum_i E^i$$

$$\sum_i E^i = \sum_i E^i$$

Proofs are immediate from definitions and $z^{CBmc} < z^{FAFmc} < z^{CPmc} < z^{FAHmc} \forall k$

Discussion. The results of the *CB* regime all stem from the overcrowding of the banking sector. The latter is caused by the fact that *CB* banks can enjoy as high a capital productivity as the *CP* banks, even though this positive effect is a little trimmed down by the fact that aggregate saving is not perfectly pooled in the *CB* mode, but fixed costs are as low as the *FAi* banks. First of all, in Proposition 6 *CB* is always more efficient than *FAH* or *CB* but still for some parametrisations *FAF* might turn out more efficient for low level of capital under monopolistic competition.

Please note that if $F < E^F$ then $k^{\$} < k^{\$}$ hence higher growth in the *CB* mode v. *FAF* starts at a lower capital per capita threshold than in the *CP* mode

Secondly, in Proposition 7 NRB^{CB} is at its highest. Also, it is easy to show that the increase in resource usage for each formerly autarkic country in each *FAi* mode to join in a *CB* mode can also be seen as a cost to upgrade the *FAi* number of banks where \bar{j} is the per branch cost of such operation, that is due to the increase in productivity.

Hence, in an economic policy framework a "benevolent" regulator who is interested in minimising the capital usage by the financial sector would still face the same dilemma as in the *CP* mode with a heavier *NRB* on top, that might call for higher future commitments for refinancing.

6 Conclusions

The model confirms that when the lending technology is characterised by non-linearities the opening of the financial sector to an environment of foreign competition might economise on the capital per capita necessary to sustain the steady state but might raise the bail-out costs in case of crisis.

Results are ambiguous because two opposing forces operate at the opening of the economy. An increase in the loan market dimension may raise market sizes hence reducing the exploitation of economies of specialisation and increasing costs. On the other hand, the increase in the productivity of capital potentially raises the number of banks, since account must be taken of the increase in fixed costs, and therefore reduces market sizes. Hence there is not a single mode of operation that is optimal both under efficiency as well as low capital intensity of the banking sector criteria, and, consequentially no straight forward answer in terms of policy. The country that hosts the less efficient financial intermediation *H* always gains from financial openness quite independently from *CB* or *CP* mode. For *F* a higher growth rate is granted only after a certain *k* threshold. Policy-wise this can be considered a (weak) rationale to prefer financial autarky to financial openness for countries with a very low capital per capita.

CB mode, with the same perfectly integrated loan market as faced by *CP* banks and no additional establishment capital costs, might seem the best of all

possible worlds but the potential excessive tax load to fund a recapitalisation after a crisis might make it difficult for a regulator to gather support for such solution.

The framework of this paper is undoubtedly simplified for such complex problem as financial openness, it however helps in highlighting the growth v. capital-intensity trade-off that policy-makers are likely to face. It also emphasises that small market size + monopolistic competition + no additional fixed costs might not turn out to be the good recipe it sounds, as "too much, too good" *CB* scenario analysis underlines. However, a relatively low capital per capita country such as China seeking integration with a higher capital per capita "rest of the world" should opt for the *CB* mode to reap the benefits of a higher growth at an earlier stage.

Further developments would be welcome in many directions, theoretical as well as empirical. With special reference to China, account should be taken of risk especially in the "stock effect", i.e. in the quality of banks' balance sheet at the time of opening¹³ when new entrants and incoming bank would probably be subject to a common internationally defined prudential regulation as in Key - Scott (1991).

¹³According to The People's Daily english internet edition the four asset management companies set up by the Chinese government in 1999 to deal with the non performing assets of the four big state-owned commercial banks and the State Development bank bought about US\$ 168 bn (euro 187 bn) in non-performing assets. About US\$ 11 bn (euro 12 bn) has been disposed of and about US\$ 4.5 (euro 5 bn) has been recovered.

Source: http://english.peopledaily.com.cn/200111/02/print200111/02_83727.html

According to the same source, the People's Bank of China stated that non-performing loans at the four big state-owned commercial banks in September 2001 totalled about US\$ 220 bn (euro 245 bn) and were over 26% of total existing loans.

Source: http://english.peopledaily.com.cn/200111/02/print200111/02_83701.html

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