BANKS, GROWTH AND GEOGRAPHY

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This paper presents a general equilibrium endogenous growth model, in which financial intermediaries evaluate the quality of projects, mobilize savings to finance the most promising ones and diversify risk. Information technology available to banks is linked to geographic proximity. This valuation capacity increases the proportion of high-return projects being financed, and thereby accelerates economic growth. This positive effect does not depend on the degree of individuals' risk aversion.

INTRODUCTION

The importance of financial markets in fostering economic growth has long been stressed by economists. Early contributions by Goldsmith (1969), McKinnon (1973) and Shaw (1973) mentioned the empirical correlation between financial and economic development. They argued that financial intermediation promoted growth through greater accumulation of capital, improved mobilization of savings and enhanced efficiency in resource allocation. Theoretically, however, links between financial intermediation and growth were difficult to formalize. In traditional growth theory, financial development could only have an influence on the level of economic activity, but not on its long-run growth rate.

The development of endogenous growth models, which show that growth rates can be related to institutional arrangements, has made it possible to formalize the presentation of the interactions between financial markets and economic growth. In these models, financial intermediation fosters economic growth basically in two ways. First, by providing an opportunity to hold a diversified portfolio, a financial intermediary enables risk-averse individuals to invest in riskier but more productive assets or technologies (see, for instance, Bencivenga and Smith, 1991; Levine, 1991; Saint-Paul, 1992). Second, by gathering information, a financial intermediary is able to improve the quality of projects being financed (Greenwood and Jovanovic, 1990; King and Levine, 1993b). In this last group of models, the information technology available to financial intermediaries is assumed to be given.

It has been claimed that banks are able to gather this additional information at a lower cost than other financial intermediaries, through the process of taking deposits and through close contacts with customers (Fama, 1985). Frequent contacts with potential borrowers provide banks with a better knowledge of their clients and help them to evaluate less tangible but nevertheless important "assets", such as managerial skills or dynamism.

This view that a link could exist between proximity and more efficient lending has been pointed out by historians. Cameron (1967) in his study on banking in the early stages of industrialization stressed that proximity enabled banks to better identify the potentialities of local communities. In order to use personal contact and detailed knowledge of local conditions, he mentioned for instance that the successful Scottish bankers of the 18th and 19th centuries used to hire businessmen of the communities in which they located branches. He suggested furthermore that the slow progress of industrialization in France during the 19th century could be linked to the underdevelopment of its banking system, characterized, among other things, by one of the lowest banking densities of any developed country.

The existence of such a link is also confirmed by more recent empirical studies. Jayaratne and Strahan (1996), for instance, studied the growth effects of the relaxation of bank branch restrictions in the United States. They show that improvements in the quality of bank-lending, not increased volume of bank-lending, has been responsible for the faster growth experienced after deregulation.

Based on these empirical observations, this paper presents a model explicitly linking the information technology available to banks to geographic proximity and thereby introduces the notion of geography into the interaction of financial intermediation and growth. The paper will proceed as follows. A model without financial intermediaries will be discussed first in chapter I. Chapter II will introduce financial intermediation in the form of banks, modelled as institutions providing both portfolio diversification and asset valuation, and discuss its effects on growth. Finally, chapter III will provide some insights into the influence of financial intermediation on economic growth when taking geography into account. Following Cameron (1967), McKinnon (1973) and Shaw (1973), the stage of development of the financial sector will be assumed to be exogenous[1].

I. MODEL WITHOUT FINANCIAL INTERMEDIATION

A. The environment

The economy is described by a simple overlapping generations model. As its name suggests, the structure of this model allows at any one time individuals of different generations to coexist and trade with one another. The aggregate implications of life-cycle savings by individuals can therefore be easily and explicitly studied. Another feature that makes this model attractive is that it is entirely built from microeconomic fundamentals. The preferences of individuals, the resources they have and the technology they can use are all explicitly taken into account, allowing one to derive endogenously important variables such as the rate of savings or capital accumulation.

These authors argued that differences in the development of financial markets across countries depended primarily on government regulation.

As with all recent models dealing with growth, the overlapping generations model is set in a general equilibrium framework. Individuals own the inputs of the economy and choose the fractions of their income to consume and save. Firms hire inputs and use them to produce goods that they then sell to individuals. Finally, markets exist on which firms exchange their goods and individuals sell their inputs. The quantities demanded and supplied determine the relative price of inputs and produced goods. As such models tend to become quickly complicated, simplifications are necessary. In order to focus here on financial intermediation and on its contribution to real growth, a real economy will be considered. There will be, therefore, no money and all exchanges will be barter ones.

Within this general structure, the model used here has the following characteristics. Each generation lives two periods and is composed of risk-averse individuals. The number of individuals born at any time is constant and is normalized to one. An individual h born at time t consumes $c_t^h(t)$ during period t and $c_t^h(t+1)$ in period $t+1$ and has a utility function of the form:

(1) $$U(c_t^{\ h}) = \sum_{i=1}^{2} \ln c_t^h(i)$$

Individuals work only when young, supplying inelastically one unit of labour and earning a real wage of $w_t^h(t)$. When they are old, they become entrepreneurs. Therefore they consume only part of their first-period income and save the rest to finance their second-period business and consumption.

There is only one good that can be either consumed or invested, and which is produced by the older generation by combining the capital stock it has saved with labour supplied by the young. In order to start production, however, entrepreneurs need to finance a project. Entrepreneurs have to choose from a pool composed of two types of projects. A proportion π are high-return projects and yield a positive return F. The remaining $(1-\pi)$ provide zero returns. Of course, all individuals would prefer a high-return project, but unfortunately they cannot distinguish them *ex ante*. The production process is therefore stochastic, and may be described by the following production function for each firm:

(2) $$\widetilde{F}(\underline{k}_{t-1}, k_{t-1}, L_t) = \Theta \underline{k}_{t-1}^{\ \beta} k_{t-1}^{\ \alpha} L_t^{\ 1-\alpha} \qquad \textit{with } \beta+\alpha=1$$

where $$\Theta = \begin{cases} 1 & \textit{probability} \quad \pi \\ 0 & \textit{probability} \quad 1-\pi \end{cases}$$

k_{t-1} is the capital stock per firm, saved by generation $t-1$, and L_t is the labour force employed by an entrepreneur. $\underline{k}_{t-1}$ is the average capital stock per firm at date t and represents a technological spillover in the spirit of Romer (1986). From an individual's viewpoint, $\underline{k}_{t-1}$ is given and the production function he faces has the traditional characteristics of decreasing returns to scale. For the economy as a whole, however, the returns to accumulate capital do not diminish. For simplicity, it is assumed that the capital stock depreciates completely during one period.

B. Factor markets

The labour market is competitive. Labour will thus be priced at its marginal productivity. However, entrepreneurs whose projects fail do not pay wages. As workers may be employed by one entrepreneur only, individual wage income will be stochastic. Following van Ees and van den Heuvel (1994), a perfect insurance market will be assumed, where individuals can find full insurance against this individual labour income risk. With full labour income insurance, individual labour income becomes certain and equal to expected labour income:

(3) $$E(\tilde{w}_t^{\,h}(t)) = (1-\alpha)\pi \underline{k}_{t-1} L_t^{-\alpha} = \overline{w}_t^{\,h}(t)$$

where $(1\text{-}\alpha)\ \underline{k}_{t-1} L_t^{-\alpha}$ is the marginal productivity of labour and π is the probability for the entrepreneur to have chosen a high-return project, and thus for his workers to be paid.

In the absence of a rental market for capital, entrepreneurs use only their own capital in production. As production is stochastic, the return on capital will be uncertain too. Subtracting the wage bill from the firm's output and dividing by the stock of capital yields, the following return on capital:

(4) $$\tilde{r}_t(t+1) = \begin{cases} \alpha \underline{k}_t^{\,\beta} k_t^{\,\alpha-1} L_{t+1}^{\,1-\alpha} & \textit{probability} \quad \pi \\ 0 & \textit{probability} \quad 1-\pi \end{cases}$$

which amounts to the marginal productivity of capital.

C. Goods market

The goods market equilibrium requires that the demand for goods in each period be equal to the supply, or equivalently that investment be equal to savings:

(5) $$S_t(t) = K_t(t+1)$$

where $S_t(t)$ denotes savings and $K_t\,(t+1)$ the investment made by generation t, yielding a return in period $t+1$. Taking the average yields:

(6) $$s_t^{\,h}(t) = \underline{k}_t(t+1)$$

D. Steady states

As individuals do not know the quality of the project they are financing, their second period income and, therefore consumption, is stochastic:

(7) $$\tilde{c}_t^{\,h}(t+1) = \tilde{r}_t(t+1)k_t^{\,h}(t+1) = \begin{cases} r_t(t+1)k_t^{\,h}(t+1) & probability \quad \pi \\ 0 & probability \quad 1-\pi \end{cases}$$

where $r_t(t+1) = \alpha \underline{k}_t^{\,\beta} k_t^{\,\alpha-1} L_{t+1}^{\,1-\alpha}$.

Their second period utility function will therefore also be stochastic :

(8) $$\ln \tilde{c}_t^{\,h}(t+1) = \begin{cases} \ln\left[r_t(t+1)k_t^{\,h}(t+1)\right] & probability \quad \pi \\ 0 & probability \quad 1-\pi \end{cases}$$

An individual *h* in period *t* will thus maximize an expected utility function of the following form :

(9) $$MaxEU(c_t^{\,h}) = \ln c_t^{\,h}(t) + \pi \ln c_t^{\,h}(t+1)$$

under his intertemporal budget constraint :

(10) $$c_t^{\,h}(t) + \frac{c_t^{\,h}(t+1)}{r_t(t+1)} = \overline{w}_t^{\,h}(t)$$

where his wage earned in period *t* is equal to his consumption in period *t* and the discounted consumption in period *t+1*.

Solving this problem yields the following time paths for consumption and savings (a detailed solution is presented in the mathematical appendix) :

(11) $$c_t^{\,h}(t) = \frac{\overline{w}_t^{\,h}(t)}{1+\pi}$$

(12) $$s_t^{\,h}(t) = \overline{w}_t^{\,h}(t)\left(\frac{\pi}{1+\pi}\right)$$

The long-run growth rate of this economy is determined by the evolution of the technological spillover factor k_t. The growth rate of this variable is obtained using (3), (6) and (12):