Contents lists available at ScienceDirect

European Economic Review

Financial development, liberalization and technological deepening

James B. Ang[*]

Department of Economics, Monash University, 900 Dandenong Road, Caulfield East, Vic 3163, Australia

ARTICLE INFO

ABSTRACT

This paper focuses on examining the effects of financial development and liberalization on knowledge accumulation. The results consistently show that while financial development facilitates the accumulation of new ideas, the implementation of financial reform policies is negatively associated with it. The undesirable effects of financial liberalization are found to operate through the triggering of crises and volatility in the financial system. There is also evidence supporting the hypothesis that financial liberalization reallocates talent from the innovative sector to the financial system, thus retarding technological deepening. Moreover, the findings also suggest that increased R&D activity and the presence of a stronger intellectual property rights protection framework tend to have beneficial effects on knowledge accumulation.

© 2010 Elsevier B.V. All rights reserved.

1. Introduction

Following the seminal contributions of Romer (1990), Grossman and Helpman (1991) and Aghion and Howitt (1992), the economics of ideas and technology have become the central focus in the literature of economic growth in recent years. The generation of ideas is strongly related to the process of technological change since new ideas improve the technology of production. Moreover, fluctuations in innovative activity closely follow productivity patterns. Thus, a better understanding of what determines the creation of knowledge is important, given that changes in the rates of innovation may explain productivity accelerations and slowdowns (Jones, 2002; Bottazzi and Peri, 2007).

Recent contributions in the theoretical growth literature have emphasized the importance of finance and R&D efforts in explaining productivity growth. In the models developed by Blackburn and Hung (1998), Aghion et al. (2005) and Aghion and Howitt (2009), the relationship between finance and growth is analyzed in the context of innovation-based growth models. These models predict that financial market imperfections increase the costs of monitoring and thus encourage the hiding of successful inventions so that firms can avoid loan repayments. The removal of these restrictions encourages more ideas to be produced and patented, thus deepening the technological sector. Hence, a positive relationship between finance and innovative production is predicted.

While the above studies assign an important theoretical role to finance in facilitating innovative production, so far there has been little empirical analysis conducted to examine the impact of financial development and financial liberalization under these innovation-driven growth frameworks. Moreover, although studies have demonstrated that financial development (and in some cases financial liberalization) tends to exert a beneficial impact on economic growth

[*] Tel.: +61 3 99034516; fax: +61 3 99031128.
   E-mail address: james.ang@buseco.monash.edu.au

(see, e.g., Demetriades and Hussein, 1996; Arestis and Demetriades, 1997; Beck and Levine, 2004), little is known about how innovative production responds to changes in the development and policy environment in financial systems.

Against this backdrop, this paper seeks to provide an empirical assessment of the determinants of knowledge accumulation across countries by focusing on the roles of financial sector reforms and financial development. This issue deserves attention because if financial development and financial liberalization do have the potential to improve a country's growth performance, then it is vital to understand the mechanisms by which they can be enhanced and made more effective. Moreover, understanding the mechanisms through which finance affects growth performance allows policymakers to evaluate the costs and benefits associated with liberalising and deepening financial systems. The next section sets out the analytical framework underlying our empirical modeling strategy.

2. Analytical framework

The important role of innovative efforts as a driver of long-term growth has been highlighted by recent contributions in the theories of endogenous growth. To illustrate, let us consider a simple production function where total output (Y_t) produced at time t is given by

$$Y_t = A_t^\sigma K_t^\alpha L_t^{1-\alpha}, \quad \sigma > 0, \quad 0 < \alpha < 1, \tag{1}$$

where A_t is the total stock of knowledge or ideas available in the economy, K_t is physical capital and L_t is the labor force. There are constant returns to scale in K_t and L_t holding A_t unchanged, and increase in returns to A_t, K_t and L_t together. Expressing Eq. (1) in per worker terms yields the following:

$$y_t = A_t^\sigma k_t^\alpha, \quad \sigma > 0, \quad 0 < \alpha < 1, \tag{2}$$

where $y_t = Y_t/L_t$ and $k_t = K_t/L_t$. Taking logs and differentiation on both sides, the growth rate of output per worker in period t can be written as

$$\frac{\dot{y}_t}{y_t} = \sigma \frac{\dot{A}_t}{A_t} + \alpha \frac{\dot{k}_t}{k_t}, \tag{3}$$

Along a balanced growth path, the growth rate of output per worker is given by

$$g_y = \frac{\sigma}{1-\alpha} g_A. \tag{4}$$

From the above, it is clear that the accumulation of ideas is an important driver for long-term growth. According to the ideas production function of Romer (1990), the rate at which new ideas are discovered depends on the amount of resources devoted to the discovery of new ideas and the stock of existing ideas. Under this innovation-based growth framework, R&D activity is a key determinant of the generation of new ideas. Researchers interested in profiting from their inventions will continue to search for new ideas. However, the model does not consider the secrecy of inventions and property rights protection since it is assumed that researchers can take advantage of having free access to the entire stock of knowledge (Romer, 1990). To the extent this assumption is not valid, the consideration of these factors is important given that the ability to conceal successful innovations or enjoy some monopolistic power over new inventions can significantly affect the rate of discovery of new ideas.

Recent developments in the theories of endogenous growth emphasize that the undesirable effects of secrecy on innovative production can be mitigated through deepening the financial system. For example, using a product variety model, Blackburn and Hung (1998) propose that firms have incentives to hide successful R&D projects to avoid repaying their loans. Such a problem of moral hazard gives rise to the enforcement of incentive-compatible loan contracts through costly monitoring systems. In their model, financial development allows financial intermediaries to diversify among a large number of projects, thus significantly reducing delegation costs. The lower costs of monitoring spur ideas production and technological development.

In a similar vein, the Schumpeterian growth models with credit constraints developed by Aghion and Howitt (2009) show that financial development results in lower screening and monitoring costs, thus mitigating agency problems and increasing the frequency of innovations. In the innovation-based growth model developed by Aghion et al. (2005), it is also argued that firms can conceal the results of successful innovations and thereby avoid repaying their creditors. A low degree of creditor protection, which is often associated with financial market underdevelopment, makes fraud an inexpensive option, thus retarding the production of new ideas. In contrast, financial development and liberalization tend to increase the hiding costs by providing better laws and institutions, thus encouraging innovative entrepreneurs to produce and patent more new ideas.

Another key aspect is the legal system, which can be used as a mechanism to influence the degree of excludability of ideas so that the strengthening of a patent protection framework may stimulate the incentives to innovate (Gould and Gruben, 1996). Given that the production of ideas generally involves large one-time costs (initial layout) to create inventions, inventors are not willing to incur these costs unless the resulting profits can be captured. A higher degree of intellectual property rights protection provides legal mechanisms to influence the degree of excludability of ideas, thereby strengthening the incentive for inventors to create new ideas (Jones, 2002).