

Financial Markets and the Macroeconomy

Financial markets and growth

An overview*

Marco Pagano

Università Bocconi, Milan, Italy and CEPR, London, UK

1. Introduction

The last five years have witnessed a resurgence of interest in the relationship between financial intermediation and economic growth. This issue had been extensively studied nearly two decades earlier by Goldsmith (1969), McKinnon (1973), Shaw (1973) and others, who produced considerable evidence that financial development correlates with growth. But their work, though insightful, lacked analytical foundations. In traditional growth theory, financial intermediation could be related to the level of the capital stock per worker or to the level of productivity, but not to their respective growth rates. The latter were ascribed to exogenous technical progress.

The recent revival of interest in the link between financial development and growth stems mainly from the insights and techniques of endogenous growth models, which have shown that there can be self-sustaining growth without exogenous technical progress and that the growth rate can be related to preferences, technology, income distribution and institutional arrangements. This provides the theoretical underpinning that early contributors lacked: financial intermediation can be shown to have not only level effects, but also growth effects.

The resulting models have offered important insights into the effect of financial development on growth and vice versa. They have also provided new impetus to empirical research on these issues. This paper reviews the ground covered so far on the theoretical and empirical front and points to some still unresolved issues.

Correspondence to: Marco Pagano, Via Catullo 64, Naples, Italy.

*I thank Tullio Jappelli and Ailsa Röell for helpful suggestions, and the Italian Ministry for Universities and Scientific and Technological Research for financial support.

2. How can financial development affect growth?

To capture the potential effects of financial development on growth, consider the simplest endogenous growth model – the ‘AK’ model, where aggregate output is a linear function of the aggregate capital stock:

$$Y_t = AK_t. \quad (1)$$

This production function can be seen as a ‘reduced form’ resulting from one of two underlying frameworks. One is a competitive economy with external economies as in Romer (1989), where each firm faces a technology with constant returns to scale but productivity is an increasing function of the aggregate capital stock K_t . For instance, consider an economy with N identical firms, each producing output $y_t = Bk_t^\alpha$ with its capital stock k_t . Suppose that B is regarded as a parameter by individual firms but actually responds to the average capital stock according to $B = Ak_t^{1-\alpha}$. Then aggregate output, $Y_t = Ny_t$, is given by (1). Alternatively, the AK model can be derived assuming that K_t is a composite of physical and human capital as in Lucas (1988), the two types of capital being reproducible with identical technologies.

For simplicity, assume that the population is stationary and that the economy produces a single good that can be invested or consumed – and, if invested, depreciates at the rate δ per period. Gross investment then equals

$$I_t = K_{t+1} - (1 - \delta)K_t. \quad (2)$$

In a closed economy with no government, capital market equilibrium requires that gross saving S_t equals gross investment I_t . For reasons that will be made clear below, it is convenient to assume that a proportion $1 - \phi$ of the flow of saving is ‘lost’ in the process of financial intermediation:

$$\phi S_t = I_t. \quad (3)$$

From (1), the growth rate at time $t+1$ is $g_{t+1} = Y_{t+1}/Y_t - 1 = K_{t+1}/K_t - 1$. Using eq. (2) and dropping the time indices, the steady-state growth rate can be written as

$$g = A \frac{I}{Y} - \delta = A\phi s - \delta, \quad (4)$$

where in the second step I have used the capital market equilibrium condition (3) and denoted the gross saving rate S/Y by s .

Eq. (4) reveals succinctly how financial development can affect growth: it can raise ϕ , the proportion of saving funnelled to investment; it may increase

A , the social marginal productivity of capital; and it can influence s , the private saving rate.

2.1. *Funnelling saving to firms*

In the process of transforming saving into investment, financial intermediaries absorb resources, so that a dollar saved by households generates less than one dollar worth of investment – the fraction ϕ in eq. (3). The remaining fraction $1 - \phi$ goes to banks as the spread between lending and borrowing rates, and to securities brokers and dealers as commissions, fees and the like.

This absorption of resources by the financial sector is primarily a reward for services supplied, but it may also reflect the X -inefficiency of the intermediaries and their market power. In addition, as noted by Roubini and Sala-i-Martin (1991, 1992), their activity is often burdened by taxation (in the form of high reserve requirements, transaction taxes, etc.) and by restrictive regulations, translating into higher unit margins.¹ If financial development reduces this leakage of resources, i.e. raises ϕ in eq. (4), it also increases the growth rate g .

2.2. *Improving the allocation of capital*

A second key function of financial intermediation is the allocation of funds to those projects where the marginal product of capital is highest. In the framework of the above model, intermediaries increase the productivity of capital, A , thereby promoting growth, in two ways: (i) collecting information to evaluate alternative investment projects; and (ii) inducing individuals to invest in riskier but more productive technologies by providing risk sharing.

The informational role of financial intermediation has been related to productivity growth by Greenwood and Jovanovic (1990). In their model, capital may be invested in a safe, low-yield technology or a risky, high-yield one. The return to the risky technology contains two random terms: an aggregate and a project-specific shock. Unlike individual investors, financial intermediaries with their large portfolios can perfectly unscramble the aggregate productivity shock, and thus choose the technology that is most appropriate for the current realization of the shock. Thus savings channelled through financial intermediaries are allocated more efficiently, and the higher productivity of capital results in higher growth.

Financial intermediaries also enable investors to share risks. This affects

¹The implicit assumption here is that the quasi-rents earned by financial intermediaries and the tax revenue extracted from them are entirely spent on private and public consumption respectively. Their detrimental effect on growth is tempered if they are partly spent on investment.

their investment choices – and, as we shall see in section 2.3, their saving behavior. This risk sharing role is not performed only by insurance markets but also by banks and securities markets, which allow individuals to share the uninsurable risk of idiosyncratic shocks, such as unobservable taste or liquidity shocks, and the diversifiable risk deriving from the volatility of asset returns.

In the absence of banks, households can guard against idiosyncratic liquidity shocks only by investing in productive assets that can be promptly liquidated, thus frequently forgoing investments that are more productive but also more illiquid. This inefficiency can be considerably reduced by banks, which pool the liquidity risk of depositors and invest most of their funds in more illiquid and more productive projects. The amount of liquid assets need not exceed the expected withdrawals by households hit by a liquidity shock. This argument, initially advanced by Diamond and Dybvig (1983), has been incorporated into an endogenous growth model by Bencivenga and Smith (1991). They show that banks increase the productivity of investment both by directing funds to illiquid, high-yield technology and by reducing the investment waste due to premature liquidation. As in Greenwood and Jovanovic, this productivity gain leads to faster growth.

Alternatively, consumers' liquidity risk can be shared via security markets. In Levine (1991) individuals buffer idiosyncratic liquidity shocks by selling shares on the stock market rather than withdrawing money from the bank, while the stock market also allows agents to reduce rate-of-return risk by portfolio diversification (an effect also present in Greenwood and Jovanovic, via intermediaries). This twofold insurance function increases willingness to invest in less liquid, more productive projects and also avoids unnecessary terminations. As a result, setting up a stock market raises the productivity of investment and the growth rate.

Saint-Paul (1992) also relates growth to portfolio diversification via the stock market. In his model, firms can increase their productivity by specializing, but this increases the risk from sectoral demand shocks. When this risk can be shared efficiently via the stock market, producers are encouraged to specialize and thus raise productivity. In the presence of externalities à la Romer, this productivity gain translates into a higher steady-state growth rate.

2.3. *Affecting the saving rate*

The third way financial development can affect growth is by altering the saving rate s . In this instance the sign of the relationship is ambiguous, in that financial development *may also reduce* saving, and thereby growth. As capital markets develop, households gain better insurance against endowment shocks and better diversification of rate-of-return risk, while consumer

credit becomes more readily and cheaply available. Financial development also narrows the wedge between the interest rate paid by firms and that received by households. Each of these factors affects saving behavior, but in each case the effect is ambiguous.

Risk sharing. Financial markets enable people to share both endowment risks (such as health hazards) and rate-of-return risk (such as that due to the volatility of stock returns). Typically, people counter the first type of risk via insurance markets, if they exist. Now consider an economy where these markets are just being introduced. A well-known result is that consumers will save less if their utility function has a positive third derivative – a condition that is satisfied for utility functions with constant relative risk aversion: introducing the insurance market reduces the need for precautionary saving. In an endogenous growth model, this fall in the saving rate lowers the growth rate, providing one instance in which financial development can retard growth. An analogous point is made by Devereux and Smith (1991), who show that when countries share endowment risk via international capital markets, the saving and growth rate can be lower than in autarky.

Rate-of-return risk can be reduced by diversifying portfolios through securities markets. Again, the effect on saving is ambiguous: with constant relative risk-aversion utility, the response of saving is negative if the risk-aversion coefficient is above 1, and positive otherwise. As a result, the response of growth to a reduction of rate-of-return risk is ambiguous as well – a result also shown by Devereux and Smith.²

In fact, all the models described in section 2.2 must deal with the ambiguous response of saving, since in all of them one effect of financial intermediation is more efficient risk sharing, which *can* reduce the saving rate and thus at least partly offset the growth-enhancing effect of more productive investment. Bencivenga and Smith show that the emergence of banks may reduce the saving rate but they also identify conditions under which the growth-enhancing effect of financial intermediation (higher A) outweighs the lower saving rate (lower s). Other authors avoid this complication, precluding a negative effect of risk sharing on saving by suitable assumptions: Levine simply posits a constant saving rate, while Saint-Paul chooses assumptions under which risk sharing actually raises saving.³

Household borrowing. Capital markets also channel funds from households that save to those that dissave, in the form of consumer credit and mortgage

²Obstfeld (1992) extends their analysis to the case where the world asset portfolio responds endogenously to accommodate the asset demand shifts implied by the transition from autarky to international economic integration

³He assumes that the coefficient of relative risk aversion is below 1: otherwise, as noted above, the saving rate would fall.

loans. If the loan supply falls short of demand, some households are liquidity-constrained: their consumption is limited by current resources, rather than by permanent income.

Using an overlapping generations model with three-period-lived households, Jappelli and Pagano (1992) show that binding liquidity constraints increase the saving rate, because young households cannot dissave as much as they would like. With the technology described by eq. (1), this increase in the aggregate saving rate s translates into faster growth g . By the same token, liberalization of the consumer credit or mortgage market leads to a reduction in saving and growth. Here we have another instance of financial market development tending to reduce growth.

De Gregorio (1992) adds a potentially important qualifier. If households borrow to finance not only current consumption but also the accumulation of human capital, the effect of liquidity constraints on growth is ambiguous: they raise the saving rate s , but lower the productivity of investment A , insofar as this depends on the worker skills acquired by investment in education.

The relevance of this qualifier depends on the extent to which human capital formation is self-financed by households. In many countries it is subsidized by government via public schooling, student grants and loans, etc. Moreover, on-the-job training and learning-by-doing – generally regarded as no less important than schooling – may enable workers to acquire skills borrowing constraints.⁴

Interest rate effects. As noted in section 2.1, financial repression and lack of competition widen the margins charged by financial intermediaries. Aside from the direct resource cost ϕ , margins affect capital accumulation via their incentive effect on saving. Financial repression and imperfect competition keep the interest rate paid to savers below that prevailing under perfect capital markets, i.e. the marginal product of capital net of depreciation, $A - \delta$.

If the saving rate rises with the rate of interest, then capital market imperfections lower growth by depressing saving. The early studies of McKinnon (1973) and Shaw (1973) argued that this is an important way in which financial repression depresses growth; conversely, financial develop-

⁴Another way borrowing constraints may affect growth is by distorting the allocation of wealth: liquidity-constrained households may not only dissave less but also buy smaller and cheaper housing, which redirects funds away from residential towards non-residential investment. If external economies are greater in manufacturing than in construction, this may result in a higher social marginal productivity of investment and faster growth – a conjecture that accords with De Long and Summers' (1991) finding that growth is much more strongly associated with machinery and equipment than with other components of investment. In this case, liquidity constraints would lead to higher growth by enhancing productivity, rather than by increasing saving.

ment should raise saving and growth.⁵ However, the impact of the real interest rate on saving has long been known to be ambiguous a priori, and the relevant empirical studies are far from agreeing on its sign.

3. What determines financial development?

While the potential effects of financial development on growth have been analyzed extensively, in most models the degree of financial development is assumed to be exogenous. But understanding what determines the emergence of financial markets or their degree of development is at least as important as assessing their effects on growth. For if indeed financial intermediation affects growth, one would like to know what gets financial markets off the ground, whether we should expect them to develop in a particular sequence, and what explains their relative development. For instance, bank lending to firms has generally appeared first, followed by stock and bond markets, and finally credit and insurance markets catering to households. On the other hand, the relative size of these markets differs significantly even in countries that have reached a comparably high level of economic development, witness the huge variance in stock market capitalization and in the volume of consumer credit between OECD countries.

Greenwood and Jovanovic (1990) and Saint-Paul (1992) are among the few models in which growth and financial development are jointly determined.⁶ In both, financial intermediation entails real resource costs that are fixed or less than proportional to the volume of funds intermediated: as the economy grows, the individual incentive to participate in financial markets increases, as the benefits increase with the scale of the funds invested while costs rise less – or not at all.⁷

Financial development also depends on public policy. Roubini and Sala-i-Martin (1992) argue that governments may pursue financial repression to raise tax revenue, even while they recognize its detrimental growth effects. Where collecting income taxes is costly, the financial sector is a comparatively easy source of government revenue, especially via seigniorage. So the

⁵In fact they suggested that, since a low real interest rate often is a symptom of financial repression, it should be associated empirically with a low saving rate and a low growth rate. This hypothesis has been much debated in later literature [see De Gregorio and Guidotti (1992)].

⁶The evolution of financial markets is analyzed jointly with the accumulation of capital also in the models of Aghion and Bolton (1991), Azariadis and Smith (1991) and Tsiddon (1992). In all three papers, capital market imperfections are due to informational asymmetries between lenders and borrowers: in Azariadis and Smith this asymmetry produces adverse selection, whereas in the other two papers it generates a moral hazard problem.

⁷Aside from the existence of fixed costs, the unit cost of financial intermediation may decrease with growth because of more aggressive competition among intermediaries, as in Sussman (1991).

government may optimally choose to hinder financial intermediation to raise the demand for money and thus increase the revenue from seigniorage.

Public policy may also affect financial development more selectively. For instance, in many countries the markets for consumer credit and mortgage loans have been traditionally repressed in several ways [Jappelli and Pagano (1992)]. This probably reflects a public concern to force households to save more and to direct credit towards industrial rather than residential investment.

4. The evidence

A positive correlation between growth and indicators of financial development was first documented by Goldsmith (1969), McKinnon (1973) and Shaw (1973). Even then, however, two interpretative problems emerged. First, does the causal relationship run from financial development to growth, the reverse, or both ways? Second, conceding that financial development enhances growth, does it do so by enhancing the efficiency of investment (the parameter A) or the rate of investment (the saving rate s or the proportion of saving invested ϕ)?⁸

Unfortunately, these two problems still lie largely unresolved, as is apparent from the recent, comprehensive study by King and Levine (1992), which confirms that growth correlates with many indicators of financial development in cross-country data.⁹ In fact, the partial correlation remains significant even after controlling for a host of 'core' variables considered in earlier work, such as the initial level of GDP, schooling, and measures of monetary, fiscal and trade performance. Thus, these correlations appear to be robust, in the sense made clear by Levine and Renelt (1991). However, the findings are indecisive both on causality and on the relative importance of the efficiency and the rate of investment. Progress on causality will require resorting to policy variables that affect financial markets but are unaffected by growth, as was done by Roubini and Sala-i-Martin (1991), who find that growth is negatively correlated with the bank reserve ratio – a proxy for financial repression that is unlikely to be affected by growth.

Most of the empirical studies use highly aggregated indicators of financial intermediation, such as the ratio of M2 or private sector credit to GDP. This

⁸Goldsmith (1969) argued that the correlation reflected a two-way causal relationship, and that financial markets enhance growth by raising the efficiency of investment. McKinnon (1973) and Shaw (1973) claimed instead that financial intermediation raises mainly the level of saving and investment

⁹The indicators are: (i) the ratio of credit to GDP (a measure of total financial size), (ii) the ratio of deposit bank domestic assets to the sum of deposit bank and Central Bank domestic assets (the fraction of credit intermediated by deposit banks); and (iii) the ratio of claims on the non-financial private sector held by deposit banks and the Central Bank to total domestic credit (the fraction of credit extended to firms and households).

neglects one of the lessons of the theoretical literature, namely that the effect of financial development can vary depending on the specific market where it occurs: insurance and household credit may well reduce the growth rate, via reduced saving, whereas bank lending to companies or the creation of a stock market is more likely to promote growth.

King and Levine (1992) take a first step in the direction of more disaggregated measures of financial intermediation, such as indicators of the importance of deposit bank credit relative to total credit. But a finer disaggregation is really needed, distinguishing the role of the stock market, the bond market, the insurance market and the market for household credit (although here data availability problems reduce the number of observations). Atje and Jovanovic (1992), for instance, study the correlation between growth and the trading volume on the stock market, scaled by GDP. Jappelli and Pagano (1992) find that the saving and growth rates are negatively and significantly correlated with indicators of the development of household lending, such as the ratio of consumer credit to GDP and the maximum loan-to-value ratio in the mortgage market, a finding that confirms that some forms of financial development are not conducive to faster economic growth.

5. Conclusions

Financial intermediation can affect economic growth by acting on the saving rate, on the fraction of saving channelled to investment, or on the social marginal productivity of investment. Usually financial development has a positive effect on growth, but there are exceptions: improvements in risk-sharing and in the household credit market may decrease the saving rate, hence the growth rate. Thus 'financial development' is too generic a term; to gauge the impact on growth, one must specify the particular financial market concerned.

Some researchers have also analyzed how financial intermediation arises and develops endogenously in the context of economic growth. But here too, further progress requires a shift of focus away from the generic notion of 'financial development': it is still unclear how and why specific financial markets arise and develop, and whether their development follows some sort of standard sequence. The same applies to the existing body of empirical work. Tests of the models have shown that some of the predicted correlations are indeed present in cross-country data, but little is known about how the development of different markets affects economic growth.

References

Aghion, P. and P. Bolton, 1991, A theory of trickle-down growth and development with debt overhang, Mimeo.

- Atje, R. and B. Jovanovic, 1992, Stock markets and development, *European Economic Review*, this issue.
- Azariadis, C. and B. Smith, 1991, Adverse selection in a neoclassical growth model, Paper presented at the Seminar on Capital Market Imperfections and Macroeconomics, Jerusalem, June 1991.
- Bencivenga, V.R. and B.D. Smith, 1991, Financial intermediation and endogenous growth, *The Review of Economic Studies* 58, April, 195–209.
- De Gregorio, J., 1992, Liquidity constraints, human capital accumulation and growth, Mimeo. April.
- De Gregorio, J. and P. Guidotti, 1992, Notes on financial markets and economic growth, Mimeo. July.
- De Long, J.B. and L.H. Summers, 1991, Equipment investment and economic growth, *Quarterly Journal of Economics* 106, May, 445–502.
- Devereux, M.B. and G.W. Smith, 1991, International risk sharing and economic growth, Discussion paper no. 829 (Department of Economics, Queen's University, Kingston, Ont.) Aug.
- Diamond, D.W. and P.H. Dybvig, 1983, Bank runs, deposit insurance, and liquidity, *Journal of Political Economy* 91, June, 401–419.
- Goldsmith, R.W., 1969, *Financial structure and development* (Yale University Press, New Haven, CT)
- Greenwood, J. and B. Jovanovic, 1990, Financial development, growth and the distribution of income, *Journal of Political Economy* 98, Oct., 1076–1107.
- Jappelli, T. and M. Pagano, 1992, Saving, growth and liquidity constraints, Discussion paper no. 662 (CEPR, London).
- King, R. and R. Levine, 1992, Financial indicators and growth in a cross section of countries, Working paper no. 819 (The World Bank, Washington, DC).
- Levine, R., 1991, Stock markets, growth, and tax policy, *The Journal of Finance* 46, Sept., 1445–1465.
- Levine, R. and D. Renelt, 1991, A sensitivity analysis of cross-country growth regressions, Working paper no. 609 (The World Bank, Washington, DC).
- Lucas, R., 1988, On the mechanics of economic development, *Journal of Monetary Economics* 22, July, 3–42.
- McKinnon, R.I., 1973, *Money and capital in economic development* (Brookings Institution, Washington, DC).
- Obstfeld, M., 1992, Risk-taking, global diversification, and growth, Working paper no. 4092, June (NBER, Washington, DC).
- Romer, P., 1989, Capital accumulation and the theory of long-run growth, in: R. Barro, ed., *Modern business cycle theory* (Harvard University Press, Cambridge, MA).
- Roubini, N. and X. Sala-y-Martin, 1991, Financial development, the trade regime, and economic growth, Working paper no. 3876 (NBER, Cambridge, MA) Oct.
- Roubini, N. and X. Sala-y-Martin, 1992, A growth model of inflation, tax evasion, and financial repression, Working paper no. 4062 (NBER, Cambridge, MA) May.
- Saint-Paul, G., 1992, Technological choice, financial markets and economic development, *European Economic Review* 36, 763–781.
- Shaw, E. S., 1973, *Financial deepening in economic development* (Oxford University Press, New York).
- Sussman, O., 1991, A theory of financial development, Working paper no. 233 (The Hebrew University of Jerusalem, Jerusalem).
- Tsiddon, Daniel, 1992, A moral hazard trap to growth, *International Economic Review* 33, May, 299–321.