Finance and Growth: A Synthesis and Interpretation of the Evidence *

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1. Introduction

Do financial intermediaries and services affect long-run growth? While the idea that finance affects growth is not new and can be traced back at least to Schumpeter's *Theory of Economic Development* (1969), it is fair to say that until recently most economists looked with scepticism at the proposition that financial conditions could explain part of the cross-country differences in levels of development and rates of growth. Nevertheless, the last five years have witnessed a resurgence of interest in the study of how financial intermediaries and services affect long-run growth. This paper reviews and interprets the empirical evidence that has been accumulated so far on the relation between finance and growth, and seeks to answer three questions: first, does the evidence suggest that financial intermediaries affect long-run growth? Second, which financial services and institutions matter? Third, why do they matter? The premise of this paper is that central to the interest in the relation between finance and growth is the belief that incentive frictions in credit markets are important and affect real allocations.

The rest of the paper proceeds as follows. Section 2 briefly discusses the nature of these frictions and sets up a simple analytical framework to interpret the evidence on finance and growth. Section 3 then examines the path of financial development that has been followed by several industrial economies since the industrial revolution until today. Section 4 reviews recent cross-country studies that examine the relation between financial indicators and growth. Section 5 interprets the evidence and concludes.

Before proceeding with the rest of the paper I call attention to a caveat. In reviewing the evidence I will cite selectively; no attempt has been made to comprehensively survey the vast literature on finance and development, in part because that would require a much longer paper than this one, but mainly because my focus is the relation between finance and *long-run* growth. Having said this, I proceed with no further apology.

2. Frictions in credit markets

A useful (though unrealistic) benchmark to think about financial intermediaries is the standard Walrasian model. In such a world firms and individuals use markets to borrow and to diversify idiosyncratic risks. But because firms can issue perfectly divisible securities, information is symmetric, and complete contracts can be written and enforced at no cost, there is no need for financial intermediaries, and exchange is organized through direct and impersonal markets. As is well known, under such assumptions an efficient risk allocation obtains whenever markets are complete; but financial markets are quite uninteresting: they work like any other commodity market, their efficiency is a straightforward implication of the technological environment, and financial arrangements are irrelevant – Modigliani-Miller applies.

One explanation of financial intermediaries starts with the observations that (a) the securities issued by individual firms are not perfectly divisible; and (b) there are scale economies in transaction technologies.[1] This view, first proposed by Gurley and Shaw (1960),

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[1] On this see Hellwig (1991).

stresses that intermediaries transform primary securities issued by firms – e.g. bonds, shares – into the indirect securities that final savers want. By lumping together the funds of many small savers, intermediaries take advantage of scale economies and overcome the indivisibility of firm's securities; by lending to many firms they diversify borrower-specific risks. We may say, therefore, that according to this view intermediaries overcome technological frictions – frictions caused by the properties of the transaction and security-issuing technologies.

Technological frictions suggest why intermediaries exist, but under fairly weak assumptions do not change the irrelevance results that follow from the Walrasian model. If scale economies in transaction technologies are realized at scales large enough to justify intermediation, but small enough to permit competition, intermediaries allocate funds and risks efficiently, and financial arrangements do not affect real allocations. Thus, as long as governments let the market work, cross-country differences in growth rates cannot be explained by differences in financial structure.

While useful as a benchmark, the assumptions of the Walrasian model are clearly unrealistic. The second explanation of financial intermediaries starts from the observation that limited liability creates divergent incentives between lenders and borrowers, because *a priori* a borrower knows more about his characteristics, actions, and outcomes than lenders; and not all the actions of a borrower can be constrained by contractual covenants: many contingencies cannot be anticipated, some actions and outcomes cannot be verified before a court, and not all contracts are renegotiation-proof. Here the tasks of financial intermediaries are twofold: first, by collecting inside information about borrowers, intermediaries can screen them, and directly monitor and influence their actions; they provide these services efficiently because there are scale economies in screening, monitoring, and information collection.[2] Second, as Mayer (1988) suggested, incomplete contracts cause a time-consistency problem: after contracting a borrower may have incentives to exploit lenders because assets are more valuable if controlled by firm insiders. Intermediaries reduce the bargaining power of the borrower and its incentive to behave opportunistically by becoming familiar with the inner workings of the firm and being able to take control of its assets.

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[2] On this see Diamond (1984).

Incentive frictions drastically change the irrelevance results that follow from the Walrasian model. As is well known, both asymmetric information and the incompleteness of contracts impair the ability of an economy to achieve an efficient risk allocation, and imply that financial arrangements affect real allocations – Modigliani-Miller no longer applies. Thus, how efficiently intermediaries allocate funds and spread risks depends on how well they overcome incentive frictions. Because of this, cross-country differences in growth rates may be partly explained by differences in financial arrangements.

3. The path of financial development

One way to learn about the relation between finance and long-run growth is to examine the path of financial development that market economies follow once sustained growth begins. This section describes this path, and answers two questions: (a) do modern financial systems emerge during the early stages of sustained growth, or after industrialization? (b) are incentive frictions important in today's developed economies?

We begin by looking at the work of Raymond Goldsmith on national balance sheets, which accurately pictures the financial development of several developed countries since the industrial revolution. Goldsmith (1969 and 1985) classified aggregate data on tangible and financial wealth, and computed several financial ratios, the most comprehensive being the Financial Interrelations Ratio (FIR), the ratio of all financial assets issued by financial and non-financial institutions to real (as opposed to financial) national wealth. Goldsmith (1969, p. 33) observed that FIR rises with economic development: while most non-industrial economies (e.g. Japan, the United States, and Western European countries before their industrialization, or today's LDCs) have values of FIR between 0.2 and 0.5, as industrialization advances, FIR rises and stabilizes between 0.75 and 1.75. This pattern is also present across time. Starting in 1850, Table 1 shows FIRs for ten developed countries. While in any given year FIR varies a lot across countries, for most of them FIR starts at low levels, and rises sharply until 1913; for the rest of the century, FIR varies widely in the medium term, but does not show any trend.

TABLE 1

FINANCIAL INTERRELATIONS RATIO (FIR), 1850-1978

Country	Standard benchmark year[a]									
	1850	1875	1895	1913	1929	1939	1950	1965	1973	1978
Belgium	0.25	0.38	0.55	0.90	0.82	0.98	0.83	0.75	0.99	0.85
Denmark	n.a.	1.11	1.28	1.41	1.55	1.26	1.12	1.04	1.25	1.10
France[b]	0.25	0.56	n.a.	0.98	0.81	n.a.	0.55	1.24	0.92	0.83
Germany	0.20	0.38	0.72	0.76	0.39	0.56	0.40	0.92	0.85	0.89
Great Britain[c]	0.68	0.93	1.96	1.96	2.45	2.70	1.77	1.50	1.29	1.11
Italy	0.21	0.39	0.45	0.47	0.68	0.73	0.42	0.85	1.16	1.04
Japan	n.a.	0.30	0.34	0.64	1.23	1.42	0.55	0.81	0.92	1.02
Norway	n.a.	0.37	0.55	0.72	1.03	0.74	0.79	0.78	0.87	0.87
Switzerland	n.a.	1.11	1.60	1.50	1.65	1.59	1.29	1.52	1.61	1.82
United States[d]	0.47	0.64	0.71	0.83	1.29	1.32	1.17	1.28	1.11	0.99

[a] For actual dates see Goldsmith (1985, Table 33).
[b] In addition 1815: 0.18.
[c] In addition 1688: 0.17; 1760: 0.40; 1800: 0.57; 1830: 0.42.
[d] In addition 1774: 0.28; 1805: 032.
Source: Goldsmith (1985, Table 19).

Three points are worth noting here. First, the evolution of FIR suggests that external finance was an integral part of the process of industrialization, and that modern financial systems developed during the early stages of industrialization and sustained economic growth, not after. Second, if FIR describes financial development accurately, we should agree with Goldsmith (1985, p. 2) that, in its essentials, these countries had a modern financial system by the beginning of this century. Third, the evolution of FIR essentially tells the same story than several historical studies that trace the origins of modern financial systems to the early stages of industrialization.

FIR has not been computed for countries that industrialized during this century, but since in most economies banks are by far the most important issuer of financial assets, a fair description of the evolution of their financial systems can be obtained by looking at the ratio of M2 to GDP. Table 2 shows this ratio for five Asian countries that became industrialized in the last four decades, and for Germany and Japan, who rebuilt their economies after the Second World War. Again, we observe that financial systems grow fast during the initial period of sustained growth. One could think that the increasing size of financial systems in NICs may just have been the part of a larger, worldwide trend towards larger financial systems. Goldsmith's (1969)

study, however, shows that this is not so. As mentioned before, in LDCs financial systems are of similar size to those of the United States and Western Europe before their industrialization.

TABLE 2

RATIO OF M2 TO GDP, SELECTED COUNTRIES, 1955-1990[a]

Country	1955	1960	1965	1970	1975	1980	1985	1990
Germany	0.32	0.38	0.44	0.48	0.54	0.54	0.59	0.70
Japan	0.50	0.65	0.78	0.74	0.85	0.86	0.97	1.18
Indonesia	n.a.	n.a.	0.13	0.10	0.16	0.17	0.25	0.43
Korea	0.10	0.11	0.12	0.33	0.31	0.34	0.39	0.40
Malaysia	0.34	0.24	0.28	0.35	0.46	0.53	0.68	0.67
Singapore	n.a.	n.a.	0.56	0.66	0.61	0.66	0.70	0.96
Taiwan[b]	0.12	0.17	0.33	0.46	0.59	0.75	1.26	n.a.

[a] M2 is IFS line 32d; GDP is IFS line 99b.
[b] Figures correspond to the ratio of M3 to GNP.
Sources: IMF, *International Financial Statistics Yearbook*, various issues; for Taiwan McKinnon (1991, Table 2.2).

A second characteristic of the path of financial development (not revealed by FIR) is that during the early stages of industrialization firms obtain their external funds mostly through intermediaries. This is not to say that intermediaries develop in similar fashion everywhere. A closer look at specific experiences reveals significant differences in market structure, extent to which intermediaries intervene in firm's decisions, and in the nature of government intervention. For example, the historical studies edited by Cameron (1967, 1972, 1992) show that in the nineteenth century banks were very competitive in Scotland, but not so in Germany or Belgium; while powerful investment banks like J.P. Morgan & Co. in the United States, or the large *Kreditbanken* in Germany got heavily involved in firm's affairs, British banks kept distant relations with their clients;[3] and in most Asian NICs financial systems have been heavily regulated, and until recently, governments owned most financial institutions.[4] Nevertheless, the common thread is that during the early stages of industrialization most firms could access external finance only through an inter-

[3] See Carosso (1970) on the United States, Neuburger (1977) and Whale (1930) on Germany, and Cottrell (1980) and Lavington (1921) on Britain.
[4] See Fry (1988, ch. 14.2), Skully and Viksnins (1987), Cole and Park (1983) and Cho (1989).

mediary. Moreover, it is particularly interesting to note that stock and bond markets worked best as a source of industrial finance where investment banks got heavily involved in firm's affairs (as in Germany and the United States); in contrast, where intermediaries kept distant relations with their clients (as in Britain) security markets played a minor part in the financing of industry.

Whatever the role of intermediaries during the early stages of industrialization, it is commonly believed that, as the economy and financial markets mature, it becomes easier for firms to issue shares and bonds without having long-term ties with an intermediary. Thus, according to this belief, as development proceeds intermediaries become less important, both as a source of funds and as means to access direct markets. In terms of frictions in credit markets, this belief would imply that economic development reduces the importance of incentive frictions making financial markets more impersonal. Mayer (1990) collected data from the flow-of-funds accounts of eight industrial economies, and inquired into the sources of funds of corporations. Table 3 shows that, contrary to what is commonly believed, intermediated loans are the primary source of external finance for firms, and, with the exception of Canada, much more important than bonds and shares combined. It is also notable that retentions are everywhere a very important source of funds, in several countries the dominant one.

TABLE 3

AVERAGE GROSS FINANCING OF NON-FINANCIAL ENTERPRISES, 1970-1985

	Canada	Finland	France	Germany	Italy	Japan	United Kingdom	United States
Retentions	54.2	42.1	44.1	55.2	38.5	33.7	72.0	66.9
Short-term sec.	1.4	2.5	0.0	0.0	0.1	n.a.	2.3	1.4
Capital transfers	0.0	0.1	0.1	1.4	6.7	5.7	0.0	2.9
Loans	12.8	27.2	41.5	21.1	38.6	40.7	21.4	23.1
Trade credit	8.6	17.2	4.7	2.2	0.0	18.3	2.8	8.4
Bonds	6.1	1.8	2.3	0.7	2.4	3.1	0.8	9.7
Shares	11.9	5.6	10.6	2.1	10.8	3.5	4.9	0.8
Other	4.1	6.9	0.0	11.9	1.6	0.7	2.2	−6.1
Adjustments	0.8	−3.5	−4.7	0.0	2.3	n.a.	−9.4	−4.1
Total	99.9	99.9	99.9	99.9	99.9	100.0	99.9	100.1

Source: Mayer (1990, Table 12.3)

For a longer period, evidence from flow-of-funds accounts is available only for the United States and the United Kingdom. For the United States, Taggart's (1985) study confirms that retentions have been always the dominant source of funds, and suggests that the relative fall in share issues is not a short-term phenomenon, but rather a trend: while during the 1920s and 1930s shares made 19% of all sources of funds, from the 1940s on less than 5% of corporate funds were obtained by issuing shares.[5] For the United Kingdom, Mayer (1990) also reports a declining trend since the 1950s.

The predominance of retained profits and intermediated loans suggests that incentive frictions are important even in developed economies today. This is confirmed by several empirical studies that test the implications of models of external finance with asymmetric information. A survey of this literature would go well beyond the scope of this paper; here I will mention only three of its findings. First, as Bernanke (1993) has noted, one of the insights of the theoretical literature on agency costs of external finance is that incentive frictions make external finance more expensive than internal finance. Thus, of two firms facing an identical investment opportunity, the one with more internal funds will always be more willing to make the investment. This is confirmed by several empirical studies that show that liquidity affects firm's willingness to invest.[6]

Second, several studies suggest that intermediaries reduce the negative effects of incentive frictions and have better information about borrowers than other outsiders. For example, Hoshi et al. (1991) studied the relation between investment outlays and cash flow for Japanese firms. They found a close and positive relation for firms that borrowed mainly from direct markets, but no such relation for firms that borrowed from a main bank. Assuming that investment opportunities and cash flows are imperfectly correlated, this suggests that firms that rely on direct markets forego investment opportunities that are profitable if financed with internal funds. Moreover, Mikelson and Partch (1986), James (1987) and Lummer and Mc-Connel (1989) found that a firm's share price rises on average, when a loan agreement with a bank is announced, but falls when the firm uses private placements or debt to repay bank loans, or the bank

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[5] See Taggart (1985, Table 1.4).

[6] See Fazzari et al. (1988), Fazzari and Atthey (1987) and Hubbard and Kashyap (1992).

tightens covenants. This suggests that banks have information other outsiders have not.

Third, many studies suggest that intermediaries reduce the costs of financial distress and restructuring. As Bulow and Shoven (1978) have stressed, even when such restructuring is efficient, creditors may be unwilling to commit fresh funds, because when an individual creditor does so, she bears the full costs of the firm's rescue, but shares the benefits. Moreover, as Hoshi et al. (1990) point out, when debt is diffusely held, creditors are not likely to be well informed, and may not know whether it is profitable to commit new funds to restructure the firm. Last, reorganization often requires not only the restructuring of the firm's debt, but also of the firm's operations, which require creditors to get involved in the management of the firm, a task that is increasingly difficult the more diffusely debt is held, and the worse creditors are informed about the firm. Hoshi et al. (1990) found evidence suggesting that after the onset of financial distress, Japanese firms who have a close relation with a main bank tend to sell and invest more than firms that do not have such a relation. Corbett (1987) reports that Japanese banks reduce the costs of financial distress because they have close relationships with their clients and enough inside knowledge to restructure the firm's operations, which facilitates the coordination of other debtors. Furthermore, Gilson et al. (1990) found that stockholders do better when firms restructure outside Chapter 11; firms that can do so tend to owe to fewer lenders and more to banks.

4. Cross-country evidence

A second source of evidence on the relation between finance and growth are recent cross-country regression studies. Broadly speaking, this literature constructs proxies for financial services, and studies how they correlate with growth indicators. Three types of proxies for financial services are used: interest rates, aggregate measures of the size of banking systems, and aggregate measures of asset distribution.

Interest rates. The main justification for using real interest rates as proxies for financial services is the "financial repression" paradigm

of McKinnon (1973) and Shaw (1973).[7] As has been discussed exhaustively in this literature, financially repressed economies are characterized by nominal interest rates fixed close to zero, and high and volatile inflation rates. According to the financial repression paradigm real interest rates are more than just a proxy for financial services: negative real interest rates reduce growth directly, because they discourage saving and investment, and reduce the efficiency of investment. More generally, it seems reasonable that when financial intermediaries pay and charge extremely negative real interest rates they are not able to provide high-quality financial services, so that empirical investigations of the relation between real interest rates and growth can be seen as tests of the thesis that financial services matter for growth.

King and Levine (1992, Table 24-A) grouped a sample of 73 countries according to their growth performance during the period 1974 to 1989, and found that, on average, faster growth rates are positively associated with higher real interest rates. Moreover, several studies report that real interest rates correlate positively with growth.[8] Nevertheless, this positive association is generally the result of outliers – countries with extremely negative real interest rates – and generally disappears when other variables are included in the regressions, or outliers disregarded. For instance, Roubini and Sala-i-Martin (1992) included a dummy variable that distinguished merely between negative and positive real interest rates in standard Barro-type regressions, and obtained a small and insignificant coefficient. They also constructed a second dummy variable that identified real interest rates below –5% p.a., and in this case the coefficient turned negative, statistically significant, and economically important. While these results offer some evidence, both in favor of the financial repression paradigm and on the importance of financial intermediation generally, they must be interpreted with caution, because, as is well known, financially repressed economies usually have distorted trade, fiscal, and monetary regimes, so that extremely negative real interest rates may also be proxies for other policy-induced distortions. In this line, King and Levine (1992) included a dummy variable for real interest rates below –5% p.a., but they also included variables

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[7] See Fry (1988) for a survey. De Gregorio and Guidotti (1993) discuss the shortcomings of interest rates as proxies for financial services.
[8] See Dornbusch (1990), Easterly (1990), Fry (1988, ch. 6.4), Gelb (1989) and Polak (1989).

that proxied for policy distortions. The coefficient of the interest-rate dummy turned out negative and economically important, but statistically insignificant at the 10% level.

On the investment side, there is evidence that the efficiency of investment (measured by the incremental output-capital ratio) correlates positively with real interest rates.[9] This association remains statistically significant when proxies for policy distortions are included (see King and Levine 1992). While suggestive, these results should be interpreted with caution, because it is clear that causality may run from the efficiency of investment to real interest rates: countries with productive investments also pay higher real interest rates. Moreover, King and Levine (1992) did not find any significant correlation between the investment share in GDP and severely repressed interest rates.

Size and asset distribution measures, and growth. A new set of proxies of financial services has been recently constructed by King and Levine (1992, 1993a and 1993b) with data from the *International Financial Statistics.* Their sample includes about 80 countries, excludes major oil exporters, and covers the period 1960-1989. Two indicators measure the size of the formal intermediary sector, the ratio of liquid liabilities (M2) to GDP (LLY), and the ratio of quasi-liquid liabilities (M2 minus M1) to GDP (QLLY), a measure of non-monetary financial depth. At least since Gurley (1967) and Goldsmith (1969) it has been known that richer countries have larger financial systems. Table 4 groups countries according to their growth rates and shows that the same holds for countries that grow faster.[10]

Some of the services that financial intermediaries provide, particularly those that help to overcome incentive frictions, are not related directly to their liabilities (which provide mostly transaction and store-of-value services), but rather to their assets. Furthermore, in many countries a substantial fraction of loanable funds is intermediated by the central bank, or is allocated to the government or state-owned enterprises. Because of this, measures of the size and composition of the assets of financial institutions should be better proxies for financial services. King and Levine constructed three of such measures: first, to measure who intermediates they computed the

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[9] See Fry (1988, ch. 6.3) and Gelb (1989).
[10] See also Gertler and Rose (1991), King and Levine (1993a), Neal (1990) and World Bank (1989).

TABLE 4

FINANCIAL INDICATORS AND REAL PER-CAPITA GDP GROWTH, 1960-1989[a]

Indicator	Growth Performance				Correlation with growth
	Very fast (g>3%)	Fast (3%>g> 2%)	Slow (2%>g> 0.5%)	Very slow (g<0.5)	
LLY	0.60	0.38	0.29	0.22	0.62
QLLY	0.37	0.20	0.15	0.07	0.64
BANK	0.81	0.73	0.71	0.60	0.46
PRIVATE	0.70	0.56	0.61	0.51	0.39
PRIVY	0.35	0.27	0.20	0.13	0.44
Average growth (%)	4.5	2.6	1.4	−0.5	
Observations	29	28	29	28	

Source: King and Levine (1993b, Table 1).
[a] Growth in per capita GDP and financial indicators are averaged over the whole sample period.
LLY = Liquid liabilities to GDP; QLLY = Liquid liabilities minus M1 to GDP; BANK = Deposit money bank domestic credit divided by deposit money bank domestic credit plus central bank domestic credit; PRIVATE = Claims on the non-financial private sector to total domestic credit; PRIVY = Gross claims on private sector to GDP.

ratio of the domestic assets of deposit money banks to the domestic assets of the central bank and deposit money banks combined (BANK).[11] The conjecture is that central banks do not offer services that overcome incentive frictions. Second, to measure who uses intermediated funds they computed (a) the ratio of claims of deposit money banks and the central bank combined on the non-financial private sector to total domestic credit (PRIVATE); (b) the ratio of claims of deposit money banks and the central bank combined on the non-financial private sector to GDP (PRIVY). The conjecture is that when financial intermediaries lend to the public sector they evaluate more leniently than when they lend to private firms.[12] It can be seen from Table 4 that in countries that grow faster: (a) a larger fraction of credit is granted by commercial banks; (b) a larger fraction of credit goes to the private sector; (c) loans to the private sector are a larger percentage of GDP.

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[11] Deposit money banks comprise commercial and other banks with large demand deposits.

[12] As they note, however, these indicators could be just a proxy of the size of the private sector.

All these correlations remain statistically significant at the 1% level in standard growth regressions including proxies for trade, fiscal, and monetary policies.[13] Moreover, King and Levine (1993b) point out that their results are robust in the sense of Levine and Renelt (1992), and that estimated coefficients are economically important. For example, and ignoring the issue of causality, they imply that a country that increases the level of its financial indicators, from the mean of the slowest growing group in Table 4 to the mean of the fastest growing group, would grow by between 0.7 and 1.1 percentage points faster p.a. Since the difference between the very fast and very slow growers is about 5 percentage points, this would cut between 15 and 20% of the difference in growth rates. The same exercise with the figures of slow- and fast-growing countries suggests that raising the level of financial indicators to the mean of the fastest growing group would eliminate between 10 and 30% of their difference in growth rates.

A few remarks are in order. First, Fernandez and Galetovic (1995) repeated King and Levine's exercise, but split the sample between OECD and non-OECD countries. While results were very similar for the sample of non-OECD countries, correlations are considerably weaker for OECD countries, especially when Japan is excluded from the sample: all financial indicators are insignificantly correlated with growth, the size of the estimated coefficients falls at least by one-third, and adjusted R^2s are reduced by one-half. Second, De Gregorio and Guidotti (1993) studied the correlation between the ratio of claims of deposit money banks and the central bank combined on the private sector to GDP (equivalent to the PRIVY indicator constructed by King and Levine), and growth in per capita income between 1960 and 1985 in standard Barro-type regressions for a sample of 98 countries. For the complete sample, their results are similar to King and Levine's. They also split the sample in three groups, according to per capita income in 1960, and found that the coefficient of the financial indicator is very large and significant for low-income countries, large and significant for middle-income countries, and small (though significant) for high income countries.[14]

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[13] These proxies are: the ratio of imports plus exports to GDP, the ratio of government expenditures to GDP, and the inflation rate, respectively. Regressions include also the logarithm of initial income and the logarithm of the initial secondary school enrollment rate.

[14] The value of the coefficient is half of that of the whole sample.

Third, another interesting finding of De Gregorio and Guidotti is that their financial indicator enters with a negative and statistically significant coefficient in growth regressions for twelve Latin American countries, which they attribute to the liberalization attempts in the late 1970s that failed because deposit insurance and poor prudential regulation encouraged banks to lend leniently and take excessive risks. Several authors interpret this as showing that financial development, meaning the development of private intermediaries, may retard growth. Nevertheless, if we think in terms of financial services that moderate the negative effects of incentive frictions, these results support the view that when these financial services are not provided, the average quality of firms falls and growth is retarded.

Size and asset distribution measures and the sources of growth. Assuming that there is a positive relation from financial services to growth, a relevant question is through which channels. In their work King and Levine investigated the relation of financial indicators with efficiency indicators, and with capital accumulation. They proxied efficiency by the incremental output-capital ratio, and by a growth residual, constructed by subtracting from the rate of growth of per-capita GDP that part associated with growth in the per-capita stock of physical capital (see King and Levine 1993b for details). Accumulation has been proxied by the investment rate, and by the rate of growth of the capital stock. Results are similar to those obtained for growth in per capita income: in countries that accumulate more and efficiency grows faster: (a) banking systems are larger on average; (b) a larger fraction of credit is allocated by commercial banks; (c) a larger fraction of credit is allocated to the private sector; and (d) loans to the private sector are larger as a fraction of GDP (see King and Levine 1993b, Tables, II, III and IV). Most of these correlations remain statistically significant at the 5% level in standard growth regressions, and estimated coefficients tend to be economically important (see King and Levine 1992, 1993a and 1993b).[15] For investment ratios (and again ignoring issues of causality), results suggest that a country that increases the level of its financial indicators from the mean of the group with the lowest ratios to the mean of the group with highest ratios would invest between 2.4 and 3.5%

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[15] The exception is the correlation of the incremental output-capital ratio with financial indicators, which is statistically insignificant in standard growth regressions (see King and Levine 1992).

more of GDP, thereby erasing between 17 and 25% of the difference in investment rates.[16] The same exercise performed with the figures of countries in both middle groups suggests that raising their level of financial indicators to the mean of the group with highest investment rates would eliminate between 19 and 35% of the difference. As regards efficiency, regression results suggest a smaller, though not negligible, impact of finance: a country that increases its financial indicators from the mean of countries where productivity grows very slow to the mean of countries where productivity grows fastest would erase between 8 and 15% of the gap in productivity growth rates; for countries in both middle groups the gains are between 4 and 20%.[17]

Two remarks are in order. First, De Gregorio and Guidotti (1993) investigated the channels whereby financial services affect growth by including investment ratios as right-hand side variables, the rationale being that if the main channel through which the relation between financial services and growth runs is the level of investment, then the estimated coefficient of the financial indicator should fall and no longer remain statistically significant. Since they found that, to the contrary, their financial indicator remained statistically significant, and its coefficient declined only by one-fourth, they concluded that most of the effects of financial services on growth are transmitted through an increase in the marginal productivity of capital. Second, an interesting finding of Fernandez and Galetovic (1995) is that in non-OECD countries there is a strong positive correlation between financial indicators and equipment investment. (As is known from the work of De Long and Summers – 1991, 1992 and 1993 –, there is a strong positive correlation between the growth rate of GDP per worker and equipment investment.) Nevertheless, the correlation turns negative and statistically insignificant if the sample is restricted to OECD countries.

Simultaneity. Several authors have stressed that the positive correlations between financial and growth indicators may reflect just that economic development causes financial development. To check for the possibility that the correlations are due to contemporaneous shocks that affect both financial and economic development, King

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[16] Countries' investment rates are classified into very high, high, low and very low.
[17] Countries' efficiency growth is classified into very high, high, low and very low.

and Levine (1993b) reestimated their equations using the level of liquid liabilities in 1960, initial decade values of all four financial indicators, and instrumental variables procedures (3SLS), the rationale being that the initial levels of financial indicators should be exogenous relative to subsequent growth. Results were similar to the ones obtained using contemporaneous values for the financial indicators, so that countries that initially had larger financial systems and allocated a larger fraction of credit through commercial banks and to the private sector tended to grow faster, invest more, and experience faster rates of productivity growth during the next 10 or 30 years. These results make it more likely that the positive associations between financial indicators and growth do not reflect merely that economic growth causes financial services to be demanded. Still, if growth or investment rates prior to the sample period are correlated with growth and investment rates during the sample period, then both an initially large financial system and fast subsequent growth could be the result of previous growth.[18] Nevertheless, this is unlikely: as seen before, financial systems develop and attain maturity during the initial decades of sustained growth, which suggests that to an important extent the demand for financial services is not the result of past economic growth.

Is the data adequate? One possible shortcoming of the financial indicators constructed by King and Levine is that they are not comprehensive enough, because deposit money banks issue or hold only a fraction of the financial assets of an economy. Nevertheless, if financial intermediaries and services matter for growth because of incentive frictions, then an aggregate of all financial assets is probably not an adequate proxy either, the reason being that many financial services have little to do with the financing firms and the overcoming of incentive frictions. For example, many types of insurance, or the consumption smoothing allowed by pension funds or consumer credit are financial services akin to consumption goods that have little, if anything, to do with the average quality of firms that receive funds. On the other hand, the omission of other financial intermediaries that lend to firms and of securities markets is in principle of some concern. In this regard, one point to note is that in LDCs loans are by far the most important type of intermediary, and security markets are unim-

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[18] On this point see also Gertler (1993).

portant as a source of funds for firms. Second, Mayer's (1990) study suggests that even in developed economies security markets are not the dominant source of funds for firms. And, as the study by Davis and Mayer (1991) indicates, even for large corporations banks continue to play an important role in their financing.

On the other hand, it could also be argued that bank lending includes items that have little to do with the overcoming of incentive frictions (e.g. mortgages and consumer loans), or even that larger banking systems may reflect a worsening of incentive frictions (as in the case of the failed Latin American liberalization attempts). While the former problem is matter of some concern, because the demand for mortgages and consumer loans is probably affected by economic development, the latter should not, because if the problem could be remedied, it would probably strengthen the positive correlations between financial indicators and growth.

5. An interpretation of the evidence

The last two sections have reviewed evidence suggesting that: (a) in market economies, financial systems develop and attain maturity during the very early stages of sustained economic growth; (b) incentive frictions are important, and intermediaries play an important role in overcoming them, even in today's developed economies; (c) financial indicators correlate positively with growth for a large cross-section of countries; (d) the positive association between financial and growth indicators is considerably weaker for OECD countries; and (e) while richer countries have larger financial systems on average, the size and institutional features of financial systems vary considerably among countries of similar level of development and growth performance. The purpose of this section is to interpret this evidence and argue that it is consistent with the thesis that financial intermediaries that help to overcome incentive frictions affect growth.

The first point to note is that Goldsmith's studies and the recent experience of East Asian countries suggest that the development of financial systems is not just a passive response to past economic development. As said before, would this be the case, then one should observe that market economies do without financial systems for a

long time after sustained growth starts. But more than that, both the early development of financial systems and the finding of King and Levine, that on average countries with small banking systems grow slower, are consistent with the conjecture that some financial services are necessary for sustained growth to start.

It is unlikely that the importance of financial systems rests only on overcoming of technological frictions. For one, as seen in Section 3, there is substantive evidence that incentive frictions are pervasive even in today's developed economies. For another, were technological frictions the main reason why financial systems matter, one should see substantial improvements in performance when repressed financial systems are liberalized, which does not square, for example, with Latin America's experience.

It is clear that financial services are not engines of growth; ultimately growth is driven by the acquisition of commercial and technical knowledge, the diffusion of innovations, and the accumulation of physical and human capital, not by the expansion of the range and quality of available financial services. But in market economies these activities, and the firms that undertake them, must be financed to an important extent with external funds, and the willingness to finance them depends on how well incentive frictions are overcome. The theme of the rest of this section is that incentive frictions hit the financing of activities that are engines of growth particularly hard, and that financial intermediaries matter for long-run growth mainly because of this.

In his *Theory of Economic History* (1969) Hicks suggests that the massive adoption of production processes requiring substantial amounts of fixed capital is the hallmark of the industrial revolution (and of economic growth and development ever since). He also stresses that in an uncertain world people would have been willing to sink capital only if they had access to liquid capital on short notice, which rendered intermediaries that provided liquidity services crucial for growth.[19] Recent developments in endogenous growth theory have emphasized a second distinguishing characteristic of modern economic growth, namely that it is the result of the creation and adoption of new knowledge that becomes embodied in new and better products and productive processes. Furthermore, one could

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[19] See Hicks (1969, pp. 141-145). Bencivenga and Smith (1991), and Bencivenga *et al.* (1993) formalize the idea that liquidity services affect growth and development.

add a third characteristic of modern economic growth, that the creation and adoption of knowledge occurs most of the time in specialized firms, which are depositories of intangible assets like commercial and technical knowledge embodied in their members and organizational procedures.

What is important to note is that because of incentive frictions these intangible assets are costly to finance. First, they are not homogeneous, so that it is not straightforward to determine their worth, nor are they easy to sell in secondary markets. Thus, the value as collateral of an asset such as the knowledge that a firm has about the preferences of a group of consumers depends mainly on how informed creditors are about that firm. Second, the creation and use of intangible assets requires mainly human effort, which is difficult to evaluate and monitor without keeping a close eye on the day-to-day affairs of the firm. Third, to invest and create knowledge is inherently risky, which probably affects the willingness to undertake such projects. Nevertheless, because of well-known moral hazard problems, which are particularly important in the case of intangible assets, creditors will not provide insurance to a firm unless they can directly monitor their actions. Last, intangible assets are difficult to describe and define, so their financing is particularly affected by the incompleteness of contracts.

These characteristics of intangible assets suggest the services (already mentioned in Section 2) that matter most for growth and development: information gathering about firms, screening, monitoring, and the prevention of opportunistic behavior in financial relations. Because intermediaries like commercial and investment banks are the main providers of these services, these are also in all likelihood the financial institutions whose quality probably matters most for long-run growth. The finding of Fernandez and Galetovic (1995) that non-OECD economies having on average larger banking systems invest more in equipment gives some evidence in favour of this, as one would think that the acquisition of equipment is related to the acquisition of the technical knowledge they embody and the commercial knowledge needed to make profitable use of it. More generally, one can think of two links between these financial services and long-run growth. The first can be seen by noting that, while costly to provide, they reduce the costs of financing the creation and acquisition of intangible assets, and thus the incentives to devote

resources to their creation and acquisition.[20] Not only do they allow creditors to influence directly the production and investment policies of their borrowers, thereby reducing the negative consequences of incentive frictions, but without them most firms would not have access to external finance in the first place. Furthermore, the extent to which firms can use credit markets to diversify idiosyncratic risks depends on the ability of creditors to overcome the moral-hazard problems inherent to insurance. A second link between these financial services and long-run growth can be seen by noting that when creditors are able to directly influence the actions taken by firms, the average quality of active firms rises. Average firm quality matters for growth through two channels. First, higher-quality firms raise the productivity of the resources employed in sectors that are engines of growth. This not only means better R&D labs, but also better firms seeking new markets, introducing managerial improvements, or training workers on-the-job. Second, firms in sectors other than the engine of growth demand the innovations produced with new knowledge; the higher their quality, the more innovations diffuse, the larger are the profits of making an innovation and the incentive to generate new knowledge (see Galetovic 1994b).

Given all this, one may conjecture that one of the main reasons why market economies develop a network of intermediaries when industrialization starts is because growth is made of the accumulation of intangible assets. According to this interpretation both the development of financial systems and the predominance of intermediated finance are endogenous to the nature of the growth process, and in this sense one can say that finance follows industry. But, on the other hand, what the pervasiveness of incentive frictions suggests is that the smooth provision of external finance is not a technological feature of market economies that can be taken for granted. Thus, financial intermediaries play more than a passive role in the mechanics of growth.

The reasons that suggest why financial intermediaries develop during the early stages of industrialization may also suggest that they are important for growth in mature economies like OECD countries. As seen in Section 3, an extensive empirical literature, and the fact that intermediated loans are the primary source of external finance for firms suggest that frictions in credit markets remain important

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[20] For a formal analysis of this see Galetovic (1994a).

long after industrialization begins; moreover, today growth is, if anything, even more dependent on the acquisition of knowledge. One may wonder why this positive influence of financial intermediaries on long-run growth is not captured by cross-country regressions. The reason may be just that most OECD countries had mature financial systems by the beginning of this century. Thus in present times all OECD countries have intermediaries that most likely overcome incentive frictions with similar effectiveness, so that there is little reason to expect cross-country growth regressions that include only mature economies to capture the positive influence of intermediaries on long-run growth.[21] Neither is it surprising to find that the size and institutional features of financial systems vary considerably across countries of similar development, without affecting much their long-run growth performance. Here one has to note that many financial assets issued in modern market economies originate in services that have little direct or indirect impact on the creation, adoption, and diffusion of commercial and technical knowledge; and whether they are offered is most of the time a matter of regulation. Conspicuous among these services are those akin consumption goods (e.g. credit cards, or the consumption-smoothing allowed by consumer credit and pension funds) that may significantly affect consumer welfare, but in all probability have little to do with the ability of an economy to allocate funds to creditworthy firms that create knowledge or invest in it. From a policy perspective this suggests that as long as regulators allow intermediaries to provide the services that bankers would perhaps call "traditional", and economists "information gathering", "screening", and "monitoring", finance will probably have little influence on long-run growth. On the other hand, inadequate provision of them will probably retard growth.

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[21] Of course, the exception is Japan, a clear outlier. Many authors attribute part of Japan's fast growth to the fact that Japanese banks seem to be uncommonly effective in overcoming incentive frictions, which could mean that even developed countries might gain by improving the ability of their financial systems of overcoming incentive frictions.

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