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FINANCE AND GROWTH:
A SYNTHESIS AND INTERPRETATION OF THE EVIDENCE

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ABSTRACT

Evidence is reviewed suggesting that: (a) in market economies financial systems develop and attain maturity during the early stages of industrialization; (b) frictions caused by asymmetric information and the incompleteness of contracts are important in credit markets, and intermediaries play an important role in overcoming them; (c) for a large cross-section of countries financial indicators correlate positively with growth. It is argued that financial intermediaries matter for growth because they moderate the negative effects of incentive frictions, thereby reducing the costs of financing the accumulation of intangible assets like commercial and technical knowledge.

Finance and Growth: A Synthesis and Interpretation of the Evidence

Alexander Galetovic*

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* (1911), it is fair to say that until recently most economists looked with skepticism 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?

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In a Walrasian world the main service provided by financial markets is the provision of insurance against idiosyncratic risks. Nevertheless, it is well known that in such a world information is symmetric, and complete contracts can be written and enforced, so that exchange can be organized by impersonal markets and financial arrangements become irrelevant. For this reason, the premise of this paper is that central to the interest in the relation between finance and growth is the belief that frictions in credit markets are important and affect real allocations. I start in section 2 by briefly discussing the nature of these frictions. A distinction is made between technological frictions —frictions caused by the properties of the transaction and security-issuing technologies in credit markets; and incentive frictions —frictions caused by asymmetric information and the incompleteness of contracts. It is argued that when thinking about finance and growth one should focus on incentive frictions, because only incentive frictions change the irrelevance results that follow from the Walrasian theory.

With this conceptual framework in mind I examine in section 3 the path of financial development that has been followed by several industrial economies since the industrial revolution until today. Hallmarks of this path are that financial systems develop and mature during the very early stages of industrialization and sustained economic growth, and that intermediated loans predominate as source of external funds for firms. Further evidence is reviewed suggesting that incentive frictions are important even today in developed economies, and that intermediaries help to overcome them.

In section 4 recent cross-country correlation studies that examine the relation between financial indicators and growth are reviewed. Several financial indicators correlate positively with growth, and countries that grow faster have on average larger banking systems. These positive correlations remain statistically significant and economically important in standard growth regressions that control for other factors that affect growth. Moreover, financial indicators also correlate positively with investment rates

and measures of efficiency growth. An important caveat, however, is that correlations tend to be considerably weaker and statistically insignificant for OECD countries .

Section 5 interprets the evidence. It is argued that financial intermediaries matter for growth because they moderate the negative consequences of incentive frictions. Incentive frictions affect the long-run growth performance of the economy because growth is to an important extent the result of the accumulation by firms of intangible assets like commercial and technical knowledge. In turn, the inherent properties of intangible assets also suggest that the services that matter for growth are information gathering about firms, screening, monitoring, and the prevention of opportunistic behavior in financial relations; and that intermediaries that provide them, like commercial and investment banks, are the financial institutions that matter most. Thus, market economies develop a network of intermediaries during the early stages of industrialization precisely because growth is made of the accumulation of intangible assets. Moreover, the fact that incentive frictions do not disappear with economic development indicates that even in developed economies, financial services that help to overcome them play an important role in the growth process. Nevertheless, the weak correlations between financial indicators and growth for OECD countries, and the fact that financial systems attain maturity early on in the development process suggest that the contribution to economic growth of these financial services is limited, and that to an important extent most gains are realized early in the development process.

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 without further apology.

2. Frictions in credit markets

The central premise of this paper is that frictions in credit markets are important and affect real allocations. This section briefly discusses the nature of these frictions, the role of financial intermediaries in overcoming them, and sets up a basic analytical framework to interpret the evidence reviewed below on the relation between finance and growth.

A useful benchmark to think about financial intermediaries is the standard Walrasian model. In a Walrasian 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 can be organized through direct and impersonal markets. As is well known, under such assumptions an efficient risk allocation is achieved whenever a complete set of markets exists; 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 the securities issued by individual firms are not perfectly divisible, and that there are scale economies in transaction technologies.¹ This view, first proposed by Gurley and Shaw in *Money in a Theory of Finance* (1960), stresses that intermediaries transform the primary securities issued by firms —bonds, shares, etc.— into the indirect securities that final savers want. By lumping together the funds of many small savers, financial intermediaries take advantage of scale economies and overcome the indivisibility of firm's securities; by lending to many firms they take advantage of the law of large numbers and diversify borrower-specific risks. In terms of frictions in credit markets we may say, therefore, that according to this view intermediaries overcome mainly

¹On this see Hellwig (1991).

technological frictions —frictions caused by the properties of the transaction and security-issuing technologies.

Technological frictions give a rationale for the existence of intermediaries, but under fairly weak assumptions they do not change the irrelevance results that follow from the Walrasian model. To the extent that 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, from a policy perspective the adequate course of action is to let the invisible hand work. As long as governments do that, cross-country differences in growth performance cannot be attributed to differences in financial arrangements. Moreover, technological frictions suggest that the main determinant of financial structure is the preference pattern of individual savers, not the services provided when lending. As Fama (1980) pointed out, on the asset side of their balance sheets all intermediaries look like ordinary mutual funds; thus, as regards the financing of firms, both direct and indirect markets are impersonal. On the liability side of their balance sheets intermediaries differ by the security they issue. For example, commercial banks typically issue demand and time deposits, which are different from the securities issued by pension funds or life insurance companies.

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 because 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 their 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) has suggested, the incompleteness of contracts causes time-consistency problems: ex-post a borrower may have incentives to exploit lenders because most of the time assets are more valuable in the hands of the firm. Intermediaries reduce the bargaining power of the borrower and its incentive to behave opportunistically by becoming acquainted with the inner workings of the firm, thus being able to take control of its assets at a lower cost.

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 risks rests on the extent to which they are able to overcome incentive frictions. Because of this, cross-country differences in growth performance may be partly explained by differences in financial arrangements. Moreover, incentive frictions suggest that financial intermediaries should be distinguished not so much by the type of security they issue, but rather by how close they get involved with the firms they finance. This has two interesting implications which will be of some importance in the discussion below. First, the sharp distinction usually made between commercial and investment banking is no longer clear cut. An investment bank that develops a long-term working relationship with a firm, and repeatedly puts its reputation at stake when floating the firm's securities probably helps to overcome incentive frictions as much as a commercial bank that lends its own funds. Second, if security design and the information disclosed by firms are not enough to overcome incentive frictions, neither indirect nor direct financial markets are likely to be impersonal; to work they will require intermediaries like commercial and investment banks that get acquainted with the inner workings of the

²On this see Diamond (1984).

firms they finance, and that are able to influence firms' policies and actions directly. Let us now proceed with the evidence on the relation between finance and growth.

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 from the moment that sustained growth begins. The purpose of this section is to describe this path, and to answer two questions. First, do market economies typically develop a modern financial system during the early stages of sustained growth, or after they have industrialized? Second, are incentive frictions important in today's developed economies?

We begin by looking at the work of Raymond Goldsmith on national balance sheets, which gives an accurate picture of the financial development of several developed countries since the Industrial Revolution. Goldsmith (1969, 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 the value of all financial assets issued either by financial or 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 LDC's) 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 3.1 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 twentieth century, FIR varies widely in the medium term, but it does not show any clear trend.

Table 3.1 Financial Interrelations Ratio (FIR) 1850-1978

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

Source: Goldsmith (1985, table 19)

^aFor actual dates see Goldsmith (1985, table 33). ^bIn addition 1815: 0.18; ^cIn addition 1688: 0.17; 1760: 0.40; 1800: 0.57; 1830: 0.42.

^dIn addition 1774: 0.28; 1805: 0.32.

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 behavior of FIR essentially tells the same story as several historical studies that trace the origins of modern financial systems to the early stages of industrialization.³

FIR has not been computed for countries that have become industrialized during this century, but since in most economies banks are by far the most important issuer of financial assets, an accurate description of the evolution of their financial systems can be obtained by looking at the ratio of M2 to GDP. Table 3.2 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

³See, for example, Cameron (1967, 1972, 1992), and Sylla (1975).

Table 3.2 Ratio of M2 to GDP, selected countries, 1955-1990^a

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

Source: IMF, International Financial Statistics Yearbook, various issues.

^aM2 is IFS line 32d; GDP is IFS line 99b.

^bFor Taiwan the source is McKinnon (1991, table 2.2), and figures correspond to the ratio of M3 to GNP.

think that the increasing size of financial systems in NICs may just have been the reflection of a larger, worldwide trend towards larger financial systems. Goldsmith's (1969) study, however, shows that this is not the case. As mentioned before, today's LDCs have financial systems that are similar in size to those of the United States and Western Europe before their industrialization.

A second characteristic of the path of financial development, which is not apparent from looking at FIR, is that during the early stages of industrialization firms obtain most of their external funds with the intervention of intermediaries. This is not to say that intermediaries develop in similar fashion everywhere. A closer look at particular experiences reveals significant cross-country differences in terms of market structure, in the 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 during 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;⁴ and in most Asian NICs financial systems have been heavily regulated, and until recently,

⁴See Carosso (1970) on the United States, Neuburger (1977) and Whale (1930) on Germany, and Cottrell (1980) and Lavington (1921) on Britain.

governments owned most financial institutions.⁵ Nevertheless, the common thread is that during the early stages of industrialization most firms could access external finance only through an intermediary. Moreover, it is particularly interesting to note that as a source of industrial finance direct markets worked best 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 implies that economic development reduces the importance of incentive frictions and makes financial markets more impersonal. Nevertheless, the study by Mayer (1990) suggests that this belief is not warranted. Mayer collected data from the flow-of-funds accounts of eight industrial economies, and inquired into the sources of funds of corporations. Table 3.3 shows that 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. What is also notable is that retained profits are everywhere a very important source of funds, in several countries the dominant one.

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

⁵See, for example, Fry (1988, ch. 14.2), Skully and Viksnins (1987), and Cho (1989).

Table 3.3 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	na	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	na	-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)

1940s on less than 5% of corporate funds were obtained by issuing shares.⁶ 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 a number of empirical studies that have tested 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 three of its findings that are germane to our discussion. First, as Bernanke (1993) has noted, one of the insights of the theoretical literature on the agency costs of external finance is that incentive frictions make external finance intrinsically more expensive than internal finance. Thus, of two firms facing an identical investment opportunity, the one with the greater availability of internal funds will always be more willing to make the investment. This insight is confirmed by a number of empirical studies that show that firms' liquidity positions affect their willingness to invest.⁷

⁶See Taggart (1985, table 1.4).

⁷See, for example, Fazzari, et al. (1988), Fazzari and Atthey (1987), and Hubbard and Kashyap (1992).

Second, several studies suggest that intermediaries reduce the negative effects of incentive frictions and have better information about their clients 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 between cash flow and investment outlays 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 Lumber and McConnel (1989) found that on average, a firm's share price rises when a loan agreement with a bank is announced, but falls when the firm uses private placements or straight debt to repay bank loans, or the bank tightens restrictive covenants. This suggests that banks have information about their clients that other third parties have not.

Third, many studies suggest that intermediaries reduce the costs of financial distress and firm 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 the restructuring 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 inner workings of 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 distressed firms that do not have such a relation. Corbett (1987) reports that Japanese banks reduce the costs of

financial distress because they maintain close relationships with their clients and have enough inside knowledge to organize the restructuring of 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, and that firms that restructure outside Chapter 11 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 their correlation patterns with per capita growth rates, investment rates, and measures of productivity. 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 a proxy for financial services comes from the "financial repression" paradigm of McKinnon (1973) and Shaw (1973).⁸ As has been discussed exhaustively in this literature, financially repressed economies are characterized by nominal interest rates that are fixed at low levels, and high and variable inflation rates. According to the financial repression paradigm, however, real interest rates are more than just a proxy for financial services: negative real interest rates reduce growth directly, because they discourage saving (and thus investment), and reduce the efficiency of investment. Furthermore, it seems reasonable to think that when financial intermediaries can pay and charge only extremely negative real interest rates they are not able to provide a high level of financial services, so that empirical investigations that examine the relation between real interest rates and growth

⁸See Fry (1988) for a survey. De Gregorio and Guidotti (1993) discuss the shortcomings of interest rates as proxies for financial services.

can be interpreted both as tests of the financial repression paradigm, and of the hypothesis 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, higher growth rates are associated with higher real interest rates. Moreover, several studies report that real interest rates correlate positively with growth.⁹ 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 be also be proxies for other policy-induced distortions. In this line, King and Levine (1992) considered a dummy variable that identified real interest rates below -5% p.a., but, in addition, they included variables that proxied for policy distortions. The estimated coefficient of this interest-rate dummy turned out to be negative and economically important, but statistically insignificant at the 10% level.

On the investment side, there is evidence that the efficiency of investment (as measured by the incremental output-capital ratio) correlates positively with real interest

⁹See Dornbusch (1990), Easterly (1990), Fry (1988, ch. 6.4), Gelb (1989), and Polak (1989).

rates.¹⁰ The positive association between real interest rates and the efficiency of investment 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 in this case it is clear that causality might run from the efficiency of investment to real interest rates: countries with productive investments can 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, b) with data from the *International Financial Statistics*. Their sample includes about 80 countries, excludes major oil exporters, and covers the period 1960-1989. Two of their 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. It has been known at least since the studies of Gurley (1967) and Goldsmith (1969) that on average richer countries have larger financial systems. Table 4.1, which groups countries according to their growth rates, shows that the same relation holds for countries that grow faster.¹¹

Some of the services that financial intermediaries provide, and in particular, 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

¹⁰ See Fry (1988, ch. 6.3) and Gelb (1989).

¹¹ See also Gertler and Rose (1991), King and Levine (1993a), Neal (1990), and World Bank (1989).

Table 4.1 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).

^aGrowth 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: Cross claims on private sector to GDP.

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 ratio of the domestic assets of deposit money banks to the domestic assets of the Central Bank and deposit money banks combined (BANK).¹² The conjecture here is that Central Banks do not offer services that overcome incentive frictions. Second, to measure who uses the 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 here is that when financial intermediaries lend to the public sector they may not evaluate with the same thoroughness as when they lend to private firms (as they note, however, these indicators could be just a proxy of the relative size of the private sector). It can be seen from table 4.1 that in countries that grow faster: (a) a larger fraction of credit is allocated by commercial banks; (b) a larger fraction of credit is

¹²Deposit money banks comprise commercial and other banks with large demand deposits.

allocated to the private sector; and (c) loans to the private sector are larger as a percentage of GDP.

All these correlations remain statistically significant at the 1% level in most standard growth regressions that include 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 causality issue, they imply that a country that increases the level of its financial indicators from the mean of the slowest growing group in table 4.1 to the mean of the fastest growing group would grow by between 0.7 and 1.1 percent p.a. faster. Since the difference between the very fast and very slow growers is about 5%, this would erase between 15 and 20% of the difference in growth rates. The same exercise performed 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 (1994) 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 between financial indicators and growth are considerably weaker for OECD countries. This is especially apparent when Japan is excluded from the sample, for then all financial indicators are insignificantly correlated with growth, the size of the estimated coefficients falls at least by one-third, and the adjusted R^2 s 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

¹³These 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.

sample of 98 countries. For the complete sample, their results are similar to King and Levine's. Nevertheless, they also split the sample in three groups, according to per capita income in 1960. They found that the coefficient of the financial indicator was very large and significant for low-income countries, large and significant for middle-income countries, and small (though significant) for high income countries.¹⁴ 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. They attribute this result to the liberalization attempts in the late 1970s, which failed because deposit insurance and poor prudential regulation reduced the incentives banks had to gather information to screen and monitor their clients, and encouraged banks to take excessive risks. Several authors interpret this evidence as showing that financial development, by what is meant 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, generally speaking, when these financial services are not provided, the average quality of firms falls, and long-run growth is retarded.

Size and asset distribution measures and the sources of growth. Assuming that the positive correlations between financial indicators and growth reflect a relation that runs from financial services to growth, a relevant question is through which channels this relation runs. Most studies addressing this question have investigated the relation of financial indicators with efficiency indicators, and with capital accumulation. In their work, King and Levine have 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 their 1993b paper for details). Accumulation has been proxied by the investment rate, and by

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

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 in standard growth regressions at least at the 5 per cent level, and estimated coefficients tend to be economically important (see King and Levine 1992, 1993a, b).¹⁵ For investment ratios (and again ignoring issues of causality), regression results suggest that a country that increases the level of its financial indicators from the mean of the group with the lowest investment rates to the mean of the group with highest investment rates would invest between 2.4 and 3.5 percent more of GDP, thereby erasing between 17 and 25% of the difference in investment rates (countries' investment rates are classified into four categories: very high, high, low, and very low). 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 financial services: a country that increases the level of its financial indicators from the mean of the countries where productivity grows very slow, to the mean of countries where productivity grows fastest, would erase between 8 and 15% of the difference in productivity growth rates (countries' efficiency growth is classified into four categories: very high, high, low, and very low); for countries in both middle groups the gains amount to between 4 and 20%.

Two remarks are in order. First, De Gregorio and Guidotti (1993) investigated the channels whereby financial services affect growth by including investment ratios as

¹⁵The 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).

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 (1994) is that, as with growth rates, the correlation between investment rates or efficiency indicators on the one hand, and financial indicators on the other, is generally statistically insignificant for OECD countries; moreover, estimated coefficients are much smaller. On the other hand, results for non-OECD countries are similar as those for the whole sample.

Simultaneity. Several authors have stressed that the positive correlations between financial and growth indicators may just reflect that economic development causes financial development. To check for the possibility that the correlations merely reflect contemporaneous shocks that affect both financial and economic development, King and Levine (1993b) estimated again their equations using the level of liquid liabilities in 1960, initial decade values of all four financial indicators, and instrumental variables (3SLS) procedures, the rationale being that the initial levels of the financial indicators should be exogenous relative to subsequent growth. The results were similar to the ones obtained using contemporaneous values for the financial indicators. Thus, countries that initially had larger financial systems, and initially 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.¹⁶ These results strengthen the likelihood that the positive associations between financial

¹⁶It is interesting to note that these relations are again very weak for OECD countries. See Fernandez and Galetovic (1993).

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.¹⁷ Nevertheless, Goldsmith's evidence and the recent experience of East Asian countries render this possibility unlikely. As seen before, financial systems develop and attain maturity during the initial decades of industrialization and sustained growth, when economies are still relatively poor. This 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. By itself, however, this is not damning. 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, 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. Nevertheless, 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 unimportant 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

¹⁷On this point see also Gertler (1993).

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 there are circumstances, where larger banking systems reflect a worsening of incentive frictions (e.g. as in the case of the failed Latin American liberalization attempts). The latter should not be matter of much concern, because if the problem could be remedied, it would probably strengthen the positive correlations between financial indicators and growth. The former problem, however, is matter of some concern, because the demand for mortgages and consumer loans is probably affected by economic development, which introduces the simultaneity problem again.

5. An interpretation of the evidence

The preceding two sections have reviewed evidence suggesting that: (a) in market economies, financial systems develop and attain maturity during the early stages of economic growth, not after economies have industrialized; (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; in particular, on average countries that have larger banking systems grow faster and invest more; (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 long-run growth performance. The purpose of this section is to interpret this evidence, and to argue that it indicates that financial intermediaries affect growth even in today's developed economies.

The first point to note is that Goldsmith's evidence, and the recent experience of East Asian countries strongly suggest that the development of financial systems is not just a passive result of past economic development. As said before, would this be the case, then one should observe that financial systems develop after economies industrialize, not during the early stages of sustained growth. But more than that, the early development of financial systems also suggests that some financial services are necessary for sustained growth to start. This is confirmed by the finding of King and Levine that on average, countries with small banking systems (and thus, where in all likelihood, financial systems are underdeveloped) grow slower.

It is unlikely that the importance of financial systems rests mainly on their 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, then one should see substantial improvements in the performance of economies that liberalize their repressed financial systems; clearly, this does not square, for example, with Latin American financial liberalizations. Thus, in all likelihood the importance of finance, and in particular of financial intermediaries like commercial and investment banks, mainly rests on their overcoming of incentive frictions.

But why are some of the financial services provided by intermediaries important for long-run growth? It is clear that they 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 all these activities, and the firms that undertake them, are financed to an important extent with external funds. Because of this, 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 particularly hard the financing of activities that are engines of growth, and that the importance of financial intermediaries for long-run growth rests on this fact.

In his influential *A Theory of Economic History* (1969) Sir John Hicks suggested that the massive adoption of production processes requiring substantial amounts of fixed capital was the hallmark of the industrial revolution (and of economic growth and development ever since). He also stressed that in an uncertain world people would be 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.¹⁸ Recent developments in endogenous growth theory, in particular the works of Romer (1990), and Grossman and Helpman (1991), 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 add a third characteristic of modern economic growth, namely that the creation and adoption of knowledge occurs most of the time in firms. Firms certainly own and accumulate fixed assets like buildings and machines, but are also depositories of intangible assets like commercial and technical knowledge embodied in their members and organizational procedures.

What is important to note here is that by their very nature these intangible assets on which long-run growth relies 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 to an important extent human effort, which is difficult to evaluate and monitor without direct day-to-day involvement in the affairs of the firm. Third, to invest and

¹⁸See Hicks (1969, pp. 141-145). Bencivenga and Smith (1991), and Bencivenga et al. (1993) formalize the idea that liquidity services affect growth and development.

create knowledge is inherently risky, and risk 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 monitor their actions directly. Last, intangible assets are difficult to describe and define, and therefore, their financing is particularly affected by the problems created by the incompleteness of contracts.

The inherent properties of intangible assets suggests 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. One link between these financial services and long-run growth can be seen by noting that, while costly to provide, they considerably reduce the costs of financing the creation and acquisition of intangible assets, and thus the incentives to devote resources to their creation and acquisition.¹⁹ 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 the provision of insurance.

The 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,

¹⁹For a formal analysis of this see Galetovic (1994a).

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, it is reasonable to think that market economies develop a network of intermediaries during the early stages of industrialization precisely because growth is made of the accumulation of intangible assets. Thus, 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 and is not an engine of growth. But, on the other hand, what the pervasiveness of incentive frictions tells is that the smooth provision of external finance is not a technological feature of market economies that can be taken for granted. Thus, while finance is not an engine of growth, it clearly plays more than a passive role in the mechanics of long-run growth.

The reasons that explain why financial intermediaries and systems develop during the early stages of industrialization also explain why financial intermediaries 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 long after the early stages of industrialization; moreover, if anything, these days growth is even more dependent on the acquisition of knowledge. One may wonder why the positive influence of financial intermediaries on long-run growth in mature economies is not captured by cross-country growth regressions. The important point to note here is that most OECD countries had mature financial systems by the beginning of this century, which suggests that market economies realize most of the feasible gains of overcoming incentive frictions early in the development process. Thus, in present times

all OECD countries have intermediaries that, one would think, overcome incentive frictions with similar effectiveness. Because of this there is little reason to expect that cross-country growth regressions that include only mature economies will capture the positive influence of intermediaries on long-run growth. (Of course, the exception is Japan, a clear outlier. Many authors have attributed 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.)

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 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. The list of services that have little relation with long-run growth certainly includes those that by their very nature are consumption goods (e.g. credit cards, or the consumption-smoothing allowed by consumer credit and pension funds), that may affect consumer welfare significantly, 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, the inadequate provision of these services will probably retard long-run growth.

6. Concluding remarks

The main conclusion that emerges from this review is that there is reasonable evidence supporting the belief that financial intermediaries affect long-run growth, this even in today's developed economies. I will finish by briefly discussing some further implications of the analysis.

First, the early maturity of financial systems suggests that market economies realize most of the feasible gains of overcoming incentive frictions relatively early in the development process. Thus, when thinking about the role of finance in economic development it is important to make a sharp distinction between the effects on long-run growth of creating a network of intermediaries that gather inside information about firms, screen and monitor their performance, and prevent opportunistic behavior in financial relations; and the effects on long-run growth of the wide list of other financial services and constant financial innovation that characterize financially mature economies. While intermediaries that provide the traditional financial services seem to be necessary for industrialization and sustained growth, the effect of further financial innovations on long-run growth is more dubious. From a policy perspective, this suggests, for example, that at this point Eastern European countries and LDC's will gain little if they attempt to mimic sophisticated American-style securities markets; rather, they should concentrate their efforts in creating sound commercial and investment banks.

Second, all this does not necessarily imply that developing security markets is irrelevant for growth. Not only do security markets promote an efficient allocation of resources by providing prices, easing the reallocation of existing resources, and allowing the diversification of idiosyncratic risks, but in developed economies they are of some importance as a source of funds for (especially large) firms. Moreover, in the late nineteenth century they were very important for financing the adoption of large-scale production techniques and the corporate mode of organization in Germany and the

United States. The pervasiveness of incentive frictions suggests, however, that when security markets work as a source of industrial finance they are not impersonal, in the sense that to float securities, firms have to be promoted by investment banks who put their reputation at stake with each issue. In this regard (as mentioned in section 3), a look at history suggests that investment banks in the United States, and the large *Kreditbanken* in Germany got closely involved in firms' affairs. In contrast, when they didn't, as in Victorian Britain, security markets were unimportant as a source of industrial finance. Thus, when thinking about developing security markets to facilitate long-term industrial finance in LDC's one should perhaps put the emphasis not so much in developing the institution of the stock market and the types of securities traded in them, but rather in developing investment banks that are able to assume corporate governance tasks, and to promote firms in security flotations.

The last observation regards the implications for further research on the relation between finance and growth. The recent theoretical contributions on the subject have taken advantage of the insights coming out of the new models of endogenous growth,²⁰ but not so much of those coming out of the theories of asymmetric information and incomplete contracts.²¹ This review suggests that it is in this area where we should focus our efforts to improve our understanding of the links between finance and growth.

²⁰For a review see Pagano (1993).

²¹Notable exceptions are Khan (1993) and Azariadis and Smith (1993).

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