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## **Finance and economic growth – a review of theory and the available evidence**

by

**Michael Thiel**

Directorate General for  
Economic and Financial Affairs



# Finance and economic growth

## - a review of theory and the available evidence

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### **Abstract**

The EU's structural reform agenda attaches a considerable weight to the establishment of efficiently working and integrated EU financial markets. While there is a firm consensus that a well-functioning financial sector is a precondition for the efficient allocation of resources and the exploitation of an economy's growth potential, the economic literature is less consensual on how and to what extent finance affects economic growth. This paper reviews the economic theory and available evidence with particular focus on three questions: (1) How does financial development affect economic growth; (2) what are the features of a growth supportive financial structure; and (3) how are financial structures related to structural change and technical progress? It emerges that financial development is related to economic growth even in industrial countries. But it is also shown that empirical analysis at the aggregate level is unlikely to capture the complexity of the financial structures in industrial countries and of the growth process.

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\* Views expressed in the paper are exclusively those of the author and do not necessarily correspond to those of the European Commission, for whose Directorate General for Economic and Financial Affairs the author is working. I would like to thank Servaas Deroose, Harry Huizinga, Brian Kavanagh, Rolf Kjaergaard and Sven Langedijk for comments on earlier versions of the draft. Shortcomings and errors are only the responsibility of the author.

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## 1. Introduction

*"Although conclusions must be stated hesitantly and with ample qualifications, the preponderance of theoretical reasoning and empirical evidence suggests a positive, first-order relationship between financial development and economic growth. [...] There is even evidence that the level of financial development is a good predictor of future rates of economic growth, capital accumulation and technological change. Moreover, cross country, case study, industry- and firm-level analyses document extensive periods when financial development - or the lack thereof- crucially affects the speed and pattern of economic development." R. Levine (1997)*

Since the survey by Ross Levine of what may be called the first wave of evidence on the finance-growth nexus, research in this area has intensified. Interest was stimulated by at least three factors: (1) the regained popularity of growth theory in general; (2) the availability of huge cross-country data sets; and not least in the EU (3) a policy interest in stimulating growth on the one hand and in creating a single financial market on the other.

The controversy between apologists of the neo-classical approach and endogenous growth models has certainly contributed to the revitalisation of economic growth theory. From the neo-classical point of view, economic growth is entirely driven by the accumulation of input factors and technical progress, with the potential role of finance restricted to assistance in the accumulation of capital. Endogenous growth approaches stress the role of entrepreneurship and innovation, which allows some leeway for finance to direct incentives to research and innovation or rent-seeking. While no economist affiliated to one or other camp would doubt that a developed financial system is beneficial for growth, the importance attached to finance differs with respect to two key questions. Firstly, is financial development a pre-condition for economic development or does the financial sector develop in parallel with overall economic development? Secondly, do differences in financial development only account for differences in early stages of economic development or do they also matter for mature industrial economies?

The compilation of cross-country data banks covering a wide range of economic variables has given considerable impetus to empirical research. Cross-country regressions have become a common tool for attributing variation in growth performance to differences in economic, social, and political factors. The empirical literature on finance and growth has flourished with the availability of new data sets. However, while a plethora of financial data exists, the availability of data on financial prices on a daily basis or even a greater frequency being particularly notable, it must be stressed from the onset that the availability of structural data of high quality for financial markets and an insufficient degree of comparability across countries still remains a fundamental problem for studying the finance-growth linkage.

The interest of economic policy makers in growth-related questions is apparently motivated by the appearance of high rates of growth in the country that is considered to have the most advanced financial system, the USA. In comparison, the growth performance of the EU falls short and it has been repeatedly argued that the large and advanced US financial system has decisively contributed to accomplishing dynamic

growth, and that the lack thereof has curtailed growth in the EU. In particular, the emergence of "new economy" growth patterns appeared to have benefited from a "circulus virtuosus" characterised by technical progress in the ICT sector, an increasing valuation of ICT firms on stock markets and easy financial conditions for innovation in the ICT sector. However, financial markets in the EU have featured considerable changes and remedying national fragmentation is high on the policy agenda with the momentum increased since the introduction of the euro.

Earlier work by the Commission has dealt with the welfare gains expected from financial integration.<sup>1</sup> Meanwhile, academic research has progressed in analysing the dynamic effects of finance on economic growth, which were only sketched in the so-called Ceccini report. The present paper reviews the underlying transmission channels between financial developments and economic growth and attempts to apply the principles identified in the academic literature to the situation in the EU. It discusses recent theories and reviews the available empirical evidence with focus on three questions:

1. How does financial development effect economic growth?
2. What are the features of a growth supportive financial structure?
3. How are financial structures related to structural change and technical progress?

## **2. *Some stylised facts on financial developments in the EU***

Providing a comprehensive view on financial developments in the EU is complicated by three facts. Financial structures are complex, they differ between Member States and they change over time. Despite the efforts from international organisations such as for instance Eurostat, the ECB, the World Bank and the OECD, data on financial structure is neither sufficiently detailed and harmonised nor does it simultaneously cover many Member States and longer time periods. Thus, this section cannot refrain from applying a patchwork approach, presenting data from different sources that do not necessarily fit together.

With the guiding concentration of this paper being on a phenomenon at the aggregate level, it appears natural to follow a top-down strategy. The essential role of finance is to channel savings to investment. Financial prices such as interest rates, exchange rates or stock prices serve to adjust the individual plans of economic agents to be consistent with equilibrium for the aggregate. Figure 1 reveals the national investment-saving pattern as a snapshot for the 1990s. For a closed economy, the balance of payments is zero by definition and consequently, investment and savings are equal. Thus, displaying investment and saving relations at the national level serves to assess the impact of international flows on domestic finance.<sup>2</sup> The chart reveals that the larger EU Member States are closer to the 45 degree line ( $I = S$ ) than the small open economies. According to this measure, the European Union and the euro area

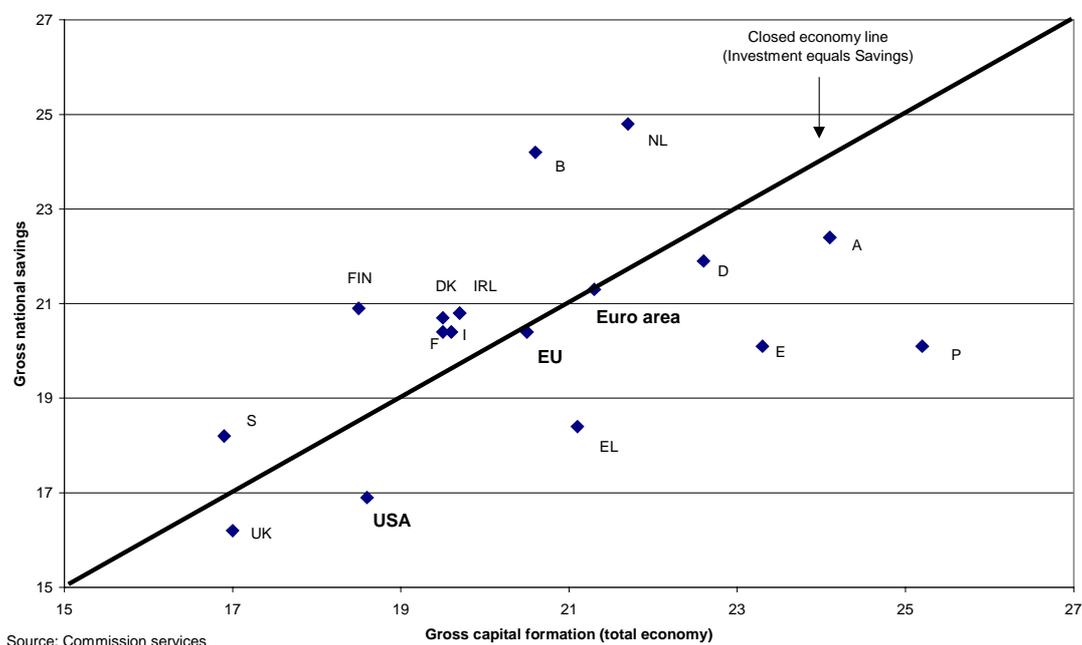
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<sup>1</sup> The Ceccini report estimated the realisation of the single market for financial services to yield a consumer surplus of around 26 billion euro. This was derived from the convergence of prices for financial services, which at the end of the 1980s still differed considerably in EU. See European Commission (1988).

<sup>2</sup> This measure was first used by Feldstein/Horioka (1980) to demonstrate the low degree of international financial integration.

display closed economy features.<sup>3</sup> The finding that the Member States' observations are more distant from the 45 degree line than the European aggregates suggests that intra-European capital flows exert some influence on national savings and investments within Member States. Indeed, the co-existence of closed-economy features for the EU aggregates with some considerable deviation from the 45 degree line for a number of Member States could be indicative of a well-integrated intra-regional financial market with limited exposure to forces outside this area. The implication would be that the analysis of finance growth linkages, via the observation of investment and saving patterns, ought to be carried out within a European rather than a national framework. Bearing this in mind, it nevertheless appears appropriate to analyse the finance-growth nexus from the domestic point of view and neglect international influences in the remainder of this paper.

**Figure 1: Investment-savings pattern in EU Member States and the USA, average 1991-2000 in percent of GDP**



The instruments used by non-financial entities to save or to finance investment may be evident from financial accounting systems, which in the case of European aggregates are still under construction. The ECB has assembled data for the euro area, which, while not yet as detailed as those by national central banks, allows for a cautious, first impression to be derived (see Table 1).<sup>4</sup> The data is derived from financial quarterly accounts covering data from ten euro area Member States, data is missing only for Ireland and Luxembourg. The table shows that the three non-financial sectors; government, households and non-financial corporations use different forms of financing, with the government dominating the security market and households relying on long-term loans. Non-financial corporates are mainly financed through quoted shares and bank loans, with two thirds of the latter two thirds being of long-term maturity. As regards flows in contrast to stocks, the relative importance of

<sup>3</sup> The excess of investment over savings in the US in the chart reflects the US current account deficit.  
<sup>4</sup> See Banque de France (2000) for France; for Germany see Deutsche Bundesbank (2001).

loans over stocks is even more pronounced for non-financial enterprises.<sup>5</sup> An important item missing is the internal financing of enterprises. For instance, in Germany more than 50 per cent of the investment of non-financial corporations is usually self-financed through cash-flows generated from profits and depreciation. Also lacking are unquoted shares and equity in any form other than shares.

As regards assets, only about a third of the non-financial sector's financial wealth is stored in securities (quoted shares and debt instruments) The rest is held either at banks (monetary financial intermediaries in the ECB's definition), funds or insurance companies. The fact that bank deposits are relatively small compared to bank loans implies that banks attract funds from other financial intermediaries. Furthermore, the consolidated data points to a huge divergence between quoted shares held as financial assets and liabilities. This points to extensive share holding by the financial sector. Overall, the general perception of the euro area's financial sector being dominated by financial intermediaries of which banks are the most important finds confirmation in Table 1.

Chart 2a gives some more details on the external financing flows of corporations, displaying that financing is mainly of a long-term character. Only about a tenth of new financing is in the form of loans of maturity up to one year, with the amount of new loans derived from the changes in stocks. Long-term loans dominate debt financing. As evidenced by a sizeable share in 1999, the issuance of debt securities by non-financial corporations has experienced vivid growth over the last years. A quarter of new finance was raised through the issuance of quoted shares. Moreover, equity financing is more important than indicated by the value of quoted shares. An almost equally important share of equity financing is done in other forms of equity, non-quoted shares and venture capital, i.e. items missing in Table 1.

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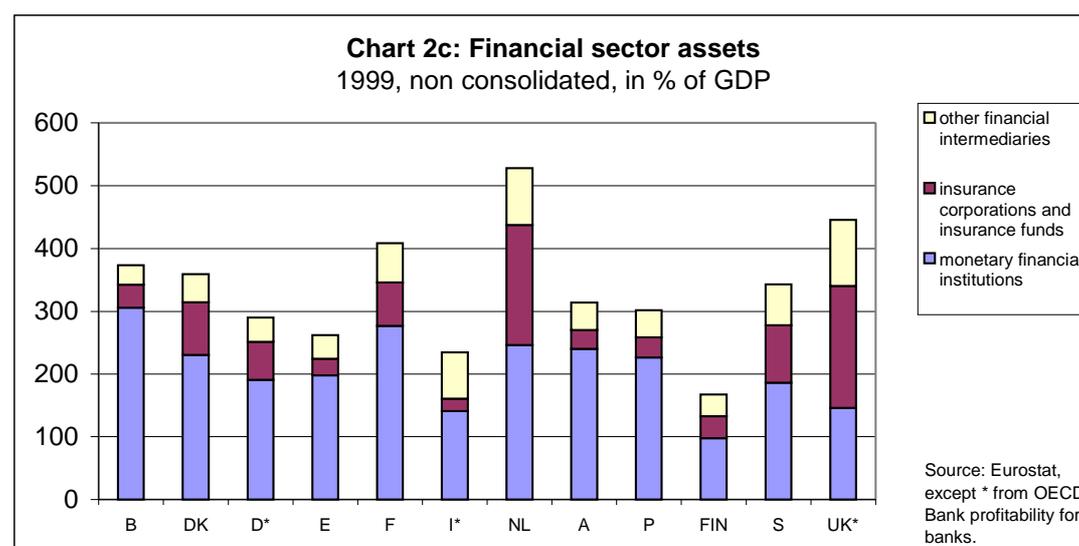
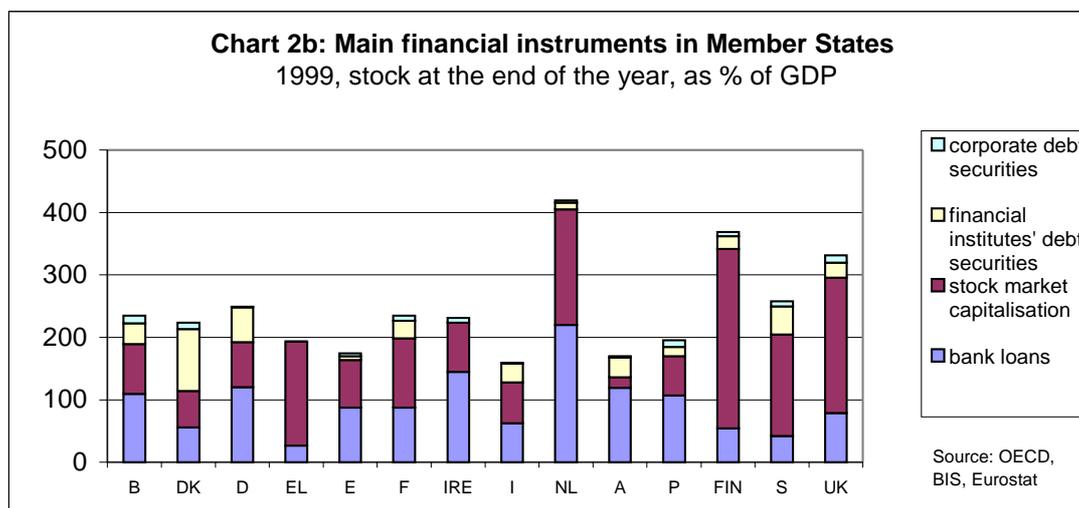
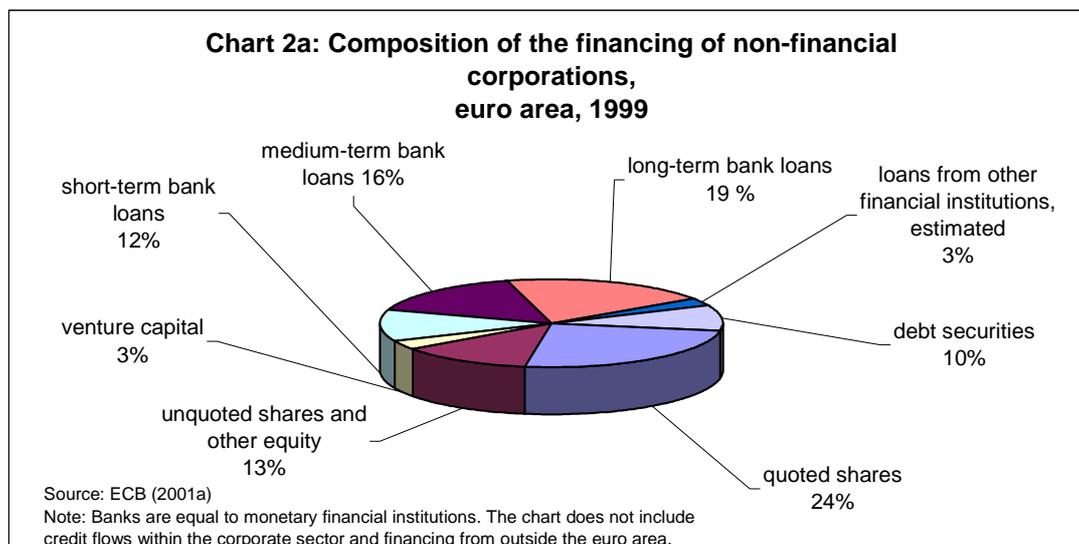
<sup>5</sup> Changes of stocks are equal to transactions (flows) and changes in the valuation, i.e. an increase of stock prices inflates the amounts outstanding but does not imply a higher flow of funds to enterprises.

**Table 1: Financial investment and the financing of the non-financial sector in the euro area at mid 200**

<i>1. Stocks: amounts outstanding</i>						<i>2. Flows in % of GDP, 1<sup>st</sup> half of 2000</i>			
<b>assets</b>	EUR bio	%	<b>liabilities</b>	EUR bio	%	<b>financing</b>	%	<b>wealth holding</b>	%
currency and deposits with non-MFIs	491	3.3	loans from MFIs	6261	40.3	financing of general government	1.6	currency and deposits	3.2
deposits with euro area MFIs	4405	30.3	loans from other financial corporations	690	4.4	loans of non-financial corporations	4.8	securities other than shares	1.2
securities other than shares	1592	11	securities other than shares	4003	25.8	securities other than shares issued by non-financial corporations	0.6	quoted shares	1
Quoted shares	2952	20.3	quoted shares	4157	26.8	quoted shares issued by non-financial corporations	1.6	mutual market fund shares	2.4
mutual fund shares	1956	13.5	deposits of central government	148	1	loans of households	4.1	insurance technical reserve	4.5
insurance technical reserve	3138	21.6	pension fund reserves	267	1.7	others	0.2		
<b>among liabilities</b>						sum in % of GDP	13		12.3
<i>1a. loans granted to</i>			<i>1b. securities other than shares</i>			<i>3. Net borrowing of non-financial corporations (non-consolidated, 1999)</i>			
general government	885	5.7	general government	3600	23.2			EUR bio	% of liabilities
- of which long-term	844	5.4	- of which long-term	3175	20.4	liabilities		625	100
non-financial corporations	2994	19.3	non-financial corporations	403	2.6	loans		329.3	52.7
- of which long-term	1905	12.3	- of which long-term	312	2	trade credit and advance payments received		68.6	11.0
households	3072	19.8				securities other than shares		37.3	6.0
- of which long-term	2798	18				shares and other equity		147.2	23.6
						- of which quoted shares		89.3	14.3
						other liabilities		42.7	6.8

**Source:** European Central Bank monthly bulletin February and May 2001.

**Figure 2: The financial structure in the euro area and Member States: some snapshots of recent pattern**

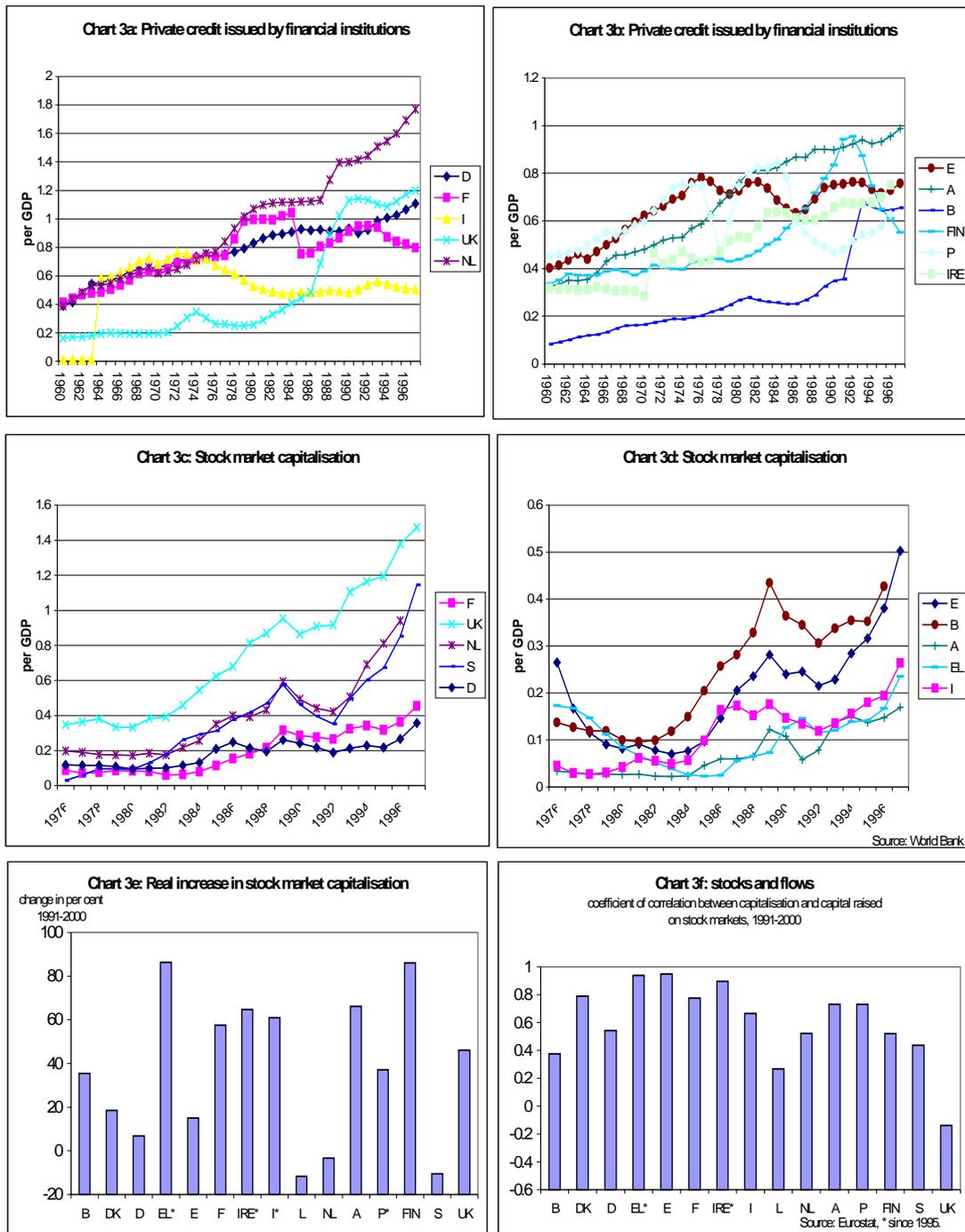


As Chart 2b and 2c demonstrate, the differences among member states are notable. Countries differ in the size of the financial sector and in the relative role played by bank loans or stock markets. In both categories, the Netherlands and Italy stand out. Financial intermediation plays a relatively minor role in Finland, which is featuring a relatively large stock market capitalisation. Debt security issuance is dominated by financial institutions. Insurance companies and other institutional investors account for a sizeable portion of the economies' financial assets in all EU Member States. They account for relatively large market share in the Netherlands and the UK.

The analysis of economic growth necessitates the analysis of long-term relationships. The World Bank has assembled historical time series going back to 1960 for bank related data and to the mid 1970s for stock market data. The charts below reveal the differences among EU Member States as regards the extent of bank loan financing and stock market capitalisation, both displayed as a share of GDP, and their change over time. While most series increased over time relative to GDP, neither the timing of structural breaks nor the trend over time are uniform. Private credit issued by financial institutions stagnated in Italy, Spain and Portugal. It may also be seen that stock market capitalisation increased to a lesser extent in France, Germany, Italy, Austria and Greece. In the other countries, there were apparently two waves of increased stock market activity during the 1980s and since the early 1990s. The timing of these wave coincided with rising stock market prices. If market capitalisation is deflated by stock price indices, volumes have risen less dramatically during the 1990s (Chart 4e). However, nominal stock market capitalisation is closely related to the issuance of new capital on stock markets in most economies (Chart 4f) thereby suggesting that the former could be a useful proxy despite the impact of changes in the prices of stocks.

Obviously, there is a trade-off between the complexity of the financial structure, illustrated in the table and charts on the euro area above, and the availability of long and comparable cross-country time series. Long time series are required for the analysis of the finance-growth link not only because economic growth is a long-term phenomenon. Financial data might be heavily distorted by cyclical factors. Since the cash flow from profits is pro-cyclical, the corporate sector's demand for external financing is also featuring some counter-cyclical patterns. In consequence, indicators of financial development are not necessarily linked with growth over short-term periods. Additionally, three qualifications on the use of bank loans and stock market capitalisation as indicators of an economy's degree of financial development are necessary. Firstly, the issuance of stock is not always driven by the desire to finance physical investment. In recent years, the financing of mergers and acquisition has been an important motivation for raising capital on stock markets. Secondly, a significant part of bank loans are granted to households to finance housing. Thirdly, changes in the degree of international financial integration limit the reliability of purely domestic financial indicators. For the analysis of the finance-growth linkages in mature economies, these three factors are of relevance, in particular if they are different across countries and vary over time.

**Figure 3: The financial structure of EU Member States: changes over time**



### 3. *How does financial development effect economic growth?*

In essence, economic growth depends on the accumulation of input factors in the production process and technical progress. Traditionally, finance has been linked primarily with the first of these sources of growth, regarding capital as an important input factor and its accumulation as a condition for sustainable economic growth. Furthermore, finance contributes to the realisation of technical progress to the extent that technical advances need to be embedded in the capital stock to influence production. In particular, in periods of rapid technical progress, an efficiently structured financial sector appears to be required in order to facilitate embedding technical advances in capital formation and allowing countries to benefit from this development in terms of higher rates of economic growth.

Growth theory assumes that the interest rate plays the main role in equilibrating an economy's savings and investment. According to the neo-classical Golden Rule, the optimal growth path is equal to the real interest rate. For a long time, the design of the financial sector was thought to be of no major importance for economic decision making because in the presence of perfect markets, the financial sector produces nothing but a veil on the true determinants of economic developments.<sup>6</sup> While today's understanding of market imperfections has allowed this view to be put aside, the exact transmission channels from finance to economic activity and in particular any estimate of their quantitative impact are still subject to considerable uncertainty.

#### **3.1 The economic function of finances - the micro view**

In the presence of imperfect markets, the relation between investors/borrowers and savers/lenders is characterised by agency problems caused by conflicting interests. Agency problems exist as regards hidden action and hidden information of the borrower, who is perceived to be better informed than the lender and to be able to influence the return of an investment. Coping with these agency problems would need a comprehensive contract between lender and borrower covering all eventualities and ensuring the compatibility of individual incentives.

The value of the financial sector consists in reducing the special transaction costs that emanate from the asymmetric information in the relation between investor/borrower and saver/lender. Financial contracts are often designed to ensure incentive compatibility between both, for instance in the choice of equity versus debt contracts, by allowing rights to monitor, or by differentiating the investment projects in stages which can be easily monitored. Furthermore, corporate statutes and public law express rules to ensure investor protection and therewith reducing the informational imbalance between borrower and lender. In principle, it is the role of the financial system to provide optimally designed contracts with the comparative advantage of financial intermediaries consisting in the implementation and enforcement of these contracts.

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<sup>6</sup> The famous Modigliani-Miller irrelevance theorem states that in an ideal market, investment decisions are independent of financial considerations. It is only with the recognition of asymmetric information and their importance on economic relations between borrowers and lenders, that the Modigliani-Miller view has lost in importance

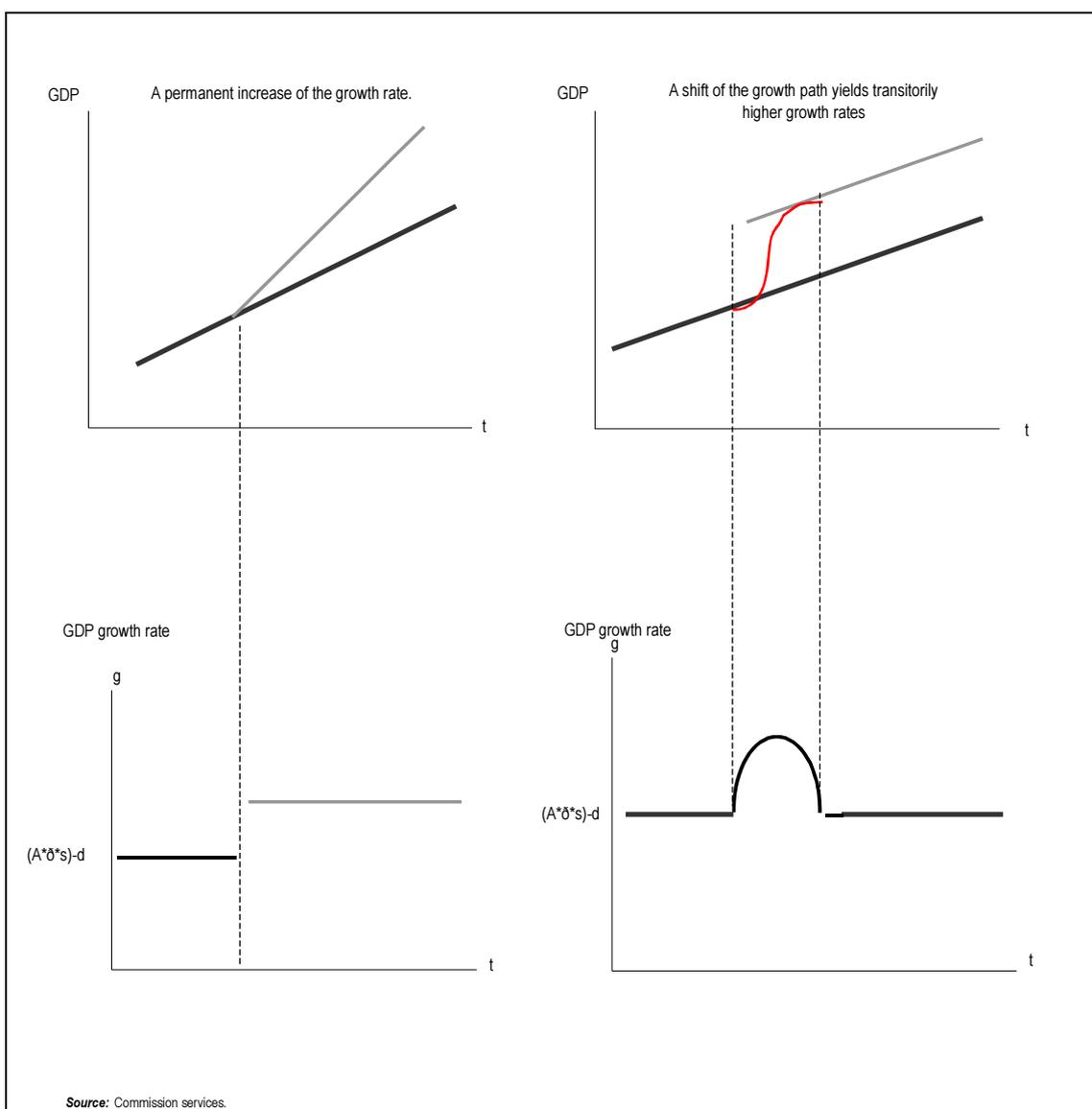
This microeconomic explanation differs somewhat from the traditional approach, which views financial intermediaries as being a bridge between the differences in interests between borrowers and lenders concerning the size of a financial investment, its maturity and risk. While households usually have a preference for short-term investment at low risk and are typically endowed with small amounts, enterprises have divergent preferences and need large sums to finance capital accumulation. Financial intermediaries and especially banks use economies of scale to transform households' savings into corporate debts. This approach as well as the one that analyses the role of banks as providing payment services<sup>7</sup> offer little leeway for financial intermediaries to stimulate economic growth besides the extent to which their transformation services improve the allocation of resources.

The approach linking financial institutions with asymmetric information and agency costs gives the financial system a more prominent role in accomplishing an efficient allocation of capital. Financial institutions accumulate special knowledge in evaluating and monitoring investment projects, they have comparative advantage in evaluating risks and designing financial contracts. In particular banks may gain information advantages from lasting relations with customers by learning from past experience, and realise economies of scale from offering payment services. Thereby, an upgrading in the efficiency of the financial system may lead to a higher level of GDP, which is accompanied, at least temporarily, by higher rates of economic growth (right-hand side of Figure).

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<sup>7</sup> See Pauli (2000).

**Figure 4: Level and growth effects**



### 3.2 The Finance-growth nexus in theory

The link between finance and economic growth may run through various transmission channels. Already a very simple growth model illustrates that there are three important connections between financial variables and economic activity. Financial development might (1) reduce the loss of resources required to allocate capital; (2) increase the savings ratio; and (3) raise capital productivity. The so-called AK model assumes only one type of goods, which is produced with capital as the only input factor.<sup>8</sup>

$$Y_t = AK_t$$

With  $Y_t$  being output in period  $t$  produced by capital  $K_t$  and with  $A$  symbolising capital productivity. The capital stock in the period  $t+1$  is

$$K_{t+1} = I_t + (1-d) K_t$$

<sup>8</sup> The illustration follows Pagano (1993). Despite its simplicity, the AK model is a workhorse for many applications. It is used, for instance, to derive the optimal size of the financial system in Santomero/Seater (2000).

with  $d$  the depreciation rate and  $I$  investment, that has to be equal to the non-consumed resources in each period. With the saving ratio  $s$  and assuming, furthermore that the channelling of savings to investment implies the loss of a share of savings  $(1-\delta)$  with  $1 > \delta > 0$ , the funds available for investment are

$$\delta * s * Y_t = I_t.$$

The growth rate  $g$  is  $(Y_t/Y_{t-1}) - 1 = (K_t/K_{t-1}) - 1$  which implies a steady state of

$$g = [(A * \delta * s) - d] / (1 - A * \delta * s) \approx [(A * \delta * s) - d]$$

for realistically small values of  $(A * \delta * s)$ . In this simple model, there are three possible transmission channels from finance to growth. The subsequent sections explore how finance affects the three variables of interest  $\delta$ ,  $A$ , and  $s$ .

### **An efficient financial system reduces the loss of resources $(1-\delta)$ required to allocate capital.**

In practice,  $\delta$  reflects the transaction costs including fees to market organisations or financial intermediaries, the spread between banks' borrowing and lending rates. In a competitive environment, the amount of  $\delta$  is determined by the real costs of financial intermediation. Inefficiency in the provision of financial services, the redistribution of the financial intermediaries' profits to the state by taxes, and a compensation for the risk undertaken by the intermediary furthermore influence  $\delta$ .

The more efficient the transformation of savings into investment, the lower the loss of resources  $\delta$  and the more savings can be used for productive investments. This does not need to be a one-time effect. A durable positive feedback effect between finance and growth is demonstrated in the model of Harrison et al. (1999). They assume the transaction costs  $(1-\delta)$  to be determined by the geographic distance between the bank and the entrepreneur. Higher economic growth raises the profit margin of financial intermediation, thereby attracting the entry of more banks and raising their specialisation. The entry reduces the average distance between bank and investment projects, thus reducing the costs of intermediation and increasing economic growth. In their model this process comes to an end, once higher wages in the banking system discourage the entrance of new banks.<sup>9</sup>

### **The effect of financial development on the saving rate $s$ is ambiguous.**

A higher efficiency of the financial system can be expected to yield more favourable return-risk combinations for savers. Whether or not the prospects of higher returns or lower risk on savings can induce an increase of the saving ratio  $s$ , which would in turn stimulate higher economic growth, is uncertain. Prospects of higher returns may actually decrease savings because the same future consumption can be accomplished with higher present consumption and thus lower present savings. Risk sharing through the holding of diversified portfolios reduces individual exposure to risk. But a reduced risk pattern might induce a direction of savings into higher risk/higher return assets without stimulating an increase in current savings. Furthermore, it might reduce the level of precautionary savings.<sup>10</sup>

<sup>9</sup> In the empirical part of their paper, it is demonstrated that the specialisation effect dominates the wage effect for a sample of US states.

<sup>10</sup> The effect of risk sharing on the savings ratio is ambiguous, depending on the risk properties of the utility function.

Empirical estimates usually confirm the ambiguous effect of return and risk on the savings ratio.<sup>11</sup> For instance, the recent stock market boom in the US appears to have reduced the incentive to save from current income as consumers regarded a higher market valuation of the existing wealth as a substitute for higher savings.

**The productivity of capital *A* will be raised by an efficient financial system.**

The impact of financial variables on transaction costs and the saving ratio work through their impact on the resources available for investment. In addition to this effect on capital accumulation, the literature knows of a number of channels, through which financial activity might raise the productivity of capital *A*. They concern (1) the selection of the most profitable investment projects, (2) the provision of liquidity and (3) the allocation of risks.

(1) The function of financial intermediaries to evaluate and select investment projects raises, if effectively performed, the profitability of investment. The average capital productivity of those investment projects, which are realised by effective evaluation and monitoring by intermediaries, is considered to be higher than for those investment projects that do not have these control mechanism. Furthermore, average productivity will be raised through the selection of the most profitable projects while disregarding unprofitable ones. Following this approach implies that resources devoted to finance should grow until the marginal utility of spending resources in the selection of investment projects is equal to the marginal utility of undertaking physical investment.

This channel has been modelled by Greenwood/Jovanovic (1990). Their model considers the financial intermediaries' prime task in the collection and analysis of information, thereby channelling the allocation of funds into the most profitable investment projects. Crucial in the model is the capability of financial intermediaries to distinguish between project-specific and aggregate shock, which allows a selective direction of capital to the most profitable investment projects. Following this approach, it would be natural to regard banks as financial intermediaries acquiring specific skills for selecting investment projects. An efficient allocation of capital can also be provided by financial market participants whose portfolio choices establish proper market signals that reward promising investment projects with low financing costs and prevent unpromising investment projects by imposing prohibitively high costs of capital.

(2) The provision of liquidity creates incentives to invest a larger share of savings in long-term projects, which are perceived as more profitable. The argumentation is complicated by the fact that the term liquidity is used with different meanings.<sup>12</sup> Its microeconomic motivation is the provision of insurance for individual agents against uncertain timing of consumption. That is, if economic agents have to reshuffle

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<sup>11</sup> For an overview on recent theories and empirical evidence on private consumption and savings see Bayar/Mc Morrow (1999).

<sup>12</sup> On financial markets, liquidity characterises the possibility to place large orders without significantly affecting the price of the asset concerned. A financial market's liquidity depends on the number and relative size of market participants on the demand and the supply side; it is also affected by all those factors that determine the costs of transaction. Normally, transaction fees or the bid-ask spread are used as proxy for a market's liquidity.

intertemporal consumption plans, they can do so by selling or buying assets. Without the possibility of doing so, agents would have to start or eliminate physical investment. Anticipating the eventual elimination of projects induces an incentive to invest disproportionate large amounts in short-term projects. The availability of a liquid financial market allows a larger proportion of savings to be invested in long-term projects and if an individual agent is required to bring forward consumption, he can do so by transferring assets to other agents instead of eliminating investment projects. This permits physical investment to be continued.<sup>13</sup> In this regard, the provision of liquidity raises the average duration of investment projects, which is likely to raise the productivity of the capital stock.

(3) The possibility of portfolio diversification by holding financial assets allows individual agents to undertake riskier and more specialised investment projects. The holding of foreign assets, for instance, decreases the exposure towards domestic economic shocks. The opportunity to share risks via the capital market might induce investors to invest a higher fraction in riskier projects, which on average tend to be more profitable.<sup>14</sup> Furthermore, being able to hedge against project-specific shocks tends to stimulate the incentive to undertake specialised investment. Some academic papers have focused on the risk-sharing function of the financial system. They argue that the reduction of the exposure towards uncertainty through risk sharing affects economic welfare directly, thereby stimulating economic growth. Empirical estimates point to a potentially large welfare gain from perfect international risk sharing. Work on the extent of international financial integration suggests that there is potential scope for large increases in welfare.<sup>15</sup> The approach linking risk-sharing and increasing specialisation is less embedded in growth theory and its economic significance is difficult to assess. There is, however, a firm consensus that increasing specialisation can contribute decisively to economic growth by the acquisition of highly profitable but specialised skills.<sup>16</sup>

These effects are more likely to show up in total factor productivity than in capital accumulation. Increased efficiency of capital allocation, commensurate with the above mentioned approaches, yields a higher profitability of investments, but not necessarily more investment in quantitative terms. Indeed, one cannot exclude the possibility that investment is higher in less mature financial systems. The reason is derived from the incentive of managers to re-invest profits in firms rather than channelling them to the proprietors of the firms. The less efficient the control of

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<sup>13</sup> See the seminal contribution of Diamond/Dybvig (1983), which shows that the provision of liquidity through banks can be characterised by two equilibria. One equilibrium is the efficient allocation, the other a bank run.

<sup>14</sup> Obstfeld (1994)

<sup>15</sup> Despite all the problems of measurement issues and third factors, transaction costs seem to have a substantial impact on this. For an overview see for instance Obstfeld (1994), van Wincoop (1999) Obstfeld/Rogoff (2000).

<sup>16</sup> A model linking financial markets' technological choice and economic development, in which financial development induces increasing specialisation and the improved division of labour raises growth, was set up in Saint-Paul (1992). For an empirical estimate on the link between risk-sharing and industrial specialisation see Kalemlı-Ozcan et al. (2001). Stulz (2000) reports evidence that stock markets appear to value specialised firms higher than diversified ones, which suggests a positive relation between specialisation and growth prospects.

managers the more leeway they have to invest. Thus, an increasing efficiency of the financial market would show up in lower, albeit more productive investment.<sup>17</sup>

Furthermore, increasing activity in the financial sector will not permanently raise an economy's growth path. Once the optimal degree of evaluation activity, liquidity provision and risk sharing is accomplished, capital productivity will not continue to be improved by raising the size of the financial sector.<sup>18</sup> However, policy initiatives reducing obstacles to allocate capital through the financial sector and thus improve the sector's efficiency will stimulate economic growth up to the point where the financial sector's size and efficiency are optimal. Bearing this in mind, there is a general perception that all gains from financial markets are not yet exploited, i.e. there would be ample scope to increase economic growth at least transitorily (see right-hand side of Figure 4) by means of further financial market stimulation.

### 3.3 A review of the empirical evidence

Overall, the literature provides broad empirical evidence of a positive relation between finance and economic growth, with the papers mainly differing in the data coverage as regards countries and time periods, the estimation methods and the variables selected. Table 2 overviews the main pattern of some recent empirical studies, which were not yet covered by the review by Levine (1997), which is referred to in the introductory quotation. The first evidence that financial development accelerates growth was presented by Goldsmith in a study covering 35 countries over the period 1860-1963. However, his work did neither control for other factors, nor did it allow the derivation of any conclusions as regards causality or the relative importance of the different transmission channels.

Recent years have given risen to a vivid interest in empirical research on the finance-growth nexus. In particular, the paper by King and Levine (1993) provided the starting point for intensified research, which received a major impetus by the construction of the financial structure database compiled for the World Bank by Beck et al. (1999).<sup>19</sup> King/Levine (1993) found a strong statistical relation for twelve combinations of four financial variables with three growth indicators after controlling for a set of further variables. Financial variables in 1960 were correlated with the three growth variables in the period 1960-1989, which was interpreted as evidence for a causal link from finance to growth. Rousseau/Wachtel (1998) examined the causal link between bank assets and bank deposits and real economic growth for five industrial countries in the period 1870-1929. They yielded evidence that financial developments lead economic growth and that movements in financial variables affect

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<sup>17</sup> The link between inefficient control and the accumulation of too much capital is emphasised by Chirinko (2001). It is, however, questionable, whether this effect is robust at the aggregate level. If owners would reduce savings in response to inefficient investment by managers, less funds were available for investment outside the incumbent firms.

<sup>18</sup> This argument bases on declining returns of the evaluation activity, which implies an optimal degree of evaluation and monitoring beyond which an expansion of activity is inefficient.

<sup>19</sup> The World Bank financial structures database is described in Beck et al. (1999). It is used for the financial variables in the graphs. Analytical papers using the database are Levine/Loayza/Beck (2000), Beck/Levine/Loayza (2000), Beck/Levine (2000), Demirguc-Kunt/Levine (1999), Beck et al (2000a, 2000b).

real variables but not vice versa.<sup>20</sup> Levine and Zervos (1998) analysed the relation between six financial variables and three real growth variables (real per capita GDP growth, real per capita capital stock growth, and productivity growth) and the savings ratio. The cross-country study covering the period 1976-1993 reveals no evidence of a significant relation between the private saving rate and the financial indicators. The same conclusions are reached by two studies with the World Bank data set (Levine/Loayza/Beck (2000) and Beck/Levine/Loayza (2000)), finding a significant impact of financial intermediation indicators on real GDP growth and productivity but an ambiguous effect on physical capital growth and saving.

The methods used at the aggregate level are quite uniform. The main tool applied is the cross-country growth regression, in which financial variables of a large set of countries together with a set of additional determinants are regressed on a proxy of economic developments. A significant and positive sign is interpreted as evidence of a positive impact of financial variables on economic development. Financial variables often display indicators of the magnitude or level of financial activity. The most prominent variables are bank loans to the private sector, stock market capitalisation and stock market turnover, all expressed in relation to GDP. The dependent variable mainly consists of the real rate of economic growth, on capital accumulation or productivity growth. Control variables are selected from the large body of literature on growth determinants based on cross-country regressions and reviewed for instance by Barro (1997) and Temple (1999).

Table 2 below provides an overview of the evidence at the aggregate level. Some other empirical studies used firm data to analyse whether or not firms or industrial sectors that rely more heavily on external financing grow faster in economies with a more developed financial system (for an overview of the evidence on the industry level, see Table 6 on page 35).

- Demirgüç-Kunt/Maksimovic (1998) show that stock market activity and the size of the banking system (as measured by bank deposits in relation to GDP) are positively related with firm growth in excess of internally generated finance. The size of the stock market as measured by market capitalisation in relation to GDP is of less importance than the indicator of stock market activity (turnover). They furthermore find that measures of the efficiency of the legal system are also positively related to the capability of firms to raise external finance.
- The analysis of Rajan/Zingales (1998) demonstrates that industries, which depend disproportional on external finance, can grow faster in economies with developed financial markets. Significant variables in their study are the ratio of loans to the private sector over GDP as an indicator for the size of the banking system and the size of stock markets measured by market capitalisation relative to GDP. The innovative part in their study is the measurement of the financial dependence of industries.

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<sup>20</sup> In a second study, Rousseau/Wachtel (2001) find a robust impact of finance on economic activity that, however, disappears if inflation is high.

**Table 2: Recent empirical studies on the finance-growth linkage at the aggregate level**

Authors	Financial variables	Dependent variable	Panel	Estimation technique	Results
Hansson and Jonung (1997)	Total lending by non-bank public per capita	GDP per capita, total investment per capita	Sweden 1830-1990	Co-integration analysis	Choice of time periods and of control variables crucially affects results. Finance no independent role if controlled for investment. Largest impact of the financial system in the period 1890-1939
Rousseau and Wachtel (1998)	Ratio of financial institution assets to output, ratio of sum of financial institution assets, corporate stocks and corporate bonds to total financial assets	Real per capita output growth	5 countries (USA, CND, UK, SWE, NOR) 1871-1929	Granger causality in a VAR Vector error correction model	Evidence of one-way causality from finance to growth
Levine and Zervos (1998)	Capitalisation, stock turnover, value traded on stock markets, stock return volatility of, bank loans to private enterprises international capital market integration (measured by APT and alternatively by CAPM)	Real per capita output growth, capital accumulation, productivity growth, savings ratio	49 countries, 1976-1993	Cross-country regression controlling for initial income, inflation, government, social and political variables	Robust correlation of stock market liquidity and bank development with future rates of economic growth. No relation of stock market volatility, capitalisation and international financial integration with economic performance
Demirgüç-Kunt and Levine (1999)	Size and efficiency of the financial sector, derived from assets, liabilities, turnover, overhead costs and interest margins	GDP per capita	150 countries, 1990s	Correlation	Financial systems are more developed in richer countries. In high income countries, stock markets are more active and efficient relative to banks. Legal variables effect level and financial structure.
Andrés, Hernando and López-Salino (1999)	Liquid liabilities and credit to non-financial sector of the banking sector, stock market capitalisation, all in relation to GDP	Inflation, real per capita output growth	21 OECD countries, 1961-1993	a) cross-country growth regression controlled inter alia for inflation and country specific effects; b) Unrestricted VAR	Market capitalisation is the only variable for which significance and causality could be found.
Beck, Levine and Loayza (2000)	Legal origin indicators as instrument to extract exogenous component of financial intermediation	Real output growth, TFP growth, saving ratio, physical capital accumulation,	63 countries, 1960-1995	Cross-country regression and dynamic panel estimator. conditioning variables: real GDP per capita, average years of schooling, inflation rate, openness, government expenditure	Banks exert a strong, causal impact on real GDP and TFP growth. Results for capital accumulation and saving ratio are not robust or insignificant.
Levine, Loayza and Beck (2000)	Legal variables to extract exogenous component of financial development	Real per capita output growth	71 countries averaged over 1960-95	Cross country instrumental variable estimation used to form panel for difference dynamic panel estimator	Exogenous component of financial variables correlated with real economic growth

Table 2 continued

Authors	Financial variables	Dependent variable	Panel	Estimation technique	Results
Singh, Singh and Weisse (2000)	Stock market capitalisation, turnover, number of listed companies	ICT indicators: mobile phones, PCs, internet hosts, high-tech exports	63 developed and developing countries in 1990s	Cross-country regression	No robust relation of stock markets with ICT developments when controlled for number of scientists and researchers, GDP level and growth
Bassanini, Scarpetta and Hemmings (2001)	liquid liabilities, private credit from deposit banks, stock market capitalisation, all in relation to GDP	a) real per capita output growth,  b) change of share of real private non-residential investment to GDP	21 OECD countries 1971-1998	Error correction panel regression, pooled mean group estimators controlled for a) investment, human capital, population growth and  b) inflation, public investment, taxes and trade exposure	a) stock market significant, bank credit only when controlled for inflation variability  b) private credit and stock market significant even after controlling for investment. Better results for stock markets than for bank variables
Leahey, Schich et al. (2001)	liquid liabilities, private credit from deposit banks, stock market capitalisation, all in relation to GDP	a) growth of real private non-residential investment  b) real per capita output growth	19 OECD countries 1970-1997 for bank variables, 16 OECD countries 1976-1997 for stock market variables	Error correction panel regression with different specifications to account for country specific effects, controlled for a) output growth and adjusted real interest rate,  b) human capital, population growth, inflation variability, investment share	a) all financial variables significant for pooled mean group estimator,  b) credit and stock market significant even with control for investment.
Shan, Morris and Sun (2001)	Bank credit to GDP.	Real per capita GDP	9 OECD countries and China, series start at different times between 1960 and 1986 and ends in 1998	Granger no-causality test in VAR model. Control variables are TFP, openness, Investment ratio, Price level, Stock market prices (two-way causality for most of the control variables)	Causality different among countries. For 5 countries bi-directional causality, causality runs from growth to finance for 3 countries, no causality for the remaining 2 countries.
Rousseau and Wachtel (2001)	M3, M3-M1, total credit all in relation to GDP	Real output growth and inflation, 5 year averages	84 countries, 1960-1995	Cross country regression controlling for initial real GDP, initial secondary school enrolment	Financial variables are highly significantly positive. This effect disappears at high inflation
Rousseau and Sylla (2001)	Broad money to GDP	Real per capita output growth	17 countries, 1850-1997	Cross country growth regressions controlling for initial real per capita GDP, initial trade ratio, initial government expenditure	Financial variables important for early stages of development, best results for time prior to 1914, less important for the time after 1945. Transmission might work through promotion of international trade

Further evidence can be drawn from studies using different dependent variables. A measure for the efficiency of the capital allocation is used by Wurgler (2000) for a panel of 65 countries and 28 industries. His study finds a positive relation between financial development and the efficiency of capital allocation, which is derived as the elasticity between the capital formation of an industrial's sector and the growth rate of

its value added.<sup>21</sup> Denizet et al. (2000) analyse the impact of financial variables on macroeconomic volatility, which is supposed to be inversely related with economic growth. Their estimates show that countries with a developed financial system are less exposed to severe business cycle fluctuations. A developed banking system goes hand in hand with lower consumption and investment volatility, private sector credit is inversely related to consumption and output volatility. Bekaert et al. (2001) compare the growth performance before and after equity market liberalisation. Their estimates point to an important transmission channel from equity market liberalisation. Rising international capital inflow increases the availability of resources, this induces a rising investment share that spurs real output growth.

While the positive role of finance for the economic development of poorer countries appears widely accepted, the lessons drawn from this evidence for industrial countries are inconclusive. The study of Andrés et al. (1999) does not reveal a significant finance-growth nexus for OECD countries. The opposite result was found in recent OECD studies. Using panel estimation techniques, they detect a significant relation of stock market capitalisation and bank credits, respectively, in the investment functions of industrialised countries.<sup>22</sup> The significance of the liquidity variable is somewhat weaker. A second estimate with GDP per capita growth as the dependent variable indicates that the transmission channel from finance via investment growth to output growth might not be the only channel of relevance because financial variables are significant even if the estimation controls for investment.

Some newly conducted cross-country regressions combine the data from the World Bank financial structure data bank with macroeconomic data from the European Commission. The results displayed in the table below confirm the ambiguity of evidence as regards the finance-growth nexus. For a sample of 22 industrial countries, the table shows the significance of selected financial variables in OLS regressions on selected economic output indicators controlled for the impact of the GDP level in 1976 and employment growth. In 6 out of the 15 possible combinations, the calculations yielded a significantly positive coefficient, which is more than one would expect if the impact of finance on growth were purely accidental. The fact that a few regressions revealed a negative relation casts some doubts on the robustness of evidence derived at the aggregate level, even if these coefficients were not significant. If the results are accepted on face value, private credit by deposit money banks and other financial institutions has an impact on the investment share only, but not on growth figures. This might indicate their relevance for investment in construction rather than in equipment. Stock market capitalisation seems to have a somewhat stronger impact on economic growth indicators in industrial countries.

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<sup>21</sup> According to his results, the more developed the financial sector in a country, the more capital formation is conducted by growing sectors and the less by declining sectors.

<sup>22</sup> Bassanini et al. (2001), Leahey et al. (2001).

<b>Table 3: Significance of financial variables in cross-country regressions</b> with independent variables (1-3) on dependent variables (A-E) controlled for GDP level and employment growth, 22 industrial countries.			
	<b>(1) Private credit/GDP</b>	<b>(2) Stock market capitalisation/GDP</b>	<b>(3) Total financing (1) + (2)</b>
<b>(A) GDP growth</b>	negative, ns	positive,**	positive, ns
<b>(B) TFP growth</b>	positive, ns	positive, ns	positive,**
<b>(C) Real investment growth</b>	positive, ns	positive,*	positive,*
<b>(D) Investment/GDP</b>	positive,**	negative, ns	positive, ns
<b>(E) Returns on capital</b>	negative, ns	positive,*	negative, ns

Note: \*:= t-value significant at 5 % level, \*\*:= t-value significant at 1 % level, ns:= not significant at 5 % level. TFP growth derived from Cobb-Douglas production function. Countries are EU Member States plus USA, Japan, Canada, Switzerland, Norway, Australia, New Zealand. Economic output data is from European Commission's AMECO data bank (average 1976-2000), financial variables are from World Bank FINANCIAL STRUCTURES DATABASE (average 1976-1997).<sup>23</sup>

Any empirical analysis of the financial and economic development linkage is exposed to several serious methodological problems. In general, the methodological reservations brought forward against cross-country regressions apply equally to this branch of the literature.<sup>24</sup> Two caveats are elaborated in some more detail below. These are (1) the appropriate choice of control variables and (2) the direction of causality, i.e. running from finance to growth and not vice versa.

Financial indicators are only one among a large number of potential determinants of economic growth. For instance, differences in political institutions or legal structures may determine financial development and economic growth. Parameters like changes in technology, the accumulation of human capital or the impact of fiscal policies have additional effects on the development of the financial as well as the overall economic system.<sup>25</sup> In order to be able to identify the true impact of financial variables, the selection and calibration of these control variables has to be appropriate. The correct choice of control variables is even more important for estimates of industrial countries because both the dependent and the independent variable will show up only in differences in the margin. The variables used for instance by the Beck et al. (2000b) study encompassing a broad panel of countries and consisting of the real GDP level, inflation, black market premium, government size, openness, human capital and social indicators might not be appropriate to identify growth differences between high income countries. Some studies point to an important role of inflation or inflation variability. For instance, private credit appears to be highly significant but with the incorrect sign in Bassani et al. (2001) if inflation volatility is not included in the estimation. Garretsen et al. (2000) argue that the positive link between stock market liquidity and economic growth found for instance by Levine/Zervos (1998) disappears if the estimate is controlled for legal and societal indicators.

<sup>23</sup> Due to incomplete data Switzerland, Norway and New Zealand, were excluded from the regressions containing stock market capitalisation. The stock market capitalisation data covers starts in 1981 for Luxembourg, covers only the time since 1995 for Ireland. The same restrictions apply for the total financing data.

<sup>24</sup> See Mankiw (1995) and Temple (1999) for a discussion of methodological problems such as poor data quality, simultaneity, multicollinearity and limited degrees of freedom.

<sup>25</sup> See Outreville (1999).

Evidence of a statistical relation between finance and growth does not indicate causality running from finance to growth. Reverse causality with high economic growth creating demand for more financial services and thus stimulating the development of the financial sector is equally plausible. For instance, Demirgüç-Kunt/Levine (1999) demonstrate that banks, other financial intermediaries and stock markets are larger, more active and more efficient in high income countries. Other studies, for instance, King/Levine (1993) interpret a significant impact of the financial variables at the beginning of the period on economic performance during the period as evidence in favour of causality. However, given the long lags before, for instance, technical progress shows up in economic growth, a lead in the series of financial variables could be interpreted as a predicting variable without necessarily indicating a causal relation.<sup>26</sup> In this context, Hobijn/Jovanovic (2000) explain the development of US stock prices in the 1970s as a leading indicator of the technological change imposed by the IT revolution that only becomes visible in productivity data in the late 1990s. Luintel/Khan (1999) reveal evidence for bi-directional causality between financial development and economic growth in a sample of 10 developing countries. Shan et al. (2001) confirm this finding in a sample of 9 OECD countries. All in all, the direct empirical evidence for unilateral causality from finance to growth is not robust on the aggregate level.

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<sup>26</sup> This was emphasised by Rajan/Zingales (1998).

#### 4. *What are the features of a growth-supportive financial structure?*

The better economic performance in market-based financial systems such as the USA and the UK relative to those of the bank-based financial systems of Germany and Japan in the last decade is often regarded as evidence for the superiority of a market-based financial system. While observers sometimes refer to a "financial revolution", which was spurred by the rise of risk capital markets in the USA, the EU's financial structure is often assessed as being less conducive to growth.<sup>27</sup> In particular the larger role of bank loans relative to equity financing is critically viewed. The debates on this topic have prompted policy initiatives aiming at strengthening market-based elements in the EU Member States' financial systems.<sup>28</sup>

##### 4.1 **Definition of the financial structure**

The financial structure can be defined as the institutions, technology and rules that govern the organisation of the inter-temporal exchange of payments at a point in time. A discussion of the subsystems of a financial system is undertaken in Schmidt (1999), Hackethal/Schmidt (2000), stressing that the interactions between institutions, technology and rules of the game should allow the financial structure to form a coherent system. They conclude that structural policy aiming at adjusting only parts of the financial structure might impede its overall functioning.

In practice and in empirical work, the distinction is made between bank-dominated and market-dominated financial structures. Alternatively, if the focus is on corporate financing, a dividing line is drawn between debt and equity financing owing to differences in the incentive structures of borrowers and lenders. A further distinguishing feature is the tradability of financial claims. Differences in the features of financial claims have implications for the incentives to exert corporate control, thereby it is exerted differently in market-based and bank-based systems. Banks usually exert corporate control by forming long-term relationships with enterprises, acting for instance as a house bank, or by being endowed with control rights over the management. Corporate control in a market-based system is more indirect. It is at "arm's length" and works in that managers respond to signals from markets because owners will finally decide on the appointment of managers. A declining firm value might induce them to replace the managing staff. Furthermore, financing through debt or equity makes a difference for the entrepreneur's incentives and the creditor's control of the investment project.

**Table 4: Forms of financial claims**

	<b>Direct lending</b>	<b>Indirect lending</b>
<b>Debt contract</b>	Bonds	Bank deposits and loans
<b>Equity contract</b>	Shares	Shares in investment funds

<sup>27</sup> See Cohen/Debonneuil (2000), Bassanini et al. (2000).

<sup>28</sup> A comprehensive comparison between the financial systems in the US and Germany is undertaken in Allen/Gale (1995). Whether there is convergence between the financial systems of Germany, France and the UK is analysed in Schmidt et al. (2001).

These features are strongly interrelated and their complementarity appears crucial for the efficiency of the financial system. For instance, a bank-dominated financial structure is characterised by bank deposits and bank loans as the main medium to store wealth and to finance investment. This corresponds to the dominance of relationship banking as a special form of corporate control, i.e. the delegation of monitoring to financial intermediaries.<sup>29</sup> Alternatively, a market-based financial system tends to have a larger proportion of equity titles. It is characterised by firms being controlled by outsiders at arm's length with an important role for asset prices determined on financial markets as disciplining devices for the management of the firm. The emergence of a market-based or a bank-based financial structure has implications for the incentives of households and entrepreneurs to take risk and will thus affect their saving and investment behaviour. Moreover, the different forms of financial relations have an impact on the commitments of debtor and creditor for instance in long-term projects and on the feasibility of adjusting investment plans according to changes in the economic environment.

#### **4.2 Theoretical considerations on the superiority of financial structures**

Evaluating whether a market based or a bank based financial structure is more supportive of economic growth requires an assessment of the relative advantages of the services provided by the different financial institutions. In microeconomic terms, the main difference between a bank bias and a market bias for financial decisions of enterprises consists in the concentration of lenders. Bank systems are characterised by a few lenders whereas market systems are characterised by a large number of lenders. This distinction reflects differences in the incentive to engage in the selection of information and to exert corporate control.<sup>30</sup> A second set of differences is between debt and equity contracts, both again with different implications for evaluation and monitoring. On actual markets, the general observation applies that bank dominated financial structures tend to be characterised by a larger share of debt contracts, whereas market-based systems have a larger share of equity contracts. While hybrid forms do exist, i.e. corporate bonds markets and participating interest, and sometimes accounting for a not insignificant role, they are perceived as less rewarding from an analytical point of view as concerns the finance-growth nexus.

#### **Differences in the provision of information**

The specific features of information may cause banks to be superior in some cases and the provision of finance through markets to be superior in others. Banks may be more efficient if the acquisition of information is costly and provided its accumulation is characterised by economies of scale. In these circumstances, the evaluation by numerous agents on financial markets might involve a duplication of research efforts. Furthermore, investment in information acquisition may be lower than socially desirable in a market system because of free-riding behaviour. The so-called information paradox appears if it is more profitable to unveil information from the activity of other agents than to invest in information acquisition.

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<sup>29</sup> Diamond (1984) analysed the bank's function as a delegated monitor.

<sup>30</sup> For an overview see Carlin/Mayer (1999a, 1999b), Beck/Levine (2000b).

Markets are usually regarded to be more efficient in dealing within uncertain environments. The larger the number of participants with an independent opinion on the determinants of future developments, the more likely the aggregate view is reflecting the true probability distribution. Consequently, a market-based financial system may have relative advantages in aggregating diverse views on the profitability of an investment compared to a bank based system. Financing through markets is therefore thought to be superior if the economy needs to deal with more speculative investments in an uncertain environment. For instance, a market-based system has merits in aggregating views on new technologies and displaying them in public prices, which, then, stimulate market participants to acquire information about firms. Information acquisition by banks does not give rise to information acquisition by other agents, thus the possibility of positive spill-over is dismissed.

Often, banks are blamed for having a bias towards conservative investments, while financial markets spur innovation. The fact that banks often demand collateral implies a bias in bank lending in favour of established enterprise at the expense of young enterprises. Collateral plays a less prominent role for equity financing. Overall, financing from the markets appears to be more supportive for enterprises which are not endowed with collateral.

From the point of view of the enterprise, a single investor might be the superior option if the investment is a routine case, because the transaction costs of lending increase with the number of lenders. On the other hand, firms engaged in R&D may fear disclosure of proprietary information and therefore prefer relations with only a few lenders to ensure confidentiality. It would therefore appear to be beneficial to have a mixed regime, in order to benefit from the advantages of a bank-based or a market-based financial system in evaluating investment projects depending on the very specific features of the investment projects.

### **Differences in the provision of corporate control**

Similar to the bank's economies of scale and cost advantages from the accumulation of specific knowledge, banks reduce the costs of screening and of monitoring firms and managers. The establishment of long-term relations tends to reduce monitoring costs. Moreover, it offers the opportunity for a tailored funding of investment. Thus, the lending of enterprises can be adapted over time as the actual needs develop. A long-term relationship with a bank enhances the credibility of the commitment to provide staged funding while lending from anonymous financial market participants does not imply any commitment of the borrower to increase their lending at a later stage.

A long-term relationship between an enterprise and a bank is not necessarily supportive of a tight budget constraint. Bank managers might collude with managers and hinder effective outside control. As the bank has benefits from continuing the relationship, it might be reluctant to withdraw from inefficient projects. A decentralised financial system imposes a tighter budgetary constraint on the investors because the lenders are relatively small and might not have adequate resources to refinance failing investments. Stock markets stimulate greater corporate control by

facilitating take-overs and providing a mechanism to relate the managers' compensation to the firm's performance.<sup>31</sup>

Large block-holders such as banks or large holders of equity cannot withdraw easily. The implicit commitment to continue their engagement helps overcoming free-rider problems. Concentrated ownership therefore encourages activities that require irreversible investments by other stakeholders, for instance in specialised equipment or skills. Furthermore, this commitment is beneficial for investments with long gestation periods.

In sum, markets are more efficient monitors that are more likely to be able to enforce the cancellation of inefficient investment projects. But sometimes, monitoring through banks is cheaper. Bank systems are advantageous for long-term projects, which may be sequentially financed. Concerning structural change, arguments can be brought forward for either form of financial system. Markets may be more flexible and less risk-averse than banks. Banks tend to be more patient and their commitment to engage encourages other stakeholders to invest in specific skills, which encourages the adaptability towards structural changes. In consequence, theory does not allow preferable discrimination between more or less growth supportive financial structures in terms of a market-based versus a bank-based financial structure.

### **4.3 Empirical evidence**

Microeconomic theory does not permit the disregarding of any particular form of financial structure as completely inferior. The specific characteristics of individual investment projects lead to one or other form of financing being preferable as regards considerations of information evaluation and monitoring. The first section below reviews the reasons for the emergence of different financial structures. They are evident more in legal and political than economic aspects. Subsequently, the empirical evidence as regards the superiority of a bank-based or a market-based financial structure is reviewed.

#### **Determinants of the financial structure**

Academic research has revealed that differences in financial structures may be derived to a large extent from legal differences. In a seminal contribution, La Porta et al. (1998) showed that the legal features of a country result in different degrees of investor protection. An efficient protection of shareholders and creditors in turn has an important impact on the emergence of market-based systems and in particular on the importance of stock markets. Indices on the quality of investor protection are on average highest in countries in which the legal system is of an English origin and lowest in the French type civil law systems. The former is also seen as having higher accounting standards together with Scandinavian legal systems.<sup>32</sup>

Empirical evidence suggests that a common law tradition, strong protection of shareholder rights and strong accounting standards are favourable for the development

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<sup>31</sup> In comparing firm's performance with the competitors, the control by shareholders encourages competition and thus creates greater incentives for entrepreneurship.

<sup>32</sup> La Porta et al (1998, 1999).

of a more market-oriented financial system, whereas countries with a French civil law tradition, inferior protection of shareholder and creditor rights and poor accounting standards tend to have underdeveloped financial systems.<sup>33</sup> Concerning developed financial structures, the study of Carlin/Mayer (1999b) reveals that the quality of accounting standards is negatively correlated with banking indicators and positively with stock market capitalisation. In dependence on legal restrictions, financial structures seem to have either stronger market-based or more bank-based financial systems. In Rajan/Zingales (1998) the interaction of accounting standards with financial variables has a significant impact on the growth of industries. Both studies present evidence that the quality of accounting standards is positively related with equity financing and negatively with bank credit. A significant relation between financial structure and legal determinants emerges from Figure 5.<sup>34</sup>

The thesis that the legal system is the final cause of the financial structure's evolution has recently been questioned by Rajan/Zingales (2000b), pointing out that Germany and France had better developed financial markets in the beginning of the 20<sup>th</sup> century than the UK and the US. Subsequently, backward developments in Germany and France had taken place in the first half of the century, which they attribute to declining competition in the financial sector in combination with political crises and the closing of the economies towards international influences. They conclude that the openness of an economy determines financial development by creating an obstacle to attempts at a reduction of competition in the financial sector. Correspondingly, La Porta et al (2000) argue that internationally open markets are crucial for the development of financial markets because they enforce the imposition of improved investor protection.

There is also some evidence that economic development has some impact on the financial structure. From the comparison of countries with different per capita income, it becomes evident that financial intermediaries and stock markets are larger, more active and more efficient in high-income countries. In relative terms, stock markets are more active in high-income countries and there is a general tendency evident that increasing income coincides with a rising market orientation of financial systems.<sup>35</sup> In sum, the legal environment, openness and economic development may be regarded as the major determinants of the financial structure.<sup>36</sup>

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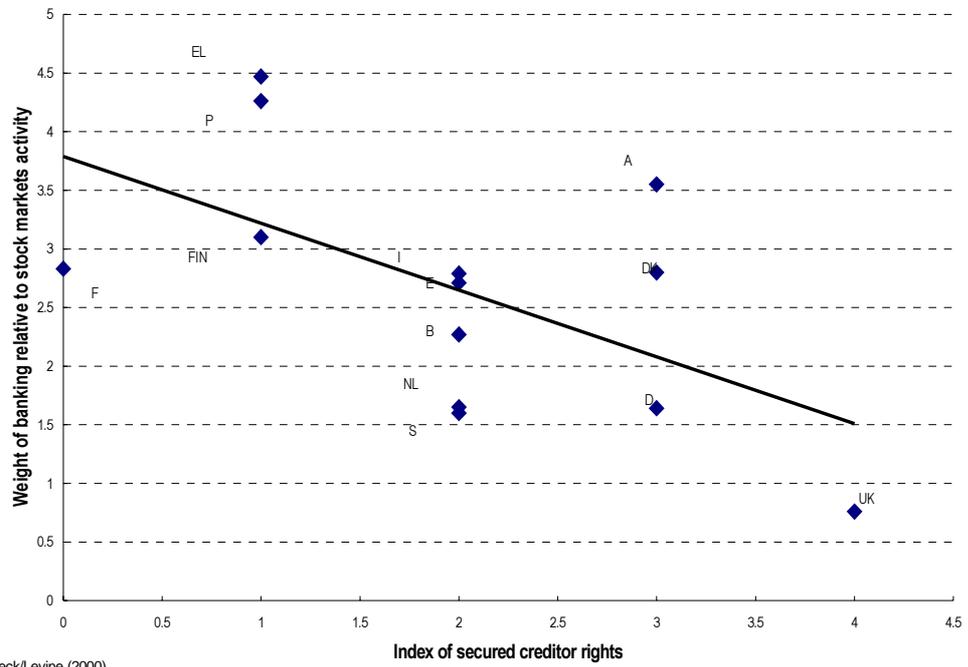
<sup>33</sup> Demirguc-Kunt/Maksimovic (1998), Demirguc-Kunt/Levine (1999).

<sup>34</sup> The relation between the financial structure and creditor rights is significant at the 5 per cent level. Those with accounting standards at the 1 per cent level.

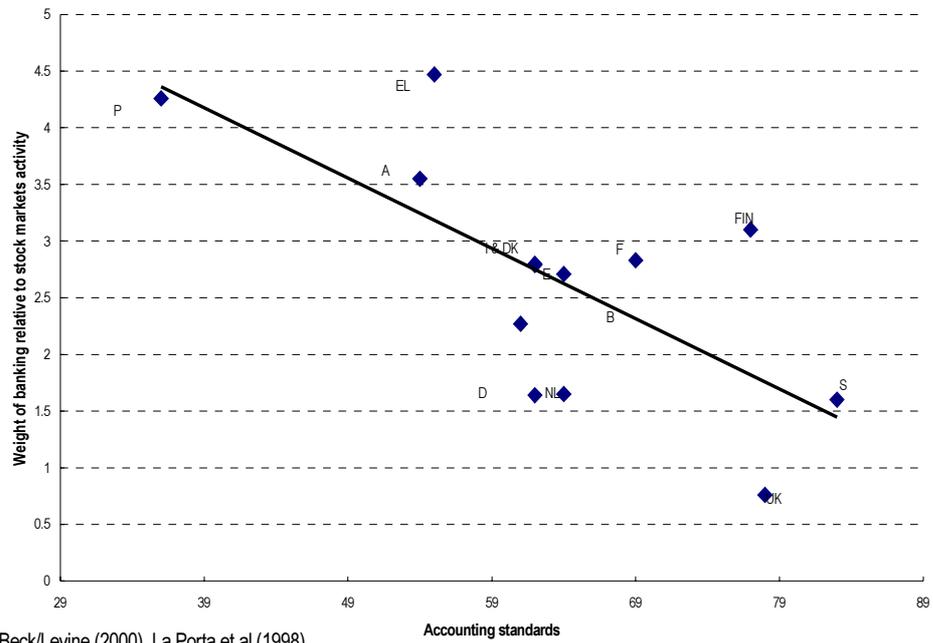
<sup>35</sup> Demirguc-Kunt/Levine (1999).

<sup>36</sup> Barth, et al (2000) find a negative relationship between the state ownership of banks and the development of financial institutions.

**Figure 5: Legal aspects and financial structure, EU Member States**



Source: Beck/Levine (2000)



Source: Beck/Levine (2000), La Porta et al (1998).

## Aggregate and firm specific evidence

Studies analysing the impact of banking and stock market variables on economic growth demonstrated that stock market as well as banking indicators are generally positively linked with economic performance variables but that the extent and significance differs in dependence on the data coverage and methodology applied. By means of cross country growth regressions with a broad panel of countries, Levine (2000) did not find indicators of financial structure to have a significant bearing on real GDP growth. The evidence from studies that restricted the focus on industrial countries presented in Table 2 suggests that stock markets might have a stronger bearing for industrial countries than for developing countries. Stock market capitalisation also yields a larger number of significant results in the cross country regressions in Table 3.

<b>Table 5: Significance of financial structure in cross-country regressions</b>	
with stock market capitalisation divided by private credit as independent variable on dependent variables (A-E) controlled for GDP level and employment growth, 19 industrial countries.	
	<b>relative importance of stock markets</b>
<b>(A) GDP growth</b>	positive, **
<b>(B) TFP growth</b>	positive, **
<b>(C) Real investment growth</b>	positive, ns
<b>(D) Investment/GDP</b>	negative, ns
<b>(E) Returns on capital</b>	positive, **

Note: \*:= t-value significant at 5 % level, \*\*:= t-value significant at 1 % level, ns:= not significant at 5 % level. TFP growth derived from Cobb-Douglas production function. Countries are EU Member States plus USA, Japan, Canada, Australia. Economic output data is from European Commission's AMECO data bank (average 1976-2000), financial variables are from World Bank FINANCIAL STRUCTURES DATABASE (average 1976-1997).<sup>37</sup>

As with the previous exercise, significance does not indicate causality. Given that actual or prospective economic growth is positively related to stock prices, which will show up in rising stock market capitalisation, some caution in interpreting the results above is warranted. More appropriate to circumvent the problem of causality are studies at the firm level because firm performance is unlikely to shape an economy's financial development.

Carlin/Mayer (1999b) analysed the relation between the growth rates of 27 industries in 14 OECD countries and the interaction of industry-specific characteristics with financial variables. They found that in particular the growth of industries relying on R&D<sup>38</sup> is strongly affected by financial variables. The estimates are less robust as regards fixed capital formation. Thus, finance mainly stimulates economic growth by affecting investment in R&D whereas the financing of physical capital accumulation is only of minor importance. They regard their results as providing evidence that the superiority of a particular form of corporate control and financing does not depend on general considerations. Instead, the optimal financial relations for an enterprise depend on the type of economic activity the corporate is involved in. Financing via

<sup>37</sup> Due to incomplete data Switzerland, Norway and New Zealand, were excluded from the regressions containing stock market capitalisation. The stock market capitalisation data covers starts in 1981 for Luxembourg, covers the time since 1995 for Ireland only. The same restrictions apply for the total financing data.

<sup>38</sup> Measured by R&D expenditure in relation to value added.

stock markets may be better suited to high-risk and innovative activity. Bank finance may be more appropriate for more traditional investments that rely on the provision of long-term finance.

Also the analyses of Beck/Levine (2000) and Demirgüç-Kunt/Maksimovic (2000) on the firm level demonstrate that the financial structure does not affect the quantity of external financing available to firms.<sup>39</sup> New firms and expanding firms do not grow significantly different in a market-based or a bank-based financial system. Instead, the overall level of financial development matters for the growth prospects of new firms. A structural difference that Demirgüç-Kunt/Maksimovic (2000) observe is that security markets facilitate long-term financing and banking systems facilitate short-term financing. This insight contrasts with the result by Carlin/Mayer above, who see the main merit of banks in providing long-term finance.

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<sup>39</sup> Both studies cover industries in around 40 countries. Furthermore, calculations at the aggregate, the industry and the firm level are conducted in Beck et al. (2000b) reaching similar conclusions.

**Table 6: Recent empirical studies on the finance-growth linkage at the industry and firm level**

Authors	Dependent variables	Independent variables	Control variables	Panel	Results
Rajan and Zingales (1998)	Growth of value added in industry, all calculations relative to USA as a benchmark	Interaction variable: industry's need for external financing times financial development of country (stock market capitalisation, bank debt, accounting standards)	Country indicators, industry indicators, industry share of manufacturing	UN Industrial statistics, Yearbook, S&P Compustat, manufacturing firms, 1980-90, 36 industries in 41 countries	The interaction variable is positively significant in all specifications, suggesting that firms dependent on external finance grow faster if the financial system is developed. better results for the growth of number of firm than for growth of the size of firms.
Demirgüç Kunt and Maksimovic (1998)	Excess of firms growth over internal and short-term financing.	Stock market turnover, stock market capitalisation, and size of bank deposits relative to GDP 1980-1995	Inflation, national output growth, law and order index, government subsidies, GDP per capita	Global Vantage database and IFC Developing Countries database, 30 countries, 1980-1995	Firms in countries with developed finance grow faster .
Carlin and Mayer (1999)	Output growth, investment share, R&D share	Dependence of financial variables (ownership concentration, index of accounting disclosure, capitalisation) with industry characteristics (external equity, bank debt and skilled labour)	Control for industry and country specific characteristics by de-meaning	OECD STAN data, 27 industries in 14 OECD countries, 1970-95	Countries with high accounting standards and ownership concentration have high growth of firms that depend on external financing. The financial variables yield better results for R&D than for physical investment.
Demirgüç Kunt and Maksimovic (2000)	Proportion of firms whose rate of growth exceeds the growth supported by internal resources	Assets of banks, stock market turnover, dummy on banking versus stock market system	National growth rate, inflation, average size of firms in country, GDP per capita	Worldscope data bank, publicly traded firms, 40 countries, around 45 000 firms, 1989-96	A larger proportion of firms obtain external financing in a legal environment conducive to finance, the relative size of banking to market activity not important in general, but firms requiring long term finance benefit from strong securities market
Beck and Levine (2000)	Growth of value added, number of firms, size of firms in industries	Interaction of external financing with financial development and structure	Country and industry dummies, share in manufacturing	Same as Rajan and Zingales (1998), World Bank financial structure data bank.	Financial development and investor protection supportive to industry growth, financial structures do not explain industry growth patterns. Financial developments explains number of firms but not their size.
Cetorelli and Gambera (2001)	Growth of real value added in manufacturing industries	Private domestic credit to GDP, stock market capitalisation, banking concentration	Share of industry, legal origin, GDP, population, accounting standards, human capital	Same as Rajan and Zingales, 36 industries in 41 countries, IBCA Bankscope	All financial variables positively significant. Concentration in the banking sector depresses growth across sectors. It promotes the access of young enterprises to credit.
Rivaud-Danset, Dubocage and Salais (2001)	Mark up, value added, return on capital employed	Own funds, leverage, financial debt structure, liquid capital	Analysis of differences between SMEs and large enterprises	BACH database, manufacturing in 9 industrial countries, 1990-1996	Performance and profitability indicators do not correlate with financing. Financial structure depends on country characteristics.

#### **4.4 Completeness and adaptability of financial structure**

Recently, the debate about the optimal financial structure has been put into a new light. It is in particular the importance of legal issues that has raised doubts about the policy relevance of the "bank versus market" approach, given that policy makers are unable to affect the legal origin of the economy.<sup>40</sup> Both, financial markets and financial intermediaries, provide capital services, which are important to spur economic growth. Whether a bank-based or a market-based system provides financial services appears to be of secondary importance, which is in line with the empirical evidence presented above.

Overall, it turns out that existing financial structures are rather complex with the above mentioned distinction between a bank- and a market-based financial structure falling short of providing a reasonable approximation of reality. Financial structures in developed countries display both categories and differ mainly in the extent, to which markets or banks deliver financial services. For instance, bank lending has an important market share even in the USA, with the country's financial system being widely perceived as the prototype of a market-based system. In addition, banks are not the only financial intermediaries. Insurance companies and investment funds often also play prominent roles in the allocation of savings.

Furthermore, theoretical reasoning permits plausible arguments in favour of both financial markets and banks as providers of capital while empirical research has so far not been able to establish a clear case for one or other of the mentioned prototypes. Instead of focusing on the difference between banks and markets, attention has shifted towards the completeness and adaptability of the financial structure. These issues will be considered in the subsequent chapter.

Stulz (2000) regards it as essential that a bank-dominated system be accompanied by active financial markets, which serve as an alternative for enterprises in getting funds thereby reducing the market power of banks. For banks or other financial intermediaries, it is furthermore useful if an active financial market exists because it allows banks to limit their lending to large customers. This seems to be of importance if enterprises are large in comparison to the bank or if they are growing rapidly. Financial markets provide an exit clause for banks through offering enterprises their assistance in going public, which implies the issuance of equity or corporate bonds.

Over the life-cycle of firms, their financial needs are likely to change. Small and young enterprises are likely to benefit from the service of banks to provide financing in stages while the bank learns how the enterprises evolve. Small firms may also value that banks provide their services at low transaction costs compared to financial markets. More mature and larger firms rely more on financial markets finding it favourable to lend large sums by issuing bonds or equity. Overall, it is important that the financial structure is complete offering financing through banks and financial markets and being sufficiently adaptive to allow the evolution of financial

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<sup>40</sup> The argument has been brought forward by Stulz (2000), Rajan/Zingales (2000b).

intermediaries that specialise in financing the needs of small enterprises. In this context, venture capitalists are regarded as hybrids that fill the gap.<sup>41</sup>

The same principles might hold for countries. As the economies become more mature and the recent technological advances require investment into immaterial capital to a larger extent than in the past, a financial structure with the ability to adjust should develop a bias towards market elements. In Germany and Japan, who have for long been regarded as bank-oriented systems, recent developments suggest that financial markets have become more important. For instance, a rising importance of securitisation, the increasing issuance of equity by large corporations and the formation of risk capital markets have increased the importance of funding via the market in Germany. In Japan, the banking crises of the 1990s have diminished the role of banks in the economy.

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<sup>41</sup> See Tsuru (2000), Kortum/Lerner (1998).

## **5. *How are financial structures related to structural change and technical progress?***

The discussion on the determinants of economic growth has shifted in recent years from the analysis of factor accumulation towards the analysis of technical progress and its determinants. Endogenous growth approaches stress the importance of R&D in generating knowledge and of innovative entrepreneurs using this knowledge to introduce new products and processes in business. Empirical research attaches crucial importance to R&D activity, human capital formation and the incentives of entrepreneurs.<sup>42</sup> Financial patterns are likely to influence innovative entrepreneurs along the lines analysed in section 4.2. In addition to determining the costs of capital, financial structures influence incentives through the evaluation of projects and the way corporate control is exerted. In this connection, financial structures can be either preservative or supportive of structural change. This section attempts to derive evidence of this feature from two sources. The first is the extent of structural change in the financial system itself, showing its ability to adapt and to exploit technical advances. The second source is the completeness of the financial structure, which is the extent of coverage of the innovative enterprises' financial demands.

### **5.1 Structural change in the EU financial system**

With hindsight, the revealed experience that institutional change normally occurs only slowly, the EU's financial structure has undergone a remarkable structural change in recent years. The pace of change is most tangible in the increasing concentration of banks, in the increasing spread of strategic alliances and mergers among equity market organisations, and in the creation and growth of new forms of financial intermediaries such as pension funds, venture capitalists and risk capital markets. Overall, the change in the EU's financial structure can be characterised by the catchwords of dis-intermediation and securitisation on the one hand and economic integration on the other hand. In both regards, there is a general trend of growing market-based elements and a decline of intermediation through banks.

Evidence for the trend of increasing securitisation and dis-intermediation can be drawn in particular from the issuance of securities from non-financial corporations, which has increased considerably in magnitude. The amount raised on the EU stock markets has increased for instance from 1.9 per cent of GDP in 1998 to 4.5 in 2000.<sup>43</sup> Similarly, corporate bond markets have experienced a marked acceleration of issuance from an amount outstanding of 330 bln USD in 1998 to 500 bln USD in 2000. Given that the acceleration of issues in this market has not been restricted to euro area Member States, it is unlikely that EMU is the only catalyst. The strong issuance activity of telecommunication enterprises suggests that the increased merger and acquisition activity has also given a major impetus to this market segment. Furthermore, new markets specialised in the provision of equity for small growing enterprises have grown considerably over recent years. Venture capitalists, who were virtually unknown in continental Europe, hold a steadily increasing market share.

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<sup>42</sup> Endogenous growth theory is extensively elaborated in Aghion/Howitt (1998).

<sup>43</sup> According to the FIBV data displayed in the Eurostat structural indicator database.

The process of disintermediation has challenged banks in the EU in particular.<sup>44</sup> Notably large corporates have shifted their financing patterns from bank financing towards direct financing on the market. Furthermore, the issuance of equity has assumed a larger role in recent years. Banks have adjusted their financial services to large corporates. Instead of lending funds, they provide services for the issuance of shares or corporate bonds. The increasing role for mergers and acquisitions has furthermore accelerated the structural change from "traditional banking" to "investment banking". The shift in banking activity has become visible in a rising proportion of non-interest components in bank's profits and a rising volume of off-balance sheet activities.<sup>45</sup>

The change in balance sheets indicates that the banks' liability side has been even more affected by structural change than the asset side.<sup>46</sup> Other financial intermediaries, such as pension funds, investment funds and insurance companies have increasingly acquired funds and have increased their market share at the expense of banks. Likely reasons are the changing incentives of savers to prepare for ageing and in their desire to participate in stock market developments. Consequently, risk-bearing long-term investments tend to be valued higher than deposits with a fixed rate by savers. Banks have addressed this trend by acquiring or founding funds. In sum, the changing savings pattern has less affected the banks' loan activity than modified the composition of their financing. The impact of structural change in the banking system on economic growth is unclear. To the extent that they imply enhanced capabilities to select and monitor investments, the recent trends should raise potential output growth. On the other hand, structural change induces concentration in the banking sector. Cetorelli and Gambera (2001) found evidence that concentration in the banking sector has a general depressing effect on growth although it seems to promote the credit facilities of younger enterprises.

Developments in the effectiveness of the financial sector are difficult to capture. An attempt is made in Figure 6, which relates the amount of credit institutions' domestic loans to other credit institutions to the amount of domestic loans to non-financial enterprises. A high number suggests that funds are actively re-allocated within the financial sector and indicates the extent to which the banking system improves the allocation of savings. For almost all countries, the number has grown between 1992 and 1997. It has especially grown for the larger Member States but is small and even declining for some other ones. Obviously, the information content of this variable for smaller Member States is restricted by these countries' larger openness and probably the smaller benefit of an intra-bank market in a smaller economy.<sup>47</sup>

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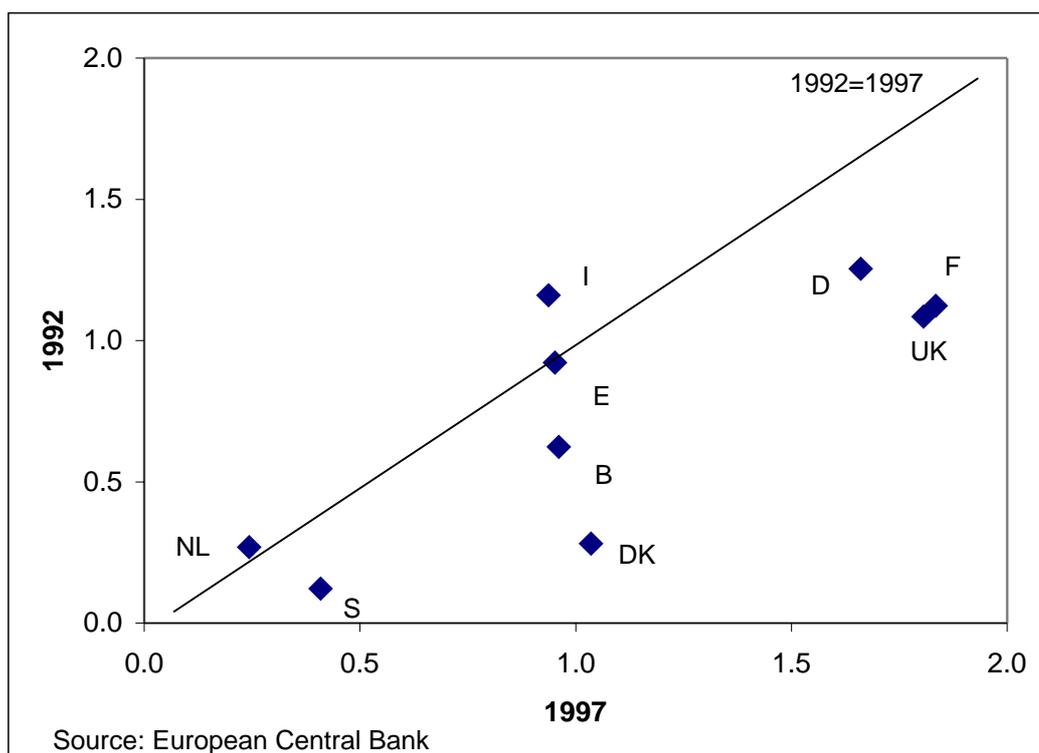
<sup>44</sup> For a comprehensive review of structural change in the euro area's banking industry, see Belaisch et al (2001).

<sup>45</sup> European Central Bank (2000).

<sup>46</sup> See ECB (2000).

<sup>47</sup> Furthermore, this indicator is not invariant to consolidation in the banking industry.

**Figure 6: "Financial sophistication" - domestic interbank claims relative to claims from banks on domestic non-financial corporations**



An alternative approach to measure an increasing degree of efficiency is the use of sophisticated financial contracts. Another quantitative proxy for efficiency could be the spread of financial innovations. During the 1990s the notional principal in financial innovations has increased considerably.<sup>48</sup> European exchanges reported an increase from 1150 billion USD in December 1994 to 3515 in September 1998 of futures and from 676 billion USD to 1705 in the case of options. Most of this is on interest rate derivatives. Since then, activity has consolidated, running to a notional principal of 2400 for futures and 1470 billion USD for options. The introduction of the euro might be a reason for the consolidation, the increasing market share of interest rate swaps is another possible explanation. The re-direction of banking activity from providing universal banking services to investment banking could be one indication of rising efficiency, which should show up in rising profitability. However, bank profitability measures give a mixed picture - returns on assets remained roughly constant between 1992 and 1998, while return on equity increased in the majority of Member States.<sup>49</sup>

## 5.2 The impact of technological progress on the production process of the financial sector.

Information and communication technologies are widespread in the "production process" of the financial sector. Thus, technological progress can be expected to change the organisation of financial activity. The availability of automatic machinery

<sup>48</sup> The numbers reported stem from the BIS quarterly financial statistics. The notional principal is the face value of contracts times the number of contracts.

<sup>49</sup> According to the calculations in Belaisch et al (2001)

and large processing power has already enabled financial intermediaries to streamline activity. The spread of ATM and the reduced density of the branch network are visible signs of this development as regards the retail market. Concerning the wholesale market, the development of financial innovations as well as the remote access to financial markets at different locations, for instance, would not have been possible without the emergence of information technologies.

The management of information has become less costly by the use of mainframe computers in the last decade. The recent technical advances relevant for the financial sector are more communication related than related to processing power. New communication technologies facilitate different means of access for customers to their financial intermediaries. The replacement of personal services by remote banking is estimated to yield considerable cost reductions. Transactions via telephone are estimated to cost 40 to 70 % less and those via the internet are estimated to reduce costs to 1 - 25 % in comparison to manually handled transactions.<sup>50</sup>

Productivity growth in the financial sector is hard to measure owing to difficulties in pinpointing the sector's output. For the US financial sector, Bailey and Lawrence (2001) identify an acceleration of labour productivity growth by 3.5 percentage points in the second half of the 1990s to about 6.5 per cent annually. Since the financial sector invested heavily in ICT, the acceleration of productivity is likely to a large extent to be due to the increased usage of new technologies.<sup>51</sup> A more indirect effect of the usage of ICT can be derived from the study of Petersen/Rajan (2000). They see the efficiency effect of the increasing use of ICT in financial services in falling transaction costs and present evidence that ICT usage has resulted in a reduced physical distance between banks and small lenders.<sup>52</sup> Thus, access to bank loans has become wider for small business in the USA, which tends to reduce their capital costs and raises their growth potential.

According to a review by the European Central Bank (1999b), banks in the EU mainly use new technologies to improve internal information management, but have generally been hesitant to exploit technical advances in their relation to customers. Illustrations of this may be seen in the impact of remote banking on bank's intangible assets such as customer loyalty as well as in their difficulties in assessing the technological risks of electronic banking.<sup>53</sup> The reluctance of EU banks stands in contrast to observations in the US, where financial institutions have increasingly focused on new technologies. Instead of outsourcing their information technology, they tend to link their core competencies with new technologies in a shift towards information providers.<sup>54</sup>

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<sup>50</sup> Quoted from European Central Bank (1999b).

<sup>51</sup> However, Stiroh (2001) yielded decisively lower productivity growth in the FIRE sector (fire, insurance, real estate) of close to 3 % on average 1995-99, up by barely half a percentage point from the first half of the 1990s.

<sup>52</sup> According to the study by Petersen/Rajan (2000), the distance between a small firm and their lenders has increased from 16 miles for relations that begun in the 1970s to 51 miles on average for relationships that began in the 1990s.

<sup>53</sup> See European Central Bank (1999b), Wenniger (2000).

<sup>54</sup> This issue is raised in Thakor (1999).

### 5.3 Changes in the demand for financial services

To the extent that the economic activity of enterprises is modified by the emergence of new technologies, their demand for financial services is likely to be affected. In particular, firms active in the ICT sector apparently have other financial needs, distinct from those of traditional manufacturers. Despite the fact that sound evidence is not yet available and thus, this section cannot avoid being to some extent speculative, the following "stylised developments" can be claimed to matter for the financing of "new economy business" in the US and the EU.

The characteristics of such firms might be described along the following lines. Most enterprises in the ICT sector are young and rely on innovative or R&D intensive activity. Their production is in general less capital-intensive than that of traditional industries but the information and communication equipment used is subject to rapid depreciation and will need to be replaced or updated on a relatively frequent basis. The field of business is perceived as risky because future supply and demand conditions are unknown. Some "high tech " firms have long gestation periods, not-generating significant cash flows for a considerable time, which adds to the uncertainty of their profitability. However, it is expected that some of these firms have the potential for fast and strong growth. Consequently, their corporate structure will evolve in parallel to their entrepreneurial success or failure, which might imply quite drastic changes in corporate control. With regard to more mature firms, their entry into ICT related activity implies an increase in their exposure towards technical and organisational change. The restructuring of large corporations and the prevalence of M&A may be expected to be more frequent than in the past.

The characteristics of technology-intensive enterprises gives rise to specific financial demands.<sup>55</sup>

- Financial engagement with a new economy-firm is risky and firms have no collateral at their disposal as they invest mainly in intangible assets. To the extent that market participants are less risk-averse than banks, firms might find it favourable to offer equity on markets.
- Small firms may prefer a single lender to avoid the disclosure of firm-specific information related to innovations and R&D. Moreover, single lenders allow one to avoid the duplication of evaluation and monitoring costs.
- To the extent that firms have projects with long gestation periods and expect uncertain cash flow in the start-up phase, financing through bank loans makes the enterprise vulnerable towards the renewing of the credit terms and the need to pay interest. Equity financing avoids this vulnerability. Asset holders will obtain a positive cash flow only once the enterprise is sufficiently profitable to generate them.
- At a certain stage, the superiority of financial markets in aggregating information in an uncertain business environment may become important. Those firms acting under very uncertain demand and supply conditions may be forced to go public if they do not succeed in securing finance from single lenders.
- Firms undergoing high growth are faced with growing financial requirements. Banks are perceived to be superior in providing tailor-made and flexible financing conditions. At a later stage financing via markets might be more appropriate

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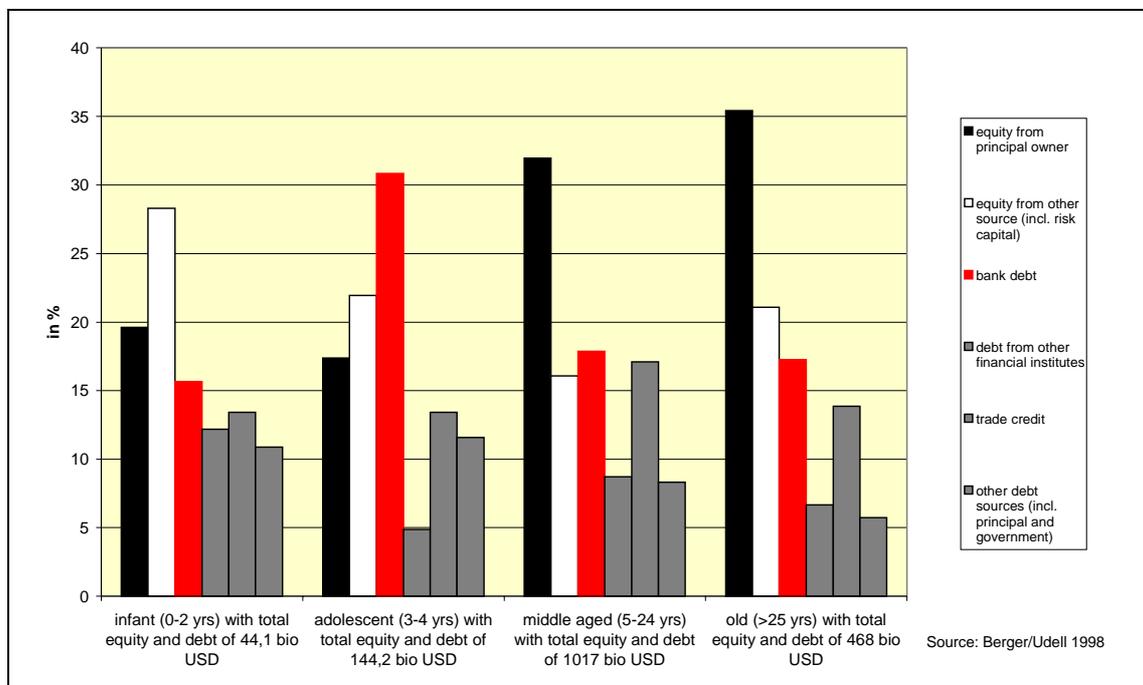
<sup>55</sup> See also Stultz (2000), for the underlying microeconomic considerations compare to section 3.3.

because having corporate control "at arm's length" is considered to be more flexible, which is of value to enterprises undergoing restructuring.

- Mature firms involved in re-structuring or M&A often need large sums beyond the budgetary constraint of single institutions. A liquid public market for equity or corporate debt would be more responsive to their needs.

Generally, "new economy enterprises" demand a financial system that is sufficiently flexible to provide them with the different financial instruments stipulated by the particularities of their life cycle. Exit clauses from bank financing to market financing and vice versa might be appropriate for their financial needs. Concerning their risk attributes, reliance on equity financing instead of debt might be more important for "new economy" enterprises than for the more traditional industries. However, debt financing through banks is more flexible and may not be conclusively regarded as less useful. The change of US small firms' financing structures over time is presented in Figure 7.

**Figure 7: Composition of financing of small US business, classified by age**

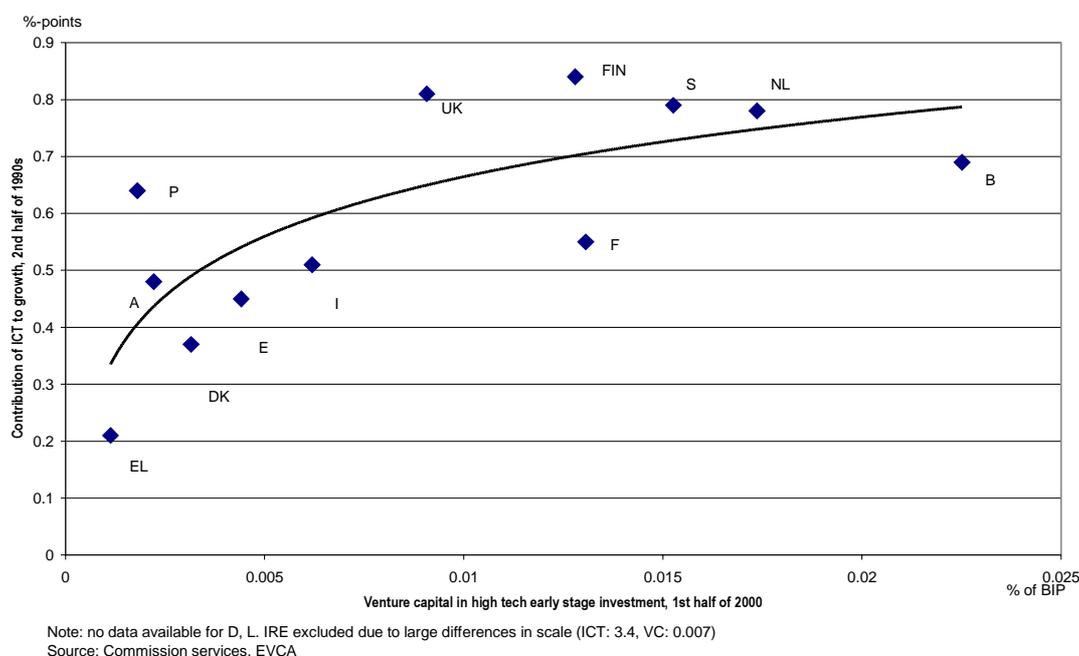


Are the changes in financial needs of young enterprises reflected in the changing structure of the EU's financial system? Whether banks have adjusted their lending practices is difficult to observe. An increase in the availability of uncollateralised debt or a shift towards lending to small, nascent firms would be indicative of their adjustment. The changeover to investment banking appears to be more beneficial to large corporates, better suiting their demands for the financing of re-structuring and M&A, than to young enterprises.

These young enterprises rely strongly on risk capital markets as information evaluation though markets is seen as superior in aggregating information in uncertain surroundings. The increasing involvement of business angels and venture capitalists in EU financial markets is a promising sign, as is the increased potential for equity financing in the so-called new markets. In general, these market segments appear not yet to be sufficiently active in the EU. Risk capital markets in the EU have flourished

in recent years and the graph below suggests a positive relation between the importance of ICT for economic activity and the financing of high-tech start-ups through venture capital.<sup>56</sup> Given that risk capital markets have grown from a very low base, they are still considerably smaller than their US counterparts.

**Figure 8: Venture financing and growth in the high-tech sector, EU Member States**



Given the diverse financial needs of "new economy businesses" the capacity of the financial structure to support corporate change appears to be crucial. In this respect, the strengthening of market-based elements of the EU's financial structure first implies a step towards structural completeness and secondly a better adaptation towards the needs of the new economy. In particular in times of rapid technical change, a market-based system has the main merit of aggregating views on new technologies and injecting them into public prices, which then, stimulate market participants to acquire information. Information acquisition by banks does not give rise to information acquisition by other agents, thus dismisses the possibility for positive spill-over effects. However, stock market development alone is not sufficient to promote the diffusion of new technologies as the empirical study of Singh et al (2000) suggests. They found that quantitative stock market indicators are not significantly related to ICT indicators, once the estimate is controlled for human capital, the growth and level of GDP. A different though not opposing view emerges from a study by Edison and Sløk (2001) in which investment is related to stock market valuations in a VAR model. The estimates reveal a positive relationship between overall investment and an increase of the stock market valuation of "new economy" firms, with the estimated parameters being quite similar in Anglo-Saxon countries and Continental European economies. A further result is that an increase of the stock market valuation of "non-new economy" firms has no impact on investment in Continental Europe whereas its impact in North America and the UK is comparable to those of "new economy" firms.

<sup>56</sup> The data on ICT in Figure 8 is taken from the growth accounting exercise in European Commission (2000), the venture capital data is from the EVCA mid-year survey 2000.

## 6. *Conclusions*

This paper reviewed the interactions between the financial sector and economic growth taking a long-term view. Overall, it emerges that financial development is related to economic growth even in industrial countries. But it is also shown that empirical analysis at the aggregate level is unlikely to capture the complexity of the financial structures in industrial countries and of the growth process. In brief, the main insights of the paper are the following.

- Numerous evidence suggests that finance is important for growth at early stages of economic developments. As regards industrial economies, the evidence is less conclusive at the aggregate level. Tentatively, the evidence for stock markets is stronger than for variables on banking activity. Studies at the firm level yield relatively strong support for the growth-enhancing effect of finance.
- Among the transmission channels from finance to growth, the effect of financial patterns on capital productivity - i.e. through the selection and monitoring of investment - appears more important for industrial economies than the transmission channel running from the reduction of transaction costs via bank credits to increased investment.
- Evidence that market-based systems are constantly superior to bank-based financial systems does not exist. Empirically, the financial sector's degree of development and structure strongly depend on legal issues ruling investor protection and transparency.
- Young and innovative enterprises demand a flexible financial structure that allows them to rapidly change their financing in accordance with their life cycle. For them, market-based elements and equity play a larger role than for traditional industries.
- The EU financial structure is undergoing a remarkable transformation, though considerable differences among Member States still exist. Factors such as the provision of risk capital, and the strengthening of market-based elements have become more important in recent years.
- Even in the EU, there is evidence that differences in the degree of overall financial sector activity and the proportion of activity on financial markets is related to differences in creditor protection and accounting standards. This insight is important for policies aimed at stimulating the market-based financial structure and enhancing overall financial activity.

The general character of these results is indicative of gaps in the understanding of the finance-growth nexus. Research is in particular lacking for the EU as regards some specific and detailed transmission channels. In this respect, further research in the following areas is warranted.

- The link between financial development, risk sharing, specialisation and economic growth is promising and need to be pursued.
- It is prescient that the notion of a "complete" financial structure is elaborated in more detail.
- The financial needs of young and innovative enterprises and their evolution over the life cycle of the firm need to be backed up by more detailed empirical analysis.
- The limited availability of harmonised, detailed and sufficiently long time series is an obstacle for empirical work in this area.

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