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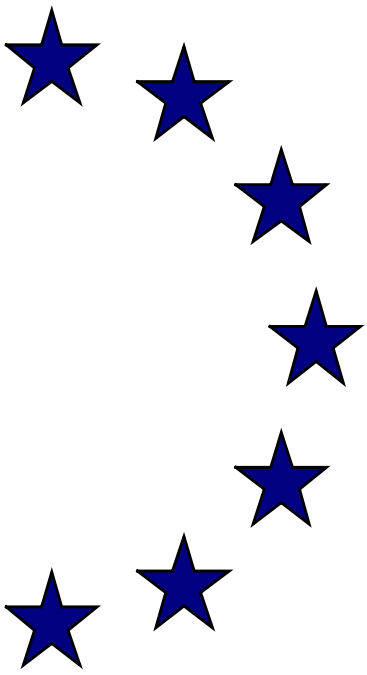

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N° 179 - November 2002

Financial Market Integration, Corporate Financing and Economic Growth*
Final Report (22 November 2002)

by

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* We thank Leonardo Otranto and Mauro Staiano for providing research assistance, Michael Halling for help in extracting the firm-level data, and CEPR for supplying administrative support.

ECFIN/597/02-EN This paper only exists in English.

Financial Market Integration, Corporate Financing and Economic Growth

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Executive Summary

This study provides a thorough assessment of the likely effects of financial market integration on the ability of European countries to grow faster and on how the possible benefits will be distributed among the Community countries and industries. The study achieves several conclusions strongly supportive of the idea that promoting financial market integration is an important step in promoting economic growth in Europe. The main findings of the study can be summarized as follows:

- European countries still differ considerably in the degree of financial development, even after a decade where progress has been made on the front of the integration of national financial markets.

- Domestic financial backwardness constrains manufacturing industry growth below its potential, and affects corporate investment and entrepreneurship. Thus, promoting financial market integration should enhance economic growth among European countries.

- The effect of financial development on economic growth has not weakened in the early 1990s, when some financial integration occurred, suggesting that financial development can still have relevant effects on economic growth.

- Simulations suggest that the potential benefits of financial integration – interpreted as firms' access to a financial market similar to the U.S. standards (or of the most developed EU economies) – can have potentially large effects on the EU countries' growth. The impact of financial integration on the growth of value added in the EU manufacturing industry as a whole is estimated at between 0.75 to 0.94 percentage points per year. Of course, the effect would be smaller if financial market integration were associated to a lower level of financial development than that of the U.S.

- The overall impact of financial market integration hides considerable diversity in country and sector growth, reflecting both the degree of financial backwardness (more backward countries gain more) and sector specialisation (countries that specialise in financially dependent sectors gain more).

- In our simulations, the growth effect of financial integration is 1 percent per year or more for Belgium, Denmark, Finland, Germany, Greece, Ireland, Italy, Portugal and Spain. In other countries, growth increases by less than 1 percent per year. This second group includes Austria and France (whose projected growth rate increases by somewhat less than 1 percentage point) and the Netherlands, Sweden and the UK, who do not gain much, being already the most developed financially in the Community. The two groups differ

mainly because of their initial level of financial development, which is considerably higher in the second group of countries.

- The overall effect on economic growth depends on which institutional determinant of financial development is varied to achieve full financial market integration. The study considers three variables that are both important determinants of financial development and at the same time are under policy control: the degree of creditor's protection, the severity of accounting standards and the rule of law. Unsurprisingly, the largest benefits accrue when all determinants are assumed to improve simultaneously. But convergence in accounting standards to the highest level in Europe is shown to be alone sufficient to raise growth substantially.

- The study shows that the effect of financial development on manufacturing firms' growth differs markedly also according to firm size, the development of domestic financial markets being mainly a constraint on the growth of relatively small and medium enterprises (SMEs). This is consistent with the idea that larger firms can overcome local financial market imperfections by raising funds where they are more abundant and available. If financial market integration among European countries helps develop local financial markets or widens the geographical limits within which SMEs can raise funds, it will prompt a disproportionate growth of SMEs. Then countries whose industrial structure is more tilted towards small firms (such as Austria, Belgium, Greece, Italy, Spain and Sweden) stand to gain more from domestic financial development. However, an important qualifier to this argument is that the local financial markets serving SMEs are also those less likely to be permeable to the competitive pressures arising from financial integration.

- Financial market integration may have both winners and losers. In countries that are less financially developed, the financial sector stands to lose market shares and profits. This may result in a powerful constituency lobbying against financial integration, or at least slowing down its progress. At the same time, the industrial sectors of these countries have an incentive to promote financial integration because integration gives them an opportunity to expand. So the overall balance of opinion in these countries will depend on whether the pro-integration pressure of industry will win over the anti-integration resistance of local finance. In financially developed countries, the situation is likely be reversed. The financial sector will gain from integration, while industry will not gain much and may even lose from the increased competitiveness of foreign manufacturing producers, which will be able to access to hitherto inaccessible sources of financing. Therefore, in these countries finance is likely to be in favour of integration while industry may be less favourable or even opposed to it.

1. Overview of the study

This report provides estimates of the relationship between financial market development and corporate growth and assesses the impact of financial market integration on this relationship with reference to European Union (EU) countries.

The report starts out in Section 2 by reviewing critically the approaches and the empirical strategies so far used to study the impact of financial market efficiency and development on corporate financing, investment and growth. Many studies have analyzed the relationship between finance and growth, forming a relatively consolidated but still expanding literature. We build on this literature to discuss three issues that are central to our empirical strategy: (i) the measures of financial development, (ii) the relationship between financial integration and financial development, and (iii) the econometric methods used to analyze the finance-growth nexus.

In Section 3 of the report we lay out the methodology that we implement to estimate the impact of financial development on the manufacturing sector growth in the EU. The approach, first proposed by Rajan and Zingales (1998), exploits cross-country variation between real as well as financial variables and relies on the intuitive idea that financial efficiency is more relevant for firms that depend heavily on external finance. Although these authors applied it to industry-level data, the approach can be applied also to firm-level data to obtain additional insights on the nature of the link between financial and real variables and the likely beneficiaries of financial market integration. In the report, we apply it to both types of data.

In Section 4 we estimate the relation between financial development and growth using an international industry-level panel. The data set combines industry-level information on sector growth, investment, number of firms, firm size and access to finance with country-level indicators of financial development and institutional variables. The sample covers a longer time interval and larger set of countries than that used by Rajan and Zingales. The regression results obtained using this panel support the hypothesis that financial development promotes growth, particularly in industries that are more financially dependent on external finance. Indicators of financial development are significantly correlated with the growth rate of manufacturing output and value added, and with firm creation. These estimates are an intermediate step to assess the effects of financial development and integration in the EU.

In Section 5 we use these estimates to simulate possible "scenarios" of the growth impact of financial market integration in the EU. To illustrate the impact of financial integration on manufacturing sector growth, in Section 5.1 we simulate the impact of raising the level of financial development in each EU country to the U.S. level of financial development. We consider the latter to be a valid benchmark, being a highly developed and continent-wide financial market, not dissimilar from what an integrated European financial market would presumably look like once the integration process is completed. Indicators of financial development place the US slightly above the most financially developed European countries, and its size is comparable to that of the EU.

Financial development is correlated with several underlying regulatory variables (such as indicators of investor protection, rule of law, etc), which are under the control of national legislators and EU directives. For policy purposes, analyzing changes in these regulatory variables may be a more interesting exercise than analyzing integration of the financial systems themselves. Since assuming that EU countries will raise its regulatory and legal standards to the U.S. standards appears unrealistic, in this case we examine a scenario where EU countries raise their standards to the highest current EU standard. The resulting impact on manufacturing performance of the various countries and sectors is presented in Section 5.2.

In Section 6 we apply the methodology described in Section 3 to a panel of companies incorporated in EU, Central and Eastern European countries. This allows us to test the robustness of the results obtained in Section 4 with industry-level data, as well as to investigate if the finance-growth relationship is particularly strong for small and medium enterprises (SMEs), as the theory would suggest. Firm-level estimates turn out to be quite consistent with the industry-level estimates reported in Section 4. This is an impressive result, considering that the two data sets differ deeply in terms of aggregation level, country coverage and time interval. The micro estimates also highlight that the growth of SMEs is more sensitive to financial development than the growth of large enterprises. This needs not imply, however, that EU financial integration will benefit particularly SMEs, since many such firms may remain beyond the reach of foreign banks and of securities markets.

Section 7 summarizes our findings and their implications for the process of European financial market integration. We comment on the likely losers and gainers from this process, and on the consequent emergence of interest groups in favor and against the integration process. This concluding section also provides some important notes of caution about the

interpretation of the results. The main cautionary note is that our estimates refer only to manufacturing industries, not to the whole economy. This implies that the estimated impact on the overall economic growth rate cannot be immediately gauged from our estimates. To do so, one should take into account that manufacturing is only a portion of the EU economy, and that financial development may also affect other sectors, especially industries within the service sector. In particular, and quite obviously, financial development is likely to affect directly the financial and professional service sector. Our analysis cannot take this effect into account because our data source – the UNIDO database – does not include data on these industries. The output of banks, insurance companies, and of security, law and accounting firms is hard to quantify in ways comparable to that of manufacturing industries, especially in an internationally comparable fashion. We provide some suggestions on the qualitative corrections to be made to our estimates when attempting to translate them in terms of impact on the economy-wide growth rate.

2. A critical assessment of existing literature

Financial development can affect growth via three channels (Pagano, 1993): (i) it can raise the fraction of savings funneled to investment, reducing the costs of financial intermediation; (ii) it may improve the allocation of resources across investment projects, thus increasing the social marginal productivity of capital; and (iii) it can influence households' saving rate.

While in the first two cases the effect is generally positive, in the third its sign is ambiguous: financial development *may* also reduce saving, and thereby growth. As capital markets develop, households gain better insurance against endowment shocks and better diversification of rate-of-return risk, consumer credit becomes more readily and cheaply available, and the wedge between lending and borrowing rates shrinks. In this case the effect on saving and growth is ambiguous.[1] However, especially in economies open to capital flows, domestic investment is to some extent decoupled from domestic savings, so that financial development is unlikely to affect the growth rate via changes in the saving rate – the third channel mentioned above. It is much more likely to do so either via the first and second channel, that is, by reducing the cost of financial intermediation or by improving the allocation of capital across projects.

Financial development can enhance growth by **reducing the cost of financial intermediation** in two ways. First, to the extent that it is associated with the entry or creation of new intermediaries, financial development can increase the degree of competition in financial markets and thereby curtail monopoly rents. The interest rate margin charged by banks will tend to be compressed below the level that incumbents would have chosen otherwise, and the availability of credit will correspondingly tend to increase. Second, more developed financial systems can reduce the cost of financial intermediation because they can deal better with the problems of asymmetric information that are pervasive in financial markets. For instance, financial systems may vary in their ability to prevent borrowers from using loans to their own private benefit instead of investing in productive assets, or in their ability to control the risks taken by the borrowers. Close bank relationships or efficient

[1] These considerations suggest that "financial development" is too generic a term and that in order to assess its effects on growth one needs to be specific on the particular financial market concerned. In this study we are concerned mainly with the effects of financial development on firms.

information production by large investors may mitigate such opportunistic behavior by borrowers, and thereby allow intermediaries to require a lower return and/or increase funding.

Financial development can also contribute to growth by **allocating capital more efficiently** across alternative investment projects. First, by facilitating the trading, hedging and pooling of risks a more developed financial sector allows investors to fund highly profitable, but risky investment opportunities that would otherwise be forgone. Second, to the extent that more sophisticated intermediaries are more effective in distinguishing good and bad projects, funds are allocated to more profitable projects, and the productivity of the economy will increase.

An important issue is whether financial development has mainly "level effects" – that is, allows countries to raise long run per capita output – or rather it affects steady state growth. In principle both outcomes are possible, depending on the nature of the growth process. In endogenous growth models, financial development and financial reform would allow countries to grow permanently faster. In more traditional models with exogenously-driven technological progress, financial development – by allowing more investment and capital accumulation – would grant a transitory (but possibly prolonged) increase in the economy's growth rate, and a permanent increase in per-capita GDP.

For all these reasons, the current consensus view among economists is that financial development spurs investment and growth, although opinions differ considerably about the quantitative importance of this relationship. Indeed, a large and growing literature has documented a robust correlation between finance and growth: countries with more developed financial markets grow faster. To go beyond this mere correlation, first noticed by Goldsmith (1969), one needs to establish if there is a causal relationship running from financial development to growth. Therefore, any empirical analysis must control carefully for the potential reverse causation from growth to financial development. To this purpose, researchers have used econometric techniques and identification strategies of increasing sophistication. Nowadays, the weight of the evidence is overwhelmingly in favor of the view that financial development is capable of spurring economic growth. Events that affect the degree of financial development of a country or a group of countries, such as financial integration, may therefore be important for their subsequent economic performance.

In order to analyze the effects of financial integration on economic growth, it is useful to start by reviewing critically the existing literature, which provides guidance to the

empirical analysis on several fronts. First, it illustrates how to measure financial development. Second, it highlights how standard measures of financial development are likely to be affected by the process of financial integration itself. Thirdly, it identifies the likely effects of integration on financial development, and thereby on growth, economic specialization and investment decisions. Finally, existing studies propose various solutions to the simultaneity problems that researchers face when trying to pin down the causal relationship between finance and growth. For the purpose of this report, it is quite important to understand merits and shortcomings of these solutions.

2.1. Measuring financial development

The first problem that researchers face when analyzing empirically the effects of financial development and financial integration on economic performance is how to measure financial development.

One of the main roles of the financial system is to transfer funds from agents with a surplus of resources to agents with a deficit of resources. If we define the development of a financial system by its efficiency in performing this task, we could measure it by estimating how well funds are transferred. In this respect, a good indicator would be the *ease* with which investors in need of external funds can access them and the premium they have to pay for these funds. In practice, both avenues are quite difficult. We observe easily if individuals or firms borrow, but seldom if they are shut off from the credit market. And even if we observe if individuals borrow, we seldom have information on the rate at which they borrow, let alone the rate at which they would have borrowed in the absence of any friction.

For these reasons, the studies of the effects of financial development (e.g., King and Levine 1993, Jayaratne and Strahan 1996, Rajan and Zingales 1998) have used alternative measures based on readily available data.[2] In this respect, most of the measures of financial development currently used are a compromise between theoretical rigor and data availability. Data constraints are particularly severe in cross-country studies, because measures that are close to what theory suggests are hard to obtain and compare for many countries.

In practice, two types of indicators are normally used to capture a phenomenon as complex as financial development:

- the **size** of financial markets where potential investors can raise external funds;
- the **efficiency** with which funds are intermediated, which affects the cost of funds and the quality of the investment opportunities that are financed.

All of the indicators of financial development used in the cross-country literature belong to one of these two broad categories and refer either to markets or to financial intermediaries.[3] We examine them in turn.

A coarse indicator of the size of financial intermediation is the ratio of the liquid liabilities of the financial system to GDP, where liquid liabilities are defined as currency plus demand and interest-bearing liabilities of banks and non-bank financial intermediaries. One shortcoming of this indicator is that it includes the liabilities of the central bank, which is unlikely to convey funds to private borrowers. Better measures of the quantity of funds that financial intermediaries convey to firms are the bank credit and the private credit provided by deposit money banks and other institutions, both scaled with GDP. The latter is preferable when banks also lend to governments.

The most commonly used measures of the size of a country's financial market are the stock market capitalization (i.e. the value of listed shares) and the bond market capitalization (the value of outstanding debt securities issued by private domestic entities) divided by GDP. More recent studies include information on the size of primary equity and bond markets.

The size of a country's financial market proxies directly for the supply of funds to firms: the larger the supply of funds, the more numerous are the investment projects that can be funded and the higher the growth rate of the economy. As noted before, the relation between finance and growth does not depend only on the *amount* of investment opportunities that can be funded. Investment projects are heterogeneous and problems of asymmetric information are of key importance in financial markets. Large amounts of funds will be wasted if they are channeled to fund unprofitable projects.

Unfortunately, it is difficult to measure directly how well the financial system allocates funds across firms, because the econometrician does not observe how much information intermediaries produce to screen the most profitable projects and to monitor the firms they invest in. However, the availability of abundant external funding to firms can be regarded also as an indirect proxy for how efficiently funds are channeled to firms, since investors would

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[2] In exceptional periods of financial crises, one can use the number of bank failures as a proxy for individual access to funds (Bernanke, 1983).

[3] See the Demirguc-Kunt and Levine (2001).

hardly entrust a large portion of their wealth to financial intermediaries if the latter were inefficient in selecting and monitoring the projects to be funded. In other words, there is a presumption that larger financial systems are more efficient in choosing the most profitable investment opportunities and in giving the right incentives to managers and entrepreneurs.

In addition, size measures can be complemented with some efficiency measures to proxy for financial development. For instance, one can measure the cost at which the financial system of a country intermediates and provides funds to firms: a higher cost of intermediation may imply a higher interest rate for a given amount of funds and in equilibrium this limits the investment of the firms that depend on bank debt. The two most commonly used measures of the efficiency of commercial banks are: a) the net interest margin, which equals a bank's net interest revenue as a share of total assets, and b) the share of overhead costs in the bank's total assets. Also the market structure of the banking system may affect the cost of funds, because it determines the strength of bank competition. Therefore, measures of the concentration of commercial banks, foreign banks' penetration, and public versus private ownership of commercial banks may be useful and have indeed been used in the literature.

Similar measures of efficiency have been defined with reference to financial markets. Relatively high stock market capitalization may be coupled with low levels of activity which increase the risk premium firms have to pay, because investors want to be compensated for the lack of liquidity of the assets they hold. To measure stock market liquidity, researchers have generally used the value of total stock market trading, scaled by GDP. A more direct measure of efficiency is the stock market turnover, defined as the ratio of the value of total shares traded to market capitalization. Lack of data has prevented researchers from calculating analogous indicators for bond markets.

Besides measuring liquidity risk, measures of stock market activity are also correlated with the information produced about the stock market, because higher turnover generally implies that more market participants produce information about the prospects of listed companies and trade on the basis of such information.

As we discuss in Section 4.1.2 in this study we will mainly rely on size- and activity-based measures of financial development, because available measures of efficiency have ambiguous effects on growth. For instance, the concentration of the banking industry – which has been proposed as a measure of efficiency and is readily available – has this feature. A highly concentrated commercial banking industry may limit competition and thus the overall

efficient supply of funds to investors. On the other hand, a highly fragmented market might result in undercapitalized banks and in their inability to exploit economies of scale, which may result in a higher cost of loans and/or lower compensation of deposits, both leading to lower investment. A further reason for relying on size-based measures of financial development is that this facilitates comparison with previous empirical studies.

2.2. Financial integration and financial development

How should financial integration be expected to affect the indicators of financial development just discussed? In this section we argue that financial integration should increase the supply of finance in the less financially developed countries of the integrating area, and that this process should – to a first approximation – be reflected in an expansion of the national financial system of these countries. Therefore, in the process of financial integration the size of national financial systems should increase (relative to domestic GDP) in the countries starting with less developed financial markets.

This point requires two important qualifications. First, in some instances financial integration may enable domestic users to "by-pass" the financial markets of the laggard countries. Domestic firms or households may simply gain greater access to foreign financial markets or intermediaries, so that the additional financing would not show up in measures of domestic financial development. Second, the process of financial integration may stop short of fully equalizing the degree of financial development within the integrating area, because institutional or informational barriers may prevent equal access to financial markets throughout the area. We discuss these two qualifications and their implications for our empirical analysis.

2.2.1. Effect of integration on national financial markets

Financial integration is likely to spur the efficiency of the financial intermediaries and markets of less financially developed countries. To the extent that this greater efficiency

stimulates the demand for funds and for financial services, this should also translate into an increased size of domestic financial markets.

The main channel through which this effect should operate is the **increased competition** with more sophisticated and cheaper foreign intermediaries, associated with financial integration. Competitive pressure from these intermediaries should reduce the cost of financial services to the firms and households of countries with less developed financial systems, and thus expand the quantity of the local financial markets.

In some cases, the additional supply of financial services may be provided by foreign intermediaries entering the local market by acquiring local banks or merging with them. Direct penetration by foreign banks and cross-border acquisitions of intermediaries are likely to erode the local banks' rents. If the mergers fostered by this process bring banks closer to their efficient scale, the process should also be associated with reductions in the cost of intermediation.[4] The increase in competition, possibly coupled with cost cutting, should translate into better credit conditions, and hence stimulate investment and economic growth.

A second reason why financial integration may be associated with local financial development is that the process of integration generally requires **improvements in national regulation** (accounting standards, securities law, bank supervision, corporate governance) to bring it in line with best-practice regulation in the integrating area. The tendency towards a "level playing field" in regulation is an essential pre-requisite of an integrated market, and it is reasonable to expect this convergence in regulatory standards to result in an improvement in the regulatory standards of less developed financial markets. This improvement may help promote their development, by reducing adverse selection and agency costs as well as the distortions induced by inadequate regulation.

On both accounts, therefore, one would expect financial integration to bring about an increase in the less financially developed markets in the indicators considered in Section 2.1, such as domestic stock market capitalization and bank lending relative to GDP. Although this prediction guides our simulation exercise concerning the effects of financial integration, it requires some qualifications, to which we turn now.

[4] See Focarelli, Panetta and Salleo (2002) on the effects of bank mergers in Italy.

2.2.2 Effect of integration on the access to foreign financial markets

It is quite possible that, as financial integration proceeds, the most financially developed countries will share the services provided by their financial system with the other integrating countries. The economies of scale and the external economies involved in financial intermediation can be a powerful fuel for the expansion of the established intermediaries and markets of the more developed markets.

The banks of more developed countries can provide cross-border loans to the firms of less advanced countries. In this case, the additional provision of credit will not show up in the private domestic credit of the latter countries. Similarly, the financial services provided by foreign intermediaries will not show up in the domestic supply of such services in the countries with less developed financial markets. Therefore, size-based measures of local financial development may underestimate the effect of financial integration on the accessibility of credit and financial services in such countries.

A similar argument applies to equity markets. As these become more integrated, firms of less financially developed countries can access more easily major financial centers by listing their shares on foreign stock exchanges. They may want to do so for a variety of reasons: overcoming equity rationing in the domestic market, reducing their cost of capital by accessing a more liquid market, signaling their quality by accepting the scrutiny of more informed investors or the rules of a better corporate governance system (Pagano, Röell, Randl and Zechner, 2001; Pagano, Röell and Zechner, 2002). Whatever the reasons, by listing their shares abroad, the firms of less financially developed countries add to the stock market capitalization and turnover of those markets, rather than those of their domestic exchanges, as documented by Claessens, Klingebiel and Schmukler (2002). Therefore, the increase in domestic stock market capitalization may underestimate the impact of financial integration on access to equity markets by firms located in less financially developed countries.

In fact, while integration may expand the financial sector primarily in the already financially developed countries of the area, it may even decrease the availability of funding to their non-financial firms, which will now compete with foreign firms for such funds. However, this crowding-out effect is likely to be outweighed by the increased efficiency of financial centers associated with their expanded activity. If so, financial integration would increase the availability of funds and financial service efficiency in all integrating countries.

The upshot of this discussion is that as financial integration proceeds, the size of the financial market of a given country as a measure of its degree of financial development loses significance. Distance and thus geographical segmentation tends to become less important in financially integrated markets. Indeed, in a fully integrated market, what matters is the total size of the financial market of the integrating area: firms of a given country may have equal access to financial services as those of all other countries even if their domestic financial sector (scaled by GDP) differs from that in other countries.

For this reason, we should not expect that in a fully integrated European capital market all countries will have the same credit-GDP ratio and the same stock market capitalization-GDP ratio. Actually, given the scale and external economies in the financial service industry, this outcome is unlikely: the financial industry will tend to concentrate in a limited number of countries or even cities, as illustrated by U.S. financial history. But we expect the supply of finance for the integrating area as a whole to expand significantly. And thus, in an integrated market all firms, regardless of country, will still have access to the same funding opportunities, some of which possibly offered by foreign intermediaries. But their situation will be **equivalent** to one where they could access an equally broad and developed **domestic** financial market.

2.2.3 The limits to financial integration

As stated in Section 2.2.1, homogenizing financial regulation is a prerequisite for the creation of an integrated market. Most EU directives are precisely aimed at fulfilling this prerequisite. However, even if all regulatory barriers (including those due to taxes) were eliminated in financial markets, some deeper-seated differences in the rules of different jurisdictions may still prevent full financial integration. And the persistence of informational barriers in local financial markets may have the same effect.

Even if all regulatory barriers (including those due to taxes) were eliminated in financial markets, it may be difficult to homogenize the basic rules of national legal systems that form the infrastructure of financial markets (such as corporate law) and, even more so, the concrete functioning of these legal systems. However, these basic rules and their application by the judiciary can be important for the performance of financial markets and intermediaries. For instance, the enforcement of law in a geographic area and the ability of lenders to recover

unpaid loans via judicial procedures are likely to be important determinants of the extent to which that area will enjoy the benefits of credit market integration. If judicial enforcement of creditor rights is poor, foreign banks will be in no better position than local lenders in extending credit to domestic borrowers. This conclusion is supported by evidence in Jappelli, Pagano and Bianco (2001) and Fabbri and Padula (2001) who exploit variability across Italian provinces in judicial inefficiency to estimate the effects of local courts efficiency on the performance of local credit markets.

Informational barriers may also limit the effects of financial integration. For small borrowers the level of local financial development is more important than the availability of financial services at the country level. Stein (2002) and Berger and Udell (2002) argue that small business lending, which concerns very opaque borrowers, involves the production of soft information that cannot be easily collected by loan officers that are located faraway and do not interact with the local community. Moreover, this information is difficult to transmit to outsiders. Therefore, banks that specialize in this segment of the credit market tend to remain small and local. This implies that for small borrowers financial integration would be less relevant than for large ones.

The hypothesis that small borrowers are particularly affected by local financial conditions is supported by the recent findings of Guiso, Sapienza and Zingales (2002), who apply an innovative method to estimate the effects of local financial development using Italian regional data. They first construct a new indicator of financial development by estimating the probability that, other things equal, a borrower is shut off from the credit market. By using regional fixed effects as a proxy of local financial development, they show that differences in local financial development affect the probability that an individual starts his own business, firms' entry decisions and firms' growth.

However, the idea that small borrowers are particularly affected by local financial conditions and thus less likely to benefit from financial integration may become less relevant in the future. Technical progress in the banking industry is likely to reduce the importance of proximity in lending relationships in EU countries, just as they appear to have done in the U.S. Indeed, Petersen and Rajan (2002) show that in the U.S. the distance between small firms and their lenders increased over time, supposedly because improvements in information technology allow to gather better and cheaper information on potential borrowers and lenders.

To the extent that these technological changes will spread through the EU countries, future financial integration might benefits also small borrowers.

2.3. Empirical studies on the finance-growth nexus

To map out our empirical strategy, we review how previous studies estimated the sign and magnitude of the effects of financial development on growth, with special focus on the main contributions of the literature and especially on their estimation techniques. Previous studies relied on three types of data: country-level, industry-level or firm-level data.

2.3.1. Cross-country studies

As mentioned, identifying a causal link between financial development and growth in the data poses considerable challenges. However, the economic profession has done a lot of progress since 1969 when Goldsmith concluded that "a rough parallelism can be observed between economic and financial development if periods of several decades are considered" (p. 48), using cross-sectional data on 35 countries. To go beyond the mere correlation, researchers have used econometric techniques and identification strategies that allow to control for the possible feedback effects of economic growth on financial development, that is, for the fact that higher growth tends to call forth an increased supply of financial services.

To try to tackle this problem, King and Levine (1993a, 1993b) study the relation between financial development at the beginning of their sample period and subsequent growth in a cross-section of 80 countries. They use different indicators of long-run economic performance: besides the growth rate of GDP per capita, they also try to identify the channels through which financial development influences economic growth by looking at capital accumulation, proxied by the growth rate of physical capital per capita and the ratio of investment to GDP, and at a measure of economic efficiency, obtained from estimated Solow residuals. The main finding of this study is that all the indicators of future economic performance are positively associated with the predetermined component of financial development, as measured by the size of financial sector at the beginning of the estimation interval. Their results are qualitatively unchanged also after controlling for other determinants of growth, such as the initial level of GDP per capita and indicators of political stability.

Levine and Zervos (1998) explore further the relation between finance and growth by looking at the relative importance of banks and securities markets. Interestingly, indicators of the size of the stock market seem to have no impact on subsequent growth, while stock market liquidity and banking system development are as much as important.

Unfortunately, the use of predetermined variables to measure financial development only partly overcomes endogeneity problems. As Rajan and Zingales (2002) notice, an omitted common variable, such as the household saving rate, could still drive both long-run growth and the initial level of financial development, generating a spurious correlation between them in the data. Moreover, temporal precedence does not necessarily imply causality: the econometrician may find in the data that financial development predicts future growth only because financial markets anticipate future growth opportunities. For instance, stock market valuations may reflect changes in future growth opportunities and banks may lend more in anticipation of high growth in the sales of their customers. If so, financial development may only be a leading indicator of future growth.

The main difficulty in overcoming the reverse causality problem when using aggregate data is to find instruments that can be considered truly exogenous, i.e. variables that affect financial development but are uncorrelated with economic performance. For instance, King and Levine (1993b) show that their estimates are robust to the use of the level of secondary school enrollment as an instrument for financial development. Unfortunately, it is impossible to exclude that secondary school enrollment is itself correlated with the same omitted variables that influence financial development and growth.

La Porta et al. (1998) document that the size of a country's financial market is related to the origin of its legal system, arguably because common-law countries seem to offer better investor protection than civil-law countries. The legal origin of a country can be considered exogenous to economic growth, because English, French and German legal systems were created centuries ago and then spread mainly through occupation and colonialism. Hence Beck, Levine and Loayza (2000a, 2000b) use the legal origin of the financial system to extract the exogenous part of financial development. Using this technique, they again find that the size of the financial sector has a positive and robust correlation both with per-capita GDP growth and with total factor productivity growth. In contrast, it seems to have an ambiguous effect on the growth of physical capital and private savings. The results are confirmed also when they exploit the time-series variability in financial development and economic growth,

as opposed to the cross-sectional variation alone, using country-level fixed effects to control for unobserved heterogeneity. Beck, Levine and Loayza (2000b) use a wider range of instruments and show that also an indicator of accounting standards and the level of contract enforcement are important instruments of financial development.

The conclusions of these studies on aggregate cross-country data are tied together by Demirguc-Kunt and Levine (2001), who examine how indicators of financial market efficiency and size correlate with long-run growth. According to their estimates, both the development of financial markets and that of intermediaries correlate with long-run growth, when they are instrumented by indicators of the quality of the legal system, such as measures of investor rights' protection and of the quality of enforcement. There is no definite evidence, however, on the relative importance of bank versus security markets: only aggregate measures of financial development appear to matter.

Other strong empirical evidence on the nexus between finance and growth comes from Jayaratne and Strahan (1996), who rely on data on U.S. states. They exploit the effects of intrastate branch deregulation – and the attendant increase in competition – that occurred at different dates in the various states. The study shows that states that removed restrictions in branching grew more than the others. Since bank lending did not grow, the authors attribute this effect to increased bank efficiency. This study provides quasi-experimental evidence on the causality nexus between finance and growth, because quite clearly deregulation did not occur in anticipation of future business cycle expansions.

The evidence by Jayaratne and Strahan (1996) also helps deflect the concern that the correlation between finance and growth documented by cross-country studies arises from the inclusion of developing countries, but might not be relevant for OECD economies, whose capital markets are more uniformly broad and sophisticated. A problem in assessing the relation between finance and growth for OECD countries alone is that the estimates lose power due to the paucity of observations and the implied lack of degrees of freedom. However, the US states are comparable to the OECD economies in terms of pro-capita wealth level, and Jayaratne and Strahan's estimates show that financial development still matters for economic growth. This parallels the findings of Pelgrim and Schich (2002), who find that financial development and investment are cointegrated in OECD countries, that is, their long run movements are similar. Unfortunately, this study does not control for endogeneity problems, in contrast to Beck, Levine and Loayza (2000a and 2000b), and therefore the

documented correlation between financial development and investment does not necessarily imply causality, for the reason already explained.

In a recent paper, Edison, Levine, Ricci and Slok (2002) examine the relation between international financial integration, financial development and growth. They find that international financial integration is completely irrelevant for growth, once one controls for the level of domestic financial development. This suggests that, in spite of the cautionary arguments in Section 2.2.2, so far financial integration mattered for growth only to the extent that it affected domestic financial development. This is true both for more and less financial developed countries, and is robust to the use of different econometric techniques and to different proxies of financial integration, such as indicators of the existence of capital controls and the magnitude of capital inflows and outflows. In contrast, the coefficient of the measures of financial development consistently maintains its expected sign. To put it another way, the fact that measures of national financial development still matter for national growth, signals that the actual degree of financial integration is far from complete.

2.3.2. Industry-level studies

A more recent strand of empirical studies used industry-level data to make further progress on the issue of causality and at the same time shed light on the channels through which financial development affects economic growth. Theory suggests that financial markets and institutions can help firms overcome or at least attenuate the adverse selection or moral hazard problems in their relationship with investors. Thus, financial market development should benefit disproportionately firms or industries that are highly dependent on external finance. The testable prediction of this approach is that these firms and industries should grow faster in countries where financial markets are relatively more developed.

This approach has been proposed and implemented on industry-level data for a large sample of countries in the 1980s by Rajan and Zingales (1998). They construct their test by first identifying each industry's need for external finance from firm-level data for the U.S., under the assumption that financial development is highest in that country. Then they interact this industry-level "external dependence" variable with a country-level proxy for the degree of financial development (so as to obtain a variable that measures the extent to which

financial development constrains the growth of each industry in each country) and use this variable in a regression for industry-level growth.

Since the test exploits the interaction between the country financial development and the relative financial dependence of its industries, Rajan and Zingales control for fixed country and industry effects. This is an important step forward because many variables potentially affecting growth are typically left out in cross-country studies, creating potential biases in the estimated relationship between financial development and growth.

This method also filters out the potential feedback from future growth onto financial development. If the relation between financial development and growth is positive only because financial markets anticipate future growth, sectors that differ in "external dependence" should be affected in the same way and therefore the interaction variable should not be statistically different from zero.

Rajan and Zingales find that various measures of financial development (total stock market capitalization, domestic credit to the private sector accounting standards) disproportionately affect real economic growth in industries that are more dependent on external finance. The variable obtained by interacting industry external dependence with the domestic degree of financial development is positive and significant, even after controlling for country and industry fixed effects and for the industry's output share in the relevant country. Moreover, they find that the measures of financial development affect the growth of the number of establishments rather than the growth of the average size of the existing establishments.

In our empirical estimates of the finance-growth relation we rely on the Rajan-Zingales methodology, extending the sample of countries and the indicators of financial development. As we argue in Section 3, this methodology offers a convincing solution to the causality problem and lends itself naturally to study the economic effects of financial integration and how these effects are distributed among integrating countries.

The recognition of industry heterogeneity has proved to be very important not only to study the effect of financial development on growth within a country but also to understand the **channels** through which these effects operate. Carlin and Mayer (1999) use the Rajan-Zingales approach to probe further into the relationships between industrial activity, financial systems and legal arrangements. They conclude that in OECD countries market-based finance and legal protection of investors are correlated with the growth of equity-financed and skill-

intensive industries, and particularly with R&D investment. In contrast, market-based finance and accounting standards are not important for physical capital accumulation.

These findings provide indirect support for Allen and Gale's (2000) claim that markets and intermediaries are complementary and favor growth of technologies with different characteristics: intermediaries are useful if large amounts of capital must be raised by firms operating in traditional sectors. In contrast, the development of new technologies in high-risk sectors is favored by the concurring funding of different investors who observe different complementary signals on the future prospects of a project, because this allows pooling several pieces of independent information.

The methodology proposed by Rajan and Zingales (1998) has been used also to test the predictions of Obstfeld (1994). The model by Obstfeld shows that financial development can affect growth by creating more risk sharing opportunities, since individuals invest in high-profit, high-risk sectors only if they can share business risk. In this model, the reference to financial integration is direct, since access to foreign assets – promoted by integration – improves portfolio diversification. The model shows that finance can influence growth also by affecting industry specialization. Recently, Svaleryd and Vlachos (2002) have tested these predictions, using Rajan and Zingales' (1998) methodology to study the relation between financial market development and industry specialization. They conclude that countries with relatively efficient financial institutions tend to specialize in sectors that use financial services relatively intensively. The comparative advantage seems to derive primarily from stock markets, since only the indicators of stock market development and efficiency help to explain specialization in more finance-intensive industries.

The main contribution of the studies based on industry level data is the finding that financial development spurs growth especially in sectors that are more dependent on external finance. Moreover, stock market development and efficiency seem to be more important than the development of financial intermediaries, at least in OECD countries. The relative unimportance of the development of intermediaries and of the banking sector in particular could depend on the fact that intermediaries play an important role only in the early phases of development when large amount of capital must be mobilized. Moreover, the ambiguous effect of bank competition on the availability of funds could obfuscate the relation between availability of credit and growth. For instance, Cetorelli and Gambera (2001) show that bank concentration promotes growth for those industries that are more in need of external finance,

facilitating access to credit especially for younger firms. However, the deadweight loss associated with banking market concentration affects negatively growth in all sectors.

2.3.3. Firm-level studies

Some empirical evidence on the nexus between finance and growth comes from studies using firm-level data. One obvious advantage of using firm-level data is that the structure of the financial system can be considered exogenous with respect to the performance of individual firms, especially if data on small and medium-sized firms are used.

Demirgüc-Kunt and Maksimovic (1998) are the first to test the relation between finance and growth drawing on microeconomic data. They use firm-level data from thirty countries to estimate the maximum growth rate that each firm in their sample could attain without access to long-term financing and equity, using techniques that are common in financial planning. They define the maximum growth rate of sales and assets that firms could attain if they relied only on internally generated funds. Then they calculate the fraction of firms that in each country grows at a higher rate and analyze how this fraction differs across countries with different legal and financial systems. They show that in countries with better legal systems, more active stock markets and larger banking sectors, a greater proportion of firms finance their growth by external long-term finance and equity, and grow faster.

Indirect evidence in favor of the importance of financial development is provided also by micro-econometric studies of investment equations, financial constraints (Levine, 1997) and capital structures. Indeed, as shown by Giannetti (2002b), unlisted firms seem more subject to agency problems in countries where institutions are weaker and financial development is lower and this supposedly increases the cost of external funds and reduces access to credit. These problems are worse for firms investing in intangible assets and with high cash flow volatility.

Moreover, there is evidence that financial constraints are more stringent in countries where investor protection and financial development are lower. Love (2001) estimates the cash-flow sensitivity of investment in a cross-section of countries, and shows that this proxy of financial constraints is larger in countries with poor institutions.

Using firm-level data, one can tackle issues that cannot be addressed with more aggregate data. For instance, financial integration is expected to affect not only the size and

the efficiency of the financial sector but also to improve risk sharing. Evidence on the effects of financial integration on risk sharing comes from the studies that analyze the changes in the cost of capital in countries that opened their stock markets to foreign investors. Chari and Henri (2001) estimate a capital asset pricing model using firm-level stock returns and find that there are significant effects due to the repricing of systematic risk. Of course the magnitude of this effect should be expected to be much smaller as EU equity markets integrate, since foreign investment is already allowed and the covariance of the market portfolios of EU countries is quite large. However, there may still be a reduction in the cost of capital if European investor reduces their home equity bias. Hardouvelis, Malliaropoulos and Priestley (1999) provide evidence that this reduction already occurred in the run-up to monetary union.

Increased portfolio diversification by controlling shareholders can also contribute to stimulate investment. In countries with low investor protection, ownership is concentrated and controlling shareholders, being not well diversified, require a high return on their investment. This increases the cost of capital and thus decreases investment in equilibrium, as highlighted by Himmelberg, Hubbard and Love (2002). If financial integration is accompanied by a "rise to the top" in investor protection standards, it spurs a decrease in ownership concentration and thereby reduces the risk premium demanded by controlling shareholders. At the same time, it favors the participation of minority shareholders (see Giannetti 2002a), which also contributes to reducing the cost of capital or the severity of equity rationing.

However, much more remains to be done with microeconomic data in this research area. For example, these data could be used to test the prediction that financial development should have differential effects across firms of different size.[5] Larger businesses typically have access to international capital markets, and therefore are little affected by local financial conditions; conversely, the latter constrain small businesses severely. This point is particularly relevant when assessing the effects of financial market integration across countries with different firm-size distributions.[6]

[5] Beck et al (2002) is a notable exception: especially small firms' growth seems to be constrained by firm reported financial, legal, and corruption problems.

[6] To our knowledge, so far Guiso, Sapienza and Zingales (2002) is the only study that examines the differential effects of financial development for different firm size classes using micro data.

3. Estimating the relation between finance and growth

In this section we outline our strategy to estimate the relationship between finance and growth. This approach, which builds on Rajan and Zingales (1998), starts by identifying the main differences in firms' financing patterns across countries, and in particular in their dependence on external finance, and then relates growth in value added, output and number of firms to indicators of financial development. The analysis exploits the variability of financial market development between countries and the variability of financial market dependence across sectors.

The approach by Rajan and Zingales is designed for industry-level data, but can also be applied to firm-level data. The results are reported in Sections 4 and 6, respectively. To illustrate the approach, consider an international database of industry-level (or firm-level) data, and denote the growth rate of value added (or output and number of firms) by $y_{i,c}$ where i identifies the industry (or the firm) and c the country. This variable is regressed on a set of variables $X_{i,c}$ that vary *both* across industries and countries, on an indicator of financial dependence D_i multiplied by an indicator of financial development F_c (for instance, stock market capitalization or bank credit scaled by GDP), on industry-level fixed effects a_i (i=1,…,N) and country-level fixed effects δ_c (c=1,…,C):

$$y_{i,c} = \beta X_{i,c} + \gamma D_i F_c + \alpha_i + \delta_c \qquad (1)$$

As explained in Section 2.3.2, the financial dependence measure D_i measures each industry's need for external finance from U.S. firm-level data. The assumption is that access to financial markets in U.S. listed firms is not an obstacle to investment, so that differences across firms in reliance to external finance reflect primarily differences in demand triggered by differences in technology. Therefore, the methodology rests on the assumption that technology, and therefore capital requirements, varies across industries but not across countries. For instance, the capital-intensity of steel production is assumed to be the same in the U.S. and India. This assumption may be questioned because technology and (perhaps more importantly) factor prices and hence the optimal factor mix may differ across countries. The only way to account seriously for this problem is to have information on technology across countries and the relation between the latter and the needs for external finance, and to estimate our equation

allowing for differences between developed and developing countries. This is obviously a formidable task in terms of data requirements. One way to deal with the problem, however, is to check the robustness of the results by dropping from the sample developing countries or dummying them out.

An additional reason to distinguish between developing and developed countries is that their degree of integration in the world capital markets is likely to be different, leading to different values of the parameter γ for the two groups (growth might be less sensitive to domestic financial constraints in countries with better access to world capital markets). Therefore, in estimating equation (1) we will test if the parameters are the same for developed and developing countries.

Since industry (or firm) performance and measures of financial market development may be driven by common factors (e.g., consumer demand), in estimating equation (1) one faces a potential endogeneity problem. As we shall see, this problem can be handled by instrumental variables (IV) estimation, using measures of creditor rights, legal origin of the country and the quality of law enforcement as instruments. These instruments have been used before in cross-sectional studies to capture the exogenous component of financial development. In fact, an extensive literature on law and finance argues that the type of legal system determines institution performance and, in particular, the size and efficiency of financial markets.

Equation (1) is particularly well suited to study the effects of financial integration over time and across countries.

First, it allows *testing* for the presence of financial integration over a specific time interval. If all countries examined were fully integrated, then national (or local) financial development should not matter for the growth of national firms, whatever their dependence on external finance. In a fully integrated area, firms that are financially constrained at home would simply borrow abroad (where funds are more easily available), implying that the estimated parameter $\hat{\gamma}$ would not be statistically different from zero. Similarly, if one finds that after a period of financial market integration $\hat{\gamma}$ declines, the extent of the decline can be interpreted as reflecting financial integration. We exploit this feature to test whether the

process of financial integration in the 1990s has weakened the effects of domestic financial development on domestic growth.[7]

Second, the approach can be used to assess the *differential* impact of financial integration, because it allows us to identify the countries and sectors that are more likely to benefit from financial integration. We can therefore rank countries in terms of relative gains in economic growth from financial integration. Since we assume that financial integration spurs financial development particularly in the most backward markets, its benefits will be concentrated in these markets. Moreover, it will affect disproportionately the sectors where a larger fraction of firms depend on external finance.

In particular, the product of the estimated coefficient $\hat{\gamma}$ and the interaction between financial dependence and access to finance, i.e. the variable $\hat{\gamma}D_{i,c}$, provides an indication of the potential impact of changes in the degree of financial development of the various countries of the EU. This impact depends on their industrial composition, on the assumed degree of financial integration and on the assumed "target" of the integration process. Clearly, the countries bound to gain more from financial integration and development are those with backward financial markets that specialize in sectors that rely heavily on external finance. At the other side of the spectrum, countries that are likely to gain little from financial market integration are those that have already developed financial markets and that specialize in sectors that do not require extensive use of external finance.

This methodology cannot, however, be used to test if the growth effects of financial development are permanent or transitory (i.e. whether they affect only transitional dynamics or steady state growth), since regression (1) is estimated on cross-sectional data. Our approach exploits only the cross-sectional variation in the growth rates (the dependent variable) and in the degree of financial development and of financial dependence (two of the dependent variables). To assess the degree of persistence of the estimated effects, one would need to exploit also the time-series variation of growth and financial development, using panel data techniques. But this gain would come at the cost of much more severe endogeneity problems in the measures of financial development. Furthermore, sorting out the transitory effects of financial development on growth from its permanent effects would require several decades of

[7] Needless to say, the reverse is not true. A finding that γ is not statistically different from zero does not imply that there is full financial integration, but only that finance does not matter for growth. It is therefore important to estimate equation (1) in periods in which international financial markets are

data on economic performance with significant episodes of financial development: this would allow comparing economies across steady states and avoid confounding slow transitional dynamics with permanent effects. Such a data set has not yet been assembled. However, the finding that differences in financial development across countries at a point in time affect their average growth rate over many years leads at least to the conclusion that financial development has persistent effects.

segmented. We run our basic regressions on data prior to 1991, i.e. before the EU lifted capital controls and started the process of full financial integration.

4. Industry-level data and results

In this section we apply the approach illustrated in Section 3 to industry-level international data. We start by describing the data, and then report and discuss the estimates.

4.1 Data

We merge four different data sets: (1) industry-level data on financial dependence; (2) country-level data on financial development and other indicators of the quality of institutions; (3) industry-level panel data on output, value added growth and number of firms; (4) country-level data on institutional variables that are likely to affect financial development. This section describes the sources and main features of these data sets.

4.1.1 External dependence

Data on external dependence are taken from Rajan and Zingales (1998), who measure the dependence of US industries on external finance using the Compustat database. The external dependence of industry *j* is the share of capital expenditure that the median firm in the industry cannot finance through internal cash flow. The assumption is that for technological reasons (such as the completion period of an investment project, its refinancing needs, the distribution of cash flows over the lifetime of the project) some industries depend on external finance more than others. Rajan and Zingales note that where financial markets are well developed, as in the U.S., the supply of funds is very elastic, so that the use of external finance reflects primarily the demand for finance, rather than its supply. Hence, the identifying assumption is that differences across industries in financial dependence are mainly dictated by technological differences. In addition, it is assumed that these technology-dictated differences in financial dependence are the same in all countries. Therefore, the financial dependence of industries in countries with well-developed financial markets (the U.S.) can be used as an indicator of the financial dependence of the same industries also in other countries.[8]

[8] See Section 3 for a brief discussion of this assumption and of a way to take its limitations into account.

The Compustat database used to construct the indicator of financial dependence includes only publicly listed firms, but this is an advantage since these firms are less likely to be constrained in capital markets. To avoid biasing the measure of financial dependence with business cycle factors, the indicator is averaged over the 1980-90 period. Table 1 reports this measure of external dependence for 36 three or four digits ISIC sectors. The Drug, Radio and Plastic Products industries are the most dependent on external finance. On the other hand, Footwear, Leather and Tobacco do not rely on external finance to invest, implying that the indicator is negative.[9]

4.1.2 Financial development

Data on financial development are drawn from the database provided with the book by Demirgüç-Kunt and Levine (2001). In Chapter 2 of the same book, Beck, Demirgüç-Kunt, Levine and Maksimovic (2001) define three sets of indicators of financial intermediary and stock market developments: (1) finance-activity indicators; (2) finance-size indicators; and (3) finance-structure indicators. Finance-activity indicators refer to the overall activity of financial intermediaries and markets, which can be measured by private credit (claims on the private sector by deposit money banks and other financial institutions) divided by GDP, or value traded (total value of shares traded on the stock market) and stock market capitalization divided by GDP. Finance-size indicators are intended to measure the overall size of the financial sector, and can be measured by the sum of private credit and stock market capitalization. Finally, finance-efficiency indicators relate to the efficiency of financial intermediaries and markets, and can be proxied by the overhead costs of the banking system relative to the banking system assets, insofar as large overhead costs reflect inefficiency.

In principle, none of these indicators is superior to the others: they can rather be regarded as complementary. In order to make our results more easily comparable with the existing empirical literature on growth and finance, in this study we rely mainly on finance-activity and finance-size indicators. As explained in Section 2.1, efficiency measures have ambiguous effects on growth. For instance, this applies to efficiency measures based on the

[9] The index of financial dependence is defined as capital expenditures *minus* net cash flow from operations, all scaled by capital expenditures. Therefore, it can be negative for firms whose internal cash flow exceeds funding needs, indicating that they require no external funding. It can also exceed unity, for firms whose net cash flow is negative because of large investments in working capital.

degree of credit market competition. While a highly concentrated commercial banking industry may limit competition and thus the overall efficient supply of funds to investors, a highly fragmented market might result in undercapitalized banks that are unable to exploit economies of scale. This may lead to a higher cost of loans and/or lower compensation of deposits, and thus to lower investment. Furthermore, empirically, Demirgüç-Kunt and Levine (2001) find that finance-activity and finance-size indicators are superior indicators of financial development than efficiency indicators.

As we shall see, the indicators of financial development that contribute most to the growth in output and value added are: (i) the ratio of stock market capitalization to GDP; (ii) the ratio of private credit to GDP; and (iii) the sum of the two ratios. In our preferred specification we use the latter indicator as an overall measure of financial development.

In some specifications we also proxy financial development by an indicator of the "quality of accounting standards", produced by International Accounting and Auditing Trends (Center for International Financial Analysis & Research, Inc.). This indicator rates companies' 1990 annual reports on the basis of their inclusion or omission of 90 items in the balance sheets and income statements, and ranges from 0 to 90. The 90 items are classified along 7 general dimensions: general information, income statements, balance sheets, funds flow statement, accounting standards, stock data and special items.

Table 2 reports the ratio of stock market capitalization to GDP, the ratio of private credit to GDP, and accounting standards for each of the 60 countries that we include in our analysis. The figures in the first two columns are 1980-1995 averages, while those in the third column refer to 1990.[10]

4.1.3 Value added, output, and number of firms

Growth – our dependent variable – is measured as the growth of value added, output or number of firms. These series are drawn from the Industrial Statistics Database (revision 2), which is produced by the United Nations Statistical Division (UNIDO) and covers 169 countries. To match industrial sector definitions with those for the sectors for which we have data on external dependence, we use both 3- and 4-digits ISIC codes. The 3-digits data span

[10] The three variables are, respectively, the variables *mcap*, *privo* and *account* contained in the file *request80-95.xls* in the CD-Rom attached to Demirgüç-Kunt and Levine (2001).

the 1963-99 period, while 4-digit data run from 1977 to 1999. The final sample includes data for 36 manufacturing industries, of which 27 are 3-digits and 9 are 4-digits.

The sample has data on the number of establishments, number of employees, value added, output, gross capital formation, wages and number of females working. Value added, output and gross capital formation are first expressed in U.S. dollars, and then converted in real figures using the U.S. Producer Price Index deflator.[11] In our basic specification we compute the growth rate of real value added, output and number of firms as the difference of (log) real value added, output and number of firms in 1991 and 1981, respectively.

Since indicators of financial development or other institutional variables are not available in many countries, we use only 61 of the 169 countries present in the database. Overall, the resulting sample is a panel dataset of 36 industries in 61 countries, resulting in a total of 2,196 observations per year. However, observations on some industries are lost due to missing data on output, value added, or other variables used in the regressions, reducing somewhat the final size of the sample used in estimation.

4.1.4. Institutional variables and other instruments

It is very hard to classify legal institutions and compress their description in quantitative indicators that are the essential input to statistical analysis. Legal systems and their actual working are highly complex and multi-dimensional mechanisms, and it is a quite daring exercise to attempt eschewing their "key features" and describe them via quantitative indicators. Often even lawyers consider this task as impossible. Nevertheless, economists have designed such indicators, and used them to account for the cross-country variation in the development of financial markets (as well as in other empirical work).

One such attempt was made by La Porta et al. (1998), who constructed measures of creditor rights and of shareholder rights by collecting information on some characteristics of the legal system in 49 countries. To characterize the degree of creditor rights protection, they identify five features of the legal rules governing loan contracts, by asking if: (i) reorganization procedures require an automatic stay on the borrower's assets, preventing secured creditors from seizing collateral; (ii) the secured creditors' right to seize collateral is junior relative to those of the government and workers; (iii) management can obtain

protection from creditors by starting a reorganization procedure without creditors' consent; (iv) management remains in charge during reorganization procedures; (v) firms must maintain a minimum capital to avoid automatic liquidation. Depending on how it fares on each of the first four criteria, each country receives a certain total score, which measures its degree of creditor rights protection, or "creditor rights" variable.

The same authors use a similar method to construct an international measure of the protection of shareholder rights. The "antidirector rights" indicator they devise is the sum of six dummy variables, indicating (i) if proxy by mail is allowed; (ii) if shares are not blocked before a shareholder meeting, (iii) if cumulative voting for directors is allowed, (iv) if oppressed minorities are protected, (v) if the percentage of share capital required to call an extraordinary shareholder meeting is less than 10 percent, and (vi) if existing shareholders have pre-emptive rights at new equity offerings.[12]

We rely also on several survey-based indicators to measure the quality of legal enforcement across countries, available in Demirgüç-Kunt and Levine (2001). The variable "rule of law", which is an "evaluation of the legal and order tradition in the country", ranges from 1 (weak law and order tradition) to 10 (strong law and order tradition) and is published by the International Country Risk Guide (ICRG). We use the average of the 1982-95 values. The same rating agency (ICR) produces other institutional variables used in our analysis: "corruption", which assesses the degree of corruption in the government; "risk of contract repudiation by the government", an evaluation of the "risk of a modification in a contract taking the form of a repudiation, postponement or scaling down" due to "budget cutbacks, indigenization pressure, a change in the government, or a change in government economic and social objectives"; and "risk of expropriation", a measure that reflects ICR's evaluation of the risk of "outright confiscation" or forced nationalization.

Another country-risk rating agency, Business International Corporation, produces a "judicial efficiency" indicator, which is a survey-based assessment of the "efficiency and

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11 The latter is downloaded from the Federal Reserve Bank of Saint Louis web site (http://www.stls.frb.org/fred/).

12 The "antidirector rights" measure by La Porta et al. (1998) was inspired by the U.S. Proxy Voting Manual of Institutional Shareholder Services (I.S.S.), that contains a long list of shareholder rights U.S. institutional investors consider crucial at U.S. companies. Some of these rights do not translate well into the European context (for example blocking is necessary with bearer shares to protect minorities) and an alternative measure based on DSW (2000) will be devised that is more in line with the institutional settings of the European Union.

integrity of the legal environment as it affects business, particularly foreign firms." "Legal origin", built by La Porta et al. (1998), classifies countries in four groups, depending on whether the origin of their legal system is Anglo-Saxon, French, German or Scandinavian.

Finally, in some regressions we use average years of schooling and per capita GDP as additional regressors. Average years of schooling in the total population over 25 in 1980 is drawn form Barro and Lee (1996). Real GDP per capita in 1980 is from Alan Heston, Robert Summers and Bettina Aten, Penn World Table Version 6.0, Center for International Comparisons at the University of Pennsylvania (CICUP), December 2001. These variables are reported in Table 3, together with the creditor rights and rule of law indicators.

4.2 Regression results

Table 4 reports regressions for the growth of value added. The upper panel considers the same sample of 41 countries as in Rajan and Zingales. We adopt a slightly more restrictive choice for including sectors in the industry panel, since we retain observations only if output or value added are reported for *each* year between 1981 and 1991.[13] This results in a slightly lower number of observations than Rajan and Zingales (around 1,100 against around 1,200). Sensitivity analysis shows that this choice makes very little difference. In fact, the results do not change if we use the 1980-95 growth rates. However, in this case the number of missing sectors increases, so we focus on the 1981-91 growth rates. The United States is excluded from the sample because it is the reference country whose capital markets are assumed to be frictionless.

The estimation includes fixed industry effects and fixed country effects, which control for *all* time-invariant country and industry variables that are potentially important for growth. This is a considerable advantage in specification choice, since it would be very difficult to

[13] Rajan and Zingales retain also observations for sectors with no less than 5 years of data.

account explicitly for all such variables in the regression. Inevitably, some variables would be omitted due to erroneous specification or lack of information.[14]

All regressions include the industry's share of total value added at the beginning of the sample period (1981), and in all regressions the standard errors of the coefficient estimates are robust to unknown forms of heteroskedasticity.

The regression in the first column of the upper panel uses stock market capitalization as proxy for financial development. The estimated coefficients refer to a regression of the growth of value added on the relevant industry's initial share of value added and the interaction between external dependence and market capitalization (the $D_i F_c$ variable in equation 1). The coefficient of the interaction term is positive and statistically different from zero at the 1-percent level, indicating that financial development affects growth, particularly in those sectors that rely more intensively on external finance.

The second regression replaces market capitalization with domestic private credit. The results are similar: the coefficient of the interaction term is again positive and precisely estimated. The regression reported in the third column uses our preferred indicator of financial development, namely the sum of stock market capitalization and private credit, which we call "total finance". In the fourth regression, external dependence is interacted with accounting standards. In each of these regressions the impact of financial development on value added growth is positive and statistically different from zero at the 1-percent level.

The specification reported in the last column includes also an interaction term designed to test if the effect of financial development is larger for non-OECD countries. This hypothesis reflects the concern that OECD countries may already be much more closely integrated in a single capital market than developing countries, and that therefore the effect of financial development estimated in the previous regressions may apply only to the latter (in a financially integrated area the coefficient on the interaction term including the financial dependence indicator should be zero). However, this concern appears to be unwarranted. The coefficient of the interaction term is almost identical as that in the third column (0.018 instead of 0.019), while it should be zero in a financially integrated area. Correspondingly, the

[14] When interpreting and simulating the effects of financial integration on economic growth it is important to remember that the presence of country fixed effects might attenuate the coefficient estimate of financial development on growth. Suppose that financial development affects growth also through different channels than relaxing financial dependence, for instance because countries with larger financial markets are also able to allocate funds more cheaply, regardless of the financial

coefficient of the same variable interacted with the non-OECD dummy is very small (0.001) and not statistically different from zero.

We also experimented with other specifications – not reported for brevity – to test if other subsets of countries are more closely financially integrated than the rest of the world. In a specification that includes a further interaction term between D_iF_c and a dummy for the EU, the coefficient on this variable is not statistically different from zero, indicating that the EU is not more financially integrated than the rest of the world. We also estimated a specification that includes a variable that interacts D_iF_c with a measure of trade openness (also drawn from Demirgüç-Kunt and Levine, 2001), on the grounds that close trade partners may also be more closely integrated financially. Also the coefficient on this further interaction variable is not significantly different from zero. These results parallel those by Edison, Levine, Ricci and Slok (2002), mentioned in Section 2.3.1. As in their estimates, proxies for international financial integration appear not to affect growth, once one controls for domestic financial development. One can interpret this as indicating that so far financial integration enhanced growth only insofar as it improved domestic capital markets. Alternatively, it may indicate that the financial market integration that has thus far taken place is still insufficient to show up significantly in the data.

In the lower panel of Table 4 we use the maximum number of countries with valid data on value added growth and indicators of financial development. The data collected by Demirgüç-Kunt and Levine (2001) allow us to consider 20 additional countries with respect to the Rajan-Zingales sample. Expanding the sample in this direction is quite important in the present context, because the Rajan-Zingales sample does not include Ireland. Except for Luxembourg, which we drop because the development of its financial sector is statistically anomalous, we have therefore all EU countries in our sample.

Expanding the set of countries, besides increasing the precision of the estimates, also increases the size of the coefficient of the interaction term between financial dependence and financial development by one third. One rationale for this result is that, compared to the sample used by Rajan and Zingales, the extended sample includes several countries that are even less financially integrated with the rest of the world economy, thus making national

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dependence of each particular industry. Country fixed effects will pick up these and other country-specific effects that do not operate by relaxing financial dependence.

financial development even more important for domestic growth.[15] Despite the additional countries, the effect of financial development in non-OECD countries is not statistically different than that of OECD countries, as shown by the results reported in the last column of the lower panel.

In Table 5 we report regressions for output growth. The structure of the table is the same as Table 4. The upper panel refers to the Rajan-Zingales sample, and the lower panel to the extended sample. For each sample we report five regressions, as in Table 4. The first four specifications include interactions of external dependence with market capitalization, private credit, the sum of the two, and accounting standards. The results confirm that financial development promotes industry growth, since the coefficient of the interaction term is always positive and statistically different from zero. The last column tests if the degree of financial integration is the same inside or outside the OECD. Again, this hypothesis is not rejected.

In Table 6 we turn to regressions for the number of firms. In this case, the coefficient of stock market capitalization is positive but not statistically different from zero. However, when we interact external dependence with private credit, with the sum of stock market capitalization and private credit, or with accounting standards, we find that financial development exerts a positive impact on the growth of the number of firms.

In Table 7 the dependent variable is replaced with investment as a share of output for each industry. The results for investment are not as strong as those reported so far. Most of the coefficients are imprecisely estimated, and the overall fit of the regression is consistently below that for other variables, probably a reflection of the greater volatility of investment or its mismeasurement. In fact, the relevant left-hand side variable should be investment as a share of the beginning-of-period net capital stock, rather than the investment-output ratio, but unfortunately we have no data for the capital stock. The coefficient on the interaction term is always positive, but it is statistically different from zero (at the 5-percent level) only when the proxy for financial development is "total finance".

As highlighted in Section 2, each of the three indicators of financial development is potentially endogenous: economic growth may be driving stock market capitalization, bank credit and the sum of the two, rather then the reverse. Furthermore, there might be other

[15] The additional countries are Barbados, Bolivia, Cote d'Ivoire, Cyprus, Ecuador, Fiji, Honduras, Iceland, Indonesia, Iran, Ireland, Jamaica, Kuwait, Mauritius, Nigeria, Panama, Swaziland, Trinidad and Tobago, Tunisia and Uruguay.

determinants of manufacturing industry growth that are correlated with our indicator of financial development. It is therefore important to check the sensitivity of our results to the potential endogeneity of financial development and to the inclusion of additional regressors.

Accordingly, Table 8 displays the coefficient estimates of instrumental variable regressions. For comparison with previous results, the first column replicates the OLS estimates for the growth of value added using total finance (scaled by GDP) to measure financial development. The second regression reports the IV estimates. The instruments are institutional variables that affect financial development but are predetermined with respect to economic growth over the time span covered by our data: legal origin of the country, rule of law, and creditor rights. The coefficient of the interaction term increases in value (from 0.023 to 0.033) and retains its statistical significance, indicating that the potential endogeneity of financial development is not an issue in our data.

The third regression in the upper panel of Table 8 adds to the set of right-hand-side variables the interaction of schooling and initial per capita GDP with external financial dependence. The empirical growth literature shows that schooling and initial GDP per capita affect growth rates. Furthermore, they may influence the effect of financial development on growth: an increased availability of external finance may have a larger growth impact in countries with higher human capital endowment and higher level of economic development (approximated by GDP per capita). Also this regression is estimated with instrumental variables, using the same set of instruments as in the second column. The results are qualitatively unchanged: the coefficients of the additional interaction terms are not significantly different from zero.

The other three panels report several sensitivity tests for output growth and growth in the number of firms on the extended sample. In each of these panels the first column reports the OLS estimates already shown in Tables 5 and 6 using total finance; the second column the IV estimates and the third the IV estimates with additional regressors. In the output growth regressions the coefficient of the interaction term of external dependence and financial development is positive and statistically different from zero at the 1-percent level, even using instrumental variables or including schooling and per capita GDP among the regressors. In the regression for the number of firms, the coefficient is positive and statistically different from zero in the IV regression, and remains positive when we add other controls, though it is less precisely estimated. Also for investment, IV estimates are not dissimilar from OLS ones.

Overall, these results indicate that financial development affects growth, even taking into account the potential endogeneity of financial development and the potential impact of human capital and per capita GDP.

In the present framework, a positive effect of financial development on industry and country growth implies less than full financial market integration. If the world were fully integrated (even if financially under-developed), domestic financial development would have no effect on local growth. Therefore our results suggest that, as of 1991, geographical segmentation was still effective, and financial markets were poorly integrated.

Did financial integration progress over the 1990s? Asking this question is important, because the 1990s witnessed a considerable increase in international capital mobility, removals of barriers and exchange controls, and harmonization of financial regulation. If increased integration already weakened the link between domestic financial development and national growth, the benefits from additional integration would be overstated by 1991 data.

To check the sensitivity of our findings to the particular sample used, in Table 9 we report estimates obtained extending our sample up to 1995, the most recent year with sufficient observations provided by the UNIDO data set. As in the previous tables, the first column displays the OLS estimates, the second the IV estimates, and the third checks the robustness with respect to the inclusion of additional variables. The estimated coefficients of the interaction term between financial development and external dependence indicate that the effect of financial development on value added or output growth is similar to the previous set of estimates. This suggests that whatever integration took place in the first half of the 1990s was partial or has not yet produced its effects on growth.

5. Assessing the impact of financial integration on growth

The estimates discussed in Section 4 can be used to evaluate the effect of financial integration on economic performance and how benefits from integration will be distributed among the integrating countries. To assess the impact of financial integration on the growth rate of value added and output, we construct two different scenarios.

In the **first scenario**, we assume that financial integration in the EU will be associated with the **same level of financial development of the United States**. We consider the U.S. as a valid benchmark, being a highly developed and continent-wide financial market, probably not dissimilar from what an integrated European financial market might look like. In the U.S. the most comprehensive indicator of financial market size, i.e. the sum of stock market capitalization and total private credit scaled by GDP, is 2.09, higher than that of any EU country, though not far from the corresponding values for the most financially developed EU countries (the score for Sweden, the U.K. and the Netherlands being 1.47, 1.50 and 1.69 respectively). In fact, the approach by Rajan and Zingales (1998) takes the U.S. as the benchmark of a frictionless capital market. Also the size of the U.S. economy is comparable to that of the EU taken as an integrated market. At the beginning of 2001, the U.S. population was 278 million, as opposed to 377 million in the 15 EU countries; in 2000, the U.S. GDP was € 10,709 billion against a total EU-15 GDP of € 8,524 billion at current prices.[16]

It should be stressed that the results of this scenario are similar to those obtained from a slightly less optimistic scenario where the level of financial development of all EU countries is raised to the level of financial development of the U.K. or the Netherlands. In particular, the ranking of the simulated impacts by countries and sectors would not be affected by considering raising financial development to the British or Dutch standards.

Even more importantly, it must be noted that assuming that all EU countries reach the same level of financial development as the U.S. does **not** correspond to a hypothetical (and unrealistic) situation where each EU country achieves the same stock market capitalization/GDP ratio or the same private credit/GDP ratio as the U.S. Rather, it is intended to capture a situation where **any** EU company, wherever it is located, would have the **same access** to stock market financing and to bank credit as its U.S. counterparts. This may well

[16] Source: Eurostat.

happen not as a result of its domestic capital market development, but rather as a result of their improved access to other EU financial markets, that is, by raising equity or credit in other EU countries, as explained in Section 2.2.2.

In the **second scenario** we recognize that financial development is the result of both spontaneous market developments and variables that change as a consequence of economic reform and policy action. Thus, the second scenario posits that policy actions by national and EU legislators will **bring the institutional determinants of financial development to the highest EU standard**. Then we predict their impact on financial development from a first-stage cross-country regression of financial development on its institutional determinants. Finally, we use the predicted value of financial development to evaluate the effect of financial integration on the growth of EU countries.

To illustrate the simulation methodology for the first scenario, suppose one wants to simulate the impact of raising financial development in country *c* to the U.S. value, as measured by, say, the ratio of stock market capitalization to GDP.

We multiply the estimated coefficient $\hat{\gamma}$ by the difference between the degree of stock market development in the U.S., denoted by F_{us}, and that in country *c*, denoted by F_c (obviously $F_c < F_{us}$), taking into account industry dependence on external finance. That is, we estimate the impact of raising financial development to the U.S. level for sector *i* in country *c* as follows:

$$\hat{\gamma} \cdot D_i \cdot (F_{us} - F_c) \tag{2}$$

Clearly, for any given sector *i*, the countries whose growth benefits most from integration are those with the largest financial development gap, $F_{us} - F_c$. Similarly, for any given country gap, the sectors whose growth gains most from integration are those with the highest dependence on external finance. The impact on a country's growth rate will therefore depend both on its financial development gap and on its industrial specialization.[17]

[17] In simulating the impact of financial integration on economic growth we assume that financial development does not alter the industrial specialization of the country. As noticed in Section 2, Svaleryd and Vlachos (2002) show that countries with better financial institutions tend to specialize in sectors that rely intensively on financial institutions, implying that the sector weights tend to move towards more financially dependent industries as the country progresses in financial development. Accounting for this extra link would further increase the benefits from financial integration.

Finally, to summarize the benefits of financial integration we compute weighted averages of the expression above for any country or sector, where the weights are the value added shares in the relevant sector or country. More precisely, denoting by x_{ic} the value added of sector *i* in country *c*, we compute the:

$$\text{impact on the growth of country } c = \sum_i \left[\frac{x_{i,c}}{\sum_i x_{i,c}} \cdot \hat{\gamma} \cdot D_i \cdot (F_{us} - F_c) \right], \qquad (3)$$

$$\text{impact on the growth of sector } i = \sum_c \left[\frac{x_{i,c}}{\sum_c x_{i,c}} \cdot \hat{\gamma} \cdot D_i \cdot (F_{us} - F_c) \right], \qquad (4)$$

$$\text{impact on EU growth} = \sum_c \left\{ \frac{\sum_i x_{i,c}}{\sum_i \sum_c x_{i,c}} \sum_i \left[\frac{x_{i,c}}{\sum_i x_{i,c}} \cdot \hat{\gamma} \cdot D_i \cdot (F_{us} - F_c) \right] \right\}, \qquad (5)$$

where expression (5) is the estimated effect on the growth rate of all sectors and all EU countries.

The exercise provides an estimate of the potential impact of raising financial development to the US level (or, for that matter, to any other standard) for any country and sector. It is worthwhile noticing that the expressions (3), (4) and (5) estimate the **increase** in growth in country *c*, in sector *i* or in the EU that could be achieved from raising financial development to the U.S. level. Alternatively, it can be considered as the growth in country *c*, in sector *i* or in the EU that is **currently forgone** as a result of financial market imperfections. As explained in Section 3, the cross-sectional nature of our estimation approach does not allow us to predict whether this increase in growth is permanent or transitory.

5.1. Raising financial development in the EU

We estimate the impact of financial integration on country and industry growth of both value added and output raising our indicator of financial development to the US standard. The computation of the growth effect of financial integration is obtained using the coefficient estimates of the instrumental variable regressions in the last column of Table 8, first two panels. Averaging over all countries and sectors, the estimated impact of financial integration on the growth of value added in the EU as a whole (expression (5)) amounts to 0.94

percentage points per year. The corresponding figure for output growth is 0.92 percentage points, not statistically different from 0.94.

This overall impact, however, underlies considerable diversity in country and sector growth, reflecting both the degree of financial backwardness (more backward countries gain more) as well as the sector specialization (countries that specialize in financially dependent sectors gain more).

Figure 1 reports the increase in the growth rate of value added by country. The effects are similar if growth is measured by value added or output. The figure shows considerable country dispersion in the growth effect of financial integration. In a first group of countries, growth increases substantially by 1 percent per year or more: Belgium, Denmark, Finland, Germany, Greece, Ireland, Italy, Portugal and Spain. In other countries, growth increases by less than 1 percent per year: Austria, France, and in particular the Netherlands, Sweden and the UK. It is interesting to note that even the first group includes some countries from Northern Europe. And even in the second group there are several countries whose growth increases considerably (Austria and France). Predictably, the only ones who do not gain much are the most financially developed countries, that is, the Netherlands, Sweden and the U.K.

Figure 2 plots the growth effect of the 9 industries that are expected to contribute more to European total growth (to make the graph more readable we focus on 9 industries only). There is again some similarity between the impact of financial integration on output and value added growth at the sector level. As with country growth, the total effect reflects (i) the degree of financial dependence of the industry and (ii) the weight of highly financially dependent industries in the industrial structure of financially backward countries. The dispersion by industry is larger than the dispersion by country. In all the sectors reported in Figure 2 growth increases by over 1 percentage point. And in some industries – notably Drugs, Plastic Products and Professional Goods – the additional growth effect exceeds 3 percent per year (obviously, for some of the industries the effect is negligible).

The main conclusion from this exercise is that the potential **growth benefits of financial integration are considerable** both at the country and the industry level, and that they are not evenly distributed across countries and across sectors.

5.2. Improving the institutional determinants of financial development in the EU

It can be argued that the previous estimates tend to exaggerate the growth benefits of policy actions aimed at promoting financial markets integration because financial integration in not under complete control of policy makers but depends also on spontaneous market developments. In other words, the previous experiment implicitly assumes that domestic financial development is a control variable.

In this section, we simulate the growth effects of letting the determinants of financial developments that are under policy control converge to the highest European standard. To perform this exercise, we first regress our measure of total financial development on a set of policy-controlled variables that literature has shown to be relevant for financial markets efficiency.[18] We assume that financial integration leads all integrating countries to adopt the highest value of these determinants in the EU. We then predict the implied value of financial development in each sector and country. Finally, we proceed as in the previous scenario to compute the growth effects. We focus on three (policy-controlled) determinants of financial development: the quality of accounting standards, the degree of creditors protection and the rule of law.

The simulation clearly requires a regression relating financial development to its institutional determinants as an intermediate input. This is done in Table 10, which reports the results of the regression of financial development on accounting standards, creditor protection, rule of law and dummies for the country's legal origin (the latter variable is not under policy control). Accounting standards and rule of law appear as the two most effective variables in predicting financial development.[19]

[18] In practice, this is the first-stage regression of our IV procedure with the omission of per capita GDP and schooling.

[19] The regression is robust to the presence of influential values. We run an OLS regression, compute the Cook's distance and exclude any observation for which the Cook's distance is greater than 1. After excluding potentially influential outliers, we proceed in two steps. We run iteratively least squares regressions weighting the observations with Huber weights. After convergence is reached we construct biweights with which we re-weight the observations. We finally run iteratively least squares until convergence is reached. Using a LAD regression we get similar results.

Figure 3 shows the effects on country growth when the three determinants of financial development are simultaneously set at the maximum level within the EU countries. With respect to the previous scenario there are some noteworthy differences.

First, as one would expect, the growth effects are smaller than when financial development is raised to the U.S. standards. Averaging over all European countries and sectors, growth of value added increases by 0.75 percentage points (down by 0.19 percentage points with respect to the first scenario), and output growth increases by 0.74 percentage points (down by 0.18 points).

Second, the two countries that gain most in terms of growth are Greece and Portugal. Third, in this experiment even the Netherlands benefits approximately as much as Italy, France, Germany and Spain. The group of countries that benefit the least now includes (in decreasing order) Belgium, Austria, Denmark, Finland, the U.K. and Sweden. The fact that the U.K. and Scandinavian countries gain the least in this simulation reflects the fact that their regulatory framework and its effectiveness are already quite high.

Figure 4 shows the effects on the nine sectors that contribute most to the European growth rate. Raising the institutional determinants of financial development, rather than in financial development itself, reduces the absolute size of the effects only sligthly. The reason is that the countries that would benefit most from the regulatory improvements are also those where financial development is more limited.

Figures 5, 6 and 7 show the impact on countries growth when the three determinants of financial development are modified once at a time. This experiment is of interest for two reasons. First, it highlights which institutional variable is likely to have the largest growth impact. Second, there are reasons to believe that some of the determinants of financial development are easier to change than others. For instance, it might be easier to improve accounting standards rather than to raise the rule of law, which may require deeper reforms in each country.

The main message that emerges from Figures 5, 6 and 7 is that raising accounting standards to the maximum EU levels is far more important than raising the degree of creditors' protection and, even more so, modifying the rule of law. Again, Southern or Central European countries appear to gain more than Nordic countries and the UK.

6. Firm-level data and results

In this section we apply the approach laid out in Section 3 to a large international panel of firm-level data for companies in EU and transition countries. There are two reasons for extending to firm-level data the same method used for industry data. First, we can test the robustness of the conclusions reached on the basis of industry-level data. As will be seen, apart from the obvious difference in their level of aggregation, our firm-level data differ in several dimensions from the industry-level data analyzed so far. They refer to a later period, with no overlapping years, spanning 1996-2001, while the UNIDO industry-level data cover the 1981-95 period. Moreover, they refer to a partly different set of countries. They do not include non-European countries, but include most former socialist European economies, none of which was present in the industry-level data. The EU countries form the only intersection between the two data sets.

A second reason for using firm-level data is that they allow us to check whether financial development affects differentially firms belonging to different size classes, and not only to different industries. Finding differences in the effect of financial dependence on firm's growth according to size would strengthen further the causal interpretation of our regressions. Theoretically, we do not expect all firms to be equally affected by local financial development. Larger firms can more easily tap markets far from their main headquarters. Therefore, if finance affects growth we expect the effect of local financial development to be mostly concentrated among small firms.

6.1. Data

We draw firm-level data for employees, sales, and value added from the Amadeus Top 200,000 company database of Bureau Van Dijck. Due to missing values, changes in the definitions and our choice to focus only on the manufacturing sector, the number of firms for which observations can be used is reduced to 70,679 firms.

The maximum interval for which data are observed for a firm is 1996-2001, but for many firms the time interval over which data are available is shorter. Thus, the average growth rates for each individual firm are computed using the available sample for each firm, and are therefore estimated with different number of observations. Of course, the shorter the

time interval over which the averages are computed, the more precisely the average is measured. But the resulting data set is a cross-section, and the asymptotic properties of the estimates depend only on the total number of firms. The fact that growth rates may be measured with different precision for different firms does not pose particular problems, because the OLS estimates accommodate measurement error in the left-hand variable.

We exclude all firms for which only one observation is available for sales and value added, since for them no growth rate can be computed.[20] As in the industry level-analysis, growth variables are merged with country-level data on indicators of financial development and sector-level data on financial dependence.[21]

Table 11 shows the distribution of companies across countries, as well their average sales growth by country, and the two basic indicators of financial development – bank credit and stock market capitalization scaled by GDP. Iceland, Ireland, Latvia, Norway, Russian Federation, and Slovenia are excluded from the analysis (and therefore do not appear in Table 11) because the growth rates of sales and value added are entirely missing for their firms. Bosnia-Herzegovina and Yugoslavia (Serbia/Montenegro) are excluded because indicators of financial development are not available. This reduces the total number of countries included in the empirical analysis to 26.

The statistics in Table 11 show that average growth rates differ considerably depending on whether one computes them from sales or from value added data. Also, unsurprisingly most former socialist countries are far less financially developed than EU countries. Finally, there are large international differences in firm size, as measured by the number of employees of the median firm.

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[20] The Top 200,000 version of the Amadeus database covers European companies from the following countries: Austria, Belgium, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Macedonia, FYR, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom, Yugoslavia, FR (Serbia/Montenegro). To be included in the Amadeus sample, companies must satisfy the following criteria. For the UK, Germany, France, Italy, Ukraine and Russian Federation, operating revenue must be at least € 15 million, total assets at least € 30 million, and the number of employees must be at least 150. For companies in other countries, operating revenue must be to at least 10 million, total assets at least € 20 million, and the number of employees at least 100.

[21] The data on financial development used in the firm-level analysis are drawn from the Word Development Indicators (2001), a database maintained by the World Bank, which covers 207 countries and provide data from 1960. From this database, we extract the market capitalization of listed companies and the domestic credit provided by the bank sector, both as percentage of GDP.

6.2. Estimation results

Table 12 reports the regressions where the dependent variable is each firm's average growth rate of sales over the 1996-2001 interval (or a shorter interval, as dictated by data availability). To compute yearly growth rates, in the regressions we use only data for firms for which at least two adjacent observations are available. As a result, the number of observations used in the estimation is considerably lower than in Table 11. The upper panel reports the OLS estimates with standard errors corrected for heteroskedasticity. The bottom panel shows Least Absolute Deviation (LAD) estimates, which are robust to the presence of influential values. The first three columns differ for the indicator of financial development in the interaction term with external dependence: stock market capitalization, domestic credit to the private sector, and the sum of the two. The fourth column reports a test of whether financial development has a different growth impact in transition economies. All regressions include country and industry fixed effects. Thus, any difference in firms growth due to differences in common factors within countries (such as inflation) is captured by the country dummies.

The results are largely consistent with those obtained from the industry-level data and presented in Section 4. The coefficient of the interaction term is positive and precisely estimated in all regressions. The size of the coefficient is of the same order of magnitude as in the industry-level estimates, especially when one considers the LAD coefficient estimates, which are considerably smaller but also much more precise than the OLS estimates. The estimates in the fourth column indicate that financial development does not have a different impact in former socialist economies. The R^2 of the OLS regressions is very small, due to the presence of a large firm-specific noise that was absent in the industry data as a result of aggregation.

In Table 13 we replace the dependent variable with the firms' average growth of value added. Again, the coefficient that measures the effect of financial development on growth is positive, but in this case it is not statistically different from zero. In the value added specifications the R^2 of the OLS regressions is smaller than in the regressions for sales growth, indicating the presence of larger noise in the micro data for this measure of growth. This is not surprising because value added statistics from balance sheet information suffer from differences in accounting practices and methodologies both across firms and countries, resulting in large measurement errors and thus downward biased estimates. Differences in

methodologies are less of an issue with sales, which is the least ambiguous accounting concept and the variable that is more readily comparable across countries with different accounting standards.[22]

Our last test of the effect of financial development on growth is presented in Table 14. We split the sample along the size dimension, and estimate two separate regressions, respectively for firms above and below 200 employees. For the reasons explained above, we report only regressions using the growth rate of sales as the dependent variable. We find that financial development indicator (interacted with financial dependence) has a much larger impact in the sample with small firms, regardless of the estimation method. In the OLS regressions the effect of financial development on large firms growth does not differ statistically from zero. In the LAD estimates it is only half the effect on small firms.

These results support the hypothesis that financial development constrains more severely the growth of small and medium enterprises (SMEs), and therefore that financial imperfections take a heavier toll in countries where SMEs are more prominent in the population of firms. From Table 11, this appears to be the case in Austria, Belgium, Greece, Italy, Spain, and Sweden, where the median firm is smaller than in the rest of the sample. As a result, a given improvement in **domestic** financial development should be expected to have a larger impact in these countries.

However, insofar as we are dealing with SMEs, one should refrain from rushing to the conclusion that these countries will also benefit more from EU financial **integration.** The effect might be attenuated, or even reversed, unless financial integration results in an improvement in these countries' domestic financial markets. The reason is that, as explained in Section 2.2.3, SMEs are less likely than other firms to access foreign capital markets or borrow from foreign banks, and therefore to reap the benefits from an integrated EU financial market. For such companies, the assumption made in Section 5 that access to a developed **EU** capital market is equivalent to access to a developed **domestic** capital market is less likely to be met. Therefore, the results in Table 11 suggest that the simulations in Section 5 are likely to overestimate the growth payoff of EU financial integration, especially for countries that include a large proportion of SMEs.

[22] Estimates using investment as dependent variable cannot be perfomed, because this variable is not available in the Amadeus database.

7. Summary and conclusions

In this concluding section we summarize the main findings of the report, and assess their limitations and implications for the process of EU financial integration.

7.1. Summary of the results

The regression and simulation analysis based on the UNIDO industry-level data suggest several conclusions about the effect of financial development on growth and about the likely effects of financial integration in the EU:

1. There is still **considerable dispersion in financial development** across European countries.
2. Our estimates imply that **gaps in national financial development matter for** economic **growth** in the manufacturing sector.
3. These **effects have not weakened in the early 1990s**, when some financial integration occurred, suggesting that financial development can still affect growth.
4. Simulations suggest that the potential benefits from **financial integration** – interpreted as firms' access to a financial market similar to that of the U.S. (or of the most developed EU economies)– **can have** potentially **large effects on countries and sectors growth**. Simulation analysis also shows that the overall effect depends on which institutional determinant of financial development is varied to raise the current standards of the EU financial development. Unsurprisingly, the largest benefits accrue when all determinants are assumed to improve simultaneously.
5. Overall, we estimate that the **impact of raising the level of financial development to the U.S. level on the growth of European manufacturing industry is slightly less than 1 percentage point per year** (ranging from 0.75 to 0.94 percentage points depending on the assumed scenario). Of course, the effect would be smaller if financial integration were to occur at a lower level of financial development than that of the United States.
6. This overall growth effect results from rather different country and sector effects, a reflection of the heterogeneity of the EU in terms of sector composition and level of

financial development. **Countries that currently have a comparably weak financial structure** (such as Belgium, Denmark, Greece and Italy) are predicted to **benefit most**, while those which have already achieved a relatively high level of financial development (such as the UK, Sweden and the Netherlands) are predicted to benefit little.

To a large extent, these results are confirmed by the estimates obtained using a large sample of firms in 26 countries, drawn from the Amadeus Top 200,000 company database. Both the sign and the estimated magnitude of the growth effect of financial development are consistent with those obtained from industry-level data. In this sample the effect appears to stem primarily from the effect of financial development on the sales growth of SMEs, defined as firms with less than 200 employees. This implies that countries with comparatively small firms (such Austria, Belgium, Greece, Italy, Spain, and Sweden) stand to gain more from domestic financial development. However, it also suggests that for these countries EU financial integration may have a smaller payoff than that implied by industry-level simulations, insofar as financial integration will not lead to domestic financial development for these countries but simply to improved access to international financial markets for their firms. The reason is that SMEs are likely to be the least able to take advantage of such improved access to foreign financial intermediaries and markets.

7.2. Limitations of the analysis and implications for EU financial integration

These conclusions raise some interesting issues. If the main beneficiaries of financial market integration are the financially underdeveloped members of the EU, why should more financially developed EU countries support financial market integration? This political economy issue is important in light of the fact that financial integration is only partly driven by spontaneous market developments. Much of it – as can be gauged by comparing Figure 3 with Figures 5 to 7 – stems from regulatory intervention and financial reform.

We advance three possible explanations for why more financially developed countries not only do not oppose but actually favor – perhaps more than financially backward countries – increased integration. First, even if in these countries manufacturing industry does not benefit from financial market integration, financial industry may actually gain from integration. The efficient financial intermediaries of more advanced countries can expand

abroad and gain a large market share at the expense of local institutions. Second, the enhanced competition and the economies of scale in financial intermediation stemming from integration can improve the working of financial markets in already relatively developed economies. Finally, since financial market integration often goes hand-in-hand with economic integration, more financially and economically developed countries can reap benefits also on this front.

Our analysis does not account for these growth effects of financial development because the nature of our data constrains the estimation to manufacturing industry. However, for some financially developed countries these growth effects could be the most important effect at work. In particular, the financial service sector and the professional service sector in the U.K. may greatly benefit from financial integration in the EU. Conversely, the financial service industries of less financially developed countries may lose market shares and therefore face a downturn in their activity. While financial market integration should enhance the growth and formation of domestic firms in these countries, the same integration process is likely to hurt their financial industry. Therefore, the effect of financial integration on the GDP of these countries is likely to be smaller than its effect on their manufacturing industry. In other words, insofar as they focus exclusively on manufacturing, our estimates are likely to underestimate the growth effects of financial integration for financially developed countries and to overestimate them for financially underdeveloped ones.

This highlights also that financial integration will not be a Pareto-improving process. It will create not only winners but also some losers. In countries that are less financially developed, the financial sector stands to lose market shares and profits. This may result in a powerful constituency lobbying against financial integration, or at least slowing down its progress. At the same time, the industrial sectors of these countries have an incentive to promote financial integration because integration gives them an opportunity to expand. So the overall balance of opinion in these countries will depend on whether the pro-integration pressure of industry will win over the anti-integration resistance of local finance.

In financially developed countries, the situation is likely be reversed: the financial sector will gain from integration, while industry will not gain much and may even lose from the increased competitiveness of foreign manufacturing producers, which will be able to access to hitherto inaccessible sources of financing. Therefore, in these countries finance is likely to be in favor of integration while industry may be less favorable or even oppose.

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Table 1

Indicator of External Dependence

Industry	ISIC code	External dependence
Apparel	322	0.03
Basics ex. fert.	3511	0.25
Beverage	313	0.08
Drugs	3522	1.49
Electric machinery	383	0.77
Food products	311	0.14
Footwear	324	-0.08
Furniture	332	0.24
Glass	362	0.53
Iron and steel	371	0.09
Leather	323	-0.14
Machinery	382	0.45
Metal products	381	0.24
Motor vehicle	3843	0.39
Nonferrous metal	372	0.01
Non-metal products	369	0.06
Office & computing	3825	1.06
Other chemicals	352	0.22
Other industries	390	0.47
Paper prod.	341	0.18
Petroleum and coal products	354	0.33
Petroleum ref.	353	0.04
Plastic products	356	1.14
Pottery	361	-0.15
Printing and publishing	342	0.2
Professional goods	385	0.96
Pulp paper	3411	0.15
Radio	3832	1.04
Rubber products	355	0.23
Ship	3841	0.46
Spinning	3211	-0.09
Synthetic resins	3513	0.16
Textile	321	0.4
Tobacco	314	-0.45
Transport. equip.	384	0.31
Wood products	331	0.28

Note. The index of financial dependence is defined as capital expenditures *minus* net cash flow from operations, all scaled by capital expenditures. The figures in this table are drawn from Table 1 in Rajan and Zingales (1998).

Table 2

Indicators of Financial Development

Country	Stock market capitalization (1980-95 average)	Claims of banks and other financial institutions (1980-95 average)	Accounting standards (1990)
Australia	0.43	0.81	75
Austria	0.07	0.87	54
Bangladesh	0.01	0.16	
Barbados	0.21	0.40	
Belgium	0.26	0.37	61
Bolivia	0.01	0.20	
Brazil	0.12	0.25	54
Canada	0.45	0.77	74
Chile	0.43	0.50	52
Colombia	0.06	0.27	50
Costa Rica	0.05	0.17	
Cote d'Ivoire	0.04	0.35	
Cyprus	0.19	0.77	
Denmark	0.22	0.41	62
Ecuador	0.10	0.19	
Egypt	0.05	0.28	24
Fiji	0.02	0.30	
Finland	0.18	0.67	77
France	0.20	0.91	69
Germany	0.19	0.92	62
Greece	0.08	0.40	55
Honduras	0.05	0.29	
Iceland	0.09	0.39	
India	0.13	0.27	57
Indonesia	0.05	0.26	
Iran	0.04	0.30	
Ireland	0.26	0.62	
Israel	0.29	0.50	64
Italy	0.12	0.50	62
Jamaica	0.24	0.28	
Japan	0.73	1.69	65
Jordan	0.52	0.62	
Kenya	0.12	0.29	
Korea	0.24	0.81	62
Luxembourg	2.14	0.24	
Malaysia	1.07	0.80	76
Mauritius	0.22	0.29	
Mexico	0.14	0.18	60
Netherlands	0.41	1.28	64
New Zealand	0.40	0.54	70
Nigeria	0.04	0.15	59
Norway	0.15	0.88	74
Pakistan	0.09	0.23	
Panama	0.07	0.51	
Paraguay	0.01	0.16	
Philippines	0.21	0.29	65
Portugal	0.08	0.63	36

Singapore	1.23	0.95	78
South Africa	1.31	0.79	70
Spain	0.18	0.72	64
Sri Lanka	0.13	0.19	
Sudan		0.09	
Suriname		0.37	
Sweden	0.38	1.09	83
Trinidad and Tobago	0.11	0.50	
Tunisia	0.08	0.56	
Turkey	0.06	0.14	51
U.K.	0.76	0.74	78
U.S.A.	0.58	1.51	71
Uruguay	0.01	0.31	31
Venezuela	0.08	0.39	40
Zimbabwe	0.13	0.22	

Note. The figures in this table are drawn from the database in the CD-Rom accompanying Demirgüç-Kunt and Levine (2001). The three variables are *mcap*, *privo* and *account* contained in the file *request80-95.xls* in the database.

Table 3

Log GDP, Schooling, Creditor Rights, and Rule of Law

Country	Log of real GDP	Average years of schooling	Creditor rights	Rule of law
Australia	12520	10.02	1	6
Austria	10509	6.89	3	6
Bangladesh	1085	1.68		1.36
Barbados	6379	6.84		
Belgium	11109	8.17	2	6
Bolivia	1989	3.84		1.32
Brazil	4303	2.98	1	3.78
Canada	14133	10.23	1	6
Chile	3892	5.96	2	4.21
Colombia	2946	3.87	0	1.25
Costa Rica	3717	4.65		4
Cote d'Ivoire	1790			3.38
Cyprus	5295	6.16		3.59
Denmark	11342	10.31	3	6
Ecuador	3238	5.4	4	4
Egypt	1645	2.16	4	2.5
Fiji	3609	6.01		
Finland	10851	9.61	1	6
France	11756	5.96	0	5.39
Germany	11920	8.46	3	5.53
Greece	5901	6.56	1	3.71
Honduras	1519	2.34		2.07
Iceland	11566	7.11		6
India	882	2.72	4	2.5
Indonesia	1281	3.09	4	2.39
Iran	3434	1.85		
Ireland	6823	7.6	1	4.68
Israel	7895	9.11	4	2.89
Italy	10323	5.32	2	5
Jamaica	2362	3.6		2.11
Japan	10072	8.18	2	5.39
Jordan	3384	2.93		2.61
Kenya	911	2.46	4	3.25
Korea	3093	6.81	3	3.21
Luxembourg	11893			6
Malaysia	3799	4.49	4	4.07
Mauritius	3988	4.5		
Mexico	6054	4.01	0	3.21
Netherlands	11284	8	2	6
New Zealand	10362	11.94	3	6
Nigeria	1438		4	1.64
Norway	12141	7.26	2	6
Pakistan	1110	1.74	4	1.82
Panama	3392	5.91		2.11
Paraguay	2534	4.63		2.46
Philippines	1879	6.06	0	1.64
Portugal	4982	3.27	1	5.21
Singapore	7053	3.69	4	5.14

South Africa	3496	4.6	3	2.65
Spain	7390	5.38	2	4.68
Sri Lanka	1635	5.18	3	1.14
Sudan	866	0.64		1.89
Suriname	3737			1.31
Sweden	12456	9.45	2	6
Trinidad and	11262	6.6		4
Tunisia	2527	1.92		2.79
Turkey	2874	2.61	2	3.10
UK	10167	8.11	4	5.14
Uruguay	5091	5.75	2	3
Venezuela	7401	4.93		3.82
Zimbabwe	1206	2.26	4	2.21

Table 4

Financial Development and Growth of Industry Value Added

Rajan and Zingales Sample					
Share of value added, 1981	-0.260 (0.064)**	-0.266 (0.064)**	-0.268 (0.064)**	-0.252 (0.054)**	-0.268 (0.064)**
External dependence × market capitalization	0.029 (0.015)*				
External dependence × domestic credit private sector		0.028 (0.013)*			
External dependence × total finance			0.019 (0.008)*		0.018 (0.008)*
External dependence × accounting standards				0.094 (0.032)**	
External dependence × financial development × non-OECD dummy					0.001 (0.008)
Constant	0.047 (0.028)	0.044 (0.018)*	0.038 (0.029)	0.083 (0.022)*	0.038 (0.029)
Observations	1145	1145	1145	945	1145
R-squared	0.36	0.36	0.36	0.46	0.36
Extended Sample					
Share of value added, 1981	-0.280 (0.060)**	-0.277 (0.054)**	-0.299 (0.064)**	-0.368 (0.081)**	-0.301 (0.064)**
External dependence × market capitalization	0.038 (0.014)**				
External dependence × domestic credit private sector		0.035 (0.014)*			
External dependence × total finance			0.023 (0.008)**		0.026 (0.009)**
External dependence × accounting standards				0.070 (0.037)*	
External dependence financial development × non-OECD dummy					-0.008 (0.008)
Constant	-0.141 (0.095)	-0.151 (0.094)	-0.150 (0.095)	0.005 (0.037)	-0.150 (0.095)
Observations	1593	1690	1571	995	1571
R^2	0.38	0.36	0.37	0.39	0.37

Note. The dependent variable is the growth rate of real value added for each ISIC industry in each country from 1981 to 1991. External dependence is the fraction of capital expenditure not financed with internal funding. All regressions contain a full set of country and industry dummies. Standard errors robust to unknown form of heteroskedasticity are reported in parenthesis. Two stars denote that the coefficient is statistically different from zero at the 1 percent level, one star at the 5 percent level.

Table 5

Financial Development and Growth of Industry Output

Rajan and Zingales Sample					
Share of output, 1981	-0.157 (0.057)**	-0.162 (0.058)**	-0.164 (0.058)**	-0.194 (0.069)**	-0.164 (0.058)**
External dependence × market capitalization	0.037 (0.013)**				
External dependence × domestic credit private sector		0.036 (0.013)**			
External dependence × total finance			0.024 (0.008)**		0.023 (0.008)**
External dependence × accounting standards				0.131 (0.034)**	
External dependence × financial development × non-OECD dummy					0.001 (0.008)
Constant	0.059 (0.031)	0.037 (0.021)	0.047 (0.032)	0.064 (0.020)**	0.048 (0.032)
Observations	1158	1158	1158	939	1158
R^2	0.35	0.35	0.35	0.47	0.35
Extended Sample					
Share of output, 1981	-0.161 (0.047)**	-0.166 (0.047)**	-0.178 (0.052)**	-0.276 (0.109)*	-0.179 (0.052)**
External dependence × market capitalization	0.042 (0.013)**				
External dependence × domestic credit private sector		0.040 (0.013)**			
External dependence × total finance			0.026 (0.008)**		0.028 (0.008)**
External dependence × accounting standards				0.103 (0.038)**	
External dependence × financial development × non-OECD dummy					-0.006 (0.008)
Constant	0.012 (0.032)	-0.061 (0.059)	-0.061 (0.058)	-0.026 (0.039)	-0.062 (0.058)
Observations	1595	1721	1572	989	1572
R^2	0.38	0.36	0.37	0.43	0.37

Note. The dependent variable is the growth rate of real output for each ISIC industry in each country from 1981 to 1991. External dependence is the fraction of capital expenditure not financed with internal funding. All regressions contain a full set of country and industry dummies. Standard errors robust to unknown form of heteroskedasticity are reported in parenthesis. Two stars denote that the coefficient is statistically different from zero at the 1 percent level, one star at the 5 percent level.

Table 6

Financial Development and Growth of Number of Firms

Rajan and Zingales Sample					
Share of firms, 1981	-0.470 (0.139)**	-0.482 (0.138)**	-0.479 (0.139)**	-0.258 (0.069)**	-0.481 (0.138)**
External dependence × market capitalization	0.035 (0.021)				
External dependence × domestic credit private sector		0.075 (0.017)**			
External dependence × total finance			0.036 (0.011)**		0.044 (0.010)**
External dependence × accounting standards				0.53 (0.033)**	
External dependence × financial development × non-OECD dummy					-0.018 (0.012)
Constant	0.085 (0.030)**	0.011 (0.026)	0.028 (0.025)	0.027 (0.037)	0.027 (0.025)
Observations	1035	1035	1035	905	1035
R^2	0.50	0.51	0.50	0.50	0.51
Extended Sample					
Share of firms, 1981	-0.387 (0.099)**	-0.420 (0.094)**	-0.433 (0.102)**	-0.282 (0.071)**	-0.435 (0.101)**
External dependence × market capitalization	0.036 (0.020)				
External dependence × domestic credit private sector		0.071 (0.014)**			
External dependence × total finance			0.035 (0.009)**		0.043 (0.009)**
External dependence × accounting standards				0.055 (0.033)	
External dependence × financial development × non-OECD dummy					-0.019 (0.011)
Constant	0.104 (0.029)**	0.002 (0.035)	-0.111 (0.042)**	-0.044 (0.035)	-0.110 (0.042)**
Observations	1372	1454	1349	928	1349
R^2	0.46	0.50	0.47	0.43	0.48

Note. The dependent variable is the growth rate of the number of firms for each ISIC industry in each country from 1981 to 1991. External dependence is the fraction of capital expenditure not financed with internal funding. All regressions contain a full set of country and industry dummies. Standard errors robust to unknown form of heteroskedasticity are reported in parenthesis. Two stars denote that the coefficient is statistically different from zero at the 1 percent level, one star at the 5 percent level.

Table 7

Financial Development and Investment

Rajan and Zingales Sample					
Share of output, 1981	-0.184 (0.118)	-0.187 (0.119)	-0.188 (0.119)	-0.132 (0.139)	-0.188 (0.118)
External dependence × market capitalization	0.024 (0.014)				
External dependence × domestic credit private sector		0.027 (0.014)			
External dependence × total finance			0.016 (0.008)*		0.014 (0.009)
External dependence × accounting standards				0.029 (0.029)	
External dependence × financial development × non-OECD dummy					0.006 (0.010)
Constant	0.070 (0.030)*	0.064 (0.028)*	0.062 (0.030)*	0.037 (0.031)	0.063 (0.031)*
Observations	850	850	850	732	850
R^2	0.33	0.33	0.33	0.25	0.33
Extended Sample					
Share of output, 1981	-0.124 (0.063)*	-0.077 (0.066)	-0.121 (0.068)	-0.126 (0.132)	-0.120 (0.068)
External dependence × market capitalization	0.028 (0.015)				
External dependence × domestic credit private sector		0.023 (0.012)			
External dependence × total finance			0.015 (0.008)		0.013 (0.008)
External dependence × accounting standards				0.030 (0.026)	
External dependence × financial development × non-OECD dummy					0.006 (0.009)
Constant	0.175 (0.038)**	0.136 (0.030)**	0.027 (0.022)	0.061 (0.033)	0.026 (0.023)
Observations	1151	1237	1131	770	1131
R^2	0.34	0.31	0.34	0.26	0.34

Note. The dependent variable is investment as a share of output for each ISIC industry in each country from 1981 to 1991. External dependence is the fraction of capital expenditure not financed with internal funding. All regressions contain a full set of country and industry dummies. Standard errors robust to unknown form of heteroskedasticity are reported in parenthesis. Two stars denote that the coefficient is statistically different from zero at the 1 percent level, one star at the 5 percent level.

Table 8

Financial Development and Growth: Sensitivity Analysis

Growth of real value added			
	OLS	*IV*	*IV-Extended*
Share of value added, 1981	-0.299 (0.064)**	-0.401 (0.081)**	-0.303 (0.072)**
External dependence × total finance	0.023 (0.008)**	0.033 (0.011)**	0.036 (0.016)*
External dependence × schooling			0.001 (0.003)
External dependence × log per capita GDP			-0.005 (0.013)
Constant	-0.149 (0.095)	0-035 (0.020)	0.084 (0.133)
Observations	1571	1154	1131

Growth of real output			
	OLS	*IV*	*IV-Extended*
Share of output, 1981	-0.178 (0.052)**	-0.254 (0.086)**	-0.196 (0.064)**
External dependence × market capitalization	0.026 (0.008)**	0.035 (0.012)**	0.035 (0.015)*
External dependence × schooling			0.003 (0.003)
External dependence × log per capita GDP			-0.006 (0.012)
Constant	-0.061 (0.058)	0.010 (0-017)	0.069 (0.124)
Observations	1572	1148	1125

Table 8 - continued

Growth of number of firms			
	OLS	*IV*	*IV-Extended*
Share of firms, 1981	-0.433 (0.102)**	-0.319 (0.070)**	-0.297 (0.068)**
External dependence × market capitalization	0.035 (0.009)**	0.042 (0.010)**	0.011 (0.016)
External dependence × schooling			0.003 (0.003)
External dependence × log per capita GDP			-0.004 (0.003)
Constant	-0.061 (0.058)	0.010 (0-017)	0.0030 (0.015)*
Observations	1349	1052	1029

Investment			
	OLS	*IV*	*IV-Extended*
Share of output, 1981	-0.121 (0.068)	-0.118 (0.093)	-0.123 (0.097)
External dependence × market capitalization	0.015 (0.008)	0.007 (0.011)	0.003 (0.015)
External dependence × schooling			-0.001 (0.003)
External dependence × log per capita GDP			0.009 (0.014)
Constant	0.027 (0.022)	0.104 (0.024)**	-0.063 (0.152)
Observations	1131	889	868

Note. The dependent variables are the growth rate of real value added, output, number of firms and investment for each ISIC industry in each country from 1981 to 1991. In the IV regression, the instruments for financial development are dummies for the legal origin of the country (Anglo-Saxon, French, German and Scandinavian), and indicators of the rule of law and the degree of protection of creditor rights. All regressions contain a full set of country and industry dummies. Standard errors robust to unknown form of heteroskedasticity are reported in parenthesis. Two stars denote that the coefficient is statistically different from zero at the 1 percent level, one star at the 5 percent level.

Table 9

Financial Development and Growth: Sensitivity Analysis, 1981-1995

Growth of real value added			
	OLS	*IV*	*IV-Extended*
Share of value added, 1981	-0.250 (0.065)**	-0.312 (0.082)**	-0.302 (0.082)**
External dependence × total finance	0.026 (0.011)**	0.051 (0.016)**	0.038 (0.021)*
External dependence × schooling			0.006 (0.004)
External dependence × log per capita GDP			-0.006 (0.014)
Constant	0.004 (0.073)	0.046 (0.021)*	0.064 (0.147)
Observations	1264	926	926

Growth of real output			
	OLS	*IV*	*IV-Extended*
Share of output, 1981	-0.212 (0.059)**	-0.264 (0.090)**	-0.258 (0.089)**
External dependence × market capitalization	0.025 (0.011)**	0.044 (0.015)**	0.048 (0.020)*
External dependence × schooling			0.004 (0.004)
External dependence × log per capita GDP			-0.015 (0.014)
Constant	0.176 (0.061)**	0.023 (0.018)	0.176 (0.144)
Observations	1293	9438	943

Table 9 - continued

Growth of number of firms			
	OLS	*IV*	*IV-Extended*
Share of firms, 1981	-0.628 (0.100)**	-0.474 (0.106)**	-0.469 (0.105)**
External dependence × market capitalization	0.024 (0.014)	0.036 (0.017)*	-0.0016 (0.022)
External dependence × schooling			-0.003 (0.006)
External dependence × log per capita GDP			0.048 (0.028)
Constant	0.155 (0.034)**	0.074 (0.028)**	0.085 (0.027)**
Observations	823	581	5819

Investment			
	OLS	*IV*	*IV-Extended*
Share of output, 1981	-0.097 (0.075)	-0.173 (0.104)	-0.170 (0.106)
External dependence × market capitalization	0.013 (0.011)	-0.008 (0.014)	0.014 (0.017)
External dependence × schooling			0.001 (0.004)
External dependence × log per capita GDP			-0.013 (0.012)
Constant	0.103 (0.042)*	0.020 (0.023)	-0.044 (0.045)
Observations	1041	819	797

Note. The dependent variables are the growth rate of real value added, output, number of firms and investment for each ISIC industry in each country from 1981 to 1995. In the IV regression, the instruments for financial development are dummies for the legal origin of the country (Anglo-Saxon, French, German and Scandinavian), and indicators of the rule of law and the degree of protection of creditor rights. All regressions contain a full set of country and industry dummies. Standard errors robust to unknown form of heteroskedasticity are reported in parenthesis. Two stars denote that the coefficient is statistically different from zero at the 1 percent level, one star at the 5 percent level.

Table 10

The Determinants of Financial Development

	French legal origin	German legal origin	Scandinavian legal origin	Anglo-Saxon legal origin	Accounting Standards	Degree of creditors protection	Rule of Law	Constant
Coefficient	-0.059	0.000	-0.419	-0.111	0.020	0.086	0.118	-0.974
Standard error	(0.256)	(0.000)*	(0.288)	(0.252)	(0.008)**	(0.070)	(0.054)*	(0.555)*

Note. The dependent variable is "total finance", the sum of stock market capitalization and domestic credit extended by banks and other financial institutions. Two stars denote that the coefficient is statistically different from zero at the 1 percent level, one star at the 5 percent level.

Table 11

Microeconomic Data: Summary Statistics

	Growth rate of sales	Growth rate of value added	Number of firms	Number of employees	Bank Credit as share of GDP	Market Capitalization / GDP
Austria	0.0423	0.0197	1507	136	1.2738	0.1549
Belgium	0.0289	0.0037	2139	94	1.5116	0.5791
Bulgaria	0.2474	0.1572	1297	200	0.5981	0.0287
Croatia	-0.0564		510	205	0.4714	0.1189
Czech Republic	0.0744	0.0575	2111	200	0.6937	0.2398
Denmark		-0.0014	1058	163	0.5666	0.4654
Estonia	0.1226	0.1546	221	161	0.2360	0.2246
Finland	0.0943	0.0685	962	146	0.6202	0.9512
France	0.0472	0.0116	6698	168	1.0177	0.5409
Germany	0.0286	-0.0007	12789	181	1.3407	0.3864
Greece	0.1030		707	129	0.9302	0.5101
Hungary	0.1851	0.0363	1062	220	0.7129	0.1953
Italy	0.0479	0.0315	8553	118	0.9463	0.3287
Lithuania	0.0810		322	263	0.1452	0.1044
Luxembourg	-0.0088	-0.0601	87	173	0.9075	1.8410
Macedonia, FYR	0.3012		66	349	0.3391	0.0106
Netherlands	0.0280	0.0149	2132	158	1.1613	1.1893
Poland	0.0629	0.0703	3699	240	0.3547	0.0895
Portugal	0.0463	0.0003	946	184	0.9299	0.3484
Romania	0.2188	-0.0074	2412	233	0.2179	0.0127
Slovak Republic	0.0137	0.0123	506	250	0.5989	0.0707
Spain	0.1274	0.0930	5553	105	1.0424	0.4965
Sweden		0.0442	1888	125	1.1899	1.0338
Switzerland	0.0915	0.0172	1571	203	1.8239	1.9023
Ukraine	0.0598		2564	364	0.2033	0.0369
United Kingdom		0.0384	9319	225	1.2387	1.5206

Note. The first column reports the average growth rate of sales, the second the average growth rate of value added, the third the number of firms in each country, the fourth the number of employees of the median firm in each country and the fifth and sixth the bank credit and the market capitalization, respectively, divided by GDP. Iceland, Ireland, Latvia, Norway, Russian Federation, and Slovenia are excluded from the analysis because the growth rates are not available; Bosnia-Herzegovina and Yugoslavia (Serbia/Montenegro) are excluded because data on financial development are not available.

Table 12

Microeconomic Data: Financial Development and Growth Rate of Sales

Ordinary Least Squares Regressions				
External dependence × market capitalization	0.056 (0.023)*			
External dependence × domestic credit private sector		0.061 (0.025)*		
External dependence × financial development			0.037 (0.014)*	0.039 (0.019)*
External dependence × financial development × transition economies				0.006 (0.036)
Constant	-0.028 (0.094)	-0.019 (0.094)	-0.029 (0.094)	-0.031 (0.095)
Observations	39339	39339	39339	39339
R^2	0.02	0.02	0.02	0.02
LAD regressions				
External dependence × market capitalization	0.025 (0.004)**			
External dependence × domestic credit private sector		0.034 (0.003)**		
External dependence × financial development			0.019 (0.002)**	0.022 (0.002)**
External dependence × financial development × transition economies				0.007 (0.005)
Constant	-0.053 (0.010)**	-0.050 (0.011)**	-0.053 (0.011)**	-0.052 (0.011)**
Observations	39339	39339	39339	39339

Note. The dependent variable is the firms' average growth rate of sales from 1996 to 2001. Each regression includes a full set of country and sector dummies. Robust standard errors are reported in parenthesis. Two stars denote that the coefficient is statistically different from zero at the 1 percent level, one star at the 5 percent level.

Table 13

Microeconomic Data: Financial Development and Growth Rate of Value Added

Ordinary Least Squares regression				
External dependence × market capitalization	0.015 (0.011)			
External dependence × domestic credit private sector		0.033 (0.021)		
External dependence × financial development			0.013 (0.008)	0.012 (0.008)
External dependence × financial development × transition economies				-0.003 (0.030)
Constant	-0.138 (0.053)**	-0.131 (0.053)*	-0.136 (0.053)*	-0.136 (0.053)*
Observations	39467	39467	39467	39467
R^2	0.01	0.01	0.01	0.01
LAD regressions				
External dependence × market capitalization	0.001 (0.005)			
External dependence × domestic credit private sector		0.007 (0.009)		
External dependence × financial development			0.001 (0.003)	0.001 (0.004)
External dependence × financial development × transition economies				-0.007 (0.011)
Constant	-0.065 (0.022)**	-0.097 (0.027)**	-0.066 (0.023)**	-0.068 (0.022)**
Observations	39467	39467	39467	39467

Note. The dependent variable is the firms' average growth rate of value added from 1996 to 2001. Each regression includes a full set of country and sector dummies. Robust standard errors are reported in parenthesis. Two stars denote that the coefficient is statistically different from zero at the 1 percent level, one star at the 5 percent level.

Table 14

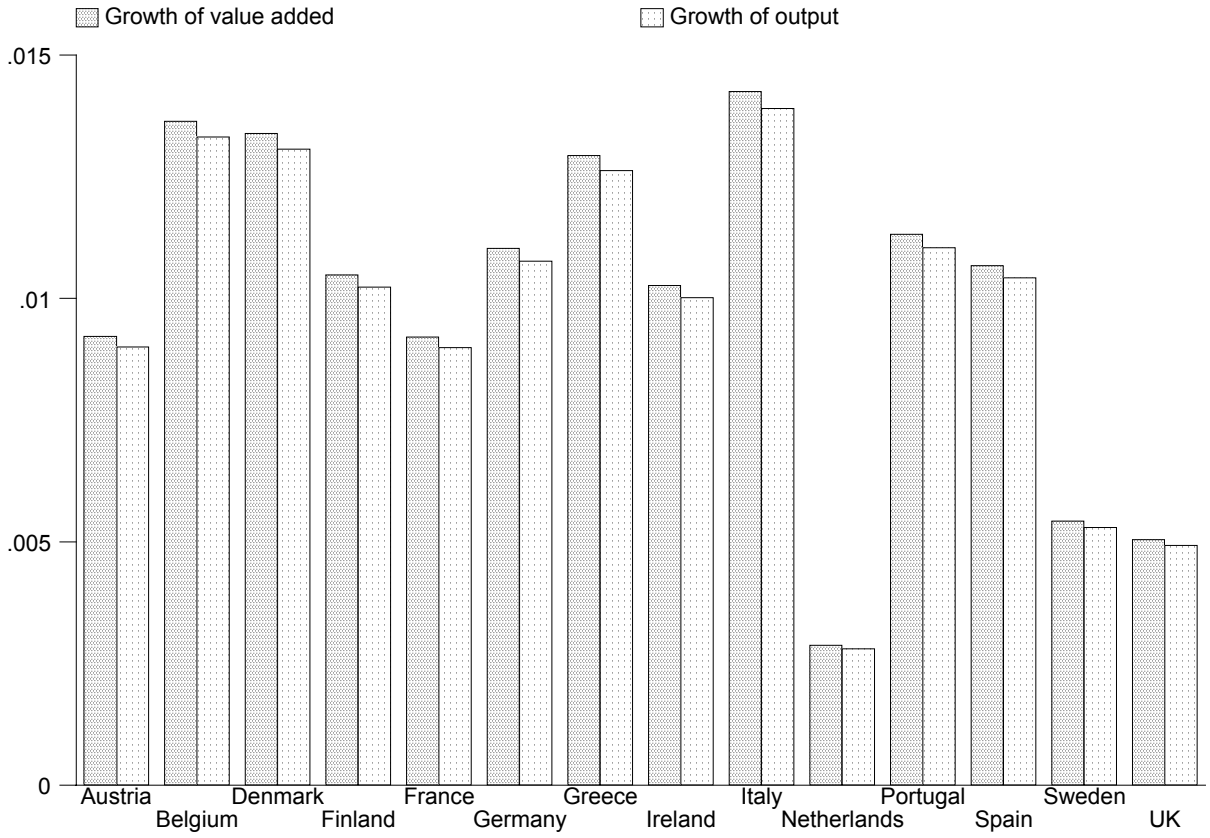
Microeconomic Data: Financial Development and Growth, by Firms' Size

Growth of sales				
	OLS regression		LAD regression	
	Small firms	Large firms	Small firms	Large firms
External dependence × financial development	0.057 (0.021)**	0.004 (0.017)	0.025 (0.004)**	0.012 (0.006)*
Constant	0.202 (0.130)	0.886 (0.591)	-0.014 (0.053)	0.103 (0.066)
Observations	28982	10357	28982	10357
R^2	0.04	0.02		

Note. The dependent variable is the firms' average growth rate of sales from 1996 to 2001. Firms' size is defined on the basis of the average number of employees between 1996 and 2001. Small firms have less than 200 employees, large firms more than 200 employees. Each regression includes a full set of country and sector dummies. Robust standard errors are reported in parenthesis. Two stars denote that the coefficient is statistically different from zero at the 1 percent level, one star at the 5 percent level.

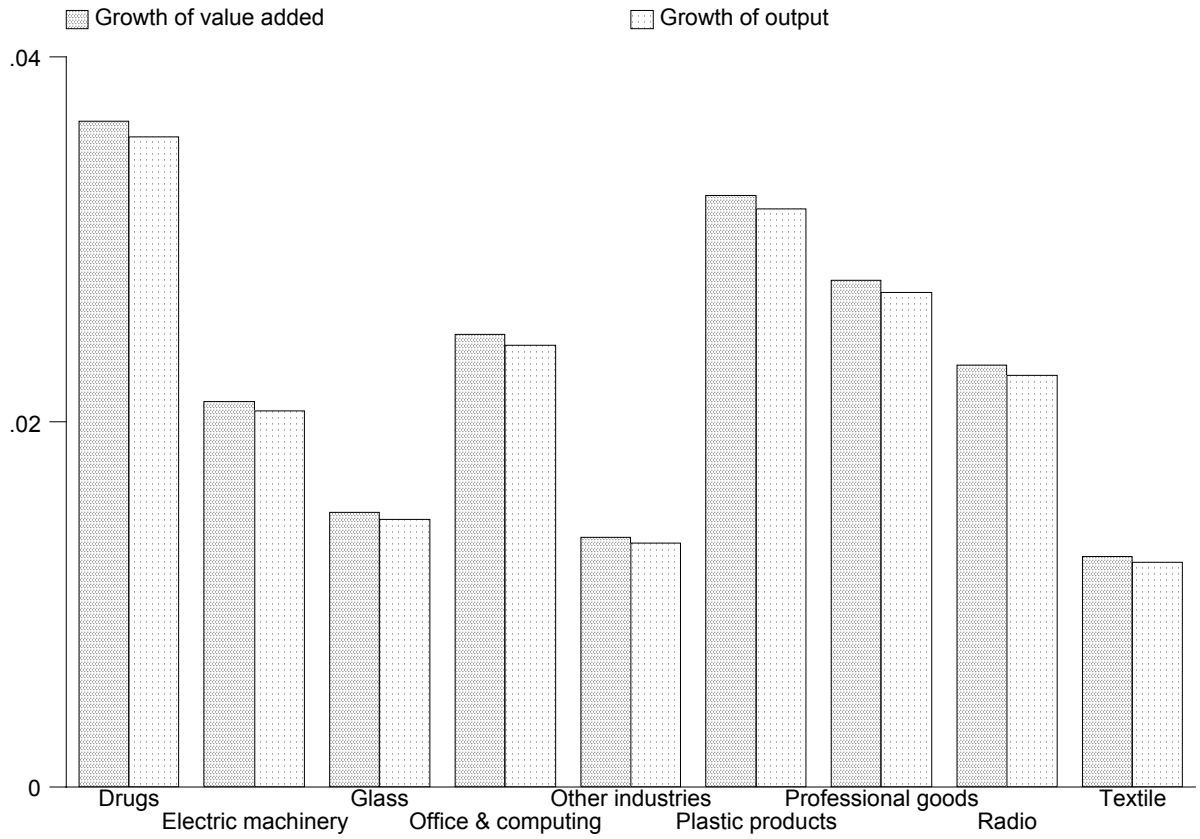
Figure 1

Potential Growth of Value Added and Output by Country: Raising Financial Development to the US Standard



Note. The graph displays the potential growth of value added and output by country if the degree of financial development is raised to the level prevailing in the U.S.

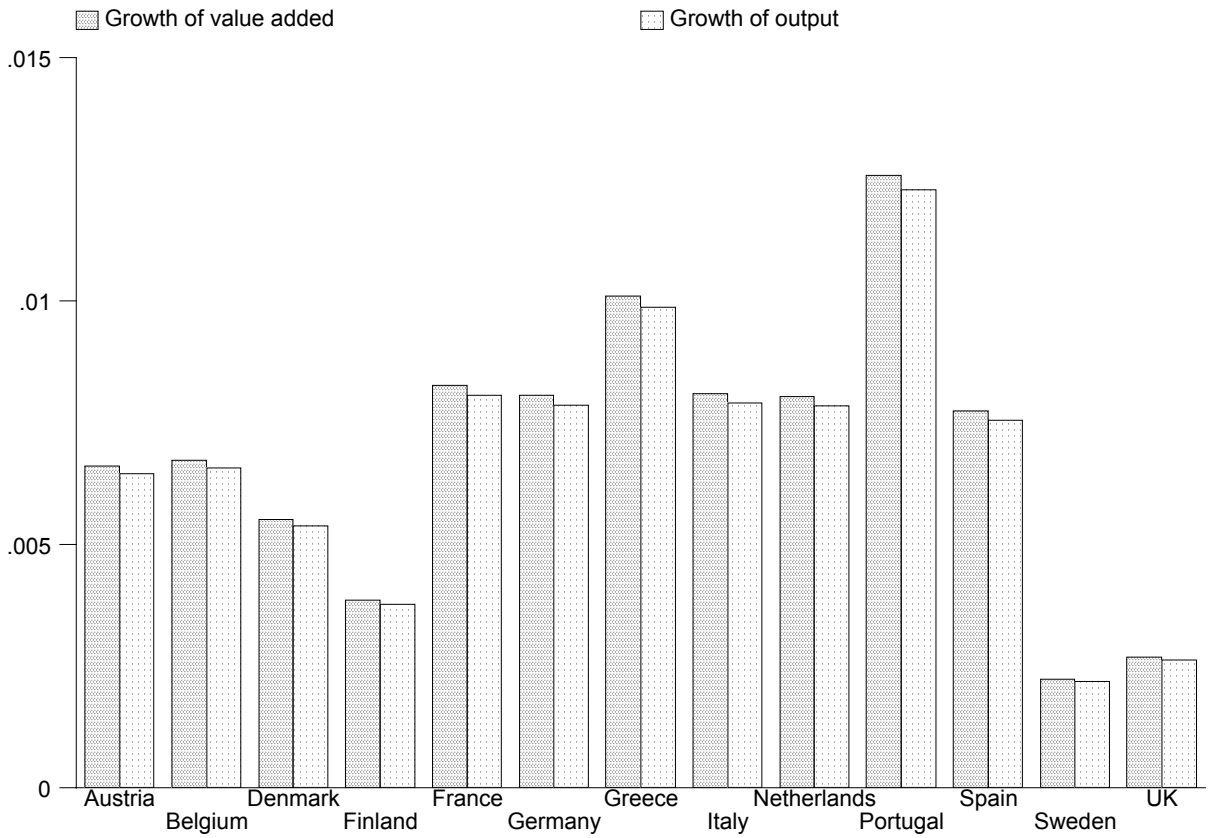
Figure 2
Potential Growth of Value Added and Output by Sector: Raising Financial Development to the US Standard



Note. The graph displays the potential growth of value added and output by sector if the degree of financial development is raised to the U.S. level. We report the potential growth of value added and output of the nine most growing sectors.

Figure 3

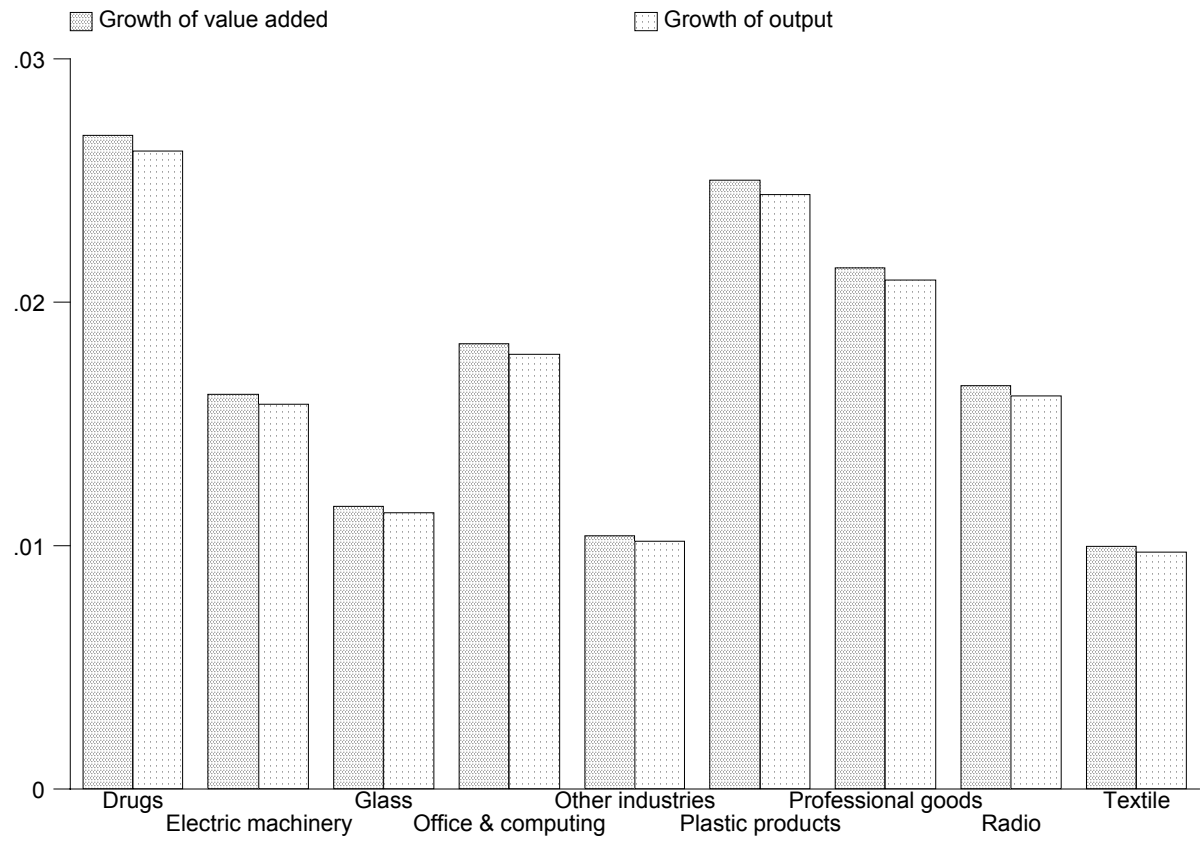
Potential Growth of Value Added and Output by Country: Raising the Determinants of Financial Development to the Maximum EU Standard



Note. The graph displays the potential growth of value added and output by country if the determinants of financial development (accounting standards, degree of creditors' protection and rule of law) are raised to the maximum EU standard.

Figure 4

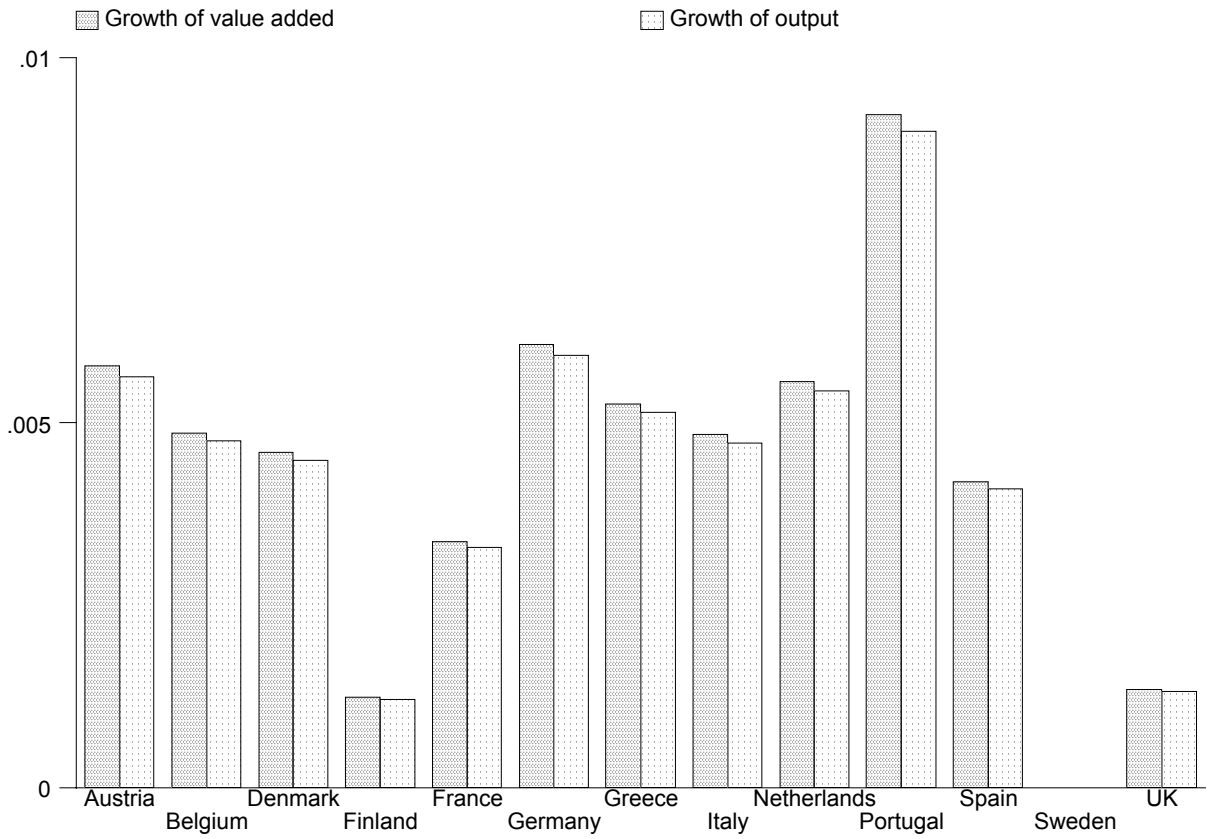
Potential Growth of Value Added and Output by Sector: Raising the Determinants of Financial Development to the Maximum EU Standard



Note. The graph displays the potential growth of value added and output by sector if the determinants of financial development (rule of law, creditor rights and accounting standards) are raised to the maximum EU standard.

Figure 5

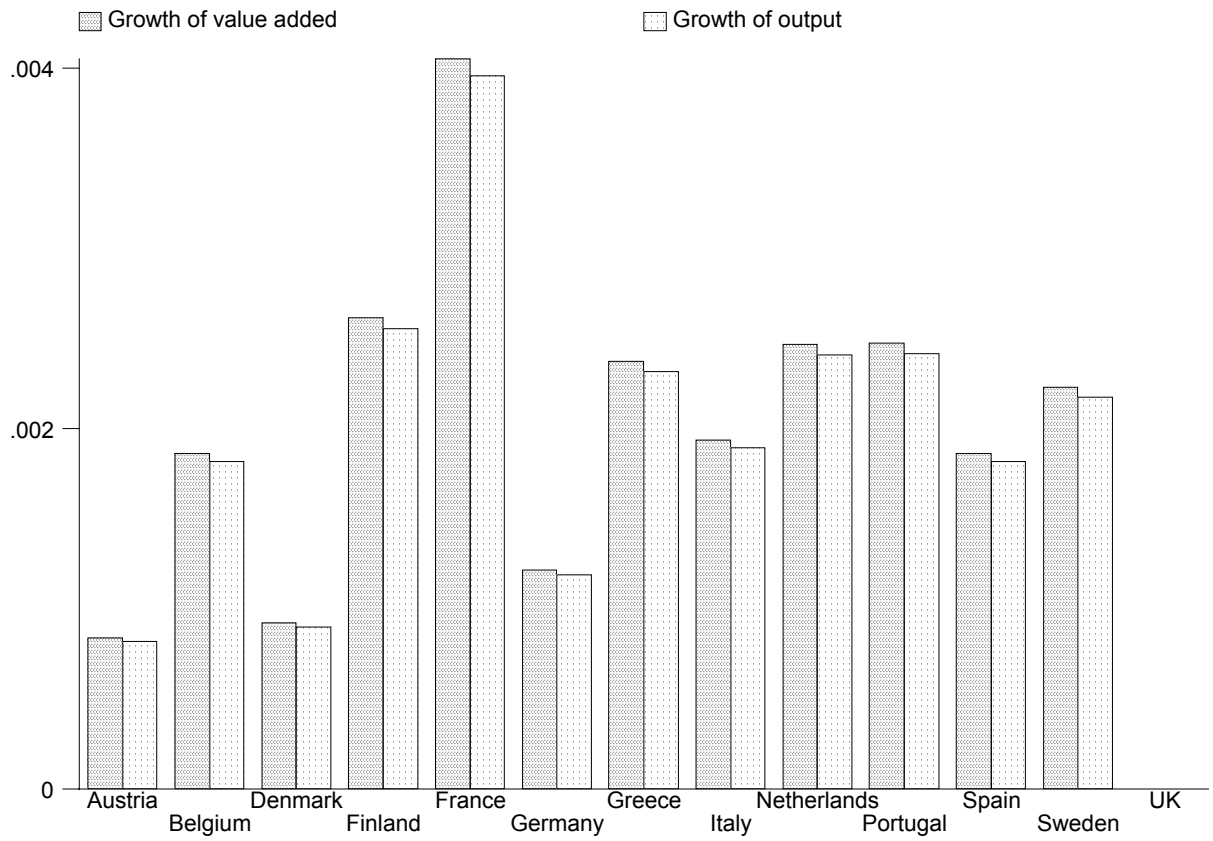
Potential Growth of Value Added and Output by Country: Raising Accounting Standards to the Maximum EU Value



Note. The graph displays the potential growth of value added and output by country if accounting standards are raised to the maximum EU value.

Figure 6

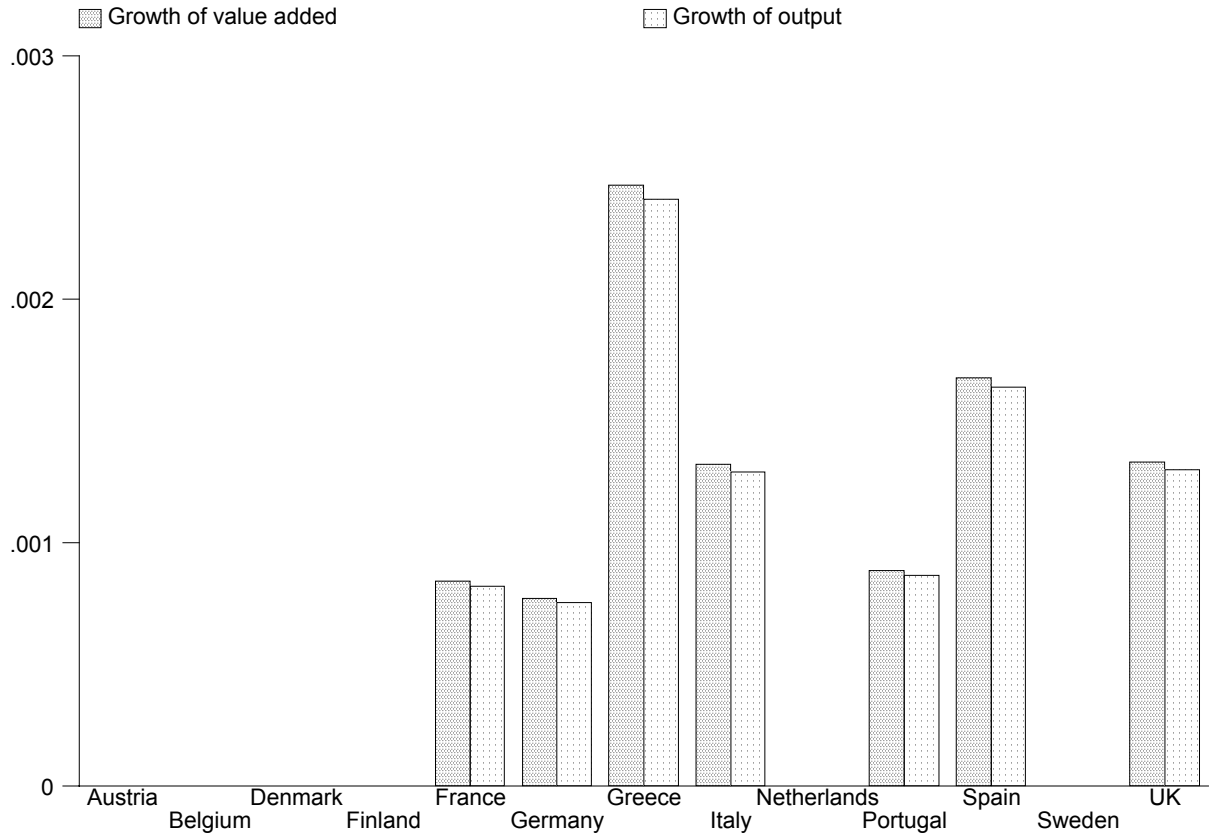
Potential Growth of Value Added and Output by Country: Raising the Degree of Creditors' Protection to the Maximum EU Standard



Note. The graph displays the potential growth of value added and output by country if the degree of creditors' protection is raised to the maximum EU standard.

Figure 7

Potential Growth of Value Added and Output by Country: Raising the Rule of Law to the Maximum EU Standard



Note. The graph displays the potential growth of value added and output by country if the rule of law is raised to the maximum EU standard.