Financial Development and Growth in Direct Firm-Level Comparisons

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Abstract

The establishment of the EU-15 'single market' in 1993 brought about a high degree of synchronization of industry shocks, while substantial diversity existed in the development of country-level financial markets. We compare within-industry growth rates of similar 'single-market' firms facing financial systems of different depth and institutional quality as of 1993. Moving from the least to the most developed financial market within the EU-15 boosts firms' annual value-added growth by about three percentage points. Our results also suggest that the growth gap due to initially under-developed financial systems was closed by 2003.

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1. Introduction

Despite a long-recognized positive association between financial-sector development and economic growth, economists continue to disagree whether the state of the financial sector merely reflects a country's stage of economic development or whether it represents one of its key determinants (Levine, 2005, p.867).[1] Trying to disentangle the finance-growth nexus empirically raises a fundamental identification problem: one needs to isolate the part of the variation in financial development that is unrelated to current and future growth opportunities, which are inherently unobservable. Tackling this identification problem at the country level is difficult in the absence of significant episodes of financial development driven by non-economic decisions.

Two country-level approaches have been proposed in the literature. First, King and Levine (1993) and Levine and Zervos (1998) are examples of studies that attempt to overcome the reverse causality problem by relating financial development indicators from an initial period to subsequent growth performance of a sample of countries. A key criticism of this approach is that financial development may be a leading indicator of future growth because financial markets are forward-looking and initial-period differences in stock market valuations or bank lending could, in fact, merely reflect differences in future growth opportunities. Second, La Porta et al. (1998) and Levine et al. (2000) are examples of studies that search for instrumental variables predicting a country's financial development but unrelated to economic performance.[2]

Given the fundamental difficulties of country-level analysis, much recent research follows the Rajan and Zingales (1998) seminal study and uses industry-country comparisons to address the

[1] The pervasive positive cross-country correlation between financial development and level of economic activity is documented in, e.g., Goldsmith (1969) or King and Levine (1993). Financial development here stands for the development of banking sectors (La Porta et al., 2002), stock markets (Atje and Jovanovic, 1993; Levine and Zervos, 1998a), and bond markets (Beck et al., 2001).

[2] Instrumenting for the development of financial sectors not only requires the presence of a valid instrument, but also asks that data on many countries be available, as two-stage least squares is biased in small samples.

identification problem of country-level analysis. Their approach is based on a quantification of the inherently unobservable industry-specific need for tapping the financial system (using external finance) in a sample of countries. The quantification is based on two strong assumptions. First, Rajan and Zingales assume that cross-industry differences in the need for external finance are the same across countries, because the industry-specific production technology driving the amount of external finance needed to expand production by one unit is constant across countries. Implicitly, they also assume that industry shocks to growth opportunities, which drive the differences in the units of potential production expansion, are not country-specific, but global. Second, they quantify industry differences in the use of external finance in the US, where listed firms presumably face a perfectly elastic supply of funds. These assumptions then lead them to use the US measure as a counterfactual for what industry differences in external finance use would be in economies as diverse as Sweden or Zimbabwe, were their financial systems as developed as those of the US. They regress industry growth from a sample of countries on country and global-industry fixed effects as well as on the *interaction* between US industry external finance dependence (EFD) and country financial development. Such regression asks whether industries predicted to be in more need of external finance grow faster in countries with more developed financial markets, conditional on all (potentially unobservable) country- and industry-specific factors driving growth.

The Rajan-Zingales approach is a powerful tool for dealing with country-level reverse causality.[3] Unfortunately, there are no direct tests available of the validity of its underlying assumptions. The notion that the relative growth opportunities of different industries remain constant along the development path is contradicted by much of trade economics. Similarly, the assumption that the technological content of industries is identical in the US and in other economies is threatened by recent empirical trade research, which highlights the extensive intra-industry technology heterogeneity (e.g., capital-labor ratio, firm size and age) across countries at different income levels

[3] A growing empirical literature, e.g., Beck et al. (2004) or Braun and Larrain (2005), now relies on the Rajan-Zingales identification strategy and, in most cases, on their 1998 measure of EFD.

(Schott, 2003). In simple terms, while the technology used in, e.g., oil refining may be constant across countries, it is less clear why the relative content of electronics production should be similar in Finland and in the Philippines.

To check the robustness of the Rajan-Zingales approach, Fisman and Love (2004) avoid the overt quantification of the industry structure of external finance need across countries. Like Rajan and Zingales, Fisman and Love assume that industry differences in the need for external finance are similar across countries, but they avoid using the US industry structure of EFD as a counterfactual. The cost of this decision is that they cannot directly model industry growth; they focus instead on industry-growth co-movements across pairs of countries. They ask whether such co-movements are more strongly correlated across pairs of countries with more developed financial markets. The empirical results based on both the Rajan-Zingales (1998) and the Fisman-Love (2004) approach strongly suggest the presence of a causal link from financial market development to industry growth. However, their analyses do not lead to an estimate of the effect of financial development on growth, whose magnitude would directly translate into economically measurable terms.[4]

In this paper, we use the establishment of the 'single market' of the EU-15 economies in 1993 as a unique opportunity to study the effect of financial development on growth using direct comparisons. If common 'single-market' shocks create new opportunities for growth in some industries and require reallocation of resources to these industries, and if this reallocation process requires well-developed financial institutions, then only industries operating in countries with high levels of financial development will be able to respond to these new opportunities by increasing their external financing and by growing. Our strategy is based on the assumption that in the absence of differences in financial development, growth of similar firms in a given industry would be very similar across the EU-15 countries between 1995 and 2003. We take the initial distribution of firm

[4]The Rajan-Zingales estimates measure only the percentage-point *difference* in growth of industries facing a different need for external finance. Further, this measure of growth difference can only be taken at face value under the assumption of exact similarity of industry EFD differences across countries.

types and financial development across the 'single-market' economies as pre-determined and study how successfully firms reap the growth opportunities presented by the integrated EU-15 market. In particular, we condition our comparisons on characteristics such as firms' age, size, or leverage, measured at the time of the establishment of the 'single market' and thus corresponding to the nexus of pre-single-market country-level demand shocks, financial development and firm quality.

We combine the country-level approach of King and Levine (1993) and Levine and Zervos (1998) with the industry-country comparisons of Rajan and Zingales (1998) and Fisman and Love (2004). Specifically, we follow the country-level approach by relating initial-period indicators of country financial development to subsequent growth. We extend this approach by presenting a new robustness check that allows for the forward-looking nature of financial markets. Similar to Rajan and Zingales (1998), our identification strategy focuses on growth deviations from global industry means. However, we use micro data to take cross-country comparisons within industries and compare the growth experience of highly similar firms facing different aggregate levels of financial development.[5]

Following the existing literature, we assume that industry differences in both technology and growth opportunities are highly comparable across countries. Unlike the existing analyses, however, we allow these industry differences, which are fixed across countries, to change over time. Furthermore, we apply this assumption in a more appropriate context because industry-specific shocks are verifiably highly synchronized across the 'single-market' economies of the EU-15 while they may differ across the wide set of countries used in the existing literature (e.g., Sweden and Zimbabwe in Rajan and Zingales, 1998). Indeed, we would like to argue that no other set of countries in the world combines such a high degree of regulatory and economic integration, leading to a high degree of synchronization of industry growth opportunities and technological similarity, with such

[5] Alternatively, one can think of our strategy as consisting of industry comparisons where we control for cross-country differences of industry firm-type composition.

markedly different levels of aggregate financial development.[6] Our analysis is based on quantifying the degree of growth synchronization across industries in the EU-15, which allows us to increase the validity of our cross-country comparisons by "weeding out" those industries that display only weak growth synchronization; that is, industries that are likely to be affected by country-level regulation.

Our identifying assumption harkens back to the literature before Rajan and Zingales (1998) in that we assume heterogeneity in financial development across the EU-15 countries to be orthogonal to other country-level determinants affecting corporate growth. Unlike Rajan and Zingales (1998), we do not control for country fixed effects; hence, our approach is problematic to the extent that financial markets develop faster to "offset" the negative growth effect of high labor market rigidity or that they develop faster in countries with a specific legal framework, which also drives growth directly. We make such a strong assumption for several reasons. Like Fisman and Love (2004), we want to avoid quantification of industry-level EFD, but, unlike them, we want to provide economically measurable estimates of the effect of financial development on growth. We also believe that the assumption of orthogonality of the country-level growth-affecting unobservables to the country's financial development level is more likely to hold in our set of EU-15 economies compared to the extensive set of countries used in, e.g., King and Levine (1993) or Levine and Zervos (1998).

Following the practice of cross-country growth regressions, we control for the beginning-of-period level of GDP in order to capture 'convergence' effects. Further, in order to check for the possibility that current financial development merely reflects future growth opportunities, we also control for differences in aggregate future growth opportunities implied by pre-existing industrial structure. Specifically, we use as a regressor a country-level growth rate equal to the average of the realized EU-15-wide industry growth rates over our sample period weighted by the country's initial-period industrial composition. Alternatively, we replace this industry-structure-induced future growth with country GDP growth predictions made by the OECD at the time of the establishment of the

[6] The within-EU differences in financial development are highlighted by Guiso et al. (2004) and Allen et al. (2006).

'single market'.

Our approach leads us to regress annual firm-level value-added growth from the EU-15 economies between 1995 and 2003 on several dimensions of country-level financial infrastructure measured as of 1990 to 1994, as well as on a set of firm-level pre-determined controls, a full set of industry-time dummies, and a limited number of country-level growth determinants. The inclusion of industry-time fixed effects removes the growth pattern of industry-level business cycles synchronized at the EU-15 level. The parameters of interest are identified by cross-country variation in financial development, similar to the country-level analysis of King and Levine (1993) and Levine and Zervos (1998), but our underlying comparisons are more careful in the choice of countries and more detailed in that they take place at firm level.

Our estimation is complementary to that of Guiso et al. (2004), who also use extensive firm-level data from the EU to study the effect of financial development on growth. In contrast to our work, they adhere fully to the Rajan-Zingales specifications and EFD measures, and they also combine the EU-15 economies with the post-communist countries of the new EU member states. Our results, based on an alternative set of assumptions, confirm the finding of Guiso et al. (2004) that financial markets facilitate corporate growth. Unlike them, we quantify this effect in economically measurable terms. Finally, it is reassuring that we find the differences in our estimates across industries displaying a different degree of growth synchronization to be in accord with our identification assumption.

The structure of the paper is as follows: In the next section we present our methodology. Section 3 contains a description of our data and summary statistics, while section 4 presents the basic results together with some robustness checks. Section 6 summarizes the findings.

2. Methodology

Our identification assumption is that in the absence of differences in financial development and firm-type composition, industry growth synchronization would be near perfect. Clearly, we will be

able to detect departures from synchronized growth driven by differences in financial development only in industries that face highly similar shocks to growth opportunities. We therefore start our analysis by asking which industries strongly co-move across the economies of the EU-15. Our goal is to "weed out" industries that lack any sign of synchronization, as such industries may be affected by country-level regulations or idiosyncratic shocks, bringing noise to our identification.[7] To this effect, we use annual industry value-added growth data for the EU-15 economies and apply Analysis of Variance (ANOVA) to examine the explanatory power of year factors as opposed to country identity for each industry separately. We then classify industries as synchronized or not based on two alternative criteria. First, we simply use the share of total country/year growth variability (sum of squares) explained by the year factors as a measure of industry co-movement. Second, we classify industries as synchronized or not based on the statistical significance of industry and country factors. Details of the classification procedure are laid out in Section 4.

Next, we ask about the effect of financial development on firms' value-added growth. In the language of a linear regression framework, our strategy is to control for all determinants of industry growth using industry-year fixed effects and to ask whether firms of a similar type grow faster depending on country-level financial development. Hence, our initial firm-level regression specification is of the form

$$G_{ijkt} = \alpha + \beta FD_i + \gamma GDP_i + \delta_{tj} + X_{ijk}^{0}\zeta + \epsilon_{ijkt}, \tag{1}$$

where G_{ijkt} denotes the annual growth rate of the real value added of firm k in industry j in country i in year t, and where FD_i corresponds to a measure of pre-determined financial development (determined before the start of our sample period in order to alleviate reverse causality). In all specifications, we control for a full set of industry-year dummies, δ_{tj}, which capture the (synchronized) time path of industry growth across the EU-15, and for a set of firm-specific initial-period characteristics X_{ijk} including firm size, age, leverage, tangibility and collateralization, as well as

[7] Given the existing literature on the finance-growth nexus, it is likely that differences in financial development lead to some decoupling of industry co-movements and growth synchronization is therefore not perfect.

an indicator for quoted companies and a set of indicators for company concentration of ownership and legal form. Finally, we control for a country's growth potential by adding real GDP per capita (GDP_i), also as of before the beginning of our sample frame. If higher initial financial development leads to higher corporate growth, the coefficient β should be positive and statistically significant.

Our regressions are estimated separately for groups of industries displaying a different degree of growth synchronization. We have no clear interpretation for growth differences detected for 'single-market' industries, in which growth is mainly a matter of the firms' country of residence and may therefore be driven by local regulations or government policies. On the other hand, we expect our regressions to be successful in detecting the finance-growth effect in industries that display a significant degree of growth synchronization, indicating the presence of common shocks.[8]

Our analysis is based on the fact that the 'single market' combines a high level of regulatory and product market integration with substantial diversity in the development of countries' financial markets (documented in the next section). We expect firms facing initially more developed financial markets to grow faster in the subsequent period. However, the use of pre-determined levels of financial development, which alleviates reverse causality, also raises an important question. If subsequent EU integration leads to faster growth of financial markets in countries with initially low levels of financial development or, alternatively, if integration lowers the importance of local financial markets as firms increasingly obtain external finance in other EU-15 countries, then one would expect firm growth to increase faster over time, ceteris paribus, in initially low-FD countries. The presence of such an effect would make it harder for us to detect the finance-growth relationship

[8] We can also go beyond industry groupings based on synchronization and directly use a continuous measure of synchronization, such as the share of total growth variability explained by the year factors in our ANOVA exercises. One can then interact indicators of financial development with such a measure of industry synchronization and use this interaction as an additional regressor in equation (1). It is important to clarify the interpretation of such 'synchronization interaction'. We maintain the assumption that the underlying finance-growth effect is the same across industries; however, we expect to be able to *detect* the effect better in those industries where growth shocks are more synchronized. The synchronization interaction therefore merely reflects the ability of our approach to detect the finance-growth effects in different industries.

using specification (1). To check for the effect of financial integration, we therefore augment equation (1) with the interaction of the initial financial development level with a time trend:

$$G_{ijkt} = \alpha + \beta_0 FD_i + \beta_1 (t * FD_i) + \gamma GDP_i + \delta_{tj} + X^{0}_{ijk}\zeta + \epsilon_{ijkt}. \quad (2)$$

This enriched specification allows us to measure to what extent an initial growth disadvantage due to lower financial development has been closed over the span of our sample frame. Equation (2) explicitly focuses on the potentially higher growth of financial development in initially lagging EU-15 economies, but it does not rely on the likely endogenous observed annual changes in the depth of financial markets. (One would suspect that year-to-year changes in financial market size are driven by reverse causality.) In an alternative interpretation, Equation (2) asks about the diminishing influence of local financial markets for firm growth. The latter interpretation is perhaps less likely given recent evidence on the persistent segmentation of the EU's financial markets.[9]

3. Data

Our identification assumption is likely to be satisfied in a set of countries where industries face highly synchronized shocks and share a highly similar technology content of industrial classification—such as the countries of the EU's 'single market'.[10] Hence, we focus on the EU-15 economies during the 1993-2003 period, which covers the first decade of the market's operation before its extension to post-communist countries. To supply our empirical strategy with data, we rely on firm-level, industry-level and country-level sources. Firm-level financial statements and descriptive data, which

[9] The notion of significant progress in the EU's financial integration is discussed by Baele et al. (2004) who show that after 1999 full or near-full integration has been achieved for the overnight loan and government debt markets, while the corporate bond market and, especially, the bank loan and stock markets are still segmented. This finding may not be surprising given the lack of uniform regulation of financial services in the EU stressed by Giannetti et al. (2002), the influence of different legal origin on the efficiency of financial markets highlighted by La Porta et al. (1998) and the limiting influence of cultural and geographical distance on lending by foreign banks recently demonstrated by Mian (2006) for a developing country.

[10] For recent evidence on EU business cycle synchronization see Camacho, et al. (2005).

allow us to compare the growth experience of highly similar firms residing in different countries, come from the Amadeus database. Industry-wide measures of value-added growth and its co-movement are taken from the OECD STAN database.[11] Finally, country-level measures of financial development come primarily from the World Bank. We introduce these data sources in this section and complement the description with detailed tables in the Data Appendix.

3.1. Firm-Level Data

We use firm-level data from the Amadeus (Analyse MAjor Databases from EUropean Sources) database, created by Bureau Van Dijk from standardized commercial data collected by about 50 vendors across Europe. Among the key advantages of the data from our perspective is that they cover both listed and unlisted firms of all size categories and that they provide corporate descriptive statistics including growth together with a detailed source-of-finance accounts. In principle, the database should cover most public and private limited companies;[12] it includes up to 10 years of information per company, although coverage varies by country and generally improves over time. The firm and industry coverage of these data is an order of magnitude better compared to other existing firm samples as argued in Gomez-Salvador et al. (2004).

These data have been tapped in the finance-growth literature only recently, by Guiso et al. (2004), and have also been recently used by Klapper et al. (2006) to study firm entry. Our selection of the analysis-ready sample follows the choices made by these two studies. Similar to Guiso et al. (2004), we use the 'TOP 250 thousand' module of the Amadeus data,[13] which we downloaded in

[11] STAN is primarily based on EU Member countries' national accounts. We use annual 'Value Added at Current Prices' and convert it into real value by Eurostat's Producer Price Index.

[12] There are exceptions to the rule. For example, small and medium size German firms are not legally forced to disclose (Desai et al., 2003).

[13] Firms selected as TOP 250,000 had to meet at least one of the following inclusion criteria: For UK, Germany, France, and Italy operating revenue at least 15 million euros, total assets at least 30 million euros, or the number of employees at least 150. For all other countries operating revenue at least 10 million euros, total assets at least 20 million euros, or the number of employees at least 100.

May 2006. Following Klapper et al. (2006) we use only unconsolidated statements to avoid double counting, and we also exclude all legal forms other than the equivalent of public and private limited liability corporations due to the uneven coverage of partnerships, proprietorships and other minor legal forms. (Definitions of key variables and a listing of the included legal forms of firms by country are provided in the Data Appendix, in Tables DA.1 and DA.2, respectively.)

The dataset is drawn from EU-15 countries that were part of the European Internal Market launched in 1993: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden and United Kingdom. As did Guiso et al. (2004) we exclude Luxembourg, because its financial sector is statistically anomalous, and we lose Ireland due to missing firm-level information. Firm coverage in the Amadeus data is incomplete before 1995 and after 2003 so we use only observations from 1995-2003. Following Rajan and Zingales (1998) and Guiso et al. (2004), we focus on manufacturing industries (NACE 15 to 37). We exclude firms with missing total assets as well as non-active firms. We also omit from analysis (i) companies in the top 1% of the size (total assets) distribution, as such extremely large firms are likely to have access to international sources of finance, (ii) growth observations falling outside of the 5-to-95 percentile range of firms' value added growth rate, and (iii) firms with significant state ownership.[14] Since Greek firms do not report value added, we used sales as a surrogate for them.[15]

Table 1 shows the final number of firm-year value-added growth observations used in the study for each country, together with simple firm-level descriptive statistics corresponding to these observations.[16] It is clear that coverage varies across countries; specifically, firm size in Germany is affected by non-reporting of small firms. Nevertheless, the data provide extensive coverage of most of the EU-15 economies and represent the best firm-level EU data source available to date.

[14] Specifically, we drop firms in which the state is as an ultimate owner of at least 10 percent of shares or a direct owner at least 10 percent of shares. There is virtually no sensitivity to the choice of the percentage threshold.

[15] See Guiso et al. (2004) for the use of sales instead of value added.

[16] We use IMF-IFS annual average exchange rates to convert all accounting data into millions of US dollars.

3.2. Financial Development Indicators

Data on financial development are drawn from the World Bank's Financial Structure and Economic Development Database (March 2005 version) described in detail in Beck et al. (2000). To make our results comparable with those in the literature we use a number of measures of finance activity to proxy financial development. We start with the traditional measures of activity in the credit and stock markets, namely the ratio of private credit to GDP (PCDMBANKOFINSTGDP) and the ratio of stock market capitalization and stock market total value traded to GDP (STMCAPGDP and STMTVTGDP, respectively). We also rely on a measure of total country-level finance activity equal to the sum of (i) stock market capitalization, (ii) bank credit to the private sector and (iii) domestic debt securities issued by the private sector. This summary measure (Total Capitalization) is taken from Hartmann et al. (2006) and is expressed, again, as a fraction of country-level GDP. All proxies for financial development are averaged over the years 1990-1994, that is, mainly before the establishment of the 'single market'. We rely on time averages to avoid year-to-year fluctuations and use pre-firm-sample measures to alleviate reverse causality problems.

In addition to volume-of-finance-activity measures of financial development, we also use two proxies for the institutional quality of financial markets. First, we use an indicator of the 'quality of accounting standards' (ACCOUNT), 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. Second, we rely on a market-based measure of institutional quality. Specifically, we use equity block premia—the private control premia that correspond to benefits enjoyed by a controlling shareholder and not shared by other shareholders (Control Premium). Control premia derive from the effective level of limits to diversion and private-benefit extraction by controlling shareholders and, thus, reflect (the value of) a country's level of investor protection.

Dyck and Zingales (2004) estimate such equity block premia corresponding to transactions spanning the 1990-2000 period and show that they are higher in countries where capital markets are less developed, ownership is more concentrated, minority shareholders are less protected, law enforcement is weaker and the press has less influence in affecting owners' reputation. From our set of EU-15 countries, the Dyck-Zingales estimates are available for Austria, Denmark, Finland, France, Germany, Italy, Netherlands, Portugal, Spain, Sweden, and United Kingdom. The lowest (highest) level of the premium required to gain a controlling position in a firm is 1% (38%) in the UK (Austria). To keep the sign of the estimates of financial-development coefficients comparable across our various specifications (financial-development measures), we use control premia values expressed as 0.38 minus the original Dyck-Zingales control premium value, where 0.38 is the highest level of the premium observed in the sample.

All six indicators of financial development are summarized across our EU countries in Table 2.[17] It is clear that despite the extensive integration of EU-15 national product markets up to 1994, there is still substantial diversity in the degree of financial development across the EU-15. This fact was recently highlighted by Guiso et al. (2004). The coefficient of variation is particularly high for our measures of stock-market activity and for the Dyck-Zingales control premium.

4. Results

4.1. Basic Estimates

We start by presenting the results of our basic linear regressions of equation (1) in Table 3. The table presents selected coefficients from regressions of annual firm-level real value-added growth rates of manufacturing firms from the period 1995-2003 on country-level financial development indicators, most of which are measured in 1990-1994. The control variables are industry-year dummies based on the 3-digit ISIC classification, firm-level controls, and the 1993 country GDP per capita in

[17] A detailed definition of each measure is provided in the Data Appendix Table DA.1. See note n. 9 for evidence on EU financial integration.

millions of US dollars. The firm-level controls are age, size,[18] leverage, tangibility, collateralization and indicators of being quoted, legal form type and ownership concentration;[19] these controls are measured as of the first year a firm enters the sample and remain fixed over time. We drop firm-year observations falling outside of the 5-to-95 percentile range of value-added growth.

The coefficient estimates in Table 3 suggest that initial financial development measures are related to company growth deviation from year-industry averages. The precisely estimated financial development coefficients are economically significant. Moving from the minimum to the maximum value of our financial development indicators (see Table 2) results in an increase in value-added growth rate of about 3 percentage points in the case of all four measures based on volume of financial activity, namely private credit, market and total capitalization, and market value traded, and it adds about 5 points in the case of our accounting quality measure. The effect is smaller, at about 1.5 of a percentage point, when using the Dyck-Zingales control premium comparison. It is interesting to note that the magnitude of the private credit growth effect we estimate is about twice the size of the corresponding effect estimated across a more extensive set of countries in the country-level analysis of Levine and Zervos (1998), who, like us, control for pre-determined measures of financial development and initial output level.

The results in Table 3 are not sensitive to (i) alternatively using industry-year fixed effects based on a 2-digit industry classification, (ii) excluding leverage from the list of control variables, (iii) dropping firms with less than five years of value-added data available, or (iv) excluding those value-added growth observations where at least one of the two underlying levels of value added were negative. (We present some of these robustness checks for our preferred specification in Section 4.3.) We also note that aggregate GDP convergence effects are strongly detected by the data and that

[18] We measure firm size in percentage-point deviation from the median firm size in a given industry to reflect the fact that different industries are characterized by different optimal firm size (Kumar et al., 1999).

[19] Ownership concentration (company independence with regard to its shareholders) is divided into low, medium and high based on the presence of shareholders with an ownership share over 25% or 50%.

older and larger firms grow more slowly, as expected. Furthermore, we find that highly leveraged firms grow faster as do quoted companies and firms with initially high tangibility of assets.[20]

4.2. Focusing on Synchronized Industries

Our identification strategy is closely related to the degree of synchronization of industry growth across countries. Our next step is therefore to divide the data into industry groups displaying different degrees of synchronization and re-estimate equation (1) for each sub-sample.

First, we compute a quantitative measure of synchronization for each industry based on the OECD STAN database. The measure equals the fraction of the total variation of industry-level annual value-added growth rate across countries and years explained by year factors in an ANOVA with year and country factors. Alternatively, we calculate another measure of synchronization taken from an ANOVA exercise, where we additionally control for a country's aggregate growth rate (aggregate business cycle). Both measures are presented in Table 4. The "synchronized" fraction of growth variability (i.e. that linked to years) varies by almost a factor of seven when comparing the least synchronized industries of leather, office machinery, or precision instruments, to the most synchronized industries of food and beverages, petroleum, or basic metals.

Next, we divide industries into four groups based on quartiles of the first quantitative synchronization measure. Alternatively, we divide industries into groups based on a qualitative assessment of the degree of synchronization. We split the sample industries into three types based on the p value of the estimated country and year factors from our ANOVA exercises. In Table 4, we denote industries where year factors do not reach the 10% level of statistical significance as low-synchronization industries, we call industries where only the year factors but not the country factors are significant as high-synchronization industries, and we denote the remaining group, where both types of factors are important, as medium-synchronization industries.

[20] Presumably, having obtained more external finance in the past helps reap current growth opportunities. Alternatively, growth opportunity attracts external finance and is strongly correlated over time at the firm level.

We are now ready to estimate the finance-growth relationship for each "synchronization group" separately. The results are displayed in Table 5, where each presented parameter comes from a separate regression. The top panel of the table corresponds to the qualitative grouping, while the bottom panel lists results for the four quartiles of the first synchronization measure.[21] Using either type of "synchronization grouping", we detect little evidence of a finance-growth relationship for the group of least synchronized industries, while the estimated effect is significant and similar in more synchronized industry groups.[22]

In sum, our comparisons fully support the notion that we can effectively detect the effects of financial development on firm-level growth deviation from industry average only in those industries where there is a synchronized time pattern to industry growth across all EU-15 economies.[23] The inclusion of low-synchronization industries only brings noise to our analysis and, therefore, we exclude the group of low-synchronization industries from the rest of our analysis. In the top panel of Table 6, we display the basic financial development coefficients re-estimated after excluding the group of low-synchronization industries. The parameter estimates are all somewhat larger compared to those presented in Table 3, as one would expect.

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[21] The results are similar when we use the second quantitative synchronization measure of Table 4. We have also alternatively used an industry grouping based on ANOVAs estimated not with STAN at ISIC 2-digit level, but with the Amadeus data at ISIC 3-digit level. We obtained results very similar to those presented in Table 5.

[22] We have re-estimated the regression for high-synchronization industries on a randomly chosen sub-sample mimicking the size of the low-synchronization group. We again obtained coefficients and significance levels nearly identical to those presented in Table 5.

[23] We have also estimated a tantalizing regression specification for the whole sample, where we interacted the country-level measures of financial development with industry-level measures of growth co-movement. See note n. 8 for a discussion of this specification. The coefficient estimates for the interaction terms, which are available upon request, were positive and statistically significant—in line with our group-level analysis. If one were to base the magnitude of the estimated finance-growth effect on the highest observed level of synchronization in the data, the effect would be 1.5 to 3 times larger than that reported in Section 4.1.

4.3. Time Interactions

In Section 2, we discussed the implications of EU financial integration for our estimation strategy. Specifically, faster financial development of initially financially under-developed nations hinders the detection of a finance-growth effect using our initial specification of equation (1). To check for the presence of such an integration process and to ask to what extent a growth disadvantage due to initially lower financial development has been closed over the span of our sample frame, we estimate equation (2), which allows for the interaction of initial financial development level with a time trend (starting from 1 in 1996).

The results presented in the second panel of Table 6 are striking. The positive influence of initially more developed financial markets on firm-level growth diminishes over time for all of our measures of financial development.[24] The precisely estimated parameter estimates imply that (i) the initial financial development growth effect from the mid 1990s is almost four times larger as the sample-period-average effect estimated in the top panel of Table 6, and (ii) the growth gap of similar firms operating in more and less financially developed EU-15 nations has been fully closed within the eight years of our sample frame. For example, taking the base-effect coefficient for total capitalization (0.076) and subtracting 7 years of the trend interaction corresponding to year 2002 (-0.012 * 7) results in a total effect of -0.008, which is for all practical purposes zero. Taking these estimates at face value, one would conclude that EU-15 financial integration was complete as of 2002, at least in terms of its effect on within-industry firm growth.[25]

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[24] The non-reported coefficients corresponding to firm-level controls are little affected by the introduction of the time interaction with financial development level.

[25] As previously noted, our statistical inference reflects group-level variation in financial development by clustering residuals at the country level. Alternatively, we follow the suggestion of Wooldridge (2003) and break the estimation into two stages, one firm-level, the other country-level. Using this alternative procedure, we obtain similar, if sometimes smaller coefficient estimates, most of which remain statistically significant at conventional levels. These results are presented in the Appendix Table A.1.

4.4. Controlling for Aggregate Growth Opportunities

A potential criticism of our approach is that our financial development measures, based, e.g., on initial volumes of credit or equity, are misleading because they measure not only the development of the country's financial markets, but also reflect the demand for finance in the initial period, which, in turn, is driven by future country-level growth opportunities. We then put growth on the left hand side of our regressions, thus closing a full circle.

We would like to assess the importance of this criticism and control for the co-determination of country-level growth opportunities and financial development measures. To this effect, we additionally condition on predicted future country growth, calculated as follows. We take the time-averages of EU-15 future realized growth of all our industries and weight these growth rates by the initial-period country-level shares of each industry. This is the growth rate one would expect of a manufacturing sector in a particular country if one could perfectly forecast industry-specific growth at the EU-15 level from 1995 to 2003. We use the STAN value-added growth figures to calculate this "expected" growth rate. The perfect-foresight assumption is quite strong as companies are unlikely to know the global shocks to industry growth; hence, we hope that controlling for this variable in our regressions alleviates the worry that country-level financial development measures simply reflect future growth opportunities.

The time interaction specification additionally controlling for this 'future growth potential' is presented in the third panel of Table 6. Comparing the second and third panel, we see that our main results are little affected by this robustness check. A very similar set of results is obtained when alternatively controlling for a country's GDP growth forecast made at the start of the 'single market'.[26] It appears that our estimates are not driven by the forward-looking nature of financial markets.

[26] The country-level values of both predicted-growth variables are presented in the Appendix Table DA.3.

4.5. Further Robustness Checks

In Table 7 we present our preferred specification from the third panel of Table 6, namely the specification with the financial development/time interaction controlling for predicted growth, together with a number of further robustness checks. First, we compare the estimates across firms of different size and find little sensitivity. Second, we assess the sensitivity of our estimates to excluding one country from the sample. We do so for each country in turn, with the aim of discerning which countries may be driving our results. Given the general lack of sensitivity, we present the results after excluding the UK together with an alternative set of estimates based on excluding Greece—the most and the least financially developed country in our data, respectively. There is virtually no sensitivity to excluding any country with the exception of the United Kingdom. Clearly, the UK presents the most financially developed country in our sample and the strong growth performance of UK firms supports some of the estimated finance-growth effect. Excluding the United Kingdom results in much smaller and statistically insignificant effects of stock-market-based measures of financial activity, which is perhaps not surprising given that the UK stock market is unusually developed in the EU context. Omitting the UK also lowers the size of the finance-growth effect for the other three measures of financial development we use, but they remain statistically significant.[27]

Finally, the bottom panel of Table 7 presents estimates based on subsamples of our main data that exclude either firms with less than four years of value-added data or those value-added growth observations where at least one of the two underlying levels of value added were negative. We also assess the sensitivity to excluding leverage as a control variable from the regressions based on the argument that initial leverage may be more endogenous than other control variables. None of these checks points to any important sensitivity in our estimates.[28]

[27] It is interesting to note that if we return to the specification without the time interaction and exclude the UK, we obtain an (average) effect of private credit on growth that is almost identical to that estimated by Levine and Zervos (1998) using a more extensive set of countries.

[28] We also reach the same results when we use only non-quoted companies or only firms that are present in the data

Up to now, we have avoided the influence of value-added growth outliers, present in any company-level financial data, by symmetrically excluding extreme values of annual growth from our linear 'mean' regressions. In our last robustness check, we alternatively apply median regressions, which are robust to outliers by design and allow us to use all available growth rate data (that is, even observations falling outside the 5-to-95 percentile range). The results are shown in Table 8, the structure of which replicates that of Table 6. The clustered standard errors we report are bootstrapped. The presented pattern of median regression coefficients fully confirms our previous findings and provides one last confirmation of the robustness of our results.

5. Conclusion

We use the establishment of the EU 'single market' as a unique opportunity to implement a combination of two identification strategies for the estimation of the finance-growth effect. First, we follow early country-level work in the literature in that we relate pre-determined levels of financial development to subsequent growth. Second, we follow the recent finance and growth literature in that we study within-industry growth rates. We extend the first strategy by additionally controlling for country-level future growth potential implied by inherited industrial structure and we apply within-industry comparisons, the focus of the second strategy, at the firm level. To aid identification, the estimation is explicitly based on highly synchronized industries; the pattern of our findings is in accord with our assumptions. Our results also survive a battery of robustness checks.

The sign of the estimated finance-growth effects confirms the results in the literature, which are based on different identification strategies. In particular, our results are in line with those of Guiso et al. (2004), who use the Rajan-Zingales approach on a sample of EU economies. In contrast to analysis based on either the Rajan-Zingales (1998) or the Fisman-Love (2004) approach, our comparisons allow for estimation of finance-growth effects that are economically measurable. Using

in all years, or when we additionally interact the initial GDP level with a time trend. These results are available upon request.

volume-of-finance-activity measures, we find that moving from the least to the most developed financial system within the EU-15 boosts the firm-level average annual value-added growth rate between 1995 and 2003 by about three percentage points. The effects of institutional quality, proxied here by a measure of accounting standards and a measure of investor protection (control premia), are also positive and significant, but more varied in size. Excluding the UK reduces the effects of private credit and investor protection by about half and renders stock market activity effects statistically insignificant.

Allowing for the presence of financial integration by interacting the initial financial development level with a time trend suggests that disadvantages in firm-level growth due to under-developed financial markets were much larger in the mid 1990s than in the late 1990s and that the growth gap related to country-level financial development was fully closed by 2003. Taking these findings at face value implies successful financial integration of the EU-15 area in the sense that real economic activity as measured by corporate growth is no longer affected by a firm's location.

The underlying integration process may be different for our various measures of financial development as suggested by a simple comparison of our financial development measures from the early 1990s to those from a recent period. Comparing the 1990-1994 averages of the ratio of private credit to GDP to the corresponding averages taken over the 2000-2004 period suggests that the country-level volume of private credit is now relatively similar across the EU-15 economies. In contrast, EU-15 countries with higher levels of stock market capitalization as of the early 1990s experienced a faster growth of their stock market size in the subsequent decade. Hence, our results are consistent with a diminishing importance of local stock markets for firms' growth as well as with an equalization of access to private credit through faster growth of initially under-developed local banking sectors.

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Table 1

Corporate Descriptive Statistics by Country: Firm-Year Data over 1995-2003

	Size		Growth		Age		Leverage		N
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	
Austria	67.6	38.2	0.038	0.015	22.2	15.0	0.51	0.53	689
Belgium	47.6	15.9	0.016	0.010	22.7	18.0	0.62	0.65	9,091
Denmark	49.2	19.9	0.069	0.067	23.9	17.0	0.55	0.58	682
Finland	45.8	14.3	0.041	0.035	21.3	12.0	0.54	0.55	3,183
France	58.9	20.1	0.023	0.016	30.1	24.0	0.54	0.55	10,127
Germany	128.8	50.1	0.030	0.023	32.9	20.0	0.47	0.47	3,446
Greece	25.9	11.5	0.055	0.048	17.1	15.0	0.58	0.59	4,834
Italy	38.9	18.4	0.028	0.021	20.4	16.0	0.58	0.59	32,355
Netherlands	54.2	26.8	0.006	-0.004	37.2	30.0	0.52	0.51	1,026
Portugal	39.3	17.9	0.006	-0.003	26.8	22.0	0.58	0.61	1,387
Spain	39.7	16.7	0.051	0.044	22.0	19.0	0.58	0.59	16,884
Sweden	39.9	12.3	0.042	0.040	32.3	27.0	0.48	0.48	4,304
UK	62.8	19.9	0.060	0.061	29.6	22.0	0.63	0.64	13,636

Note: The number of firm-year observations in the sample, N, corresponds to observations with non-missing value-added growth rate. All firm variables are measured in the first year a firm enters the sample except age, which is measured as of 1995; age is the number of years since firm incorporation. Size (total assets) is in millions of US dollars. Corporate growth is the annual value-added growth rate. Leverage is measured as long-term debt plus current liabilities divided by total assets. Before computing these statistics we remove growth outliers (we use only the 5-to-95 percentile range of firm value-added growth rate). See the Data Appendix for complete definitions and sources of variables.

Table 2
Financial Development: The EU-15 over 1990-1994

	Private Bank Credit	Market Capitalization	Total Capitalization	Market Value Traded	Accounting Standards	Control Premium
Mean	0.82	0.30	1.35	0.13	0.64	0.26
Median	0.85	0.23	1.45	0.09	0.62	0.31
S.D. / Mean	0.40	0.77	0.33	0.90	0.19	0.52
Min	0.32	0.10	0.51	0.03	0.36	0.00
Max	1.41	0.97	2.25	0.45	0.83	0.37
Min Country	Greece	Austria	Greece	Greece	Portugal	Austria
Max Country	Netherlands	UK	UK	UK	Sweden	UK
N	13	13	12	13	13	11

Note: We first compute the country average of each financial development measure in the period 1990-1994. Second, we present the Min, Max, Mean, and the Coefficient of Variation of the country averages from the first step across EU-15 countries. The two exceptions are Accounting Standards and Control Premium measures, which correspond to 1990 and 1990-2000, respectively. Ireland and Luxembourg are not included in this EU-15 comparison as they do not enter our firm-level analysis. The reported country-level financial development variables are used as explanatory variables in our regressions. See the Data Appendix for complete definitions and sources of variables.

Table 3

Financial Development and Corporate Growth: Basic Estimates

	Private Bank Credit	Market Capitalization	Total Capitalization	Market Value Traded	Accounting Standards	Control Premium
Financial Development	0.026**	0.033***	0.021***	0.070***	0.117***	0.041**
	(0.011)	(0.004)	(0.005)	(0.007)	(0.029)	(0.018)
Age	-0.044***	-0.045***	-0.046***	-0.046***	-0.044***	-0.043***
	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)
Size	-0.124***	-0.125***	-0.126***	-0.129***	-0.121***	-0.126***
	(0.025)	(0.026)	(0.026)	(0.024)	(0.027)	(0.028)
Leverage	0.055***	0.050***	0.050***	0.051***	0.054***	0.059***
	(0.010)	(0.012)	(0.012)	(0.012)	(0.010)	(0.011)
Tangibility	0.014*	0.013*	0.012	0.013*	0.013*	0.013
	(0.007)	(0.007)	(0.008)	(0.007)	(0.007)	(0.010)
Collateralization	-0.020	-0.018	-0.018	-0.016	-0.019	-0.021
	(0.015)	(0.016)	(0.016)	(0.017)	(0.015)	(0.017)
Quoted	0.017***	0.017***	0.017***	0.015***	0.017***	0.010
	(0.005)	(0.004)	(0.005)	(0.005)	(0.004)	(0.007)
Private Limited Company	0.012***	0.010***	0.012***	0.008***	0.009***	0.013**
	(0.003)	(0.002)	(0.002)	(0.001)	(0.002)	(0.005)
Real GDP	-4.304***	-4.232***	-5.331***	-4.162***	-4.756***	-2.978*
	(0.599)	(0.949)	(0.761)	(0.879)	(0.466)	(1.419)
N	100,535	100,535	99,871	100,535	100,533	86,866
R^2	0.16	0.16	0.16	0.16	0.16	0.15

Note: The dependent variable is the annual firm-level value-added growth rate of manufacturing firms in the period 1995-2003. All country-level financial development variables are predetermined except Control Premium, which covers the 1990-2000 period. Firm-level control variables come from the first year a firm enters the sample and remain fixed over time. Age (the number of years since a firm's incorporation as of 1995) is scaled down by 100 in all specifications, as is the measure of accounting standards. Size is measured as the percentage deviation of firm size (total assets) from the industry median firm size on a 3-digit ISIC level and is scaled down by 10,000. Leverage is measured as long-term debt plus current liabilities divided by total assets. Tangibility is measured as fixed assets divided by total assets while collateralization is defined as fixed assets plus inventories plus accounts receivables divided by total assets. Real GDP is country real GDP per capita in 1993 in millions of U.S. dollars. Quoted and Private Limited Company and are dummy variables with a base of non-quoted firms and Public Limited Companies, respectively.

See the Data Appendix for complete definitions and sources of variables. All specifications are linear regressions with outliers removed (using the 5-to-95 percentile range of the dependent variable). We always control for 3-digit-ISIC industry-year dummies, not shown. Robust standard errors (clustered at country level) are reported in parentheses; *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Table 4

Synchronized Industries: ANOVAS of Value-Added Growth Rates Across Countries and Years by Industry

		Year/Country Two Factor Model			Robust to Country Growth	
	ISIC	Year Factor SS	Synchronization Measure I	Synchronization Subsample	Year Factor SS	Synchronization Measure II
Food products and beverages	15	0.12***	0.35	Medium	0.11***	0.32
Tobacco products	16	0.58***	0.22	High	0.50***	0.19
Textiles	17	0.09***	0.21	Medium	0.04**	0.10
Apparel	18	0.15**	0.15	High	0.08	0.08
Leather	19	0.19	0.08	Low	0.14	0.06
Wood and cork	20	0.24**	0.13	Medium	0.14	0.07
Pulp and paper	21	0.53***	0.28	High	0.43***	0.23
Printing and publishing	22	0.11***	0.16	Medium	0.09***	0.13
Coke and refined petroleum	23	4.65***	0.32	High	5.12***	0.35
Chemicals	24	0.15***	0.14	Medium	0.10***	0.09
Rubber and plastics	25	0.14***	0.27	High	0.09***	0.16
Other non-metallic mineral products	26	0.15***	0.26	Medium	0.08***	0.13
Basic metals	27	0.72***	0.34	High	0.67***	0.32
Fabricated metal products	28	0.17***	0.22	Medium	0.10***	0.13
Machinery and equipment	29	0.15*	0.12	High	0.13	0.10
Office and computing machinery	30	2.85	0.07	Low	2.42	0.06
Electrical machinery	31	0.20*	0.12	High	0.18*	0.10
Radio, television and communication equipment	32	1.16***	0.16	Medium	0.89**	0.12
Medical, precision and optical instruments	33	0.06	0.05	Low	0.06	0.05
Motor vehicles	34	0.46***	0.17	High	0.23	0.08
Other transport equipment	35	0.30	0.10	Low	0.24	0.08
Manufacturing N.E.C.	36	0.07**	0.20	High	0.04*	0.11
Recycling	37	1.29**	0.18	High	1.51***	0.21

Note: The panel 'Year/Country Two Factor Model' presents first the total sum of squares of annual value-added growth rate across countries explained for a given industry by year factors in ANOVA two factor models (with year and country factors) estimated using the OECD STAN data; here, *, **, and *** denote significance of the year factors at 10%, 5%, and 1%, respectively. 'Synchronization Measure I' is the fraction of the total growth variation explained by year factors in these ANOVAs. The 'Synchronization Subsample' column assigns industries where the year factors do not reach the 10% level of statistical significance as low-synchronization industries. Next, industries where only the year factors, but not the country factors are significant are denoted as high- synchronization industries and the remaining group, where both types of factors are statistically important, as medium- synchronization industries. The panel 'Robust to Country Growth' shows analogous statistics based on alternative ANOVAs, where one controls not only for year and country factors, but also for country aggregate growth rate (business cycle).

Table 5
Financial Development and Corporate Growth: Industry Synchronization Groups

	Private Bank Credit	Market Capitalization	Total Capitalization	Market Value Traded	Accounting Standards	Control Premium
Low-synchronization based on ANOVA: Year factor WEAK						
Financial Development	0.010	0.020*	0.011	0.042	0.081*	0.001
	(0.015)	(0.011)	(0.008)	(0.024)	(0.042)	(0.017)
N	6,243	6,243	6,179	6,243	6,243	5,896
R^2	0.12	0.12	0.12	0.12	0.12	0.12
Medium-synchronization based on ANOVA: Year factor STRONG; Country factor STRONG						
Financial Development	0.029**	0.034***	0.023***	0.073***	0.139***	0.048**
	(0.010)	(0.004)	(0.005)	(0.006)	(0.029)	(0.020)
N	54,812	54,812	54,483	54,812	54,811	45,801
R^2	0.16	0.16	0.16	0.16	0.16	0.16
High-synchronization based on ANOVA: Year factor STRONG; Country factor WEAK						
Financial Development	0.026**	0.032***	0.021***	0.069***	0.091***	0.043**
	(0.011)	(0.002)	(0.003)	(0.005)	(0.030)	(0.016)
N	39,480	39,480	39,209	39,480	39,479	35,169
R^2	0.14	0.14	0.14	0.14	0.14	0.14
Synchronization Measure I: 1 st quartile						
Financial Development	0.005	0.018**	0.008	0.034	0.085**	0.002
	(0.012)	(0.008)	(0.007)	(0.020)	(0.032)	(0.018)
N	10,314	10,314	10,227	10,314	10,313	9,548
R^2	0.13	0.13	0.13	0.13	0.13	0.12
Synchronization Measure I: 2 nd quartile						
Financial Development	0.028***	0.031***	0.020***	0.066***	0.116***	0.048**
	(0.009)	(0.003)	(0.003)	(0.007)	(0.025)	(0.015)
N	36,074	36,074	35,814	36,074	36,074	31,559
R^2	0.14	0.14	0.14	0.14	0.14	0.14
Synchronization Measure I: 3 rd quartile						
Financial Development	0.027*	0.031***	0.023***	0.066***	0.124***	0.055**
	(0.013)	(0.004)	(0.004)	(0.008)	(0.034)	(0.018)
N	18,705	18,705	18,589	18,705	18,704	16,002
R^2	0.14	0.15	0.15	0.15	0.15	0.15
Synchronization Measure I: 4 th quartile						
Financial Development	0.031**	0.038***	0.025***	0.085***	0.120***	0.041*
	(0.012)	(0.006)	(0.006)	(0.008)	(0.036)	(0.021)
N	35,442	35,442	35,241	35,442	35,442	29,757
R^2	0.17	0.17	0.17	0.17	0.17	0.17

Note: The top panel reports estimates based on subsamples of firms from industries assigned to groups (Low-, Medium-, and High-synchronization) based on p-values of year factor in ANOVAs of industry growth; see Table 4. Each presented coefficient comes from a separate regression. In the bottom panel we divide industries into four groups based on quartiles of the first quantitative synchronization measure from Table 4 and we estimate the finance-growth relationship for each group separately. See Table 3 notes for a list of additional control variables and the Data Appendix for definitions of variables. All specifications are linear regressions with outliers removed (using the 5-to-95 percentile range of the dependent variable). We always control for 3-digit-ISIC industry-year dummies, not shown. Robust standard errors (clustered at country level) are reported in parentheses; *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Table 6

Financial Development and Corporate Growth: Using only Synchronized Industries

	Private Bank Credit	Market Capitalization	Total Capitalization	Market Value Traded	Accounting Standards	Control Premium
			Basic Estimates			
Financial Development	0.027**	0.034***	0.022***	0.072***	0.119***	0.045**
	(0.010)	(0.004)	(0.004)	(0.006)	(0.028)	(0.017)
N	94,292	94,292	93,692	94,292	94,290	80,970
R^2	0.16	0.16	0.16	0.16	0.16	0.16
			Time Interaction			
Financial Development	0.132**	0.147***	0.076***	0.296***	0.434**	0.173**
	(0.051)	(0.008)	(0.022)	(0.019)	(0.167)	(0.072)
Financial Development * Time	-0.021**	-0.025***	-0.012**	-0.049***	-0.065*	-0.028*
	(0.009)	(0.001)	(0.004)	(0.004)	(0.032)	(0.012)
N	94,292	94,292	93,692	94,292	94,290	80,970
R^2	0.16	0.17	0.16	0.17	0.16	0.16
Robustness to Controlling for Predicted Country Value-Added Growth Implied by Initial Industry Structure						
Financial Development	0.122**	0.144***	0.073***	0.288***	0.419**	0.165**
	(0.050)	(0.009)	(0.022)	(0.020)	(0.166)	(0.066)
Financial Development * Time	-0.022**	-0.025***	-0.012**	-0.049***	-0.066*	-0.028**
	(0.009)	(0.001)	(0.004)	(0.003)	(0.032)	(0.012)
Predicted Growth	5.326*	4.802***	4.013**	4.576**	2.559	6.480*
	(2.836)	(1.555)	(1.567)	(1.542)	(1.852)	(3.258)
N	94,292	94,292	93,692	94,292	94,290	80,970
R^2	0.16	0.17	0.16	0.17	0.16	0.16
Robustness to Controlling for Predicted Country GDP Growth						
Financial Development	0.137**	0.147***	0.076***	0.293***	0.433**	0.181**
	(0.056)	(0.009)	(0.023)	(0.020)	(0.171)	(0.074)
Financial Development * Time	-0.021**	-0.025***	-0.012**	-0.049***	-0.065*	-0.028*
	(0.009)	(0.002)	(0.004)	(0.004)	(0.032)	(0.013)
Predicted Growth	-0.320	0.606**	0.015	0.455*	0.025	-0.962
	(0.458)	(0.250)	(0.322)	(0.236)	(0.283)	(1.262)
N	94,290	94,290	93,692	94,290	94,290	80,970
R^2	0.16	0.17	0.16	0.17	0.16	0.16

Note: The estimation is based on data from which we exluded the low-synchronization group of the top panel of Table 5. The dependent variable is the annual firm-level value added growth rate of manufacturing firms in the period 1995-2003. We measure country growth opportunities (predicted growth) by either (i) the average of the realized 1995-2003 EU-15 industry-level growth rates weighted by the initial shares of value added of these industries in a given country or (ii) the country-specific GDP growth rate predicted in 1994 by OECD for the 1997-2000 period. See Table 3 notes for a list of additional control variables and the Data Appendix for definitions of variables. All specifications are linear regressions with outliers removed (using the 5-to-95 percentile range of the dependent variable). We always control for 3-digit-ISIC industry-year dummies, not shown. Robust standard errors (clustered at country level) are reported in parentheses; *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Table 7

Financial Development and Corporate Growth: Sensitivity Analysis with Synchronized Industries

	Private Bank Credit	Market Capitalization	Total Capitalization	Market Value Traded	Accounting Standards	Control Premium
			Basic Estimates			
Financial Development	0.122**	0.144***	0.073***	0.288***	0.419**	0.165**
Financial Development * Time	-0.022**	-0.025***	-0.012**	-0.049***	-0.066*	-0.028**
N	94,292	94,292	93,692	94,292	94,290	80,970
R^2	0.16	0.17	0.16	0.17	0.16	0.16
			Small Firms (Below Industry Median Firm Size)			
Financial Development	0.132**	0.152***	0.072**	0.325***	0.421**	0.147*
Financial Development * Time	-0.023**	-0.026***	-0.011**	-0.051***	-0.070**	-0.029**
N	47,658	47,658	47,392	47,658	47,657	39,912
R^2	0.18	0.18	0.18	0.18	0.18	0.17
			Big Firms (Above Industry Median Firm Size)			
Financial Development	0.107**	0.135***	0.068***	0.259***	0.388**	0.140**
Financial Development * Time	-0.021**	-0.024***	-0.012***	-0.047***	-0.066*	-0.028**
N	46,348	46,348	46,020	46,348	46,347	40,824
R^2	0.16	0.17	0.16	0.17	0.16	0.16
			Robustness to Removing United Kingdom			
Financial Development	0.041*	0.054	0.010	0.104	0.139*	0.080***
Financial Development * Time	-0.008*	-0.012	-0.001	-0.021	-0.015	-0.013**
N	81,573	81,573	80,973	81,573	81,571	68,251
R^2	0.19	0.19	0.19	0.19	0.19	0.19
			Robustness to Removing Greece			
Financial Development	0.141**	0.144***	0.081***	0.288***	0.435**	0.165**
Financial Development * Time	-0.025**	-0.025***	-0.014***	-0.049***	-0.069*	-0.028**
N	89,830	89,830	89,230	89,830	89,828	80,970
R^2	0.16	0.16	0.16	0.16	0.16	0.16
			Long-sample			
Financial Development	0.123**	0.143***	0.073***	0.289***	0.445**	0.163**
Financial Development * Time	-0.022**	-0.025***	-0.012**	-0.049***	-0.069**	-0.028**
N	91,153	91,153	91,126	91,153	91,153	77,948
R^2	0.16	0.16	0.16	0.16	0.16	0.16
			Negative-value-added-sample			
Financial Development	0.121**	0.144***	0.073***	0.288***	0.420**	0.164**
Financial Development * Time	-0.022**	-0.025***	-0.012**	-0.049***	-0.066*	-0.028**
N	94,259	94,259	93,659	94,259	94,257	80,939
R^2	0.16	0.17	0.16	0.17	0.16	0.16
			Removing Leverage as a Control Variable			
Financial Development	0.121**	0.150***	0.076***	0.298***	0.427**	0.168**
Financial Development * Time	-0.022**	-0.025***	-0.012**	-0.049***	-0.067*	-0.028**
N	94,292	94,292	93,692	94,292	94,290	80,970
R^2	0.16	0.16	0.16	0.16	0.16	0.16

Note: The estimation is based on data from which we exluded the low-synchronization group of the top panel of Table 5. All specifications control for predicted value-added country growth based on initial industry structure as in panel three of Table 6. 'Basic Estimates' repeats the coefficient estimates from the third panel of Table 6. We then re-estimate the coefficients for subsamples of firms defined based on size: firms smaller/bigger than the industry median firm size on a 3-digit ISIC level. 'Robustness to Removing United Kingdom' and 'Robustness to Removing Greece' panels report the coefficients when the UK or Greece, respectively, are removed from the sample of countries. The 'Long-sample' panel restricts the sample to firms with at least four years of value-added data. The 'Negative-value-added-sample' panel excludes those value-added growth observations where at least one of the two underlying levels of value added were negative. 'Removing Leverage as a Control Variable' excludes leverage as a control variable from the regressions. See Table 3 notes for a list of additional control variables and the Data Appendix for further definitions of variables.

All specifications are linear regressions with outliers removed (observations outside 5-to-95 percentile range of the dependent variable), include a constant and 3-digit ISIC industry-year dummies as in Table 3. See Table 3 notes for most definitions of variables. *, **, and *** denote coefficients significant at the 10%, 5%, and 1% level, respectively, based on robust standard errors clustered at the country level.

Table 8

Median Regressions: Using only Synchronized Industries

	Private Bank Credit	Market Capitalization	Total Capitalization	Market Value Traded	Accounting Standards	Control Premium
			Basic Estimates			
Financial Development	0.033*	0.039	0.025*	0.086*	0.134***	0.045
	(0.020)	(0.027)	(0.015)	(0.047)	(0.041)	(0.080)
N	104,469	104,469	103,821	104,469	104,467	89,835
Pseudo R^2	0.07	0.07	0.07	0.07	0.07	0.07
			Time Interaction			
Financial Development	0.144**	0.175**	0.084*	0.352**	0.494**	0.177
	(0.073)	(0.083)	(0.047)	(0.163)	(0.215)	(0.124)
Financial Development * Time	-0.022*	-0.029**	-0.013	-0.057**	-0.074**	-0.028
	(0.012)	(0.015)	(0.008)	(0.025)	(0.040)	(0.024)
N	104,469	104,469	103,821	104,469	104,467	89,835
Pseudo R^2	0.07	0.08	0.07	0.08	0.08	0.07
Robustness to Controlling for Predicted Country Value-Added Growth Implied by Initial Industry Structure						
Financial Development	0.134*	0.170**	0.081**	0.340**	0.479**	0.172
	(0.078)	(0.087)	(0.047)	(0.140)	(0.226)	(0.365)
Financial Development * Time	-0.023**	-0.029**	-0.013	-0.057***	-0.075*	-0.029
	(0.012)	(0.014)	(0.009)	(0.020)	(0.043)	(0.055)
Predicted Growth	5.221	5.152	3.650	4.882	2.602	6.767
	(7.413)	(7.641)	(4.874)	(5.982)	(6.543)	(9.799)
N	104,469	104,469	103,821	104,469	104,467	89,835
Pseudo R^2	0.07	0.08	0.07	0.08	0.08	0.07
Robustness to Controlling for Predicted Country GDP Growth						
Financial Development	0.147**	0.173*	0.083*	0.346**	0.484**	0.184
	(0.077)	(0.070)	(0.047)	(0.146)	(0.227)	(0.380)
Financial Development * Time	-0.022*	-0.029**	-0.013	-0.057**	-0.073*	-0.028
	(0.012)	(0.012)	(0.008)	(0.023)	(0.040)	(0.061)
Predicted Growth	-0.158	0.830	0.240	0.685	0.236	-0.921
	(1.191)	(1.170)	(1.246)	(1.481)	(1.086)	(2.791)
N	104,467	104,467	103,821	104,467	104,467	89,835
Pseudo R^2	0.07	0.08	0.07	0.08	0.08	0.07

Note: The data and equation specification are the same as in Table 6. All specifications are median regressions. In all panels we include the value-added-growth outliers, which were not used in the previous tables (i.e. observations outside 5-to-95 percentile range of the dependent variable). See Table 3 notes for a list of all control variables and the Data Appendix for definitions of variables. *, **, and *** denote significance at the 10%, 5%, and 1% level based on bootstrapped standard errors clustered at the country level.

Table DA.1
Definition of Variables

	Amadeus Firm-level Variables
VA	Firm-level value added in current prices deflated by PPI. As PPI we use Eurostat's not seasonally adjusted domestic output price index (in national currency) which covers total industry (excluding construction). Source: Amadeus.
VA_Growth	Annual firm-level growth rate of real value added based on VA. The formula for VA_Growth we use is $(VA_t - VA_{t-1}) / ABS(½ VA_t + ½ VA_{t-1})$. Source: Amadeus.
VA_ShortPanel	0/1 variable, equal 1 if less than five years of value added data available for a firm and 0 otherwise. Source: Amadeus.
VA_Negative	0/1 variable, equal 1 if the current or one lag value added figure used while calculating annual firm growth (VA_Growth) was negative and 0 otherwise. Source: Amadeus.
Age	The number of years from firm's incorporation (STATDATE - YEARINC) scaled down by 100. It is calculated as of 1995 and remains fixed over time. Source: Amadeus.
Size	The percentage deviation of firm's total assets (TOAS) from the industry median firm size on 3-digit ISIC level, scaled down by 10,000. It is calculated as of the initial-period (first year a firm enters the sample) and remains fixed over time. Source: Amadeus.
Leverage	Measured as a long term debt (LTDB) plus current liabilities (CULI) divided by total assets (TOAS). It is calculated as of the initial-period (first year a firm enters the sample and remains fixed over time). Source: Amadeus.
Tangibility	Tangibility is measured as fixed assets (FIAS) divided by total assets (TOAS). It is calculated as of the initial-period (first year a firm enters the sample and remains fixed over time). Source: Amadeus.
Collateralization	Collateralization is defined as fixed assets (FIAS) plus inventories (STOK) plus accounts receivables (DEBT sic) divided by total assets (TOAS). It is calculated as of the initial-period (first year a firm enters the sample and remains fixed over time). Source: Amadeus.
Quoted	0/1 variable, equal 1 if the firm is publicly listed company and 0 otherwise. Source: Amadeus.
Private Limited Company	0/1 variable, equal 1 if the firm is 'Limited Liability Company' (Company whose capital is divided into shares which cannot be offered to the general public. The liability of its members is limited to the amount of their shares.) and 0 if the firm is 'Limited Company' (Company whose capital is divided into shares which can be offered to the general public and whose members are only liable for its debts to the extent of any amount unpaid on their shares.) Source: Amadeus.
	Financial Development Country-level Variables
PCDMBANKOFINSTGDP	Private credit by deposit money banks and other financial institutions to GDP. Average over the period 1990-1994. Source: The Word Bank Financial Structure and Economic Development Database.
STMCAPGDP	Stock market capitalization to GDP. Average over the period 1990-1994. Source: The Word Bank Financial Structure and Economic Development Database.
STMTVTGDP	Stock market total value traded to GDP. Average over the period 1990-1994. Source: The Word Bank Financial Structure and Economic Development Database.
Total Capitalization	The sum of (i) stock market capitalisation, (ii) bank credit to the private sector and (iii) domestic debt securities issued by the private sector to GDP. Average over the period 1990-1994. Source: Hartmann et al. (2006), Chart 1.
ACCOUNT	Index created by examining and rating companies' 1990 annual reports on their inclusion or omission of 90 items in balance sheets and income statements and published by the Center for International Financial Analysis & Research, Inc. The maximum is 90, the minimum 0 and we scaled it down by 100. Source: The Center for International Financial Analysis & Research, Inc.
Control Premium	The control premium corresponding to 1990 to 2000 estimated by Dyck and Zingales (2004). We take the estimated country fixed effects from their Table III, column (1), and use as explanatory variable the value of 0.383 minus the country-level premium, where 0.383 is the maximum premium level in the sample corresponding to Austria.
	OECD STAN Industry-level Variables
VA_ISIC2	Value added by industry (ISIC 2-digit level) and country in current prices and local currency deflated by country-level PPI. As PPI we use Eurostat's not seasonally adjusted domestic output price index (in national currency) which covers total industry (excluding construction). Source: OECD STAN.
VA_ISIC2_ Growth	Growth rate of real value added by industry (ISIC 2-digit level) and country. We first take annual growth rates $(VA\_ISIC2_t - VA\_ISIC2_{t-1}) / VA\_ISIC2_{t-1}$ and then compute a compounded average of these annual growth rates. Source: OECD STAN.
VA_ISIC2_Share	Share of real industry value added (VA_ISIC2) on the total value added of a country. We use average over 1990-1994. Source: OECD STAN.
	Country Growth Predictions
VA_Predicted_ Growth	Predicted future country growth of value added. We compute the time-averages of EU-15 realized growth of manufacturing industries (ISIC 2-digit level) during 1995-2002 (VA_ISIC2_ Growth) and weight these growth rates by the initial-period country-level shares (average over 1990-1994) of each industry (VA_ISIC2_Share).
GDP_Predicted_Growth	The average predicted GDP growth rate for the period 1997 to 2000 predicted as of 1994. Source: Table 15 of the OECD Economic Outlook No. 56, December 1994, OECD, Paris.

Table DA.2
Legal Forms in the EU-15

Country	Limited Companies	Limited Liability Companies
Austria / Germany	Aktiengesellschaft (AG, AG & Co KG)	Gesellschaft mit beschraekter Haftung (GmbH, GmbH & Co KG, Einzelfirma)
Belgium	Naamloze Vennootschap (NV), Société Anonyme (SA)	Besloten Vennootschap, (E)BVBA; Société Privée a Responsabilité Limite, SPRL(U)
Denmark	Limited Company, Company with Limited Liability (A/S)	Private Limited Company (ApS)
Finland	Osakeyhtiö a julkinen (OYJ)	Osakeyhtiö (OY)
France	Société Anonyme (SA)	Société a Responsabilité Limite (SARL)
Greece	SA	Limited liability company (EPE), Sole shareholder limited liability company
Italy	Societa Per Azioni (SPA)	Societa a Responsabilita Limitata (SRL, SCARL)
Netherlands	Naamloze Vennootschap (NV)	Besloten Vennootschap (BV)
Portugal	Sociedade Anónima (SA)	Sociedade por Quotas Responsibilidada Limitada (LDA)
Spain	Sociedad Anónima (SA)	Sociedad Limitada (SL)
Sweden	AB - Public Limited	AB - Private Limited
United Kingdom / Ireland	Guarantee; Public, A.I.M.; Public, investment trust; Public, not quoted; Public, quoted; Unlimited	Private

Note: In order to ensure comparability of sampled firms across countries, we include only companies from the two broad categories: Limited Companies (companies whose capital is divided into shares which can be offered to the general public and whose members are only liable for its debts to the extent of any amount unpaid on their shares) and Limited Liability Companies (companies whose capital is divided into shares which cannot be offered to the general public. The liability of its members is limited to the amount of their shares). We exclude partnerships (at least one partner is liable for the firm's debts), sole proprietorships (there is only one shareholder) and cooperatives. We follow Bureau van Dijk's grouping of the firms' types. See Klapper et al. (2004) for a similar approach.

Table DA.3
Country Growth Predictions

	VA_Predicted_ Growth	GDP_Predicted_Growth
Austria	0.25	2.60
Belgium	0.34	2.40
Denmark	0.26	2.40
Finland	0.30	3.40
France	0.30	2.80
Germany	0.43	3.10
Greece	0.06	2.00
Italy	0.32	2.60
Netherlands	0.28	2.50
Portugal	0.05	3.30
Spain	0.36	3.60
Sweden	0.56	2.30
UK	0.39	2.90

Note: See Table DA.1 for definitions of the predicted growth variables.

Table A.1

Two-Stage Method: Using only Synchronized Industries

	Private Bank Credit	Market Capitalization	Total Capitalization	Market Value Traded	Accounting Standards	Control Premium
			Basic Estimates			
Financial Development	0.012	0.026***	0.020***	0.048***	0.091***	0.041
	(0.011)	(0.005)	(0.005)	(0.012)	(0.025)	(0.027)
N	91	91	86	91	90	74
R^2	0.05	0.07	0.06	0.06	0.09	0.03
			Time Interaction			
Financial Development	0.058**	0.141***	0.047***	0.290***	0.153***	0.185**
	(0.025)	(0.017)	(0.012)	(0.048)	(0.038)	(0.068)
Financial Development * Time	-0.009**	-0.024***	-0.006**	-0.051***	-0.012**	-0.030**
	(0.003)	(0.003)	(0.002)	(0.008)	(0.004)	(0.011)
N	91	91	86	91	90	74
R^2	0.26	0.38	0.30	0.36	0.30	0.27
Robustness to Controlling for Predicted Country Value-Added Growth Implied by Initial Industry Structure						
Financial Development	0.039*	0.133***	0.040***	0.272***	0.142***	0.165**
	(0.022)	(0.018)	(0.012)	(0.050)	(0.043)	(0.059)
Financial Development * Time	-0.010**	-0.024***	-0.006**	-0.051***	-0.012**	-0.030**
	(0.003)	(0.003)	(0.002)	(0.008)	(0.004)	(0.011)
Predicted Growth	9.608**	6.579**	6.814**	6.570**	1.754	7.661**
	(3.710)	(2.759)	(2.766)	(2.751)	(3.060)	(3.298)
N	91	91	86	91	90	74
R^2	0.29	0.40	0.32	0.38	0.30	0.30
Robustness to Controlling for Predicted Country GDP Growth						
Financial Development	0.059*	0.141***	0.050***	0.289***	0.154***	0.185**
	(0.027)	(0.018)	(0.012)	(0.049)	(0.038)	(0.072)
Financial Development * Time	-0.009**	-0.024***	-0.006**	-0.051***	-0.012**	-0.030**
	(0.003)	(0.003)	(0.002)	(0.008)	(0.004)	(0.011)
Predicted Growth	-0.122	0.125	-0.452	0.008	-0.050	0.061
	(0.747)	(0.645)	(0.709)	(0.665)	(0.450)	(1.454)
N	90	90	86	90	90	74
R^2	0.26	0.38	0.30	0.36	0.30	0.27

Note: The data and equation specification are the same as in Table 6. Here, however, we apply an alternative estimation procedure, where we first regress firm growth rates on all firm-level controls, industry-time dummies and a full set of country-year fixed effects. In the second stage, we then regress these country-time fixed effects on our country- and time-specific control variables. All reported coefficients come from this second-stage regression, which is weighted by the inverse of the variance of the country-year fixed effects estimated in the first stage. See Wooldridge (2003) for a discussion of this estimation approach. See Table 3 notes for a list of all control variables and the Data Appendix for definitions of variables. All specifications are linear regressions. Robust standard errors (clustered at country level) are reported in parentheses; *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.