Financial Development and Corporate Growth in the EU Single Market

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Abstract

The establishment of the EU-15 'single market' in 1993 brought about a high degree of similarity in firms' growth opportunities across countries, while substantial diversity existed in the development of national 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.

Keywords: Financial development, Corporate growth, Access to financial markets

JEL classification: F36, G15, G21, O16, O52

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Introduction

Understanding the positive association between financial market development and economic growth is crucial for guiding financial sector policies. Recent work in this area uses industry-level identification strategies to establish a causal link from finance to growth (Rajan and Zingales, 1998; Fisman and Love, 2004).[1] This progress on causality, however, comes at the cost of not providing a quantification of the finance-growth aggregate effect. Yet, from the policy perspective it is important to know the size of the finance-growth effect in order to compare alternative pro-growth policies.

In this paper, we therefore return to earlier country-level work on the finance-growth nexus that allowed, under strong assumptions, for a quantification of the effect of finance on growth, and we address several of the concerns that were raised regarding its validity. Specifically, we return to the identification strategy of King and Levine (1993) and Levine and Zervos (1998) who relate financial development indicators from an initial period to subsequent growth performance of a sample of countries. The key concern with this research design is that it is in general unable to disentangle the effect of financial development from the influence of other, potentially unobservable country-level determinants of growth. The other criticism of this country-level approach is that financial development may be a leading indicator of future growth because financial markets are forward-looking and initial-period differences in measures of financial system depth could, in fact, merely reflect differences in future growth opportunities.

To address these concerns, we introduce four improvements on their original approach. First, we study a highly homogenous set of countries where the assumption that heterogeneity in the initial level of financial development is orthogonal to other country-level determinants affecting growth is arguably most likely to hold. Specifically, we believe that the establishment of the 'single market' of the EU-15 economies in 1993 provides a unique opportunity to study the effect of financial development on growth. The EU-15 countries started sharing a common product market, but they differed markedly in their level of initial financial development.[2] The 'single market' removed trade barriers, harmonized product market regulation, and exposed technologically highly similar firms to common growth opportunities.[3] If reaping these growth

opportunities required external finance provided by national financial systems, then only firms operating in countries with high levels of financial development were able to respond to these new opportunities by increasing their external financing and by growing. The 'single market' makes it likely that in the absence of differences in financial development growth of similar firms would be similar across the EU-15.[4] We therefore believe that country-level determinants of corporate growth (other than the level of financial development) are of relatively low importance in the EU-15 in comparison to the wide set of countries used in the existing cross-country research and hence can be assumed as heterogenous to financial development.

Second, one may be worried that, e.g., the Greek industrial structure and level of development as of the start of the 'single market' pre-destine the Greek economy to grow faster than the UK. However, it is less clear why a Greek and a UK firm sharing the same industry identity, size, age, and the same structure of firm financial indicators ought to grow at a different rate. We therefore contrast the growth experience of highly comparable companies facing different financial systems, rather than comparing the growth performance of countries or industries. In particular, we control for firm characteristics measured at the time of the establishment of the 'single market'. This effectively conditions on the pre-determined economic structure of countries at different levels of financial development in a fashion similar to our (weak) exogeneity assumption of initial financial development. We also control for the initial level of GDP to capture 'convergence' effects.

Third, we lower the influence of country-industry unobservables by excluding from the analysis those industries that appear to be affected by national regulations. It is natural to expect industry growth synchronization within the 'single market', which combines a high degree of regulatory and economic integration with technological similarity. An industry that shows no signs of growth synchronization is therefore likely to be affected by (time-changing) national regulation or large idiosyncratic shocks and should be excluded from the analysis of the finance-growth nexus. We therefore quantify the degree of industry growth 'synchronization' using measures of industry growth time co-movement across the EU-15 countries and "weed out" those industries that do not co-move in time, arguing that they would bring noise to the estimation of the finance-growth relationship.

Fourth, we directly control for the forward-looking nature of financial markets. In order to check for the

possibility that current financial development reflects future growth opportunities, we control for differences in aggregate future growth opportunities implied by pre-existing industrial structure. (A similar strategy was recently employed by Bekaert et al., 2007.) Specifically, we use as a regressor a country-level growth rate computed as the average of the realized EU-15-wide industry growth rates over our sample period weighted by the country's initial-period industrial composition. In an alternative specification, 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 'single market'.

In sum, our approach is to regress annual firm-level value-added growth from the first decade of the 'single market' on several dimensions of country financial infrastructure measured as of before the introduction of the 'single market', as well as on a set of firm-level pre-determined controls, industry-time dummies, and a limited number of country-level growth determinants. The parameters of interest are identified by cross-country variation in financial development, while industry-time fixed effects remove the growth patterns of EU-wide industry-level business cycles.

Despite the improvements we introduce, the King and Levine (1993) strategy is unable to fully control for the presence of country-specific policies or institutional features that affect growth and are correlated with the level of development of the financial sector. It may be that countries with more developed financial systems are also leading in terms of the effectiveness of their legal system etc., resulting in an upward bias in our finance-growth coefficients. Our estimates can therefore be viewed as providing a quantified upper bound on the growth effects of financial system development. On the other hand, the proxies the literature and our study use to capture the extent of financial sector development are clearly measured with error, which is likely to lead to a downward bias in the estimated effects.[5] These two potential biases may therefore partly offset each other.[6]

We also investigate the significance of EU financial integration for corporate growth. Throughout our analysis, we rely on pre-determined initial levels of financial development as using time changes in the degree of financial development could be subject to temporal endogeneity. However, if EU integration leads to faster growth of financial markets in countries with initially low levels of financial development or if EU integration

lowers the importance of national 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-financial development countries. We therefore interact our initial financial-development measures with time trend and ask to what extent an initial growth disadvantage due to lower financial development has been closed over the span of our sample frame.

We find a substantial positive association between initial level of financial development and subsequent growth of comparable companies. The magnitude of this relationship is not affected by controlling for the forward-looking nature of financial markets. Allowing for the presence of EU financial integration by interacting the initial financial development level with a time trend suggests that disadvantages in firm-level growth due to under-developed national financial markets were large initially but disappeared by 2003.

The structure of the paper is as follows: Section 2 relates our approach to the literature, Section 3 presents the methodology, and Section 4 contains the data description. Section 5 presents the results together with robustness checks, while Section 6 summarizes our findings.

2 Relationship to the Literature

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. Three approaches aiming to overcome the reverse causality problem have been proposed in the literature. First, the country-level strategy of King and Levine (1993), discussed above, relates financial development indicators from an initial period to subsequent growth performance of a sample of countries. Second, La Porta et al. (1998) and Levine et al. (2000) are examples of studies that search for instrumental variables predicting a country's level of financial development but unrelated to economic performance.[7] Third, Rajan and Zingales (1998) together with many follow-up studies rely on industry-country comparisons to provide qualitative evidence on the causal link from finance to growth.

The Rajan and Zingales (1998) approach is based on a quantification of the unobservable industry-specific need for tapping the financial system (using external finance) in a sample of countries. They assume that both the industry technology (driving the amount of external finance needed to expand production by one unit) and industry growth opportunities (driving the units of potential production expansion) are constant across countries. Next, they quantify industry differences in the use of external finance in the US, where listed firms presumably face a perfectly elastic supply of funds, and use this 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 that of the US. They regress industry growth from a sample of countries on country and 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 country- and industry-specific factors driving growth.

The Rajan-Zingales approach is a powerful tool for dealing with country-level reverse causality,[8] but there are no direct tests available of the validity of its underlying assumptions. The notion that relative growth opportunities of different industries remain constant along the development path is contradicted by much of trade economics. Similarly, the assumption of constant technological content of industries is threatened by recent empirical trade research, which highlights extensive intra-industry technology heterogeneity across countries at different income levels (Schott, 2003).

Fisman and Love (2004) relax some of the Rajan-Zingales assumptions and avoid the overt quantification of the industry structure of EFD. They assume that industry differences in the need for external finance are similar across countries and ask whether industry-growth co-movements across pairs of countries are more strongly correlated for pairs of countries with more developed financial markets. The findings based on both the Rajan-Zingales (1998) and the Fisman-Love (2004) approach 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.[9]

In this paper, we follow the country-level strategy of King and Levine (1993) and relate initial-period indicators of country financial development to subsequent growth. However, similar to Rajan and Zingales (1998), we focus on growth deviations from global industry means.[10] Furthermore, we use micro data to perform cross-country comparisons within industries by comparing the growth experience of highly similar firms facing different aggregate levels of financial development. 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 labour 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 two reasons. First, 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. Second, we believe that the assumption of orthogonality of the growth-affecting unobservables to the country's financial development level is more likely to hold for the manufacturing sector of the EU-15 economies compared to the aggregate GDP growth in the extensive set of countries used in, e.g., King and Levine (1993).

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, but who adhere fully to the Rajan-Zingales specifications and EFD measures. Our results, based on an alternative set of assumptions, are in accord with the conclusions of Guiso et al. (2004) that financial markets facilitate corporate growth. Unlike them, we quantify this effect in economically measurable terms. Finally, our indirect evidence on EU financial integration is related to studies directly measuring the extent of integration, e.g., Pagano and von Thadden (2004) or Baele et al. (2004).

3 Methodology

We ask about the effect of financial development on firms' growth, controlling for all determinants of industry growth and several firm characteristics. Our basic regression specification is

$$G_{ijkt} = \alpha + \beta FD_i + \gamma GDP_i + \delta_{tj} + X'_{ijk}\zeta + \epsilon_{ijkt}, \tag{1}$$

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, collateralization, as well as 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.

To interpret the β coefficient as corresponding to the effect of financial development, we assume that FD_i is not related to ϵ_{ijkt}. In particular, we assume 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. In other words, we expect our regressions to be successful in detecting the finance-growth effect in industries that display a significant degree of growth synchronization. On the other hand, 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.[11]

We therefore start our analysis by "weeding out" industries that lack any sign of growth synchronization across the economies of the EU-15. 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 year and country factors. Details of the procedure are laid out in Section 5.[12]

Our analysis is based on the fact that the 'single market' combines a high level of regulatory and product market integration with substantial initial diversity in the development of countries' financial markets. 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 using specification (1). To check for the importance of financial integration, we therefore augment equation (1) with the interaction of the initial financial development level with a time trend:

$$G_{ijkt} = \alpha + \beta_0 FD_i + \beta_1 (t * FD_i) + \gamma GDP_i + \delta_{tj} + X'_{ijk}\zeta + \epsilon_{ijkt}. \quad (2)$$

This enriched specification, which does not rely on the likely endogenous observed annual changes in the depth of financial markets, 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.[13]

4 Data

We analyze EU-15 economies during the first decade of the single market's operation, before its extension to post-communist countries in 2004, using firm-, industry- and country-level data. Firm financial statements come from the Amadeus database. Industry measures of value-added growth are taken from the OECD

STAN database. Finally, country-level measures of financial development come primarily from the World Bank.

4.1 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. In principle, the database should cover most public and private limited companies;[14] it includes up to 10 years of information per company, although coverage varies by country and generally improves over time. The database represents the best available firm-level EU-wide data source as argued in Gomez-Salvador et al. (2004).

These data have been tapped in the finance-growth literature 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,[15] which we downloaded in 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 EU 'single market': 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 so we use only observations from 1995-2003. Following Rajan and Zingales (1998) and Guiso et al. (2004), we focus on manufacturing industries (ISIC 15 to 37). We exclude firms with missing size (total assets) as well as non-active firms. We also omit from analysis (i) companies in the top

1% of the size 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.[16] Since Greek firms do not report value added, we used sales as a surrogate for them.[17]

TABLE 1 AROUND HERE

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.[18] 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.

4.2 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 (variable *Private Bank Credit*) and the ratio of stock market capitalization and stock market total value traded to GDP (*Market Capitalization, Market Value Traded*). 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' (*Accounting Standards*), produced by International Accounting and Auditing Trends (Center for International Financial Analysis & Research, Inc.). This indicator rated 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 degree of investor protection. Dyck and Zingales (2004) estimate such equity block premia corresponding to transactions spanning the 1990-2000 period.[19] To keep the sign of the estimates of financial-development coefficients comparable across our various specifications (financial-development measures), we use control premium values expressed as 0.38 minus the original Dyck-Zingales value estimates, where 0.38 is the highest level of the premium observed in the sample.

TABLE 2 AROUND HERE

All indicators of financial development are summarized across our EU countries in Table 2. (Variable definitions are provided in the Data Appendix Table DA.1.) It is clear that despite the extensive integration of EU national product markets up to 1994, there is still substantial diversity in the degree of financial development across the EU-15. The coefficient of variation is particularly high for our measures of stock-market activity and for the control premium measure.

5 Results

5.1 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 millions of US dollars. The firm-level controls are age, size,[20] leverage, tangibility, collateralization, and indicators of being quoted, legal form type, and ownership concentration;[21] these controls are measured as of the first year a firm enters the sample and remain fixed over time.

TABLE 3 AROUND HERE

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 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 while 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 control premium comparison. 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).

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 5.5.) We also note that aggregate GDP convergence effects are strongly detected by the data and that 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.[22]

5.2 Focusing on Synchronized Industries

In order to lower the importance of country-industry unobservables, we 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. We also 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.

TABLE 4 AROUND HERE

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.

TABLE 5 AROUND HERE

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.[23] 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.[24]

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 in those industries where there is a synchronized time pattern of industry growth across all EU-15 economies.[25] 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.

5.3 Financial Integration

In Section 3, we discussed the implications of EU financial integration for our estimation strategy. Specifically, faster financial development of initially financially under-developed countries 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).

TABLE 6 AROUND HERE

The results presented in the second panel of Table 6 suggest that the positive influence of initially more developed financial markets on firm-level growth diminishes over time for all of our measures of financial development.[26] 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 countries has been fully closed within the nine 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.[27]

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.[28] 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.

5.4 Controlling for Aggregate Growth Opportunities

A potential criticism of our approach is that financial development measures, based, e.g., on initial volumes of credit or equity, are misleading because they capture 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.

In order to assess the importance of this criticism and to allow for the co-determination of country-level growth opportunities and financial development measures, 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 proxies simply reflect future growth opportunities.

The time interaction specification 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'.[29] It appears that our estimates are not driven by the forward-looking nature of financial markets.

5.5 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, but they remain statistically significant.[30]

TABLES 7 AND 8 AROUND HERE

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 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.[31]

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 (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 confirms our previous findings.

6 Conclusion

The Rajan-Zingales literature established the causal link from finance to growth, but the Rajan-Zingales (1998) or the Fisman-Love (2004) approach do not lead to a quantification of the aggregate finance-growth effect. We use the establishment of the EU 'single market' as a unique opportunity for revisiting the identifying assumptions of King and Levine (1993), which allow one to estimate the economic magnitude of the finance-growth effect. Specifically, we relate pre-determined levels of financial development to subsequent growth and address some of the concerns with the validity of this approach. In contrast to early country-level research, we study a highly homogenous set of countries, focus on within-industry growth rates of similar companies, and control for country-level future growth potential implied by inherited industrial structure. To aid identification, the estimation is explicitly based on highly synchronized industries.

Using 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 up to 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. Overall, our estimates of the size of the finance-growth effect are similar to those obtained by Levine and Zervos (1998) who contrast country-level growth rates across countries at widely different levels of economic as well as financial development.

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, which is consistent with direct evidence on integration provided by, e.g., Pagano and von Thadden (2004).

Notes

[1]Levine (2005) surveys the literature on the relevant dimensions of financial development, the channels through which it affects growth, as well as the identification strategies used in estimating the growth effect of financial systems. We discuss how our study fits into this literature in detail in Section 2.

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

[3]For evidence on the rapid and synchronized implementation and effects of the Single Market Programme in manufacturing see Badinger (2007) or Bottasso and Sembenelli (2001).

[4]For recent evidence on EU business cycle synchronization see Camacho et al. (2008).

[5]The measurement error in different proxies of financial development is likely to be correlated, preventing the use of instrumental variable strategies that are typically employed to deal with attenuation biases.

[6]In a similar endogeneity setting, Frankel and Romer (1999) compare the estimates of the effect of trade on growth based on ordinary-least-squares and instrumental-variable regressions. They investigate measurement error and sampling error as explanations of why the estimates differ and conclude that, in their setting, the OLS coefficients are more likely to be accurate.

[7]This approach is made difficult by the scarcity of valid instruments and the need to combine data on many countries in order to avoid small-sample biases of instrumental variable estimators.

[8]It also speaks to one of the mechanisms underpinning the finance-growth effect—provision of external funds to reap growth opportunities. Levine (2005) highlights that financial systems (i) acquire and produce risk-return information for possible investments; (ii) monitor investments; (iii) facilitate trading, hedging, diversifying, and pooling of risk; (iv) mobilize savings; and (v) ease the exchange of goods and services that permits greater specialization and innovation.

[9]The Rajan-Zingales estimates measure only the percentage-point *difference* in growth of industries facing

a different need for external finance.

[10]We control for EU-wide industry-level business cycles. Aghion et al. (2005) suggest that the effects of business cycle volatility on growth depend on the level of financial development. In their analysis, the interaction occurs during recessions; however, real GDP per capita grew in all EU-15 countries during our sample frame.

[11]Given the existing literature on the finance-growth nexus, it is likely that differences in financial development lower the degree of industry co-movements, but it is very unlikely that they fully decouple industry growth rates across highly economically integrated countries.

[12]We also go beyond industry groupings based on synchronization and use a continuous measure of synchronization—the share of total growth variability explained by the year factors in our ANOVA exercises. We then interact indicators of financial development with this measure of industry synchronization and use the 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.

[13]It does not differentiate whether financial development matters less for firm growth because financial markets develop faster in initially under-developed economies or because firms increasingly rely on international sources of financing.

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

[15]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.

[16]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.

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

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

[19]They show that the premia 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).

[20]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).

[21]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%.

[22]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.

[23]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.

[24]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.

[25]We have also estimated a 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. 12 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 5.1.

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

[27]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 available upon request.

[28]It is well known that the structure of the financial sector differs across countries (Allen and Gale, 2004), which in part reflects differences in firm type structure as firms of different type raise external finance through different channels (e.g., Beck et at., 2008). Our analysis conditions on pre-existing firm type structure.

[29]The forecast for 1997-2000 was produced by the OECD in 1994. See the Appendix Table DA.1 for details.

[30]When we return to the specification without the time interaction and exclude the UK, we obtain an effect of private credit on growth that is identical to that estimated by Levine and Zervos (1998).

[31]We also reach the same results when we use only non-quoted companies or only firms that are present in the data in all years, or when we additionally interact the initial GDP level with a time trend. These results

are available upon request.

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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. 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 growth values). 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 the EU-15. 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. 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 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 a constant and for 3-digit-ISIC industry-year dummies. 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 (SS) 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: 1st 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: 2nd 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: 3rd 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: 4th 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 dependent variable is the annual firm-level value added growth rate of manufacturing firms in the period 1995-2003. 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. In the bottom panel, we divide industries into four groups based on quartiles of the Synchornization Measure I from Table 4 and we estimate the finance-growth relationship for each group separately. 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. 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 6

Financial Development and Corporate Growth: 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 OECD Prediction of 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. 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. 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 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 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. 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. 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

Financial Development and Corporate Growth: Median Regressions for 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 OECD Prediction of 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 are 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 since 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 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 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 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 measured as of the 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
Private Bank Credit	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.
Market Capitalization	Stock market capitalization to GDP. Average over the period 1990-1994. Source: The Word Bank Financial Structure and Economic Development Database.
Market Value Traded	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.
Accounting Standards	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.
Control Premium	The control premium corresponding to 1990-2000 estimates by Dyck and Zingales (2004). We take the estimated country fixed effects from their Table III, column (1), and use 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 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	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. (2006) for a similar approach.