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5

Financial Structure and Economic Development: Firm, Industry, and Country Evidence

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5.1 Introduction

A large body of research finds that financial development exerts a large positive impact on economic growth. The conclusion emerges from cross-country studies, industry-level studies, firm-level studies, and time-series evaluations. Furthermore, the positive link between financial development and economic growth holds after controlling for other growth determinants and possible endogeneity.[1] While still open to additional research, the positive relationship between growth and financial development prompts the following question: Which specific types of financial systems are particularly conducive to new firm formation, existing firm expansion, industrial success, and overall economic growth?

Besides examining the relationship between overall financial development and economic growth, many researchers have sought to evaluate the links between financial structure—the mixture of financial markets and institutions operating in an economy—and economic growth, the composition of industrial development, and corporate finance. In defining financial structure, historians, economists, and policymakers have focused on the relative merits of bank-based versus market-based financial systems. Besides a contentious theoretical debate about the comparative advantages of bank-based and market-based systems, empirical work over the last century has primarily involved studies of Germany and Japan as bank-based systems and the United States and the United Kingdom as market-based systems. As summarized by Allen and Gale (1999) and Stulz (chapter 4), this research has produced enormously valuable information on the operation of these country's financial systems. The small sample, however, limits the generality of the inferences that

historians, economists, and policymakers can draw for other countries. The four countries have very similar long-run growth rates, so that it is difficult to correlate differences in financial structure with differences in long-run growth rates. The absence of cross-country data on financial structure has prohibited researchers from extending the analysis to a broad cross-section of countries.

This chapter expands the study of financial structure from rigorous studies of a few countries to a broad cross-section of countries by using the large international dataset constructed in chapter 2. We use (1) firm-level analyses on thirty-three countries, (2) industry-level studies on thirty-four countries, and (3) country-level investigations of forty-eight countries. Thus, we use an assortment of different datasets and econometric methodologies to assess the relationship between financial structure and economic development. In this way, we contribute to a century-long debate.

From an economic theory perspective, the chapter examines four views on financial structure: the bank-based view, the market-based view, the law and finance view, and the financial-services view. The *bank-based view* highlights the positive role of banks in mobilizing resource, identifying good projects, monitoring managers, and managing risk (Levine 1997, 2000). The bank-based view also highlights the comparative shortcomings of market-based systems. Specifically, well-developed markets quickly reveal information in public markets, which reduces the incentives for individual investors to acquire information. Thus, greater market development may impede incentives for identifying innovative projects and thereby hinder efficient resource allocation (Stiglitz 1985; Boot, Greenbaum, and Thakor 1993). Proponents of the bank-based view also stress that liquid markets create a myopic investor climate (Bhide 1993). Specifically, in liquid markets, investors can inexpensively sell their shares, so that they have fewer incentives to monitor managers rigorously. Thus, greater market development may hinder corporate control and national productivity. Moreover, Gerschenkron (1962) and others have argued that banks have advantages over markets in the early stages of economic development when the institutional environment is unable to support market activities effectively. Specifically, even in countries with weak legal and accounting systems and frail institutions, powerful banks can still force firms to reveal information and pay their debts, thereby facilitating industrial expansion (Rajan and Zingales 1999). From these vantage points, market-based systems may be less effective than bank-based systems in allocating capital to new, innovative firms.

The *market-based view* highlights the positive role of markets in promoting economic success (Beck and Levine 2000a). In particular, markets facilitate diversification and the customization of risk management devices. Furthermore, proponents of the market-based view stress deficiencies in bank-based systems. First, by acquiring expensive information about enterprises, banks can extract large rents from firms. This reduces the incentives for firms to undertake high-risk, high-return projects because firms will lose an excessively large proportion of the potential profits to banks (Rajan 1992). Second, since banks make loans, they have an inherent bias toward low-risk, and therefore, low-return projects. Thus, bank-based systems may retard innovation and growth (Morck and Nakamura 1999; Weinstein and Yafeh 1998). Furthermore, powerful banks may collude with firm managers against other investors, which stymies competition, effective corporate control, the emergence of new firms, and economic growth (Hellwig 1998). Thus, proponents of the market-based view stress that markets will reduce the inherent inefficiencies associated with banks and thereby enhance new firms formation, the ease with which firms and industry attract capital to expand, and overall economic growth.

The *law and finance view* stresses that the legal system is the primary determinant of the effectiveness of the financial system in facilitating innovation and growth (La Porta et al. 1997, 1998, 1999, 2000). Moreover, La Porta et al. (2000) reject the entire bank-based versus market-based debate. They argue instead that (1) legal systems that effectively protect outside investors, both equity and debt holders, promote overall financial development, and (2) it is overall financial development, not financial structure per se, that is critical for firm, industry, and national economic success. Thus, the law and finance view predicts that financial structure will be unrelated to new firm formation, the structure of industrial development, and economic growth after controlling for overall financial development. Instead, the law and finance view conjectures that the efficiency of the legal system will be positively related to financial development and hence innovation and growth.

Finally, the *financial-services view* stresses that financial systems provide key financial services. These financial services are crucial for firm creation, industrial expansion, and economic growth. The

division between banks and markets in providing these services, however, is of secondary importance. Thus, the financial services view predicts that overall financial development is important for economic development, but financial structure per se will not add much to our understanding of the process of economic development.

This chapter examines six specific questions:

1. Do countries with bank-based financial systems grow faster than countries with market-based systems, or is financial structure unrelated to the pace of economic development?

2. Does the legal system facilitate economic growth by exerting a major impact on the overall effectiveness of the financial system?

3. Do industries that depend heavily on external finance grow faster and/or is new firm formation more likely in bank-based or market-based financial systems?[2]

4. Does the legal system importantly influence the availability of external finance and the rate of new firm creation?

5. Do firms in bank-based system have greater access to external financing and grow faster than firms in market-based financial systems?

6. Does the component of the financial system that is defined by the legal environment influence firm performance?

We use three different datasets and methodologies to examine these three questions. First, we use standard cross-country growth regressions to assess the first two questions. We average data over the period 1980–1995 and assess whether financial structure, that is, the degree to which the country is bank-based or market-based influences economic growth. We study two alternative hypotheses: (1) the level of overall financial development influences growth, but not financial structure per se, and (2) the legal system plays the critical role in facilitating financial arrangements and hence in easing new firm creation, firm access to capital, industrial development, and economic growth.

Second, to explore the impact of financial development and financial structure on industry growth and new firm creation, we use a country-industry panel. Building on work by Rajan and Zingales (1998), we test whether industries that depend more heavily on external finance, grow faster in market- or bank-based financial systems, or whether it is the overall level of financial development

that is critical in accounting for cross-country differences in industrial growth patterns. We also examine whether the component of financial development that is explained by the legal system is important for explaining cross-industry growth patterns. Decomposing industry growth into the growth in new firms and the average size of firms, we also test the relevance of the bank-based, market-based financial services and law and finance views for understanding the creation of new firms.

Third, to answer the last two questions, we use firm-level data to compute the growth rates of firms as predicted by their internally available funds and short-term borrowings. We then examine whether the proportion of firms that grow faster than this predicted rate is higher in market- or bank-based financial systems, or whether the overall level of financial development and the legal rights of outside investors and their enforcement explain firms' growth across countries and over time.

Remarkably, country-level, industry-level, and firm-level investigations all tell the same story: the data provide no evidence for the bank-based or market based views. Distinguishing countries by financial structure does not help in explaining cross-country differences in long-run GDP growth, industrial performance, new firm formation, firm use of external funds, or firm growth. Most important, the data show that countries grow faster, industries that rely heavily on external finance expand more rapidly, new firms emerge more quickly, firms access to finance is easier, and firms enjoy greater growth in countries with higher levels of overall financial development and in nations with legal systems that more effectively protect the rights of outside investors.

Our results are thus consistent with the financial-services and the law and finance views. While the overall level of financial development and the efficiency of the legal system in protecting outside investors' rights are associated with higher growth rates and access to long-term finance, the distinction between market- and bank-based systems does not offer any additional information. Our findings suggest a valuable policy message. Instead of focusing on the composition of the financial system, policymakers should instead focus on strengthening the rights of outside investors and enhancing the efficiency of contract enforcement.

This chapter extends three recent papers on financial structure. Levine (2000) shows that financial structure is not a good predictor

of real per capita GDP growth in a cross-country growth framework: neither bank-based nor market-based financial systems are closely associated with economic growth. He also finds that financial structure is not a good predictor of capital accumulation, productivity growth and savings rates. Levine (2000) also finds strong support for the law and finance view of financial structure. Beck and Levine (2000a) show in a country-industry panel that financially dependent industries do not grow faster in bank- or market-based financial systems. Also, the creation of new firms does not vary systematically with financial structure. Demirgüç-Kunt and Maksimovic (2000) use firm-level data and show that financial structure is not a robust predictor of the proportion of firms that grow faster than predicted by their own internal resources and short-term borrowings. While each of these papers explores only one aspect of the potential relationship between financial structure and economic development, our chapter incorporates these three different methodologies under a unified framework. Specifically, we use (1) a consistent sample of countries, (2) a consistent array of financial structure and financial development indicators for the cross-country, industry-level, and firm-level estimations, and (3) and consistent instrumental variables across the different datasets and econometric specifications. Thus, this chapter provides a comprehensive evaluation of financial structure and economic performance using firm, industry, and cross-country data in a consistent manner.[3]

The remainder of the chapter is organized as follows. Section 5.2 describes our indicators of financial development, financial structure, and the legal system. Section 5.3 explores the impact of financial structure on cross-country growth. Section 5.4 examines our four hypotheses in a country-industry panel. Section 5.5 explores whether firms' access to external resources differs across financial systems with different structures. Section 5.6 offers some conclusions.

5.2   Data

This section presents the indicators of financial development, financial structure, and the legal system that we use in the cross-country, industry-level, and firm-level analysis. We discuss other firm-level, industry-level and macro data in the respective sections. Table 5.1 presents descriptive statistics and the correlation between the different indicators. Table 5.A1 presents the different indicators for all forty-eight countries in our sample with data averaged over the period 1980–1995.

5.2.1   Indicators of Financial Development

To assess the efficiency with which financial intermediaries and markets (1) assess new projects and firms, (2) exert corporate control, (3) ease risk management and (4) mobilize savings, we need appropriate indicators. While the perfect measures certainly do not exist, the recent literature has developed indicators that proxy for financial intermediary and stock market development across countries. We use newly constructed data from chapter 2 to measure overall financial development. While previous work has focused on either financial intermediary *or* stock market development, the indicators used in this chapter combine banks and stock markets into one indicator. While this does not control for the fact that banks and stock markets might impact economic growth through different channels, as found by Levine and Zervos (1998) and Demirgüç-Kunt and Maksimovic (1998), it helps us distinguish between the effects of overall financial development and financial structure.

Our preferred measure is *Finance-activity*, a measure of the overall activity of financial intermediaries and markets. It is defined as the log of the product of Private Credit (the value of credits by financial intermediaries to the private sector divided by GDP) and Value Traded (the value of total shares traded on the stock market exchange divided by GDP). Private Credit is the most comprehensive indicator of the activity of financial intermediaries as it includes both bank and nonbank intermediaries. Recent work shows that Private Credit exerts a large, positive, robust influence on economic growth (Levine, Loayza, and Beck 2000; Beck, Levine, and Loayza 2000). Value Traded measures the activity of the stock market trading volume as a share of national output and thus indicates the degree of liquidity that stock markets provide to economic agents.[4] Levine and Zervos (1998) show that Value Traded is a robust predictor of long-run economic growth.

To test the robustness of our results, we will use several alternative measures of financial development. *Finance-size* is a measure of the overall size of the financial sector and is defined as the log of the sum of Private Credit and Market Capitalization. Market Capitalization is defined as the value of listed shares divided by GDP, and is a mea-

sure of the size of stock markets relative to the economy. While we include this in our analysis, past work suggests that market capitalization is not a very good predictor of economic performance (Levine and Zervos 1998).

Finance-efficiency measures the efficiency of financial intermediaries and markets and is defined as the log of ratio of Value Traded and Overhead Costs, which equals the overhead costs of the banking system relative to banking system assets. While subject to interpretational problems, large overhead costs may reflect inefficiencies in the banking system and therefore proxy as a negative indicator of banking-sector inefficiency.

Finance-aggregate combines the previous three measures and is thus a conglomerate indicator of the size, activity, and efficiency of the financial sector. Specifically, it is the first principal component of *Finance-activity*, *Finance-size*, and *Finance-efficiency*.

Finance-dummy isolates countries that have both underdeveloped financial intermediaries and markets. Specifically, it equals 0 if both Private Credit and Value Traded are less than the sample mean and 1 otherwise.

Our indicators of financial development exhibit a large variation across different countries, as can be seen in table 5.1. Switzerland has the highest value for Finance-activity, with Value Traded at 98 percent of GDP and Private Credit at 178 percent of GDP. Ghana, on the other hand, has the lowest value for *Finance-activity*, with Value Traded being 0.4 percent of GDP and Private Credit 3 percent of GDP. All measures of financial development are correlated with each other at the 1 percent level.

5.2.2 Indicators of Financial Structure

We also construct measures of the degree to which each country has a market- or bank-based financial system. Since there is not a single accepted definition of financial structure, we use an assortment of different measures to test the robustness of our results. We present the results on five measures of financial structure. Each of these measures is constructed so that higher values indicate more market-based financial systems. Demirgüç-Kunt and Levine (chapter 3) examine the relationship between financial structure and a variety of economic, legal, and regulatory variables. Along with many find-

ings, they note that higher-income countries tend to have more market-oriented financial systems.

Our preferred indicator of financial structure is *Structure-activity*, which indicates the activity of stock markets relative to the activity of banks and is defined as the log of the ratio of Value Traded and Bank Credit. Bank Credit equals the claims of the banking sector on the private sector as a share of GDP. Compared to Private Credit, we exclude claims of nonbank financial intermediaries to thus focus on the commercial banking sector.

We construct several alternative measures of financial structure, along the same dimensions as the indicators of financial development, discussed in section 5.2.1. *Structure-size* indicates the size of stock markets relative to the size of the banking sector and is defined as the log of the ratio of Market Capitalization and Bank Credit. *Structure-efficiency* is defined as the log of the product of Overhead Costs and Value Traded and indicates the efficiency of the stock market relative to the banking sector. *Structure-aggregate* combines the previous three measures and is thus a conglomerate indicator of the size, activity, and efficiency of stock markets relative to banks. Specifically, it is the first principal component of *Structure-activity*, *Structure-size*, and *Structure-efficiency*. *Structure-dummy* is a simple bivariate classification of market- versus bank-based financial systems. Specifically, it equals 1 if *Structure-aggregate* is greater than the sample median and 0 otherwise. Note, however, that an economy can be classified as market-based or bank-based only relative to the other countries in the sample, since there is no absolute measure of market- or bank-based financial systems.

Our financial structure indicators vary significantly across countries. Table 5.2 presents the ranking of countries for the financial structure measures. While Taiwan (Value Traded: 150%, Bank Credit: 83%) is considered the most market-based financial system, according to *Structure-activity*, Panama is considered the most bank-based system (Value Traded: 0.3%, Bank Credit: 49%). While the classification of some countries is intuitively attractive, such as the United States, Great Britain, and Switzerland as market-based, *Structure-activity* also classifies Turkey, Mexico, and Brazil as market-based. This is, however, due to a low value of Bank Credit, rather than a high level of Value Traded. The other indicators of financial structure produce similar anomalies. Ghana is identified as the most

Table 5.1
Descriptive Statistics and Correlation

	Finance-activity	Finance-size	Finance-efficiency	Finance-aggregate	Finance-dummy	Structure-activity	Structure-size	Structure-efficiency	Structure-aggregate	Structure-dummy	Creditor	Anti-director	Rule of law
Mean	-3.84	-0.39	0.37	0.00	0.54	-2.00	-0.64	-6.48	0.00	0.50	2.12	3.10	4.03
Median	-4.05	-0.39	0.22	-0.13	1.00	-2.05	-0.58	-6.38	0.15	0.50	2.00	3.00	4.00
Standard deviation	2.07	0.72	1.80	1.00	0.50	1.16	0.76	1.42	1.00	0.51	1.35	1.28	1.61
Maximum	0.55	0.91	4.43	1.88	1.00	0.59	1.34	-3.03	1.86	1.00	4.00	5.00	6.00
Minimum	-9.07	-1.88	-2.71	-2.20	0.00	-5.17	-2.46	-9.98	-2.75	0.00	0.00	0.00	1.14
Observations	48	48	48	48	48	48	48	48	48	48	41	41	48

Correlations	Finance-activity	Finance-size	Finance-efficiency	Finance-aggregate	Finance-dummy	Structure-activity	Structure-size	Structure-efficiency	Structure-aggregate	Structure-dummy	Creditor	Anti-director	Rule of law
Finance-activity	1												
Finance-size	0.881 (0.001)	1											
Finance-efficiency	0.942 (0.001)	0.800 (0.001)	1										
Finance-aggregate	0.984 (0.001)	0.932 (0.001)	0.956 (0.001)	1									
Finance-dummy	0.690 (0.001)	0.802 (0.001)	0.654 (0.001)	0.746 (0.001)	1								
Structure-activity	0.689 (0.001)	0.347 (0.016)	0.730 (0.001)	0.618 (0.001)	0.172 (0.244)	1							
Structure-size	0.078 (0.599)	0.037 (0.803)	0.163 (0.269)	0.097 (0.512)	-0.190 (0.196)	0.544 (0.001)	1						
Structure-efficiency	0.796 (0.001)	0.513 (0.001)	0.675 (0.001)	0.693 (0.001)	0.306 (0.034)	0.862 (0.001)	0.298 (0.040)	1					
Structure-aggregate	0.655 (0.001)	0.375 (0.009)	0.651 (0.001)	0.588 (0.001)	0.142 (0.3357)	0.966 (0.001)	0.675 (0.001)	0.884 (0.001)	1				
Structure-dummy	0.518 (0.001)	0.331 (0.022)	0.568 (0.001)	0.495 (0.001)	0.167 (0.256)	0.776 (0.001)	0.607 (0.001)	0.630 (0.001)	0.791 (0.001)	1			
Creditor	-0.070 (0.663)	0.026 (0.874)	0.010 (0.949)	-0.012 (0.942)	-0.067 (0.678)	-0.161 (0.316)	0.054 (0.738)	-0.193 (0.227)	-0.136 (0.398)	-0.136 (0.398)	1		
Anti-director	0.167 (0.297)	0.246 (0.122)	0.173 (0.279)	0.203 (0.202)	0.224 (0.160)	0.154 (0.338)	0.379 (0.015)	0.091 (0.570)	0.226 (0.156)	0.072 (0.656)	0.095 (0.557)	1	
Rule of law	0.704 (0.001)	0.692 (0.001)	0.649 (0.001)	0.712 (0.001)	0.564 (0.001)	0.330 (0.022)	-0.130 (0.377)	0.454 (0.001)	0.291 (0.045)	0.208 (0.157)	-0.116 (0.470)	-0.084 (0.602)	1

Note: p-values are given in parentheses.

Table 5.2
Financial Structure across Countries

Structure-activity		Structure-size		Structure-efficiency		Structure-aggregate		Structure-dummy	
Taiwan	0.59	Ghana	1.34	Switzerland	-3.03	Taiwan	1.86	Australia	1
Malaysia	-0.32	South Africa	0.94	Taiwan	-3.62	Malaysia	1.59	Brazil	1
Switzerland	-0.39	Malaysia	0.60	United States	-4.38	Switzerland	1.58	Canada	1
United States	-0.64	Jamaica	0.08	United Kingdom	-4.79	United States	1.34	Denmark	1
Ireland	-0.64	Zimbabwe	0.03	Brazil	-4.87	United Kingdom	1.24	Germany	1
Turkey	-0.73	United Kingdom	0.02	Malaysia	-4.97	Brazil	1.01	Ghana	1
United Kingdom	-0.74	Mexico	-0.02	Israel	-5.10	Mexico	0.90	Ireland	1
Mexico	-0.85	New Zealand	-0.02	Japan	-5.24	Japan	0.86	Israel	1
Brazil	-0.92	Ireland	-0.03	Germany	-5.26	South Africa	0.85	Jamaica	1
Thailand	-0.92	Chile	-0.03	Sweden	-5.47	Canada	0.82	Japan	1
Japan	-1.00	Canada	-0.06	Thailand	-5.52	Sweden	0.80	Malaysia	1
Canada	-1.14	Peru	-0.07	Turkey	-5.54	Australia	0.80	Mexico	1
Israel	-1.15	Australia	-0.09	Australia	-5.58	Israel	0.75	Netherlands	1
Sweden	-1.18	Philippines	-0.10	Canada	-5.59	Turkey	0.71	New Zealand	1
Australia	-1.18	United States	-0.11	France	-5.60	Thailand	0.68	Peru	1
Netherlands	-1.36	Sweden	-0.15	Mexico	-5.75	Philippines	0.58	Philippines	1
Philippines	-1.47	Brazil	-0.31	South Africa	-5.91	New Zealand	0.49	South Africa	1
Germany	-1.52	Japan	-0.35	Philippines	-5.92	Peru	0.39	Sweden	1
Peru	-1.54	Belgium	-0.36	Denmark	-6.08	Jamaica	0.38	Switzerland	1
India	-1.61	Sri Lanka	-0.39	New Zealand	-6.12	Ireland	0.33	Taiwan	1
New Zealand	-1.64	Ecuador	-0.43	Jamaica	-6.12	Netherlands	0.33	Thailand	1
								Turkey	1
Denmark	-1.87	Kenya	-0.48	Spain	-6.14	Germany	0.17	United Kingdom	1
South Africa	-1.90	Taiwan	-0.53	Netherlands	-6.26	Denmark	0.17	United States	1
Jamaica	-2.04	Israel	-0.56	Argentina	-6.28	Ghana	0.16	Argentina	0
Norway	-2.06	Netherlands	-0.60	Norway	-6.49	India	0.14	Austria	0
Argentina	-2.15	India	-0.60	Peru	-6.53	Chile	0.00	Belgium	0
Ghana	-2.17	Denmark	-0.62	Italy	-6.54	Ecuador	-0.04	Chile	0
Ecuador	-2.19	Thailand	-0.66	India	-6.58	Belgium	-0.17	Colombia	0
France	-2.28	Switzerland	-0.71	Ecuador	-6.65	France	-0.17	Cyprus	0
Honduras	-2.34	Turkey	-0.74	Chile	-6.74	Argentina	-0.18	Ecuador	0
Spain	-2.36	Colombia	-0.78	Austria	-6.92	Norway	-0.23	Egypt	0
Belgium	-2.38	Pakistan	-0.98	Belgium	-6.94	Spain	-0.31	Finland	0
Chile	-2.46	Trinidad and Tobago	-1.00	Honduras	-7.06	Zimbabwe	-0.35	France	0
Pakistan	-2.51	Greece	-1.02	Finland	-7.23	Sri Lanka	-0.41	Greece	0
Italy	-2.52	Argentina	-1.09	Cyprus	-7.31	Italy	-0.55	Honduras	0
Zimbabwe	-2.58	Cyprus	-1.11	Sri Lanka	-7.37	Pakistan	-0.62	India	0
Greece	-2.65	Norway	-1.15	Greece	-7.37	Honduras	-0.63	Italy	0
Sri Lanka	-2.66	Finland	-1.29	Pakistan	-7.47	Greece	-0.66		

market-based economy, since it has an extremely low level of Bank Credit (3% of GDP). Brazil is identified as having relatively efficient markets, which is due to high overhead costs in the Brazilian banking sector. A financial system can therefore be identified as market-based either because markets are very well developed or banks are underdeveloped.

The indicators of financial structure are highly and significantly correlated with each other as indicated in table 5.1. While *Structure-activity* and *Structure-efficiency* are also positively correlated with many of the financial development indicators—indicating that financially more developed economies have more market-based financial systems—*Structure-size* is not correlated with any of the financial development measures.

Although these financial structure measures do not directly measure all of the channels via which banks and markets influence economic activity, they are the most comprehensive set of indicators that have been constructed to date for a broad cross-section of countries. Taken together, these indicators provide a measure of the comparative role of banks and markets in the economy. Furthermore, the underlying measures of bank development and stock market liquidity exert a strong influence on economic growth. Thus, the basic measures of bank development and stock market liquidity have some analytical content. Furthermore, Demirgüç-Kunt and Levine (chapter 3) show that countries with strong shareholder rights and high accounting standards tend to have more market-based financial systems. Thus, key legal and regulatory differences match up with the measures of financial structure that we use to assess the relationship between industrial performance and degree to which countries are bank-based or market-based.

5.2.3 The Legal Environment

We use three indicators of the rights of outside investors and the degree to which these rights are enforced. These data are from La Porta et al. (1998).

Creditor is an index of the degree to which the legal codes of the country protect the claims of secured creditors in the case of reorganization or liquidation of a company. It ranges from 0 to 4 and is the sum of four dummy variables that indicate whether (1) the reorganization procedure does not impose an automatic stay on assets,

thereby not preventing secured creditors from taking possession of loan collateral, (2) secured creditors are ranked first in the case of liquidation, (3) management does not stay in charge of the firm during reorganization, thereby enhancing creditors' power, and (4) management needs creditors' consent when filing for reorganization. In economies with higher values of *Creditor*, outside investors have more rights relative to the management and other stakeholders, and should therefore be more willing to provide the external resources that firms need. Among the countries in our sample Ecuador, Egypt, Great Britain, India, Israel, Kenya, Malaysia, Pakistan, and Zimbabwe have very high levels of Creditor (4), whereas Colombia, France, Mexico, Peru, and the Philippines have low levels of Creditor (0).

Anti-director is an index of the degree to which the legal codes of the country protect minority shareholder rights. It ranges from zero to six and is the sum of six dummy variables that indicate whether (1) shareholders are allowed to mail their proxy vote to the firm, (2) shareholders are not required to deposit their shares prior to the General Shareholders' Meeting, (3) cumulative voting or proportional representation of minorities on the board of directors is allowed, (4) an oppressed minority mechanism is in place, (5) the minimum percentage of share capital that entitles a shareholder to call for an Extraordinary Shareholders' Meeting is less than or equal to 10 percent, and (6) shareholders have preemptive rights that can only be waived by a shareholders' vote. In economies with higher values of *Anti-director*, minority shareholders are better protected against expropriation by management and large shareholders and should therefore be more willing to provide external financing to firms. Canada, Chile, Great Britain, India, Pakistan, the United States, and South Africa have all very extensive minority shareholder protection (5), whereas Belgium experiences an extremely low level (0).

Rule of law is an assessment of the law and order tradition of a country that ranges from ten, strong law and order tradition, to one, weak law and order tradition. This measure was constructed by ICRG and is an average over the period 1982–1995. In countries with a higher law and order tradition, outside investors can more easily enforce their claims and rights and should therefore be more willing to provide external finance. Austria, Australia, Belgium, Canada, Denmark, Finland, the Netherlands, New Zealand, Norway, Sweden,

Switzerland, and the United States are the countries in our sample with the highest level of *Rule of law* (6), whereas there are five countries with values below two: Colombia, Pakistan, Peru, the Philippines, and Sri Lanka.

While Creditor and Anti-Director are not significantly correlated with any of the financial development and structure indicators, the correlations in table 5.1 indicate that countries with higher levels of Rule of law experience higher levels of financial development and have more market-based financial systems.

5.2.4 The Legal Origin

Legal systems with European origin can be classified into four major legal families (Reynolds and Flores 1996): the English Common Law and the French, German, and Scandinavian Civil Law countries.[5] As described by Glendon, Gordon, and Osakwe (1982), Roman law was compiled under the direction of Byzantine Emperor Justinian in the sixth century. Over subsequent centuries, the *Glossators* and *Commentators* interpreted, adapted, and amended the law. In the seventeenth and eighteenth centuries the Scandinavian countries formalized their legal code, and it has remained relatively unaffected from the far-reaching influences of the German and especially the French civil codes.

Napoleon directed the writing of the French Civil Code in 1804 and made it a priority to secure the adoption of the Code in France and all conquered territories, including Italy, Poland, the Low Countries, and the Habsburg Empire. Also, France extended her legal influence to parts of the Near East, Northern and Sub-Saharan Africa, Indochina, Oceania, French Guyana, and the French Caribbean islands during the colonial era. Furthermore, the French civil code was a major influence on the Portuguese and Spanish legal systems, which helped spread the French legal tradition to Central and South America. The German civil code (*Bürgerliches Gesetzbuch*) was completed almost a century later in 1896. The German code exerted a big influence on Austria and Switzerland, as well as China (and hence Taiwan), Czechoslovakia, Greece, Hungary, Italy, and Yugoslavia. Also, the German civil code heavily influenced the Japanese civil code, which helped spread the German legal tradition to Korea.

Unlike these Civil Law countries, the English legal system is common law, where judges trying to resolve particular cases primarily formed the laws. The Common Law tradition was spread mainly through colonialism to North America, parts of Africa, the Caribbean, and Asia.

Since most countries have acquired their legal systems through occupation and colonization, legal origin can be regarded as relatively exogenous for the period under investigation. Furthermore, La Porta et al. (1997, 1998) have shown that the legal origin of a country materially influences its legal treatment of creditors and shareholders, its accounting standards and the efficiency of contract enforcement. Levine (1998, 1999, forthcoming) and Levine, Loayza, and Beck (2000) show that the legal origin explains cross-country variations in the level of financial development.

Given its exogenous character and explanatory power, we use the legal origin of countries as instruments for financial development and financial structure, so that we can control for simultaneity bias. Specifically, we want to control for the possibilities that faster growing countries, countries with specific industrial structures, or countries with specific firm characteristics develop financial systems or structures. That is, we want to control for the possibility that financial development and structure respond to aggregate growth, industrial composition, and corporate financing. By extracting the exogenous components of financial development and structure, we isolate the impact of the financial system on economic growth, industry expansion, new firm creation, and firms' access to long-term finance.

5.3 Cross-Country Growth Regressions

This section explores the impact of financial structure on long-run economic growth in a sample of forty-eight countries, with data averaged over the period 1980–1995. We (1) describe the methodology, (2) present evidence of the impact of financial structure and financial development on economic growth, (3) discuss evidence on the law and finance approach, (4) describe different robustness tests, and (5) summarize our findings.

5.3.1 Econometric Methodology

To test the validity of the (1) market-based, (2) bank-based, (3) financial services, and (4) law and finance approach in a cross-country sample, we modify the standard growth regression as follows:

$$Growth_i = \alpha' X_i + \beta FD_i + \gamma FS_i + \varepsilon_i, \tag{5.1}$$

where *Growth* is the average annual growth rate of real per capita GDP, calculated as regression coefficient from an OLS regression, X is a set of potential growth determinants, *FD* is an indicator of financial development, *FS* is a measure of financial structure, and ε is the error term. The four competing hypotheses predict different signs for β and γ. The market-based view predicts that market-based financial systems grow faster, implying $\beta > 0$ and $\gamma > 0$. The bank-based view holds that bank-based systems are better for growth, implying $\beta > 0$ and $\gamma < 0$. The financial-services view holds that financial structure does not matter for growth and that it is overall financial development that enhances economic growth. This implies $\beta > 0$ and $\gamma = 0$. The law and finance view, finally, claims that only the part of financial development defined by the legal system is linked with economic growth. If we use the legal rights of outside investors, and the efficiency of contract enforcement as instrumental variables to extract the exogenous component of financial development, the law and finance view also predicts $\beta > 0$ and $\gamma = 0$.

We use both ordinary least square (OLS) estimations and instrumental variable (IV) estimations, using the legal origin of countries as instruments for countries, as in Levine, Loayza, and Beck (2000). IV regressions allow us to control for simultaneity bias and reverse causality from growth rates to financial development, by extracting the exogenous component of financial development and structure. To assess the law and finance view, we use Creditor, Anti-Director, and Rule of Law as instrumental variables for financial development to thus extract the component of finance that is defined by the legal system. We examine the appropriateness of the instruments with Hansen's (1982) test of the overidentifying restrictions, which is further explained by Newey and West (1987). The null hypothesis is that the instrumental variables are not correlated with the error term. The instruments are appropriate if we cannot reject the null hypothesis. We can interpret this result as indicating that the instruments (legal origin or the legal system indicators) affect real per capita GDP growth only through the financial development or structure indicators *and* the variables in the conditioning information set (i.e., the other determinants of growth).

To assess the robustness of our findings, we control for other potential growth determinants in equation (5.1). Specifically, we use two different sets of conditioning information. The *policy conditioning information set* contains the log of real per capita GDP in 1980 to control for convergence and the average years of schooling to control for the effect of human capital accumulation. Furthermore, we include (1) the logarithm of one plus the average rate of inflation, (2) the logarithm of one plus the average black market premium, (3) the logarithm of government size as a share of GDP, and (4) the logarithm of exports plus imports as a share of GDP. We include the inflation rate and the government size to proxy for macroeconomic stability and government intrusion, and the trade share and the black market premium to capture the degree of openness of economies. The *full conditioning information set* contains the policy information set plus a measure of ethnic fractionalization, revolutions and coups, and political assassinations.[6]

5.3.2 Financial Structure and Long-Run Growth

The results in table 5.3 indicate that financial structure is not significantly related to economic growth. For conciseness, the table only reports the results for the two variables of interest: *Finance-activity* and the financial structure indicators. Here we present only results using the policy conditioning information set. All regressions are run with OLS and using heteroskedasticity-consistent standard errors. None of the five structure indicators enters significantly in the regression. *Finance-activity*, on the other hand, enters positively and significantly in four out of five regressions. These results, therefore, do not give support to either the market- or the bank-based view. The results in table 5.4 confirm these findings, using the other indicators of financial development as control variables. The distinction between market- and bank-based financial system does not explain much of the variation in cross-country growth rates.

The results in table 5.5 confirm that financial development is positively correlated with long-run economic growth and that simultaneity bias or reverse causality does not drive these results. We present results using both OLS and IV regressions. All indicators of financial development enter significantly at the 5 percent level, except for *Finance-size*. This result is consistent with the findings of Levine and Zervos (1998). They find that market capitalization is not a robust predictor of economic growth. The liquidity of the stock market, not its pure size (market capitalization), matters for eco-

Table 5.3
Financial Structure, Financial Development and Economic Growth, OLS Regressions

Dependent variable: Real per capita GDP growth, 1980–1995

	(1)	(2)	(3)	(4)	(5)
Structure-activity	0.001				
	(0.999)				
Structure-size		−0.656			
		(0.174)			
Structure-efficiency			−0.324		
			(0.243)		
Structure-aggregate				−0.548	
				(0.220)	
Structure-dummy					−0.957
					(0.129)
Finance-activity	0.517	0.665	0.751	0.818	0.745
	(0.158)	(0.005)	(0.006)	(0.014)	(0.005)
R^2	0.388	0.428	0.399	0.407	0.420

Notes: The dependent variable is the average growth rate of real per capita GDP, calculated as regression coefficient. All regressions include the policy conditioning information set: logarithm of initial income, schooling, inflation, black market premium, government size, and trade openness. All regressions are estimated using OLS.

Structure-activity = log(total value traded divided by claims on private sector by commercials banks)

Structure-size = log(market capitalization divided by claims on private sector by commercials bank)

Structure-efficiency = log(total value traded as share of GDP × banks' overhead costs as share of total assets)

Structure-aggregate = first principal components of structure-activity, structure-size, and structure-efficiency

Structure-dummy = dummy variable that takes the value 1 if structure-aggregate is above the median, 0 otherwise

Finance-activity = log(total value traded as share of GDP × claims on private sector by financial institutions as share of GDP)

nomic growth. The tests of overidentifying restrictions for the IV regressions indicate that we cannot reject the null hypothesis that the instruments are not correlated with the error terms.

The results in table 5.5 are not only statistically significant, but also economically important. Consider Argentina that had a value of *Finance-activity* of −5.99 over the period 1980–1995. If Argentina had enjoyed a level of financial development as Thailand (*Finance – activity* = −1.98), a country with lower real per capita GDP in 1980, the regression results suggests, that Argentina would have grown two percentage points faster over this period.

Table 5.4
Financial Structure and Economic Growth, Sensitivity Analysis

Dependent variable: Real per capita GDP growth, 1980–1995

Explanatory variable	Coefficient	Standard error	*t*-statistic	p-value	R-squared
1. Controlling for Finance-size					
Structure-activity	0.539	0.305	1.770	0.085	0.353
Structure-size	−0.327	0.469	−0.697	0.490	0.290
Structure-efficiency	0.377	0.281	1.343	0.187	0.319
Structure-aggregate	0.436	0.332	1.312	0.197	0.310
Structure-dummy	0.191	0.517	0.369	0.714	0.282
2. Controlling for Finance-efficiency					
Structure-activity	−0.346	0.355	−0.973	0.337	0.433
Structure-size	−0.739	0.416	−1.775	0.084	0.474
Structure-efficiency	−0.032	0.202	−0.159	0.875	0.424
Structure-aggregate	−0.455	0.372	−1.222	0.229	0.442
Structure-dummy	−1.390	0.612	−2.270	0.029	0.486
3. Controlling for Finance-aggregate					
Structure-activity	0.134	0.383	0.350	0.729	0.384
Structure-size	−0.734	0.480	−1.529	0.134	0.429
Structure-efficiency	−0.033	0.244	−0.135	0.894	0.382
Structure-aggregate	−0.275	0.351	−0.783	0.439	0.388
Structure-dummy	−0.937	0.585	−1.600	0.118	0.412
4. Controlling for Finance-dummy					
Structure-activity	0.329	0.248	1.325	0.193	0.428
Structure-size	−0.174	0.459	−0.379	0.707	0.405
Structure-efficiency	0.188	0.229	0.822	0.416	0.413
Structure-aggregate	0.213	0.269	0.792	0.433	0.410
Structure-dummy	−0.054	0.465	−0.116	0.908	0.402

Notes: The dependent variable is the average growth rate of real per capita GDP, calculated as regression coefficient. All regressions include the policy conditioning information set: logarithm of initial income, schooling, inflation, black market premium, government size, and trade openness. All regressions are estimated using OLS.

Structure-activity = log(total value traded divided by claims on private sector by commercials banks)

Structure-size = log(market capitalization divided by claims on private sector by commercial banks)

Structure-efficiency = log(total value traded as share of GDP × banks' overhead costs as share of total assets)

Structure-aggregate = first principal components of structure-activity, structure-size, and structure-efficiency

Structure-dummy = dummy variable that takes the value 1 if structure-aggregate is above the median, 0 otherwise

Table 5.5
Financial Development and Economic Growth

Dependent variable: Real per capita GDP growth, 1980–1995

1. OLS regressions

Explanatory variable	Coefficient	Standard error	t-statistic	p-value	R-squared
Finance-activity	0.517	0.193	2.684	0.011	0.388
Finance-size	0.885	0.796	1.113	0.273	0.280
Finance-efficiency	0.582	0.186	3.127	0.003	0.424
Finance-aggregate	1.070	0.427	2.507	0.016	0.382
Finance-dummy	1.882	0.736	2.559	0.014	0.401

2. IV regressions

Explanatory variable	Coefficient	Standard error	t-statistic	p-value	N × J statistic
Finance-activity	0.630	0.282	2.232	0.031	2.141
Finance-size	1.725	1.206	1.430	0.160	3.286
Finance-efficiency	0.752	0.291	2.586	0.014	1.652
Finance-aggregate	1.336	0.616	2.169	0.036	2.272

Notes: The dependent variable is the average growth rate of real per capita GDP, calculated as regression coefficient. All regressions include the policy conditioning information set: logarithm of initial income, schooling, inflation, black market premium, government size, and trade openness.

Finance-activity = log(total value traded as share of GDP × claims on private sector by financial institutions as share of GDP)

Finance-size = log(market capitalization and claims on private sector by financial institutions as share of GDP)

Finance-efficiency = log(total value traded as share of GDP divided by banks' overhead costs as share of total assets)

Finance-aggregate = first principal component of finance-activity, finance-size, and finance-efficiency

Finance-dummy = takes value 0 if claims on private sector by banks as share of GDP and value traded as share of GDP are less than sample mean, 1 otherwise

The results in tables 5.3, 5.4, and 5.5 give support for the financial-services view by underlining the importance that overall financial development has for economic growth. The results are not consistent with either the market- or the bank-based view.

5.3.3   The Law and Finance View and Long-Run Growth

The results in table 5.6 are consistent with the law and finance view. Here we use as instruments specific elements of the legal system that

Table 5.6
Financial Development and Economic Growth: The Legal-Based View

Dependent variable: Real per capita GDP growth, 1980–1995

Explanatory variable	Coefficient	Standard error	t-statistic	p-value	N × J statistic
1. Policy conditioning information set					
Finance-activity	0.747	0.348	2.144	0.040	0.814
Finance-size	1.653	0.717	2.307	0.028	1.468
Finance-efficiency	0.692	0.340	2.034	0.050	0.913
Finance-aggregate	1.255	0.559	2.246	0.032	1.102
2. Full conditioning information set					
Finance-activity	0.970	0.277	3.498	0.002	0.329
Finance-size	2.282	0.699	3.266	0.003	2.122
Finance-efficiency	0.878	0.311	2.827	0.008	0.729
Finance-aggregate	1.757	0.521	3.373	0.002	0.931

Notes: N × J statistic is distributed chi-squared with two degrees of freedom.

At the 10 percent level, the critical value is 4.61. At the 5 percent level, the critical value is 5.99. The dependent variable is the average growth rate of real per capita GDP, calculated as regression coefficient. Policy conditioning information set: simple set, plus inflation, black market premium, government size, and trade openness. Full conditioning information set: policy set, plus a measure of ethnic fractionalization, revolutions and coups, and political assassinations. We use creditor, anti-director, and rule of law as instruments for financial development.

Finance-activity = log(total value traded as share of GDP × claims on private sector by financial institutions as share of GDP)

Finance-size = log(market capitalization and claims on private sector by financial institutions as share of GDP)

Finance-efficiency = log(total value traded as share of GDP divided by banks' overhead costs as share of total assets)

Finance-aggregate = first principal component of finance-activity, finance-size, and finance-efficiency

are important for financial development. Specifically, we use *Creditor, Anti-director,* and *Rule of law* as instruments for the indicator of financial development. All indicators of financial development enter significantly in the regression at the 5 percent level. Furthermore, the regressions pass the test of the overidentifying restrictions. That is, the data do not reject the hypothesis that Creditor, *Anti-director,* and *Rule of law* influence growth only through their effects on financial development or the other explanatory variables. The coefficients show similar sizes as when using the legal origin as instruments and are larger than in the OLS regressions. Thus, the data are consistent with the view that the component of overall financial development

explained by legal codes and their enforcement is positively and significantly related to economic growth.

5.3.4 Sensitivity Analysis

Our results are robust to several robustness checks. First, we rerun the regressions in tables 5.3, 5.4, and 5.5 using the full conditioning information set. The structure indicators never enter significantly. Second, we include a dummy for very undeveloped financial systems in the regressions with financial structure. This does not alter our results. None of the structure indicators enters significantly. Third, we use *Creditor*, *Anti-director*, and *Rule of law* as instruments for financial structure. Again, the indicators of financial structure do not enter significantly. Finally, we examine unbalanced financial systems. While financial structure might not matter, financial systems with a distorted structure might impede the efficient provision of financial services. We therefore create a dummy variable that takes the value 1 if Value Traded is above the sample mean and Bank Credit below the mean or vice versa. Using this indicator of unbalanced financial systems does not change our results—classifying countries, as having unbalanced financial systems does not explain long-term economic growth.

5.3.5 Summary

Our findings are consistent with the financial services and the law and finance views. Financial development and the component defined by the legal protection of outside investors explain long-term cross-country growth rates. Financial structure, namely, the distinction between market- and bank-based financial systems, does not offer any additional information. These results are robust to the use of different indicators of financial development and structure and different conditioning information sets. These results are also robust a battery of sensitivity tests (Levine 2000), including tests of whether bank-based systems are more effective at promoting growth at low-levels of economic development (Boyd and Smith 1996, 1998).

5.4 Industry-Level Results

This section explores our four competing hypotheses in a panel data set of thirty-four countries and thirty-six industries. Specifically, we explore (1) whether industries that depend heavily on external finance grow faster in market- or bank-based financial systems, and (2) new firms are more likely to form in bank-based or a market-based financial systems. Thus, unlike in the section 5.3, we focus on a specific channel through which financial development and potentially financial structure affects economic activity and industrial structure. We first discuss the econometric methodology and the additional data we use. We then explore whether externally dependent industries grow faster in market- or bank-based financial systems or whether it is the overall level of financial development that determines industrial growth patterns across countries. In a second step, we decompose industry growth into its two components—growth in the number of firms and growth in the average size of firms—and analyze whether financial structure and development determines the creation of new firms. Finally, we test the importance of the legal system for industry growth and new firm creation.

5.4.1 Econometric Methodology and the Data

We use a panel of thirty-four countries and thirty-six industries to test our four hypotheses. We build on work by Rajan and Zingales (1998) and explore the interaction of industry and country characteristics, that is, the dependence of industries on external finance and the level and structure of financial development across countries. This subsection describes the methodology and data.

Methodology

Financial intermediaries and markets help overcome market frictions that drive a wedge between the price of external and internal finance. Lower costs of external finance facilitate firm growth and new firm formation. Therefore, industries that are naturally heavy users of external finance should benefit disproportionately more from greater financial development than industries that are not naturally heavy users of external finance. That should be especially true for new firms in these industries.

Rajan and Zingales (1998) find evidence consistent with the hypothesis that industries that rely more heavily on external finance grow faster in countries with a better-developed financial system. Furthermore, Rajan and Zingales show that the effect of financial development on the industrial growth runs mostly through growth

in the number of establishments rather than through growth in the average size of establishments. Financial development improves disproportionately the prospects of young firms in industries that rely heavily on external finance.

We extend the work by Rajan and Zingales and explore whether industries with a high need of external finance grow faster in economies with bank- or market-based financial systems. We use the following regression to assess the impact of financial development and financial structure on industry growth and the creation of new firms:

$$Growth_{i,k} = \sum_j \alpha_j Country_j + \sum_l \beta_l Industry_l + \gamma Share_{i,k}$$

$$+ \delta_1(External_k * FD_i) + \delta_2(External_k * FS_i) + \varepsilon_{i,k}, \qquad (5.2)$$

where $Growth_{i,k}$ is the average annual growth rate of value added or the growth in number of firms in industry k and country i. $Country$ and $Industry$ are country and industry dummies, respectively, and $Share_{i,k}$ is the share of industry k in manufacturing in country i in 1980. $External_k$ is the measure of dependence on external finance for industry k as measured for a sample of U.S. companies over the period 1980–1989. FD_i and FS_i are indicators of financial development and financial structure for country i, respectively. We interact the external dependence of an industry ($External$) with both (1) a measure of overall financial development (FD) and (2) an index of the degree of market-based versus bank-based, namely, an index of financial structure (FS).[9] The dummy variables for industries and countries correct for country and industry specific characteristics that might determine industry growth patterns. We thus isolate the effect that the interaction of external dependence and financial development/structure has on industry growth rates relative to country and industry means. By including the initial share of an industry we control for a convergence effect; we expect industries with a large share to grow more slowly, and therefore a negative sign on γ.[10]

The different hypotheses imply different predictions about the sign and significance of δ_1 and δ_2. The market-based view predicts that industries that are dependent on external finance grow faster in economies with market-oriented financial systems and higher levels of financial development, thus implying $\delta_1 > 0$ and $\delta_2 > 0$. The bank-based view predicts that industries that are dependent on external finance grow faster in economies with bank-oriented financial sys-

tems and higher levels of financial development, thus implying $\delta_1 > 0$ and $\delta_2 < 0$. The financial-services view predicts that industries dependent on external finance grow faster in economies with a higher level of overall financial development, whereas the financial structure should not matter, thus implying $\delta_1 > 0$ and $\delta_2 = 0$. The law and finance view predicts that industries dependent on external finance grow faster in economies that protect the rights of outside investors more efficiently, whereas financial structure should not matter. If we replace FD_i with indicators of these legal rights and contract enforcement, this implies $\delta_1 > 0$ and $\delta_2 = 0$.

We run both OLS and IV regressions. IV regressions allow us to address the issue of endogeneity of independent variables. Specifically, we control for the endogeneity of the level overall financial development and the structure of the financial system. As above, we use the legal origin of countries to extract the exogenous component of financial development and structure. We also use the religious composition of countries as additional instruments.[11] La Porta et al. (1999) show that the dominant religion of a country influences institutional development.

External Dependence

We use industry-level data on external dependence from Rajan and Zingales (1998). Their underlying assumption—and ours—is that for technological reasons some industries depend more heavily on external finance than others. Unfortunately, we can only observe the actual use of external finance, but not the demand for it. For countries with well-developed financial systems, Rajan and Zingales note that external funds will be supplied very elastically, so that the actual use of external finance would primarily reflect the demand for external finance. Assuming that the variance of the need for external finance across industries persists across countries, we can thus use the actual external dependence of industries as observed in a country with a well-developed financial system as a proxy for the "natural" dependence of industries on external finance. As discussed in Rajan and Zingales (1998), we use the United States to compute the natural external dependence of industries.

The data are from Standard and Poor's *Compustat* for U.S. firms in thirty-six industries. This database contains only publicly listed firms. A firm's dependence on external finance is defined as the share of investment that cannot be financed through internal cash flows; or

as capital expenditures minus cash flow from operations divided by capital expenditures. Both numerator and denominator are averaged over the 1980s to smooth temporal fluctuations. The industry values are calculated as medians rather than means to thus prevent outliers from dominating the results. Table 5.A2 lists the external dependence for all thirty-six industries. The drug industry is the industry most dependent on external finance, whereas the tobacco industry has no demand for external finance, namely, our dependence measure is less than zero.

Industry Growth Rates

Our dependent variable is the average annual growth rate of value added. We use the data obtained by Rajan and Zingales (1998) from the *Industrial Statistics Yearbook* database put together by the United Nations Statistical Division (1993). We also use a decomposition of the industry growth rate. Specifically, we consider the growth in the number of establishments, as opposed to the growth in the average size of establishments.[12] The decomposition of industry growth therefore provides both a robustness test of the previous results and a more detailed exploration of the mechanisms through which financial development and financial structure influence industrial growth patterns across countries.

5.4.2 Financial Structure and Industry Growth

The results in table 5.7 indicate that financial structure does not have an independent impact on industrial growth patterns across countries.[13] Although the interaction terms of external dependence with *Structure-activity* and *Structure-aggregate* show coefficients that are significant at the 5 percent level in the OLS regressions, these results are not confirmed by the instrumental variable regressions. None of the interaction terms with financial structure enters significantly at the 5 percent level. These results are not consistent with the market- or the bank-based view.

The results in table 5.8 support the financial-services view and thereby strengthen the previous findings. The interaction terms with financial development always enter significantly at the 5 percent level level. None of the interaction terms with financial structure enters significantly. These results indicate that externally dependent industries grow relatively faster in countries with better-developed

Table 5.7
Financial Structure and Industry Growth

Dependent variable: Industry growth, 1980–1989

	Structure-activity	Structure-size	Structure-aggregate	Structure-dummy
1. OLS regressions				
Interaction (external dependence × structure-activity)	0.887 (0.033)			
Interaction (external dependence × structure-size)		0.698 (0.144)		
Interaction (external dependence × structure-aggregate)			0.914 (0.046)	
Interaction (external dependence × structure-dummy)				1.101 (0.233)
R^2	0.311	0.309	0.310	0.309
Number of observations	1016	1016	1016	1016
2. IV regressions				
Interaction (external dependence × structure-activity)	1.407 (0.064)			
Interaction (external dependence × structure-size)		1.119 (0.246)		
Interaction (external dependence × structure-aggregate)			1.415 (0.121)	
Number of observations	1016	1016	1016	

Notes: The dependent variable is the annual compounded growth rate in real value added for 1980–1990 for each industry in each country.

The p-values for heteroskedasticity robust standard errors are reported in parentheses. All regressions also include the industry's share of total value added in manufacturing in 1980. We use the British, French, and German legal origin dummies as instruments for financial structure in the IV regressions.

Structure-activity = log(total value traded divided by claims on private sector by commercials banks)

Structure-size = log(market capitalization divided by claims on private sector by commercial banks)

Structure-aggregate = first principal components of structure-activity and structure-size

Structure-dummy = dummy variable that takes the value 1 if structure-aggregate is above the median, 0 otherwise

Table 5.8
Financial Development, Financial Structure, and Industry Growth

Dependent variable: Industry growth, 1980–1989

	Structure-activity	Structure-size	Structure-aggregate
Interaction (external dependence × structure-activity)	−1.314 (0.308)		
Interaction (external dependence × structure-size)		−0.103 (0.892)	
Interaction (external dependence × structure-aggregate)			−0.416 (0.640)
Interaction (external dependence × finance-activity)	1.350 (0.033)	0.719 (0.018)	0.842 (0.022)
Number of observations	1016	1016	1016
Interaction (external dependence × structure-activity)	−0.868 (0.435)		
Interaction (external dependence × structure-size)		−0.175 (0.825)	
Interaction (external dependence × structure-aggregate)			−0.441 (0.628)
Interaction (external dependence × finance-size)	3.659 (0.029)	2.494 (0.010)	2.843 (0.014)
Number of observations	1016	1016	1016
Interaction (external dependence × structure-activity)	−1.137 (0.346)		
Interaction (external dependence × structure-size)		−0.151 (0.845)	
Interaction (external dependence × structure-aggregate)			−0.461 (0.609)
Interaction (external dependence × Finance-Aggregate)	2.742 (0.029)	1.629 (0.013)	1.899 (0.016)
Number of observations	1016	1016	1016

Notes: The dependent variable is the annual compounded growth rate in real value added for 1980–1990 for each industry in each country. The p-values for heteroskedasticity robust standard errors are reported in parentheses. All regressions also include the industry's share of total value added in manufacturing in 1980. All regressions are IV. We use the British, French, and German legal origin dummies and the share of Catholic, Muslim, and Protestant population in total population as instruments for financial development and financial structure development and financial structure.

Finance-activity = log(total value traded as share of GDP × claims on private sector by financial institutions as share of GDP)

Finance-size = log(market capitalization and claims on private sector by financial institutions as share of GDP)

Finance-aggregate = first principal component of finance-activity and finance-size

Table 5.8
(continued)

Structure-activity = log(total value traded divided by claims on private sector by commercial banks)

Structure-size = log(market capitalization divided by claims on private sector by commercial banks)

Structure-aggregate = first principal components of structure-activity and structure-size

financial systems, while the specific structure of the financial system does not have any impact on industrial growth patterns.

5.4.3 Financial Structure and the Creation of New Firms

The results in table 5.9 indicate that new firms are more easily created in countries with higher levels of financial development, but financial structure does not explain industry patterns in the growth of new firms across countries.[14] None of the interaction terms with financial structure enters significantly in the regressions. The interaction terms with the financial development indicators, however, enter significantly at the 10 percent level in the regressions with *Structure-size* and *Structure-aggregate*. They do not enter significantly in the regressions with *Structure-activity*. We can explain this inconsistency with the fact that *Structure-activity* is the structure measure that shows the highest correlation with the indicators of financial development. Overall, these results are again consistent with the financial-services view and are inconsistent with the market- or bank-based view.

5.4.4 Industry Growth, New Firm Creation, and the Law and Finance View

The results in table 5.10 show that externally dependent industries grow faster and new firms are created more easily in countries with higher levels of creditor and shareholder rights and more effective enforcement of those rights. While none of the interaction terms with financial structure enters significantly, the interaction terms with the three legal variables enter jointly significantly at the 10 percent level in all six regressions. The p-values on the individual coefficients indicate that it is especially the enforcement of laws that is important for the growth of externally dependent industries and the creation of new firms in these industries.

Table 5.9
Financial Development, Financial Structure, and the Growth in Number of Firms

Dependent variable: Growth in the number of firms, 1980–1989

	Structure-activity	Structure-size	Structure-aggregate
Interaction (external dependence × structure-activity)	0.127 (0.905)		
Interaction (external dependence × structure-size)		0.729 (0.310)	
Interaction (external dependence × structure-aggregate)			0.571 (0.474)
Interaction (external dependence × finance-activity)	0.659 (0.227)	0.572 (0.015)	0.521 (0.092)
Number of observations	903	903	903
Interaction (external dependence × structure-activity)	0.275 (0.748)		
Interaction (external dependence × structure-size)		0.786 (0.282)	
Interaction (external dependence × structure-aggregate)			0.609 (0.427)
Interaction (external dependence × finance-size)	1.969 (0.169)	1.914 (0.014)	1.746 (0.074)
Number of observations	903	903	903
Interaction (external dependence × structure-activity)	0.179 (0.852)		
Interaction (external dependence × structure-size)		0.747 (0.302)	
Interaction (external dependence × structure-aggregate)			0.574 (0.465)
Interaction (external dependence × finance-aggregate)	1.400 (0.193)	1.268 (0.014)	1.163 (0.081)
Number of observations	903	903	903

Notes: The dependent variable is the log difference between the number of establishments in 1990 and 1980 for each industry in each country. The p-values for heteroskedasticity robust standard errors are reported in parentheses. All regressions also include the industry's share of total value added in manufacturing in 1980. All regressions are IV. We use the British, French, and German legal origin dummies and the share of Catholic, Muslim, and Protestant population in total population as instruments for financial development and financial structure.

Finance-activity = log(total value traded as share of GDP × claims on private sector by financial institutions as share of GDP)

Finance-size = log(market capitalization and claims on private sector by financial institutions as share of GDP)

Finance-aggregate = first principal component of finance-activity and finance-size

Table 5.9
(continued)

Structure-activity = log(total value traded divided by claims on private sector by commercial banks)

Structure-size = log(market capitalization divided by claims on private sector by commercial banks)

Structure-aggregate = first principal components of structure-activity and structure-size

5.4.5 Sensitivity Analysis

Our findings are robust to a number of sensitivity checks (Beck and Levine 2000a). First, when we use a larger sample of forty-two countries (some of which are not in this chapter's 48-country sample), our conclusions do not change. While industries with higher need of external finance grow faster in economies with better-developed financial sectors and better protection of outside investors, financial structure cannot explain industry growth patterns across countries. Second, we use alternative measures of external dependence. Specifically, we use external dependence measured for a sample of Canadian firms to thus test whether our results are due to peculiarities of the U.S. financial system. The results do not change. We also use a measure of external finance computed from a sample of firms that have gone public over the previous ten years, since young firms are especially dependent on external finance. Again, our main findings hold. Finally, we use an indicator for unbalanced financial systems to explore whether the growth of industries that depend heavily on external finance is impacted by distorted financial systems. As in the cross-country analysis, we do not find any significant impact of the unbalanced indicator.

5.4.6 Summary

Our findings from the country-industry panel confirm the results from the cross-country regressions and provide support for the financial services and law and finance view. Industries that depend relatively more on external finance grow faster in economies with higher levels of financial development and legal systems that better protect the rights of outside investors. Industries that are heavy users of external finance do not grow faster and new firms are not created more rapidly in either a market- or bank-based financial system. It is

Table 5.10
Financial Structure, the Legal Environment, and Industry Growth

	Structure-activity	Structure-size	Structure-aggregate
Dependent variable: Industry growth, 1980–1989			
Interaction (external dependence × structure-activity)	−1.494 (0.124)		
Interaction (external dependence × structure-size)		−0.543 (0.695)	
Interaction (external dependence × structure-aggregate)			−1.651 (0.243)
Interaction (external dependence × creditor)	0.229 (0.687)	0.300 (0.614)	0.181 (0.756)
Interaction (external dependence × anti-director)	1.327 (0.078)	0.598 (0.594)	1.455 (0.178)
Interaction (external dependence × rule of law)	1.179 (0.001)	0.818 (0.001)	1.059 (0.001)
F-test creditor, anti-director, and rule of law	4.77 (0.003)	4.95 (0.002)	4.92 (0.002)
Number of observations	1016	1016	1016
Dependent variable: Growth in the number of firms, 1980–1989			
Interaction (external dependence × structure-activity)	−0.858 (0.329)		
Interaction (external dependence × structure-size)		0.104 (0.926)	
Interaction (external dependence × structure-aggregate)			−0.564 (0.650)
Interaction (external dependence × creditor)	0.749 (0.138)	0.788 (0.118)	0.749 (0.137)
Interaction (external dependence × anti-director)	1.175 (0.126)	0.440 (0.069)	0.928 (0.343)
Interaction (external dependence × rule of law)	0.719 (0.012)	0.472 (0.010)	0.588 (0.024)
F-test creditor, anti-director, and rule of law	2.49 (0.059)	3.05 (0.028)	2.39 (0.067)
Number of observations	903	903	903

Notes: The dependent variable in the top panel is the annual compounded growth rate in real value added for 1980–1990 for each industry in each country. The dependent variable in the bottom panel is the log difference between the number of establishments in 1990 and 1980 for each industry in each country. The p-values for heteroskedasticity robust standard errors are reported in parentheses. All regressions also include the industry's share of total value added in manufacturing in 1980. All regressions are IV. We use the British, French, and German legal origin and the legal determinants.

Table 5.10
(continued)

Structure-activity = log(total value traded divided by claims on private sector by commercials banks)

Structure-size = log(market capitalization divided by claims on private sector by commercial banks)

Structure-aggregate = first principal components of structure-activity and structure-size

Creditor = index of secured creditor rights

Anti-director = index of minority shareholder rights

Rule of law = measure of the law and order tradition of a country

thus the overall level of financial development, but not a specific structure of the financial system that enables especially new firms to overcome barriers in obtaining external funding.

5.5 Firm-Level Results

In this section we use firm-level data from a panel of thirty-three countries and six years between 1990 and 1995 to explore whether firms' access to external finance varies across financial systems with different structures, or whether the overall level of financial development and the legal system determine firms' access to external finance. We next describe the methodology and data that we use; assess the market-based, bank-based, and financial-services view; and explore the importance of legal institutions for firms' access to external finance.

5.5.1 Econometric Methodology and Data

We follow an approach developed by Demirgüç-Kunt and Maksimovic (1998, 2000) to measure whether firms' growth in an economy is financially constrained. Simple correlation between firms' growth and financial development and structure does not control for differences in the amount of external financing needed by firms in the same industry but in different countries. These differences may arise because firms in different countries may employ different technologies, because profit rates may differ across countries, or because investment opportunities and demand may differ. In our empirical tests we take into account the possibility that these factors may affect the demand for external capital. To control for these differences at the firm level, we calculate for each firm in an economy the rate at

which it can grow, using (1) only its internal funds or (2) using its internal funds and short-term borrowing. We then compute the percentage of firms that grow at rates that exceed each of these two estimated rates. These statistics yield estimates of the proportion of firms in an economy relying on external financing to grow.

The firm-level data consist of accounting data for the largest publicly traded manufacturing firms in thirty-three countries, using data from the Worldscope database. We estimate a firm's potential growth rate using the standard "percentage of sales" financial planning model (Higgins 1977). This approach relates a firm's growth rate of sales to its need for investment funds, based on three simplifying assumptions. First, the ratio of assets used in production to sales is constant. Second, the firm's profits per unit of sales are constant. Finally, the economic depreciation rate equals the accounting depreciation rate. Under these assumptions, the firm's financing need in period t of a firm growing at g_t percent per year is given by

$$EFN_t = g_t * Assets_t - (1 + g_t) * Earnings_t * b_t, \qquad (5.3)$$

where EFN_t is the external financing need and b_t is the fraction of the firm's earnings that are retained for reinvestment at time t. Earnings are calculated after interest and taxes. While the first term on the righthand side of equation (5.1) denotes the required investment for a firm growing at g_t percent, the second term is the internally available funds for investment, assuming a constant retention rate b_t.

We use two different estimates of a firm's attainable growth rate. The internally financed growth rate IG_t is the maximum growth rate that can be financed with internal resources only. Assuming that the firm retains all its earnings, that is, $b_t = 1$, equating EFN_t to 0 and solving equation (5.1) for g_t, we obtain

$$IG_t = ROA_t/(1 - ROA_t), \qquad (5.4)$$

where ROA_t is the firm's return on assets (*Earnings/Assets*). The definition of IG thus assumes that firm does not rely on any external source to finance its growth.

The short-term financed growth rate SG_t is the maximum growth rate that can be obtained if the firm reinvests all its earnings and obtains enough short-term external resources to maintain the ratio of its short-term liabilities to assets. To compute SG_t, we first replace total assets in equation (5.1) by assets that are financed by new long-

term capital, calculated as total assets times one minus the ratio of short-term liabilities to total assets. SG_t is then given by

$$SG_t = ROLTC_t/(1 - ROLTC_t), \qquad (5.5)$$

where $ROLTC_t$ is the ratio of earnings, after tax and interest, to long-term capital. The definition of SG thus assumes that the firm does not access any long-term borrowings or sales of equity to finance its growth.

The estimates of IG and SG are conservative for several reasons. First, we assume that a firm utilizes the unconstrained sources of finance—trade credit in the case IG, and trade credit and short-term borrowing in the case of SG—no more intensively than it is currently doing. Second, firms with spare capacities do not need to invest and may grow at a faster rate than predicted without accessing external resources. Third, the financial planning model abstracts from technical advances that reduce the requirements for investment capital. Thus, it may overstate the costs of growth and underestimate the maximum growth rate attainable using unconstrained sources of financing.

For each country we then calculate the percentage of firms whose realized annual real growth rate of sales exceeds the predicted rates IG_t and SG_t, respectively. $STCOUNT_t$ is calculated as $\sum_f d_{fit}/n_{it}$, where n_{it} is the number of firms in country i in period t and d_{fit} takes the value 1 if the firm f's real growth rate of sales exceeds IG_{fit}, and 0 otherwise. $LTCOUNT_{it}$ is calculated in a similar way, using IG_{fit}. $STCOUNT_t$ is thus an estimate of the proportion of firms in country i that obtain external funding at time t, and $LTCOUNT_{it}$ is an estimate of the proportion of firms in country i that obtain long-term external financing at time t.

Table 5.11 presents the average values for $STCOUNT$ and $LTCOUNT$ for all thirty-three countries in our sample. There is a large variation in the proportion of firms that obtain external resources. Only 26 percent of firms in New Zealand grow at rates requiring external financing, while 100 percent of firms in Austria do. Only 17 percent of firms in Chile grow beyond the rate predicted by the use of internal and short-term external funds, but 100 percent in Austria. These differences are likely to be affected by the availability of external finance both directly and indirectly, as the composition of firms in each economy evolves through mergers and diversification to take advantage of the available sources of financing.

Table 5.11
Firm Growth across Countries

Country	STCOUNT	LTCOUNT
Argentina	0.51	0.46
Australia	0.46	0.39
Austria	1.00	1.00
Belgium	0.45	0.38
Brazil	0.49	0.48
Canada	0.65	0.61
Chile	0.29	0.17
Colombia	0.33	0.33
Denmark	0.43	0.35
Finland	0.47	0.42
France	0.38	0.29
Germany	0.93	0.92
Great Britain	0.39	0.28
Greece	0.36	0.28
India	0.53	0.38
Ireland	0.64	0.55
Israel	0.58	0.46
Italy	0.41	0.35
Japan	0.43	0.36
Malaysia	0.54	0.49
Mexico	0.52	0.47
Netherlands	0.36	0.26
New Zealand	0.26	0.23
Norway	0.46	0.41
Pakistan	0.46	0.32
Philippines	0.35	0.30
Portugal	0.40	0.36
South Africa	0.27	0.19
Spain	0.38	0.32
Sweden	0.46	0.38
Switzerland	0.33	0.28
Thailand	0.49	0.35
United States	0.44	0.39

Notes: STCOUNT is the share of firms that grow faster than predicted by the use of internal resources. LTCOUNT is the share of firms that grow faster than predicted by the use of internal resources and short-term borrowings. Data are averaged over the period 1990–1995.

To analyze our different hypotheses in our sample of thirty-three countries and six years, we run the following regressions:

$$y_{it} = \beta_1 FD_{it} + \beta_2 FS_{it} + \beta_3 CV_{it} + \varepsilon_{it}, \tag{5.6}$$

where y is either STCOUNT or LTCOUNT, FD is one of the five indicators of financial development, defined above, FS is one of the five indicators of financial structure, CV is a set of control variables, and ε is the error term.

We estimate equation (5.6) using IV techniques to control for simultaneity bias and reverse causality. Specifically, as in sections 5.3 and 5.4, we will be using the legal origin of countries to extract the exogenous component of the level of financial development and structure.

To assess the robustness of the link between the proportion of firms that receive external resources and the level of financial development and structure, we include several control variables. Specifically, we include the average size of firms, since firms that are larger relative to the economy might enjoy better access to external financing than smaller firms. We include the inflation rate to control for measurement errors in firms' financial statements in highly inflationary economies. We include the level and the growth rate of real per capita GDP. We include the level of real per capita GDP to control for determinants of firms' access to external financing that are related to the level of economic development, but are independent of the financial system. We include the growth rate of real per capita GDP to control for the possibility that firms' desire to grow depends on the rate of growth of the economy. Finally, we include Rule of law to control for effects of the legal system that are independent of the effect of the financial system.

5.5.2 Excess Growth of Firms and Financial Structure

The results in table 5.12 indicate that the share of firms growing at rates requiring external financing does not vary across countries with different financial structures. For conciseness, the table only reports the results for the variable of interest—financial structure. The top panel reports the results for STCOUNT, the bottom panel for LTCOUNT. Except for Structure-Size, none of the indicators of financial structure enters significantly at the 5 percent level in the regressions of either STCOUNT or LTCOUNT. These findings are not consistent with either the market- or the bank-based view.

Table 5.12
Financial Structure and Firm Growth

Explanatory variable	Coefficient	Standard error	t-statistic	p-value	Number of observations	Countries
1. Dependent variable: *STCOUNT*						
Structure-activity	−0.010	0.020	−0.479	0.632	172	33
Structure-size	−0.091	0.024	−3.846	0.000	172	33
Structure-efficiency	−0.014	0.017	−0.829	0.408	172	33
Structure-aggregate	−0.031	0.018	−1.757	0.081	172	33
2. Dependent variable: *LTCOUNT*						
Structure-activity	−0.010	0.021	−0.494	0.622	172	33
Structure-size	−0.100	0.024	−4.098	0.000	172	33
Structure-efficiency	−0.010	0.017	−0.566	0.572	172	33
Structure-aggregate	−0.032	0.019	−1.738	0.084	172	33

Notes: STCOUNT is the share of firms that grow faster than predicted by the use of internal resources. *LTCOUNT* is the share of firms that grow faster than predicted by the use of internal resources. Conditioning information set: level and growth rate of real per capita GDP, inflation rate, total assets of firms in a country divided by GDP, and rule of law. We use the British, German, and French legal origin as instruments for financial structure.

Structure-activity = log(total value traded divided by claims on private sector by commercial banks)
Structure-size = log(market capitalization divided by claims on private sector by commercial banks)
Structure-efficiency = log(total value traded as share of GDP × banks' overhead costs as share of total assets)
Structure-aggregate = first principal components of structure-activity, structure-size, and structure-efficiency

The table 5.13 results provide evidence for the financial services view. We again report only the variable of interest—financial development. All four indicators of financial development enter significantly positive at the 5 percent level in the regressions of *STCOUNT*. This indicates that firms are more likely to grow at rates that require external financing in economies with higher level of financial sector development. All four indicators of financial development enter significantly positive at the 10 percent level in the regressions of *LTCOUNT*. We interpret this as evidence that the share of firms that grow at rates requiring long-term external financing is higher in countries with better-developed financial sector.

5.5.3 Excess Growth of Firms and the Law and Finance View

To explore the law and finance view, we first regress our indicators of financial development on our three legal indicators, *Creditor, Antidirector,* and *Rule of law.* The fitted values of these regressions indicate the level of financial development predicted by the legal environment of a country. We also use the residual from each regression—*Excess-finance*—to indicate the component of financial development that is not predicted by the legal environment. In the second stage, we then run equation (5.7) including both the predicted value of financial development from the first stage and *Excess-finance*. The law and finance view predicts a positive coefficient on the fitted value of *Finance* and an insignificant coefficient on *Excess-finance*. A significantly positive coefficient on *Excess-finance* would indicate an importance of other components of the financial sector not predicted by the legal systems for firms' growth. A significantly negative coefficient on *Excess-finance* would indicate that a financial sector growing beyond the legal infrastructure is damaging for firms' growth.

The results in table 5.14 provide support for the law and finance view. We report only the coefficient on the fitted values of our indicators of financial development and on the respective *Excess-finance*. The results in the top panel indicate that firms are more likely to grow at rates requiring external finance in economies in which the legal system is conducive to the development of large, active, efficient banks and stock markets. With the exception of Finance-Size all predicted indicators of financial development enter significantly positive. None of the Excess-Finance variables enters significantly in the regressions. The results in the bottom panel are even stronger. All indicators of predicted financial development enter significantly

Table 5.13
Financial Development and Firm Growth

Explanatory variable	Coefficient	Standard error	t-statistic	p-value	Number of observations	Countries
1. Dependent variable: STCOUNT						
Finance-activity	0.056	0.025	2.219	0.028	172	33
Finance-size	0.154	0.069	2.248	0.026	172	33
Finance-efficiency	0.059	0.028	2.134	0.034	172	33
Finance-aggregate	0.092	0.041	2.230	0.027	172	33
2. Dependent variable: LTCOUNT						
Finance-activity	0.049	0.026	1.897	0.060	172	33
Finance-size	0.143	0.070	2.029	0.044	172	33
Finance-efficiency	0.048	0.029	1.661	0.099	172	33
Finance-aggregate	0.080	0.043	1.887	0.061	172	33

Notes: STCOUNT is the share of firms that grow faster than predicted by the use of internal resources. LTCOUNT is the share of firms that grow faster than predicted by the use of internal resources. Conditioning information set: level and growth rate of real per capita GDP, inflation rate, total assets of firms in a country divided by GDP, and rule of law. We use the British, German, and French legal origin as instruments for financial development.

Finance-activity = log(total value traded as share of GDP × claims on private sector by financial institutions as share of GDP)
Finance-size = log(market capitalization and claims on private sector by financial institutions as share of GDP)
Finance-efficiency = log(Total value traded as share of GDP divided by banks' overhead costs as share of total assets)
Finance-aggregate = first principal component of finance-activity, finance-size, and finance-efficiency

Table 5.14
Firmg Growth and the Legal-Based View

Explanatory variable	Coefficient	Standard error	t-statistic	p-value	Number of observations	Countries
1. Dependent variable: STCOUNT						
Finance-activity	0.057	0.029	1.998	0.046	172	33
Excess-finance-activity	0.013	0.017	0.760	0.447		
Finance-size	0.100	0.066	1.511	0.131	172	33
Excess-finance-size	−0.013	0.047	−0.283	0.778		
Finance-efficiency	0.074	0.033	2.236	0.025	172	33
Excess-finance-efficiency	0.021	0.018	1.145	0.252		
Finance-aggregate	0.090	0.046	1.972	0.049	172	33
Excess-finance-aggregate	0.019	0.030	0.651	0.515		
2. Dependent variable: LTCOUNT						
Finance-activity	0.080	0.029	2.761	0.006	172	33
Excess-finance-activity	0.022	0.017	1.262	0.207		
Finance-size	0.150	0.067	2.227	0.026	172	33
Excess-finance-size	0.010	0.048	0.199	0.842		
Finance-efficiency	0.093	0.034	2.757	0.006	172	33
Excess-finance-efficiency	0.025	0.018	1.371	0.170		
Finance-aggregate	0.123	0.046	2.665	0.008	172	33
Excess-finance-aggregate	0.033	0.030	1.094	0.274		

Notes: STCOUNT is the share of firms that grow faster than predicted by the use of internal resources. LTCOUNT is the share of firms that grow faster than predicted by the use of internal resources. All regressions are estimated using panel data with random effects. Conditioning information set: level and growth rate of real per capita GDP, inflation rate, total assets of firms in a country divided by GDP, and rule of law. Finance-activity, size, efficiency and aggregate are the predicted values from a regression of finance-activity, size, efficiency, and aggregate on creditor, anti-director, and rule of law. Excess-finance refers to the residuals from the respective regression.

Finance-activity = log(total value traded as share of GDP × claims on private sector by financial institutions as share of GDP)
Finance-size = log(market capitalization and claims on private sector by financial institutions as share of GDP)
Finance-efficiency = log(total value traded as share of GDP divided by banks' overhead costs as share of total assets)
Finance-aggregate = First principal component of finance-activity, finance-size, and finance-efficiency

positive in the regressions, while none of the Excess-Finance indicators does. This indicates that the share of firms that grow at rates requiring external long-term financing is higher in economies with a contracting environment that favors financial development.

5.5.4 Sensitivity Analysis

We confirm our main findings using a larger sample of thirty-eight countries, some of which are not included in the forty-eight-country sample of this chapter.[15] While firms grow at rates requiring external financing in economies with higher level of financial development and economies with better protection of outside investors, financial structure and financial development beyond the component predicted by the legal system does not have any explanatory power for firms' growth.

Demirgüç-Kunt and Maksimovic (2000) take a different approach to test the law and finance view. Specifically they allow banking-sector and stock market development to take different coefficients. In the first stage they regress an indicator of banking-sector development on *Rule of law*, the common legal origin dummy, *Creditor* and the inflation rate, and an indicator of stock market development on *Rule of law*, the Common legal origin dummy, *Anti-director*, and the inflation rate. They show that while the predicted level of banking-sector and stock market development can explain the share of firms that grow at rates requiring external financing, the residuals from the first-stage regressions do not have any explanatory power. In the regressions of *LTCOUNT* only the predicted level of stock market development enters significantly, while the predicted level of banking-sector development does not enter significantly. Again, the residuals from the first-stage regressions do not have any explanatory power. This indicates that any financial development beyond the level predicted by the macroeconomic environment and the legal system does not explain firms' growth.

5.5.5 Summary

Using firm-level data we confirm our previous findings. Financial structure does not explain the growth of firms beyond the rates predicted by the internal resources and short-term borrowings. This is inconsistent with both the market- and the bank-based view. The share of firms that grow at rates requiring external financing is

higher in countries in countries with higher levels of financial-sector development, which is consistent with the financial-services view. Furthermore, we find that firms are more likely to grow at rates that require external finance in countries in which the contracting environment favors financial sector development. Financial sector development beyond the level that is predicted by the legal system does not have any explanatory power for firms' growth. This is consistent with the law and finance view.

5.6 Conclusions

This chapter explored the relationship between financial structure —the degree to which a financial system is market- or bank-based— and economic development. We use three methodologies. The cross-country approach uses cross-country data to assess whether economies grow faster with market- or bank-based financial systems. The industry approach uses a country-industry panel to assess whether industries that depend heavily on external financing grow faster in market- or bank-based financial systems, and whether financial structure influences the rate of new firm creation. Finally, the firm-level approach uses firm-level data across a broad selection of countries to test whether firms are more likely to grow beyond the rate predicted by internal resources and short-term borrowings in market- or bank-based financial systems.

The cross-country regressions, the industry panel estimations, and the firm-level analyses provide remarkably consistent conclusions. Financial structure is not an analytically useful way to distinguish among financial systems. More precisely, countries do not grow faster, financially dependent industries do not expand at higher rates, new firms are not created more easily, firms' access to external finance is not easier, and firms do not grow faster in either market- or bank-based financial systems.

We do find strong evidence in favor of the both the financial services and law and finance views of financial structure. We find that economies grow faster, industries depending heavily on external finance expand at faster rates, new firms form more easily, firms' access to external financing is easier, and firms grow more rapidly in economies with a higher levels of overall financial-sector development and in countries with legal systems that more effectively protect the rights of outside investors. These results are consistent with both the financial services and the law and finance theories.

Appendix 5.1

Table 5A.1
Indicators of Financial Development, Financial Structure and the Legal System across Countries

Country	Finance-activity	Finance-size	Finance-efficiency	Finance-aggregate	Finance-dummy	Structure-activity	Structure-size	Structure-efficiency	Structure-aggregate	Structure-dummy	Anti-director	Credi-tor	Rule of law	Legal origin
Argentina	-5.99	-1.62	-1.91	-1.39	0	-2.15	-1.09	-6.28	-0.18	0	4	1	3.21	F
Australia	-2.14	0.22	1.71	0.84	1	-1.18	-0.09	-5.58	0.80	1	4	1	6.00	E
Austria	-3.36	-0.06	0.48	0.26	1	-3.04	-2.46	-6.92	-1.27	0	2	3	6.00	G
Belgium	-4.37	-0.47	0.19	-0.16	0	-2.38	-0.36	-6.94	-0.17	0	0	2	6.00	F
Brazil	-4.14	-1.01	-0.62	-0.53	0	-0.92	-0.31	-4.87	1.01	1	3	1	3.79	F
Canada	-2.14	0.20	1.84	0.86	1	-1.14	-0.06	-5.59	0.82	1	5	1	6.00	E
Chile	-3.96	-0.07	0.20	0.10	1	-2.46	-0.03	-6.74	0.00	0	5	2	4.21	F
Colombia	-6.31	-1.09	-2.51	-1.31	0	-3.04	-0.78	-7.50	-0.75	0	3	0	1.25	F
Cyprus	-4.44	-0.04	-1.06	-0.21	1	-3.62	-1.11	-7.31	-1.05	0			3.59	E
Denmark	-3.63	-0.45	0.58	0.05	0	-1.87	-0.62	-6.08	0.17	1	2	3	6.00	S
Ecuador	-5.75	-1.25	-1.52	-1.10	0	-2.19	-0.43	-6.65	-0.04	0	2	4	4.00	F
Egypt	-6.85	-1.11	-1.55	-1.23	0	-4.14	-1.54	-9.60	-2.09	0	2	4	2.50	F
Finland	-3.52	-0.16	0.98	0.28	1	-2.72	-1.29	-7.23	-0.76	0	3	1	6.00	S
France	-2.57	0.10	0.64	0.50	1	-2.28	-1.42	-5.60	-0.17	0	3	0	5.39	F
Germany	-1.76	0.10	1.91	0.89	1	-1.52	-1.53	-5.26	0.17	1	1	3	5.54	G
Ghana	-9.07	-1.88	-2.71	-2.20	0	-2.17	1.34	-8.52	0.16	1			2.00	E
Greece	-5.05	-0.73	-0.92	-0.62	0	-2.65	-1.02	-7.37	-0.66	0	2	1	3.71	F
Honduras	-5.15	-1.08	-0.76	-0.77	0	-2.34	-1.46	-7.06	-0.63	0			2.07	F
India	-4.35	-0.92	0.52	-0.30	0	-1.61	-0.60	-6.58	0.14	0	5	4	2.50	E
Ireland	-2.41	-0.11	4.14	1.11	1	-0.64	-0.03	-8.02	0.33	1	4	1	4.68	E
Israel	-2.52	-0.23	1.43	0.51	1	-1.15	-0.56	-5.10	0.75	1	3	4	2.89	E
Italy	-3.89	-0.47	0.13	-0.09	1	-2.52	-1.45	-6.54	-0.55	0	1	2	5.00	F
Jamaica	-4.82	-0.66	-0.96	-0.55	0	-2.04	0.08	-6.12	0.38	1	4	2	2.11	E
Japan	-0.43	0.88	3.32	1.76	1	-1.00	-0.35	-5.24	0.86	1	4	2	5.39	G
Kenya	-6.83	-0.90	-2.30	-1.27	0	-3.93	-0.48	-8.88	-1.37	0	3	4	3.25	E
Malaysia	-1.08	0.63	3.27	1.52	1	-0.32	0.60	-4.97	1.59	1	4	4	4.07	E
Mexico	-4.50	-1.13	0.23	-0.49	0	-0.85	-0.02	-5.75	0.90	1	1	0	3.21	F
Netherlands	-1.41	0.52	2.95	1.35	1	-1.36	-0.60	-6.26	0.33	0	2	2	6.00	F
New Zealand	-3.14	-0.06	1.07	0.42	0	-1.64	-0.02	-6.12	0.49	1	4	3	6.00	E
Norway	-2.91	0.04	0.91	0.47	1	-2.06	-1.15	-6.49	-0.23	0	4	2	6.00	S
Pakistan	-5.41	-1.13	-0.45	-0.78	0	-2.51	-0.98	-7.47	-0.62	0	5	4	1.82	E
Panama	-6.55	-0.55	-1.76	-0.95	1	-5.17	-1.94	-9.98	-2.75	0			2.11	F
Peru	-6.60	-1.84	-2.02	-1.62	0	-1.54	-0.07	-6.53	0.39	1	3	0	1.50	F
Philippines	-4.17	-0.69	0.03	-0.26	0	-1.47	-0.10	-5.92	0.58	1	3	0	1.64	F
Portugal	-4.32	-0.34	-0.19	-0.17	1	-3.40	-2.10	-7.52	-1.43	0	3	1	5.21	F
South Africa	-2.81	0.74	0.75	0.79	1	-1.90	0.94	-5.91	0.85	1	5	3	2.65	E
Spain	-3.11	-0.10	0.57	0.30	1	-2.36	-1.29	-6.14	-0.31	0	4	2	4.68	F
Sri Lanka	-5.97	-1.14	-1.26	-1.03	0	-2.66	-0.39	-7.37	-0.41	0	3	3	1.14	E
Sweden	-1.91	0.39	1.49	0.92	1	-1.18	-0.15	-5.47	0.80	1	3	2	6.00	S
Switzerland	0.55	0.91	2.98	1.88	1	-0.39	-0.71	-3.03	1.58	1	2	1	6.00	G
Thailand	-1.98	-0.06	2.33	0.86	1	-0.92	-0.66	-5.52	0.68	1	2	3	3.75	E
Trinidad and Tobago	-5.32	-0.50	-1.52	-0.67	0	-3.41	-1.00	-7.72	-1.04	0			4.00	E
Tunisia	-5.52	-0.44	-1.00	-0.58	1	-4.29	-1.91	-8.90	-2.09	0			2.79	F
Turkey	-4.77	-1.61	-0.03	-0.81	0	-0.73	-0.74	-5.54	0.71	1	2	2	3.11	F
United Kingdom	-1.33	0.41	2.72	1.27	1	-0.74	0.02	-4.79	1.24	1	5	4	5.14	E
United States	-0.80	0.64	2.24	1.37	1	-0.64	-0.11	-4.38	1.34	1	5	1	6.00	E
Zimbabwe	-6.14	-1.04	-1.37	-1.04	0	-2.58	0.03	-7.88	-0.35	0	3	4	2.21	E

Table 5A.1
(continued)

Notes:

Finance-activity = log(total value traded as share of GDP × claims on private sector by financial institutions as share of GDP)

Finance-size = log(market capitalization and claims on private sector by financial institutions as share of GDP)

Finance-efficiency = log(total value traded as share of GDP divided by banks' overhead costs as share of total assets)

Finance-aggregate = first principal component of finance-activity, finance-size, and finance-efficiency

Finance-dummy = takes value 0 if claims on private sector by banks as share of GDP and value traded as share of GDP are less than sample mean, 1 otherwise

Structure-activity = log(total value traded divided by claims on private sector by commercials banks)

Structure-size = log(market capitalization divided by claims on private sector by commercials bank)

Structure-efficiency = log(total value traded as share of GDP × banks' overhead costs as share of total assets)

Structure-aggregate = first principal components of structure-activity, structure-size, and structure-efficiency

Structure-dummy = dummy variable that takes the value 1 if structure-aggregate is above the median, 0 otherwise

Creditor = index of secured creditor rights

Anti-director = index of minority shareholder rights

Rule of law = measure of the law and order tradition of a country

Legal origin: E = British, F = French, G = German, S = Scandinavian

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Table 5A.2
External Dependence across Industries

ISIC code	Industrial sector	External dependence
314	Tobacco	−0.45
361	Pottery	−0.15
323	Leather	−0.14
3211	Spinning	−0.09
324	Footwear	−0.08
372	Nonferrous metal	0.01
322	Apparel	0.03
353	Petroleum refineries	0.04
369	Nonmetal mineral products	0.06
313	Beverages	0.08
371	Iron and steel	0.09
311	Food products	0.14
3411	Pulp, paper	0.15
3513	Synthetic resins	0.16
341	Paper and paper products	0.18
342	Printing and publishing	0.20
352	Other chemicals	0.22
355	Rubber products	0.23
332	Furniture	0.24
381	Metal products	0.24
3511	Basic industrial goods excl. fertilizers	0.25
331	Wood products	0.28
384	Transportation equipment	0.31
354	Petroleum and coal products	0.33
3843	Motor vehicles	0.39
321	Textile	0.40
382	Machinery	0.45
3841	Ships	0.46
390	Other industries	0.47
362	Glass	0.53
383	Electric machinery	0.77
385	Professional and scientific goods	0.96
3832	Radios	1.04
3825	Office and computing products	1.06
356	Plastic products	1.14
3522	Drugs	1.49

Source: Rajan and Zingales 1998.
External dependence is defined as capital expenditures (Compustat #128) minus cash flow from operations divided by capital expenditures. Cash flow from operations is broadly defined as the sum of Compustat funds from operations (items #110), decreases in inventories, decreases in receivables, and increases in payables

Notes

1. Specifically, firm-level studies (Demirgüç-Kunt and Maksimovic 1998, 1999), industry-level studies (Rajan and Zingales 1998; Wurgler 2000), country-case studies (Cameron et al. 1967; McKinnon 1973; Haber 1991, 1997), time-series studies (Neusser and Kugler 1998; Rousseau and Wachtel 1998), cross-country studies (King and Levine 1993a, b; Levine and Zervos 1998), cross-country instrumental variable studies (Levine 1998, 1999, 2000) and pooled cross-country, time-series studies (Beck and Levine 2000b; Beck, Levine, and Loayza 2000; Levine, Loayza, and Beck 2000; Rousseau and Wachtel forthcoming) find that the level of financial development is positively related to growth, and this relationship is not due only to simultaneity bias. Note, however, that these findings do not reject the hypothesis that economic activity influences financial development. The findings merely suggest that there is an exogenous component of financial development that positively influences economic activity, such that the strong positive relationship between the level of financial development and economic growth is not only due to economic activity's influence on financial development.

2. Everywhere in this chapter, new firm formation is proxied by new establishment formation.

3. There are, of course, some costs associated with developing this unified approach. The underlying papers perform more sensitivity analyses and robustness checks than we present in this synthesis.

4. Levine and Zervos (1998) point out a potential pitfall of Value Traded. If forward-looking stock markets anticipate large corporate profits and therefore higher economic growth, this will boost stock prices and therefore boost Value Traded. However, when we use the turnover ratio, which equals Value Traded divided by Market Capitalization, we get similar results. Turnover does not suffer from this price effect because stock prices enter into the numerator and denominator.

5. This does not include legal systems with Islamic roots or socialist systems.

6. Levine, Loayza, and Beck (2000) and Beck, Levine, and Loayza (2000) have used similar conditioning information sets in their work on the impact of financial intermediary development on economic growth. We also tried a full conditioning information set that comprises the policy conditioning information set and indicators of civil liberties, revolutions and coups, political assassinations, bureaucratic efficiency, and corruption. The results are similar.

7. We use the coefficient estimate for *Finance-activity* from table 5.5 (top panel).

8. Results available on request. See also Levine 2000 for further robustness tests.

9. We do not include financial development or financial structure on their own, since we focus on within-country and across-industry growth rates.

10. This does not correspond exactly to the convergence concept known from cross-country growth regressions. We include the share in manufacturing rather than the level, since we focus on within-country, across-industry growth rates. As in Rajan and Zingales (1998), γ enters significantly negative in most regressions.

11. Unlike in the cross-sectional growth regressions we include financial structure and financial development indicators at the same time, since we can exploit more variance

in these panel regressions. We therefore extend our set of instrumental variables by religious composition.

12. There are no cross-country data available on firms. An establishment is defined as a unit which engages, under a single ownership or control, in one, or predominantly one, kind of activity at a single location.

13. Since *Structure-efficiency* and *Finance-efficiency* are available only for the years 1990–1995, we do not use these measures in this section.

14. Beck and Levine (2000a) show that the growth in the average size of firms is related to neither financial development nor financial structure.

15. Results available on request.

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