Financial Dependence and Growth

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Abstract

This paper examines whether financial development facilitates economic growth by scrutinizing one rationale for such a relationship; that financial development reduces the costs of external finance to firms. Specifically, we ask whether industrial sectors that are relatively more in need of external finance develop disproportionately faster in countries with more developed financial markets. We find this to be true in a large sample of countries over the 1980s. We show this result is unlikely to be driven by omitted variables, outliers, or reverse causality. (JEL O4, F3, G1)

A large literature, dating at least as far back as Joseph A. Schumpeter (1911), emphasizes the positive influence of the development of a country's financial sector on the level and the rate of growth of its per capita income. The argument essentially is that the services the financial sector provides – of reallocating capital to the highest value use without substantial risk of loss through moral hazard, adverse selection, or transactions costs – are an essential catalyst of economic growth. Empirical work seems consistent with this argument. For example, on the basis of data from 35 countries between 1860 and 1963, Raymond W. Goldsmith (1969, p48)

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concludes that "a rough parallelism can be observed between economic and financial development if periods of several decades are considered". Nevertheless, studies such as these simply suggest correlation. As Goldsmith puts it "There is no possibility, however, of establishing with confidence the direction of the causal mechanism, i.e., of deciding whether financial factors were responsible for the acceleration of economic development or whether financial development reflected economic growth whose mainsprings must be sought elsewhere." While Goldsmith is agnostic, other economists have expressed downright scepticism that financial development is anything but a sideshow to economic development. Joan Robinson (1952, p86) is representative of such a viewpoint when she claims "where enterprise leads, finance follows".

In an important recent paper, Robert G. King and Ross Levine (1993a) investigate the causality problem following a post hoc, ergo propter hoc approach. They show that the predetermined component of financial development is a good predictor of growth over the next 10 to 30 years. However, the sceptic could still offer a number of arguments against attributing causality.

First, both financial development and growth could be driven by a common omitted variable such as the propensity of households in the economy to save. Since endogenous savings (in certain models of growth) affects the long run growth rate of the economy, it may not be surprising that growth and initial financial development are correlated. This argument is also hard to refute with simple cross-country regressions. In the absence of a well accepted theory of growth, the list of potential omitted variables that financial sector development might be a proxy for is large, and the explanatory variables to include a matter of conjecture.

Second, financial development – typically measured by the level of credit and the size of the stock market – may predict economic growth simply because financial markets anticipate future growth; the stock market capitalizes the present value of growth opportunities, while financial institutions lend more if they think sectors will grow. Thus financial development may simply be a leading indicator rather than a causal factor.

One way to make progress on causality is to focus on the details of theoretical mechanisms through which financial development affects economic growth, and document their working. Our paper is an attempt to do this. Specifically, theorists argue that financial markets and institutions help a firm overcome problems of moral hazard and adverse selection, thus reducing

the firm's cost of raising money from outsiders. So financial development should disproportionately help firms (or industries) typically dependent on external finance for their growth. Such a finding could be the 'smoking gun' in the debate about causality. There are two virtues to this simple test. First, it looks for evidence of a specific mechanism by which finance affects growth, thus providing a stronger test of causality. Second, it can correct for fixed country (and industry) effects. Though its contribution depends on how reasonable our micro-economic assumptions are, it is less dependent on a specific macroeconomic model of growth.

We construct the test as follows. We identify an industry's need for external finance (the difference between investments and cash generated from operations) from data on U.S. firms. Under the assumption that capital markets in the United States, especially for the large listed firms we analyze, are relatively frictionless, this method allows us to identify an industry's technological demand for external financing. Under the further assumption that such a technological demand carries over to other countries, we examine whether industries that are more dependent on external financing grow relatively faster in countries that, a priori, are more financially developed.

This would imply that, ceteris paribus, an industry such as Drugs and Pharmaceuticals, which requires a lot of external funding, should develop relatively faster than Tobacco, which requires little external finance, in countries that are more financially developed. Consider, for instance, Malaysia, Korea, and Chile, which are moderate-income, fast-growing, countries, that differ considerably in their financial development. Consistent with our hypothesis, in Malaysia, which was the most financially developed by our measures, Drugs and Pharmaceuticals grew at a 4 percent higher annual real rate over the 1980s than Tobacco (the growth rate for each industry is adjusted for the worldwide growth rate of that industry). In Korea, which was moderately financially developed, Drugs grew at a 3 percent higher rate than Tobacco. In Chile, which was in the lowest quartile of financial development, Drugs grew at a 2.5 percent lower rate than Tobacco. So financial development seems to affect relative growth rates of industries in the way predicted. We establish this result more systematically for a large cross-section of industries and countries in the body of the paper.

Delving deeper into the components of growth, industry growth can be decomposed into the growth in the number of establishments and the growth in the average size of existing estab-

lishments. New establishments are more likely to be new firms, which depend more on external finance than established firms. So the growth of the number of establishments in industries dependent on external finance should be particularly sensitive to financial development. This is indeed the case. Our estimates suggest that financial development has almost twice the economic effect on the growth of the number of establishments as it has on the growth of the average size of establishments. This suggests that an additional indirect channel through which financial development could influence growth is by disproportionately improving the prospects of young firms. If these are typically innovators, they make possible Schumpeterian "waves of creative destruction" that would not even get initiated in countries with less developed markets.

Let us be careful about what we find, and about what we have little to say. Our findings suggest that the ex ante development of financial markets facilitates the ex post growth of sectors dependent on external finance. This implies that the link between financial development and growth identified elsewhere may stem, at least in part, from a channel identified by the theory: financial markets and institutions reduce the cost of external finance for firms. Of course, our analysis suggests only that financial development liberates firms from the drudgery of generating funds internally. It is ultimately the availability of profitable investment opportunities that drives growth, and we have little to say about where these come from. In the imagery of Rondo Cameron (1967, p2), we find evidence consistent with finance as a lubricant, essential no doubt, but not a substitute for the machine.

Our paper relates closely to three recent papers that attempt to establish the direction of causation of the finance-growth correlation. Asli Demirguc-Kunt and Vojislav Maksimovic (1996) also use micro data to develop a test of the influence of financial development on growth. Using firm-level data, they estimate the proportion of firms whose rate of growth exceeds the growth that could have been supported only by internal resources. They then run a cross country regression and find that this proportion is positively related to the stock market turnover and to a measure of law enforcement. There are two essential differences from our paper. First, their estimate of the internal growth rate of a firm is dependent on the firm's characteristics. While it is potentially more accurate than our measure of external dependence, it is also more endogenous. Second, they focus on between-country differences in the spirit of traditional cross-country regressions, while our focus is on within-country, between-industry differences. The

latter is an important innovation in this paper.

Jith Jayaratne and Philip E. Strahan (1996) examine the liberalization of the banking sector in different states in the United States in recent years and show that this had a positive influence on a state's growth. Our attempt to correct for fixed effects is similar to theirs. They use differences in growth rates across the temporal shock of liberalization while we use differences between industries within a country to do so. Since they focus on a very nice natural experiment to provide identification, their methodology may be harder to apply to different countries or different questions. But the more important difference is that we focus on providing evidence for a micro-economic channel through which finance is supposed to work rather than examining, as they do, the broader correlation between finance and growth.

Finally, Levine and Sarah Zervos (1996) study whether stock markets and banks promote economic growth. They find that measures of market liquidity are strongly related to growth, capital accumulation, and productivity, while surprisingly, more traditional measures of development such as stock market size are not as robustly correlated. They also find that bank lending to the private sector has a strong independent effect on growth. They focus on a richer set of measures of financial development and growth than we do, but their cross-country regression methodology is also more traditional. The two studies should be viewed as complementary, theirs providing information on a broader set of correlations, while ours details a mechanism.

The rest of the paper is as follows. We start by describing the theoretical underpinnings of our work in section 1 and then our measure of external dependence in section 2. In section 3, we present our data on financial development, country characteristics, and industry growth. In section 4 we set up our main test and discuss the results. We explore other tests and the robustness of our findings in section 5. Section 6 concludes.

I Theoretical Underpinnings and The Basic Test.

A Theoretical Underpinnings

There has been extensive theoretical work on the relationship between financial development and economic growth. Economists have emphasized the role of financial development in better identifying investment opportunities, reducing investment in liquid but unproductive assets,

mobilizing savings, boosting technological innovation, and improving risk taking.[1] All these activities can lead to greater economic growth. We do not have the space to go into all these theories (see Levine (1997) for a comprehensive recent survey) so we content ourselves with outlining the essential theoretical underpinnings for our test.

Jeremy Greenwood and Boyan Jovanovic (1990) develop a model where the extent of financial intermediation and economic growth are endogenously determined. In their model, financial intermediaries can invest more productively than individuals because of their better ability to identify investment opportunities. So financial intermediation promotes growth because it allows a higher rate of return to be earned on capital, and growth in turn provides the means to implement costly financial structures.

Equivalently, the model could be recast to show that financial development reduces the cost of raising funds from sources external to the firm relative to the cost of internally generated cashflows. External funds are generally thought to be costlier because outsiders have less control over the borrower's actions (see, for example, Michael C. Jensen and William R. Meckling (1976)) or because they know less about what the borrower will do with the funds (see Joseph E. Stiglitz and Andrew Weiss (1981) and Stewart C. Myers and Nicholas S. Majluf (1984)). Financial development, in the form of better accounting and disclosure rules, and better corporate governance through institutions, will reduce the wedge between the cost of internal and external funds and enhance growth, especially for firms that are most reliant on external financing.[2]

A second issue is how financial development takes place. Some economists take the development of the financial market as exogenous to the model arguing that "differences in the extent of financial markets across countries seem to depend primarily on legislation and government regulation" (Bencivenga and Smith (p 207)). By contrast, Greenwood and Jovanovic (1990) have a "once-and-for-all" lump sum cost of development and development is endogenous to their framework. From the perspective of our paper, it really does not matter whether legal and political or economic forces are responsible for financial development. Our focus is on whether the pre-determined level of financial development affects growth. All we need for the stock of financial development to matter even when development is endogenous is that there be a cost to development (as in Greenwood and Jovanovic) or that financial development cannot happen instantaneously (as in reputational models of financial development such as Douglas W. Diamond

(1989)). Either assumption seems plausible.

If financial development cannot take place at low cost and on the fly, the above theories would suggest that the a priori existence of a well-developed financial market should disproportionately improve the ex post growth rates of industries that are technologically more dependent on external funds.

B The basic test

The most disaggregated comprehensive data on growth that we have for countries is at the industry level (data at the firm level, if available, is typically limited to large listed firms). Our hypothesis is that industries that are more dependent on external financing will have relatively higher growth rates in countries that have more developed financial markets.

Therefore, the dependent variable is the average annual real growth rate of value added in industry j in country k over the period 1980-1990. If we can measure industry j's dependence on external finance and country k's financial development, then after correcting for country and industry effects we must find that the coefficient estimate for the interaction between dependence and development is positive.

The most effective way of correcting for country and industry characteristics is to use indicator variables, one for each country and industry. Only additional explanatory variables that vary both with industry and country need be included. These are industry j's share in country k of total value added in manufacturing in 1980 and the primary variable of interest, the interaction between industry j's dependence on external financing and financial market development in country k.

The model we want to estimate is then

$$\begin{aligned} Growth_{j,k} = Constant + \beta_{1..m} \cdot Country\ Indicators + \beta_{m+1..n} \cdot Industry\ Indicators + \\ \beta_{n+1} \cdot (Industry\ j's\ share\ of\ manufacturing\ in\ country\ k\ in\ 1980) + \\ \beta_{n+2} \cdot (External\ Dependence\ of\ industry\ j \cdot Financial\ Development\ of\ country\ k) + \epsilon_{j,k} \end{aligned} \tag{1}$$

Of course, in order to estimate the model, we need appropriate measures of financial development and external dependence. This is what we will examine shortly.

Before proceeding, we point out that our study has one important advantage over recent

cross-country empirical studies of growth.[3] That advantage is simply that we make predictions about within country differences between industries based on an interaction between a country and industry characteristic. Therefore, we can correct for country and industry characteristics in ways that previous studies were unable to correct for, and will be less subject to criticism about an omitted variable bias or model specification.

II A Measure of Dependence on External Finance

A The proxy for dependence.

Data on the actual use of external financing is typically not available. But even if it were, it would not be useable because it would reflect the equilibrium between the demand for external funds and its supply. Since the latter is precisely what we are attempting to test for, this information is contaminated. Moreover, we are not aware of systematic studies of the external financing needs of different industries, either cross-sectionally or over time.[4]

We, therefore, have to find some other way of identifying an industry's dependence on external financing. We assume that there is a technological reason why some industries depend more on external finance than others. To the extent that the initial project scale, the gestation period, the cash harvest period, and the requirement for continuing investment differ substantially between industries, this is indeed plausible. Furthermore, we assume that these technological differences persist across countries, so that we can use an industry's dependence on external funds as identified in the U.S. as a measure of its dependence in other countries. While there are enormous differences in local conditions between countries, all we really need is that statements of the following sort hold: If pharmaceuticals require a larger initial scale and have a higher gestation period before cashflows are harvested than the textile industry in the U.S., it also requires a larger initial scale and has a higher gestation period in Korea.

B How the proxy is calculated.

We start by computing the external financing needs of U.S. companies over the 1980s. We use data from Compustat for this. Compustat does not contain a representative sample of U.S. firms, because it is limited to publicly traded firms, which are relatively large. Nevertheless, we

regard this as an advantage for two reasons. First, in a perfect capital market the supply of funds to firms is perfectly elastic at the proper risk adjusted rate. In such a market the actual amount of external funds raised by a firm equals its desired amount. In other words, in such an idealized setting, the identification problem does not exist. But capital markets in the United States are among the most advanced in the world, and large publicly traded firms typically face the least frictions in accessing finance. Thus the amount of external finance used by large firms in the United States is likely to be a relatively pure measure of their demand for external finance.[5]

A second reason for using a database on listed firms is that disclosure requirements imply that the data on financing are comprehensive. For most of the paper, we will take the amount of external finance used by U.S. firms in an industry as a proxy for the desired amount foreign firms in the same industry would have liked to raise had their financial markets been more developed.

Next, we have to define precisely what we mean by external and internal finance. We are interested in the amount of desired investment that cannot be financed through internal cash flows generated by the same business. Therefore, a firm's dependence on external finance is defined as the ratio of 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 cash flow from operations (Compustat # 110) plus decreases in inventories, decreases in receivables, and increases in payables.[6] Note that this definition includes changes in the non-financial components of net working capital as part of funds from operations. In fact, in certain businesses these represent major sources (or uses) of funds, that help a firm avoid (or force it to tap) external sources of funds.[7]

Similarly, the dependence on external equity finance is defined as the ratio of the net amount of equity issues (Compustat # 108 minus # 115) to capital expenditures. Finally, the investment intensity is the ratio of capital expenditure to net property plant and equipment (Compustat # 8).

To make these measures comparable with the industry level data we have for other countries, we have to choose how to aggregate these ratios over time and across companies. We sum the firm's use of external finance over the 1980s and then divide by the sum of capital expenditure

over the 1980s to get the firm's dependence on external finance in the 1980s. This smooths temporal fluctuations and reduces the effects of outliers. To summarize ratios across firms, however, we use the industry median. We do this to prevent large firms from swamping the information from small firms; for instance, we know that IBM's free cash flow does not alleviate possible cash flow shortages of small computer firms.

C External dependence for different industries.

In Table 1, we tabulate by International Standard Classification Code (ISIC) the fraction of investments U.S. firms financed externally (first column) and the level of capital expenditures divided by net property plant and equipment (second column). We restrict our attention to those manufacturing industries for which we have value-added data from the United Nations Statistics. Drugs and Pharmaceuticals emerge as the industry that uses the most external finance, with Plastics and Computing coming close behind. Tobacco, on the other hand, generates the most excess cash flow and has negative external funding needs.

It is common wisdom in the corporate finance literature (though we were hard-pressed to find formal empirical studies of this phenomenon) that there is a life cycle in the pattern of financing for firms; firms are more dependent on external financing early in their life than later. Figure 1 supports the common wisdom. It plots the median financing and investment needs across U.S. firms as a function of the number of years since the initial public offering (IPO). Not surprisingly, in the year of the IPO, firms raise a substantial amount of external funds (especially equity). More interestingly, this continues – albeit on a smaller scale – up to approximately the 10th year. After that period, net equity issues go to zero and the usage of external finance fluctuates around zero. In the third and fourth columns of Table 1, we report the external dependence and capital expenditures for mature companies (firms that were listed for more than 10 years), while the fifth and sixth columns are for young companies (firms that were listed for less than 10 years).[8] This pattern appears to be fairly standard across different industries, though there are exceptions. All this suggests that very young firms are more dependent on external finance than older firms. This fact will provide an additional test of our hypothesis.

D Is the Dependence of U.S. Firms a Good Proxy?

Much of our analysis rests on dependence of U.S. firms on external finance being a good proxy for the demand for external funds in other countries. We think this is reasonable for four reasons.

First, in a steady state equilibrium there will not be much need for external funds, as Figure 1 shows. Therefore, much of the demand for external funds is likely to arise as a result of technological shocks that raise an industry's investment opportunities beyond what internal funds can support. To the extent these shocks are worldwide, the need for funds of U.S. firms represents a good proxy.[9]

Second, even if the new investment opportunities generated by these worldwide shocks differ across countries, the amount of cash flow produced by existing firms in a certain industry is likely to be similar across countries. In fact, most of the determinants of ratio of cash flow to capital are likely to be similar worldwide: the level of demand for a certain product, its stage in the life cycle, and its cash harvest period. For this reason, we make sure that our results hold even when we use the amount of internally generated cash, rather than the difference between investments and internally generated funds. We also check that the results hold when we use dependence as measured in Canada, a country which has well developed capital markets but a very different banking system and industry concentration than the United States. Unfortunately, we do not have access to flow of funds data from any other countries, so we cannot venture further afield, but this methodology could, in principle, be used with dependence measured in any country with well functioning capital markets.

Third, one might argue that the stage of the product life cycle that U.S. firms are in is likely to be different from that of foreign firms. Given that our sample is biased toward developing countries one might think that the U.S. industry in the 1970s might be a better proxy for the position of developing countries in a product life cycle. For this reason, we also explore the robustness of our results to measuring the dependence of U.S. firms in the 1970s rather than in the 1980s. We also distinguish between dependence as measured for young firms in the United States (less than 10 years from listing) and dependence for old firms (more than 10 years from listing).

Last but not least, that we only have a noisy measure of the need for funds creates a bias against finding any interaction between dependence and financial development.

III Data.

A Data on industries.

Data on value added and gross fixed capital formation for each industry in each country are obtained from the Yearbook of Industrial Statistics (vol 1) database put together by the United Nations Statistics Division. We checked the data for inconsistencies, changes in classification of sectors, and changes in units. The U.N. data is classified by International SIC code. In order to obtain the amount of external finance used by the industry in the U.S., we matched ISIC codes with SIC codes.[10] Typically, the three digit ISIC codes correspond to two digit SIC codes, while the four digit ISIC code corresponds to three digit SIC codes. In order to reduce the dependence on country specific factors like natural resources we confine our analysis to manufacturing firms (U.S. SIC 2000-3999).

We would like data on as many countries as possible. The binding constraint is the availability of measures of financial development (specifically the availability of data on accounting standards). Since we also wanted data on equity market capitalization, we started with the 55 countries from the Emerging Stock Markets Factbook. We dropped countries like Kuwait that did not report a stock market capitalization till the latter half of the 1980s. We could not use Hong Kong and Taiwan because data on these countries are not present in the International Financial Statistics volumes. We also dropped countries for which we did not have data from the Yearbook database that is separated by at least five years (notably, Switzerland). Finally, Thailand is dropped because the U.N. notes that data from year to year are not comparable. The United States is excluded from the analysis because it is our benchmark. This leaves us with the 43 countries in Table 2.

We want to see if financially dependent industries are likely to be better off in countries with well developed financial sectors. The availability of finance affects not just investment but also the ability to finance operations and sales through working capital. Therefore, the most appropriate measure of an industry being "better off" is the growth in value added for that industry, i.e., the change in the log of real value added in that industry between 1980 and 1990. Real value added in 1990 is obtained by deflating value added by the Producer Price Index. For high inflation countries, spurious differences in value added may be obtained simply because the

UN data are measured at a different point from the PPI index. So, instead, we determine the effective deflator by dividing the growth in nominal value added for the entire manufacturing sector in the UN database by the index of industrial production (which measures the real growth rate in industrial production) obtained from the IFS statistics.

B Data on countries.

The Gross Domestic Product, the Producer Price Index, the exchange rate, and the Index of Industrial Production are all obtained from International Financial Statistics (I.F.S.) published by the International Monetary Fund. Whenever a particular series is not available, we use close substitutes – for instance, the wholesale price index if the producer price index is not available. Data on a country's human capital (average years of schooling in population over 25) is obtained from the Barro-Lee files downloaded from the NBER web site (see Barro and Jong Wha Lee (1993)).

C Measures of financial development.

Ideally, financial development should measure the ease with which borrowers and savers can be brought together, and once together, the confidence they have in one another. Thus financial development should be related to the variety of intermediaries and markets available, the efficiency with which they perform the evaluation, monitoring, certification, communication and distribution functions, and the legal and regulatory framework assuring performance. Since there is little agreement on how these are appropriately measured, and even less data available, we will have to make do with crude proxies even though they may miss many of the aspects we think vital to a modern financial system.

The first measure of financial development we use is fairly traditional – the ratio of domestic credit plus stock market capitalization to GDP. We call this the capitalization ratio. We obtain stock market capitalization for all countries listed in the Emerging Stock Markets Factbook published by the International Finance Corporation, which contains data on developed countries also.[11] Domestic credit is obtained from the International Financial Statistics. Specifically, it is the sum of IFS lines 32a through 32f and excluding 32e. Finally, domestic credit allocated to the private sector is IFS line 32d.

Despite the virtue of tradition, there are concerns with this measure. Unlike domestic credit, stock market capitalization does not reflect the amount of funding actually obtained by issuers. Instead, it reflects a composite of retained earnings, the investing public's perception of the corporate sector's growth prospects, and actual equity issuances. One could argue that the amount of money raised through initial public offerings and secondary offerings is more suitable for our purpose. Unfortunately, these data are not widely available. At the same time, one cannot dismiss the capitalization measure in favor of actual financing too easily. The net amount raised from U.S. equity markets by large firms was negative in the 1980s (see, for example, Rajan and Zingales (1995)). So the actual amount raised may underestimate the importance of the stock market's role in providing price information and liquidity to investors. Market capitalization may be a better measure of the importance of the stock market in this respect. Since we are unsure about whether market capitalization is a reasonable proxy, we will check that the results are robust to redefining the capitalization ratio as the ratio of domestic credit to the private sector to GDP.

The second proxy for financial development we use is the accounting standards in a country. Unlike our first measure, accounting standards reflect the potential for obtaining finance rather than the actual finance raised. Specifically, the higher the standards of financial disclosure in a country, the easier it will be for firms to raise funds from a wider circle of investors. The Center for International Financial Analysis and Research (CIFAR) creates an index for different countries by rating the annual reports of at least three firms in every country on the inclusion or omission of 90 items. Thus each country obtains a score out of 90 with a higher number indicating more disclosure. The Center for International Financial Analysis and Research which produces this data started analyzing balance sheets from 1983 onwards. However, their first comprehensive survey dates from 1990. We will use the accounting standards as measured in this study in much of the paper. The date of the survey raises concerns about endogeneity, but we believe such concerns are small to begin with, and can easily be addressed. First, accounting standards do not change much over time. In 1995, the CIFAR published a study examining how accounting standards had changed since 1983. This study estimated the standards in 1983 and 1990 based on a subset of annual reports, and for a subset of countries that are in the comprehensive 1990 survey. The study finds the mean accounting standards for countries

followed both in 1983 and 1990 is the same at 65. The Wilcoxon signed rank test for equality of distributions fails to reject the equality of the distribution of accounting standards across countries in the two years. Finally, the correlation between the accounting standards in 1983 and 1990 is 0.75.[12] Nevertheless, we will instrument accounting standards with variables that predate the period of growth that we are looking at. Also, we will use the 1983 data to see that the results hold in the subset of countries for which it is available.

Both our measures of financial development, accounting standards and the capitalization ratio, are tabulated for the different countries (see Table 2). While more developed countries have better accounting standards, there are exceptions. For instance, Malaysia scores as high as Australia or Canada, while Belgium and Germany are in the same league as Korea, Philippines, or Mexico. Portugal has among the worst accounting standards.

Before we go the the summary statistics, note that for a country's financial development to have any effect on industrial growth in that country we have to assume that firms finance themselves largely in their own country. In other words, only if world capital markets are not perfectly integrated can domestic financial development affect a country's growth. There is a wealth of evidence documenting the existence of frictions in international capital markets: the extremely high correlation between a country's savings and its investments (Martin Feldstein and Charles Horioka, 1980), the strong home bias in portfolio investments (Kenneth R. French and James M. Poterba, 1991), and cross countries differences in expected returns (Geert Bekaert and Cambell R. Harvey, 1995). We have little else to say about this assumption other than noting that its failure would weaken the power of our test but not necessarily bias our findings.

Summary statistics and correlations are in Table 3. A number of correlations are noteworthy. First, the financial sector is more developed in richer countries. The correlation of per capita income in 1980 with accounting standards and capitalization is 0.56 and 0.26 (significant at the 1 percent and 10 percent level respectively).

Second, the correlation between our capitalization measure of financial development and accounting standards is 0.41 (significant at the 5 percent level for the 33 countries for which we have both data). However, the correlations between accounting standards and the components of capitalization differ. Accounting standards are strongly correlated with equity market capitalization (correlation = 0.45, significant at the 1 percent level) but not with domestic credit

(correlation = 0.25, not significant). Domestic credit is credit offered by depository institutions and the central bank. One explanation of the low correlation is perhaps that institutions rely on their own private investigations, and credit from them is little affected by accounting standards. Another possible explanation is that when accounting standards are low, only institutions offer credit. But even though institutions benefit from improvements in accounting standards, other sources of finance become available, and firms substitute away from their traditional sources. We cannot distinguish between these explanations. It will suffice for our purpose that the overall availability of finance, whatever its source, increases with financial development.

IV Financial dependence and growth

A Results from the basic regression.

A.1 Varying measures of financial development

Table 4 reports the estimates of our basic specification (1) obtained by using various measures of financial development. Since the specification controls for country-specific effects and industry-specific effects, the only effects that are identified are those relative to variables that vary both cross countries and cross industries. Thus, Table 4 reports only the coefficient of the industry's share of total value added at the beginning of the sample and the coefficient of the interaction between external dependence and different measures of financial development.[13] Since we use U.S. data to identify the external dependence, we drop the United States in all regressions.

We start with total capitalization as the proxy for development. As can be seen in the first column of Table 4, the coefficient estimate for the interaction term is positive and statistically significant at the 1 percent level (throughout the paper, the reported standard errors are robust to heteroskedasticity).[14]

The interaction term is akin to a second derivative. One way to get a sense of its magnitude is as follows; the industry at the 75th percentile of dependence (high dependence) is Machinery. The industry at the 25th percentile (low dependence) is Beverages. The country at the 75th percentile of development as measured by capitalization is Italy, while the country at the 25th percentile is Philippines. We set the industry's initial share of manufacturing at its overall mean. The coefficient estimate then predicts that Machinery should grow 1.3 percent faster than

Beverages annually, and in real terms, in Italy as compared to Philippines. For comparison, the real annual growth rate is, on average, 3.4 percent per year. So a differential of 1.3 percent is a large number.

For each specification, we compute a similar number which is reported as the differential in real growth rate in the last row of each table. Of course, the countries at the 75th and 25th percentile vary with the measure of development as do the industries at the 75th and 25th percentile with the measure of dependence.

The rest of the columns of the table include different measures of development. We include domestic credit to the private sector in the second column, accounting standards in the third column, and accounting standards from the 1983 subsample in the fourth column (for ease of presentation, accounting standards have been divided by 100 in the estimation). The coefficients are uniformly significant at the 1 percent level. The economic magnitudes – as measured by the differential in growth rates – are also similar except when development is measured by accounting standards in 1983. The magnitude in column IV falls to approximately half of its level otherwise. The explanation for this fall is, perhaps, that the 1983 subsample, being based on just a few companies for each country, introduces significant measurement error.[15]

In the fifth column, we include both total capitalization and accounting standards. The coefficient for total capitalization is no longer different from zero and its magnitude falls to one fifth of its level in the first column. Similar results are obtained when we replace total capitalization by domestic credit to the private sector (coefficients not reported). This suggests that accounting standards capture the information about development that is contained in the capitalization measures. For this reason, we will use accounting standards as our measure of development in the rest of the paper. The reader should be assured, however, that the results are qualitatively similar when capitalization measures of development are used.

Because of potential concerns about endogeneity, we will, however, instrument accounting standards with predetermined institutional variables. Rafael La Porta et al. (1996) suggest that the origin of a country's legal system has an effect on the development of a domestic capital market and on the nature of the accounting system. Countries colonized by the British, in particular, tend to have sophisticated accounting standards while countries influenced by the French tend to have poor standards. This suggests using the colonial origin of a country's legal

system (indicators for whether it is British, French, German, or Scandinavian) as reported in La Porta, et al. as one instrument. Also, countries differ in the extent to which laws are enforced. So we use an index for the efficiency and integrity of the legal system produced by Business International Corporation (a country-risk rating agency) as another instrument. As the sixth column of Table 4 shows, the fundamental interaction becomes even stronger in magnitude when we estimate it using instrumental variables.

Before going further, consider the actual (rather than estimated) effects of development on the growth of specific industries. In Table 5, we summarize for the three least dependent and three most dependent industries, the residual growth rate obtained after partialling out industry and country effects. The pattern is remarkable. For countries below the median in accounting standards, the residual growth rate of the three least dependent industries is positive, while the residual growth rate of the three most dependent industries is negative. The pattern reverses for countries above the median. Clearly, this suggests no single country or industry drives our results and the realized differential in growth rates is systematic and large.

A.2 Varying measures of dependence.

We now check that our measure of dependence is, indeed, reasonable. We do this in two ways. First, we check that past financing in a country is related to the external dependence of industries in the country. Second, we check that our result is robust to different measures of dependence.

Total capitalization is a (crude) measure of how much finance has been raised in the past in the country. If external dependence is a proxy for an industry's technological need for external finance outside the United States, then countries more specialized in externally dependent industries should have higher capitalization. We calculate the weighted average dependence for each country by multiplying an industry's dependence on external finance by the fraction that the industry contributes to value added in the manufacturing sector in 1980. We then regress total capitalization against weighted average dependence for the 43 countries in the sample. Weighted average dependence is strongly positively correlated with capitalization in 1980 ($\beta = 2.89$, t=3.06). This suggests that our measure of dependence in the United States is related to the external financing used by industry in other countries.[16]

Next, in Table 6 we check that the results are robust to using the external dependence

measured for the sample of young firms. Since Figure 1 suggests that most of the demand for external funds is expressed early on in the life of a company, it may be legitimate to expect this to be a better measure of an industry's financial needs. Regardless of how we measure financial development, the interaction effect is positive and statistically significant at the 10 percent level or better and at the 5 percent level when we use instrumented accounting standards. The magnitude of the coefficient, however, is smaller (roughly a third of the one estimated in Table 6). In part, this reflects the higher level of the external finance raised by young companies. But even when we take this into account (see last row of the table), a difference, albeit smaller, persist. One possible explanation for this result is that young firms are not as important as mature firms in influencing the growth of the industry. We shall return on this issue in section V.A.

In Table 7, we undertake further robustness checks on our measure of external dependence. While we vary the measure of external dependence, we maintain as a measure of financial development a country's accounting standards, instrumented as above.

In the first column, external dependence is calculated restricting the sample only to mature firms (listed for more than 10 years) in the United States. Our interaction variable is positive and statistically significant and the estimated differential growth rate (0.9 percent) is similar to that for the entire sample.

Next, we check whether there is persistence in dependence. If the pattern of financing in the United States in the 1980s is very different from the pattern in the 1970s, it would be unreasonable to expect it to carry any information for other countries (especially developing countries that may use older technologies). The raw correlation between an industry's demand for external financing in the 1980s and its demand in the 1970s is 0.63. The coefficient estimate when dependence is measured by the demand for external financing in the 1970s is statistically significant, and the estimated differential growth rate is 0.9 percent.

Finally, it may be that our results derive from the peculiarities of the U.S. over the 1980s. Our method should work so long as we measure dependence in a country where financial constraints are thought to be small (so that we measure demand not supply). The only other country we have detailed data on flow of funds for is Canada. Canada is very different from the U.S. along important dimensions. Its banking system is more concentrated as is corporate ownership, and the composition of its industries is different. Nevertheless, the correlation between dependence

measured in the United States and dependence measured in Canada is 0.77. As the third column of Table 7 shows, the coefficient estimate when dependence is measured using Canadian data is highly significant. What is especially interesting both in this table and Table 4 is that the economic magnitude of the interaction effect is generally similar despite variation in the measure of dependence and development used.

V Other Tests

A Decomposition of sources of growth.

An industry can grow because new establishments are added to the industry or because existing establishments grow in size. The U.N. database also reports the number of establishments in an industry.[17] In our sample, it turns out that two-thirds of the growth is spurred by an increase in the average size of establishments, while the remaining third is accounted for by an increase in the number of establishments. The growth in the number of establishments is the log of the number of ending-period establishments less the log of the number of establishments in the beginning of period. The average size of establishments in the industry is obtained by dividing the value added in the industry by the number of establishments, and the growth in average size is obtained again as a difference in logs.

Although the definition of establishments provided by the Yearbook of Industrial Statistics does not coincide with the legal definition of a firm, there are three reasons why it is interesting to decompose the effect of financial development in its effect on the growth in the number of establishments and growth in the size of the existing establishments. First, since this statistic is often compiled by a different body in a country from the one that produces the value-added data, this test provides an independent check on our results.[18] Second, the creation of new establishments is more likely to require external funds, while the expansion of existing establishments can also use internal funds. Thus, the effect of financial development should be more pronounced for the first than for the second. Finally, the growth in the number of establishments is more likely to be generated by new firms than the growth in the size of the existing establishments. Thus, the growth in the number of establishments should be more sensitive to the external dependence measured using young firms in the United States.

We, then, estimate the basic regression with growth in number of establishments and growth in average size as dependent variables. As Table 8 indicates, the interaction variable is statistically significant only when explaining the growth in the number of establishments. More important, the differential in growth rate suggested by the estimate is twice as large in the second column (the regression with growth in numbers as the dependent variable) as in the first column (the regression with growth in average size as the dependent variable).

This finding that the development of financial markets has a disproportional impact on the growth of new establishments is suggestive. Financial development could indirectly influence growth by allowing new ideas to develop and challenge existing ones, much as Schumpeter argued.

Recall that in the previous section, we found that the dependence of young firms was of lower importance (both statistical and economic) than the dependence of mature firms in explaining the relative growth of industries. One explanation is that the dependence of young firms in the United States is an accurate measure of the needs of new firms in that industry elsewhere but only a noisy measure of the dependence of all firms. This seems to be the case. When dependence is measured for young firms, the interaction coefficient has a positive, statistically significant, effect on the growth in the number of establishments, but a negative (and statistically insignificant) effect on the growth of the average size of existing establishments (third and fourth columns); when dependence is measured for mature firms, the interaction coefficient has a positive a statistically significant effect on both.

Since most of growth in value added is generated by an increase in the average size of existing establishments, the most appropriate measure of external dependence seems to be one that includes both the needs of new firms as well as the needs of existing firms. This is why in the rest of the paper we shall use external dependence measured across all firms.

B Is the Interaction a Proxy for Other Variables?

Do external dependence or financial development proxy for something else? In principle, there is a long list of sources of comparative advantage that may dictate the presence, absence, or growth of industries in a country. Our results, though, cannot be explained unless the dependence of industries on this source of comparative advantage is strongly correlated with their dependence

on external funding and financial development is a good proxy for the source of comparative advantage. We rule out two such possibilities below.

Industries that are highly dependent on external finance – for example, drugs and pharmaceuticals – could also be dependent on human capital inputs. To the extent that financial market development and the availability of human capital are correlated, the observed interaction between external dependence and financial development may proxy for the interaction between human capital dependence and the availability of trained human capital. To check this, we include in the basic regression an interaction between the industry's dependence on external finance and a measure of the country's stock of human capital (average years of schooling in population over age 25). If the conjecture is true, the coefficient of the financial development interaction term should fall substantially. As the coefficient estimates in the first column of Table 9 show, the coefficient on the human capital interaction term is small and not statistically significant, while the financial development interaction increases somewhat. This suggests that financial dependence is not a proxy for the industry's dependence on human capital.

Another possibility is that lower dependence on external financing in the United States simply reflects the greater maturity of the industry. An influential view of the development process is that as technologies mature, industries using those technologies migrate from developed economies to developing economies (see, for example, Rudiger Dornbusch, Stanley Fischer, and Paul A. Samuelson (1977)). Since developing countries are more likely to have underdeveloped financial markets, the interaction effect we document may simply reflect the stronger growth of mature technologies in underdeveloped countries.

We already have results suggesting this cannot be the entire explanation. The interaction effect is present even when dependence is measured only for young firms in the United States. Furthermore, we can test if financial development is really a proxy for economic development in the regression. We include in the basic regression the interaction between the industry's dependence on external finance and the log per capita GDP for the country, in addition to our usual interaction term. As seen in the second column of Table 9, the coefficient of the interaction term falls from 0.165 (in the basic regression) to 0.149 but is still statistically and economically significant. The interaction between financial dependence and log per capita income is close to zero and not significant. The results do not suggest financial dependence is a proxy for

technological maturity.

C Other explanations: Reverse Causality.

Thus far, we have taken the state of financial markets as predetermined and exogenous. An alternative explanation of the development of financial markets is that they arise to accommodate the financing needs of finance-hungry industries.

The argument is as follows. Suppose there are some underlying country specific factors or endowments (such as natural resources) that favor certain industries (such as mining) that happen to be finance hungry. Then, countries abundant in these factors should experience higher growth rates in financially dependent industries and – as a result – should develop a strong financial market. If these factors persist, then growth rates in financially dependent sectors will persist and we will observe the significant interaction effect. But here it will result from omitted factors than any beneficial effect of finance.

On the one hand, the lack of persistence in country growth over periods of decades (see William Easterly, et al. (1993)) and the low correlation of sectoral growth across decades (Peter Klenow, 1995) suggest that this should not be a major concern. On the other hand, our finding that capitalization is higher when the weighted average dependence of industries in the country is high indicates the argument is not implausible.

The results we already have should reduce concerns about reverse causality. By restricting the sample to manufacturing firms, we have reduced the influence of availability of natural resources. More important, the measure of financial development we use, accounting standards, is instrumented with pre-determined variables that are unlikely to be correlated with omitted factors driving the growth of industries dependent on external finance. In fact, it should be less correlated with past financing than the capitalization measure, yet it explains future relative growth rates better.

However, we can also test the argument more directly. If an industry has a substantial presence in a particular country, it is logical that the country has the necessary resources and talents for the industry. So by further restricting the sample to industries that are above the median size in the country in 1980, we reduce the problem of differences in growth stemming from differences in endowment. When we estimate the regression with this smaller sample (third

column of Table 9), the interaction coefficient is virtually unchanged.

One way to make sense of all our findings without reverse causality driving the results is that financial markets and institutions may develop to meet the needs of one set of industries, but then facilitate the growth of another younger group of industries. Alfred D. Chandler (1977) suggests this is, in fact, what happened in the United States. The financial sector, especially investment banks and the corporate bond market, developed to meet the financing needs of railroads in the mid-nineteenth century. The financial infrastructure was, therefore, ready to meet the financing needs of industrial firms as they started growing in the latter half of the nineteenth century. Similarly, Goldsmith (1985, p2) based on a study of the balance-sheets of twenty countries writes "The creation of a modern financial superstructure, not in its details but in its essentials, was generally accomplished at a fairly early stage of a country's economic development".

Again, we can test this possibility more directly. We estimate the effect of financial development only for industries that are small to start out with, and are unlikely to be responsible for the state of development of the financial markets. So we estimate the basic regression for industries that in 1980 were less than the median size in their respective countries. The coefficient of the interaction term is again unchanged (see column four of Table 9) even for these industries, for whom the economy's financial development is largely predetermined. We conclude that reverse causality is unlikely to explain our results.

D Other Explanations: Investment and Cost of Capital.

Investment opportunities in different industries may be very different. For instance, the tobacco industry in the United States uses negative external finance (see Table 1) partly because investment opportunities in the Tobacco industry are small relative to the cashflows the industry generates. It may be that our measure of dependence on external finance proxies primarily for the investment intensity of a particular industry. Furthermore, the development of the financial sector may proxy for the overall cost of capital in that country (rather than the cost of external funds). The interaction effect then indicates that capital intensive firms grow faster in an environment with a lower cost of capital. Though this is a legitimate channel through which the financial sector influences growth, we are also interested in a different channel where the

reduction in the incremental cost of external funds facilitates growth.

If investment intensity were all that mattered, and external finance and internal finance were equally costly, the cash internally generated by industries would be irrelevant in countries that are more financially developed. All that mattered would be the size of the required investment and the cost of capital. By contrast, if there is a wedge between the cost of internal and external finance which narrows as the financial sector develops, industries generating lots of internal cash should grow relatively faster in countries with a poorly developed financial sector. As indicated in the first column of Table 10, they do. This is consistent with financial development reducing the cost of external finance. Of course, as is to be expected with both the "cost of capital" and "cost of external capital" hypotheses, industries that invest a lot also grow faster in countries with more developed financial markets (second column). Unfortunately, when both interactions are introduced in the same regression, the coefficients are measured very imprecisely because of multi-collinearity (cashflow intensity and investment intensity have a correlation of 0.73). So neither is statistically different from zero. However, the coefficient on cashflows is still negative and sizeable (accounting for a real growth rate differential of about 0.4 percent per year).

Multicollinearity results from our aggregating cashflows and investments over a decade.[19] Therefore, we estimate the same regression using a measure of cashflow intensity and investment intensity measured for just one year (rather than an entire decade). In the fourth column we report the estimates obtained by using the 1980 measures of cash flow and investment. Both the cash flow intensity and the investment intensity are statistically significant at the 5 percent level. We estimated (but not report) the same regression using a 1985 measure and a 1990 measure. In both cases the results are similar and both coefficients are statistically significant at the 5 percent level.

VI Conclusion

We develop a new methodology in this paper to investigate whether financial sector development has an influence on industrial growth. In doing so, we partially circumvent some of the problems with the existing cross-country methodology highlighted by Mankiw (1995). First, it is difficult to interpret observed correlations in cross-country regressions in a causal sense. Here, we push

the causality debate one step further by finding evidence for a channel through which finance theoretically influences growth. Also, since we have multiple observations per country, we can examine situations where the direction of causality is least likely to be reversed. A second problem with the traditional methodology is that explanatory variables are multi-collinear and are measured with error. The combination of these two problems may cause a variable to appear significant when it is merely a proxy for some other variable measured with error. As a result, observed correlations can be misleading. By looking at interaction effects (with country and industry indicators) rather than direct effects, we reduce the number of variables that we rely on, as well as the range of possible alternative explanations. Third, there is the problem of limited degrees of freedom – there are fewer than two hundred countries on which the myriad theories have to be tested. Our approach partially alleviates this problem by exploiting within-country variation in the data. Our methodology, may have wider applications, such as testing the existence of channels through which human capital can affect growth.

Apart from its methodological contribution, this paper's findings may bear on three different areas of current research. First, they suggest that financial development has a substantial supportive influence on the rate of economic growth and this works, at least partly, by reducing the cost of external finance to financially dependent firms. We should add that there is no contradiction when the lack of persistence of economic growth (Easterly, et al. (1993)) is set against the persistence of financial development. Other factors may cause (potentially serially uncorrelated) changes in a country's investment opportunity set. Finance may simply enable the pursuit of these opportunities, and thereby enhance long run growth. The paper does, however, suggest that financial development may play a particularly beneficial role in the rise of new firms. If these firms are disproportionately the source of ideas, financial development can enhance innovation, and thus enhance growth in indirect ways.

Second, in the context of the literature on financial constraints, this paper provides fresh evidence that financial market imperfections have an impact on investment and growth.

Finally, in the context of the trade literature, the findings suggest a potential explanation for the pattern of industry specialization across countries. To the extent that financial market development (or the lack thereof) is determined by historical accident or government regulation, the existence of a well developed market in a certain country represents a source of comparative

advantage for that country in industries that are more dependent on external finance. Similarly, the costs imposed by a lack of financial development will favor incumbent firms over new entrants. Therefore, the level of financial development can also be a factor in determining the size composition of an industry as well as its concentration. These issues are important areas for future research.

Notes

[1]Apart from the papers discussed below, see Valerie R. Bencivenga and Bruce D. Smith (1991), John H. Boyd and Smith (1996), King and Levine (1993 b), Giles Saint-Paul (1992), and Maurice Obstfeld (1994).

[2]In Greenwood and Jovanovic (1990), there are no moral hazard or asymmetric information problems at the level of the entrepreneur. The intermediary simply provides information about economy wide trends that the entrepreneur cannot figure out for himself, enabling the entrepreneur to invest his own funds more productively. An equivalent formulation is to distinguish between savers and entrepreneurs. Absent financial development, savers can invest directly only in safe, low return, government-sponsored projects, while financial development can reduce adverse selection, enabling savers to invest in risky (but often more productive) entrepreneurs.

[3]See, for example, Robert J. Barro (1991), Roger Kormendi and Philip Meguire (1985), King and Levine (1993a), Levine and David Renelt (1992), N. Grigori Mankiw, David Romer, and David Weil (1992), and Demirguc-Kunt and Maksimovic (1996).

[4]Colin Mayer (1990) does look at external financing, but largely at the country level.

[5]Even if capital markets are imperfect so that the supply is not perfectly elastic, this methodology provides a reasonable measure of the relative demand for funds provided the elasticity of the supply curve does not change substantially in the cross-section. By contrast, in a very imperfect capital market, the relative amount of funds raised may be a function not only of the demand for funds but also of factors that affect supply, such as the availability of collateral.

[6]This item is only defined for cash flow statements with format codes 1, 2, or 3. For format code 7 we construct it as the sum of items # 123, 125, 126, 106, 213, 217.

[7]It could be argued that inter-firm trade credit should be viewed as a component of external financing. It is unclear how much of trade credit is used to reduce transactions costs and how much is used for financing. Much trade credit is granted routinely and repaid promptly and usually, net trade credit for a firm (accounts receivable less payables) is small (see Mitchell A. Petersen and Rajan (forthcoming)). This may be why trade credit is typically treated as part of operations in capital budgeting exercises. We adhere to this tradition.

[8]We required that there be more than one observation in the industry for this variable to be computed. Even with this weak requirement we do not have data for some industries. Most notably there are insufficient young firms in the Tobacco industry.

[9]This amounts to saying that if the invention of personal computers increased the demand for external funds in the U.S. computer industry, it is likely to increase the need for funds in the computer industry in other countries as well.

[10]Not all the ISIC sectors for which the Yearbook of Industrial Statistics report data on value added are mutually exclusive. For example, drugs (3522) is a subsector of other chemicals (352). In these cases, the values of the broader sectors are net of the values of the subsectors that are separately reported. We follow this convention both for the data value added and for the financial data from Compustat.

[11]Stock market capitalization is measured at the end of the year, while Gross Domestic Product may value

flows through the year. This may be a problem in high inflation countries. We therefore measure GDP as the GDP in constant prices multiplied by the producer price index where the base year for both series is five years before the year of interest.

[12]The regression estimates are not sensitive to dropping the few countries such as Denmark and Spain that changed accounting standards substantially.

[13]The dependent variable is the average real growth rate over the period 1980-1990. For some countries, however, data availability limits the period. For no country do we have data separated by less than 5 years. A potential concern is that we measure growth in value added rather than growth in output. Unfortunately, we do not have data for the latter. While we may not capture increases in productivity fully, we see no obvious way in which this should bias our results.

[14]We reduce the impact of outliers by constraining growth between -1 and +1. Three observations are affected. The coefficient estimates for the interaction coefficient are higher and still significant when we do not do this, though the explanatory power of the regression is lower. We also re-estimate the same specification after winsorizing the 1 percent and 5 percent tails of the growth rate distribution obtaining virtually identical results (except that the explanatory power of the regression is still higher).

[15]When we instrument this measure (see next paragraph), the coefficient estimate goes up by 50 percent suggesting the coefficient estimate is biased downwards by measurement error.

[16]Of course, this raises the possibility of reverse causality which we will address later.

[17]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." (Industrial Statistics Yearbook p. 4). This definition may not coincide with the legal boundaries of the firm, but is the only one available for such a large cross section of countries.

[18]The disadvantage is that the industry classification used by the body compiling the number of firms may differ from the industry classification used by the body compiling value-added data, resulting in an increase in noise.

[19]Early investments will generate later cashflows resulting in the correlation. Aggregating over a decade, however, will still give a reasonable estimate of the average demand for external funds even though it tells us less about the components.

References

Barro, Robert J. "Economic Growth in a Cross-Section of Countries." Quarterly Journal of Economics, May 1991, 106, pp. 407-443.

Barro, Robert J. and Lee, Jong Wha. "International Comparisons of Educational Attainment." Journal of Monetary Economics, December 1993, 32(3), pp. 363-94.

Bekaert, Geert and Harvey, Campbell R. "Time-varying World Market Integration." Journal of Finance, June 1995, 50(3), pp. 403-44.

Bencivenga, Valerie and Smith Bruce. "Financial Intermediation and Endogenous growth." Review of Economic Studies, April 1991, 58(2), pp 195-209.

Boyd, John and Smith Bruce. "The Co-Evolution of the Real and Financial Sectors in the Growth Process." World Bank Economic Review, 1991, 10(2), pp 371-396.

Cameron, Rondo. Banking in the Early Stages of Industrialization. New York, NY: Oxford University Press, 1967.

Chandler, Alfred D. Jr. The Visible Hand: The Managerial Revolution in American Business Cambridge, MA: Harvard University Press, 1977.

Demirguc-Kunt, Asli and Maksimovic, Vojislav. "Financial Constraints, Uses of Funds and Firm Growth: An International Comparison." World Bank Working Paper, 1996.

Diamond, Douglas W." Reputation Acquisition in Debt Markets." Journal of Political Economy August 1989, 97(4), pp. 828-62.

Dornbusch, Rudiger; Fischer, Stanley and Samuelson, Paul A. "Comparative Advantage, Trade and Payments in A Ricardian Model with a Continuum of Goods." American Economic Review, December 1977, 67(5), pp. 823-839.

Easterly, William; Kremer, Michael; Pritchett, Lant and Summers, Lawrence H. "Good Policy or Good Luck? Country Growth Performance and Temporary Shocks." Journal of Monetary Economics, December 1993, 32(3), pp. 459-83.

Feldstein, Martin and Horioka, Charles. "Domestic Saving and International Capital Flows." The Economic Journal, December 1980, 90, pp. 314-29.

French, Kenneth R. and Poterba, James M. "Investor Diversification and International Equity Markets." American Economic Review, May 1991, 81(2), pp. 222-26.

Goldsmith, Raymond, W. Financial Structure and Development, New Haven, CT: Yale University Press, 1969.

Goldsmith, Raymond, W. Comparative National Balance Sheets Chicago, IL: University of Chicago Press, 1985.

Greenwood, Jeremy and Jovanovic, Boyan. "Financial Development, Growth, and the Distribution of Income." Journal of Political Economy, October 1990, 98(5), pp 1076-107.

International Finance Corporation. Emerging Stock Markets, Factbook. Washington, D.C.: 1990.

International Monetary Fund. International financial statistics. Washington, D.C.: 1993.

Jayaratne, Jith and Strahan, Philip E. "The Finance-Growth Nexus: Evidence from Bank Branch Deregulation." Quarterly Journal of Economics, August 1996, CXI(3), pp. 639-671.

Jensen, Michael C. and Meckling, William. "Theory of the Firm: Managerial Behavior, Agency Costs and Capital Structure." Journal of Financial Economics, October 1976, 3(4), pp. 305-60.

King, Robert G. and Levine, Ross. "Finance and Growth: Schumpeter Might Be Right." The Quarterly Journal of Economics, August 1993a, CVIII(3), pp. 681-737.

King, Robert G. and Levine, Ross. "Finance, Entrepreneurship, and Growth." Journal of Monetary Economics, December 1993, 32(3), pp. 513-42.

Klenow, Peter. "Ideas vs. Rival Human Capital: Industry Evidence on Growth Models." Mimeo, University of Chicago, 1995.

Kormendi, Roger and Meguire, Philip. "Macroeconomic Determinants of Growth." Journal of Monetary Economics, September 1985, 16, pp. 141-163.

La Porta, Rafael; Lopez de Silanes, Florencio; Shleifer, Andrei and Vishny, Robert. "Law and Finance," NBER Working Paper 5661, 1996.

Levine, Ross. "Financial Development and Economic Growth: Views and Agenda." Journal of Economic Literature., June 1997, 35(2), pp. 688-726.

Levine, Ross and Renelt, David. "A Sensitivity Analysis of Cross-Countries Growth Regressions." American Economic Review, September 1992, 82(4), pp. 942-963.

Levine, Ross and Zervos, Sara. "Stock Markets and Economic Growth." Mimeo, World Bank, 1996.

Mankiw, N. Gregory. "The Growth of Nations." Brookings Papers on Economic Activity, 1995, (1), pp. 275-310.

Mankiw, N. Gregory, Romer, David, Weil, David. "A Contribution to the Empirics of Economic Growth," The Quarterly Journal of Economics, May 1992, 152(2), pp. 407-437.

Mayer, Colin. "Financial Systems, Corporate Finance, and Economic Development," in R. Glenn Hubbard, ed., Asymmetric Information, Corporate Finance and Investment. Chicago, IL: The University of Chicago Press, 1990.

Myers, Stewart C. and Majluf, Nicholas S. "Corporate Financing and Investment Decisions when Firms have Information that Investors Do Not Have," Journal of Financial Economics, June 1984, 13 (2), pp. 187-222.

Obstfeld, Maurice. "Risk Taking, Global Diversification, and Growth." American Economic Review, December 1994, 84(5), pp 1310-29.

Petersen, Mitchell A. and Rajan, Raghuram R. "Trade Credit: Some Theories and Evidence." Review of Financial Studies, forthcoming.

Rajan, Raghuram R. and Zingales, Luigi. "What Do We Know About Capital Structure: Some Evidence From International Data." Journal of Finance, December 1995, 50(5), pp. 1421-60.

Robinson, Joan. "The Generalization of the Generat Theory," in The rate of interest, and other essays. London: Macmillan, 1952, pp. 67-142.

Saint-Paul, Gilles. "Technological Choice, Financial Markets, and Economic Development." European Economic Review, May 1992, 36 (4), pp 763-81.

Schumpeter, Joseph, A. A Theory of Economic Development. Cambridge, MA: Harvard University Press, 1911.

Standard & Poor. Compustat Services. New York, NY: McGraw Hill, 1994.

Stiglitz, Joseph, E. and Weiss, Andrew. "Credit Rationing in Markets with Imperfect Information." American Economic Review, June 1981, 71(3), pp. 393-410.

United Nations. Industrial Statistics Yearbook. New York, NY: United Nation Publications, 1993.

Table 1:

Pattern of external financing and investment across industries in the U.S. during the 1980s

The tablereports the median level of external financing, equity financing, and capital expenditure for ISIC industries during the 1980s. External dependence is the fraction of capital expenditures not financed with cash flow from operations. Cash flow from operations is broadly defined as the sum of Compustat funds from operations (item # 110), decreases in inventories, decreases in receivables, and increases in payables. Equity dependence is the ratio of the net amount of equity issues to capital expenditures. Capital expenditures are the ratio of capital expenditures to net property plan and equipment. Mature companies are firms that have been public for at least 10 years, correspondingly young companies are firms that went public less than 10 years ago. The year of going public is the first year in which a company starts to be traded on the NYSE, AMEX, or NASDAQ. All companies is the union of mature and young firms plus firms for which the year of going public could not be determined (firms already traded on NASDAQ in 1972). All the information is obtained from the flow of funds data in Compustat, except for the SIC code which is obtained from CRSP and then matched with the ISIC code.

		All companies		Mature companies		Young companies	
ISIC code	Industrial sectors	External dependence	Capital expenditures	External dependence	Capital expenditures	External dependence	Capital expenditures
314	Tobacco	-0.45	0.23	-0.38	0.24	.	.
361	Pottery	-0.15	0.20	0.16	0.41	-0.41	0.13
323	Leather	-0.14	0.21	-1.33	0.27	-1.53	0.16
3211	Spinning	-0.09	0.16	-0.04	0.19	.	.
324	Footwear	-0.08	0.25	-0.57	0.23	0.65	0.26
372	Non-ferrous metal	0.01	0.22	0.07	0.21	0.46	0.24
322	Apparel	0.03	0.31	-0.02	0.27	0.27	0.37
353	Petroleum refineries	0.04	0.22	-0.02	0.22	0.85	0.28
369	Non metal products	0.06	0.21	0.15	0.22	-0.03	0.26
313	Beverages	0.08	0.26	-0.15	0.28	0.63	0.26
371	Iron and steel	0.09	0.18	0.09	0.16	0.26	0.19
311	Food products	0.14	0.26	-0.05	0.25	0.66	0.33
3411	Pulp, paper	0.15	0.20	0.13	0.21	0.22	0.20
3513	Synthetic resins	0.16	0.30	-0.23	0.20	0.79	0.45
341	Paper and products	0.18	0.24	0.10	0.23	0.57	0.29
342	Printing & publishing	0.20	0.39	0.14	0.33	0.60	0.41
352	Other chemicals	0.22	0.31	-0.18	0.25	1.35	0.46
355	Rubber products	0.23	0.28	-0.12	0.21	0.50	0.32
332	Furniture	0.24	0.25	0.33	0.17	0.68	0.29
381	Metal products	0.24	0.29	0.04	0.25	0.87	0.34
3511	Basic exclud fert	0.25	0.30	0.08	0.24	0.79	0.29
331	Wood products	0.28	0.26	0.25	0.23	0.34	0.40
384	Transportation equipment	0.31	0.31	0.16	0.28	0.58	0.31
354	Petroleoum and coal products	0.33	0.23	0.16	0.26	-0.26	0.22

ISIC code	Industrial sectors	All companies		Mature companies		Young companies	
		External dependence	Capital expenditures	External dependence	Capital expenditures	External dependence	Capital expenditures
3843	Motor veichle	0.39	0.32	0.11	0.33	0.76	0.32
321	Textile	0.40	0.25	0.14	0.24	0.66	0.26
382	Machinery	0.45	0.29	0.22	0.25	0.75	0.33
3841	Ship	0.46	0.43	0.04	0.34	1.05	0.56
390	Other industries	0.47	0.37	-0.05	0.28	0.80	0.49
362	Glass	0.53	0.28	0.03	0.28	1.52	0.33
383	Electric machinery	0.77	0.38	0.23	0.29	1.22	0.46
385	Professional goods	0.96	0.45	0.19	0.33	1.63	0.52
3832	Radio	1.04	0.42	0.39	0.30	1.35	0.48
3825	Office &computing	1.06	0.60	0.26	0.38	1.16	0.64
356	Plastic products	1.14	0.44	.	.	1.14	0.48
3522	Drugs	1.49	0.44	0.03	0.32	2.06	0.47

Table 2:

Financial development across countries.

Accounting standards is an index developed by the Center for International Financial Analysis & Research ranking the amount of disclosure in annual company reports in each country. Total Capitalization to GDP is the ratio of the sum of equity market capitalization (as reported by the IFC) and domestic credit (IFS line 32a-32f but not 32 e) to GDP. Domestic credit to the private sector is IFS line 32d. Per capita income in 1980 is in dollars and is from the IFS.

Country	Accounting standards	Total capitalization over GDP	Domestic credit to private sector over GDP	Per capita income (dollars)
Bangladesh	.	0.20	0.07	121
Kenya	.	0.28	0.20	417
Morocco	.	0.41	0.16	807
Sri Lanka	.	0.44	0.21	252
Pakistan	.	0.53	0.25	290
Costa Rica	.	0.53	0.26	2,155
Zimbabwe	.	1.01	0.30	441
Jordan	.	1.16	0.54	1,109
Egypt	24	0.74	0.21	563
Portugal	36	0.82	0.52	2,301
Peru	38	0.28	0.11	842
Venezuela	40	0.34	0.30	3,975
Colombia	50	0.21	0.14	1,150

Country	Accounting standards	Total capitalization over GDP	Domestic credit to private sector over GDP	Per capita income (dollars)
Turkey	51	0.35	0.14	1,081
Chile	52	0.74	0.36	2,531
Brazil	54	0.33	0.23	1,650
Austria	54	1.00	0.77	9,554
Greece	55	0.74	0.44	3,814
India	57	0.50	0.24	240
Mexico	60	0.39	0.16	2,651
Belgium	61	0.65	0.29	11,226
Denmark	62	0.56	0.42	12,188
Germany	62	1.08	0.78	12,345
Italy	62	0.98	0.42	6,460
Korea	62	0.63	0.50	1,407
Netherlands	64	0.91	0.60	11,155
Spain	64	1.02	0.76	5,087
Israel	64	1.18	0.67	3,573
Philippines	65	0.46	0.28	729
Japan	65	1.31	0.86	9,912
France	69	0.70	0.54	11,337
New Zealand	70	0.59	0.19	7,490
South Africa	70	1.51	0.26	2,899
Norway	74	0.63	0.34	13,430
Canada	74	0.98	0.45	10,486
Australia	75	0.82	0.28	9,866
Malaysia	76	1.19	0.48	1,683
Finland	77	0.52	0.48	10,181
UK	78	0.78	0.25	9,600
Singapore	78	1.96	0.57	4,661
Sweden	83	0.79	0.42	14,368

Table 3:

Summary Statistics.

Industry real growth is the annual compounded growth rate in real value added for the period 1980-1990 for each ISIC industry in each country. The growth in the number of firms is the difference between the log of number of ending-period firms and the log of number of beginning-period firms. The average size of firms in the industry is obtained by dividing the value added in the industry by the number of firms, and the growth in average size is obtained again as a difference in logs. The industry's share of total value added is computed dividing the 1980 value added of the industry by the total value added in manufacturing that year. External dependence is the median fraction of capital expenditures not financed with cash flow from operations for each industry. Cash flow from operations is broadly defined as the sum of Compustat funds from operations (item # 110), decreases in inventories, decreases in receivables, and increases in payables. External dependence has been constructed using Compustat firms between 1980 and 1990 except for Canada where we use Global Vantage data between 1982 and 1990. Accounting standards is an index developed by the Center for International Financial Analysis & Research ranking the amount of disclosure of companies' annual reports in each country. In panels B and C the p-value are reported in brackets.

A: Summary statistics						
Variable	Mean	Median	Standard Deviation	Minimum	Maximum	Number of observations
Industry real growth	0.034	0.029	0.099	-0.447	1.000	1242
Industry growth in number of firms	0.012	0.007	0.071	-0.414	0.759	1073
Industry growth in average firms' size	0.022	0.026	0.094	-0.536	0.410	1070
Industry's share of total value added	0.016	0.009	0.021	0.000	0.224	1217
Log per capita income in 1980 in dollars	7.814	7.883	1.340	4.793	9.573	43
Average years of schooling	5.900	5.442	2.829	1.681	12.141	41
External finance dependence (all firms)	0.319	0.231	0.319	-0.451	1.492	36
External finance dependence (old firms)	0.010	0.075	0.302	-1.330	0.394	35
External finance dependence (young firms)	0.675	0.673	0.643	-1.535	2.058	34
External finance dependence (1970s)	0.078	0.073	0.188	-0.450	0.542	35
External finance dependence (Canadian firms)	0.427	0.384	0.767	-0.802	3.512	27
Cash flow generated	0.173	0.198	0.112	-0.217	0.331	36
Investment intensity	0.298	0.278	0.095	0.161	0.600	36
Total capitalization over GDP	0.738	0.696	0.375	0.199	1.962	41
Domestic credit to private sector over GDP	0.377	0.302	0.201	0.069	0.856	41
Accounting standards	61.324	62.000	13.238	24.000	83.000	34
Accounting standards (1983)	65.393	68.500	11.426	39.000	81.000	28

B: Correlation between measures of external dependence

	All	Old	Young	1970s	Cash flow	Investment
External finance dependence (all firms)	1.00					
External finance dependence (old firms)	0.46	1.00				
	(0.01)					
External finance dependence (young firms)	0.72	0.48	1.00			
	(0.00)	(0.00)				
External finance dependence (1970s)	0.63	0.42	0.48	1.00		
	(0.00)	(0.01)	(0.00)			
Cash flow generated	-0.91	-0.37	-0.55	-0.50	1.00	
	(0.00)	(0.03)	(0.00)	(0.00)		
Investment intensity	0.81	0.28	0.64	0.63	-0.60	1.00
	(0.00)	(0.10)	(0.00)	(0.00)	(0.00)	
External finance dependence (Canadian firms)	0.77	0.36	0.58	0.37	-0.78	0.55
	(0.00)	(0.07)	(0.00)	(0.07)	(0.00)	(0.00)

C: Correlation between measures of financial development

	Total capitalization	Market capitalization	Domestic credit to private sector	Accounting standards	Accounting standards 1983
Market capitalization over GDP	0.79				
	(0.00)				
Domestic credit to private sector	0.67	0.21	1.00		
over GDP	(0.00)	(0.18)			
Accounting standards	0.41	0.45	0.25	1.00	
	(0.02)	(0.01)	(0.17)		
Accounting standards (1983)	0.27	0.39	-0.14	0.68	1.00
	(0.17)	(0.05)	(0.50)	(0.00)	
Per capita income	0.26	0.04	0.48	0.56	0.28
	(0.09)	(0.80)	(0.00)	(0.00)	(0.16)

Table 4:

Industry growth and various measures of development.

The dependent variable is the annual compounded growth rate in real value added for the period 1980-1990 for each ISIC industry in each country. External dependence is the fraction of capital expenditures not financed with internal funds for U.S. firms in the same industry between 1980-90. The interaction variable is the product of external dependence and financial development. Financial development is total capitalization in the first column, domestic credit to the private sector over GDP in the second column, accounting standards in 1990 in the third column, accounting standards in 1983 in the fourth column. The sixth column is estimated with instrumental variables. Both the coefficient estimate for the interaction term and the standard error when accounting standards is the measure of development are multiplied by 100. The differential in real growth rate measures (in percentage terms) how much faster an industry at the 75th percentile level of external dependence grows with respect to an industry and 25th percentile level when it is located in a country at the 75th percentile of financial development rather than in one at the a 25th percentile. All regressions include both country and industry fixed effects (coefficient estimates not reported). Heteroscedasticity robust standard errors are reported in brackets.

	Financial development measured as					
Variable	Total capitalization	Bank debt	Accounting standards	Accounting standards in 1983	Accounting standards and Capitalization	Instrumental variables
Industry's share of total value added in manufacturing in 1980	-0.912 (0.246)	-0.899 (0.245)	-0.643 (0.204)	-0.587 (0.223)	-0.433 (0.135)	-0.648 (0.203)
Interaction (external dependence X total capitalization)	0.069 (0.023)				0.012 (0.014)	
Interaction (external dependence X domestic credit to private sector)		0.118 (0.037)				
Interaction (external dependence X accounting standards)			0.155 (0.034)		0.133 (0.034)	0.165 (0.044)
Interaction (external dependence X accounting standards 1983)				0.099 (0.036)		
R-squared	0.290	0.290	0.346	0.239	0.419	0.346
Number of observations	1217	1217	1067	855	1042	1067
Differential in real growth rate	1.3	1.1	0.9	0.4	1.3	1.0

Table 5:

Effect of Financial Development on Actual Growth Rates in Different Industries.

This tablereports the mean residual growth rate (in percentage term) obtained after regressing the annual compounded growth rate in real value added for the period 1980-1990 on industry and country dummies.

	Countries below the median in accounting standards	Countries above the median in accounting standards
	Least financially dependent industries	
Tobacco	0.53	-0.60
Pottery	0.25	-0.30
Leather	0.77	-0.77
	Most financially dependent industries	
Drug	-1.11	1.30
Plastics	-0.21	0.21
Computers	-2.00	1.80

Table 6:

Industry growth and various measures of development using external dependence measured for young firms.

The dependent variable is the annual compounded growth rate in real value added for the period 1980-1990 for each ISIC industry in each country. External dependence is the fraction of capital expenditures not financed with internal funds between 1980-90 for U.S. firms who went public in the previous ten years belonging to the same industry. The interaction variable is the product of external dependence and financial development. Financial development is total capitalization in the first column, domestic credit to the private sector over GDP in the second column, accounting standards in 1990 in the third column, accounting standards in 1983 in the fourth column. The sixth column is estimated with instrumental variables. Both the coefficient estimate for the interaction term and the standard error when accounting standards is the measure of development are multiplied by 100. The differential in real growth rate measures (in percentage terms) how much faster an industry at the 75th percentile level of external dependence grows with respect to an industry and 25th percentile level when it is located in a country at the 75th percentile of financial development rather than in one at the a 25th percentile. All regressions include both country and industry fixed effects (coefficient estimates not reported). Heteroscedasticity robust standard errors are reported in brackets.

	Financial development measured as					
Variable	total capita-lization	bank debt	accounting standards	accounting standards in 1983	accounting standards and capitalization	instrumental variables
Industry's share of total value added in manufacturing in 1980	-0.911 (0.287)	-0.904 (0.286)	-0.568 (0.234)	-0.616 (0.252)	-0.293 (0.149)	-0.571 (0.233)
Interaction (external dependence X total capitalization)	0.021 (0.012)				-0.004 (0.008)	
Interaction (external dependence X domestic credit to private sector)		0.034 (0.019)				
Interaction (external dependence X accounting standards)			0.046 (0.021)		0.045 (0.022)	0.058 (0.028)
Interaction (external dependence X accounting standards 1983)				0.038 (0.019)		
R-squared	0.283	0.283	0.341	0.236	0.415	0.340
Number of observations	1150	1150	1008	808	984	1008
Differential in real growth rate	0.6	0.5	0.4	0.2	0.1	0.5

Table 7:

Industry growth and various measures of external dependence

The dependent variable is the annual compounded growth rate in real value added for the period 1980-1990 for each ISIC industry in each country. External dependence is the fraction of capital expenditures not financed with internal funds by firms in the same industry during the 1980s. In the first column this ratio is computed only for companies that have been public for at least 10 years, in the second column the ratio is computed for companies that have gone public in the last 9 years, in the second column it is computed for U.S. firms during the 1970s. In the third column it is computed for Canadian firms during the 1980s. Also in the third column, data on U.S. industries are included while data on Canadian industries are dropped. The differential in real growth rate measures (in percentage terms) how much faster an industry at the 75th percentile level of external dependence grows with respect to an industry and 25th percentile level when it is located in a country at the 75th percentile of financial development rather than in one at the a 25th percentile. All regressions are estimated using instrumental variables and include both country and industry fixed effects (coefficient estimates not reported). Heteroscedasticity robust standard errors are reported in brackets.

Variable	External dependence measured using Old firms	1970s firms	Canadian firms
Industry's share of total value added in manufacturing in 1980	-0.648 (0.227)	-0.620 (0.205)	-0.610 (0.235)
Interaction (external dependence X accounting standards)	0.255 (0.064)	0.315 (0.127)	0.068 (0.023)
R-squared	0.344	0.3345	0.343
Number of observations	979	1035	802
Differential in real growth rate	0.9	0.9	0.8

Table 8:

Growth in average size and number of establishments

The average size of establishments in the industry is obtained by dividing the value added in the industry by the number of establishments, and the growth in average size is obtained as a difference in logs between average size in 1990 and average size in 1980. The growth in the number of establishments is the log of the number of establishments in 1990 less the log of the number of establishments in 1980. The differential in real growth rate measures (in percentage terms) how much faster an industry at the 75th percentile level of external dependence grows with respect to an industry and 25th percentile level when it is located in a country at the 75th percentile of financial development rather than in one at the a 25th percentile. All regressions are estimated using instrumental variables and include both country and industry fixed effects (coefficient estimates not reported). Heteroscedasticity robust standard errors are reported in brackets.

	External dependence measured using					
	All firms		Young firms		Mature firms	
Variable	Growth average size	Growth number	Growth average size	Growth number	Growth average size	Growth number
Industry's share of total value added in manufacturing in 1980	-0.620 (0.217)	-0.312 (0.154)	-0.662 (0.252)	-0.267 (0.176)	-0.624 (0.220)	-0.282 (0.152)
Interaction (external dependence X accounting standards)	0.051 (0.043)	0.115 (0.037)	-0.018 (0.028)	0.078 (0.023)	0.125 (0.055)	0.131 (0.041)
R-squared	0.498	0.347	0.499	0.308	0.492	0.310
Number of observations	951	1011	926	949	923	947
Differential in real growth rate	0.3	0.7	-0.2	0.6	0.4	0.4

Table 9:

Robustness Checks

The dependent variable is the annual compounded growth rate in real value added for the period 1980-1990 for each ISIC industry in each country. The first column adds to the basic specification the interaction between external dependence and a country's human capital. The second column adds to the basic specification the interaction between external dependence and a country's level of economic development (log per capita income). The third column estimates the basic specification for industries that in 1980 were above the median industry in terms of the fraction they accounted for of value added in the manufacturing sector. The fourth column estimates the basic specification for industries that in 1980 were below the median industry in terms of the fraction they accounted for of value added in the manufacturing sector. The differential in real growth rate measures (in percentage terms) how much faster an industry at the 75th percentile level of external dependence grows with respect to an industry and 25th percentile level when it is located in a country at the 75th percentile of financial development rather than in one at the a 25th percentile. All regressions are estimated using instrumental variables and include both country and industry fixed effects (coefficient estimates not reported). Heteroscedasticity robust standard errors are reported in brackets.

Variable	Human capital	Economic development	Below median	Above median
Industry's share of total value added in manufacturing in 1980	-0.386 (0.137)	-0.422 (0.134)	-0.437 (0.178)	-6.079 (1.932)
Interaction (external dependence X accounting standards)	0.191 (0.072)	0.149 (0.055)	0.161 (0.065)	0.161 (0.066)
Interaction 2 (external dependence X average years of schooling)	-0.002 (0.003)			
Interaction 3(external dependence X log of per capita income in 1980)		0.000 (0.005)		
R-squared	0.413	0.418	0.548	0.390
Number of observations	1006	1042	522	545
Differential in real growth rate	1.0	0.9	0.9	1.0

Table 10:

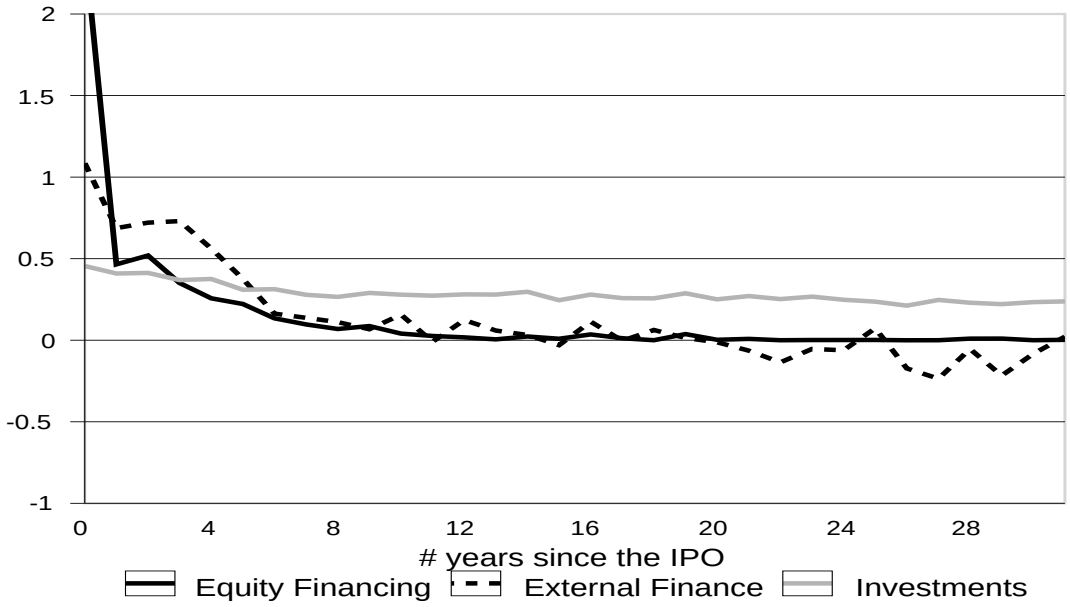
Cash Flow and Investments

The dependent variable is the annual compounded growth rate in real value added for the period 1980-1990 for each ISIC industry in each country. Internal cash flow is the ratio of cash flow from operations broadly defined (see text) to net property plant and equipment for U.S. firms in the same industry. Investment intensity is the ratio of capital expenditures to property plant and equipment for U.S. firms in the same industry. The fourth column uses the cashflow intensity and the investment intensity measured for the year 1980. The differential in real growth rate measures (in percentage terms) how much faster an industry at the 75th percentile level of external dependence grows with respect to an industry and 25th percentile level when it is located in a country at the 75th percentile of financial development rather than in one at the a 25th percentile. All regressions are estimated using instrumental variables and include both country and industry fixed effects (coefficient estimates not reported). Heteroscedasticity robust standard errors are reported in brackets.

Variable	Cashflow intensiveness	Investment intensiveness	Both	Both measured for 1980
Industry's share of total value added in manufacturing in 1980	-0.588 (0.201)	-0.653 (0.205)	-0.639 (0.205)	-0.639 (0.207)
Interaction (internal cash flow X financial development)	-0.482 (0.153)		-0.261 (0.196)	-0.595 (0.295)
Interaction 2 (investment intensiveness X accounting standards)		0.623 (0.221)	0.443 (0.283)	0.800 (0.299)
R-squared	0.343	0.345	0.345	0.344
Number of observations	1067	1067	1067	1035
Differential in real growth rate	-0.7	1.4	0.5	1.6

Figure 1:

Life Cycle of External Financing and Investments



The graph plots the median level of external financing, equity financing, and investments in the U.S. across 3-digit SIC industries as a function of the number of years since the IPO. External finance is the amount of investments (CAPEX) not financed with cash flow from operations, reduction in inventories, or decreases in trade credit. Equity finance is the net amount of funds raised through equity issues divided by the amount of investments. Investment is the ratio of CAPEX to net property, plant and equipment. The IPO year is defined as the first year in which a company starts to be traded on the NYSE, AMEX, or NASDAQ. All the information is obtained from the flow of funds data in Compustat, except for the SIC code which is from CRSP.