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ABSTRACT

Banking Crises, Financial Dependence and Growth*

This paper investigates the growth impact of banking crises on industries with different levels of dependence on external sources of finance to analyze the mechanisms linking financial shocks and real activity. If the banking system is the key element allowing credit constraints to be relaxed, then a sudden loss of these intermediaries in a system where such intermediaries are important should have a disproportionately contractionary impact on the sectors that flourished due to their reliance on banks. Using data from 38 developed and developing countries that experienced financial crises during the last quarter century, we find that sectors highly dependent on external finance tend to experience a substantially greater contraction of value added during a banking crisis in deeper financial systems than in countries with shallower financial systems. On average, in a country experiencing a banking crisis, a sector at the 75th percentile of external dependence and located in a country at the 75th percentile of private credit to GDP would experience a 1.6 percent greater contraction in growth in value added between the crisis and pre-crisis period than a sector at the 25th percentile of external dependence and private credit to GDP. This effect is sizeable compared with an overall mean decline in growth of 3.5 percent between these two periods. Our results, however, do not suggest that on net the externally dependent firms fare worse in deep financial systems.

JEL Classification: G21 and O16
Keywords: banking and financial crises, credit channel, financial development and financing constraints

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I. Introduction

While it is widely accepted that financial crises have adverse consequences for the economy as a whole, relatively little empirical work investigates the mechanisms by which financial crises generate problems in the real sector. In this paper, we analyze data from 38 developed and developing countries that have experienced financial crises during the last 25 years to investigate the impact of crises on industrial growth in those countries. This paper thus contributes to the literature on the mechanisms linking financial shocks and real economic activity.

Much theoretical work has been done on how financial intermediaries and financial markets facilitate investment by firms and, hence, promote economic growth (see Levine (1997, 2005) and Kroszner and Strahan (2005) for overviews). Financial intermediaries and financial markets are generally thought to reduce moral hazard and adverse selection problems that can make raising external funds difficult and expensive for firms. Well-functioning and well-developed financial intermediaries and markets thus should disproportionately benefit firms that are most dependent on external funds to finance their growth. Conversely, crises in the financial sector thus should have a disproportionately negative impact on firms that rely heavily on external sources of finance.

We investigate whether the impact of a financial crisis on sectors dependent on external sources of financing varies with the level of development of the financial system. To evaluate the empirical relevance of this theoretical mechanism, our empirical work focuses on the differential impact of banking financial crises on sectoral growth. Others such as Rajan and Zingales (1998) have argued that a deep financial system appears to relax credit constraints to permit externally dependent sectors to grow faster during normal periods. We instead focus on

banking and financial crises because such periods of turmoil provide a way to isolate the impact of banks on firms as providers of credit and liquidity during times of distress. If the banking system is the key element allowing credit constraints to be relaxed, then a sudden loss of these intermediaries in a system where such intermediaries are important should have a disproportionately contractionary impact on the sectors that flourished due to their reliance on banks.

To preview our main result, we find that in well-developed and deep financial systems, sectors highly dependent on external finance tend to experience a greater contraction of value added during a crisis than do externally dependent sectors in countries with shallower financial systems. Our proxy for the depth of the financial system is the ratio of private credit to GDP. The effect is economically significant: On average, in a country experiencing a banking crisis, a sector at the 75th percentile of external dependence and located in a country at the 75th percentile of private credit to GDP would experience a 1.6 percent greater contraction in growth in value added between the crisis and pre-crisis period than a sector at the 25th percentile of external dependence and located in a country at the 25th percentile of private credit to GDP. This is a large effect compared with an overall mean decline in growth of 3.5 percent between these two periods. We thus find an important real impact of banking crises on growth.

To investigate further the implications of the "credit channel" impact of banking crises, we consider a variety of industry and country characteristics. Among firms that depend heavily on outside financing, young firms with short histories and firms with a large fraction of hard-to-measure intangible assets, for example, may have particular difficulties raising funds from the market and instead will typically depend on banks and other intermediaries. Consistent with this interpretation, we find a differential impact of banking crises on growth for industries dominated

by young firms that are highly dependent on external finance and for industries with high levels of intangible assets.

To separate out the impact of financial depth from other factors that might be correlated with financial depth, we control for the quality of institutions in a country as well as the overall level of economic development and find that our results continue to hold. In addition, the differential sectoral impact of a banking crisis is most pronounced in countries with relatively low incomes.

As further evidence of the credit channel through banking, we investigate how our main result depends on the frequency and types of crises. We find that our result is more pronounced for countries that have experienced multiple banking crises. To assess whether the effect we find is due to banking crises rather than other types of economic shocks, we re-run our main set of regressions for currency crises and economic recessions rather than banking crises. When we do this, we no longer find an effect, suggesting that the credit channel we observe is operating through the banking system. We also find, as Dell'Ariccia, Detragiache, and Rajan (2005) do, that growth in externally dependent sectors is lower during banking crises regardless of the development of the financial system.

For a smaller set of countries and a shorter time horizon, we have Worldscope data that allow us to examine firm-level rather than industry-level effects. Consistent with the results on the real growth of industry value-added, we find a disproportionately negative impact of banking crises on real growth in sales, real growth in earnings, and real stock returns for firms in externally dependent industries. We also find that growth in sales, earnings and stock returns are less negatively affected by banking crises for firms with proxies that suggest better information disclosure.

We interpret the results as consistent with a "credit channel" impact of banking crises: since deep financial systems allow sectors dependent on external finance to obtain relatively more external funding in normal periods, a crisis would then have a disproportionately negative effect on such sectors and firms. In contrast, since externally dependent firms tend to obtain relatively less external financing in shallower financial systems (hence, we observe relatively lower growth rates in externally dependent sectors in such countries during normal times), a crisis in such countries has less of a disproportionately negative effect on the growth of these sectors. While our results might suggest a "dark side" of financial development, we do not find evidence that on net the externally dependent firms fare worse in deep financial systems (see Table 11).

In the next section, we provide a more detailed motivation for the approach we are taking and relate our work to the existing literature. Section III explains our econometric approach. Section IV then describes the data and, in particular, how we measure financial dependence and how we define financial crises. Section V contains the estimates and several robustness checks of our results. Section VI concludes.

II. Motivations and Relation to Previous Work

Our paper is related to several strands of literature. First, there exists a large body of empirical literature on the link between finance and growth (see Levine (2005) and Kroszner and Strahan (2005) for reviews). King and Levine (1993) find that measures of bank credit to GDP have a strong independent effect on economic growth. Controlling for potential endogeneity biases using instrumental variables techniques, Beck, Levine, and Loayza (2000) find that financial intermediary development exerts a large, positive impact on total factor productivity

growth, which feeds through to overall economic growth. Jayaratne and Strahan (1996) address endogeneity concerns directly by studying the relaxation of bank branch restrictions across U.S. states and find that state-level economic growth increases significantly following intrastate branch reform. Interestingly, improvements in the quality of bank lending, not increased volume of bank lending appear to be responsible for faster growth.

Rajan and Zingales (1998) examine whether financial development facilitates economic growth by reducing the costs of external finance to firms. They overcome some of the identification problems embedded in standard cross-country growth regressions by using cross-country industry-level data and including an interaction between a country characteristic (financial development) and an industry characteristic (external financial dependence) in addition to country indicators and industry indicators. They find that industrial sectors that are relatively more in need of external finance develop disproportionately faster in countries with more-developed financial markets. In related work, Demirgüç-Kunt and Maksimovic (1998) show that more developed financial systems are associated with more externally financed firm growth.

Second, our paper relates to a large empirical literature on the existence of a credit channel. This literature tries to investigate to what extent adverse shocks to a borrower's net worth increase the cost of external financing, and through which channels these adverse effects occur. Aggregate and financial shocks can affect the corporate sector by curtailing credit to borrowers with valuable trading and investment opportunities (see Kashyap and Stein (1994) for a review). Real, financial or regulatory shocks can cause a real or perceived shortage of capital for banks. As a result, banks may become unwilling to lend even to viable companies. Increased uncertainty about whether and at what price loans will be available can also result in a shortage

of loanable funds (Stiglitz and Weiss (1981)). These effects can be particularly severe for bank lending because banks are more likely than other financial intermediaries or markets to lend to firms that suffer from a greater degree of informational asymmetries.

In addition, a so-called balance sheet effect can further amplify the effect of shocks on corporations (see Bernanke and Gertler (1995) for a review). Mishkin (1977) provides evidence of effects of household balance sheet conditions on consumer expenditures in the U.S. during the 1973-75 depression. Kashyap and Stein (2000) study the monetary-transmission mechanism using quarterly data on every insured U.S. commercial bank for the period 1976-1993. They find that the impact of monetary policy on lending is stronger for banks with less liquid balance sheets, i.e., banks with lower ratios of securities to assets. Peek and Rosengren (2000) use the Japanese banking crisis as a natural experiment to test whether a (arguably exogenous) loan supply shock can affect real economic activity. They exploit the variation across geographically distinct U.S. commercial real estate markets to establish conclusively that loan supply shocks emanating from Japan had real effects on economic activity in the United States.

Third, our paper adds to the empirical literature on banking crises. Empirical research on identifying tools for the resolution and management of banking crises that are effective in resolving the crisis while limiting adverse economic spillover to the rest of the economy is sparse, and most research in this area is limited to individual cases (see Claessens, Klingebiel and Laeven (2001) for a review). Honohan and Klingebiel (2003) use cross-country evidence to determine whether specific crisis containment and resolution policies systematically influence the fiscal costs of resolving a crisis. They find that accommodating policies — such as blanket deposit guarantees, open-ended liquidity support, repeated recapitalizations, debtor bailouts, and regulatory forbearance — significantly increase fiscal costs of resolving a crisis.

Our paper is also related to literature on the link between financial development and growth volatility. Caballero and Krishnamurthy (2001) present a model that shows that firms in underdeveloped financial markets underprovision collateral, thereby exacerbating the impact of shocks on economic growth. Within this framework, Caballero and Krishnamurthy (2003) show that as firms undervalue international collateral they will choose excessive dollar debt, creating vulnerabilities that add to volatility. Building on this theoretical work, Raddatz (2004) shows that sectors that depend more on external finance are less volatile in countries with well-developed financial systems. He uses a measure of dependence on external finance that differs from the one used by Rajan and Zingales (1998) and captures short-term liquidity needs for working capital. Braun and Larrain (2005) in related and contemporaneous work study whether the growth rates of industries that rely on external finance vary with economic business cycles. They find that the growth rate of industries that depend more on external finance is disproportionately lower during economic recessions. Their work differs from ours in that they focus on business cycles while we focus on financial crises, and they do not investigate the impact of the level of development of the financial system.

Dell'Ariccia, Detragiache, and Rajan (2005) build on data from an earlier version of this paper (Laeven, Klingebiel, and Kroszner 2002) to investigate whether sectors that are more dependent on external finance perform relatively worse during banking crises. They do not study whether this relationship varies with the depth of the financial system as we do but, instead, focus on the impact of a banking crisis within a country. As we describe in more detail below, Dell'Ariccia et al (2005) use a different estimation approach than we do. We confirm the results of Dell'Ariccia et al. (2005) as well as the results in Raddatz (2004) and Braun and Larrain (2005) for our sample of countries and discuss the papers in more detail at the end of section V.

III. Method

We apply the method in Rajan and Zingales (1998) to investigate the link between external financial dependence and industrial growth during financial crises. Rajan and Zingales (1998) relate real growth in value added of a sector to an interaction term that includes a proxy for financial development and an index of external financial dependence and find a positive relation between the interaction term and real growth in value added.[1]

The index of external dependence (ED) is constructed at the industry level based on data of US firms. They choose the financial structure of U.S. industries as their benchmark because the relatively open, sophisticated, and developed U.S. financial markets should allow U.S. firms to face the fewest obstacles to achieving their desired financial structure. This approach offers a valid and exogenous way to identify the extent of external dependence of an industry anywhere in the world under the assumption that there are technological and economic reasons why some industries depend more on external finance than others, and that these differences persist across countries.[2]

By using an interaction between a country characteristic (financial development) and an industry characteristic (external financial dependence) in addition to country indicators and industry indicators, we can isolate the impact of financial development on industry growth after controlling for cross-country and within-country differences, and is therefore less subject to

[1] This method has been applied in several other papers. For example, Fisman and Love (2003) study whether industries that depend on trade credit benefit more or less from financial development, and Claessens and Laeven (2003) study whether industries that rely more on tangible assets benefit more or less from the protection of property rights. Cetorelli and Strahan (2006) apply this method to investigate the impact of local banking market concentration on the access to credit for young firms.

[2] Although this assumption is plausible, it may not hold for all countries for country-specific reasons. Many developing countries, for example, support certain industries through subsidies. These industries may be less dependent on external finance than without those subsidies.

criticism about an omitted variable bias or model specification than traditional cross-country regressions. We apply this method to industries in countries experiencing financial crises to be able to investigate the real impact of shocks to the financial system in a country over time.

First, we estimate the basic model in Rajan and Zingales (1998) for our sample of countries (model (1)).

$$RVAGR_{ij} = \alpha_i + \mu_j + \beta_1 * SHARE_{ij} + \beta_2 * FD_i * ED_j + \varepsilon_{ij}, \quad (1)$$

where $RVAGR_{ij}$ is the real growth in value added of sector *j* in country *i*, [3] α_i is a country-fixed effect for country *i*, μ_j is an industry-fixed effect for industry *j*, $SHARE_{ij}$ is the share of sector *j* in the total value added of country *i*, FD_i is the development of the financial system of country *i*, ED_j is the external dependence ratio of sector *j* according to Rajan and Zingales (1998), as described above. The specification thus includes fixed country and industry effects. Consistent with previous literature, we use the ratio of private sector credit to GDP as a proxy for FD, the level of financial development of a country.[4]

The main differences with the Rajan and Zingales (1998) setup are twofold. First, we estimate the model for three sub-periods, namely, before, during, and after a financial crisis.

[3] Real growth in value added for a given period is calculated as the change in the log of real value added in that industry between the beginning and end of the reference period. Real value added in a given year is obtained by deflating value added by the Consumer Price Index. Value added of an industry is defined as the value of output minus the value of input of all establishments in the industry. The value of output comprises (a) the value of all products of the establishment; (b) the net increase for the year in the value of work in progress and stocks of goods to be shipped in the same condition as received; (c) the value of industrial work done or industrial services rendered to others; (d) the value of goods shipped in the same condition as received less the amount paid for these goods; and (e) the value of fixed assets produced during the year by the establishment for its own use. The value of input comprises (a) the value of materials and supplies for production (including cost of all fuel and purchased electricity); and (b) the cost of industrial services received (including payments for contract and commission work and repair and maintenance work). Data on value added come from the Industrial Statistical Yearbook of the United Nations Statistics Division.

[4] Private sector credit to GDP is the value of credits by deposit-taking institutions allocated to the private sector divided by GDP. It excludes credit issued by the central bank, credit to the public sector and inter-bank loans. Private credit is calculated using lines 22d and 42d and GDP is calculated using line 99b of the International Financial Statistics database compiled by the International Monetary Fund.

When estimating the model for the crisis and post-crisis periods, we use the pre-crisis levels of share in value added and our proxies for financial development to avoid potential endogeneity problems. Second, we estimate the model for crisis countries only, that is, for countries that are listed in Caprio and Klingebiel (2002) as having experienced a banking crisis (and for which we have data). They define a banking crisis as an episode during which the capital of the banking sector has been depleted due to loan losses, resulting in a negative net worth of the banking sector. As we describe in more detail in the next section, we calculate one crisis observation per country, averaging the crisis episodes for countries that experience more than one crisis during out time period. The inclusion of country and industry indicators permits us to control for factors that are unique to each country and industry. By including country indicators for the crisis period, for example, we are effectively controlling for the general severity of the crisis in each country.

We are also interested in the link between the interaction of financial dependence and financial development on the one hand and the difference in real growth in value added between the crisis period and the pre-crisis period on the other hand. In an alternative specification of model (1), we therefore use the difference in real growth in value added between the crisis period and the pre-crisis period as a dependent variable.

$$\Delta RVAGR_{ij} = \alpha_i + \mu_j + \beta_1 * SHARE_{ij} + \beta_2 * FD_i * ED_j + \varepsilon_{ij}, \qquad (2)$$

where $\Delta RVAGR_{ij}$ is the difference in real growth in value added of sector *j* in country *i* between the crisis period and the pre-crisis period. In other words,

$\Delta RVAGR_{ij} = RVAGR_{ij,crisis} - RVAGR_{ij,pre-crisis}$, where $RVAGR_{ij,crisis}$ is the real growth in value added of sector *j* in country *i* during the crisis period and $RVAGR_{ij,pre-crisis}$ is the real growth in

value added of sector *j* in country *i* during the pre-crisis period. To avoid potential endogeneity problems, we use the pre-crisis levels of share in value added and our proxies for financial development.[5]

IV. Data

As measure of firm performance we use real growth in industry value added (annually compounded), the same measure as in Rajan and Zingales (1998). The data on value added for each industry in each country is obtained from the Industrial Statistical Yearbook database put together by the United Nations Statistics Division. The value added data are corrected for inflation using CPI data from the International Financial Statistics of the International Monetary Fund. We calculate the real growth in value added figures for sectors on the mix of three-digit and four-digit ISIC used by Rajan and Zingales (1998). We also calculate the industry's share in total value added of the country, a variable used by Rajan and Zingales (1998) to capture possible growth convergence effects. Our measure of financial depth (private sector credit to GDP) and the level of GDP per capita are from the International Financial Statistics of the International Monetary Fund, and we calculate these for the first year in our sample, 1980.[6]

We use the Caprio and Klingebiel (2002) data set to time pre-crisis, crisis and post-crisis periods. Since it is difficult to identify the crisis period precisely – in particular the end of the crisis period – we use [*t*, *t*+2] as the crisis period, where *t* is the first crisis year reported in

[5] Kaminsky and Reinhart (1999), among others, show that because during periods of credit booms, often preceding financial crises, (private) credit over GDP may overstate the level of financial depth. We avoid this problem by using the private credit to GDP at the start of our sample period as the measure of financial depth.

[6] In some countries, private credit is only a small part of total credit because banks extend a large amount of credit to state enterprises. We find similar results when using total credit rather than private credit as our measure of financial depth. Total credit includes credit extended by the Central Bank as well as credit going to the government sector. For some countries, data on private credit starts later than the year 1980. The results do not change when we use the initial value of private credit to GDP and include countries for which private credit to GDP starts later than the year 1980.

Caprio and Klingebiel (2002). To ensure that the pre-crisis period is a distinct period not affected by the crisis, we separate the pre-crisis period from the crisis period by three years. We define the pre-crisis period to be [t_1, t-3], where t_1 is the first year of the sample period (1980 or earliest available) and t is the crisis year reported in Caprio and Klingebiel (2002).[7] As post-crisis period, we use [t+3, T], where t is the crisis year reported in Caprio and Klingebiel (2002) and T is the end of the sample period (generally the year 2000).[8]

A small number of countries experience multiple crises during our sample period (see Table 1). If the data are available, we account for multiple crises within a country as follows. Because periods between crises may not be regarded as normal times, the pre-crisis variables are based only on the period prior to the first crisis and the post-crisis variables are based only on the period after the last crisis in the sample. The "during" crisis variables are calculated as an average of each "during" crisis episode for that country. We thus include only one crisis observation in the basic regressions for countries that have experienced multiple crises. We perform a number of robustness checks to assure that the treatment of multiple crises does not affect our results. The results are unchanged when we allow each crisis episode in a country to be a distinct observation, thereby including more than one crisis per country (see column 9 in Table 3 below). [9] The results also do not change when we add an indicator for countries with

[7] The results do not change when we only include countries with data starting in 1980.

[8] Determining the precise timing of crises is difficult, both in terms of identifying the beginning and the end of a crisis. We also experimented with alternative definitions of the crisis windows, expanding and contracting the length of the "crisis," "pre-crisis," and "post-crisis" periods as well as the gap between the "crisis" and the "pre-" and "post-" crisis periods, and our results are not sensitive to the alternative definitions. This is also an important robustness test because firm-level performance measures such as growth in value added tend to respond with a lag to adverse shocks such as financial crises.

[9] Our primary empirical focus is on the difference between pre- and during- crisis growth (that is, Equation (2)). If we allow each crisis episode to be a distinct observation, the pre-crisis variable would be the same for each crisis episode in a country because we would only want to use initial pre-crisis period as a "normal" benchmark. The pre-crisis vs. during-crisis differences we calculate, thus, might not represent completely independent observations for countries experiencing more than one crisis. This is why we report the results using only a single "averaged" crisis if there are multiple crises, as described in the text.

multiple crises, or when we drop countries with multiple crises altogether (see columns 1 and 2 in Table 7 below).

The Caprio and Klingebiel (2002) data set includes 113 banking crises from 93 countries since the 1970s. Due to data constraints we need to drop a large number of countries. First, we do not have data on sectoral value added for many crisis countries. We also drop countries for which we do not have sectoral value added data for at least five sectors during any of the periods. This excludes Argentina, for example, for which we have only data available for four sectors during the pre-crisis period. In the unbalanced sample results, we keep countries for which we have data for only crisis periods but drop them when we present the balanced panel results. These requirements reduce the sample to 53 banking crises from 44 countries. Due to missing data on private credit to GDP in 1980, however, the main data set includes 45 banking crises, including both developing and developed countries, in a total of 38 crisis countries.[10] The sample is an unbalanced sample of 647 country-sector observations for the pre-crisis period, 928 country-sector observations for the crisis period, and 756 country-sector observations for the post-crisis period. The pre-crisis period covers a total of 27 banking crises in 27 countries. The crisis period covers a total of 41 banking crises in 34 countries. The post-crisis period covers a total of 31 banking crises in 31 countries.[11]

Table 1 presents the final list of crisis countries and the dates of the crises. For each

[10] We do not have data on private credit for Tanzania for any of the years prior to the banking crisis in 1988. For five other countries we only have data on private credit starting post-1980 (see Table 1). By not including these five countries without data on private credit in 1980, we avoid using a measure of financial depth that is overstated because of a credit boom leading up to the crisis or that is depressed because of remnants of previous crises. For Turkey, for example, data on private credit starts in 1987, only five years after the start of the first banking crisis in 1982. For Congo, on the other hand, data on private credit starts in 1991, only one year before the start of the banking crisis in 1992. In a robustness check, we include these five countries in the sample and use the first available year for which private credit is available as the initial level of private credit. The results are similar when using this enlarged dataset of 43 countries.

[11] The data we use here includes a larger set of crisis countries than in an earlier version of this paper (Laeven, Klingebiel, and Kroszner 2002).

country's "pre-," "during-" and "post-" crisis periods, the table also shows the average real growth in value added and the number of sectors. Finally, the last column of the table reports our proxy for financial sector development, namely, the initial ratio of private credit to GDP.

The number of sectors varies widely across countries from 6 sectors in Algeria and Swaziland to 36 sectors in Colombia, Egypt, Finland, India, Japan, Malaysia, Mexico, Norway, Peru, Philippines, Sweden, Turkey, and Venezuela. The number of firms within the sectors varies widely over time. In particular we see a large increase in the number of firms within certain sectors at certain points in time. This may be the result of a re-classification or the inclusion of firms that were previously excluded from the statistics on value added. In both cases, changes in value added are not related to firm performance, and such observations need therefore be excluded from the analysis. We winsorize all sectoral observations on real growth in value added over the sub-periods at +100% and –100%. This criterion affects around 1% of observations across the different sub-periods. Our results are not affected when we drop these observations or when we include but do not winsorize them.

Table 2 presents the summary statistics of the main regression variables. When comparing the summary statistics of the pre-crisis and crisis periods, we find the following crisis characteristics. During crises periods, countries experience lower real growth in sectoral value added on average. Post-crisis growth in value added is very similar to pre-crisis growth in value added. These statistics indirectly provide some reassurance about the appropriateness of the timing of the crisis periods.

We use the Rajan and Zingales (1998) measure of financial dependence by sector based on U.S. firm-level data. Financial or external dependence is calculated as the fraction of capital expenditures not financed with cash flow from operations. The sectors considered by Rajan and

Zingales (1998) are a mix of three-digit and four-digit ISIC (International Standard of Industrial Classification) level industries, and we follow their industry classification.[12] In the base regression setup we simply use their external dependence figures for the 1980s. We also apply the same method as in Rajan and Zingales (1998) to financial data on U.S. firms from Compustat to estimate external dependence figures for the period 1980-99 for robustness tests. Appendix Table 1 lists the industry-level external dependence figures across sectors in the United States during the 1980s and the period 1980-99. The correlation between the two measures of financial dependence is high, 0.82. Although in what follows we report results using the external dependence measure calculated for the 1980s, all of our results are robust to using the measure for 1980-1999.

V. Empirical Results

A. What is the effect of financial depth on the link between financial dependence and industry growth before, during, and after crises?

First, we investigate the role of financial development on the link between external finance and sector growth for both pre-crisis and crisis periods. To this end, we estimate model (1) both for the pre-crisis period and the crisis period. The regression results are presented in columns (1) and (2) of Table 3. The "pre-crisis" and "crisis" columns use a different sample. The regressions are estimated using OLS and include country and industry dummies. All standard errors are corrected for heteroskedasticity using the White (1981) correction. Consistent with the findings in Rajan and Zingales (1998), we find for the pre-crisis "normal" period that financially dependent sectors grow on average disproportionately faster in countries with well-developed or

[12]Our results are similar when we re-calculate the growth in value added, share in value added, and external

deeper financial systems.[13]

During crisis periods, we find the opposite relationship, namely, that financially dependent sectors grow disproportionately slower in countries with well-developed or deeper financial systems (see column (2)). The coefficient on the interaction term between financial depth and external dependence is of a similar absolute magnitude as in the pre-crisis regressions but with the opposite sign. The coefficient is statistically significantly different from zero at the 10 percent level.

Having shown the opposite effect of financial development on growth of financially dependent sectors in "normal" vs. "crisis" periods, we want to establish that this difference is economically and statistically important. We do so in column (3) of Table 3 where we estimate whether the crisis relation differs from the pre-crisis relation by using the difference in real growth in value added between the crisis period and the pre-crisis period, $\Delta RVAGR_{ij}$, as dependent variable (model (2) in the previous section).[14] The reduction in growth rate from the pre-crisis period to the crisis period is greater for financially dependent firms in countries with well-developed financial systems. The effect is economically significant: On average, in a country experiencing a banking crisis, a sector at the 75th percentile of external dependence and located in a country at the 75th percentile of private credit to GDP would experience a 1.6 percent greater contraction in real annual growth in value added between the crisis and pre-crisis period than a sector at the 25th percentile of external dependence and located in a country at the

dependence figures on a three-digit ISIC level and re-run the regression on a three-digit ISIC level only. In an earlier version of this paper (Laeven, Klingebiel, and Kroszner 2002), we considered only three-digit ISIC level industries.

[13] Our coefficient estimate for the interaction term is similar but somewhat smaller and less statistically significant than in Rajan and Zingales (1998), but our sample is smaller than theirs due to our focus on crisis countries.

[14] Note that the regression in column (3) involves a "balanced" panel of country and sector observations for which we have both the pre-crisis and during crisis observations. For countries with multiple crises, the pre-crisis component of the differential growth variable is equal to growth during the first pre-crisis period.

25th percentile of private credit to GDP.[15] This is a large effect compared with an overall mean decline in growth of 3.5 percent between these two periods. The coefficient of the interaction term also is statistically significantly different from zero at the 1 percent confidence level. Financially dependent firms thus appear to be hit disproportionately by a financial crisis if they operate in countries with developed financial systems.

In column (4), we examine growth during the post-crisis period. The interaction term enters again positively, as in the pre-crisis growth regressions, but the coefficient is much smaller and not statistically significant. In column (5), we estimate the difference in post-crisis growth versus growth during the crisis period. Although the coefficient on the interaction term is now positive, suggesting that the financially dependent sectors growth relatively faster in countries with deep financial systems post-crisis versus crisis, the coefficient is not statistically significant at conventional levels. Defining the end of a crisis may be more difficult than determining when a crisis begins, and the recovery times may be heterogeneous. While recovery from crises may be speedy in some countries, recovery can take a long time in other countries (see Claessens et al. (2001)), and different policy responses may affect the speed of the recovery of the financial sector (see Dell'Ariccia et al. (2005)). In addition, financial crises might have long lasting effects. In column (6), we compare post-crisis growth with growth during the pre-crisis period. The coefficient on the interaction term is negative, suggesting that there might be long–term effects of a financial crisis on growth of externally dependent sectors in deep financial systems, but the coefficient is not statistically significant. Our subsequent empirical work on sectoral growth, thus, will focus primarily on the pre-crisis and during-crisis periods.

In column (7), we use a balanced panel consisting of the same sectors in both the pre-

[15] When computing the economic effect, we set the industry's initial share of value added at its sample mean.

crisis and crisis periods by excluding a number of sectors for several countries for which we have data in only one sub-period.[16] This setup ensures consistency in a country across periods, but may lead to a potential selection problem because the data in the Industrial Statistical Yearbook is gradually becoming more comprehensive over time. Another potential selection issue arises if entire sectors disappear during the crisis period. The latter is however not the case in our sample. The balanced panel data set contains a total of 582 country-sector observations from 29 crises in 25 countries. The during-crisis results for the balanced sample in column (7) are very similar to those obtained from the larger, unbalanced sample in column (2).[17]

The results in Table 3 suggest that in times of crisis there is a negative relationship between the interaction term of financial development or depth of the financial system and external dependence and real growth in value added in contrast to the positive relation in pre-crisis periods. For simplicity of presentation, our subsequent empirical work will report only the coefficients for the difference between pre-crisis and during-crisis specification (Equation (2) from the previous section). The results for the separate pre-crisis and during-crisis specifications that are not reported follow the same pattern as in columns (1) and (2) as well as (7) and (8), that is, positive coefficients for the interaction term in the pre-crisis period and negative coefficients for the interaction term in the during-crisis period.

B. Effects of Other Industry Characteristics Related to Ease of Obtaining External Finance

To further investigate the link between external dependence and financial sector development before and during crises, we consider a variety of industry characteristics that may be related to the ease of obtaining external finance. We first consider the differential effects of

[16] Note that this "balanced panel" is the same sample as in the crisis vs. pre-crisis specification in column (3).

crises on young versus old financially dependent firms. In column (1) of Table 4, we use the Rajan and Zingales (1998) measure of the external financial for young firms only, calculated as the external dependence index for U.S. firms that have been public for less than 10 years. Since demand for external finance is expected to be greater when firms are young, this variable may be a better measure of an industry's financial needs. The results for young firms are similar to those obtained earlier, although the magnitude of the coefficient is smaller. When we repeat this regression using financial dependence calculated for the subset of old firms (defined as firms that have been public for at least 10 years), our results are no longer statistically significant, consistent with the view that young firms may indeed better reflect an industry's need for finance than old, established firms (column (2) of Table 4). [18]

We are concerned that financial dependence for U.S. firms in the 1980's may not be a valid benchmark for other countries, especially developing countries that may use different technologies. We consider three ways to provide support for using the United States as a relevant benchmark in our sample: by using an earlier time period from the United States, by using Canadian data, and by calculating a measure based on Worldscope data from the non-crisis countries. First, we calculate the external dependence index for different time periods because using an earlier period of U.S. financial development may be more relevant as a benchmark for

[17] We also obtain similar results when we estimate the pre-crisis and post-crisis specifications in column (1) and (4) using a balanced sample (not reported in the table).

[18] As an alternative measure of external finance, we consider the measure of an industry's liquidity needs developed by Raddatz (2004), calculated as the ratio of inventories over annual sales over the period 1980-89. This variable captures an industry's need for working capital financing (although inventories is only one of the components of working capital). When we use a variable that is the interaction between our measure of private credit to GDP and the Raddatz measure of liquidity needs, this variable does not enter statistically significantly (not shown). One explanation for this difference may be that the Rajan and Zingales index is a broader measure of financial needs, and in particular may capture better an industry's reliance on (somewhat longer term) bank credit, the supply of which is generally negatively affected during a banking crisis. The Raddatz measure captures very short-term working capital financing, which need not be supplied by banks only, and its supply may be less negatively affected during a banking crisis than bank credit. The correlation between the measures of financial dependence and liquidity needs is low, 0.09, and not statistically different from zero, suggesting they indeed capture different aspects of an industry's financial needs. See our analysis of Raddatz (2004)

other countries today. The results we report use data for the U.S. from the 1980s (as Rajan and Zingales did in their main specifications). We also use data for the U.S. from the 1970s to calculate the index and find no difference (not reported). We also calculate the index using data for the U.S. from 1980 to 1999, and again the results are unchanged. Second, instead of using the U.S. as the benchmark, we use data for Canada from the 1980s, as Rajan and Zingales do in a robustness check. Our results again are not affected (not reported).

More importantly, we create a new index, based on the Rajan and Zingales method, using data for all of the non-crisis countries in our sample. We use the non-crisis countries as a benchmark because we do not want banking crises to affect the measurement of the extent of a sector's external dependence. Worldscope provides us with the firm-level flow of funds data that is necessary to do the calculation, and these data are available for the 1990's. The benefit of creating this new measure is that we can use data averaged from 18 countries with different levels of financial development.[19] The potential downside is that countries with less efficient financial systems than the US may provide more a noisy benchmark for the "natural" or "unconstrained" financial structure of firms and sectors. In Appendix Table 1, we report our new measure of external dependence for non-crisis countries by ISIC industrial sector. Our new measure and the external dependence index used in our main specifications are highly correlated (0.79), and the correlation is statistically significant at the 1% level. As column (3) of Table 4 shows, our results hold when we use our new measure of external dependence that is the average

using our data in Table 11 below.

[19] We use the Caprio and Klingebiel (2002) dataset to identify countries that have not experienced crises during the period 1980-2000 (see Appendix Table 2 for a complete list; Portugal, which did not experience a crisis during this period, is not on this list because we do not have growth data on value added for this country). We have data on external dependence from Worldscope for the following non-crisis countries: Austria, Australia, Belgium, Canada, Denmark, France, Germany, Greece, Hong Kong, Ireland, Italy, Netherlands, New Zealand, Portugal, Singapore, Switzerland, Taiwan, and the United Kingdom. Our measure of external financial dependence in non-crisis countries is the average of financial dependence across these non-crisis countries. Financial dependence is calculated as the ratio of (capital expenditure minus funds from operations) to capital expenditure.

across non-crisis countries.

Another characteristic that may affect the ease of obtaining external finance is the tangibility of assets. There may be less uncertainty for outsiders in measuring the value of tangible assets and such assets may more easily be used as collateral in obtaining financing relative to intangibles. To investigate the variation of an industry's propensity to have intangibles on the balance sheet, in column (4) of Table 4, we include the median level of the ratio of intangible assets to fixed assets of U.S. firms in Compustat for the period 1980-1999. We find that industries that tend to have a high proportion of intangible assets are disproportionately negatively affected in countries with deep financial systems during a financial crisis compared with the pre-crisis period. In addition, the interaction of external dependence and financial development is virtually unchanged from the estimate in Table 3.

As an alternative measure, in column (5), we control for an industry's propensity to have tangible assets on the balance sheets by including using the median level of the ratio of fixed assets to total assets for U.S. firms in Compustat for the period 1980-1999. The coefficient estimate is small and not statistically significant, and the estimate of the interaction of external dependence and financial development remains unaltered.

Caballero and Hammour (1994) show that sectors that produce durable goods are disproportionately negatively affected during recessions. Similarly, it could be that industries that manufacture durable goods are most adversely affected by financial crises. In addition, since industries that manufacture durable goods tend to be highly dependent on external finance, it could be that our interaction term is picking up variation in the durability of the goods produced by an industry rather than its dependence on external finance. To check for this, in column (6), we include an indicator of whether the industry manufactures predominantly durable goods,

using the classification of U.S. industries by the U.S. Bureau of Economic Analysis. We find, however, that our results are unchanged when we include an interaction between the durable goods indicator and our measure of financial development and that the coefficient on this indicator is small and not statistically significant.

As robustness checks, in columns (7) and (8), we control for whether an industry is capital-intensive or makes large investments in research and development (R&D). As measure of an industry's capital-intensity we use the median level of the ratio of fixed assets over number of employees of U.S. firms in Compustat and as measure of an industry's R&D intensity we use the median level of the ratio of R&D expenses over sales for U.S. firms in Compustat. Both variables are calculated at the three- or four-digit ISIC industry level for the period 1980-1999. Our key result from Table 3 is robust to the inclusion of the interaction of these variables with our measure of financial development, and neither of the coefficients on these interaction terms is statistically significant.

C. Is Financial Development Simply a Proxy for Other Country Characteristics?

The level of financial development in a country may partly capture other aspects of overall economic development and the quality of institutions more generally. To investigate whether we can interpret our results as primarily about financial depth, we include a variety of other country characteristics in Table 5.[20] First, to control for differences in the overall level of economic development, we include an interaction between our measure of financial dependence and the logarithm of GDP per capita. The coefficient on this interaction variable is small and not statistically significant, and we continue to find that the growth of financially dependent

[20] In an alternative specification, we have also included stock market capitalization to GDP as a measure of stock

industries is disproportionately affected during banking crises (compared to pre-crisis growth) in countries with deep financial systems (column (1)).

In columns (2) to (4) of Table 5, we control for the quality of specific political and legal institutions. In column (2), we include an index of constraints on the executive in 1980 from the Polity IV database to control for the quality of political institutions.[21] In column (3), we control for the country's level of corruption using the index of corruption of the International Country Risk Guide (ICRG). This index takes higher values for countries with less corruption from ICRG. We use the value for the year 1984 (the first year for which data is available). From the same source, we obtain an index of the law and order tradition of each country in 1984 to control for the quality of legal institutions. When we include each of these variables interacted with external dependence, our main results from Table 3 remain unaltered.

As discussed above, the method we use reduces potential endogeneity problems, but we wish to explore the robustness of our results with an instrumental variables approach. La Porta et al. (1998), for example, argue that the origin of a country's legal origin and the degree to which laws are enforced have an effect on the development of a country's financial system. In particular, countries with better enforcement of laws and with a British legal origin tend to have deeper financial systems. Following Rajan and Zingales, we use the country's legal origin as reported in La Porta et al. (1998) and an index for the efficiency of the legal system produced by the Business International Corporation as instruments for private credit to GDP.[22] We have data on legal efficiency only for a subset of the countries in our sample. As the final column in Table

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market development. Interestingly, the interaction between stock market capitalization and external dependence does not enter significantly, suggesting that the effect is through banking rather than stock markets.

[21] Polity IV is a database constructed by the University of Maryland with detailed information about Political Regime Characteristics and Transitions in countries around the world.

[22] The extent of "great reversals" that have occurred in the development of financial systems with a particular legal origin, however, raise some questions about its interpretation as an instrument (see Rajan and Zingales 2003).

5 shows, using these instruments, the coefficient on the interaction of external dependence and financial development is reduced in magnitude. The level of statistical significance also is reduced but the coefficient remains statistically significant at the 10 percent level. To summarize, we find that our main result is robust to using alternative country characteristics that might proxy for the overall level of economic development or for the quality of institutions in a country.

D. Effects Sub-Samples of Countries with Different Levels of Development

In Table 6, we investigate whether and how our results vary across sub-samples of countries with different levels of development. We may not expect to find the same results for poor and rich countries, for example, because the banking crises themselves in poor and rich countries may not be comparable and their impacts might be different. First, since financial systems in Africa tend to be extremely underdeveloped, we examine whether our results continue to hold excluding African countries. As column (1) shows, our results are not driven by the African crisis countries. Second, since rich countries with generally deep financial systems should be relatively well-positioned to be able to absorb significant shocks, we try dropping these countries in column (2). As expected, the coefficient on the interaction term becomes more negative and remains statistically significant when the OECD countries are excluded.[23] Next, we split the sample along the median of economic development as measured by GDP per capita. The results are shown in columns (3) and (4). We find that our result is generally stronger in poor countries.

[23] This effect can be mainly contributed to the exclusion of the Scandinavian countries.

E. The Effects of Multiple Crises and Banking versus Non-Banking Crises

We now check how our result is affected when we control for multiple crises and for crises other than banking. First, we investigate whether there is a differential effect of multiple crises in countries. In column (1) of Table 7, we exclude countries with more than one banking crisis during the sample period. The results are very similar to those in Table 3. In column (2), we investigate whether the interaction effect is different for countries that have experienced multiple crises by including a triple interaction between our main interaction term and a dummy variable that takes a value of one for countries with more than one banking crisis. The negative effect for countries with multiple crises is more pronounced, and the coefficient for countries with a single crisis remains almost the same as in column (1). We thus do not find that firms in countries where crises recur are unable to raise external finance in good times because the bad times are just around the corner. Instead, we find that our main effect is even greater in countries that experience multiple financial shocks.

We are also concerned that crises in different countries may not be alike. The focus on sub-samples in Table 6 was one approach to addressing this concern because crises are more likely to be similar in countries with a similar level of economic and financial development. Another way to make the set of countries more comparable is to focus on the subset of countries that had a crisis of systemic impact, using the classification of crises in Caprio and Klingebiel (1996). Column (3) of Table 7 confirms that our results hold when we exclude countries with banking crises that are identified by Caprio and Klingebiel (1996) as non-systemic.

There is a large literature on the impact of other crises, such as currency crises (see Kaminsky and Reinhart (1999)) and economic recessions (see Caballero and Hammour (1994)), on economic growth. We want to investigate whether our result is due to banking rather than

other types of economic shocks. The results presented in columns (4) and (5) suggest they are specific to banking.

In column (4), we recalculate the dependent variable based on the timing of currency crises rather than banking crises. Specifically, we use the difference in real growth in value added between currency crisis and pre-currency crisis period. Similarly, in column (5) we recalculate the dependent variable for recessions rather than banking crisis periods. As before, the pre-crisis period is [t_1, t-3] and the crisis period is [t, t+2], but now t is either the currency crisis date (column (4)) or the recession date (column (5)), and t_1 is the first year of the sample period. Currency crises are defined as in Milesi-Ferretti and Razin (1998) as a period during which (a) the currency depreciated by more than 25%, (b) the depreciation was more than twice as large as the depreciation during the previous year, (c) the depreciation during the previous year was less than 40%, and (d) there were no currency crises during the previous three years.[24] Recessions are defined and calculated as in Braun and Larrain (2005) and described in more detail below. The sample includes only countries with a currency crisis (column (4)) or a recession (column (5)) during the sample period. In both regressions, the interaction variable does not enter significantly. The lack of an impact of currency crises and recessions suggests that our result is driven by banking crises, not by currency crises or recessions more generally.

Since the crises in our sample occur at different points in time, we want to adjust for global trends could be driving the results. In column (6), we include triple interactions between our main interaction term and dummy variables that indicate whether the banking crisis started during different time periods. We break the time period into three parts: before 1990, 1991 to

[24] The results do not alter when we define a currency crisis as a period during which only conditions (a) through (c) hold (not shown).

1995, and 1996 to 2000.[25] The coefficient for our main interaction variable is virtually unchanged in size and significance and the triple interactions that are included to capture possible time trends do not enter significantly.

F. Robustness Check: Falsification Strategies for Non-Crisis Countries

To ensure that our results are capturing the effects of crises, we develop a falsification strategy using data from countries that do not experience a crisis. In particular, we repeat the analysis presented in Table 3 for non-crisis countries in which we assign a hypothetical banking crisis date to each non-crisis country. Appendix Table 2 shows the average real growth in value added across industries in countries without a banking crisis during our sample period. As in Table 3, the "pre-crisis" period is [t_1, t-3] and the "crisis" period is [t, t+2], but now t is the hypothetical banking crisis date (and t_1 is still the first year of the sample period). The classification of a "pre-crisis" period is now artificial because the banking crisis date is hypothetical.

The results of this robustness test are presented in Table 8. In columns (1) to (3), we assign a random crisis date t. In columns (4) to (6), t is the year 1990, the most common crisis date in the sample (and the mid-point of the sample period). In none of the specifications do we find a statistically significant effect of the interaction term between external dependence and financial development. Thus, the lack of an effect in Table 8 suggests that our results are specific to crisis countries and not an artifact of the data.

G. Firm-Level Data

[25] Given our timing requirements for pre-crisis and crisis periods and that our sample begins in 1980, we have no

To explore whether our results hold when at the firm level rather than at the sector level, we use firm-level data from Worldscope. An advantage of the disaggregated firm-level data is that we can calculate alternative measures of firm performance, such as real growth in sales, real growth in earnings before interest and taxes (EBIT), and real stock market returns. Of these firm-level performance measures, EBIT is closest related to value added, the industry measure of performance we have used thus far. Appendix Table 3 presents summary statistics of the Worldscope variables.

There are, however, two disadvantages of using data from Worldscope. First, we have data only from 1990 onwards. We thus do not have a long enough history to be able to examine the pre-crisis periods and lose observations of crises occurring during the 1980s. Instead, we will analyze firm-level data for the crisis and post-crisis periods (and the difference between the post-crisis and crisis periods) for the countries that experience crises in the 1990s. Second, the sample consists of only publicly-traded firms that are arguably the firms that are the least financially constrained. The sample thus likely works against finding a credit channel impact of banking crisis.

In Table 9, we repeat the analysis in Table 3 for the crisis and post-crisis periods using the Worldscope data. Because industries in Worldscope are classified based on SIC codes rather than ISIC codes, we calculate all variables (including industry dummies) at the two-digit SIC industry level (rather than at the combination of two and three-digit ISIC levels used thus far). As the measure of each firm's level of external dependence, we use the ED index described above, but recomputed at the two-digit SIC industry level using data from Compustat. Given the data constraints discussed above, our sample is limited to 17 crises in 15 countries. Columns (1)

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observations of "crisis" to "pre-crisis" differences prior to 1985.

to (3) present the results when we use real growth in sales as measure of firm performance over the different periods and columns (4) to (6) present the results for real growth in earnings (EBIT).

Consistent with our industry-level results, we find that the performance of firms in financially dependent industries is disproportionately negatively affected in deep financial systems during periods of banking crisis, regardless of the way we measure firm performance. The interaction between the firm's external dependence and the level of financial development is negative during crisis periods and positive in post-crisis periods, and the difference is highly statistically significant.[26] Apparently, the firms in our sample are able to bounce back several years after the banking crisis to the relationship that persists during "normal" times. On average, in a country experiencing a banking crisis, a firm at the 75th percentile of external dependence and located in a country at the 75th percentile of private credit to GDP would experience roughly a 1.0 percent greater increase in real sales growth and a 2.7 percent greater increase in real earnings growth (EBIT) between the between the post-crisis and crisis period than a firm at the 25th percentile of external dependence and located in a country at the 25th percentile of private credit to GDP. These are large effects compared with an overall mean increase in real sales growth of 2.4 percent and an overall mean increase in real earnings growth of 6.6 percent between these two periods.[27]

In addition, since we have firm level data, we can investigate the impact of disclosure practices on firm performance during crises. Mitton (2002), for example, finds that firm performance during the East Asian crisis of 1997-98 was significantly affected by indicators of the quality of firm disclosure (as measured by whether the firm has an ADR listing in New York

[26] The results are unchanged when we use private credit to GDP in 1990 rather than private credit to GDP in 1980.

or whether the firm is audited by one of the major international accounting firms), ownership structure, and firm diversification. We do not have information on ownership structures and firm diversification but are able to compute the disclosure variables used by Mitton (2002) for our much larger sample of firms. ADR is a dummy variable that takes a value of one if the firm has an American depository receipt listed in the United States, and zero otherwise. Big Six Auditor is a dummy variable that takes a value of one if the firm's auditor is one of the Big Six international accounting firms (Arthur Andersen, Coopers & Lybrand, Deloitte & Touche, Ernst & Young, KPMG Peat Marwick, and Price Waterhouse), and zero otherwise. Data on ADR listings come from the Bank of New York comprehensive list of ADR listings on U.S. stock markets. Data on the firm's auditor come from Worldscope.

For comparability with Mitton (2002), in columns (7) to (9) of Table 9, we use real stock market return results as the measure of firm performance, which also provides a further robustness check on our earlier results. The stock returns are dividend inclusive and in real local currency terms. As in Mitton (2002), we include the two disclosure variables and control for the logarithm of total assets to control for size effects and for the firm's financial leverage (as measured by the book value of total debt divided by the book value of total capital) to control for the effect of financial leverage on expected returns.[28]

During the crisis period, we find that firms with better disclosure practices, as proxied by having an ADR and having a Big Six auditor, had higher stock returns during the crisis than other firms. The impact of having an ADR and/or a Big Six auditor is also statistically significant in the post-crisis period. The magnitudes of impact of having an ADR are larger than

[27] The results are unchanged when we exclude firms in countries that have experienced multiple crises during the sample period.
[28] When we add the disclosure variables to the regressions presented in columns (1) to (6) of Table 9, the results are unaltered.

for having a Big Six auditor, consistent with Mitton (2002). There is some evidence that having an ADR does have a more beneficial impact during crises than in "normal" post-crises periods, although the coefficient is marginally statistically significant.

After controlling for all of these factors and using real stock returns as the performance measure, we once again find that the interaction between the firm's external dependence and the level of financial development is negative during crisis periods and positive in post-crisis periods and that the difference is highly statistically significant. The magnitude of the impact is also significant: On average, in a country experiencing a banking crisis, a firm at the 75th percentile of external dependence and located in a country at the 75th percentile of private credit to GDP would experience roughly a 2.4 percent greater increase in real stock returns between the between the post-crisis and crisis period than a firm at the 25th percentile of external dependence and located in a country at the 25th percentile of private credit to GDP. This is a large effect compared with an overall mean difference in real stock returns of 7.1 percent between these two periods. Thus, the firm-level evidence supports our industry-level finding: firms and sectors that have high dependence on external sources of finance are disproportionately harmed during banking crises in countries with well developed financial systems.

H. Comparisons with Related Work: Overall Effects of Banking and Other Crises

We now consider a related literature that focuses on the question of the impact of financial and economic distress on financially dependent sectors, regardless of the level of financial development. Braun and Larrain (2005), for example, use the United Nations Industrial Statistics data on industry value added to study whether the growth rates of industries that rely on external finance vary with economic business cycles. They find that the growth rate of

industries that depend more on external finance is disproportionately lower during economic recessions. Their work differs from ours in terms of focus, data, and specification: first, they focus on business cycles while we focus on banking crises; second, they use annual observations on sectoral growth in value added including indicators for years of recessions while we use growth averaged for crisis and non-crisis periods; third, since they are using annual observations, they include a different set of fixed and time effects than we do.

In particular, the model specification is:

$$RVAGR_{ijt} = \alpha_i + \mu_j + \lambda_t + \phi_{ij} + \chi_{jt} + \beta_1 * SHARE_{ij,t-1} + \beta_2 * DISTRESS_{it} + \beta_3 * DISTRESS_{it} * ED_j + \varepsilon_{ijt}$$

The dependent variable, $RVAGR_{ijt}$, is annual real growth in value added of sector *j* in country *i* at time *t*, α_i is a country-fixed effect, μ_j is an industry-fixed effect, λ_t is a year-fixed effect, ϕ_{ij} is a country-industry-fixed effect, χ_{jt} is a industry-year-fixed effect, $SHARE_{ij}$ is the one-period lag of the share of sector *j* in the total value added of country *i*, ED_j is the Rajan and Zingales (1998) measure of external dependence of sector *j*, and $DISTRESS_{it}$ is an indicator variable that takes value of one during economic distress years *t* in country *i*, and zero otherwise. Using annual observations, Braun and Larrain (2005) take advantage of the panel data structure to control for various other differential effects by including country, industry, year, country-industry, and industry-year fixed effects in all regressions. This empirical strategy is most effective when we have reasonably long time series data. We therefore restrict the sample to countries and sectors with growth data starting no later than 1985.[29]

In columns (1) to (6) of Table 10, we run the above specification using our sample of

[29] The Braun and Larrain (2005) sample includes observations for the years 1963 to 1999, and also includes non-crisis countries.

crisis countries and consider other types of economic turmoil besides recessions. The first column simply reproduces the Braun and Larrain (2005) results on the impact of recessions using our sample. We use their method to identify recession years and construct a recession indicator variable that takes a value of one during recession years, and zero otherwise.[30] We confirm their finding that the growth of financially dependent industries is disproportionately negatively affected during periods of economic recessions. The coefficient on the interaction of the external dependence index and recession indicator is almost identical to their coefficient estimate of -0.031 (see their column (1), Table 1) but somewhat less statistically significant than in their sample which also includes non-crisis countries.

Since unlike Braun and Larrain (2005) our focus is on banking crises, we include in column (2) a banking crisis indicator variable which takes a value of one for the banking crisis year and the two following years and zero otherwise, that is, the indicator takes the value of one for the years [*t*, *t*+2] where *t* is the banking crisis date, consistent with the timing of crises we use above and with Dell'Ariccia, Detragiache, and Rajan (2005). We also include the interaction of the bank crisis indicator and the external dependency index. We find that overall growth is reduced during banking crisis years and disproportionately so for industries which are financially dependent. On average, in a country experiencing a banking crisis, real growth in value added of a sector at the 75th percentile of external dependence is roughly 1.7 percent lower during banking crisis years than that of a sector at the 25th percentile of external dependence. The difference of 1.7 percentage points is statistically significant and large compared with an average growth rate

[30] Specifically, for each country troughs are identified as years when the logarithm of real local currency GDP deviates by more than one standard deviation from its trend level (computed using the Hodrick-Prescott (1997) filter with a smoothing parameter of 100). For each trough a local peak is defined as the closest preceding year for which cyclical GDP (the difference between actual and trend values) is higher than the previous and posterior years. The recession variable takes a value of one for all the years between peak and trough, and zero otherwise. The cyclical component of GDP is constructed with data from 1960 to 2000, whenever available. Due to missing GDP data, we

of 3.2 per cent in the sample as a whole and -0.9 percent during crisis years.

In column (3), we repeat the analysis for currency crises. As described above, we follow the method in Milesi-Ferretti and Razin (1998) to construct a currency crisis dummy variable that takes a value of one during currency crisis years and zero otherwise, consistent with the approach taken by Dell'Ariccia, Detragiache, and Rajan (2005). While we find that industry growth is statistically significantly lower during currency crisis years, we do not find a differential effect of currency crises on growth for financially dependent industries, in contrast to banking crises and economic recessions.

In columns (4) to (6), we investigate which type of economic turmoil has the dominant impact. As noted, Braun and Larrain (2005) do not consider banking crises so do not run such a horserace between economic recessions and other types of distress. Column (4) controls both for banking crises and economic recessions. We find that the banking crisis effect dominates the recession effect on externally dependent sectors. Specifically, the coefficient on the ED interaction with the banking crisis indicator is little changed from column (2), in terms of both magnitude and statistical significance. In contrast, the coefficient on the ED interaction with the recession indicator falls by half compared with column (1) and is no longer statistically significant. The results reported in columns (5) and (6) show that the differential effect of banking crises on growth is robust controlling for currency crises and currency crises and recessions together. The estimates here, combined with the estimates in columns (4) and (5) of Table 7, suggest that it is primarily due to banking crises, rather than currency crises or recessions, that we observe a differential impact on externally dependent sectors.

A recent paper by Dell'Ariccia, Detragiache, and Rajan (2005) builds on data from an

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cannot construct recession dates for Kuwait.

earlier version of our paper (Laeven, Klingebiel, and Kroszner 2002) to study whether sectors that are more dependent on external finance perform relatively worse during banking crises.[31] They have additional analysis concerning firm size, export-orientation, and the effectiveness of different crisis resolution strategies. As in the Braun and Larrain (2005) paper, they use annual observations on value added growth. Since they are not interested in the independent effect of banking crises on growth, however, they only include an interaction term between a banking crisis variable and external financial dependence. This allows them to control for potential country-year factors but then, unlike in Braun and Larrain (2005), they cannot estimate the independent effect of banking crises.

Their paper differs from ours primarily in terms of specification and focus, since they examine the impact of a financial crisis on the growth of financially dependent sectors using annual data but do not study whether this relationship varies with the depth of the financial system. They find that sectors that predominantly have small firms also perform worse during banking crises. They do not find that more export-oriented sectors perform better during banking crises. They also find that government bailouts, including blanket guarantees and regulatory capital forbearance, limit the adverse effect of a banking crisis. Their model specification is:

$$RVAGR_{ijt} = \phi_{ij} + \chi_{jt} + \psi_{it} + \beta_1 * SHARE_{ij,t-1} + \beta_2 * CRISIS_{it} * ED_j + \varepsilon_{ijt},$$

where ϕ_{ij} is a country-industry-fixed effect, χ_{jt} is a industry-year-fixed effect, and ψ_{it} is a country-year-fixed effect.

Columns (7) to (9) of Table 10 present the results obtained when we repeat the

[31] Our current data differs from the earlier data in two dimensions. First, we have expanded the number of countries to include more banking crises. Second, we now use the industry classification used by Rajan and Zingales (1998), which is based on a mix of three-digit and four-digit ISIC industries rather than three-digit ISIC industries only, thereby expanding the number of industries and enhancing comparability to their and related work. The results (not reported) are similar when using the older version of our dataset.

Dell'Ariccia et al. (2005) analysis for our dataset. Dell'Ariccia et al. (2005) uses Caprio and Klingebiel (2002) to identify banking crises and constructs crisis periods as we do. To take full advantage of the dimensions of the panel dataset, we control for country-industry, country-year, and industry-year fixed effects, as they do. Column (7) confirms their results. We find that the growth of financially dependent industries is hurt relatively more during a banking crisis. The magnitude of the effect is economically substantial: on average, in a country experiencing a banking crisis, real growth in value added of a sector at the 75th percentile of external dependence is roughly 1.4 percent lower during crisis years than that of a sector at the 25th percentile of external dependence. This compares with an average growth rate of 3.2 per cent in the sample as a whole and -0.9 percent during crisis years. The magnitude of the effect is comparable to the estimate in Dell'Ariccia et al. (2005).[32] Consistent with their results, the estimates do not change when we also control for recessions or currency crises (columns (8) and (9)). In addition, we find that the results are unchanged when calculating financial dependence over a longer time period (1980-1999) (not shown).

We have also checked the results when we control for other industry characteristics (as used earlier in Table 4). When we control for whether the industry produces durable or nondurable goods, the differential effect of financial dependence is significantly weaker although still significant at the 10% level. The new interaction with the durable goods sector indicator enters negatively and significantly, suggesting that the growth of industries that produce durable goods is disproportionately negatively affected during a banking crisis (column (10)). Controlling for an industry's use of intangible or tangible assets and its capital or R&D intensity does not alter the main result on the differential effect of financial dependence (none of these

[32] Our coefficient estimate for the interaction term is -0.037 (column (7), Table 10) compared to -0.027 in Dell'

additional variables enter statistically significant, not shown). Using the specifications of Braun and Larrain (2005) and Dell'Ariccia et al. (2005) in our sample, we find that industries that tend to rely on external finance grow relatively less during banking crisis episodes.

I. Would Externally Dependent Firms Be Better Off without Financial Development?

Given our results on the negative impact of crises on externally dependent firms in deep financial systems, it is natural to ask whether such firms might be better off in countries with lower financial development that experience banking crises. In parallel work, Raddatz (2004) focuses on the impact of financial development on the volatility (rather than the level) of industry growth and shows that more financial development reduces the volatility for sectors with greater financial liquidity needs. Unlike our approach so far, the Raddatz setup potentially allows some inferences on whether firms are better off in general with more financial development. Our framework does not measure the overall impact of financial development but rather the differential effect of financial development across crisis and non-crisis periods. Also, we focus on growth, not volatility, and our results are about effects conditional upon there being a crisis.

To provide some suggestive evidence on the question of whether financial development makes firms better off overall, even for countries that have experienced banking crises, we use the Raddatz (2004) method to investigate whether financial development reduces overall volatility of growth and mitigates output drops. In Table 11, we report the results obtained when repeating the main analysis in Raddatz for our sample of crisis countries. As in Raddatz, we measure growth volatility by the standard deviation of the annual rate of growth of real value

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Ariccia et al. (see their Table 1).

added for each ISIC industry in each country over the sample period, and we measure the worst output drop by the minimum rate of this growth variable. Raddatz measures these variables over the period 1981-97. Because we have more recent data, we can extend the sample period until the year 2000. [33]

As in Raddatz, we restrict the sample to countries and sectors with growth data starting no later than 1985 and with at least five growth observations. One difference with the setup in Raddatz is that we focus on the subset of countries that experienced a banking crisis during the sample period. Growth observations are winsorized at +100% and -100%. Raddatz deviates from the Rajan and Zingales (1998) method to develop a new measure of an industry's financial needs that focuses on short-term liquidity needs. We use the method in Raddatz (2004) to calculate his measure of short-term liquidity needs as the ratio of total inventories over annual sales for U.S. firms in the same industry between 1980 and 1989. For comparison with our results above, we also use the external dependency figure in Rajan and Zingales (1998) as an alternative measure of an industry's financial needs. As before, we use private credit to GDP in 1980 as a measure of financial development of a country, and the initial share in total value added to capture potential growth convergence effects. The specification is as follows:

$$\sigma_{ij} = \alpha_i + \alpha_j + \beta_1 * SHARE_{ij} + \beta_2 * FD_i * ED_j + \varepsilon_{ij},$$

where σ_{ij}, the dependent variable, is either the volatility of growth or the worst output drop over the sample period. Growth volatility is calculated as the standard deviation of the annual rate of growth in real value added of industry *j* in country *i* over the period 1981-2000, and the worst output drop is calculated as the minimum value for the period 1981-2000 of the annual rate of growth in real value added of industry *j* in country *i*. ED_j is either the Rajan and

[33] The results reported below are not affected if we end our sample period in 1997.

Zingales (1998) measure of financial dependence or the Raddatz measure of liquidity needs of industry *j*. We also include country and industry-specific fixed effects in all regressions.

Panel A in Table 11 reports the worst output drop regression results, and panel B reports the growth volatility results.[34] Raddatz employs both OLS and instrumental variables in estimating the link between finance and volatility. We follow his procedure and use the country's legal origin as instrument for private credit to GDP. Columns (1) to (3) in both panels report the OLS regressions and columns (4) to (6) report the IV regressions where private credit is instrumented using a country's legal origin. Our results are qualitatively similar to, although less statistically significant than, those reported by Raddatz (2005, Table 3 and Table 8, column 3).[35] As in Raddatz, the statistical significance tends to increase when we estimate using instrumental variables.

Throughout Table 11 we find that financial development reduces the volatility as well as the absolute value of the worst drop in output for sectors with greater liquidity needs or with greater financial dependence. Not all of the coefficients, however, are statistically significant. The liquidity needs interaction with financial development is statistically significant only using instrumental variable in both the growth volatility and worst output drop regressions. The ED interaction with financial development is statistically significant in all of the OLS and IV specifications of the worst output drop equations (Panel A) but is not for any of the volatility equations (Panel B). When both the liquidity needs and ED interactions are included, the levels

[34] The regressions in Table 11 are based on a sample of 920 country-industry observations. The sample differs from that used previously because we restrict the sample to countries and sectors with growth data starting no later than 1985 and with at least 5 growth observations.

[35] In the OLS regression of volatility we obtain a statistically insignificant coefficient estimate for the interaction between Liquidity needs and Private credit to GDP of -0.29 (column (1)) compared to a significant coefficient of -0.44 in Raddatz, and in the OLS regression of worst output drop we obtain an insignificant coefficient of 0.42 compared to a statistically significant coefficient of 0.65 in Raddatz. In the IV regression of volatility we obtain estimate of the interaction term of -0.69 (column (4)) compared to a coefficient of -1.14 in Raddatz, and in the IV regression of worst output drop we obtain a coefficient of 1.54 compared to a coefficient of 1.81 in Raddatz. All of

of statistical significant vary across specifications, but the coefficient magnitudes are little changed from when we include only one interaction term. Overall, the evidence is suggestive that greater financial depth mitigates the output drop of sectors that dependent on outside finance, and the evidence is most consistent when using the ED measure of external dependence. Thus, while we find that sectors highly dependent on external finance tend to experience a greater contraction during a banking crisis in deeper financial systems, we should not conclude that deeper financial systems are not beneficial in the long-run.

VI. Conclusions

In "normal" non-crisis periods, we find that sectors relatively more reliant on external finance grow disproportionately faster in countries with deep financial systems, consistent with Rajan and Zingales (1998). When we examine crisis periods, however, we find the opposite relation: financial crises have a disproportionately negative impact on sectors that rely heavily on external sources of finance in countries with deep financial systems. These results are robust to controlling for a wide variety of industry and country characteristics and employing various specifications. On average, in a country experiencing a banking crisis, a sector at the 75th percentile of external dependence and located in a country at the 75th percentile of private credit to GDP would experience a 1.6 percent greater contraction in growth in value added between the crisis and pre-crisis period than a sector at the 25th percentile of external dependence and private credit to GDP. This is a large effect compared with an overall mean decline in growth of 3.5 percent between these two periods. In addition, we find similar results when we use firm-level data. Our results provide evidence on the mechanisms linking the financial and real sectors in a

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the IV coefficients are statistically significant in both Raddatz and our sample.

financial crisis.

In particular, we find that our results obtain for banking crises but not for other types of economic distress, such as currency crises and economic recessions, suggesting that the results are primarily due to troubles in the banking sector. We interpret our results to provide a consistent evidence of the existence of a "credit channel" operating through the banking system: a deeper financial system allows sectors dependent on external finance to obtain relatively more external funding in normal periods, so a crisis that significantly impairs the functioning of the banks would have a disproportionately negative effect on externally dependent firms in such systems. In contrast, since externally dependent firms tend to obtain relatively less external financing in shallower financial systems (hence the relatively lower growth rates in externally dependent sectors in such countries during normal times), a crisis in such countries has less of an effect on the growth of these sectors. An additional complementary effect is that deeper financial systems are more efficient in enforcing hard budget constraints on firms during a financial crisis than are financial institutions in underdeveloped financial systems. Our results, however, do not suggest that externally dependent firms on net fare worse in well developed financial systems.

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Table 1. Average Real Growth in Value Added for All Sectors Across Banking Crises

This table reports country averages of the industry-level real growth in value added for the pre-crisis and crisis periods. Sample consists of banking crisis countries. Data are for the period 1980-2000. Pre-crisis period is [t_1, t-3], crisis period is [t, t+2], and post-crisis period is [t+4, T], where t is the banking crisis date, t_1 is the first year of the sample period and T is last year of the sample period. Banking crisis dates are the first year of the banking crisis episodes reported in Caprio and Klingebiel (2002). We allow for multiple crises in a country, in which case crisis period growth variables are an average of each during crisis period for that country. Pre-crisis variables are based only on the period prior to the first crisis and post-crisis variables are based only on the period after the last crisis in the sample. Growth observations are winsorized at +100% and –100%. We also report the ratio of private credit to GDP in 1980 (or the first year available, as otherwise indicated between brackets). Due to missing data on private credit to GDP for Tanzania and on private credit to GDP in 1980 for an additional five countries, the final sample consists of a total of 45 banking crises in 38 countries. We do not include several crisis countries in the sample due to a lack of UNIDO growth data. These countries include (with banking crisis dates between brackets): Argentina (1980, 1989, 1995), Benin (1988), Brazil (1990, 1994), Burkina Faso (1988), Ecuador (1996), Equatorial Guinea (1983), Israel (1977), Jamaica (1994), Sierra Leone (1990), Thailand (1983, 1997), Togo (1993), Uganda (1994), and Zambia (1995). Data on value added are from UNIDO. Data on private credit to GDP are from IFS.

		Real growth in value added			Number of sectors			
Country	Banking crisis date	Pre-crisis	Crisis	Post-crisis	Pre-crisis	Crisis	Post-crisis	Private credit to GDP
Algeria	1990	0.178	-0.218	-0.245	6	6	6	0.399
Bolivia	1986, 1994	-0.103	-0.071, 0.026	0.005	19	19, 31	20	0.144
Burundi	1994	0.034	n.a.	n.a.	12	0	0	0.068
Cameroon	1987, 1995	-0.069	n.a., -0.001	0.121	17	0, 18	18	0.285
Cape Verde	1993	0.139	n.a.	n.a.	7	0	0	0.019 (1985)
Central African Republic	1988	0.071	0.063	0.028	7	8	4	0.113 (1982)
Chile	1981	n.a.	-0.119	0.051	0	21	35	0.308
Colombia	1982	n.a.	-0.002	0.032	0	36	36	0.252
Congo	1992	-0.024	n.a.	n.a.	8	0	0	0.158 (1991)
Costa Rica	1994	0.038	0.021	-0.001	32	34	35	0.264
Cote d'Ivoire	1988	-0.070	0.000	0.073	13	10	10	0.402
Egypt	1991	0.074	-0.009	0.136	36	36	36	0.178
Finland	1991	0.030	-0.033	0.041	36	36	36	0.430
Ghana	1982	n.a.	-0.362	0.108	0	32	32	0.021
India	1993	0.084	0.116	0.051	36	36	36	0.233
Indonesia	1992, 1997	0.150	0.208, 0.064	-0.044	31	35, 35	17	0.078
Japan	1992	0.050	0.008	-0.020	36	36	21	1.173
Jordan	1989	0.067	0.006	0.054	19	31	31	0.475
Kenya	1985, 1993	0.009	0.054, 0.082	0.193	19	19, 18	18	0.317
Korea	1997	0.142	-0.022	0.044	36	20	20	0.483
Kuwait	1986	-0.038	0.082	-0.016	23	23	25	0.337
Madagascar	1988	-0.111	-0.103	n.a.	19	14	0	0.203

		Real growth in value added			Number of sectors			
Country	Banking crisis date	Pre-crisis	Crisis	Post-crisis	Pre-crisis	Crisis	Post-crisis	Private credit to GDP
Malaysia	1985, 1997	n.a.	0.064, 0.099	n.a.	0	36, 36	0	0.435
Mexico	1981, 1994	n.a.	-0.074, 0.101	0.015	0	11, 36	21	0.167
Morocco	1980	n.a.	n.a.	0.028	0	0	19	0.237
Nepal	1988	n.a.	0.064	0.094	0	20	20	0.104
Nicaragua	1989	0.294	n.a.	n.a.	19	0	0	0.417
Niger	1983	n.a.	n.a.	-0.064	0	0	4	0.156
Nigeria	1991	-0.001	-0.096	0.030	15	26	25	0.109
Norway	1990	0.027	-0.044	0.024	36	36	19	0.750
Panama	1988	0.018	-0.025	-0.004	28	27	28	0.479
Peru	1983	n.a.	-0.014	-0.014	0	36	36	0.094
Philippines	1983, 1998	n.a.	-0.248, 0.119	n.a.	0	36, 21	0	0.384
Senegal	1988	0.009	-0.041	0.053	11	10	11	0.405
South Africa	1989	0.022	0.046	0.014	21	21	21	0.382
Sri Lanka	1989	-0.001	0.039	0.071	20	34	34	0.183
Swaziland	1995	0.012	0.015	n.a.	6	3	0	0.218
Sweden	1991	0.020	-0.094	0.036	36	36	36	0.834
Tanzania	1988	-0.105	-0.450	0.114	21	17	24	n.a.
Tunisia	1991	0.016	0.069	0.033	15	24	24	0.487 (1988)
Turkey	1982, 1994, 2000	n.a.	0.030, 0.006, 0.012	n.a.	0	36, 36, 21	0	0.163 (1987)
Uruguay	1981	n.a.	-0.181	0.050	0	32	32	0.291
Venezuela	1994	0.009	-0.119	-0.117	36	36	18	0.503
Zimbabwe	1995	-0.040	0.017	n.a.	29	29	0	0.286
Average/Total	1990	0.029	-0.014	0.029	705	1210	808	0.329

Table 2. Summary Statistics Before, During, and After Crisis

This table lists the summary statistics for the following variables: real growth in value added over the pre-crisis period, real growth in value added over the crisis period, initial share in value added, and the interaction between the external financial dependence of the sector (ED) and the private credit to GDP of the country in 1980. Pre-crisis period is [t_1, t-3], crisis period is [t, t+2], and post-crisis period is [t+4, T], where t is the banking crisis date, t_1 is the first year of the sample period and T is last year of the sample period. Banking crisis dates are the first year of the banking crisis episodes reported in Caprio and Klingebiel (2002). We allow for multiple crises in a country, in which case growth rates are averages for the different crisis periods. Growth observations are winsorized at +100% and –100%. Initial share in value added is the industry's share in total value added in 1980 or the first year for which data is available. We only include sectors in crisis countries over the period 1980-2000 for which data on growth in value added, initial share in value added, and financial development of the country are available. The sample is an unbalanced sample of 647 country-sector observations for the pre-crisis period, 928 country-sector observations for the crisis period, and 756 country-sector observations for the post-crisis period. The pre-crisis periods cover a total of 27 banking crises in 27 countries. The crisis periods cover a total of 41 banking crises in 34 countries. The post-crisis periods cover a total of 31 banking crises in 31 countries. Total sample consists of a total of 43 banking crises in 36 countries.

Variables	Observations	Average	25^{th} percentile	Median	75^{th} percentile	Minimum	Maximum	Standard deviation
Pre-crisis growth in real value added	647	0.036	-0.030	0.036	0.100	-0.672	0.608	0.131
During-crisis growth in real value added	928	-0.023	-0.112	-0.008	0.077	-1	1	0.212
Post-crisis growth in real value added	756	0.037	-0.024	0.033	0.090	-1	0.987	0.179
During-crisis minus pre-crisis growth	582	-0.035	-0.125	-0.046	0.063	-1.020	0.802	0.206
Post-crisis minus crisis growth	710	0.061	-0.064	0.042	0.166	-1.461	1.320	0.301
Initial share in value added	1032	0.033	0.006	0.016	0.035	0.000	0.528	0.053
ED	36	0.319	0.070	0.231	0.452	-0.451	1.492	0.406
Private Credit to GDP	36	0.336	0.180	0.299	0.423	0.021	1.173	0.229
ED * Private Credit to GDP	1032	0.101	0.012	0.053	0.129	-0.529	1.750	0.184

Table 3. Value Added Growth, Financial Dependence, and Financial Development: Before, During, and After a Financial Crisis

Dependent variable in columns (1), (2), and (4) is real growth in sectoral value added. Dependent variable in regression (3) is the difference in real growth in value added between the crisis period and the pre-crisis period. Dependent variable in regression (5) is the difference in real growth in value added between the post-crisis period and the crisis period. Dependent variable in regression (6) is the difference in real growth in value added between the post-crisis period and the pre-crisis period. Sample consists of crisis countries. Pre-crisis period is [t_1, t-3], crisis period is [t, t+2], and post-crisis period is [t+4, T], where t is the banking crisis date, t_1 is the first year of the sample period and T is last year of the sample period. Generally, t_1 is 1981 and T is 2000. Hence, real growth in value added over the crisis period is the 3-year average growth rate over the year of the banking crisis and the two following years. Growth observations are winsorized at +100% and –100%. ED is the external dependency figure in Rajan and Zingales (1998) on a two or three-digit ISIC level. In columns (7) and (8) we use a balanced panel of countries in the sample with data for both the pre-crisis and the crisis period. In column (9) we allow each crisis episode in a country to be a distinct observation, thereby including more than one crisis for countries with multiple crises. Country and industry dummies are included, but not reported. We use initial share in value added and private credit to GDP in 1980 only. A constant was added, but is not reported. White (1981) heteroskedasticity-consistent standard errors are reported between brackets. * significant at 10% level; ** significant at 5% level; *** significant at 1% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
							Balanced panel		*Multiple crisis observations*
	Pre-crisis	*Crisis*	*Crisis vs. Pre-crisis*	*Post-crisis*	*Post-crisis vs. Crisis*	*Post-crisis vs. Pre-crisis*	*Pre-crisis*	*Crisis*	*Crisis vs. Pre-crisis*
Share in value added	-0.297***	-0.197	0.545**	0.331	0.537	0.752**	-0.272**	0.274	0.559**
	(0.095)	(0.216)	(0.240)	(0.220)	(0.344)	(0.300)	(0.116)	(0.194)	(0.229)
ED * Private Credit to GDP	0.070**	-0.084*	-0.174***	0.002	0.068	-0.060	0.076**	-0.097**	-0.178***
	(0.033)	(0.044)	(0.055)	(0.054)	(0.084)	(0.054)	(0.035)	(0.047)	(0.053)
F-test (p-value)	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
Observations	647	928	582	756	710	471	582	582	650
Number of countries	27	34	25	31	29	22	25	25	25
- with one crisis episode	23	28	22	26	25	18	22	22	22
- with two crisis episodes	4	6	3	5	4	4	3	3	3
R-squared	0.44	0.29	0.22	0.17	0.23	0.27	0.37	0.25	0.20

Table 4. Value Added Growth, Financial Dependence, and Financial Development: Alternative Industry Characteristics

Dependent variable is the difference in real growth in value added between the crisis period and the pre-crisis period. Sample consists of crisis countries. Pre-crisis period is [t_1, t-3], and crisis period is [t, t+2], where t is the banking crisis date and t_1 is the first year of the sample period. Growth observations are winsorized at +100% and –100%. ED is external financial dependence of the sector. In regression (1), ED is calculated for young U.S. firms. In regression (2), ED is calculated for old U.S. firms. In regression (3), ED is calculated for firms in non-banking crisis countries. Intangibility is the median level of the ratio of intangible assets to fixed assets of U.S. firms. Tangibility is the median level of the ratio of fixed assets to total assets for U.S. firms. Durable goods is an indicator that takes value of one if the sector manufactures predominantly durable goods, and a value of zero if the sector manufactures predominantly non-durable goods. Capital-to-labor is the median level of the ratio of fixed assets over number of employees of U.S. firms. R&D intensity is the median level of the ratio of R&D expenses over sales for U.S. firms for the period. For more details on the industry-level variables, see Appendix Table 1. Country and industry dummies are included, but not reported. We use initial share in value added and private credit to GDP in 1980. A constant was added, but is not reported. Heteroskedasticity-consistent standard errors are reported between brackets. * significant at 10% level; ** significant at 5% level; *** significant at 1% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share in value added	0.697***	0.497**	0.509**	0.552**	0.552**	0.544**	0.546**	0.556**
	(0.240)	(0.240)	(0.243)	(0.241)	(0.243)	(0.240)	(0.239)	(0.241)
ED Young firms * Private Credit to GDP	-0.073**							
	(0.034)							
ED Old firms * Private Credit to GDP		-0.123						
		(0.087)						
ED Non-crisis * Private Credit to GDP			-0.126**					
			(0.060)					
ED * Private Credit to GDP				-0.169***	-0.177***	-0.176***	-0.173***	-0.216***
				(0.055)	(0.056)	(0.055)	(0.054)	(0.075)
Intangibility * Private Credit to GDP				-0.015				
				(0.048)				
Tangibility * Private Credit to GDP					-0.490*			
					(0.291)			
Durable goods * Private Credit to GDP						-0.033		
						(0.220)		
Capital-Labor ratio* Private Credit to GDP							0.000	
							(0.001)	
R&D intensity * Private Credit to GDP								0.296
								(0.224)
Observations	551	562	582	582	582	582	582	582
Number of countries	25	25	25	25	25	25	25	25
- with one crisis episode	22	22	22	22	22	22	22	22
- with two crisis episodes	3	3	3	3	3	3	3	3
R-squared	0.23	0.22	0.22	0.22	0.22	0.22	0.22	0.22

Table 5. Value Added Growth, Financial Dependence, and Financial Development: Alternative Country Characteristics

Dependent variable is the difference in real growth in value added between the crisis period and the pre-crisis period. Sample consists of crisis countries. Pre-crisis period is [t_1, t-3], and crisis period is [t, t+2], where t is the banking crisis date and t_1 is the first year of the sample period. Growth observations are winsorized at +100% and –100%. ED is the external dependency figure in Rajan and Zingales (1998) on a two or three-digit ISIC level. Country and industry dummies are included, but not reported. We use initial share in value added and private credit to GDP in 1980 only. Log of GDP per capita is the logarithm of GDP per capita in 1980. Executive constraints is the index of constraints on the executive from Polity IV in 1980. Corruption is the index of corruption (with higher values denoting less corruption from ICRG in 1984 (first year of data availability). Law and order is the index of law and order tradition in the country from ICRG in 1984. In column (5), we present instrumental variable regressions. Financial development (Private credit to GDP) is instrumented using legal origin dummy variables and the index of legal efficiency produced by Business International Corporation. The IV regressions are based on the subsample of countries for which legal efficiency data are available. A constant was added, but is not reported. Heteroskedasticity-consistent standard errors are reported between brackets. * significant at 10% level; ** significant at 5% level; *** significant at 1% level.

	(1)	(2)	(3)	(4)	(5)
Share in value added	0.546**	0.531**	0.533**	0.543**	0.166
	(0.241)	(0.238)	(0.241)	(0.241)	(0.274)
ED * Private Credit to GDP	-0.184**	-0.199***	-0.240***	-0.158***	-0.089*
	(0.079)	(0.065)	(0.066)	(0.061)	(0.053)
ED * Log of GDP per capita	0.002				
	(0.016)				
ED * Executive constraints		0.033			
		(0.032)			
ED * Corruption			0.057*		
			(0.032)		
ED * Law and order				-0.013	
				(0.045)	
R-squared first-stage					0.94
Joint significance of instruments (p-value)					0.00***
Sargan test of overidentifying restrictions (p-value)					0.64
Observations	582	582	579	579	426
Number of countries	25	25	24	24	15
- with one crisis episode	22	22	21	21	13
- with two crisis episodes	3	3	3	3	2
R-squared	0.22	0.22	0.22	0.22	0.22

Table 6. Value Added Growth, Financial Dependence, and Financial Development: Sub-samples

Dependent variable is the difference in real growth in value added between the crisis period and the pre-crisis period. Sample consists of crisis countries. Pre-crisis period is [t_1, t-3], and crisis period is [t, t+2], where t is the banking crisis date and t_1 is the first year of the sample period. Cut-off for difference in growth in value added between sub-periods is +100% and –100%. ED is the external dependency figure in Rajan and Zingales (1998) on a two or three-digit ISIC level. Country and industry dummies are included, but not reported. We use initial share in value added and private credit to GDP in 1980 only. In column (1) we exclude countries in Africa. In column (2) we exclude OECD countries. Sampled OECD countries excluded: Finland, Japan, Korea, Mexico, Norway, and Sweden. In column (3) we run the regression on the subset of countries with above median GDP per capita. In column (4) we run the regression on the subset of countries with below median GDP per capita. A constant was added, but is not reported. Heteroskedasticity-consistent standard errors are reported between brackets. * significant at 10% level; ** significant at 5% level; *** significant at 1% level.

	(1) Excluding African countries	(2) Excluding OECD countries	(3) Above median GDP per capita	(4) Below median GDP per capita
Share in value added	0.390	0.713***	0.534**	0.739
	(0.250)	(0.272)	(0.267)	(0.507)
ED * Private Credit to GDP	-0.130***	-0.865***	0.011	-1.077**
	(0.049)	(0.202)	(0.054)	(0.540)
Observations	448	418	327	255
Number of countries	16	20	12	13
- with one crisis episode	14	17	12	10
- with two crisis episodes	2	3	0	3
R-squared	0.30	0.24	0.38	0.20

Table 7. Value Added Growth, Financial Dependence, and Financial Development: Multiple Crises, Crisis Other than Banking, and Time Trends

Dependent variable is the difference in real growth in value added between crisis and pre-crisis period. Sample consists of crisis countries. Pre-crisis period is [t_1, t-3] and crisis period is [t, t+2], where t is the banking crisis date and t_1 is the first year of the sample period. In regressions (1) to (2), we control for the occurrence of multiple crises. Regression (1) excludes countries with multiple crises during the sample period. Regression (2) controls for multiple crises by adding a triple interaction between Multiple crises, ED, and private credit to GDP, where Multiple crises is a dummy variable that takes a value of one for countries with multiple crises, and zero otherwise. Regression (3) excludes countries with crises identified by Caprio and Klingebiel (1996) as non-systemic. The dependent variable in regression (4) is calculated for currency crisis periods rather than banking crisis periods. Sample includes only countries with a currency crisis during the sample period. Currency crisis is defined as a period during which the currency depreciated by more than 25%, the depreciation was more than twice as large as during the previous year, the depreciation during the previous year was less than 40%, and there were no currency crises during the previous three years. The dependent variable in regression (5) is calculated for currency crisis periods. Sample includes only countries with a recession during the sample period. Recessions are defined as in Braun and Larrain (2005). Pre-crisis period is [t_1, t-3] and crisis period is [t, t+2], where t is the currency crisis or recession date, and t_1 is the first year of the sample period. The dependent variable in regression (6) is the difference in real growth in value added between banking crisis and pre-crisis period. Pre-crisis period is [t_1, t-3] and crisis period is [t, t+2], where t is the banking crisis date and t_1 is the first year of the sample period. Regression (6) controls for time trends by adding triple interactions between crisis period dummies, ED, private credit to GDP. Crisis 1991-1995 takes a value of one if the banking crisis date of the country is during the period 1991 to 1995. Crisis 1996-2000 takes a value of one if the banking crisis date of the country is during the period 1996 to 2000. The left-out category is the period before 1990. In the case of multiple crises, we calculate the time period variables for each crisis in the country. Growth observations are winsorized at +100% and –100%. ED is external financial dependence from Rajan and Zingales (1998), recomputed at the two-digit SIC level using data from Compustat. Country and industry dummies are included in all regressions, but not reported. We use initial share in value added and private credit to GDP in 1980 only. A constant was added, but is not reported. Heteroskedasticity-consistent standard errors are reported between brackets. * significant at 10% level; ** significant at 5% level; *** significant at 1% level.

	(1) One crisis only	(2) Multiple crisis	(3) Only systemic crises	(4) Currency crises	(5) Recessions	(6) Time trends
Share in value added	0.485*	0.551**	0.649**	0.554**	1.073***	0.546**
	(0.254)	(0.240)	(0.266)	(0.219)	(0.353)	(0.241)
ED * Private Credit to GDP	-0.190***	-0.200***	-0.152**	-0.074	-0.089	-0.173**
	(0.066)	(0.059)	(0.061)	(0.111)	(0.085)	(0.075)
Multiple crises * ED * Private Credit to GDP		-0.543**				
		(0.269)				
Crisis 1991-1995 * ED * Private Credit to GDP						-0.002
						(0.057)
Crisis 1996-2000 * ED * Private Credit to GDP						-0.052
						(0.155)
Observations	499	582	470	473	441	582
Number of countries	21	25	21	23	20	25
- with one crisis episode	21	22	18	21	16	22
- with two crisis episodes	0	3	3	2	4	3
R-squared	0.23	0.22	0.23	0.33	0.21	0.22

Table 8. Value Added Growth, Financial Dependence, and Financial Development: Falsification Strategies for Non-Crisis Countries

Dependent variable in columns (1), (2), and (4) is real growth in value added of sector. Dependent variable in regression (3) is the difference in real growth in value added between the crisis period and the pre-crisis period. Sample consists of non-crisis countries. Pre-crisis period is [t_1, t-3], and crisis period is [t, t+2], where t is the hypothetical banking crisis date and t_1 is the first year of the sample period. In regressions 1-3, t is the randomized banking crisis date. In regressions 4-6, t is the year 1990, the most common crisis date in the sample (and the mid-point of the sample period). Cut-off for difference in growth in value added between sub-periods is +100% and –100%. ED is the external dependency figure in Rajan and Zingales (1998) on a two or three-digit ISIC level (see Table 1). Country and industry dummies are included, but not reported. We use initial share in value added and private credit to GDP in 1980 only. A constant was added, but is not reported. Heteroskedasticity-consistent standard errors are reported between brackets. * significant at 10% level; ** significant at 5% level; *** significant at 1% level.

	(1)	(2)	(3)	(4)	(5)	(6)
	Randomized crisis date			Crisis date 1990		
	Pre-"crisis"	*"Crisis"*	*"Crisis" vs. "Pre-crisis"*	*Pre-"crisis"*	*"Crisis"*	*"Crisis" vs. "Pre-crisis"*
Share in value added	-0.397	-0.018	0.542	-0.147*	-0.305*	-0.032
	(0.249)	(0.143)	(0.497)	(0.082)	(0.159)	(0.173)
ED * Private Credit to GDP	0.020	0.037	0.044	0.024	0.059	0.024
	(0.041)	(0.044)	(0.090)	(0.027)	(0.057)	(0.050)
Observations	653	555	458	728	669	635
Number of countries	30	28	23	33	29	27
R-squared	0.37	0.23	0.32	0.41	0.51	0.25

Table 9. Firm Performance, Financial Dependence, Financial Development, and Banking Crises

Dependent variable in columns (1) to (3) is firm-level real growth in total sales. Dependent variable in columns (4) to (6) is firm-level real growth in earnings before interest and taxes (EBIT). Dependent variable in columns (7) to (9) is firm-level real stock returns. In columns (1), (4), and (7), the dependent variable is calculated over the crisis period. In columns (2), (5), and (8), the dependent variable is calculated over the post-crisis period. In columns (3), (6), and (9), the dependent variable is the difference between the respective post-crisis and crisis variables. We do not report pre-crisis growth regression results because data is only available for one country. Pre-crisis period is [t_1, t-3], crisis period is [t, t+2], and post-crisis period is [t+4, T], where t is the banking crisis date, t_1 is the first year of the sample period and T is last year of the sample period. Generally, t_1 is 1990 and T is 2000. Sample consists of crisis countries. Log of assets is the logarithm of the initial value of total assets in real U.S. dollars (i.e., in 1990 or the earliest date available). Leverage ratio is the initial value of the ratio of book value of total debt to book value of total equity. ADR is a dummy variable that takes a value of one if the firm has an American depository receipt listed in the United States, and zero otherwise. Big Six Auditor is a dummy variable that takes a value of one if the firm's auditor is one of the Big Six international accounting firms, and zero otherwise. Firm-level data are from Worldscope, except data on ADR listings, which are from the Bank of New York, and stock returns, which are from Datastream. Private credit to GDP is the ratio of private credit to GDP in 1980. ED is the external financial dependence ratio over the period 1980-89, calculated at the two-digit SIC level using data from Compustat using the method in Rajan and Zingales (1998). All regressions include country and industry dummies (at the two-digit SIC level) (not reported). Heteroskedasticity-consistent standard errors are reported between brackets. * significant at 10% level; ** significant at 5% level; *** significant at 1% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Real growth in sales			Real growth in earnings (EBIT)			Real stock returns		
	Crisis	*Post-Crisis*	*Post-Crisis vs. Crisis*	*Crisis*	*Post-Crisis*	*Post-Crisis vs. Crisis*	*Crisis*	*Post-Crisis*	*Post-Crisis vs. Crisis*
Log of assets	-0.013***	-0.009***	0.013***	-0.034***	-0.004	0.038***	0.001	-0.002	0.015***
	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)	(0.006)	(0.004)	(0.003)	(0.005)
ED * Private Credit to GDP	-0.096***	0.041*	0.107***	-0.121*	0.069	0.265***	-0.056	0.163***	0.259***
	(0.028)	(0.022)	(0.037)	(0.065)	(0.044)	(0.092)	(0.050)	(0.042)	(0.070)
Leverage ratio							0.004	0.001	-0.003
							(0.003)	(0.002)	(0.003)
ADR							0.133***	0.079***	-0.104*
							(0.048)	(0.030)	(0.055)
Big Six Auditor							0.038*	0.030**	0.024
							(0.021)	(0.015)	(0.028)
Observations	2298	3708	2282	2064	3158	1866	2156	3551	2132
Number of countries	15	16	15	15	16	15	15	16	15
- with one crisis episode	13	14	13	13	14	13	13	14	13
- with two crisis episodes	2	2	2	2	2	2	2	2	2
R-squared	0.09	0.04	0.08	0.09	0.02	0.07	0.10	0.04	0.07

Table 10. Value Added Growth, Financial Dependence, and Financial Crises

Dependent variable is annual real growth in sectoral value added. Sample consists of crisis countries. We restrict the sample to countries and sectors with growth data starting no later than 1985. Growth observations are winsorized at +100% and -100%. Lagged share in value added is the lagged share in total value added of the country. ED is the external dependency figure in Rajan and Zingales (1998). Recession is a dummy variable that takes a value of one during recession years as calculated using the method in Braun and Larrain (2005). Specifically, for each country troughs are identified as years when the current logarithm of real local currency GDP deviates by more than one standard deviation from its trend level (computed using the Hodrick-Prescott (1997) filter with a smoothing parameter of 100). Due to missing GDP data, we cannot construct recession dates for Kuwait. Banking crisis is a dummy variable that takes value of one for the crisis date and the two following years, and zero otherwise. Currency crisis is a dummy variable that takes a value of one during years of currency crisis, defined as (i) an exchange rate depreciation against the dollar of at least 25 percent; (ii) a depreciation that is at least twice as high as the rate of depreciation during the previous year; (iii) a depreciation the previous year of less than 40 percent; and (iv) no currency crisis during the previous three years. Durable goods is an indicator that takes value of one if the sector manufactures predominantly durable goods, and a value of zero if the sector manufactures predominantly non-durable goods. Regressions in columns (1) to (6) include country, industry, year, country-industry, and industry-year fixed effects. Regressions in columns (7) to (10) include country-year, country-industry, and industry-year fixed effects. White (1981) standard errors are reported between brackets. * significant at 10% level; ** significant at 5% level; *** significant at 1% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Lagged share in value added	-3.188***	-3.008***	-3.009***	-3.190***	-3.011***	-3.193***	-2.905***	-3.080***	-2.905***	-2.908***
	(0.223)	(0.207)	(0.206)	(0.224)	(0.207)	(0.223)	(0.190)	(0.206)	(0.190)	(0.190)
Banking crisis		-0.049***		-0.034***	-0.045***	-0.031***				
		(0.008)		(0.008)	(0.008)	(0.008)				
ED * Banking crisis		-0.044**		-0.040**	-0.047***	-0.043**	-0.037**	-0.036**	-0.039**	-0.028*
		(0.017)		(0.018)	(0.018)	(0.018)	(0.017)	(0.018)	(0.017)	(0.016)
Recession	-0.085***			-0.077***		-0.072***				
	(0.008)			(0.008)		(0.008)				
ED * Recession	-0.027*			-0.014		-0.017		-0.007		
	(0.016)			(0.017)		(0.017)		(0.016)		
Currency crisis			-0.087***		-0.079***	-0.065***				
			(0.017)		(0.017)	(0.017)				
ED * Currency crisis			0.032		0.037	0.044			0.042	
			(0.038)		(0.038)	(0.038)			(0.036)	
Durable goods * Banking crisis										-0.029**
										(0.012)
Observations	14962	15397	15397	14962	15397	14962	15397	14962	15397	15397
Number of countries	42	43	43	42	43	42	43	42	43	43
- with one crisis episode	34	35	35	34	35	34	35	34	35	35
- with two crisis episodes	7	7	7	7	7	7	7	7	7	7
- with three crisis episodes	1	1	1	1	1	1	1	1	1	1
R-squared	0.05	0.04	0.04	0.05	0.04	0.06	0.04	0.04	0.04	0.04

Table 11. Volatility of Value Added Growth, Financial Dependence, and Financial Development

Dependent variable in panel A is the standard deviation of annual real growth in sectoral value added for the period 1981-2000. Dependent variable in panel B is the minimum rate of this growth variable. Sample consists of countries with a banking crisis during the period 1980-2000. We restrict the sample to countries and sectors with growth data starting no later than 1985 and with at least 5 growth observations. Growth observations are winsorized at +100% and -100%. Liquidity needs is the industry-level ratio of total inventories over annual sales for U.S. firms during the 1980's, constructed using the methodology in Raddatz (2004). ED is the external dependency figure in Rajan and Zingales (1998). We use private credit to GDP in 1980. Share in value added is the initial share in total value added. Columns (1) to (3) report OLS regressions. Columns (4) to (6) report IV regressions where private credit is instrumented using a country's legal origin. Regressions include country and industry fixed effects. White (1981) standard errors are reported between brackets. ** significant at 5% level; *** significant at 1% level.

Panel A: Volatility

	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Share in value added	-0.346***	-0.339***	-0.333***	-0.337***	-0.335***	-0.322***
	(0.125)	(0.124)	(0.124)	(0.125)	(0.124)	(0.124)
Liquidity needs * Private Credit to GDP	-0.295		-0.282	-0.691**		-0.669**
	(0.254)		(0.243)	(0.317)		(0.304)
ED * Private Credit to GDP		-0.048	-0.047		-0.060	-0.056
		(0.032)	(0.032)		(0.037)	(0.037)
Observations	920	920	920	920	920	920
Number of countries	35	35	35	35	35	35
- with one crisis episode	28	28	28	28	28	28
- with two crisis episodes	7	7	7	7	7	7
R-squared	0.67	0.67	0.67	0.67	0.67	0.67

Panel B: Worst output drop

	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Share in value added	0.672***	0.644***	0.636***	0.647***	0.626***	0.596***
	(0.198)	(0.195)	(0.197)	(0.200)	(0.194)	(0.198)
Liquidity needs * Private Credit to GDP	0.421		0.386	1.543**		1.466**
	(0.541)		(0.520)	(0.741)		(0.715)
ED * Private Credit to GDP		0.132**	0.130**		0.197**	0.189**
		(0.061)	(0.061)		(0.086)	(0.085)
Observations	920	920	920	920	920	920
Number of countries	35	35	35	35	35	35
- with one crisis episode	28	28	28	28	28	28
- with two crisis episodes	7	7	7	7	7	7
R-squared	0.59	0.59	0.59	0.59	0.59	0.59

Appendix Table 1. Industry Characteristics Across Industries in the United States During the 1980s and 1990s

This table reports industry characteristics for ISIC industries for the 1980's and 1990's on a three-digit and four-digit ISIC level. We use the classification of the second revision of the ISIC. External dependence is the fraction of capital expenditures not financed with cash flow from operations. Cash flow from operations is defined as in Rajan and Zingales (1998). We report the median level of external financing for ISIC industries in the United States for the period 1980-1989 and 1980-1999. We also report the median level of external financing for ISIC industries in non-crisis countries for the period 1990-1999. Non-crisis countries are defined as countries that did not experience a banking crisis during the period 1980-2000 as defined by Caprio and Klingebiel (2002). Liquidity needs is the ratio of inventories to sales. We report the median level of liquidity needs for ISIC industries for the period 1980-1989 and 1980-1999. Durable goods is an indicator that takes value of one if the sector manufactures predominantly durable goods, and a value of zero if the sector manufactures predominantly non-durable goods. Intangibility is the median level of the ratio of intangible assets to fixed assets for ISIC industries for the period 1980-1999. Tangibility is the median level of the ratio of fixed assets to total assets for ISIC industries for the period 1980-1999. Capital-to-labor is the median level of the ratio of fixed assets over number of employees for ISIC industries for the period 1980-1999. R&D intensity is the median level of the ratio of R&D expenses over sales for ISIC industries for the period 1980-1999. We calculate these variables for the same sectors (at a combination of three-digit and four-digit ISIC levels) as in Rajan and Zingales (1998). For the external dependence in the 1980's we simply use their external dependence figures. The durable goods index is based on the classification of manufacturing industries by the U.S. Bureau of Economic Analysis (BEA). The measure of external dependence for non-crisis countries is based on data from Worldscope. All other measures are calculated as in Rajan and Zingales (1998) using data from Compustat.

ISIC code	Industrial sector	External dependence 1980s	External dependence 1980-99	External dependence non-crisis	Liquidity needs 1980s	Liquidity needs 1980-99	Durable goods	Intangibility	Tangibility	Capital-to-labor	R&D intensity
311	Food products	0.14	-0.15	0.05	0.10	0.10	0	0.07	0.37	25.17	0.01
313	Beverages	0.08	0.03	0.03	0.11	0.10	0	0.14	0.40	53.71	0.00
314	Tobacco	-0.45	-1.14	-0.25	0.25	0.28	0	0.34	0.19	26.13	0.00
321	Textiles	0.40	0.01	0.43	0.17	0.17	0	0.01	0.31	13.28	0.01
322	Apparel	0.03	-0.21	0.07	0.21	0.21	0	0.07	0.15	7.12	0.00
323	Leather	-0.14	-0.95	-0.14	0.27	0.23	0	0.09	0.12	8.16	0.01
324	Footwear	-0.08	-0.74	-0.21	0.23	0.22	0	0.04	0.13	8.24	0.01
331	Wood products	0.28	0.05	0.24	0.12	0.11	1	0.01	0.32	18.05	0.01
332	Furniture	0.24	-0.38	-0.02	0.15	0.15	1	0.09	0.28	12.67	0.01
341	Paper products	0.18	-0.35	0.04	0.12	0.13	0	0.11	0.42	37.32	0.01
342	Printing and publishing	0.20	-0.42	-0.04	0.08	0.07	0	0.43	0.21	18.20	0.01
352	Other chemical products	0.22	-0.30	-0.03	0.15	0.15	0	0.20	0.27	31.08	0.02
353	Refineries	0.04	-0.02	-0.19	0.07	0.07	0	0.00	0.62	244.65	0.00
354	Petroleum and coal	0.33	0.13	-0.11	0.12	0.12	0	0.00	0.46	71.85	0.01
355	Rubber products	0.23	-0.02	-0.09	0.14	0.15	0	0.06	0.36	22.46	0.02
356	Plastic products	1.14	-0.02	1.55	0.13	0.13	0	0.18	0.38	41.09	0.02
361	Pottery	-0.15	-0.41	-0.17	0.17	0.17	1	0.00	0.28	13.21	0.02
362	Glass and products	0.53	0.03	0.02	0.15	0.15	1	0.06	0.42	29.96	0.02
369	Non-metal products	0.06	-0.29	0.00	0.14	0.15	1	0.03	0.48	43.20	0.01
371	Iron and steel	0.09	0.05	0.26	0.16	0.17	1	0.02	0.44	60.62	0.01

ISIC code	Industrial sector	External dependence 1980s	External dependence 1980-99	External dependence non-crisis	Liquidity needs 1980s	Liquidity needs 1980-99	Durable goods	Intangibility	Tangibility	Capital-to-labor	R&D intensity
372	Non-ferrous metal	0.01	-0.12	0.18	0.17	0.16	1	0.05	0.32	39.35	0.01
381	Metal products	0.24	-0.25	0.08	0.18	0.17	1	0.09	0.28	20.39	0.01
382	Machinery	0.45	-0.04	0.03	0.22	0.20	1	0.13	0.22	21.78	0.02
383	Electrical machinery	0.77	0.24	0.25	0.20	0.18	1	0.03	0.21	19.53	0.07
384	Transport equipment	0.31	-0.08	-0.04	0.19	0.18	1	0.11	0.23	19.63	0.02
385	Professional equipment	0.96	0.72	0.26	0.21	0.21	1	0.15	0.16	18.34	0.09
390	Other manufacturing	0.47	0.28	0.31	0.22	0.20	1	0.15	0.18	14.54	0.02
3211	Spinning	-0.09	-0.05	0.14	0.16	0.16	0	0.02	0.38	17.07	0.01
3411	Pulp and paper	0.15	-0.07	0.06	0.11	0.12	0	0.02	0.60	115.82	0.01
3511	Basic chemicals	0.25	-0.19	-0.01	0.15	0.14	0	0.06	0.43	81.70	0.03
3513	Synthetic resins	0.16	0.03	0.07	0.13	0.13	0	0.07	0.40	39.42	0.03
3522	Drugs	1.49	2.43	1.36	0.16	0.13	0	0.09	0.16	35.27	0.58
3825	Office and computing	1.06	0.54	0.60	0.21	0.17	1	0.00	0.14	16.42	0.10
3832	Radio	1.04	0.70	0.33	0.23	0.19	1	0.06	0.14	16.57	0.09
3841	Ship building	0.46	0.38	0.19	0.18	0.15	1	0.08	0.28	20.45	0.02
3843	Motor vehicles	0.39	0.06	0.04	0.15	0.14	1	0.12	0.28	21.53	0.02
Average		0.29	-0.05	0.15	0.16	0.16	0.47	0.09	0.31	36.40	0.03

Appendix Table 2. Average Real Growth in Sectoral Value Added in Countries without a Banking Crisis

This table reports the average real growth in value added across all sectors for countries that did not have a banking crisis during the period 1980-2000 (according to Caprio and Klingebiel, 2002), but for which we have data on value added. Growth observations are winsorized at +100% and –100%. We use this sample of countries for the falsification strategies reported in Table 8. Data on value added are from UNIDO.

Country	Real growth in value added	Number of sectors
Australia	0.023	36
Austria	0.024	33
Bangladesh	0.054	34
Barbados	-0.005	7
Belgium	0.002	23
Botswana	0.025	6
Canada	0.020	36
Cyprus	0.038	28
Denmark	0.023	21
Dominican Republic	-0.064	18
Ethiopia	-0.037	15
France	-0.020	19
Gabon	-0.151	10
Germany	0.015	35
Greece	0.013	36
Guatemala	-0.033	35
Haiti	-0.346	5
Honduras	0.001	31
Hong Kong	-0.040	33
Iceland	0.010	23
Iran	0.021	21
Ireland	0.032	20
Italy	0.031	21
Lesotho	-0.064	6
Macao	0.039	29
Malawi	0.033	12
Malta	0.062	26
Mauritius	0.084	28
Netherlands	0.018	32
New Zealand	-0.014	21
Oman	0.097	16
Pakistan	0.066	21
Papua New Guinea	0.008	13
Qatar	-0.002	12
Seychelles	0.020	4
Singapore	0.078	33
Switzerland	0.021	8
Syria	0.061	6
Taiwan	0.070	21
Trinidad and Tobago	-0.018	28
United Kingdom	-0.001	36
Average/Total	0.015	898

Appendix Table 3. Summary Statistics of Worldscope Variables

Sample consists of the subset of countries in Worldscope with banking crises during the period 1990-2000.[1] Panel A reports the firm-level real growth in sales for the pre-crisis, crisis and post-crisis periods, the real growth in earnings before interest and taxes (EBIT) for the crisis and post-crisis periods, the real stock returns for the crisis and post-crisis periods, the number of firms included in the sample of firms with data on real sales growth for the different periods, and private credit to GDP of the country in 1980 and 1990. Pre-crisis period is [t_1, t-3], crisis period is [t, t+2], and post-crisis period is [t+4, T], where t is the banking crisis date, t_1 is the first year of the sample period and T is last year of the sample period. Generally, t_1 is 1990 and T is 2000. We allow for multiple crises in a country, in which case crisis period variables are an average of each during crisis period for that country. Pre-crisis variables are based only on the period prior to the first crisis and post-crisis variables are based only on the period after the last crisis in the sample. Stock returns are in local currency from Datastream and adjusted for dividend payments. Growth and return variables are adjusted for inflation using the GDP deflator from IFS, and growth and return observations are winsorized at -100% and +100%. Panel B reports summary statistics of the firm-level variables. Log of assets is the logarithm of the initial value of total assets in thousands of 1990 U.S. dollars. Leverage ratio is the initial value of the ratio of total debt to total equity. The leverage ratio variable is winsorized at 0 and 20. ED is external financial dependence at the two-digit SIC industry level.

Panel A: Banking Crisis Dates, Firm-Level Sales Growth, Firm-Level EBIT, and Firm-Level Stock Returns

		Real sales growth			Real EBIT growth		Real stock returns		Number of firms			Private credit to GDP	
Country	Crisis dates	Pre-crisis	During crisis	Post-crisis	During crisis	Post-crisis	During crisis	Post-crisis	Pre-crisis	During crisis	Post-crisis	1980	1990
Argentina	1995	n.a.	0.007	-0.068	0.003	-0.112	0.031	-0.246	0	18	35	0.187	0.212
Brazil	1990, 1994	n.a.	0.237, -0.123	0.041	0.491, -0.142	0.034	0.497, -0.215	0.043	0	10, 73	181	0.257	0.338
Egypt	1991	n.a.	n.a.	-0.011	n.a.	-0.005	n.a.	-0.167	0	0	7	0.178	0.437
Finland	1991	n.a.	0.096	0.098	0.138	0.062	0.566	-0.030	0	38	79	0.430	0.614
India	1993	n.a.	0.108	0.030	0.100	-0.006	0.065	-0.238	0	167	279	0.233	0.237
Indonesia	1992, 1997	n.a.	0.155, -0.011	0.068	0.086, -0.040	-0.006	0.023, -0.110	-0.383	0	55, 82	141	0.078	0.377
Japan	1992	n.a.	-0.034	0.030	-0.205	-0.004	-0.073	-0.076	0	1216	1666	1.173	1.474
Korea	1997	0.028	0.067	0.069	0.095	-0.040	0.022	-0.031	116	273	508	0.483	1.261
Malaysia	1997	n.a.	-0.005	-0.017	0.030	-0.115	-0.080	-0.130	0	167	298	0.435	1.273
Mexico	1994	n.a.	0.111	-0.058	0.192	-0.127	0.012	-0.180	0	38	75	0.167	0.195
Norway	1990	n.a.	-0.018	0.085	-0.399	0.101	-0.379	-0.010	0	9	60	0.750	0.812
Philippines	1998	n.a.	-0.012	0.038	-0.116	-0.070	-0.289	-0.188	0	36	42	0.384	0.435
Sweden	1991	n.a.	0.122	0.176	0.212	0.098	0.518	0.000	0	48	143	0.834	1.161
Thailand	1997	n.a.	-0.006	0.032	-0.047	0.054	-0.119	0.063	0	124	175	0.325	1.048
Turkey	1994, 2000	n.a.	0.056, -0.016	n.a.	0.080, 0.002	n.a.	0.031, -0.026	n.a.	0	37, 102	0	n.a.	0.174
Venezuela	1994	n.a.	-0.010	-0.161	0.102	-0.330	0.016	-0.265	0	7	15	0.503	0.165
Zimbabwe	1995	n.a.	0.129	0.052	0.014	0.120	-0.389	-0.193	0	3	5	0.286	0.261
Total	1994	0.028	0.003	0.038	-0.076	-0.009	-0.038	-0.086	116	2503	3709	0.695	0.616

Panel B: Summary Statistics of Worldscope Variables

Variable	Observations	Average	25th percentile	Median	75th percentile	Minimum	Maximum	Standard deviation
Pre-crisis growth in real sales	116	0.028	-0.026	0.036	0.106	-0.94	0.467	0.161
During-crisis growth in real sales	2403	0.000	-0.065	-0.011	0.058	-1	1	0.158
Post-crisis growth in real sales	3708	0.038	-0.018	0.031	0.096	-1	1	0.180
Post-crisis minus crisis growth in real sales	2282	0.027	-0.036	0.037	0.105	-1.893	1.267	0.207
Pre-crisis growth in real EBIT	97	0.069	-0.092	0.079	0.184	-1	1	0.332
During-crisis growth in real EBIT	2164	-0.080	-0.254	-0.061	0.100	-1	1	0.348
Post-crisis growth in real EBIT	3158	-0.010	-0.149	0.005	0.143	-1	1	0.336
Post-crisis minus crisis growth in real EBIT	1866	0.066	-0.186	0.045	0.311	-2	2	0.462
Pre-crisis real stock returns	90	0.218	0.065	0.211	0.356	-0.535	0.967	0.237
During-crisis real stock returns	2260	-0.042	-0.199	-0.069	0.084	-1	1	0.287
Post-crisis real stock returns	3553	-0.086	-0.208	-0.091	0.037	-1	1	0.283
Post-crisis minus crisis real stock returns	2133	-0.071	-0.225	-0.041	0.109	-1.629	1.459	0.365
Log of total assets	4076	11.821	10.724	11.733	12.824	0.693	18.146	1.681
Leverage ratio	4074	2.157	0.652	1.280	2.421	0	20	2.992
ED * Private credit to GDP in 1980	249	-0.084	-0.105	-0.042	-0.008	-2.731	0.531	0.289

[1] The full sample of countries in Worldscope is: Argentina, Australia, Austria, Belgium, Bermuda, Brazil, Canada, Cayman Islands, Chile, Colombia, Denmark, Egypt, Finland, France, Germany, Greece, Hong Kong, India, Indonesia, Ireland, Israel, Italy, Japan, Jordan, Korea, Liechtenstein, Luxembourg, Malaysia, Mexico, Morocco, Netherlands, New Zealand, Norway, Pakistan, Peru, Philippines, Portugal, Singapore, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Kingdom, United States, Venezuela, and Zimbabwe.