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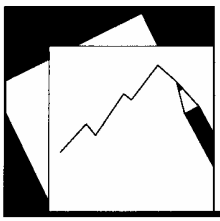

IMF Working Paper

The Real Effect of Banking Crises

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The Real Effect of Banking Crises

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Abstract

Banking crises are usually followed by a decline in credit and growth. Is this because crises tend to take place during economic downturns, or do banking sector problems have independent negative effects on the economy? To answer this question we examine industrial sectors with differing needs for financing. If banking crises have an exogenous detrimental effect on real activity, then sectors more dependent on external finance should perform relatively worse during banking crises. The evidence in this paper supports this view. Additional support comes from the fact that sectors that predominantly have small firms, and thus are typically bank-dependent, also perform relatively worse during banking crises. The differential effects across sectors are stronger in developing countries, in countries with less access to foreign finance, and where banking crises have been more severe.

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I. INTRODUCTION

Banks are thought to be central to business activity. Therefore, when they experience financial distress, governments usually come to the rescue, offering emergency liquidity and various forms of bailout programs. The case for generous bank support, however, is murky for a number of reasons. First, we have the standard identification problem: if bank distress and economic distress occur at the same time, how can we tell the direction of causality? Second, if bank distress does in fact impair economic activity, under what circumstances is this likely to be most harmful? Third, while interventions may save banks, they may not necessarily prevent the distressed banks from affecting economic activity. So do any interventions prevent banks from impairing economic activity, and if so, which ones are they? Fourth, how do the costs of intervention measure up against the benefits? This paper focuses on the first two questions, shedding limited light on the last two issues.

Empirical studies show that credit to the private sector and aggregate output do in fact decelerate during banking crises (see, for example, Kaminsky and Reinhart, 1999; Eichengreen and Rose, 1998; Demirgüç-Kunt and others, forthcoming). However, this is not necessarily evidence that banking problems contribute to the decline in output: first, the same exogenous adverse shocks that trigger banking problems may also cause a decline in aggregate demand, leading firms to cut investment and working capital and, ultimately, demand for bank credit. These same shocks may also cause a temporary increase in uncertainty, leading firms to delay investment and borrowing decisions. In addition, adverse shocks might hurt borrower balance sheets and exacerbate the effects of asymmetric information and limited contractibility, prompting banks—even healthy ones—to curtail lending to riskier borrowers ("flight to quality") or raise lending spreads. To summarize, output and bank credit are likely to decelerate around banking crises even in the absence of a feedback effect from bank illiquidity and insolvency to credit availability.[2] To identify the real effects of banking crises it is necessary to sort out this joint endogeneity problem.

Problems of joint endogeneity are familiar in studies of whether finance matters to the real economy. They are central to the literature on financial development and growth (Levine, forthcoming) and to the work on whether financial market imperfections worsen economic downturns (the so called "credit channel" literature). To test whether banking crises have real effects, we adopt the "difference-in-difference" approach used by Rajan and Zingales (1998) to

[2] There are also measurement issues. Specifically, changes in the aggregate stock of real credit to the private sector are not a good measure of the flow of credit available to the economy, especially around banking crises. The stock may fall because a jump in inflation erodes the value of nominal contracts, or because restructuring operations transfer nonperforming loans to agencies outside the banking system. On the other hand, a devaluation increases the domestic currency value of foreign currency–denominated (Demirgüç-Kunt and others, forthcoming).

study the effects of finance on growth.[3] Our premise is that, if industries more dependent on external finance are hurt more severely after a banking crisis, then it is likely that banking crises have an independent negative effect on real economic activity. Using panel data from 41 countries from 1980 to 2000, we test whether more financially dependent industries experienced slower growth in banking crisis periods, after controlling for firm-year, country-year, and industry-country fixed effects. This profusion of dummy variables controls for all possible time specific, country specific, and industry specific shocks that may affect firm performance, thereby avoiding the usual difficulties of choosing an appropriate set of control variables.

In Rajan and Zingales (1998) industry dependence on external finance is measured by the fraction of investment not financed through retained earnings. We use the same index in our main specification. As an alternative measure of bank dependence, we use average establishment size in a sector, under the assumption that sectors dominated by small firms are more dependent on domestic bank financing.[4] In the credit channel literature, identification based on firm size has been used, for instance, by Gilchrist and Himmelberg (1995).

The results are supportive of the joint hypothesis that banking crises have real effects, and at least part of this effect is through the lending channel. More financially dependent sectors perform significantly worse during banking crises, and the magnitude of the effect is nontrivial: more financially dependent sectors (in the 4th quartile of the dependence distribution) lose about 1 percentage point of growth in each crisis year compared to less financially dependent sectors (in the 1st quartile of the dependence distribution). Of course, not all doubts about causality are laid to rest by this methodology, and we conduct a number of additional tests.

One criticism of our testing strategy, in particular, is that because of balance sheet effects or other financial market imperfections, externally dependent sectors may grow more slowly during *any* economic downturn, whether a banking crisis or not (Braun and Larraín, 2003). A related concern is that the differential effect might be driven by balance sheet effects following currency crises (which often accompany banking crises). This may happen if more externally dependent sectors tend to have more foreign currency debt. When we allow for separate differential effects during recessions or currency crises, however, the differential effect during banking crises remains significant, suggesting that we are not simply picking up balance sheet effects.

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[3] The "difference-in-difference" methodology has also been used in a variety of related problems (see, for example, Cetorelli and Gambera, 2001; Beck, 2003; and Bonaccorsi di Patti and Dell'Ariccia, 2004).

[4] An establishment is better thought of as a plant rather than a firm. In general, the majority of firms in any sector consist of single plant firms, so there will be a strong correlation between establishment size and firm size.

We also address the issue of the residual endogeneity of the banking crisis variable. If bank dependent sectors are relatively more represented in bank portfolios, asymmetric sectoral shocks affecting these sectors might cause both the banking crisis and the relative underperformance of these sectors. However, we find that more external dependent industrial sectors perform poorly during banking crises even in countries/crises where they represent a smaller share of bank portfolios. This suggests that our correlations are not driven only by asymmetric sectoral shocks.

Another criticism may be our reliance on the Rajan-Zingales measure of external dependence. When instead we differentiate across industries based on average establishment size, our tests show that small-scale sectors suffer more during crises, consistent with the hypothesis that the lending channel is operative.

Tornell and Westermann (2002, 2003) have argued that asymmetries in the response to financial crises in emerging markets are not just between large and small firms, but also between firms in traded and non-traded sectors, because the firms in traded sectors have better access to alternative sources of financing (especially foreign finance) when domestic credit is depressed. We also examine if such asymmetric effects are present in our data. We do not, however, find significant differences across sectors during banking crises based on their propensity to export, though we do find such differences during currency crises.

The second question we posed at the outset is to examine where the differential effect is stronger. On the one hand, this gives us a sense of where intervention may be more critical, on the other, if the differential effect is stronger where the theory plausibly suggests the costs of banking crises are likely to be larger, the differential effect itself gains credibility as a measure of the impact of the crisis. We find the differential effects to be stronger in developing countries, in countries where the private sector has less access to foreign finance, and where the crises are more severe (in a way we will make more precise). These results make intuitive sense: externally dependent sector should suffer less from a banking crisis if they can tap domestic bond or stock markets (as in developed countries) or foreign capital markets. Also, the more severe the disruption in the banking sector, the stronger should be the differential effect.

We turn next to the question of how different government intervention policies might affect the bank lending channel. Using the differential as a measure of the effect on the lending channel, and using data on intervention from Honohan and Klingebiel (2003), we find that more generous intervention policies such as regulatory forbearance, are negatively correlated with the cost of the crisis. Because the sample is small, going beyond simple correlations is impossible and, without a thorough econometric analysis, generalizations are unwarranted. Nonetheless, the finding is consistent with our hypothesis: if banks are special, keeping them alive is essential for credit to flow to financially dependent industries. Moreover, banks that are kept alive might focus on squeezing borrowers in order to regain liquidity. That they do not seem to do so when given maneuvering room is interesting.

Of course, policymakers are particularly interested in whether the benefits of an intervention outweigh the cost. Since our methodology allows us only to identify the differential effect of an

intervention and not the aggregate effect (for instance, if spillovers from the increased growth of financially dependent industries prevents the whole economy from falling into recession) we have little to say here other than interventions that do not affect the differential are unlikely to affect activity through the lending channel, and therefore have to be justified for other reasons.

The paper is structured as follows: In section II, we explain the empirical methodology and the data, in section III we present the results. Section IV has a brief summary of the related literature, and we conclude in Section V.

II. THE BASIC TEST

A. Methodology

To study whether banking crises have real effects, we ask whether industries more dependent on external finance experience a more severe output loss following a banking crisis. In the benchmark specification, value added growth in industry j at time t in country i is regressed on three sets of fixed effects (industry-year, country-year, and industry-country) and the variable of interest, an interaction term equal to the product of the financial dependence measure for industry j and the banking crisis dummy for year t and country i. Following Rajan and Zingales (1998), we also include the lagged share of industry j in country i to account for "convergence" effects, that is, the tendency of larger industries to experience slower growth. The benchmark regression is:

$$y_{i,j,t} = \sum_{ij} \alpha_{i,j} d_{i,j} + \sum_{i,t} \beta_{i,t} d_{i,t} + \sum_{j,t} \gamma_{j,t} d_{j,t} + \delta FINDEP_j \bullet BANK\_CRISIS_{i,t} + \varphi SHARE_{i,j,t-1} + \varepsilon_{i,j,t}$$

where the d's denote dummy variables. A negative and significant δ indicates that banking crises have a relatively worse impact on industries that depend more heavily on external finance. The three sets of fixed effects should control for most shocks affecting firm performance, including—for instance—the severity of the banking crisis, the level of financial development, global shocks to the industry, aggregate country-specific shocks. This gets around the usual difficulties with omitted variable bias. Indeed, the only shocks not controlled for are those varying simultaneously across countries, industrial sectors, and time. As robustness tests, we also use gross capital formation, employment, and number of establishments as the dependent variable instead of value added.

B. Data

Data on manufacturing value added, investment, and number of establishments are disaggregated at the 3-digit ISIC level and come from the *UNIDO, Industrial Statistics, 2003*.

There are 28 industries at this level of disaggregation. Value added is deflated using consumer price indexes from the *International Financial Statistics*.[5]

External dependence is defined as the share of capital expenditure not financed with cash-flow from operations. The data come from Laeven and others (2002), who take them from Compustat, and differ from Rajan and Zingales (1998) in that they include only 3-digit ISIC level sector rather than a mixture of 3 and 4-digit level sectors.[6] The figures are for U.S. manufacturing firms and reflect industry medians during the 1980s. An important assumption underlying our approach is that external dependence reflects technological characteristics of the industry that are relatively stable across space and time (see Rajan and Zingales (1998) for a discussion of this assumption). In Section V below we explore alternative proxies for a sector's reliance on bank finance: average establishment or plant size and export orientation.[7]

To identify banking crisis inception dates, we rely on information from case studies, including Lindgren and others (1986) and Caprio and Klingebiel (2003). Following Demirgüç-Kunt and Detragiache (1998), we consider episodes of bank distress to be systemic crises when at least one of the following conditions holds: there were extensive depositor runs; the government took emergency measures to protect the banking system, such as bank holidays or nationalization; the fiscal cost of the bank rescue was at least 2 percent of GDP; or non-performing loans reached at least 10 percent of bank assets. A list of banking crises is in the Appendix.

The crisis dummy variable takes the value 1 for the crisis inception year and the two following years, under the hypothesis that the real effect of the crisis dissipate after three years or so. Table A4 in the Appendix shows that if crises are set to last four years there is not much difference in aggregate value added growth rates between crisis and non-crisis periods, while for shorter durations crisis years have lower growth. Also, in a sample of 36 crises, Demirgüç-Kunt and others (forthcoming) find that GDP growth returns to its pre-crisis level in the fourth year of a crisis. To test robustness, we will also consider narrower and wider crisis windows.

To maximize sample size we use an unbalanced panel in which some country/year/sector observations are missing. Country/years for which less than 10 industrial sectors are available, however, are excluded, to ensure that there is enough information to estimate the differential

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[5] The producer price index would be a more appropriate measure of prices in manufacturing, but it was not available for a number of countries in our sample. In any case, the price index does not affect differences in growth rates across sectors, which is what matters to our tests.

[6] See Appendix for more details and summary statistics of all data used. Not using 4-digit ISIC sectors helps increasing sample size.

[7] It should be emphasized that, if the Rajan-Zingales does not capture meaningful differences across sectors in our sample, then our coefficient estimates should be insignificant and not biased toward overrejection.

effect. Constraints on the availability of banking crisis and sectoral value added information leave us with data from 41 countries from 1980 to 2000 for a total of over 16,000 observations, after excluding 2 percent of outliers on either tail of the distribution.[8]

III. RESULTS

A. The Benchmark Test

Estimates from the benchmark regression support the hypothesis that banking crises have an exogenous effect on the real economy. The coefficient of the interaction term is negative and significant at the 5 percent level, indicating that the growth rate of sectors that rely more heavily on external finance is relatively more affected in crisis years compared to sectors that rely less on external finance (Table 1). The economic magnitude of this effect is substantial. On average, in a country experiencing a banking crisis, the difference in value added growth between a sector at the 25 percentile and one at the 75 percentile of the external dependence distribution is 1.1 percentage point per year of crisis. This compares with an average rate of growth of 3.7 per cent in the sample as a whole and 1.7 percent during crisis years.

As sensitivity analysis, we drop from sample the 5-percent tails of the dependent variable distribution. When this is done, the coefficient of the interaction term remains negative and significant.[9] The results are also robust to correcting standard errors for first-order autocorrelation in the residuals and to clustering standard errors by country.

B. Bank Distress or Balance Sheet Effects?

A concern with our interpretation of the basic regression is that the differential effects we document may reflect balance sheet problems among borrowers rather than their banks. In other words, banking crises often coincide with economic downturns which worsen firm balance sheets. This, in turn, aggravates agency problems and other financial frictions, causing all banks (even healthy ones) to cut back on lending, presumably hurting bank-dependent sector disproportionately more. To separate out the effect of financial frictions during recessions from

[8] Countries that did not experience banking crises during the 1980s or 1990s are excluded from the sample. Including these observations would only serve to estimate more accurately the time-industry dummies, but would sharply increase the already large number of parameters to be estimated.

[9] We also change the sample by considering only observations for which data for all the 28 sectors is available. The sample size drops by almost one half. For the baseline specification the coefficient of the interacted term remains negative but is no longer significant. However, when we allow the effect of a crisis to vary between advanced economies and developing countries, the coefficient for the latter is significant. Similar results arise if the crisis window is changed from three to four years. These results are not reported.

the specific effect of banking crises, we construct a recession dummy variable using GDP data from the World Bank *World Development Indicators*. Following the peak-to-trough criterion (Braun and Larraín, forthcoming), we date recessions as follows: first, a trough is identified when GDP falls more than one country-specific standard deviation below its trend level (where trend is computed with a standard Hodrick-Prescott filter). Then, a peak is identified as the last year with positive GDP growth before the trough. The recession dummy variable takes the value of one from the year after the peak to the year of the trough. Using this dummy variable, we estimate the following equation:

$$y_{i,j,t} = \sum_{ij} \alpha_{i,j} d_{i,j} + \sum_{i,t} \beta_{i,t} d_{i,t} + \sum_{j,t} \gamma_{j,t} d_{j,t} + \delta FINDEP_j \bullet BANK\_CRISIS_{i,t} + \varphi SHARE_{i,j,t-1} + \xi FINDEP_j \bullet RECESSION_{i,t} + \varepsilon_{i,j,t}$$

If the coefficient δ capture the differential effect of recessions rather than the banking crises, we would expect it to lose significance in this specification, while ξ would be negative and significant.

As it turns out, there is an overlap between recessions and banking crises, but the overlap is far from perfect: not all recessions coincide with banking crises and not all banking crises occur during economic downturns. When we estimate the regression with both interaction terms, the coefficient of the crisis/dependence interaction term becomes a bit smaller, as one might expect, but remains significant at 5 percent in both benchmark specifications (Table 3). On the other hand, the coefficient of the recession/dependence interaction term has the expected sign (negative), but it is not significant. This finding supports the interpretation that we are picking up not only balance sheet effects, but also disruptions in credit supply due to the banking crisis.

Similar arguments apply to currency crises. These events, especially in countries where the corporate sector has large unhedged foreign currency exposures, may cause large balance sheet effects. If more leveraged firms are also more dependent on external finance, and if large currency depreciations occur in association with banking crises (the "twin crises"), then the differential effect found in the baseline regression may reflect the balance sheet channel rather than distress in the banking sector. To sort out this issue, we rerun the benchmark regressions by adding an interaction term between external dependency and a currency crisis dummy. Following Milesi-Ferretti and Razin (1998), a currency crisis is defined as a year in which the exchange rate satisfies the following three conditions: it depreciates (vis-à-vis the U.S. dollar) at least 25 percent; it depreciates at least twice as fast as in the previous year; and the previous year it depreciated by less than 40 percent.[10]

[10] The latter condition serves to eliminate cases of chronically high inflation countries, in which large rates of depreciation are recorded on a regular basis. This definition corresponds to the second of the four definitions of crisis considered by Milesi-Ferretti and Razin (1998).

When currency crises are controlled for, the coefficient of the bank–crisis/dependence interaction term remains negative and significant and of similar magnitude as in the baseline regression (Table 3). The coefficient of the currency-crisis/dependence interaction term has a positive sign, perhaps because more externally dependent sectors tend to be exporting sectors which benefit from a devaluation, but is not significant. This evidence supports our original interpretation of the results suggesting bank distress has an exogenous negative effect on economic activity.

C. Are the Results Driven by Asymmetric Sector-Specific Shocks?

The methodology employed in this paper greatly reduces the concern for simultaneity biases in the relationship between growth and banking crises. However, the endogeneity of the banking crisis variable is still an issue since bank dependent sectors are likely to be more heavily represented in bank portfolios than less bank dependent sectors. Asymmetric sectoral shocks concentrated in bank dependent sectors could cause both the banking crisis and relatively poor growth in those sectors.

To address these concern, we proceed as follows. Since we do not have data about the sectoral composition of bank portfolios, we assume that, in each country, sectors are represented in bank portfolios roughly proportionately to the product of their share in the country aggregate value added and their external dependency index. For each country and year, we compute the correlation between the sectoral share and the external dependence variable. So in countries with high correlation, bank dependent sectors are likely to account for a significant share of bank balance sheets, while in countries with low correlation, they are not. We split the sample around the cross-country median of the distribution of this correlation. Then, we rerun the baseline specification allowing the coefficient of the interaction term to differ between crises with a high correlation between bank portfolio allocation and external dependence index and crises with a low correlation. If our previous findings were mainly the result of a simultaneity bias, we should find a stronger negative coefficient for the crises occurring in countries with a high correlation, and possibly an insignificant coefficient for the others. Instead, the opposite happens (Table 4). The coefficient for the crises where bank dependent sectors represent a relatively smaller portion of bank portfolios is larger than that in our baseline regression and remains significant at the 5 percent level. The coefficient for the other crises, on the other hand, is not significant. This evidence supports our interpretation of our previous results—banking crises have exogenous real effects.

D. Where Do Crises Matter Most?

In our baseline specification all banking crises are treated as having the same differential effect on industries. In practice, this is unlikely to be the case, as different characteristics of the economy may affect the impact of the banking crises, and the crisis itself may be of different nature and magnitude. So the question we now turn to is if bank distress does in fact impair economic activity, under what circumstances is this likely to be most harmful?

Banking crises are likely to have relatively larger real effects in developing countries where bond and equity markets are less developed and where governments may find it more difficult to provide support for troubled banks. For this reason we consider an alternative specification where the coefficient of the interaction term is allowed to differ across advanced and developing countries (as defined by the IMF's *World Economic Outlook*). The results confirm this conjecture (Table 3). While the coefficient for advanced countries is not significant, that for developing countries is larger than in the benchmark specification and significant at the 5 percent level. The difference in value added growth between a sector at the 25^{th} percentile and one at the 75^{th} percentile of the external dependence distribution becomes 1.5 percentage points per year of crisis.

In a related vein, the effects of banking crises should differ across countries with different access to foreign finance, under the hypothesis that industries dependent on external finance should be more severely affected by banking crises in countries with more limited access to foreign sources of capital.

To proxy for access to alternative sources of finance we use data on disbursement of foreign loans and bonds to the private sector (scaled by the sum of imports and exports). The data come from the *Global Development Finance* database of the World Bank. Since developed countries are not covered by this database, we arbitrarily set the value for these countries at the largest sample observation, under the assumption that developed country firms have broad access to alternative finance. We then estimate the model using this access parameter to "weigh" the interaction term. Specifically, let x denote the measure of access and x^{max} the maximum value of this variable over the sample. Then the new interaction term is $FINDEP_j * BANK\_CRISIS_{it} *[1-x*(0.5/ x^{max})]$. Thus, for countries with maximum access to external finance the banking crisis dummy takes the value of 0.5 in crisis years, while for countries with no access at all it takes the value of 1. The estimation results confirm that more externally dependent sectors grow less during crises (Table 4). The coefficient of the new interaction term is larger than in the benchmark specification and it is still significant at the 5 percent confidence level. This suggests that access to foreign finance can help mitigate the real effects of banking crises.

Crises, of course, also differ in severity, and more severe and pervasive crises should have larger real effects than less severe and contained ones. There are several difficulties associated with measuring the severity of a banking crisis, as there is often limited information on the disruption caused by the crisis and available measures may not be fully comparable across countries. We consider three indicators of crisis severity: the fiscal cost of the crisis, the share of non-performing loans on total loans, and the fraction of insolvent bank assets in total bank assets. First we rank the crises according to each of these three variables, and then take the average of the ranks. When the variable in question is not available, the ranking only reflects an average of the available measures of severity. The sample is then split according to whether the severity ranking is above or below the median, and the usual regression is estimated with two separate interaction terms, one for more severe and one for milder crises.

The regression results indicate that, while both coefficients are negative, only the interaction term with the more severe crises is significant (Table 4). The magnitude of this coefficient is

also larger than in the baseline. This result suggests that banking crises are more likely to have significant real effects in those cases where they are more pervasive and involve the disruption of the orderly functioning of the banking system. Similar results are obtained if we split the sample according to the aggregate output loss experienced during the crisis, where the loss is computed as the difference in average GDP growth between the three years preceding a crisis and the three years of the crisis.

Another interesting question is whether the differential effects of crises are more pronounced when bank distress is accompanied by a currency crises, as is has been the case in a number of well known episodes. Perhaps surprisingly, when we split the sample between "twin crises" and stand-alone crises, differential effects are significant only for the latter episodes. This might be explained by the fact that during twin crises, the adverse effects on the bank lending channel might be offset by the (favorable) effects of exchange rate devaluation on exports and profitability.

Finally, thus far we have looked at overall value added growth. One might expect the effects of lending to be more direct and pronounced on capital formation. Using investment growth as the dependent variable (dropping 5 percent of outliers, since this variable is noisier) in the baseline regression, the coefficient of the interaction term remains negative and statistically significant (Table 5). The differential effect is economically more significant than in the case of value added: an industry at the 25^{th} percentile of the external dependence distribution has investment growth 4 percentage points higher than one at the 75^{th} percentile during crisis years.

Another measure that is likely to be sensitive to bank lending is employment. This variable has the advantage of not being affected by changes in relative prices across sectors, which we cannot control for because of lack of data. Consistent with the importance of the bank lending channel, we find that employment growth is slower in more financially dependent sector during banking crises. When we differentiate between developed and developing countries, the effect on employment seems to be a bit more pronounced in the former, in contrast with the findings for value added and capital formation.

A third alternative dependent variable is growth in number of establishments. To the extent that this variable reflects the birth of new firms, it has the advantage of being less sensitive to balance sheet effects than value added (see earlier): a new firm is unencumbered by past liabilities, and therefore growth in the number of firms will not be influenced by how the roots of the crisis affect firm balance sheets. In addition, like employment growth this variable is not muddled by relative price changes The differential effect is again significant and negative, the more so in developing countries. An industry at the 25^{th} percentile of the external dependence distribution has growth in establishments 0.6 percentage points higher than one at the 75^{th} percentile during crisis years.

In sum then, our methodology suggests that banking crises have the most effect where we would expect from the theory that the lending channel to be most operative. Next we turn to alternative ways of identifying differences in reliance on domestic banking across industries.

E. Differences Among Sectors Based on Firm Size

In corporate finance it is well known that small firms tend to rely more on domestic bank finance than large firms, as the latter can raise capital through domestic securities markets or international capital markets. Thus, other things being equal, sectors dominated by small firms should be more severely affected by disruptions in the domestic banking sector. The distinction between small and large firms, therefore, can provide an identification strategy alternative to the Rajan-Zingales index.

While we do not have cross-country panel data on value added by firm size, we construct a proxy for this variable using industry level data on employment and number of establishments. We conjecture that industries with a larger average number of employees per establishment are dominated by large, less bank dependent firms. As such, they should experience a less pronounced contraction during banking crises than industries with a smaller average plant size. To avoid endogeneity issues, we measure plant size as the logarithm of the average over the sample period.[11] In contrast to the Rajan-Zingales index, which is common to all countries, this measure of bank dependence is country specific, and can thus capture differences in technology and product mix across countries.

Table 6 presents the results of regressing value added growth on country-time, industry-time, and country-industry dummies and an interaction term between average industry plant size and the banking crisis dummy. The positive and significant coefficient for the interaction term indicates that industries with larger plant size tend to grow faster during banking crises, which we interpret as evidence of the bank lending channel. This result is robust to clustering standard errors by country and to controlling for differential effects during currency crises and recessions. Interestingly, large scale sectors do relatively better also during recessions, consistent with the credit channel literature (Gertler and Gilchrist, 1994).

When we introduce separate interaction terms for developed and developing countries, once again we find the differential effects to be larger and more statistically significant in developing countries. This may indicate that asymmetries in access to finance between large and small firms are stronger in developing countries, or that shocks leading to crises, on average, are more severe in developing countries, which magnifies the effect of asymmetries. When we control for recessions, an interesting dichotomy appears: the differential effect during banking crises is significant only in developing countries, while that of recessions only in developed countries. A possible explanation is that in developed countries banks are not special because firms have alternative sources of finance. As a result, asymmetries between large and small firms are only driven by differential access to finance, which gets accentuated by weakened small borrower balance sheets and consequent borrower agency problems in recessions. In developing countries, by contrast, small firms may be restricted to borrowing only from banks so bank

[11] The results are robust to using plant size at the beginning of the sample to identify bank dependence.

financial distress accentuates large-firm/small-firm growth differentials. In developing country recessions, by contrast, banks may help small firms overcome disabilities, and therefore there is little differential.

F. Differences Among Sectors Based on Export Orientation

Another avenue for identifying differential real effects of banking crises is to distinguish among sectors based on their export orientation. Tornell and Westermann (2002 and 2003) have argued that firms in the traded sector have better access to alternatives to domestic bank finance, especially foreign finance, and thus suffer less than firms in non-traded sectors during financial crises. If this conjecture is true, trade orientation can provide an identification strategy to test for the presence of a bank lending channel.

In the next set of regressions (Table 7), we interact the banking crisis dummy with the ratio of exports to value added for each industry and country (averaged over the sample period).[12] The coefficient of the interaction term has the correct sign, but is far from being statistically significant. This is particularly the case when we control for currency crises, when export sectors can be expected to perform better on account of the real exchange rate depreciation. Interestingly, the interaction term of export orientation with currency crises is positive and significant, so our regressions do pick up this effect. During banking crises, however, we find no evidence that more export oriented sector perform better, casting doubt on a credit channel interpretation of asymmetries across industry based on export orientation. We should note that one reason we may not find strong support for the hypothesis is that our data are confined to the manufacturing sector, leaving out important segments of nontraded productive activities, such as construction and services.

G. Interventions and the Lending Channel

We now turn to estimating the effect of different forms of intervention on the lending channel. We compute the effect of a crisis on the bank lending channel as follows:

- We run the baseline regression with all dummies but no interaction term;
- For each industry j and each banking crisis, we average residuals in the 3 banking crisis years. This measures how growth in industry j differed from the average during the crisis. Call this u^{jiBC}.
- For each industry j and country i, we average residuals over the whole sample period (excluding the crisis years). This measures how growth in industry j differed from the average in non-crisis years. Call this u^{jiNBC}.

[12] Export data by sector are from the World Bank's World Integrated Trade Solution (WITS) database.

- For each industry j and each banking crisis, compute $x^{jBC} = u^{jBC} - u^{jNBC}$. This measures the difference between the residual in years of crisis and in years of no crisis for that industry.

- Average x^{jBC} across industries in the top (a^{hBC}) and bottom quartile (a^{lBC}) of the financial dependence distribution and compute $a^{lBC} - a^{hBC}$ for each crisis. This is our measure of the effect of the banking crisis on the lending channel. The more positive it is, the more the banking crisis has an adverse effect through the bank lending channel.

In Table 8, we list this lending channel effect for the different crises in our sample. The correlation between the lending channel effect and the cost of the crisis in lost GDP is 32 percent ($p = 0.03$) suggesting that our measure does capture something meaningful.

We obtain the list of policy interventions undertaken in each crisis from Honohan and Klingebiel (2003). In this paper, interventions are classified into six categories: blanket depositor protection (including both explicit blanket guarantees to depositors and cases in which depositors are implicitly protected because most of the banking sector is publicly owned); prolonged and extensive liquidity provision to banks; forbearance of type A (when insolvent/illiquid banks are allowed to continue operating without restriction for at least 12 months); forbearance of type B (either there is forbearance of type A or some regulations, such as loan classification and provisioning, are not enforced); repeated recapitalizations; and, finally, government-sponsored debt relief initiative for corporate or private borrowers. All these variables are captured by simple zero-one dummies.

Table 8 contains the details of intervention measures for each episode and correlations between the various interventions and the lending channel effect. Interestingly, the correlation between the total number of interventions, which can be viewed as a measure of the generosity of the bailout, and the lending channel effect, is negative (though not significantly different from zero). Correlations between the lending channel effect and individual measures are most negative (that is, interventions minimize the adverse effects of the banking crisis on the lending channel) when the authorities decide to offer blanket guarantees and type A forbearance (the most generous type). Only the latter, however, is significantly different from zero.

These results, though intriguing, should be interpreted with caution: first, our data are crises episodes selected to exceed a threshold of severity. We therefore do not look at which interventions ward off a banking crisis entirely. Second, because data on interventions is so difficult to construct, the sample is small (about twenty episodes), so a rigorous econometric analysis is not possible. Third, intervention policies are endogenous to the policymakers' perception of the repercussions of the crisis (including the effect on the bank lending channel). Finally, most policymakers would probably argue that with crisis intervention often "the devil is in the details," such as the timing, sequencing and implementation of the various measures.

While the evidence in this section should be viewed as preliminary, it does suggest that ensuring banks stay open—through blanket guarantees and a policy of broad forbearance—can limit the impact of the banking crisis on the lending channel. This is not a vacuous result for even if

banks were left open, they might attempt to pull back credit in a flight to quality paper. Of course, we have little to say on the well known direct and indirect costs of intervention, and our methodology does not allow for a direct comparison of costs and benefits.

IV. Related Literature

There is a long literature focusing on the effects of banking crises. For example, Lindgren, Garcia, and Saal (1996) summarizes many early experiences, and concludes that "*episodes of fragility in the banking sector have been detrimental to economic growth in the countries concerned*." (p. 58). Cross-country studies of banking crises have also shown that output growth and private credit growth drop significantly below normal levels in the years around banking crises, but do not attempt to sort out the direction of causality (Kaminsky and Reinhart, 1999, Eichengreen and Rose, 1998, Demirgüç-Kunt and others forthcoming).

In their study of the so-called capital crunch in the United States in 1990, Bernanke and Lown (1991) in fact express skepticism that the credit crunch played a major role in the recession of 1990. Instead, they stress demand effects, pointing to the fact that there was little relation between bank capital ratios and employment growth across states, and all types of credit, not just bank credit, fell.

The question of whether banking crises cause a credit crunch was resurrected once more following the Asian crises of 1997–98, and a number of studies attempted to provide answers. Domaç and Ferri (1999) found that small and medium-sized enterprises were hurt disproportionately in Malaysia and Korea, and interpreted this as evidence of a credit crunch as these firms are usually more dependent on bank credit than larger firms. Ghosh and Ghosh (1999) tested an aggregate model of credit demand and supply using Indonesian and Korean data, and found evidence of credit rationing, but only in the first few months of the crisis; afterwards, the decline in credit was explained by lower demand. Using firm level data from Korea, Borensztein and Lee (2002) finds that firms belonging to industrial groups (*chaebols*) lost their preferential access to credit during the banking crisis, although this was not necessarily evidence of a credit crunch. According to Dollar and Hallward-Driemeier (2000), most Thai firms surveyed after the crisis attributed low production levels not to lack of credit, but to poor demand, although many complained about high interest rates. To summarize, studies of the consequences of the Asian crises come to different conclusions as to the relevance of a credit crunch. Also, arguably none of these studies was designed to tackle the joint endogeneity problem head on.

A number of papers have tried to tackle the identification problem in clever ways. Some have examined the issue from the side of banks. Peek and Rosengren (2000) use geographical separation as their means of identifying supply shocks: Japanese banks lost capital as a result of bad loans made in Japan. The authors then show that the withdrawal of these banks from lending to real estate in the United States had a strong dampening effect on U.S. commercial real estate markets. Clearly, it is hard to attribute the fall in real activity to demand side effects. Kashyap and Stein (2000) suggest a lending channel for monetary policy by pointing out that

small, less liquid banks seem to curtail credit more in response to tight monetary conditions than large, liquid banks.

Our paper differs from these in that it attempts to identify supply effects by looking to see if borrowing sectors that are more likely to be sensitive to a supply shock are indeed disproportionately affected by it. In this, our paper is closely related to two recent papers:

Braun and Larraín (forthcoming) tests whether industries more dependent on external finance experience a sharper output contraction than other industries during economic downturns, and finds a large positive differential effect. The interpretation is that financial market imperfections make access to credit more difficult during downturns and thus contribute to economic fluctuations. Braun and Larraín also find the differential effect to be larger in countries with poor accounting standards and for industries whose assets are less tangible, supporting the interpretation that financial frictions are at work. This study does not attempt to distinguish between balance sheet effects, whereby adverse shocks hurt corporate balance sheets making banks more reluctant to lend, and the so-called bank lending channel, whereby banks are unwilling to lend because their own financial conditions have deteriorated. Our tests attempt to uncover the presence of a bank lending channel.

In another related study, Laeven and others (2002) investigate whether banking crises impact sectors dependent on external finance more severely in countries with a less developed financial system. The finding is that the differential effect found by Rajan and Zingales is present in pre-crisis periods, but becomes insignificant (and even changes sign) during crises. The interpretation is that operating in an environment where financial markets are well developed is an advantage for more financially dependent industries in good times, but a disadvantage in times of banking crises. Laeven and others (2002) thus look at the effects of financial development in two distinct regimes. Their focus is not on the effect of the banking crisis within a country, which is our focus.

The problem of separating out the effect of bank distress from other contemporaneous shocks hinders efforts to measure the economic cost of banking crisis and to understand the determinants of these costs. Most existing studies have looked at the decline in output as a yardstick to differentiate across crises. For instance, Bordo and others (2001) argue that financial crises (currency crises, banking crises, or both) have entailed similar-sized output losses in recent years as compared to previous historical periods, although they are more frequent now than during the gold standard and Bretton Woods periods and as frequent as in the interwar years. Hoggarth and others (2002) claim that, contrary to popular belief, output losses associated with banking crises are not more severe in developing countries than in developed countries.

More recently, Claessens, Klingebiel, and Laeven (2003) study how output losses following banking crises are affected by institutions and policy interventions. As in our paper, the latter are identified through the Honohan-Klingebiel dataset. The main finding is that generous support to the banking system does not reduce the output cost of banking crises. This conclusion, however, does not take into account that omitted exogenous shocks may cause both

a stronger output decline and more generous intervention measures. Using a measure of the cost of crises less marred by this problem, we find that depositor protection and forbearance may indeed be effective in reducing the real cost of crises.

V. CONCLUSIONS

We have studied the effects of banking crises on growth in industrial sectors and find that in sectors that are more dependent on value-added external finance, capital formation, and the number of establishments grew relatively less than in sectors less dependent on external finance. We interpret this finding as evidence that a lending channel is operative during banking crises. Specifically, while adverse shocks cause both poor economic performance and bank distress, bank distress has an additional, adverse effect on growth, as banks must cut back their lending. As might be expected, the differential effect is stronger in developing countries (where alternatives to bank financing are more limited), in countries with less access to foreign finance, and where bank distress is more severe. In addition, we find that the effect we have measured is not just the reflection of balance sheet effects during recessions or currency crises, but appears to be special to periods in which banks experienced liquidity and solvency problems.

These results lend support to the view, often expressed by policymakers, that banks need more support than other commercial enterprises in time of financial distress. If bank credit cannot be easily replaced by other sources of finance, at least for some businesses, then profitable production activities may have to be cut back and viable investment projects abandoned, leading to a misallocation of resources. In addition, the bank lending channel can ratchet up the macroeconomic effects of an adverse shock, leading to a downward spiral in which a contraction in economic activity and bank distress reinforce each other.

How to design and implement appropriate policies to support banks during crises, however, remains difficult in practice. The problems are well known: bailouts create perverse incentives ex ante, which (costly) regulation and supervision can only partially mitigate. Once the principle that bailouts are justified is established, it may prove impossible to keep costs from skyrocketing as well-connected parties clamor for protection. Even aside from political pressures, with limited information and little time to act, the authorities may end up granting more help to the less needy.

With our results it is possible to construct proxies for the impact on the bank lending channel in individual crises, but it is difficult to use these measures for a rigorous empirical study of the effects of different interventions. Data on interventions are hard to come by and quantify and, perhaps more importantly, unobservable shocks affect both the lending channel impact and the propensity and modalities of intervention. Future research to tackle these difficulties would be undoubtedly very valuable.

Summary of the Data

Table A.1. External Dependence Index

	External Dependence
Tobacco	–0.45
Pottery	–0.15
Leather	–0.14
Footwear	–0.08
Non ferrous metal	0.01
Apparel	0.03
Petroleum refineries	0.04
Non metal products	0.06
Beverages	0.08
Iron and steel	0.09
Food products	0.14
Paper and products	0.17
Textile	0.19
Printing and publishing	0.2
Rubber products	0.23
Furniture	0.24
Metal products	0.24
Industrial chemicals	0.25
Wood products	0.28
Petroleum and coal products	0.33
Transportation equipment	0.36
Other industries	0.47
Glass	0.53
Machinery	0.6
Other chemicals	0.75
Electric machinery	0.95
Professional goods	0.96
Plastic products	1.14

Source: Krozner, Leuven, and Klingebiel (2002).

Table A.2. Summary Statistics

	Mean	Median	Standard Dev.	Max	Min	No. of obs.
VA growth (in percent)	3.7	1.8	22.7	107.4	–54.1	16,227
Growth in capital formation (in percent)	12.3	2.0	56.2	240.7	–80.5	9,752
Employment growth (in percent)	0.9	0.1	8.7	29.0	–20.4	15,940
Growth in number of establishments (in percent)	1.8	0.0	10.1	45.9	–22.1	9,684
Access to foreign financing (in percent of trade volume)	1.8	0.6	3.0	25.5	0.0	482
Output loss during crisis (in percent; by episode)	1.8	2.0	3.9	12.0	–7.4	46
Rajan-Zinglaes Index (by industry)	0.3	0.2	0.4	1.1	–0.5	28
Average plant size (by country/industry)	125.3	65.6	232.3	4,197.7	1.5	1,012
Export/value added (by country/industry) (in percent)	71.2	41.3	73.1	297.8	0.0	872

Correlations Between Measures of External Dependence

	Rajan-Zingales	Average Plant Size	Exports/VA
Rajan-Zingales	1		
Average plant size	–0.16	1.00	
Exports/VA	0.02	–0.03	1

Table A.3. Banking Crises Inception Dates

Countries	Banking Crisis Inception	Countries	Banking Crisis Inception
Argentina	1989	Malaysia	1997
Argentina	1995	Mexico	1994
Bolivia	1986	Nepal	1988
Bolivia	1994	Nigeria	1991
Brazil	1994	Norway	1987
Cameroon	1995	Panama	1988
Central African Republic	1988	Papua New Guinea	1989
Chile	1981	Peru	1983
Colombia	1982	Philippines	1981
Colombia	1999	Portugal	1986
Costa Rica	1994	Senegal	1983
Ecuador	1995	South Africa	1985
Finland	1991	Sri Lanka	1989
Ghana	1982	Swaziland	1995
India	1991	Sweden	1990
Indonesia	1992	Tanzania	1988
Israel	1983	Tunisia	1991
Italy	1990	Turkey	1982
Japan	1992	Turkey	1991
Jordan	1989	Turkey	1994
Kenya	1993	Turkey	2000
Korea	1997	United States	1980
Madagascar	1988	Uruguay	1981
Malaysia	1985	Venezuela	1993
Total number of crises = 48			

Table A.4. Average Growth of Real Value Added in Crisis and Non-Crisis Years

Crisis duration	Crisis	No. of Observations	Non-Crisis	No. of Observations
1-Year dummy	0.10	1,130	4.00	15,097
2-Year dummy	–0.92	2,167	4.45	14,060
3-Year dummy	1.70	3,059	4.20	13,168
4-Year dummy	3.33	4,012	3.86	12,215
5-Year dummy	3.84	4,851	3.69	11,376

Table 1. Differential Effect of Banking Crises on Value Added Growth

	Benchmark	Outliers 5 percent	Newey-West	Cluster
Crisis3*Dependence	–2.74	–2.01	–2.74	–2.74
	[2.19]**	[2.07]**	[2.30]**	[2.31]**
Lagged Share	–2.44	–1.69	–2.44	–2.44
	[13.99]***	[12.24]***	[13.32]***	[6.71]***
Constant	8.46	3.33	8.46	8.46
	[1.23]	[0.47]	[1.22]	[1.53]
Observations	16227	15213	16227	16227
R-squared	0.33	0.34	0.33	0.35

Note: Robust t-statistics in parenthesis. ***, **, and * denote significance levels of 1 percent, 5 percent, and 10 percent respectively. Crisis3 is a dummy variable for the year of banking crisis inception and two following years. Dependence is a parameter measuring an industry's dependence on external finance (Rajan and Zingales, 1998). Lagged share is the share of the sector's value added in total value added lagged by one period. Regressions are estimated with OLS and also include time-country, time industry, and industry-country dummy variables.

Table 2. Differential Effect of Banking Crises on Value Added Growth: Balance Sheet Effects and Asymmetric Sectoral Shocks

	(1)	(2)	(3)
Crisis3*Dependence	–2.55	–2.87	
	[1.94]*	[2.26]**	
Recession*Dependence	–0.77		
	[0.67]		
Currency Crisis*Dependence		1.38	
		[0.94]	
Crisis3*Dependence*High Exposure			–2.07
			[1.17]
Crisis3*Dependence*Low Exposure			–3.39
			[1.99]**
Lagged Share	–2.44	–2.44	–2.44
	[13.99]***	[13.99]***	[14.00]***
Constant	8.53	–29.61	8.49
	[1.24]	[1.58]	[1.23]
Observations	16227	16227	16227
R-squared	0.33	0.33	0.33

Note: Robust t-statistics are in parenthesis. ***, **, and * denote significance levels of 1 percent, 5 percent, and 10 percent respectively. Crisis3 is a dummy variable for the year of banking crisis inception and two following years. Dependence is a parameter measuring an industry's dependence on external finance (Rajan and Zingales, 1998). Recession is a dummy for recession years. Currency crisis is a dummy for currency crisis years. High exposure are crisis episodes in which sectoral dependence for the country is highly correlated with sectoral share. Lagged share is the share of the sector's value added in total value added lagged by one period. Regressions are estimated with OLS and also include time-country, time industry, and industry-country dummy variables.

Table 3. Differential Effects of Banking Crises on Value Added Growth:
Differences between Developed and Developing Countries

	3-Year Window	4-Year Window	Outliers 5 Percent	Cluster	Recessions	Currency Crises
	(1)	(2)	(3)	(4)	(5)	(6)
Crisis3*dependence*DC	−0.07		−1.43	−0.07	0.72	−0.02
	[0.04]		[1.01]	[0.03]	[0.38]	[0.01]
Crisis3*dependence*LDC	−3.73		−2.24	−3.73	−3.66	−4.01
	[2.33]**		[1.80]*	[2.67]**	[2.22]**	[2.45]**
Crisis4*dependence*DC		0.52				
		[0.35]				
Crisis4*dependence*LDC		−2.58				
		[1.76]*				
Recession*dependence DC					−2.07	
					[1.42]	
Recession*dependence LDC					−0.34	
					[0.23]	
Currency crisis*dependence*DC						−1.66
						[0.84]
Currency crisis*dependence*LDC						2.41
						[1.32]
Lagged share	−2.44	−2.44	−1.69	−2.44	−2.44	−2.45
	[14.01]***	[14.00]***	[12.24]***	[6.72]***	[14.01]***	[14.01]***
Constant	8.41	8.37	6.41	8.41	3.90	8.04
	[1.22]	[1.21]	[0.50]	[1.53]	[0.58]	[0.48]
Observations	16227	16227	15213	16227	16227	16227
R-squared	0.33	0.33	0.34	0.33	0.33	0.33

Note: Robust t-statistics are in parenthesis. ***, **, and * denote significance levels of 1 percent, 5 percent, and 10 percent respectively. Crisis3 is a dummy variable for the year of banking crisis inception and two following years. Dep is a parameter measuring an industry's dependence on external finance (Rajan and Zingales, 1998). DC is a dummy for developed countries. LDC is a dummy for developing countries. Recession is a dummy for recession years. Currency crisis is a dummy for currency crisis years. Lagged share is the share of the sector's value added in total value added lagged by one period. Regressions are estimated with OLS and also include time-country, time industry, and industry-country dummy variables.

Table 4. Differential Effect of Banking Crises on Value Added:
Difference Among Countries and Crises

	Value Added	Value Added	Value Added	Value Added
	(1)	(2)	(3)	(4)
Dep*access*crisis3	–3.66			
	[2.37]**			
Dep*more severe crisis		–4.18		
		[2.12]**		
Dep*less severe crisis		–2.51		
		[1.22]		
Dep*crisis3*high loss			–4.48	
			[2.91]**	
Dep*crisis3*low loss			–0.58	
			[–0.29]	
Dep*twin crisis				–.52
				[0.72]
Dep*non-twin crisis				–3.45
				[2.23]**
Lagged share	–2.43	–2.39	–2.47	–2.44
	[13.89]***	[12.62]***	[2.47]**	[13.99]***
Constant	3.84	1.11	–10.14	–43.21
	[0.56]	[0.09]	[–0.72]	[2.29]**
Observations	15640	13464	15909	16227
R-squared	0.34	0.34	0.35	0.35

Note: Robust t-statistics are in parenthesis. ***, **, and * denote significance levels of 1 percent, 5 percent, and 10 percent respectively. Crisis3 is a dummy variable for the year of banking crisis inception and two following years. Dep is a parameter measuring an industry's dependence on external finance (Rajan and Zingales, 1998). Access measures access to foreign finance using external disbursement to the private sector. More (less) severe denotes crises where the banking sector was more (less) severely disrupted than the mean. High (low) loss denotes crises where the decline in output relative to trend was above (below) the mean. Lagged share is the share of the sector's value added in total value added lagged by one period. Regressions are estimated with OLS and also include time-country, time industry, and industry-country dummy variables.

Table 5. Differential Effects of Banking Crises on Growth in Capital Formation, Number of Establishments, and Employment

	Capital formation		Number of Establishments		Employment	
	(1)	(2)	(3)	(4)	(5)	(6)
Crisis3*dep	–9.85		–1.47		–1.11	
	[2.34]**		[2.18]**		[2.23]**	
Crisis3*dep*DC		–9.32		-0.93		–1.25
		[1.56]		[0.87]		[1.68]*
Crisis3*dep*LDC		–10.12		–.71		–1.06
		[1.85]*		[1.95]*		[1.65]*
Lagged share	–2.21	–2.21	–0.47	–0.47	–0.83	–0.83
	[3.75]***	[3.75]***	[5.58]	[5.59]***	[10.98]***	[10.98]***
Constant	28.52	28.51	–7.80	17.57	–0.66	18.73
	[0.76]	[0.76]	[1.04]	[1.79]*	[0.21]	[3.54]***
Observations	9752	9752	9684	9684	15940	15940
R-squared	0.29	0.29	0.44	0.44	0.38	0.38

Note: Robust t-statistics are in parenthesis. ***, **, and * denote significance levels of 1 percent, 5 percent, and 10 percent respectively. Crisis3 is a dummy variable for the year of banking crisis inception and two following years. Dep is a parameter measuring an industry's dependence on external finance (Rajan and Zingales, 1998). DC is a dummy for developed countries. LDC is a dummy for developing countries. Lagged share is the share of the sector's value added in total value added lagged by one period. Regressions are estimated with OLS and also include time-country, time industry, and industry-country dummy variables.

Table 6. Differential Effects of Banking Crises on Value Added Growth: Industries Differentiated Based on Establishment Size

	Robust S.E.s	Clustered S.E.s	Split DC/LDC	Currency Crises	Split and Currency	Recessions	Split and Recessions
Size*crisis3	1.52	1.52		1.36		1.18	
	[2.24]**	[2.05]**		[1.96]**		[1.66]*	
Size*crisis3*DC			1.04		1.03		−0.07
			[0.93]		[0.92]		[0.06]
Size*crisis3*LDC			1.67		1.45		1.53
			[2.04]**		[1.71]*		[1.82]*
Currency crisis*size				0.99			
				[1.22]			
Currency crisis*size*DC					0.67		
					[0.59]		
Currency crisis*size*LDC					1.06		
					[1.06]		
Recession*size						1.29	
						[2.02]**	
Recession*size*DC							2.84
							[3.10]***
Recession*size*LDC							0.65
							[0.81]
Lagged share	−2.46	−2.46	−2.46	−2.46	−2.46	−2.45	−2.46
	[13.84]***	[6.57]***	[13.86]***	[13.84]***	[13.85]***	[13.77]***	[13.86]***
Constant	7.72	7.72	45.45	6.67	72.61	45.01	−13.81
	[1.10]	[1.35]	[6.33]***	[0.94]	[6.64]***	[6.33]***	[1.33]
Observations	15,985	15,985	15,985	15,985	15,985	15,985	15,985
R-squared	0.35	0.35	0.35	0.35	0.35	0.35	0.35

Note: Robust t-statistics are in parenthesis. ***, **, and * denote significance levels of 1 percent, 5 percent, and 10 percent respectively. Crisis3 is a dummy variable for the year of banking crisis inception and two following years. Size is average employees per establishment in sector j in country i averaged over the sample period. DC is a dummy for developed countries. LDC is a dummy for developing countries. Recession is a dummy for recession years. Currency crisis is a dummy for currency crisis years. Lagged share is the share of the sector's value added in total value added lagged by one period. Regressions are estimated with OLS and also include time-country, time industry, and industry-country dummy variables.

Table 7. Differential Effects of Banking Crises on Value Added Growth: Industries Differentiated Based on Export Orientation

	Robust S.E.s	Clustered S.E.s	Split DC/ LDC	Currency Crises	Split and Currency
	(2)	(3)	(4)	(6)	(8)
Crisis3*export/VA	0.78	0.78		0.71	
	[0.95]	[0.79]		[0.86]	
Crisis3*export/VA*DC			0.98		0.92
			[0.93]		[0.88]
Crisis3*export/VA*LDC			0.71		0.65
			[0.68]		[0.62]
Currency crisis*export/VA				2.11	
				[2.12]**	
Currency crisis*export/VA*DC					3.08
					[2.38]**
Currency crisis*export/VA*LDC					1.78
					[1.42]
Share (t-1)	–2.44	–2.44	–2.44	–2.44	–2.44
	[12.44]***	[6.04]***	[12.44]***	[12.46]***	[12.46]***
Constant	30.11	30.11	13.16	-21.39	12.99
	[1.73]*	[4.35]***	[1.09]	[1.76]*	[1.07]
Observations	14499	14499	14499	14499	14499
R-squared	0.35	0.35	0.35	0.35	0.35

Note: Robust t-statistics are in parenthesis. ***, **, and * denote significance levels of 1 percent, 5 percent, and 10 percent respectively. Crisis3 is a dummy variable for the year of banking crisis inception and two following years. Export/VA is the ratio of export to value added in industry j and country i averaged over the sample period. DC is a dummy for developed countries. LDC is a dummy for developing countries. Currency crisis is a dummy for currency crisis years. Lagged share is the share of the sector's value added in total value added lagged by one period. Regressions are estimated with OLS and also include time-country, time industry, and industry-country dummy variables.

Table 8. Cost of Crisis from Bank Lending Channel

Episode	Cost of Crisis
Argentina 1989	–0.7
Argentina 1995	3.3
Bolivia 1986	–3.9
Bolivia 1994	–16.4
Brazil 1994	–4.6
Cameroon 1995	–0.7
Central African Republic 1988	13.9
Sri Lanka 1989	15.1
Chile 1981	19.1
Colombia 1982	–3.6
Colombia 1999	8.1
Costa Rica 1994	6.4
Ecuador 1995	1.7
Finland 1991	–4.3
Ghana 1982	–12.8
India 1991	–4.6
Indonesia 1992	17.0
Israel 1983	–6.7
Italy 1990	0.6
Japan 1992	6.9
Jordan 1989	–9.4
Kenya 1993	5.6
Korea 1997	–4.1
Madagascar 1988	5.9
Malaysia 1985	3.7
Malaysia 1997	–5.2
Mexico 1994	2.3
Nepal 1988	26.6
Nigeria 1991	18.6
Norway 1987	7.0
Panama 1988	11.8
Papua New Guinea 1989	5.1
Peru 1983	6.8
Philippines 1981	0.1
Portugal 1986	–11.0
Senegal 1983	9.5
South Africa 1985	1.1
Swaziland 1995	–32.9
Sweden 1990	5.3
Tunisia 1991	–5.0
Turkey 1982	–0.5
Turkey 1991	–8.6
Turkey 1994	–6.1
Turkey 2000	–5.0
Tanzania 1988	11.4
United States 1980	–2.0
Uruguay 1981	10.5
Venezuela 1993	22.0

Table 9. Cost of the Lending Channel and Intervention Policies

Episode	Cost of Lending Channel	Blanket guarantee	Liquidity support	Forbearance A	Forbearance B	Repeated recaps	Relief to debtors	Total
Ghana 1982	−12.8	1	1	1	1	0	1	5
Turkey 1994	−6.1	1	0	0	1	0	0	2
Malaysia 1997	−5.2	1	0	0	1	1	0	3
Brazil 1994	−4.6	0	0	1	1	0	1	3
Finland 1991	−4.3	1	1	0	1	0	0	3
Korea 1997	−4.1	1	1	1	1	1	0	5
Colombia 1982	−3.6	1	1	0	0	0	0	2
United States 1980	−2.0	0	0	1	1	0	0	2
Turkey 1982	−0.5	0	0	0	0	0	0	0
Philippines 1981	0.1	0	1	1	1	0	1	4
Ecuador 1995	1.7	0	0	1	1	0	1	3
Mexico 1994	2.3	1	1	0	1	1	1	5
Argentina 1995	3.3	0	0	0	0	0	0	0
Malaysia 1985	3.7	0	1	0	1	0	0	2
Sweden 1990	5.3	1	0	0	0	0	0	1
Japan 1992	6.9	1	1	0	1	1	0	4
Norway 1987	7.0	1	1	0	1	0	0	3
Uruguay 1981	10.5	1	1	0	1	1	1	5
Sri Lanka 1989	15.1	1	0	0	1	1	0	3
Indonesia 1992	17.0	0	0	0	1	0	0	1
Chile 1981	19.1	0	1	0	1	0	1	3
Venezuela 1993	22.0	0	1	0	1	0	0	2
Total episodes		12	12	6	18	6	7	
Correlation with cost		−0.29	0.08	−0.48	0.11	0.07	−0.07	−0.18
p-value		0.2	0.71	0.03	0.62	0.75	0.76	0.42

Note: Blanket guarantee is a dummy for extensive depositor protection. Forebearance A is a dummy for letting insolvent banks operate unrestricted. Liquidity support is a dummy for providing extensive liquidity to troubled banks. Forbearance B is a dummy for letting insolvent banks operate unrestricted or not enforce some regulations. Repeated crecap is a dummy for repeated government recapitalizations of banks. Debtor relief is a dummy for government programs to subsidize bank debtors.

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