# The Real Effect of Banking Crises: Finance or Asset Allocation Effects? Some International Evidence

**Abstract**

This paper analyzes whether the decline in economic growth that follows a banking crisis occurs because of a reduction in the amount of credit available (finance effect) or a worsening in the allocation of investable resources (asset allocation effect). We use a sample of more than 2,500 industrial firms in 18 developed and developing countries that experienced 19 systemic banking crises between 1989 and 2007. The results indicate that banking crises negatively affect firms' intangible investments, which intensifies the economic downturn. The negative growth effect produced by the worsening of the investment allocation is stronger in countries with highly developed financial systems and institutions.

**Keywords:** Asset Allocation; Banking Crisis; Economic Growth; Intangible Assets; Institutions

## 1. INTRODUCTION

It is widely accepted that banking crises constrain economic growth. While crises tend to occur when there are economic downturns, problems in the banking sector also have independent negative effects on the real economy.[1] Dell'Ariccia et al. (2008) confirm that negative real effects persist even after accounting for reverse causality between an economic downturn and a banking crisis. More financially dependent industries perform significantly more poorly during banking crises than industries that are not so dependent on external funds. This indicates that causality runs from banking crises to recessions and not only from recessions to banking crises.

Krozsner et al. (2007), moreover, show that banking crises have a more strongly negative effect on growth in countries with more developed financial systems. This result extends for crisis periods the huge empirical literature showing that financial development promotes economic growth (La Porta et al., 1997, 1998; Levine, 1997, 2005; Rajan and Zingales, 1998; Beck et al., 2000; Ergungor, 2004). 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.

The negative real effect of banking crises has been associated with a reduction in funds provided by banks (*the finance effect*). The finance effect determines the resources available for investment and thus affects firm growth. Another way banking crises might affect growth negatively is by modifying the allocation of investments (the *asset allocation effect*). Matsuyama (2007) theoretically shows that both effects are not independent because a reduction in the bank credit supply may change the composition of credit and originate an allocation effect. Wurgler (2000), Claessens and Laeven (2003), and Pang and Wu (2009) have shown the relevance of the asset allocation effect in normal periods, but there is no empirical evidence on the changes in firms' asset structure during banking crisis periods or on how it may contribute to the negative real effect of a banking crisis.

We attempt to fill this gap with empirical analysis of the relative importance of the finance and allocation effects in the reduction of economic growth. We examine 19

[1] Bordo et al. (2001), Boyd et al. (2005), and Hutchison and Noy (2005) show that output losses associated with banking crises vary substantially across crisis episodes. Hoggarth et al. (2002) find higher output losses in developed countries on average than in emerging economies.

systemic banking crises and firm- and industry-level data in 18 developed and developing countries over 1989-2007.

This work makes several contributions to the literature. First, we provide empirical evidence on the importance of the asset allocation effect in explaining reduced economic growth during a systemic banking crisis. Like Claessens and Laeven (2003), we use the ratio of intangible and tangible assets as a measure of a firm's asset mix. We also analyze changes in firms' overall capital efficiency during a banking crisis, i.e., whether there is a change in the efficiency of channeling resources to investments (either tangible or intangible) that yield the highest returns. We then study the influence of these changes on the real effect of a systemic banking crisis after controlling for reduced credit supply (finance effect).

Second, we control for reverse causality between banking crises, firms' investment intangible intensity, and economic growth. We first analyze how firm and industry investment intangible intensity varies during systemic banking crises after controlling for reverse causality between intangible intensity and economic downturns. We then analyze how changes in intangible intensity affect firm and industry growth. In the growth equation, we control for the finance effect and potential endogeneity of the intangible intensity using alternative set of instruments. Krozsner et al. (2007) and Dell' Ariccia et al. (2008) who analyze the finance effect during banking crises use a one-stage procedure to estimate the impact on growth and do not control for potential changes in asset allocation.

Third, we use both firm-level and industry-level data to analyze the relevance of finance and asset allocation effects in the real effect of a systemic banking crisis. This lets us calculate alternative measures of firm performance. The availability of a panel database of more than 2,500 industrial firms in 20 different industries over 1989-2007 also allows us to control for specific firm and industry effects. Moreover, we estimate standard errors clustered by crisis and country to capture the potential correlation between observations of different firms or industries affected by the same crisis in a particular country.

The results show reduced firms' intangible asset intensity during a systemic banking crisis and that this reduction negatively affects economic growth in the sectors more in need of external finance. This negative real effect remains after controlling for the finance effect, and it is stronger in countries with better institutional quality and

greater financial development. We also find a reduction in overall capital efficiency during a systemic banking crisis, again constraining firm and industry growth. The negative effect of the reduction in intangible intensity remains, however, after controlling for overall capital efficiency. We therefore conclude that banking crises dampen economic growth through both the finance effect, via a reduction in credit supply, and the asset allocation effect, via a reduction in firms' intangible investment intensity. Our results are robust when we control for the endogeneity of banking crises and use different definitions of the crisis period and different estimation techniques.

The paper is organized as follows. Section 2 presents a discussion of the arguments that link banking crises to changes in firms' intangible intensity. Section 3 describes the sample and the variables used in the empirical analysis. Section 4 presents the main results and robustness checks. Finally, Section 5 concludes.

## 2. INTANGIBLE INTENSITY DURING BANKING CRISES

Theoretical studies argue that financial development promotes the efficiency of capital allocation through reduced asymmetric information problems, the screening out of bad projects, and monitoring to ensure that funds are used for productive purposes (Greenwood and Jovanovic, 1990). Wurgler (2000) confirms this conclusion in a pioneering cross-country study. Pang and Wu (2009) show that this pattern is clearer for industries that are more dependent on external finance. Claessens and Laeven (2003) use sector data in 44 countries to show empirically the importance of the mix of tangible and intangible assets for economic growth during normal periods. They find that industries with higher levels of intangibility intensity grow more in countries characterized by better-quality property rights and that this effect is due to the greater investment efficiency provided by a stronger legal framework. Claessens and Laeven (3003) argue that a firm operating in a market with weaker property rights may be led to invest more in fixed assets relative to intangible assets because it is relatively more difficult in that case to secure returns from intangible assets than from fixed assets. This negatively affects growth. Quantitatively, the finance and asset allocation effects appear to be equally important drivers of growth in sector value added.

All this research analyzes the asset allocation effect during normal periods. What happens with intangible intensity during a banking crisis is an empirical question, because either an increase or a reduction might be theoretically expected.

On the one hand, a systemic banking crisis might increase intangible intensity, as debt usually finances tangible assets and intangible investments are more often financed with equity (Hall, 2002). There are several reasons why intangible investments are difficult to finance with debt. First, adverse selection problems in the debt market are likely to be most pronounced for intangible assets. Intangible assets involve much greater uncertainty about returns than tangible assets. Firms are also likely to have better knowledge than lenders about the inherent riskiness of projects. In such an environment, lenders may choose to ration credit rather than raise interest rates, in the hope of not exacerbating adverse selection problems (Stiglitz and Weiss, 1981). Second, debt financing can lead to ex-post changes in behavior (moral hazard). Intangible assets are subject more than tangible assets to more risk-shifting problems. When creditors anticipate this behavior, they may ration credit or insist on debt covenants to restrict the firm's behavior (Jensen and Meckling, 1976). Third, intangible assets provide little or no collateral value. The lower liquidation value of intangible assets increases the cost of financial distress in the use of debt and creates another difficulty in financing intangible assets using debt (Berger and Udell, 1990; Boot et al., 1991). As a banking crisis primarily damages investment financed with debt, we might expect tangible investments to lose more value during banking crises than intangible investments. In this case, we would expect an increase in intangible intensity during banking crises.

On the other hand, several reasons might lead to a reduction of firms' intangible intensity during a systemic banking crisis. First, banks and debtors may use lending relationships to reduce adverse selection and the moral hazard problems associated with intangible assets. This would explain why some intangible assets may be financed with debt. A banking crisis could destroy the benefits of such close lending relationships and damage intangible investments the most. If the relationship bank goes bankrupt, some of its borrowers might be obliged to borrow from non-relationship banks that would prefer to allocate funds to the better known and less risky, although less profitable, projects of relationship firms (Detragiache et al., 2000). The consequence is a reduction in firms' intangible intensity. Second, if banks become more concerned about avoiding bankruptcy, they may adopt more conservative investment behavior toward debtors wishing to renew their loans. This would lead debtors to reduce risky assets, making intangible investments more difficult. When bankruptcy probability increases under systemic banking crises, risk-averse bank managers tend to avoid variance-increasing projects. Moreover, if banks are obliged by regulators and supervisors to behave more

prudently, intangible intensity will be reduced during banking crises. Theoretically, Matsuyama (2007) develops a macroeconomic model of credit market imperfections suggesting a reduction in intangible intensity during banking crisis. He shows that a reduction in the credit supply is associated with a change in the composition of investments because banks prefer to finance projects with a lower return but fewer agency problems (tangible assets) when debtors reduce their net worth.

Given these opposing arguments, we cannot make an explicit hypothesis on the asset allocation effect during banking crises. We thus treat it as an empirical question.

The potential variation in firms' intangible intensity during a banking crisis may affect economic growth. Claessens and Laeven (2003) show that better protection of property rights favors intangible investments in normal periods and that more intangible intensity in the asset mix of firms promotes greater industry growth. Although John et al. (2008) do not specifically analyze intangible investment, they find that higher corporate risk-taking promotes firm growth in a cross-country sample. Expanding this evidence for periods of banking crises, we would expect a reduction of intangible intensity during episodes of systemic banking crises to damage economic growth and increase the negative real effect associated with the reduction in credit supply; an increase in intangible intensity could have the opposite effects. We therefore distinguish two channels to explain the negative real effect of a banking systemic crisis: the finance effect and the asset allocation effect. In the empirical analysis, we separate the contribution of each channel to economic growth.

## 3. DATA, METHODOLOGY, AND VARIABLES

### 3.1. Data

We use firm balance-sheet and income statement annual data (in US dollars and in real prices) available in the Compustat Global Vantage database. As Compustat provides data only from 1989 onward, our analysis starts in 1989 and ends in 2007. Compustat Global provides data covering publicly traded companies in more than 80 countries, representing over 90% of the world's market capitalization, including coverage of over 96% of European market capitalization and 88% of Asian market capitalization. We select firms belonging to 20 industrial sectors on a two-digit SIC level.

Initially, we select countries that have experienced at least one systemic banking crisis using the Laeven and Valencia (2008) database.[2] This database includes information on 85 systemic banking crises that occurred in 78 developed and developing countries during the 1989-2007 period. Unfortunately, we have to eliminate several crises because of limited firm and country-level data in Compustat. First, we eliminate 49 countries that are not available at all in Compustat. Second, we drop 11 countries for which we do not have firm-level financial data to construct measures of firms' economic growth, external financial dependence, and intangibility intensity. The final sample is made up of a panel database from up to 2,530 industrial firms in 18 countries. We analyze a total of 19 systematic crises and use a maximum of 12,396 firm-year observations.

We separate crisis from non-crisis periods following Krozsner et al. (2007). We define three different periods, namely: pre-crisis, crisis, and post-crisis period. Since it is difficult to identify the crisis period and, more specifically, the end of a banking crisis, we consider the crisis period as ($t$, $t$+2), where $t$ is the inception date of the crisis provided by the Laeven and Valencia (2008) database. To guarantee that the pre-crisis period is not affected by crisis years, we separate the crisis period by three years from the pre-crisis period. That is, we define the pre-crisis period as ($t_1$, $t$-3), where $t_1$ is the first year in our sample period (generally, 1989 or earliest available). Finally, the post-crisis period is defined as ($t$+3, T), where T is the final year in our sample (generally, 2007).[3]

### 3.2. Methodology

We run estimations using a firm-level and industry-level panel database. We regress intangible intensity on variables capturing crisis periods and controlling for economic downturns and other relevant factors. We also examine whether changes in intangible intensity are associated with growth during banking crises, controlling for changes in the credit supply. We apply two procedures to control for the potential endogeneity of intangible intensity in the growth equation. First, we instrument it using pre-crisis values of intangible intensity and, second, we apply a two-stage least squares procedure to estimate the growth equation. Moreover, our methodology must control for a variety

[2] Laeven and Valencia (2008) define a banking crisis as systemic when the country's corporate and financial sectors experience a large number of defaults, and financial institutions and corporations face great difficulties repaying obligations on time. As a result, non-performing loans increase and all or most of the aggregate banking system capital is exhausted. In some cases, the crisis is triggered by depositor runs on banks, although in most cases it is a general realization that systemically important financial institutions are in distress.

[3] Results do not change when we use alternative definitions of the crisis period, such as (t-3, t+3) and (t-5, t+5).

of specific factors and reverse causality problems across economic downturn, banking crisis, and changes in intangible intensity.

The regression specifications when we use firm-level data are:

$$\begin{aligned} \textit{Intangible Intensity}_{ijkt} = {} & \alpha_0 + \alpha_1 * \textit{Intangible Intensity}_{initial} \\ & + \alpha_2 * \textit{Assets}_{ijkt-1} \\ & + \alpha_3 * \textit{Crisis}_{kt} * \textit{External Dependence}_{ijk\ pre\text{-}crisis} * \textit{Institutional Quality}^{IV}_{k} \\ & + \theta_{kj} + \lambda_{jt} + \varphi_{kt} + \mu_{1ijk} + \varepsilon_{1ijkt} \end{aligned} \tag{1}$$

$$\begin{aligned} \textit{Growth (Sales/EBIT)}_{ijkt} = {} & \beta_0 + \beta_1 * \textit{Sales/EBIT}_{ijkt-1} \\ & + \beta_2 * \textit{Crisis}_{kt} * \textit{External Dependence}_{ijk\ pre\text{-}crisis} * \textit{Financial Development}_{k1989} \\ & + \beta_3 * \textit{Crisis}_{kt} * \textit{Intangible Intensity}^{IV}_{ijkt} * \textit{Institutional Quality}^{IV}_{k} \\ & + \theta_{kj} + \lambda_{jt} + \varphi_{kt} + \mu_{2ijk} + \varepsilon_{2ijkt} \end{aligned} \tag{2}$$

Intangible Intensity$_{ijkt}$ is the intangible intensity of firm $i$ in sector $j$ from country $k$ in year $t$. We control for the initial value of the dependent variable and firm size. We define firm size as the natural logarithm of the market value of firms' total assets (*Assets* $_{ijkt-1}$). We use one lag of this variable to avoid potential endogeneity problems.[4]

Crisis$_{kt}$ is a dummy variable that takes a value of one for the years of the crisis period in country $k$ and zero for years in the pre-crisis and post-crisis periods. To identify the causality between banking crisis and intangible intensity, we interact banking crisis with the firm's external dependence and the country's institutional quality. Our premise is that banking crises have a greater negative effect on the availability of funding for intangible investments in firms that are more dependent on external finance and in countries with better institutional quality. Firms that are more dependent on external finance are more sensitive to a reduction in bank lending caused by a banking crisis (Dell'Ariccia et al. 2008). Firms in countries with better institutional quality invest more in intangible assets as their returns are less easily expropriated by competitors (Claessens and Laeven, 2003). Therefore, greater reduction of intangible intensity during banking crises in firms that are more dependent on external finance in countries with better institutions indicates that at least part of the causality runs from the banking crisis to intangible intensity. A negative (positive) coefficient of $\alpha_3$ would

[4] Parisi et al. (2006); Benfratello et al. (2008), among others, include firm size to analyze firm innovation.

indicate reduced (increased) intangible intensity during banking crises. We use the pre-crisis values of external dependence and different instruments for our proxies of country's institutional quality to focus only on their exogenous component. The superscript IV indicates that the variable is instrumented.

In the second regression, we analyze how the change in intangible intensity during a banking crisis impacts economic growth. We use the annual real growth in *Sales* and earnings before interest and taxes (*EBIT*) as two alternative dependent variables. As explanatory variables of annual firm growth, we include one lag of, respectively, firm sales or EBIT ($Sales_{ijkt-1}/EBIT_{ijkt-1}$).

We also include two interaction terms. First, we interact the crisis dummy variable with the firm's external dependence and the country's financial development to control for the reduction of credit supply (finance effect). We focus on the exogenous component of financial development using values in the first year available, 1989. Controlling for the level of external financial dependence aims to avoid the usual reverse causality problem between economic growth and banking crisis. This method was initially applied by Rajan and Zingales (1998) and extended in Krozsner et al. (2007) and Dell'Ariccia et al. (2008) for crisis periods. The idea is that, if firms more dependent on external finance suffer the most during a banking crisis, it is likely that banking crises have independent negative effects on real economic activity. Moreover, a banking crisis in a system where banks are important will restrict funding more than in countries where the banking system is less developed. For this reason, the interaction between external dependence and financial development during banking crises captures the finance effect associated with the reduction in credit supply. The coefficient $\beta_2$ of this interaction term, extensively analyzed in Krozsner et al. (2007), is expected to be negative.

Second, we include interaction among the crisis dummy variable, the firm's intangible intensity, and a proxy for the country's institutional quality. This triple interaction term captures the impact on growth of the asset allocation effect during banking crises. We include the institutional quality proxy because firms operating in a market with better-quality institutions may be led to invest more in intangible assets during non-crisis periods when it may be easier to secure returns from these more profitable investments (Claessens and Laeven, 2003). Thus the impact of changes in intangible intensity on economic growth following a banking crisis would be greater in countries with more developed institutions. A negative (positive) sign in the coefficient $\beta_3$ would be consistent

with a lower (higher) allocation between intangible and tangible assets during episodes of systemic banking crises.

We control for the potential endogeneity of intangible intensity by instrumenting it in two different ways in the growth equation: 1) First, we use the pre-crisis values of firms' intangible intensity and, 2) we apply a two-stage least squares procedure to estimate the growth equation. In the 2SLS estimation, we first regress intangible intensity on all the independent variables in models (1) and (2) and use the fitted values of intangible intensity in the economic growth equation. These fitted values are then used as instruments for intangible intensity. This system of equations satisfies the rank and order conditions for model identification (see Green, 2011). That is, each equation has its own predetermined variable, $Intangible\ Intensity_{initial}$ for the intangible intensity equation and $Sales_{ijkt-1}$ or $EBIT_{ijkt-1}$, respectively, for the growth equations. These variables satisfy the conditions for suitable instruments, namely, the initial value of intangible intensity is related to the posterior values of the annual intangible intensity and neither directly affects nor is directly affected by annual economic growth.[5] The lagged values of sales or EBIT are considered an appropriate instrument for growth because they are related to, respectively, a firm's growth of sales and EBIT, but they do not directly affect and are not directly affected by the firm's intangible intensity.[6] In sub-section 4.5 we perform a set of further analyses to check the robustness of the results to alternative instruments and specifications.

We include in both equations four specific effects: country-industry, industry-year, country-year, and firm-specific effects. The four sets of specific effects should control for most shocks affecting firm intangibility and growth. $\theta_{kj}$ is a country-industry specific effect to control not only for characteristics that are specific to either an industry or a country, but also for characteristics that are specific to an industry located in a particular country, as long as these are persistent on time. These include, for instance, the effect of persistent differences in size, concentration, financial frictions, external dependence, or government intervention and support, derived from different factor endowments, market size, or institutional characteristics that may generate different

[5] The coefficients of the initial intangible intensity are statistically significant in all estimations to explain intangible intensity. The coefficients of correlation of the initial value of intangible intensity with the firm's growth of sales and EBIT are, respectively, 0.0003 and 0.0013. These coefficients are, respectively, 0.0079, and 0.0097 when we use industry-level data. None of these coefficients of correlation are statistically significant at conventional levels.

[6] The coefficients of the lagged value of sales and EBIT are statistically significant in most of the estimations to explain economic growth. The coefficients of correlation with intangible intensity are, respectively, 0.0042 and 0.0040. These coefficients are, respectively, 0.0066 and 0.0150 when we use industry-level data. None of these coefficients of correlation are statistically significant at conventional levels.

intangible intensity and growth patterns across industries and countries. $\lambda_{jt}$ is an industry-year specific effect to control for worldwide industry shocks. $\varphi_{kt}$ is a country-year specific effect. It includes, for instance, the severity of the banking crisis, the level of financial development, and aggregate country-specific shocks. This approach has the advantage that it is less likely to suffer from omitted variable bias or model specification than traditional regressions. Moreover, inclusion of these specific effects avoids the need for the crisis dummy variable, external dependence, financial development, and institutional quality variables to enter the regression on their own. It allows us to focus only on the terms of their interaction.[7]

We estimate standard errors clustered by crisis and country to capture correlations of different firms or industries affected by the same crisis in a particular country. This correlation would be captured by the country-year dummies if the time or crisis effect is fixed, but we adopt a general approach following Petersen (2009). We do not make assumptions on the precise form of the dependence across standard errors and cluster them by two dimensions simultaneously (crisis and country). We also check that results do not change when the standard errors are clustered by crisis and firm or crisis and industry.

In both equations, we apply random effects estimations to control for unobservable firm-specific effects. So, $\mu_{ijk}$ is a firm-specific effect, which is assumed to be constant for firm $i$ over $t$ and $\varepsilon_{ijkt}$ is a white-noise error term. We replicate estimations at the industry level. In this case, we aggregate the firm data to obtain information at an industry level. We estimate regressions using ordinary least squares and controlling for the three specific effects ($\theta_{kj}$, $\lambda_{jt}$, and $\varphi_{kt}$) to avoid omitted variable bias.

### 3.3. Variables

#### *3.3.1. Intangibility Intensity*

The measure of firm intangibility intensity is defined as the annual ratio of intangible assets-to-net fixed assets (Claessens and Laeven, 2003). Mean values in Table 1 show that Japan, Sweden, Finland, and Norway are the countries in our sample with the highest intangible intensity during non-crisis periods. Zimbabwe has the lowest intangible intensity in our sample. The average intangible intensity across countries

[7] Dell'Ariccia et al. (2008) use this procedure to control for other factors affecting the relation between banking crises and economic growth. As they use only industry-level data, they do not control for firm-specific effects.

drops from 5.55% in non-crisis periods to 3.55% in crisis periods. This reduction is statistically significant at the 1% level. Ten countries experience a statistically significant reduction in intangible intensity during banking crises (Colombia, India, Indonesia, Jamaica, Japan, Norway, South Korea, Thailand, Turkey, and Venezuela), and five countries increase their intangible intensity during the crisis period (Argentina, Czech Republic, Malaysia, Philippines, and Zimbabwe). In three countries, we do not observe a significant change in intangible intensity from non-crisis to crisis periods (Finland, Mexico, and Sweden).

Table 2 reports the variation in intangible intensity across industries in non-crisis and crisis periods. Thirteen industries reduce their intangible intensity during crisis periods, and five increase it (Textile and mill products; Petroleum and coal products; Leather and leather products; Stone, clay, glass, and concrete products; and Electrical and electronic equipment). Only the Food and kindred products and the Rubber and miscellaneous plastic industries do not have statistically significant changes in their intangible intensity.

Obviously, a simple comparison of means incorporates confounding effects. We need to run the multivariate analysis indicated in model (1) to control for reverse causality between banking crisis and intangible intensity, and for other country, industry, year, and firm-specific effects.

*3.3.2. Firm Growth*

We use two different measures of firm growth: annual real growth of a firm's sales and annual real growth in a firm's earnings before interest and taxes (EBIT). These variables are commonly used as measures of firms' economic growth in other empirical studies (Demirgüç-Kunt and Maksimovic, 1998; Krozsner et al., 2007). EBIT is most closely related to value added, which is the typical industry measure of performance in studies analyzing economic growth (Krozsner et al., 2007).

Table 1 shows that most of the countries experience a significant reduction in growth: 12 or 16 countries, depending on the measure. Table 2 shows that all industries reduce their sales growth from non-crisis to crisis periods. This reduction is not statistically significant only in two industries (Industrial machinery and equipment and Instruments and related products). In terms of EBIT, 14 industries experience on average statistically significant reduction in EBIT growth during crisis periods.

INSERT TABLE 1 ABOUT HERE

INSERT TABLE 2 ABOUT HERE

*3.3.3. External Dependence*

We measure a firm's external dependence as the fraction of capital expenditures not financed with cash flow from operations. In order to avoid potential endogeneity problems, we define this measure as the average value during the pre-crisis period. Our measure differs from the one used by Rajan and Zingales (1998). They construct their proxy at industry-level for a sample of US firms and assume that each industry has the same external dependence across all countries.[8] Our firm-specific measure of external dependence, however, captures differences in technology and product mix across firms, industries, and countries. The basic results do not change when we use the same measure of external dependence as Rajan and Zingales (1998).

*3.3.4. Financial Development and Institutional Quality*

We measure a country's financial development as the amount of private credit by deposit money banks over GDP. We consider this measure in 1989, the first year available, to avoid any potential endogeneity problems. This measure has been widely used by other authors (Rajan and Zingales, 1998; Beck et al., 2000; Krozsner et al., 2007, among others). We confirm that the results do not vary when we average financial development over the pre-crisis period or when we instrument it using the legal origin variables.

We include a set of proxies for the country's institutions. Following Claessens and Laeven (2003), we use as an index of property rights the rating of protection of property rights constructed by the Heritage Foundation. It ranges from 1 to 5, where higher values indicate greater protection of property rights. We examine the robustness of our results to alternative proxies: (1) the index of economic freedom from the Heritage Foundation, which measures the extent to which individuals and firms feel free to

[8] Rajan and Zingales (1998) argue that the financial structure of US industries is an appropriate benchmark because the relatively open, sophisticated, and developed US financial markets should allow US firms to face fewer obstacles to achieving their desired financial structure than firms in other countries. This approach offers a valid and exogenous way of identifying the extent of an industry's external dependence anywhere in the world. An important assumption underlying it is that external dependence reflects technological characteristics of the industry that are relatively stable across space and time.

conduct their businesses; Values range from 1 to 5, with greater values indicating better protection of freedom; and 2) the index of control of corruption from Kaufmann et al. (2005).

As the law and finance literature suggests that better institutional quality promotes financial development (La Porta et al., 1997, 1998), we do not include simultaneously financial development and proxies for institutional quality. These variables are introduced sequentially to avoid potential correlation problems. Moreover, we consider only the exogenous component of all these variables using instruments for them and thus controlling for potential simultaneity bias. Each proxy of institutional quality is regressed on the instruments proposed by Beck et al. (2000): five legal origin dummy variables (English, French, German, Scandinavian, and Socialist). To test the suitability of an instrumental variables (IV) estimator, we perform the Durbin-Wu-Hausman test. The test verifies the null hypothesis that the introduction of IVs has no effect on the estimates of the regression's coefficients. We report IV estimations when the test is rejected at the 10% level or less. The results are robust to the proxy used.

## 4. EMPIRICAL RESULTS

### 4.1. Effect of Banking Crises on Intangible Intensity

We now analyze how banking crises affect firm and industry intangible intensity. The results for model (1) are reported in Table 3. Panel A reports the results including controls for reverse causality and country-industry, industry-year, and country-year specific effects. Panel B reports the results without such controls. Columns (1)-(4) show the results using firm-level data, and columns (5)-(8) show the results using industry-level data.

We find in Panel A that banking crises have a disproportional exogenous negative effect on intangible intensity in countries with more developed institutions. The coefficients of the interaction terms are negative and statistically significant at conventional levels in all the estimations. This indicates more reduction in intangible intensity of more financially dependent firms during crisis years in more institutionally developed countries. The results are similar for the three proxies of institutional quality (property rights, the index of economic freedom, and the index of control of corruption) and using both firm-level and industry-level data. Note in columns (4) and (8) that the results

remain unchanged when we use a country's financial development instead of quality of institutions. The initial values of intangible intensity and firm size have positive and statistically significant coefficients in all the estimations. The results in Panel B are similar only when we use firm-level data because the coefficients of the interaction terms are not statistically significant in the industry-level estimations. This suggests the relevance, at least in the industry-level estimations, of the control for reverse causality and country-industry, industry-year, and country-year specific effects.

Claessens and Laeven (2003) show that, during non-crisis periods, industries invest more in intangible assets in countries that provide better protection of property rights and that higher industry intangible intensity promotes economic growth. We now find that a systemic banking crisis has more of a negative impact on intangible intensity in countries where better institutional quality favors more intangible investment during non-crisis periods. The reduction in intangible intensity indicates that investments that are more easily financed with debt, tangible investments, are relatively less damaged during banking crises than intangible investments, where adverse selection and moral hazard problems make the use of debt more difficult. This result is consistent with the idea that a systemic banking crisis destroys close lending relationships that allow banks to provide debt to finance intangible assets and that banks become more conservative when they are renewing debt under credit constraints.

The reduction in intangible intensity during banking crises is economically significant. Estimations in column (1) of Table 3, for example, show that in a country experiencing a banking crisis, a firm at the 75$^{th}$ percentile of external dependence in a country at the 75$^{th}$ percentile of property rights protection experiences a 140.4% greater contraction in intangible intensity during a banking crisis period than a firm at the 25$^{th}$ percentile of external dependence in a country at the 25$^{th}$ percentile of property rights protection. This is a large effect compared with an overall mean decline in intangible intensity of 36.04% between non-crisis and crisis periods.

INSERT TABLE 3 ABOUT HERE

### 4.2. Intangible Intensity and Economic Growth

We next analyze whether the variation in intangible intensity during a systemic banking crisis affects economic growth. Following model (2), we control in all regressions

for the finance effect, i.e., the variation in the credit supply during a systemic banking crisis, and for the potential endogeneity of intangible intensity. We apply two procedures to control for the potential endogeneity of intangible intensity in the growth equation. First, we use the pre-crisis values of intangible intensity instead of the observed values, and second, we apply a two-stage least squares (2SLS) procedure.

Table 4 reports the results when we control for the endogeneity of intangible intensity using its average value in the pre-crisis period. The interaction term between external dependence and financial development during a systemic banking crisis has negative coefficients in all the estimations in Panel A; three of the four estimations are statistically significant. This result suggests that banking crises have a disproportionately worse effect on economic growth in industrial firms that are more in need of external finance, especially in countries with sounder financial systems. This finding confirms the relevance of the finance effect in a banking crisis and is consistent with Krozsner et al. (2007).

In terms of the asset allocation effect, the interactions of intangible intensity and the protection of property rights during banking crises have negative and significant coefficients in all estimations in Panel A. This indicates that industrial firms using more intangible assets experience a greater decline in economic growth during a systemic banking crisis and that the negative growth effect is stronger in countries with better protection of property rights. This result suggests that the reduction in intangible intensity during periods of banking crises impacts negatively on growth and exacerbates the downturn in more institutionally developed countries.

Panel B reports the results without controlling for reverse causality and country-, industry-, and year-specific effects. The negative and significant coefficients of the interaction *Crisis*Intangible Intensity*$^{PRE\text{-}CRISIS}$**Property Rights* in three of the four estimations confirm the relevance of the allocation effect in explaining the decline in economic growth during banking crises. The results are also consistent with co-existence with the finance effect when we use firm-level data. The coefficients of *Crisis *External Dependence*Financial Development* are negative and significant in all the estimations but only statistically significant in firm-level estimations.

INSERT TABLE 4 ABOUT HERE

Table 5 reports the results when we control for the endogeneity of intangible intensity in the growth equation using 2SLS. In the first stage of a typical 2SLS, we regress intangible intensity on the instrument and the other exogenous variables:

$$\begin{aligned} \textit{Intangible Intensity}_{ijkt} = {} & \gamma_0 + \gamma_1 * \textit{Intangible Intensity}_{ijk\ Initial} \\ & + \gamma_2 * \textit{Assets}_{ijkt-1} \\ & + \gamma_3 * \textit{Sales/EBIT}_{ijkt-1} \\ & + \gamma_4 * \textit{Crisis}_{kt} * \textit{External Dependence}_{ijk\ Pre\text{-}crisis} * \textit{Institutional Quality}^{IV}_{k} \\ & + \gamma_5 * \textit{Crisis}_{kt} * \textit{External Dependence}_{ijk\ Pre\text{-}crisis} * \textit{Financial Development}_{k1989} \\ & + \theta_{kj} + \lambda_{jt} + \varphi_{kt} + \mu_{3ijk} + \varepsilon_{3ijkt} \end{aligned} \tag{3}$$

In the second stage, we replace intangible intensity by its predicted value (Intangible Intensity$^{2SLS}$) from the preceding regression to estimate model (2). Both stages are estimated applying a random effects model to eliminate unobserved firm-specific effects when we use firm-level data and an OLS model when we use industry-level data.

The results of the 2SLS estimations reported in Panel A of Table 5 confirm the relevance of the asset allocation effect to explain the negative real effect of a banking crisis. The interaction between intangible intensity and property rights during a systemic banking crisis has negative and statistically significant coefficients in all the estimations.[9] The coefficients of the interaction between external dependence and financial development during a systemic banking crisis are negative in three of the four estimations but are not statistically significant. These results suggest that the asset allocation effect is even more statistically significant than the finance effect. The coefficients of the interaction term capturing the asset allocation effect are statistically significant in all the estimations, but the coefficients of the interaction capturing the finance effect are not.

Panel B reports different results when we do not control for reverse causality and country-, industry-, and year-specific effects. We do not find negative significant coefficients for the interaction terms capturing the allocation (*Crisis*Intangible Intensity$^{2SLS}$ *Property Rights*), and the coefficients of the variables capturing the finance effect (*Crisis*External Dependence*Financial Development*) are negative and significant only when we use firm-level data. The different results in Panels A and B

[9] We also check that the results do not vary when we explicitly include interactions for the non-crisis periods, i.e., when we test the growth equation: $\textit{Growth (Sales/EBIT)}_{ijkt} = \beta_0 + \beta_1 * \textit{Sales/EBIT}_{ijkt-1} + \beta_2 * \textit{External Dependence}_{ijk\ pre\text{-}crisis} * \textit{Financial Development}_{k1989} + \beta_3 * \textit{Crisis}_{kt} * \textit{External Dependence}_{ijk\ pre\text{-}crisis} * \textit{Financial Development}_{k1989} + \beta_4 * \textit{Intangible Intensity}_{ijkt} * \textit{Institutional Quality}^{IV}_{k} + \beta_5 * \textit{Crisis}_{kt} * \textit{Intangible Intensity}_{ijkt} * \textit{Institutional Quality}^{IV}_{k} + \theta_{kj} + \lambda_{jt} + \varphi_{kt} + \mu_{2ijk} + \varepsilon_{2ijkt}$. The inclusion of four specific effects in our initial specification explains that the results do not vary.

show the relevance of controls for reverse causality and fixed effects. We thus report only results including these controls in later tables.

INSERT TABLE 5 ABOUT HERE

### 4.3. Intangible Intensity or Efficiency of Capital Allocation?

We next evaluate whether the effect attributed to the reduction in intangible investments during banking crises is due to a diminished overall efficiency of capital allocation, not specifically related to intangible assets. That is, is there a failure during banking crises in directing resources toward uses –either tangible or intangible– that bring in higher marginal returns?

Several authors demonstrate the relevance of capital allocation for economic growth during normal periods. Wurgler (2000) shows that a country's financial development improves the real economy by facilitating the allocation of capital to more profitable investments. Pang and Wu (2009) find a clearer positive influence of financial development on the efficiency of capital allocation in industries that are more dependent on external finance.

A priori, it is not clear how the efficiency of capital allocation behaves during a banking crisis. On the one hand, the reduction in funds available for firms to invest during banking crises may favor the liquidation of mediocre projects, thereby improving the efficiency of capital allocation. Almeida and Wolfenzon (2005) provide indirect evidence on this idea, showing that an increase in external financing needs during normal periods is associated with a more efficient capital allocation because it increases the liquidation of low-productivity projects. On the other hand, banking crises may destroy the benefits of close lending relationships between banks and firms. Without a relationship bank, borrowers might be obliged to borrow from non-relationship banks and face an adverse selection problem; the substitute banks will prefer to lend to the better known, but less profitable, projects of their relationship firms (Detragiache et al., 2000). The consequence in this case might be a reduction in the efficiency of capital allocation.

We follow Wurgler (2000) and Pang and Wu (2009) in defining the measure of efficiency of allocation of capital. Specifically, we define the capital efficiency as the elasticity of a firm's investments to the firm's value added. We estimate this measure of capital

efficiency for each industry $j$ in each country $k$ using the firm's annual EBIT as a proxy for value added in three separated subperiods, (pre-crisis, crisis, and post-crisis). The model for each sub-period is: [10]

$$\text{Ln}\,(I_{ijkt}\,/I_{ijkt-1}) = \alpha + \eta_{jk\ pre\text{-}crisis} * \text{Ln}\,(V_{ijkt}\,/\,V_{ijkt-1}) + \varepsilon_{4ijkt} \quad \text{where } t \in (t_1, t\text{-}3) \tag{4}$$

$$\text{Ln}\,(I_{ijkt}\,/I_{ijkt-1}) = \alpha + \eta_{jk\ crisis} * \text{Ln}\,(V_{ijkt}\,/\,V_{ijkt-1}) + \varepsilon_{5ijkt} \quad \text{where } t \in (t, t\text{+}2) \tag{5}$$

$$\text{Ln}\,(I_{ijkt}\,/I_{ijkt-1}) = \alpha + \eta_{jk\ post\text{-}crisis} * \text{Ln}\,(V_{ijkt}\,/\,V_{ijkt-1}) + \varepsilon_{6ijkt} \quad \text{where } t \in (t\text{+}3, T) \tag{6}$$

where $I$ is the amount of the firm's investment, $V$ is the proxy we use for the firm's value added: EBIT.[11] Ln $(I_{ijkt}\,/I_{ijkt})$ is the change in firm's investment from $t$-$1$ to $t$. Ln$(V_{ijkt}\,/V_{ijkt-1})$ denotes the change in EBIT from $t$-1 to $t$. Efficiency of capital allocation is given by the parameter $\eta_{jk,}$ that is, the elasticity of capital allocation with respect to EBIT for industry $j$ in country $k$ in the particular subperiod. We use elasticity as a proxy for capital allocation efficiency because efficient investments of capital mean that capital is allocated more to growing activities and less to declining ones. The higher the value of $\eta_{jk}$, the greater the efficiency of capital allocation.

Table 6 shows that the efficiency of capital allocation diminishes during episodes of systemic banking crises. Investment elasticity to EBIT drops from a value of 0.1644 in non-crisis periods to -0.1041 in crisis periods, a statistically significant reduction at the 1% level. Most countries and most industries experience on average reduced efficiency in capital allocation during systemic banking crises. Seven countries experience a significant reduction in investment elasticity to EBIT compared to three that significantly increase their investment elasticity to EBIT. Although variations at industry levels are less significant, seven industries suffer significant reductions in investment elasticity to EBIT during banking crises compared to four that significantly increase their investment elasticity to EBIT.

INSERT TABLE 6 ABOUT HERE

A simple descriptive analysis of means, however, does not control for reverse causality between banking crises and changes in capital efficiency. To isolate the exogenous component of the variation in capital efficiency, we estimate a similar model to that used to analyze the variation of intangible intensity. The model is:

[10] Wurgler (2000) estimates elasticity of efficiency for each country. Pang and Wu (2009) estimate this measure for each industry in each country in a similar way as we do.
[11] We confirm that results do not vary when sales are used as a proxy for the firm's value added.

$$Efficiency_{jk\ subperiod\ L} = \beta_1 * Efficiency_{jk\ pre\text{-}crisis} + \beta_2 * Assets_{jk\ pre\text{-}crisis} + \beta_3 * Crisis_{kL} * External\ Dependence_{jk\ pre\text{-}crisis} * Institutional\ Quality^{IV}_{k} + \theta_{kj} + \lambda_{jL} + \varphi_{kL} + \varepsilon_{7jkL} \quad (7)$$

where $L$ refers to each of the three subperiods (pre-crisis, crisis, and post-crisis). Explanatory variables include the natural logarithm of the assets of industry $j$ averaged for the pre-crisis period to control for the exogenous component of industry size. The triple interaction term captures changes in the efficiency of capital allocation during crisis periods and non-crisis periods. The interaction with external dependence aims to avoid reverse causality problems between banking crises and changes in efficiency if industries that are more dependent on external finance are the most affected by a banking crisis. We also interact the exogenous component of a country's institutional quality as better institutions promote higher capital allocation efficiency, so more variation would be expected in the event of a systemic banking crisis. As in previous models, we add a set of country-, industry-, and year-specific effects in order to guarantee that the results are not driven by an omitted variables problem ($\theta_{kj}$ , $\lambda_{jL}$ , *and* $\varphi_{kL}$). As data are at industry-level, we apply OLS estimations.

Table 7 reports the results. The coefficients of the triple interaction terms are negative and significant at the 1% level in all estimations. The negative coefficients suggest that during a systemic banking crisis industries more in need of external finance tend to have lower investment elasticity in countries with better-quality institutions. The results are robust to the proxy used for the country's institutional quality and when we use financial development instead of institutional quality.

INSERT TABLE 7 ABOUT HERE

Poorer overall efficiency of capital allocation might explain the negative real effect attributed so far to the allocation between intangible and tangible assets. We thus check whether the negative effect on growth associated with the reduction in intangible intensity persists after controlling for changes in the overall efficiency of capital allocation. To do so, we incorporate in the growth equation of model (2) an additional interaction term capturing the effect of the change on capital allocation efficiency during

banking crises. As the efficiency capital allocation is measured at the industry-level, regressions are estimated using only industry-level data. The model is:

$$Growth(Sales/EBIT)_{jk\ SubperiodL} = \gamma_0 + \gamma_1 * Sales/EBIT_{jk\ pre\text{-}crisis} + \gamma_2 * Crisis_{kL} * External\ Dependence_{jkpre\text{-}crisis} * Financial\ Development_{k1989} + \gamma_3 * Crisis_{kL} * Intangible\ Intensity_{jkL} * Institutional\ Quality_k + \gamma_4 * Crisis_{kL} * Capital\ Efficiency_{jkL} * Institutional\ Quality_k + \theta_{kj} + \lambda_{jL} + \varphi_{kL} + \varepsilon_{8jkL} \quad (8)$$

We instrument the efficiency of capital allocation in the growth equation in a similar way to the intangible intensity: 1) We use the pre-crisis values instead of the observed values in each subperiod, and 2) we apply a 2SLS procedure.

Columns (2) and (4) in Table 8 show the results when the three interaction terms are included in the regression. The coefficients of the interaction between capital efficiency and property rights during banking crises are negative and significant when the dependent variable is growth in sales. The interaction between intangible intensity and property rights during banking crises remains significant in most estimations of Table 8. Coefficients are non-significant only when we analyze the growth of EBIT using the pre-crisis values of the explanatory variables in columns (1) and (2) of Panel B. The predominance of the negative significant coefficients suggests that the mix of tangible and intangible assets has an effect beyond that included in the overall efficiency of capital allocation.

INSERT TABLE 8 ABOUT HERE

### 4.4. Endogeneity of Banking Crises

In this section, we check the robustness of the results after controlling for the endogeneity of banking crises. Bank-dependent sectors are likely to be more heavily represented in bank portfolios than less dependent sectors. Therefore, asymmetric sectoral shocks concentrated in bank-dependent sectors might cause both a banking crisis and relatively poor growth in such sectors. This endogeneity is not controlled by multiplying the crisis dummy variable with the firm's external dependence (Dell'Ariccia et al., 2008).

To address its potential endogeneity, we instrument the crisis dummy using the predicted values of a probit explaining the probability of a banking crisis. Following Beck et al. (2006), we use as explanatory variables of the probability of a banking crisis in country *j* in year *t*: the rate of change in inflation; the change in terms of trade in goods and services; the rate of change of the exchange terms; the annual interest rate; the ratio of M2 to total international reserves; the real growth rate of GDP; banking market concentration; the natural logarithm of per capita GDP; and five dummy variables for the legal origin of each country (English common law; French civil law; German civil law; Scandinavian civil law; and the Socialist/Communist code). We also include the index of protection of property rights to control for institutional quality in a country and a set of time dummy variables to control for year-fixed effects.[12]

We replicate previous regressions using the fitted values of this probit ($Crisis^{PROB}$) instead of the observed values of the crisis dummy. The results in Table 9 for changes in intangible intensity during banking crises are similar to those reported in Table 3. Banking crises negatively affect intangible intensity in sectors that are more in need of external finance; and this effect is stronger in countries with more highly developed institutions or financial systems. Again, the results are similar using both firm-level and industry-level data, and are statistically significant at conventional levels.

INSERT TABLE 9 ABOUT HERE

Table 10 reports the results for the impact of intangible investments on growth in crisis periods. To save space we report only results using a 2SLS procedure.[13] The coefficients for the interaction between external dependence, financial development, and $Crisis^{PROB}$ are negative and significant for both measures of economic growth when we use firm-level data. This result confirms the idea that a reduction in credit supply reduces growth during banking crises. The coefficients of the term interacting $Crisis^{PROB}$, intangible intensity, and a country's protection of property rights are negative and significant in all estimations in Table 9. The results confirm those reported in Table 4 and Table 5, indicating that banking crises negatively affect economic growth in firms and industries

[12] We confirm that the results do not change when we use country dummy variables or regulatory and institutional variables instead of the legal origin as instruments.
[13] Results are similar when we use the pre-crisis values of intangible intensity as an instrument for intangible intensity.

that are more in need of external finance and those that invest more in intangible assets.

INSERT TABLE 10 ABOUT HERE

### 4.5 Other Robustness Checks

In another analysis, we check the additional robustness of the results. First, we consider alternative instruments and specifications for our 2SLS estimation. We check that the results do not change when we use as instruments the country's legal origin or the average intangible intensity of other companies in the same two-digit SIC industry in the same country. We also replicate estimations including additional variables in model (2). We include as an additional dependent variable the growth of firm's assets. We include the firm's market share in terms, respectively, of assets, sales, or EBIT in the growth equations. This variable is therefore an additional instrument for economic growth. Market share has been widely used in the literature analyzing economic growth to control for convergence effects (Braun and Larrain, 2005; Krozsner et al., 2007; Dell'Ariccia et al., 2008). This specification also satisfies the rank and order conditions for model identification. The initial value of intangible intensity is the predetermined variable for the intangible intensity equation and the particular market share is the predetermined variable for the growth equation. The results are similar to those reported for models (1) and (2) and are available from the authors upon request.

As an additional robustness test, we investigate if the impact of intangible intensity on economic growth depends on other institutional characteristics apart from property rights. We include sequentially interaction terms between the crisis dummy, intangibility intensity, and alternative proxies for institutional quality. As alternative proxies we include the index of economic freedom, the control of corruption, and the financial development in each country. The results, not reported to save space, do not change.

We also check that the results do not vary when we compare only the crisis and the post-crisis period. In these estimations we exclude data from the pre-crisis period. The results are similar to those reported.

Finally, in order to corroborate the results analyzing the harmful effect of banking crises on intangible investments, we examine subsamples of countries; we exclude non-OECD countries and countries below the median value of per capita GDP. Results do not differ from those reported already.

## 5. CONCLUSIONS

Research traditionally associates the negative real effect of banking crises with a reduction in credit supply. We provide empirical evidence on the asset allocation effect as explaining part of the negative real effect of a banking crisis. We find in 19 episodes of systemic crises that a banking crisis reduces firm and industry growth not only by limiting the amount of credit available for investment but also by worsening the allocation of investable resources. We see during crisis periods a reduction in firms' intangible asset intensity and in the channeling of funds to investments with the highest returns (overall capital efficiency). Both reactions indicate that it is harder to finance investments in intangible assets, in particular, and risky investments, in general, during systemic banking crises. The worsening in asset allocation exacerbates the reduction in growth during banking crises and is stronger in higher-quality institutional environments.

Our work contributes to the law and finance literature. This literature indicates that a more developed financial system provides considerable amounts of funding for investment and also that stronger protection of property rights improves asset allocation by firms during normal periods. Both effects promote economic growth. Our research indicates that systemic banking crises have a more negative real effect in countries whose more financially developed system and better protection of property rights promote greater growth during normal periods.

Our results have some policy implications. If economies intend to increase growth rates by promoting innovation and investment in intangible assets, it will be increasingly important to avoid banking crises as these would become increasingly harmful. Moreover, the globalization of banking activity and the existence of cross-border banks may move the financing of intangible assets in more institutionally developed countries to the financing of tangible assets in less developed countries in the case of a banking crisis. This may intensify the negative real effect of the asset allocation effect in a banking crisis in countries with better institutions.

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**Table 1**

**Economic Growth and Intangible Intensity during Crisis and Non-Crisis Periods across Co**

Mean values of intangible intensity and the measures of economic growth – the annual real growth rate of sales and EBIT- for eac
periods. The sample consists only of crisis countries. It includes 2,530 industrial firms from 18 countries that have experienced 19 s
2007 period. Firm level data are from COMPUSTAT Global database. The pre-crisis period is [$t_1$, t-3], where $t_1$ is the first year
available) and t is the crisis inception year reported on Laeven and Valencia (2008). The crisis period is defined as [t, t+2]. The post-
end of the sample period (generally, 2007). ***, **, and * indicate whether the t-Test of difference in means between non-crisis and c
at, respectively, 1%, 5% and 10% level.

| | | Intangible Intensity | | Growth of Sales | | G |
|---|---|---|---|---|---|---|
| **Country** | **Banking Crises** | ***(1)*** | ***(2)*** | ***(3)*** | ***(4)*** | ***(5)*** |
| | | ***Non-Crisis*** | ***Crisis*** | ***Non-Crisis*** | ***Crisis*** | ***Non-Cri*** |
| Argentina | 1995,2001 | 0.0173 | 0.0790*** | 0.0085 | -0.3760*** | 0.013 |
| Colombia | 1998 | 0.0229 | 0.0096*** | -0.0028 | -0.0280*** | 0.006 |
| Czech Rep. | 1996 | 0.0074 | 0.0224*** | -0.0017 | -0.0160*** | 0.043 |
| Finland | 1991 | 0.1188 | 0.1156 | 0.0026 | -0.0036 | 0.015 |
| India | 1993 | 0.0065 | 0.0012*** | -0.0041 | 0.0057*** | 0.030 |
| Indonesia | 1997 | 0.0072 | 0.0042*** | 0.0089 | -0.0834*** | 0.004 |
| Jamaica | 1996 | 0.0178 | 0.0001*** | -0.0125 | -0.0045*** | -0.013 |
| Japan | 1997 | 0.1660 | 0.0118*** | 0.0069 | 0.0039* | 0.015 |
| Malaysia | 1997 | 0.0290 | 0.0763*** | 0.0042 | -0.0354*** | 0.022 |
| Mexico | 1994 | 0.0478 | 0.0336 | -0.0050 | -0.2114*** | -0.002 |
| Norway | 1991 | 0.1109 | 0.0454*** | n.a. | n.a. | 0.033 |
| Philippines | 1997 | 0.0123 | 0.0129** | 0.0048 | -0.0442*** | 0.006 |
| South Korea | 1997 | 0.0099 | 0.0039*** | 0.0062 | -0.0182*** | 0.018 |
| Sweden | 1991 | 0.1256 | 0.1231 | -0.0196 | -0.0031*** | 0.022 |
| Thailand | 1997 | 0.0072 | 0.0024*** | 0.0040 | -0.0451*** | 0.013 |
| Turkey | 2000 | 0.0403 | 0.0324*** | -0.0173 | -0.0555*** | 0.000 |
| Venezuela | 1994 | 0.0146 | 0*** | -0.0225 | -0.0387*** | -0.032 |
| Zimbabwe | 1995 | 0.0001 | 0.0007*** | -0.2993 | -0.0385*** | 0.242 |
| ***Mean Difference Test*** | | **0.0555** | **0.0355*** ** | **-0.0018** | **-0.0351*** ** | **0.018** |

**Table 2**

**Economic Growth and Intangible Intensity during Crisis and Non-Crisis Periods across Industries**

Mean values of intangible intensity and the measures of economic growth – the annual real growth rate of sales and EBIT- for each industrial sector during crisis and non-crisis periods. The sample consists only of crisis countries. It includes 2,530 industrial firms from 18 countries that have experienced 19 systemic banking crises over the 1989-2007 period. Firm level data are from COMPUSTAT Global database. The pre-crisis period is [$t_1$, t-3], where $t_1$ is the first year of the sample period (1989 or earliest available) and t is the crisis inception year reported on Laeven and Valencia (2008). The crisis period is defined as [t, t+2]. The post-crisis period is [t+3, T], where T is the end of the sample period (generally, 2007). ***, **, and * indicate whether the t-Test of difference in means between non-crisis and crisis periods is statistically significant at, respectively, 1%, 5% and 10% level.

| | | **Intangible Intensity** | | **Growth of Sales** | | **Growth of EBIT** | |
|---|---|---|---|---|---|---|---|
| **SIC Code** | **Industry** | ***(1)*** | ***(2)*** | ***(3)*** | ***(4)*** | ***(5)*** | ***(6)*** |
| | | ***Non-Crisis*** | ***Crisis*** | ***Non-Crisis*** | ***Crisis*** | ***Non-Crisis*** | ***Crisis*** |
| **20** | Food and kindred products | 0.0554 | 0.0530 | -0.0164 | -0.0247*** | 0.0148 | -0.0775*** |
| **21** | Tobacco manufactures | 0.4630 | 0.0187*** | 0.0069 | -0.0218*** | -0.0004 | 0.0105*** |
| **22** | Textile and mill products | 0.0076 | 0.0099*** | -0.0095 | -0.0219*** | 0.0042 | -0.1586 |
| **23** | Apparel and other textile products | 0.0248 | 0.0038*** | 0.0077 | -0.0252*** | 0.0153 | -0.1514*** |
| **24** | Lumber and wood products | 0.0353 | 0.0084*** | -0.0051 | -0.0300*** | 0.0146 | -0.1422 |
| **25** | Furniture and fixture | 0.0140 | 0.0017*** | 0.0133 | -0.0369*** | 0.0075 | -0.1722*** |
| **26** | Paper and allied products | 0.0332 | 0.0092*** | 0.0038 | -0.0231*** | 0.0125 | -0.0858*** |
| **27** | Printing and publishing | 0.0834 | 0.0149*** | -0.0030 | -0.0554*** | 0.0156 | -0.1848*** |
| **28** | Chemicals and allied products | 0.0315 | 0.0216*** | -0.0064 | -0.0540*** | 0.0159 | -0.0622*** |
| **29** | Petroleum and coal products | 0.0306 | 0.1522*** | 0.0100 | -0.0360*** | 0.0141 | -0.0190*** |
| **30** | Rubber and miscellaneous plastics | 0.0569 | 0.0514 | -0.0029 | -0.0260*** | 0.0133 | -0.1155 |
| **31** | Leather and leather products | 0.0119 | 0.0124** | 0.0069 | -0.0337*** | 0.0032 | -0.0119*** |
| **32** | Stone, clay, glass, and concrete products | 0.0361 | 0.0488*** | -0.0026 | -0.0378*** | 0.0089 | -0.1565*** |
| **33** | Primary metal industries | 0.0194 | 0.0145*** | 0.0082 | -0.0257*** | 0.0253 | -0.1204*** |
| **34** | Fabricated metal products | 0.0236 | 0.0134*** | 0.0005 | -0.0246*** | 0.0166 | -0.0997*** |
| **35** | Industrial machinery and equipment | 0.1062 | 0.0663** | -0.0175 | -0.0324 | 0.0265 | -0.1426 |
| **36** | Electrical and electronic equipment | 0.0360 | 0.1038*** | -0.0050 | -0.0417*** | 0.0223 | -0.1024 |
| **37** | Transportation equipment | 0.0260 | 0.0120*** | 0.0062 | -0.0238*** | 0.0191 | -0.1343*** |
| **38** | Instruments and related products | 0.0530 | 0.0230*** | -0.0187 | -0.0315 | 0.0259 | -0.0952*** |
| **39** | Miscellaneous manufacturing industries | 0.0623 | 0.0127*** | 0.0022 | -0.1428*** | 0.0223 | -0.1146*** |
| | ***Mean Difference Test*** | **0.0555** | **0.0355*** ** | **-0.0018** | **-0.0351*** ** | **0.0181** | **-0.1083*** ** |

## Table 3
## Banking Crises and Intangible Intensity

This table shows the results of the effect of banking crises on intangibility intensity. Intangible intensity is the ratio of intangible assets to net fixed assets. We control for the initial value of intangible intensity and the value of total assets lagged one year. Crisis is a dummy variable that takes a value of one for years in the crisis period and zero otherwise. External dependence is the averaged value over the pre-crisis period of the fraction of capital expenditures that are not financed with operative cash flow. We use three different measures of the quality of institutions: the index of quality of property rights, the index of economic freedom, and an index indicating the level of control of corruption in each country. Financial development is measured as the ratio of private credit by deposit money banks to GDP in 1989. We show IV estimations for institutional variables when the Durbin-Wu-Hausman Test is rejected at 10% level or less. Instruments for institutional variables are dummy variables defining the legal origin in each country. Standard errors are clustered by crisis and country. Estimations in Panel A include a set of country-industry, industry-year, and country-year dummy variables, but results are not reported. Estimations in Panel B do not include these fixed effects or controls for reverse causality. We apply a random-effects model to control for unobserved firm specific effects in the firm-level regressions. Industry-level regressions are estimated by OLS. T-statistics are between parentheses. ***, **, and * indicate significance levels of 1%, 5% and 10%, respectively.

**PANEL A: Including fixed effects and controls for reverse causality**

| **Explanatory Variables** | ***Firm-Level Data*** | | | | ***Industry-Level Data*** | | | |
|---|---|---|---|---|---|---|---|---|
| | *(1)* | *(2)* | *(3)* | *(4)* | *(5)* | *(6)* | *(7)* | *(8)* |
| *Initial Intangible Intensity* | 0.3774*** | 0.3774*** | 0.3774*** | 0.3774*** | 0.2670*** | 0.2671*** | 0.2671*** | 0.2670*** |
| | (24.23) | (24.23) | (24.23) | (24.22) | (9.92) | (9.93) | (9.92) | (9.92) |
| *Lagged Assets* | 0.0126*** | 0.0126*** | 0.0126*** | 0.0126*** | 1.5410*** | 1.5419*** | 1.5415*** | 1.5420*** |
| | (6.04) | (6.04) | (6.04) | (6.04) | (6.10) | (6.12) | (6.11) | (6.13) |
| *Crisis * External Dependence*Property Rights* | -0.0002** | | | | -0.0003*** | | | |
| | (-2.50) | | | | (-3.32) | | | |
| *Crisis * External Dependence*Economic Freedom* | | -0.0001** | | | | -0.0002*** | | |
| | | (-2.50) | | | | (-3.27) | | |
| *Crisis * External Dependence*Control of Corruption* | | | -0.0001** | | | | -0.0002*** | |
| | | | (-2.50) | | | | (-3.29) | |
| *Crisis * External Dependence*Financial Development* | | | | -0.0001** | | | | -0.0003*** |
| | | | | (-2.50) | | | | (-3.28) |
| *Country-Industry Dummies* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Industry-Year Dummies* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Country-Year Dummies* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| R-Squared | 0.2274 | 0.2274 | 0.2274 | 0.2274 | 0.2147 | 0.2147 | 0.2147 | 0.2147 |
| Wald Test | 13,510.64*** | 13,508.70*** | 13,509.52*** | 21,440.74*** | - | - | - | - |
| F-Test | - | - | - | - | 92.91*** | 116.26*** | 106.81*** | 101.90*** |
| # Observations | 11,864 | 11,864 | 11,864 | 11,864 | 1,550 | 1,550 | 1,550 | 1,550 |
| Durbin-Wu-Hausman Test | 15.43*** | 15.43*** | 15.44*** | - | 34.35*** | 34.80*** | 35.24*** | - |

**PANEL B: Without fixed effects and controls for reverse causality**

| **Explanatory Variables** | ***Firm-Level Data*** | | | | ***Industry-Level Data*** | | | |
|---|---|---|---|---|---|---|---|---|
| | *(1)* | *(2)* | *(3)* | *(4)* | *(5)* | *(6)* | *(7)* | *(8)* |
| *Initial Intangible Intensity* | 0.3807*** | 0.3810*** | 0.3809*** | 0.3808*** | 0.4541 | 0.4543 | 0.4542 | 0.4546 |
| | (19.08) | (18.77) | (18.91) | (18.21) | (1.11) | (1.11) | (1.11) | (1.11) |
| *Lagged Assets* | 0.0126*** | 0.0126*** | 0.0126*** | 0.0127*** | 0.0048*** | 0.0048*** | 0.0048*** | 0.0048*** |
| | (5.29) | (5.28) | (5.26) | (5.82) | (2.71) | (2.75) | (2.81) | (2.84) |
| *Crisis * Property Rights* | -0.0010*** | | | | 0.0001 | | | |
| | (-4.44) | | | | (0.07) | | | |
| *Crisis * Economic Freedom* | | -0.0007*** | | | | 0.0003 | | |
| | | (-4.78) | | | | (0.17) | | |
| *Crisis * Control of Corruption* | | | -0.0007*** | | | | 0.0002 | |
| | | | (-4.58) | | | | (0.13) | |
| *Crisis * Financial Development* | | | | -0.0123*** | | | | 0.0092 |
| | | | | (-3.72) | | | | (0.36) |
| *Country-Industry Dummies* | No | No | No | No | No | No | No | No |
| *Industry-Year Dummies* | No | No | No | No | No | No | No | No |
| *Country-Year Dummies* | No | No | No | No | No | No | No | No |
| R-Squared | 0.0559 | 0.0559 | 0.0559 | 0.0562 | 0.0169 | 0.0170 | 0.0170 | 0.0172 |
| Wald Test | 435.34*** | 431.46*** | 433.34*** | 396.20*** | - | - | - | - |
| F-Test | - | - | - | - | 71.14*** | 64.29*** | 4.28** | 42.23*** |
| # Observations | 11,864 | 11,864 | 11,864 | 11,864 | 1,550 | 1,550 | 1,550 | 1,550 |
| Durbin-Wu-Hausman Test | 13.66*** | 18.71*** | 27.59*** | - | 28.16*** | 42.57*** | 45.09*** | - |

## Table 4
## Banking Crises and Economic Growth: Using Pre-crisis Values of Intangible Intensity

This table shows the results of the effect of banking crises on economic growth. We use two measures of firm and industry economic growth: the real growth of sales and the real growth of EBIT. We control, respectively, for the one lag annual value of total sales and EBIT. Crisis is a dummy variable that takes a value of one for years in the crisis period and zero otherwise. External dependence is the averaged value over the pre-crisis period of the fraction of capital expenditures that are not financed with operative cash flow. Financial development is measured as the ratio of private credit by deposit money banks to GDP in 1989. Intangible intensity is the ratio of intangible assets to net fixed assets. We endogeneize the intangible intensity using the average value over the pre-crisis period instead of the observed values. Property rights is the index proxying the protection of the property rights. We show IV estimations for property rights when the Durbin-Wu-Hausman Test is rejected at 10% level or less. Instruments for property rights are the dummy variables defining the legal origin in each country. Standard errors are clustered by crisis and country. Estimations in Panel A include a set of country-industry, industry-year, and country-year dummy variables, but results are not reported. Estimations in Panel B do not include these fixed effects or controls for reverse causality. We apply a random-effects model to control for unobserved firm specific effects in the firm-level regressions. Industry-level regressions are estimated by OLS in the 2SLS procedure. T-statistics are between parentheses. ***, **, and * indicate significance levels of 1%, 5% and 10%, respectively.

**PANEL A: Including fixed effects and controls for reverse causality**

| Explanatory Variables | Growth of Sales | | Growth of EBIT | |
|---|---|---|---|---|
| | ***Firm-Level*** | ***Industry-Level*** | ***Firm-Level*** | ***Industry-Level*** |
| | *(1)* | *(2)* | *(3)* | *(4)* |
| *Lagged Sales/EBIT* | -0.0009 | -0.0022** | 0.1594*** | 0.0449*** |
| | (-0.62) | (-2.00) | (18.45) | (8.47) |
| *Crisis*External Dependence*Financial Development* | -0.0003** | -0.0003*** | -0.0002*** | -0.0003 |
| | (-2.08) | (-3.36) | (-2.75) | (-1.36) |
| *Crisis*Intangible Intensity$^{PRE\text{-}CRISIS}$*Property Rights* | -0.0840*** | -0.2801*** | -0.2892*** | -0.3457* |
| | (-4.19) | (-3.88) | (-4.05) | (-1.92) |
| *Country-Industry Dummies* | Yes | Yes | Yes | Yes |
| *Industry-Year Dummies* | Yes | Yes | Yes | Yes |
| *Country-Year Dummies* | Yes | Yes | Yes | Yes |
| R-Squared | 0.0029 | 0.0176 | 0.3062 | 0.1450 |
| Wald Test | 240.30*** | - | 3,655.98*** | 1,980.70*** |
| F-Test | - | 145.99*** | - | - |
| # Observations | 12,396 | 1,536 | 11,123 | 1,514 |
| Durbin-Wu-Hausman Test | 0.36 | 0.24 | 0.06 | 2.04 |

**PANEL B: Without fixed effects and controls for reverse causality**

| Explanatory Variables | Growth of Sales | | Growth of EBIT | |
|---|---|---|---|---|
| | ***Firm-Level*** | ***Industry-Level*** | ***Firm-Level*** | ***Industry-Level*** |
| | *(1)* | *(2)* | *(3)* | *(4)* |
| *Lagged Sales/EBIT* | -0.0008 | -0.0020 | 0.1600*** | 0.0448*** |
| | (-0.51) | (-1.66) | (19.47) | (10.49) |
| *Crisis*External Dependence*Financial Development* | -0.0437*** | -0.0357 | -0.1087*** | -0.0832 |
| | (-4.29) | (-1.33) | (-4.40) | (-1.62) |
| *Crisis*Intangible Intensity$^{PRE\text{-}CRISIS}$*Property Rights* | -0.2223*** | -0.3269* | -0.5610*** | -0.3705 |
| | (-6.12) | (-1.93) | (-5.94) | (-1.53) |
| *Country-Industry Dummies* | No | No | No | No |
| *Industry-Year Dummies* | No | No | No | No |
| *Country-Year Dummies* | No | No | No | No |
| R-Squared | 0.0020 | 0.0174 | 0.3055 | 0.1441 |
| Wald Test | 50.26*** | - | 737.72*** | - |
| F-Test | - | 4.28** | - | 143.88*** |
| # Observations | 12,396 | 1,536 | 11,123 | 1,514 |
| Durbin-Wu-Hausman Test | - | - | - | - |

**Table 5**

**Banking Crises and Economic Growth: Applying a 2SLS Procedure**

This table shows the results of the effect of banking crises on economic growth. We use two measures of firm and industry economic growth: the real growth of sales and the real growth of EBIT. We control, respectively, for the one lag annual value of total sales and EBIT. Crisis is a dummy variable that takes a value of one for years in the crisis period and zero otherwise. External dependence is the averaged value over the pre-crisis period of the fraction of capital expenditures that are not financed with operative cash flow. Financial development is measured as the ratio of private credit by deposit money banks to GDP in 1989. Intangible intensity is the ratio of intangible assets to net fixed assets. We endogeneize the intangible intensity and apply 2SLS serving the initial value of intangible intensity as instrument. Property rights is the index proxying the protection of the property rights. We show IV estimations for property rights when the Durbin-Wu-Hausman Test is rejected at 10% level or less. Instruments for property rights are the dummy variables defining the legal origin in each country. Standard errors are clustered by crisis and country. Estimations in Panel A include a set of country-industry, industry-year, and country-year dummy variables, but results are not reported. Estimations in Panel B do not include these fixed effects or controls for reverse causality. Both stages in the 2SLS procedure are estimated by a random-effects model to control for unobserved firm specific effects in the firm-level regressions. Both stages of industry-level regressions are estimated by OLS in the 2SLS procedure. T-statistics are between parentheses. ***, **, and * indicate significance levels of 1%, 5% and 10%, respectively.

**PANEL A: Including fixed effects and controls for reverse causality**

| Explanatory Variables | Growth of Sales | | Growth of EBIT | |
|---|---|---|---|---|
| | ***Firm-Level*** | ***Industry-Level*** | ***Firm-Level*** | ***Industry-Level*** |
| | *(1)* | *(2)* | *(3)* | *(4)* |
| *Lagged Sales/EBIT* | -0.0002 | -0.0015 | 0.1559*** | 0.0359*** |
| | (-0.20) | (-1.28) | (17.43) | (8.05) |
| *Crisis*External Dependence*Financial Development* | -0.0001 | -0.0003 | -0.0001 | 0.0005 |
| | (-0.75) | (-0.12) | (-1.64) | (0.82) |
| *Crisis*Intangible Intensity$^{2SLS}$*Property Rights* | -0.1155*** | -0.2553*** | -0.4531** | -0.3115* |
| | (-2.67) | (-2.67) | (-2.40) | (-1.68) |
| *Country-Industry Dummies* | Yes | Yes | Yes | Yes |
| *Industry-Year Dummies* | Yes | Yes | Yes | Yes |
| *Country-Year Dummies* | Yes | Yes | Yes | Yes |
| R-Squared | 0.0011 | 0.0244 | 0.0712 | 0.0788 |
| Wald Test | 189.00*** | - | 1,710.42*** | - |
| F-Test | - | 6.42*** | - | 21.21*** |
| # Observations | 11,830 | 1,547 | 10,664 | 1,494 |
| Durbin-Wu-Hausman Test | 2.59 | 3.00 | 1.66 | 0.01 |

**PANEL B: Without fixed effects and controls for reverse causality**

| Explanatory Variables | Growth of Sales | | Growth of EBIT | |
|---|---|---|---|---|
| | ***Firm-Level*** | ***Industry-Level*** | ***Firm-Level*** | ***Industry-Level*** |
| | *(1)* | *(2)* | *(3)* | *(4)* |
| *Lagged Sales/EBIT* | -0.0005 | -0.0017 | 0.1559*** | 0.0361*** |
| | (-0.30) | (-1.43) | (19.85) | (7.68) |
| *Crisis*External Dependence*Financial Development* | -0.0502*** | -0.0144 | -0.1109*** | -0.0681 |
| | (-4.94) | (-0.45) | (-3.43) | (-1.30) |
| *Crisis*Intangible Intensity$^{2SLS}$*Property Rights* | 0.0442 | -0.9511 | -0.2665 | -0.5481 |
| | (0.25) | (-1.55) | (-0.32) | (-0.51) |
| *Country-Industry Dummies* | No | No | No | No |
| *Industry-Year Dummies* | No | No | No | No |
| *Country-Year Dummies* | No | No | No | No |
| R-Squared | 0.0150 | 0.0245 | 0.3016 | 0.0703 |
| Wald Test | 28.97*** | - | 2,391.80*** | - |
| F-Test | - | 4.17** | - | 25.02*** |
| # Observations | 11,830 | 1,547 | 10,664 | 1,494 |
| Durbin-Wu-Hausman Test | - | - | - | - |

**Table 6**

**Capital Allocation Efficiency during Crisis and Non-Crisis Periods across Countries and Industries**

Mean values of the efficiency of investments on EBIT for each country and industrial sector during crisis and non-crisis periods. The sample consists only of crisis countries. It includes 2,530 industrial firms from 18 countries that have experienced 19 systemic banking crises over the 1989-2007 period. Firm level data are from COMPUSTAT Global database. The pre-crisis period is [$t_1$, t-3], where $t_1$ is the first year of the sample period (1989 or earliest available) and t is the crisis inception year reported on Laeven and Valencia (2008). The crisis period is defined as [t, t+2]. The post-crisis period is [t+3, T], where T is the end of the sample period (generally, 2007). ***, **, and * indicate whether the t-Test of difference in means between non-crisis and crisis periods is statistically significant at, respectively, 1%, 5% and 10% level.

**Panel A: Capital Allocation Efficiency Across Countries**

| Country | Banking Crises | Investment Elasticity to EBIT | |
|---|---|---|---|
| | | *Non-Crisis* | *Crisis* |
| Argentina | 1995,2001 | 0.2027 | -0.1989** |
| Colombia | 1998 | 0.0638 | 0.0249 |
| Czech Rep. | 1996 | 0.2834 | -0.8821** |
| Finland | 1991 | 0.0417 | -2.1488* |
| India | 1993 | -0.0000 | 0.3162*** |
| Indonesia | 1997 | 0.1747 | 0.0215*** |
| Jamaica | 1996 | 0.0173 | 0.2042 |
| Japan | 1997 | 0.1808 | 0.0306 |
| Malaysia | 1997 | 0.1425 | -0.4154 |
| Mexico | 1994 | 0.1309 | 0.1460** |
| Norway | 1991 | 0.3095 | 0.5317 |
| Philippines | 1997 | 0.0968 | 0.0800 |
| S. Korea | 1997 | 0.2588 | -0.1000* |
| Sweden | 1991 | 0.1184 | 0.0101 |
| Thailand | 1997 | 0.0850 | -0.0271*** |
| Turkey | 2000 | 0.4880 | -0.1689*** |
| Venezuela | 1994 | 0.1817 | 4.3646** |
| Zimbabwe | 1995 | 1.1388 | 0.0127 |
| ***Mean Difference Test*** | | **0.1644** | **-0.1041*** ** |

**Panel B: Capital Allocation Efficiency Across Industries**

| SIC Code | Industry | Investment Elasticity to EBIT | |
|---|---|---|---|
| | | *Non-Crisis* | *Crisis* |
| 20 | Food and kindred products | 0.1755 | 0.5944 |
| 21 | Tobacco manufactures | 0.9558 | -0.8809** |
| 22 | Textile and mill products | 0.0582 | -0.0544 |
| 23 | Apparel and other textile products | -0.0027 | 0.0659** |
| 24 | Lumber and wood products | 0.0298 | -0.0061 |
| 25 | Furniture and fixture | 0.0527 | 0.0069 |
| 26 | Paper and allied products | 0.1290 | -0.0381 |
| 27 | Printing and publishing | 0.1218 | 0.1094 |
| 28 | Chemicals and allied products | 0.0263 | 0.1095* |
| 29 | Petroleum and coal products | 0.1910 | -0.4995** |
| 30 | Rubber and miscellaneous plastics | 0.4793 | -2.1370** |
| 31 | Leather and leather products | -0.0019 | 0.0042 |
| 32 | Stone, clay, glass, and concrete products | 0.1064 | 0.1090 |
| 33 | Primary metal industries | 0.2900 | -0.1307*** |
| 34 | Fabricated metal products | 0.1223 | -0.0707** |
| 35 | Industrial machinery and equipment | 0.1631 | -0.0240** |
| 36 | Electrical and electronic equipment | 0.1794 | 0.0383 |
| 37 | Transportation equipment | 0.2041 | 0.0024** |
| 38 | Instruments and related products | 0.0442 | 0.1851*** |
| 39 | Miscellaneous manufacturing industries | -0.1179 | 0.3304* |
| | | **0.1644** | **-0.1041*** ** |

**Table 7**
**Banking Crises and Overall Capital Allocation Efficiency**

This table shows the results of the effect of banking crises on overall capital allocation efficiency. The dependent variable is the investment elasticity on EBIT. We control for the total assets in the pre-crisis period. Crisis is a dummy variable that takes a value of one for the crisis period and zero otherwise. External dependence is the averaged value over the pre-crisis period of the fraction of capital expenditures that are not financed with operative cash flow. We use three different measures of the quality of institutions: the index of quality of property rights, the index of economic freedom, and an index indicating the level of control of corruption in each country. Financial development is measured as the ratio of private credit by deposit money banks to GDP in 1989. We show IV estimations for institutional variables when the Durbin-Wu-Hausman Test is rejected at 10% level or less. Instruments for institutional variables are dummy variables defining the legal origin in each country. Standard errors are clustered by crisis and country. In all estimations we include a set of country-industry, industry-year, and country-year dummy variables, but results are not reported. OLS estimations with industry-level data are applied. T-statistics are between parentheses. ***, **, and * indicate significance levels of 1%, 5% and 10%, respectively.

| **Dependent variable: Investment Elasticity** | | | | |
|---|---|---|---|---|
| **Explanatory Variables** | *(1)* | *(2)* | *(3)* | *(4)* |
| *Investment Elasticity* $_{PRE\text{-}CRISIS}$ | 0.3511** | 0.3511** | 0.3511** | 0.3511** |
| | (2.56) | (2.56) | (2.56) | (2.56) |
| *Assets* $_{PRE\text{-}CRISIS}$ | -0.0051 | -0.0051 | -0.0051 | -0.0051 |
| | (-0.26) | (-0.26) | (-0.26) | (-0.26) |
| *Crisis * External Dependence * Property Rights* | -0.0001*** | | | |
| | (-3.60) | | | |
| *Crisis * External Dependence * Economic Freedom* | | -0.0001*** | | |
| | | (-3.61) | | |
| *Crisis * External Dependence * Control of Corruption* | | | -0.0009*** | |
| | | | (-3.62) | |
| *Crisis * External Dependence * Financial Development* | | | | -0.0001*** |
| | | | | (-3.67) |
| *Country-Industry Dummies* | Yes | Yes | Yes | Yes |
| *Industry-Year Dummies* | Yes | Yes | Yes | Yes |
| *Country-Year Dummies* | Yes | Yes | Yes | Yes |
| R- Squared | 0.2809 | 0.2809 | 0.2809 | 0.2809 |
| F-Test | 14.65*** | 14.65*** | 14.65*** | 2.88** |
| # Observations | 232 | 232 | 232 | 232 |
| Durbin-Wu-Hausman Test | 0.09 | 0.09 | 0.09 | - |

**Table 8**

**Banking Crises and Economic Growth: Intangible intensity and Overall Capital Allocation Efficiency**

This table shows the results of the influence of intangible intensity on economic growth during banking crises after controlling for the overall capital allocation efficiency. The dependent variables are the real growth of sales (Panel A) and EBIT (Panel B). We control, respectively, for the averaged values in the pre-crisis period of total sales and EBIT. Crisis is a dummy variable that takes a value of one for the crisis period and zero otherwise. External dependence is the averaged value over the pre-crisis period of the fraction of capital expenditures that are not financed with operative cash flow. Financial development is measured as the ratio of private credit by deposit money banks to GDP in 1989. Intangible intensity and overall capital allocation efficiency are instrumented using their respective pre-crisis values and applying 2SLS serving its particular initial value as instrument. Property rights is the index proxying the protection of the property rights. We show IV estimations for property rights when the Durbin-Wu-Hausman Test is rejected at 10% level or less. Instruments for property rights are the dummy variables defining the legal origin in each country. Standard errors are clustered by crisis and country. In all estimations we include a set of country-industry, industry-year, and country-year dummy variables, but results are not reported. OLS estimations with industry-level data are applied. T-statistics are between parentheses. ***, **, and * indicate significance levels of 1%, 5% and 10%, respectively.

**PANEL A: Growth of Sales**

| **Explanatory Variables** | ***Pre-Crisis*** | ***Pre-Crisis*** | ***2SLS*** | ***2SLS*** |
|---|---|---|---|---|
| | *(1)* | *(2)* | *(3)* | *(4)* |
| *Sales* $_{PRE\text{-}CRISIS}$ | -0.0009 | -0.0009 | -0.0009 | -0.0009 |
| | (-0.32) | (-0.36) | (-0.43) | (-0.42) |
| *Crisis*External Dependence* Financial Development* | -0.0003*** | -0.0002*** | -0.0003 | -0.0001 |
| | (-3.53) | (-3.84) | (-1.34) | (-1.26) |
| *Crisis*Intangible Intensity*Property Rights* | -0.2471*** | -0.2153*** | -0.3205*** | -0.2603*** |
| | (-4.03) | (-4.47) | (-4.94) | (-6.61) |
| *Crisis*Capital Efficiency*Property Rights* | | -0.0050** | | -0.0128* |
| | | (-2.13) | | (-1.83) |
| *Country-Industry Dummies* | Yes | Yes | Yes | Yes |
| *Industry-Year Dummies* | Yes | Yes | Yes | Yes |
| *Country-Year Dummies* | Yes | Yes | Yes | Yes |
| R-Squared | 0.0556 | 0.1229 | 0.1388 | 0.1733 |
| F-Test | 10.25*** | 20.36*** | 32.79*** | 7.50*** |
| # Observations | 259 | 232 | 245 | 217 |
| Durbin-Wu-Hausman Test | 0.01 | 1.04 | 0.79 | 1.16 |

**PANEL B: Growth of EBIT**

| **Explanatory Variables** | ***Pre-Crisis*** | ***Pre-Crisis*** | ***2SLS*** | ***2SLS*** |
|---|---|---|---|---|
| | *(1)* | *(2)* | *(3)* | *(4)* |
| *EBIT* $_{PRE\text{-}CRISIS}$ | 0.0761*** | 0.0752*** | 0.0739*** | 0.0729*** |
| | (4.46) | (4.74) | (4.36) | (4.45) |
| *Crisis*External Dependence *Financial Development* | -0.0006 | -0.0005 | -0.0002*** | -0.0002*** |
| | (-1.23) | (-1.50) | (-4.07) | (-3.23) |
| *Crisis*Intangible Intensity*Property Rights* | -0.4088 | -0.3317 | -0.7187*** | -0.5572** |
| | (-1.12) | (-1.36) | (-3.08) | (-2.27) |
| *Crisis*Capital Efficiency*Property Rights* | | -0.0135 | | -0.0320 |
| | | (-0.93) | | (-0.87) |
| *Country-Industry Dummies* | Yes | Yes | Yes | Yes |
| *Industry-Year Dummies* | Yes | Yes | Yes | Yes |
| *Country-Year Dummies* | Yes | Yes | Yes | Yes |
| R-Squared | 0.1116 | 0.1816 | 0.1291 | 0.1760 |
| F-Test | 10.23*** | 8.94*** | 8.90*** | 7.56*** |
| # Observations | 255 | 230 | 241 | 216 |
| Durbin-Wu-Hausman Test | 0.10 | 0.38 | 0.08 | 0.51 |

**Table 9**

**Effects of Banking Crises on Intangible Intensity Controlling for the Endogeneity of Banking Crises**

This table shows the results of the effect of banking crises on intangibility intensity after controlling for the potential endogeneity of banking crises. Intangible intensity is the ratio of intangible assets to net fixed assets. We control for the initial value of intangible intensity and the value of total assets lagged one year. $Crisis^{PROB}$ is the fitted value of a probit defining the probability of a banking crises. External dependence is the averaged value over the pre-crisis period of the fraction of capital expenditures that are not financed with operative cash flow. We use three different measures of the quality of institutions: the index of quality of property rights, the index of economic freedom, and an index indicating the level of control of corruption in each country. Financial development is measured as the ratio of private credit by deposit money banks to GDP in 1989. We show IV estimations for institutional variables when the Durbin-Wu-Hausman Test is rejected at 10% level or less Instruments for institutional variables are dummy variables defining the legal origin in each country. Standard errors are clustered by crisis and country. In all estimations we include a set of country-industry, industry-year, and country-year dummy variables, but results are not reported. We apply a random-effects model to control for unobserved firm specific effects in the firm-level regressions. Industry-level regressions are estimated by OLS. T-statistics are between parentheses. ***, **, and * indicate significance levels of 1%, 5% and 10%, respectively.

| **Explanatory Variables** | ***Firm-Level Data*** | | | | ***Industry-Level Data*** | | | |
|---|---|---|---|---|---|---|---|---|
| | *(1)* | *(2)* | *(3)* | *(4)* | *(5)* | *(6)* | *(7)* | *(8)* |
| *Lagged Assets* | 0.0070*** | 0.0070*** | 0.0070*** | 1.97901*** | 0.0083*** | 0.0083*** | 0.0083*** | 0.0029** |
| | (7.45) | (7.46) | (7.46) | (3.41) | (7.55) | (7.57) | (7.59) | (2.08) |
| *Initial Intangible Intensity* | 0.4342*** | 0.4341*** | 0.4340*** | 0.6474*** | 0.6768 | 0.6767 | 0.6766 | 0.7261 |
| | (8.69) | (8.68) | (8.68) | (4.82) | (1.15) | (1.15) | (1.15) | (1.19) |
| *$Crisis^{PROB}$ * External Dependence* Property Rights* | -0.0003*** | | | | -0.0006** | | | |
| | (-2.98) | | | | (-2.53) | | | |
| *$Crisis^{PROB}$ * External Dependence* Economic Freedom* | | -0.0001*** | | | | -0.0003** | | |
| | | (-2.99) | | | | (-2.54) | | |
| *$Crisis^{PROB}$ * External Dependence* Corruption* | | | -0.0001*** | | | | -0.0003** | |
| | | | (-3.01) | | | | (-2.54) | |
| *$Crisis^{PROB}$ * External Dependence * Financial Development* | | | | -0.0005* | | | | -0.0001** |
| | | | | (-1.65) | | | | (-2.38) |
| *Country-Industry Dummies* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Industry-Year Dummies* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Country-Year Dummies* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| R-Squared | 0.2536 | 0.2537 | 0.2537 | 0.0907 | 0.0368 | 0.0368 | 0.0368 | 0.0339 |
| Wald Test | 3,773.97*** | 190.07*** | 3,727.74*** | 1,228.04*** | - | - | - | - |
| F-Test | - | - | - | - | 1,824.49*** | 417.51*** | 2,321.31*** | 225.99*** |
| # Observations | 7,465 | 7,465 | 7,465 | 7,465 | 947 | 947 | 947 | 947 |
| Durbin-Wu-Hausman Test | 8.34*** | 8.43*** | 8.52*** | - | 6.21** | 6.23** | 6.25** | - |

**Table 10**

**Banking Crises and Economic Growth: Applying a 2SLS Procedure and Controlling for the Endogeneity of Banking Crises**

This table shows the results of the effect of banking crises on economic growth after controlling for the potential endogeneity of banking crisis. We use two measures of firm and industry economic growth: the real growth of sales and the real growth of EBIT. We control, respectively, for the one lag annual value of total sales and EBIT. $Crisis^{PROB}$ is the fitted value of a probit defining the probability of a banking crises. External dependence is the averaged value over the pre-crisis period of the fraction of capital expenditures that are not financed with operative cash flow. Financial development is measured as the ratio of private credit by deposit money banks to GDP in 1989. Intangible intensity is the ratio of intangible assets to net fixed assets. We endogeneize the intangible intensity and apply 2SLS serving the initial value of intangible intensity as instrument. Property rights is the index proxying the protection of the property rights. We show IV estimations for property rights when the Durbin-Wu-Hausman Test is rejected at 10% level or less. Instruments for property rights are the dummy variables defining the legal origin in each country. Standard errors are clustered by crisis and country. In all estimations we include a set of country-industry, industry-year, and country-year dummy variables, but results are not reported. Both stages in the 2SLS procedure are estimated by a random-effects model to control for unobserved firm specific effects in the firm-level regressions. Both stages of industry-level regressions are estimated by OLS in the 2SLS procedure. T-statistics are between parentheses. ***, **, and * indicate significance levels of 1%, 5% and 10%, respectively.

| **Explanatory Variables** | **Growth of Sales** | | **Growth of EBIT** | |
|---|---|---|---|---|
| | ***Firm-Level*** | ***Industry-Level*** | ***Firm-Level*** | ***Industry-Level*** |
| | *(1)* | *(2)* | *(3)* | *(4)* |
| *Lagged Sales* | 0.0018 | -0.0014 | | |
| | (1.35) | (-1.29) | | |
| *Lagged EBIT* | | | 0.1572*** | 0.0374*** |
| | | | (14.81) | (7.43) |
| $Crisis^{PROB}$* External Dependence*Financial Development* | -0.0001** | -0.0007 | -0.0003*** | 0.0001 |
| | (-2.26) | (-0.11) | (-2.60) | (0.97) |
| $Crisis^{PROB}$* Intangibility Intensity $^{2SLS}$*Property Rights* | -0.4253*** | -0.6494** | -1.0358*** | -0.9468** |
| | (-3.24) | (-2.56) | (-2.88) | (-2.04) |
| *Country-Industry Dummies* | Yes | Yes | Yes | Yes |
| *Industry-Year Dummies* | Yes | Yes | Yes | Yes |
| *Country-Year Dummies* | Yes | Yes | Yes | Yes |
| R-Squared | 0.0240 | 0.0513 | 0.0709 | 0.0907 |
| Wald Test | 611.77*** | - | 2,916.40*** | - |
| F-Test | - | 264.90*** | - | 76.57*** |
| # Observations | 10,124 | 1,314 | 9,220 | 1,265 |
| Durbin-Wu-Hausman Test | 1.16 | 5.87** | 0.62 | 0.20 |