Banking Stability, Competition, and Economic Volatility

Ana I. Fernández*

Francisco González*

University of Oviedo

Nuria Suárez *†

Public University of Navarre

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Abstract

The paper analyzes the influence of banking stability on volatility of industrial value added and its variation across 110 countries depending on bank market competition and bank-firm relationships. We find that banking stability reduces more the volatility of value added in those industries with more external dependence and intangible intensity when they are located in countries with more developed financial systems and better investor protection. These results are consistent with the relevance of a *lending channel* and an *asset allocation channel* as the channels through which banking stability diminishes industrial economic volatility. Moreover, we find that banking stability contributes more to reduce economic volatility, through both channels, in countries with less bank market competition or close bank-firm relationships. We use several proxies for banking stability and control for country's banking development, reverse causality problems, and endogeneity of banking stability.

Keywords: Bank Risk; Financial Development; Economic Volatility; Regulations

JEL Codes: G21; G32; O40

†Corresponding author: Nuria Suárez, Public University of Navarre, Faculty of Business and Economics. Department of Business Administration, Arrosadía Campus. 31006, Pamplona – Navarre (Spain) Phone: +34.948.166.085. E-mail: nuria.suarez@unavarra.es

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1. Introduction

Previous research has revealed that the development of the banking system is an essential determinant of a country's economic development. A more developed banking system promotes a country's economic growth during normal periods (Rajan and Zingales, 1998; Levine, 2007) and reduces economic volatility (Denizer et al. 2002; Easterly et al., 2000; Larrain, 2006; Raddatz, 2006). The positive effect on economic volatility would operate through the reduction of the dependence of firm's investment from its internal funds and allows a lower impact of real shocks on economic volatility. Beck et al. (2006) question the positive effect of financial development on economic volatility depending on the type of shock. They show, using country data, that financial development dampen the effect of real shocks but magnify the effect of monetary shocks. The net effect would thus depend on the predominant type of shock.

Additionally, previous research has revealed that a banking crisis diminishes economic growth, especially in countries with more developed banking systems (Kroszner et al., 2007; Dell'Ariccia et al., 2008). However, none of these previous papers have analyzed how banking stability impacts on economic volatility. What are the channels through which banking stability affects economic volatility? Does the influence of banking stability on economic volatility vary across countries depending on national characteristics? These are the research questions of the paper. We extend previous evidence and directly analyze the influence of banking stability on economic volatility after controlling for the influence of financial development. We also analyze the channels through which banking stability impacts on economic volatility, and how this influence might vary across countries depending on country's bank market competition and bank-firm relationships. In this analysis, it is particularly important to control for the endogeneity of banking stability and for reverse causality problems because a lower economic volatility also promotes banking stability. We propose alternative methods to focus on the exogenous component of banking stability and check that the results are robust.

We examine two channels through which banking stability may affect economic volatility: The *lending channel* and the *asset allocation channel*. The lending channel refers to the volatility of the credit supply. Lower banking stability increases the volatility of funds available to firms from banks. In imperfect capital markets, firms can not totally substitute banks' funds if banks reduce credit supply and debtors are then obliged to reduce investment.

In this scenario, a higher volatility of credit supply would increase economic volatility. This lending effect on economic volatility would be more relevant in more financially dependent industries and in more banking developed financial systems. The asset allocation channel is related to how higher bank risk-taking incentives affect firms' risk-taking. Banks would be less reluctant to a riskier behavior of their debtors, the less risk-averse they are. A higher firms' risk-taking behavior promoted by a less risk-averse behavior of banks would increase economic volatility. As changes in firms' risk are more likely in industries more intense in intangible assets, we expect that the asset allocation effect would be higher in these industries. Moreover, we expect that the asset allocation effect is more important in countries with better institutional quality. John et al. (2008) show that a better investor protection in a country increases firms' incentives to undertake risk and it facilitates that higher bank risk-taking incentives translate to higher firm's risk taking in these countries.

Our paper also analyzes how the influence of banking stability on economic volatility varies across countries depending on bank market competition and bank-firm relationships. Specifically, we analyze how bank market competition, bank concentration, legal entry requirements into banking, and restrictions on bank ownership and control of non-financial firms shape the influence of banking stability on economic volatility through both the lending and asset allocation channels. In this analysis, we have to separate the impact of these national characteristics on the influence of banking stability on economic volatility from their direct influence on banking stability.

In our empirical analysis, we extend the traditional setup of Rajan and Zingales (1998) and Claessens and Laeven (2003), initially developed to analyze the impact of financial development on economic growth. We find that banking stability reduces more the volatility of industry value added in those industries with more external dependence and intangible intensity when they are located in countries with more developed financial systems and better investor protection. The results indicate that banking stability reduces economic volatility through both the lending channel and the asset allocation channel. We also find that banking stability contributes more to reduce economic volatility, through both channels, in countries with less bank market competition or close bank-firm relationships. We use several proxies for banking stability and control for country's financial development, reverse causality problems, and endogeneity of banking stability.

The rest of the paper is organized as follows. Section 2 provides a brief review of the related literature and discusses the hypotheses. Section 3 describes the data, methodology, and variables. Section 4 presents the empirical results and robustness checks and, finally, Section 5 concludes.

2. Theoretical Background and Hypotheses

Banking literature highlights the importance of bank risk-taking incentives in the presence of a deposit insurance scheme and the negative effects of banking crises on economic growth (Dell'Ariccia et al., 2007; Kroszner et al., 2007). The control of bank risk-taking incentives has then become the main task of regulatory and supervisory authorities to avoid the negative real effects of banking crises. Specially, when the increased bank competition erodes the bank charter value and exacerbates the bank risk-taking incentives induced by deposit insurance and others safety nets (Keeley, 1990). Our paper focuses on how banking stability impacts on economic volatility and is related to several strands of literature.

First, our paper is related to the literature analyzing the effect of banking crises on economic growth as banking crises are the clearer ex-post measure of a low banking stability. Kroszner et al. (2007) and Dell'Ariccia et al. (2008) confirm that systemic banking crises reduce economic growth through the reduction of bank credit supply and that this negative real effect is stronger in more financially dependent industries located in countries with more developed banking systems. Fernández et al. (2013) show that banking crises diminishes economic growth not only reducing the credit supply but also negatively affecting firms' intangible investments, especially in countries with highly developed institutions. These papers analyze the consequences of banking instability on economic growth but none of them focuses on the impact on economic volatility.

Second, it is related to the literature analyzing the relationship between financial development and economic volatility. The most recent evidence indicates that greater banking development reduces economic volatility (Easterly et al., 2000; Denizer et al., 2002; Larrain, 2006; Raddatz, 2006). Banking development reduces volatility because it helps firms facing net worth problems to obtain the necessary working capital to finance their operations. Firm's investment would be less dependent on internal funds and bank funding contributes to reduce the impact of real shocks on economic volatility. In this case, banking development should lead to relatively larger reduction of volatility in more financially dependent industries.

Moreover, if financial constraints are tighter during contractions and, then, borrowing is countercyclical, banking development would even originate a higher reduction of economic volatility. Beck et al. (2006) confirm at country level that banking development dampens the impact of real shocks on economic volatility because it alleviates cash-flow constraints of firms that depend on external financing. However, they argue that financial intermediaries magnify the effect of monetary shocks on economic volatility. They identify monetary shocks with shocks to banks' balance sheets. The net effect of banking development on economic volatility is not unambiguous and it will depend on the relative importance of real versus monetary shocks. Our paper is closely related to Beck et al. (2006) but we directly analyze the impact of banking stability and use industry data. We separate the effect of banking stability through the lending and asset allocation channels, control for reverse causality focusing on more financial dependent industries, and analyze the influence of country characteristics.

Third, our paper is related to an extensive literature analyzing the influence of bank competition on economic growth and financial stability. Empirical evidence suggests that less bank competition in imperfect capital markets foster economic growth through increasing banks' incentives to invest in the acquisition of soft information by establishing close relationships with borrowers over time, facilitating the availability of credit and thereby reducing firms' financial constraints (Petersen and Rajan, 1994, 1995; Cetorelli and Gambera, 2001). The influence of bank competition on financial stability has promoted an intense debate in banking literature. The traditional "competition-fragility" view (Keeley, 1990) has been challenged by the "competition-stability" view (Boyd and De Nicolò, 2005). Recently, Beck et al. (2013) show that the relationship between bank competition and financial stability varies across countries depending on bank regulation and financial development. We provide new evidence in the context of this literature by analyzing how bank market competition and bank-firm relationships shape the influence of banking stability on economic volatility.

In this paper we merge these strands of literature and we directly analyze how banking stability impacts on economic volatility. We distinguish two potential channels or effects of banking stability on economic volatility. First, a finance or lending channel associated with the volatility of bank credit supply. A higher bank volatility or a more likely shocks to the banks' balance sheets would increase the volatility of funds available to firms from banks. In

imperfect capital markets, firms could not totally substitute banks' funds when they are reduced and they would then be obliged to reduce investment, increasing growth volatility. This channel is similar to the effect of monetary shocks analyzed by Beck et al. (2006). We expect that this would be more relevant for industries more dependent on external finance and located in countries with more bank developed financial systems. Our first hypothesis is:

> **H1.** *Banking stability decreases more economic volatility in more financial dependent industries in countries with more developed banking systems (The lending channel).*

A second channel emerges from the influence of banks' risk taking incentives on firms' investment. Banks would be less (more) reluctant to a riskier behavior of their debtors if they are less (more) risk averse. We refer to this effect as the asset allocation channel. We expect that this effect would be more relevant for industries with more intangible assets in countries with better investor protection or institutional quality. Intangible assets are riskier and have less value in case of firm's liquidation. Then, higher bank risk-taking incentives may have a greater impact on changes in firm's risk-taking in those industries with a higher proportion of intangible assets. Institutional quality also affects to the propagation of bank risk-taking incentives to firm's risk-taking. John et al. (2008) show that country's investor protection is positively related to firm's risk-taking. Several reasons explain this positive relation. In countries with well-developed institutions and good investor protection, insiders have lower private benefits in the firms that they control. Lower private benefits increases their incentives to undertake risk because there are not private benefits threaten (to loose) if risky investments fail. Good-quality institutions also favor disperse ownership (La Porta et al., 2000) and disperse ownership leads higher risk-taking through improved shareholders' diversification. Then, our second hypothesis is:

> **H2**. *Banking stability decreases more economic volatility in more intangible intensive industries in countries with a better investor protection (The asset allocation channel*).

Finally, we analyze if the influence of banking stability on economic volatility, through the lending and asset allocation channels, varies across countries depending on bank competition and bank-firm relationships. We use direct proxies for bank competition as the Lerner index and the Boone indicator and indirect proxies as the bank market concentration and country's regulation on entry requirements into banking. We use the legal restrictions on bank

ownership and control of non-financial firms to proxy for ownership relationships between banks and their debtors.

Previous literature suggests that there exists a beneficial effect of non-competitive banking market in promoting lending relationships and providing funds for firms. Cetorelli and Gambera (2001) and Claessens and Laeven (2005) show that the lower the competition in the banking market, the higher the credit provided to those firms that are more dependent on external finance. Close lending relationships between banks and firms create switching costs for borrowers when changing lenders (Petersen and Rajan, 1994, 1995; Cetorelli and Gambera, 2001). If the relationship bank goes bankrupt, some of its borrowers might be obliged to borrow from non-relationship banks. These borrowers would face an adverse selection problem as non-informed banks will prefer to allocate their funds to the better known, but less profitable, projects of relationship firms (Detragiache et al., 2000). The consequence is that lending relationships increase the impact of a given volatility of bank credit supply on economic volatility. Fernández et al. (2013a) shows that external financially dependent sectors where market power promotes higher (lower) growth during normal periods also suffer on average a higher (lower) reduction in growth during a systemic banking crisis. Their finding is consistent with bank market power enhancing lending relationships in normal times and the existence of switching costs for firms when changing lenders during a systemic banking crisis. In such cases, less competitive banking markets or closer bank-firm relationships would increase the impact of banking stability on economic volatility through the lending channel.

Moreover, close relationships between banks and borrowers reduce adverse selection and moral hazard problems associated with firms' investments and explain why some intangible assets may be financed with debt (Claessens and Laeven, 2003). We would thus expect that close relationships between banks and borrowers would increase the asset allocation effect of banking stability on economic volatility. The reason is that a higher proportion of firm's intangible assets, promoted by close relationships, favors that changes in bank's risk taking incentives induces more changes in firm's risk taking. Our third hypothesis is:

> **H3**. *Less banking competition or more bank-firm relationships increase the lending and asset allocation effects of banking stability on economic volatility.*

3. Data, methodology, and variables

3.1. Data

We use industry-specific and country-specific data from a variety of sources. We use a total sample of 110 developed and developing countries over the 1989-2008 period and aggregate data over different time periods. We report results for a 5-years period (aggregated over the periods 1989-1993, 1994-1998; 1999-2003, and 2004-2008).[1] We collect industry-level data on annual real value added from the UNIDO Industrial Statistic Database (2013). This database contains information on 23 industrial sectors at 2-digit ISIC disaggregation level for the 1963-2010 period. As we use real values, we use the Consumer Price Index (CPI) from International Financial Statistics of the International Monetary Fund (IMF) to deflate the industrial value added. Therefore, all data are expressed in US dollars and in real prices.

Country-level data of banking stability, financial development and bank market competition and concentration come from the Global Financial Development Database (GFDD) collected by the World Bank. Proxies for regulatory variables come from the World Bank's Bank Regulation and Supervision Database. Proxies for country's investor protection and institutional quality come from the World Bank Institute's Governance Group and the Heritage Foundation.

Our final sample is made up of an unbalanced panel for a maximum of 4,993 industry-year observations in 110 developed and developing countries during 1989-2008 period. We exclude USA from the analysis because is our benchmark in order to define an exogenous proxy for industry's external dependence and intangible intensity.

3.2. Methodology

We run estimations using industry-level data of the volatility of value added as dependent variable. We extend the basic setup of Rajan and Zingales (1998) and Claessens and Laeven

[1]Beck et al. (2006) apply the same procedure to analyze how the impact of financial development on growth volatility varies depending on real and monetary shocks. In further robustness tests we check that the results do not change when we use a 3-years period or a 4-years period for aggregating data.

(2003) for our empirical tests.[2] We regress economic volatility on banking stability and controlling for banking development and other relevant factors. Our methodology must control for reverse causality problems between banking stability and economic volatility, and the potential endogeneity of banking stability and development. Our basic model is:

$$VOLATILITY\_VA_{i,j,t} = \alpha_0 + \alpha_1 ISHARE_{i,j} + \\ + \alpha_2 ED_i * FD_{jt} \\ + \alpha_3 BANKSTAB_{j,t} * ED_i \\ + \theta_{ij} + \lambda_{it} + \varphi_{jt} + \varepsilon_{ijt} \qquad [1]$$

$VOLATILITY\_VA_{i,j,t}$ is the relative standard deviation of real value added of industry *i* in country *j* for the *t* period. $ISHARE_{i,j}$ is the share of industry *i* in the total value added of country *j* at the first 5-year period (1989-1993, or first available sub-period). It aims to capture the possibility that a more developed or mature sector is systematically less volatile (Raddatz, 2006). ED_i is the external dependence ratio of sector *i*. $FD_{j,t}$ is the development of the banking system of country *j* in period *t*. $BANKSTAB_{,t}$ is the proxy for banking stability in country *j* during the period *t*.

The interaction $ED_i * FD_{jt}$ controls for the influence of banking development on economic volatility. Previous evidence shows that banking development reduces the impact of real shocks on economic volatility (Larrain, 2006; Raddatz, 2006; Beck et al., 2006). We interact banking development with the external dependence ratio of the industry to control for potential reverse causality between economic volatility and banking development. If industries that depend more on external finance benefit the most from banking development, we would expect to reduce more the sensitivity of firms' investment to internal funds in industries more dependent on external finance. Thus, a negative coefficient for α_2 would indicate causality from banking development to economic volatility and would be consistent with previous evidence (Larrain ,2006; Raddatz, 2006, and Beck et al., 2006b).

The interaction $BANKSTAB_{j,t} * ED_i$ captures the influence of banking stability on economic growth after controlling for banking development. We interact banking stability with industry's external dependence to control for potential reverse causality between banking

[2]This approach was initially applied by Rajan and Zingales (1998) and subsequently used by Cetorelli and Gambera (2001), Claessens and Laeven (2003), Fisman and Love (2003), and Braun and Larrain (2005) to investigate the effects of bank concentration, property rights, trade credit usage, and recessions, respectively, on industrial growth. Kroszner et al. (2007) and Dell'Ariccia et al. (2008) have applied this approach to study the real effects of banking crises. Raddatz (2006) have used this setup to specifically analyze the influence of banking development on economic volatility.

stability and economic growth. As industries with more external financial dependence are more sensitive to banking shocks, we assume that captures better causality running from banking stability to economic growth. Thus, a negative coefficient for α_3 would indicate that banking stability reduces economic volatility.

We include three specific effects: industry-country (θ_{ij}), industry-period (λ_{it}), and country-period (φ_{jt}) specific effects. The three sets of specific effects should control for most shocks affecting the volatility of industrial value added. The industry-country specific effect should 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, or government intervention and support, derived from different factor endowments, market size, or institutional characteristics that may generate different volatility of value added patterns across industries and countries. The industry-period specific effect controls for worldwide industry shocks. Finally, the country-period specific effect controls for aggregate country-specific shocks. This approach has the advantage that avoids the need for the financial development, the measure of banking stability, and the variable to proxy industrial external dependence to enter the regression on their own. It allows us to focus only on the terms of their interaction. Moreover, inclusion of these specific effects is less likely to suffer from omitted variable bias or model specification than traditional regressions.[3]

We extend the basic model to separate the lending and asset allocation effects. The exact specification is as follows:

$$\begin{aligned} VOLATILITY\_VA_{i,j,t} = {} & \beta_0 + \beta_1 ISHARE_{i,j} + \\ & + \beta_2 ED_i * FD_{jt} \\ & + \beta_3 BANKSTAB_{j,t} * ED_i * FD_j \\ & + \beta_4 BANKSTAB_{j,t} * INTAN_i * LAW_j \\ & + \theta_{ij} + \lambda_{it} + \varphi_{jt} + \varepsilon_{ijt} \end{aligned} \qquad [2]$$

Where $INTAN_i$ is the intangible intensity of industry *i*. LAW_j is our proxy for country's investor protection.

[3] Dell'Ariccia et al. (2008) use the same procedure to examine the effects of systemic banking crises on economic growth of industries with different levels of external financial dependence.

We include two additional terms to analyze the channels through which banking stability impacts on economic volatility after controlling for banking development. These triple interaction terms are the main contribution of the paper. The first triple interaction term ($BANKSTAB_{j,t}$* ED_i *FD_{jt}) captures the relevance of the lending channel to explain how banking stability impacts on volatility of industrial value added. To identify the causality from banking stability to economic volatility, we interact BANKSTAB with the industry's external dependence. Again, our premise is that banking stability has a greater effect on the availability of funding for industries that are more dependent on external finance. Therefore, lower economic volatility associated with more banking stability in more financial dependent industries would indicate that at least part of the causality runs from banking stability to economic volatility. Moreover, a more developed banking system will increase the change of credit supply associated with a particular banking stability. For that reason, we include $FD_{j,t}$ as an additional interaction term to capture the relative importance of the lending channel on economic volatility. A negative coefficient β_3 would be consistent with our Hypothesis 1, i.e, with banking stability reducing economic volatility through the lending channel.

We include a second interaction term among the proxy for banking stability, the industry's intangible intensity, and a proxy for the country's institutional quality ($BANKSTAB_{j,t}$ * $INTAN_i$ * LAW_j). This triple interaction term would capture the impact of banking stability on economic volatility through the asset allocation channel.[4] We include the industry's intangible intensity to control for reverse causality between economic volatility and the asset allocation effect of banking stability. We would expect that industries with more intangible assets are those more sensitive to higher bank risk-taking incentives. We include the institutional quality proxy because the ability of bank risk-taking incentives to really induce higher firm's risk-taking depends on the quality of country's institutions. John et al. (2008) show that better investment protection leads corporations to undertake riskier projects. Better investment protection mitigates the taking of private benefits leading to excess risk-avoidance and allows dispersed ownership structures that promote a better risk-diversification and then higher firms' risk-taking. Then, higher bank risk-taking incentives will increase more firms' risk taking in countries with better investor protection. A negative coefficient of β_4 would be consistent with our hypothesis 2 by suggesting that greater banking stability reduces

[4] Claessens and Laeven (2003) follow a similar approach to capture the asset allocation effect of financial development on industrial economic growth.

economic volatility through the asset allocation channel, especially in more intangible intensive industries in countries with good investor protection.

We also estimate model [2] separately in different sub-samples of countries depending on bank market competition, concentration, legal bank entry requirements, and restrictions on bank ownership and control of non-financial firms.

The regressions are estimated using instrumental variables (IV) and ordinary least squares (OLS). We estimate standard errors clustered by industry and country to capture correlations of different industries affected by the same country-level characteristics. This correlation would be captured by the industry-country dummies if the country-level 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 (industry and country).

The IV methodology allows us to focus on the influence of the exogenous component of our explanatory variables. We apply several procedures to control for their potential endogeneity. Following Rajan and Zingales (1998), we use predetermined values of industry's external dependence and intangible intensity. We use different instruments for banking stability and development in a country. There is evidence showing that bank regulation, competition, and market structure affects both banking stability and development (Keeley, 1990; Barth et al., 2004; Beck et al., 2006, among others). As we aim to analyze how these country variables shape the influence of banking stability on economic volatility, we need to isolate the exogenous component of banking stability and development. Otherwise, we would mix the direct influence of these country variables on banking stability and development with their influence on the relationships between banking stability and economic volatility.

Following the law and finance literature (Beck et al., 2006; La Porta et al., 2000), our instruments are the four legal origin dummy variables (English, French, German and Scandinavian) and time dummies. We check that the results do not change when we use as alternative instruments: 1) the initial values (in the sub-period 1989-1993, or first available) of, respectively, banking stability or financial development, and 2) when we add to the four legal origin dummy variables and time, three measures of banking sector regulation – regulation on non-traditional banking activities, overall bank capital stringency, and legal

entry requirements into the banking industry–; and an index measuring the institutional quality of the country (the rule of law).

To test the suitability of our Instrumental Variables (IV) estimator, we perform the Durbin-Wu-Hausman statistic test which verifies the null hypothesis that the introduction of IVs has no effect on estimates of the regression's coefficients. We report IV estimations when the test is rejected at the 10 percent level or less. Otherwise, we report OLS estimates using the observed values of financial development and bank Z-score.[5]

3.3. Variables

3.3.1. Economic Volatility

Our dependent variable is the relative standard deviation of real value added of each industry in each country. We compute the standard deviation of real value added in each industry following previous studies (Larrain, 2006; Raddatz, 2006; Beck et al., 2006). Additionally, we normalize the standard deviation by the averaged value added, as in Klomp and de Haan (2009), to obtain a relative standard deviation. This measure incorporates the effect of growth differences across industries with different levels of volatility and allows us to infer clearer implications in terms of welfare. Higher banking stability might reduce not only economic volatility but also economic growth because bank-risk taking may promote more risky and profitable investments by firms. Our relative standard deviation captures the effect of banking stability on economic volatility after taking into account growth differences. Our volatility indicator is:

$$\sigma_{i,j,t} = \frac{\sqrt{\sum\left(y_{i,j,t} - \bar{y}_{i,j,T}\right)^2}}{\left|\bar{y}_{i,j,t}\right|}$$

Where $y_{i,j,t}$ is the real value added of industry *i* in country *j* at time *t*. $\bar{y}_{i,j,t}$ is the average industrial real value added in a five-year of industry *i* in country *j* over period t. We calculate the relative standard deviation using annual data over a five-years period. We analyze the whole period of 1989-2008 and then aggregate data over the periods 1989-1993, 1994-1998,

[5] The results of the first stage regressions are available from the authors upon request and the F-test confirms that the selected instruments are jointly highly significant in all the first stage regressions.

1999-2003, and 2004-2008. In our estimations, we use the natural logarithm of $\sigma_{i,j,t}$ to make normally distributed the dependent variable. We check the robustness of the results using the standard deviation of real value added (without dividing by growth), mostly used in previous studies.

Table 1 shows the country mean values of the variables used in the empirical analysis. We observe that the countries with higher volatility of industrial value added over the whole period (1989-2008) are Central African Republic (1.8930), Côte d'Ivoire (0.8554), Niger (0.7209), or Iraq (0.4069). The countries with the lowest levels of industrial value added volatility are Pakistan (-1.8706), Switzerland (-1.6959), Paraguay (-1.6272), or Belarus (-1.5939). Table 2 shows the mean values of the main variables by industrial sectors. The Leather industry presents the lowest value of volatility of value added. Industries like Coke, Petroleum, and Nuclear, or Office, Accounting, and Computing Machinery are the industries with the highest value of value added volatility.

3.3.2. Banking Stability

We use two main proxies for banking stability: The Z-score and the ratio of non-performing loans to total loans (NPL). The Z-score (ZSCORE) is a measure of bank insolvency risk. It is calculated at bank-level as the return on assets plus the capital-asset ratio divided by the standard deviation of asset returns. Specifically, ZSCORE = (ROA+CAR)/SDROA, where ROA is the rate of return on assets, CAR is the capital-asset ratio, and SDROA is an estimate of the standard deviation of the rate of return on assets. A higher Z-score indicates that the bank is more stable because it is inversely related with the bank insolvency probability. Since the Z-score is highly skewed, we use the natural logarithm of Z-score, which is normally distributed. Laeven and Levine (2009), Houston et al. (2010), Beck et al. (2013), among others, have recently used the Z-score as a proxy for bank insolvency risk.

We also use the ratio of non-performing loans in a country as an alternative proxy for banking stability (NPL). This is a traditional ex-post measure of bank credit risk and it is defined as the ratio of defaulting loans (payments of interest and principal past due by 90 days or more) to total gross loans.

As we perform the empirical analysis at banking industry-level, we use the aggregated value by country and period of both variables. To do this, we consider the measure of each variable at country-level provided by the GFDD collected by the World Bank. Country-level values

are calculated, using information from Bankscope, as the weighted bank average of each variable. The weights are the participation of the bank assets in the total assets of banking system.[6] In our sample, ZSCORE ranges from a minimum value of -0.1325 in Thailand to a maximum value of 3.0520 in Cyprus. Bangladesh presents the highest value of the ratio non-performing loans-to-gross loans (29.91%) and Luxembourg the lowest one (0.42%).

3.3.3. Industry's External Dependence and Intangible Intensity

We measure external dependence for each industrial sector (ED) using the index calculated by Rajan and Zingales (1998) for a sample of US firms. This index is defined as the fraction of capital expenditures not financed with cash-flow from operations constructed at industry-level. 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.[7] Cetorelli and Gambera (2001), Claessens and Laeven (2003); Dell' Arriccia et al. (2008) and Kroszner et al. (2007), among others, have previously used this approach to proxy for the exogenous component of industry's external dependence.

We follow a similar approach to only consider the exogenous component of industry's intangible intensity. We use the benchmark data from Claessens and Laeven (2003) for our measure of intangible intensity. Like Rajan and Zingales (1998) with the exogenous component of industry's external dependence, Claessens and Laeven (2003) assume that the intangible intensity for each industry in the US is a good benchmark for each industry across countries. They calculate intangible intensity as the ratio of intangible assets-to-net fixed assets using Compustat data on US firms for the years immediately before our analysis period, 1980-1989.[8]

3.3.4. Country's Banking Development

We follow Rajan and Zingales (1998), Beck et al. (2000), Beck et al. (2006) or Kroszner et al. (2007), among others, and measure banking development (FD) as the ratio of private

[6] As the World Bank does not provide aggregated data on bank Z-score and NPL before 1999, we directly aggregate at country level the bank Z-score and NPL estimated at individual level from Bankscope for the 1989-1999 period. We also use the bank assets in the total assets of the banking system as weights to compute the Z-score and NPL at country level.

[7] 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 in achieving their desired financial structure than firms in other countries.

[8] We also check that the results do not change when we calculate an individual measure of intangible intensity for each industry in a specific country at the first period of our analysis (1989-1993, or first available) using firm-level data from Compustat.

credit of deposit money banks-to-GDP taken from the World Bank Statistics Database. In our estimations, we focus on the exogenous component of country's banking development and use the fitted values of an OLS in which regulatory and institutional national characteristics are the explanatory variables. Switzerland (154%) and Hong Kong (142%) are the countries that present higher levels of banking development. The lowest values of banking development are in Iraq (2.24%) and El Salvador (3.99%).

3.3.5. Country's Institutional Quality

We use the rule of law index (LAW) as a proxy for investor protection and institutional quality in a country. Higher values of this variable indicate higher efficiency on the application of laws. In our sample, the highest values of this variable are in Sweden, Norway, or New Zealand, among others. Countries like Cameroon or Algeria are the countries with the lowest levels of rule of law. We collected these data from The World Bank Institute's Governance Group. We examine the robustness of our results to alternative proxies: (1) the Kaufman et al. (2001) KKZ index. This is calculated as the average of six indicators: voice and accountability in the political system; political stability; government effectiveness; regulatory quality; rule of law; and control of corruption. (2) The property rights index constructed by the Heritage Foundation. It ranges from 1 to 5, where higher values indicate greater protection of property rights. Results are not significantly different using these alternatives.

3.3.6. Bank competition, concentration, and ownership relationships

We use the Lerner index, the Boone indicator, and the bank market concentration as proxies for bank market competition. All these proxies are inversely related to bank competition and are obtained at country level from the GFDD. Original data come from Bankscope. The Lerner index (LERNER) is defined as the difference between output prices and marginal costs (relative to prices). Prices are calculated as total bank revenue over assets, whereas marginal costs are obtained from an estimated translog cost function with respect to output. The Lerner index takes 0 in the case of perfect competition and 1 under perfect monopoly. It has been widely and recently used in the banking sector as an indicator of the degree of market power (Beck et al., 2013). Table 1 shows that the Kyrgyz Rep. has the highest Lener index over the 1989-2008 period (0.9548) whereas Kenya has the lowest value (0.0154)

The Boone indicator (BOONE) is the elasticity of profits to marginal costs. To obtain the elasticity, the log of profits (measured by return on assets) is regressed on the log of marginal costs. The estimated coefficient is the elasticity. The rationale behind the indicator is that higher profits are achieved by more-efficient banks. Hence, the more negative the Boone indicator, the higher the degree of competition is because the effect of reallocation is stronger. Estimations of the Boone indicator in the World Bank's database follow the methodology used by Schaeck and Čihák (2010) with a modification to use marginal costs instead of average costs. In our sample of countries, the Boone indicator has its highest value in Korea (2.2074) whereas Barbados has the lowest value (-2.0520).

Bank concentration (CONC) is defined as the ratio of the assets of three largest commercial banks to total commercial banking assets in a country. Table 1 shows that Belize, Gabon, Iceland, New Zealand, Saint Lucia, Swaziland, and Tanzania present the highest value of bank concentration (100%). The less concentrated banking markets are in Luxembourg (27.79%), Panama (32.19%), or Japan (32.52%).

We also analyze the influence of two regulatory variables: legal restrictions to entry into the banking industry (ENTRY) and restrictions on the mixing of banking and commerce (RESTOWN). These regulatory variables come from the World Bank's Bank Regulation and Supervision database (Barth et al., 2006). ENTRY is based on whether or not the following information is required: (1) draft by-laws; (2) intended organizational chart; (3) financial projections for first 3 years; (4) financial information on main potential shareholders; (5) background/experience of future directors; (6) background/experience of future managers; (7) sources of funds to be used to capitalize the new bank; and (8) market differentiation intended for the new bank. Each type of information is assigned a value of 1 if it is required and 0 otherwise. Thus, higher values of this variable indicate stronger barriers to entry into the banking industry. In our sample ENTRY ranges from a minimum value of 3 to a maximum value of 8.

RESTOWN is a proxy for ownership relationships between banks and their debtors. It indicates whether bank ownership and control of non-financial firms are: (1) unrestricted, (2) permitted, (3) restricted, or (4) prohibited. This variable ranges from a minimum value of 1 (Brazil, Netherlands or New Zealand, among others) to a maximum value of 4 (Bolivia, China or Singapore, among others). Higher values of RESTOWN indicate more restrictions and thus less potential bank-firm relationships.

INSERT TABLE 1 AND TABLE 2 ABOUT HERE

Table 3 shows the correlation matrix. We observe negative and significant relationships between the volatility of value added and $FD_{j,t}$, and between the industrial volatility and the $ZSCORE_{j,t}$. Moreover, the correlation between economic volatility and $NPL_{j,t}$ is positive and statistically significant. These results suggest that the higher the banking development and the higher the stability of banking system, the lower the volatility of industrial value added. The relationship between industrial volatility and the measure of institutional quality (LAW_j) is negative and statistically significant, suggesting that higher levels of institutional quality in a country have positive effects on the stability of industrial economic performance. $BOONE_{j,t}$ correlates negatively to economic volatility, while the correlation with $CONC_{j,t}$ is positive and statistically significant. The volatility of industrial value added presents a positive relationship with the legal restrictions on banks participation in the ownership and control of non-financial firms ($RESTOWN_{j,t}$), indicating that the higher the prohibition of banks to participate in the capital of non-financial firms, the higher the economic volatility. The Lerner index ($LERNER_{j,t}$) and the index of legal entry requirements into de banking industry ($ENTRY_{j,t}$) present a negative, although not statistically significant at conventional levels, correlations with the measure of industrial volatility.

INSERT TABLE 3 ABOUT HERE

4. Empirical results

4.1. Banking Stability, Financial Development, and Economic Volatility

We present now the results for our basic model [1] explaining (1) how banking stability affects the volatility of industrial value added after controlling for financial development; and (2) the channels through which banking stability affects economic volatility. The results are reported in Table 4. We use the Z-score as proxy for banking stability in columns (2)-(5) and the ratio of non-performing loans in columns (6)-(9). ISHARE has negative and significant coefficients in all the estimations. It indicates that relatively larger sectors are less volatile. The negative and significant coefficient of $ED_i*FD_{j,t}$ in column (1) indicates that industries

with higher levels of financial dependence tend to have lower levels of volatility of value added in countries with more developed financial systems. This result is consistent with previous findings of Larrain (2006), Raddatz (2006), and Beck et al. (2006). It suggests that a greater availability of credit to sectors with more financial needs in countries with more developed banking systems helps stabilize industrial value added. It confirms that financial development reduces the dependence of firms' investment from their internal funds and reduces the impact of real shocks on industry value added volatility.

In columns (2) and (6) we analyze the direct effect of banking stability on the volatility of industry value added. We obtain a negative and significant coefficient for the interaction term $BANKSTAB_{j,t}*ED_i$ when we use ZSCORE as proxy for banking stability and a positive coefficient when we use NPL in column (6). These coefficients indicate that higher banking stability is associated with lower volatility of industrial value added. Results remain invariant in columns (3) and (7) where we jointly consider the effect of both banking development and stability on industrial economic volatility. This result suggests that banking stability reduces economic volatility after controlling for banking development. However, it not provides us information on the channels through which this influence operates.

We examine in columns (4)-(5) and (8)-(9) the channels through which a higher banking stability reduces volatility of industrial value added. To do this, we focus on the sign of two interaction terms: $BANKSTAB_{j,t}* ED_i *FD_{j,t}$ captures the impact of banking stability on economic volatility through its impact on credit supply; and $BANKSTAB_{j,t}*INTAN_i*LAW_j$ focuses on the effect through the asset allocation channel.

We obtain negative and significant coefficients of the interaction $BANKSTAB_{j,t}* ED_i *FD_{j,t}$ when the Z-score is the proxy for banking stability and positive ones when we use the NPL in columns (8)-(9). These results are consistent with our first hypothesis and the relevance of the lending channel, i.e., banking stability reduces economic volatility by diminishing the volatility of the credit supply, especially in industries more dependent on external finance and in more developed banking systems. The interaction term $BANKSTAB_{j,t}*INTAN_i*LAW_j$ has negative and significant coefficients in columns (4)-(5), and positive ones when we use the NPL as proxy for banking stability in columns (8)-(9). This result is consistent with our second hypothesis and the relevance of the asset allocation channel. Banking stability reduces economic volatility, especially in more intangible intensive industries and in countries with better investor protection.

Both the finance and the asset allocation effects are economically significant. Using, for instance, the result in column (5), a standard deviation increase in the Z-score of the national banking system would reduce the volatility of value added in an industry at the 75th percentile of external dependence and located in a country at the 75th percentile of financial development a five percent greater than in an industry at the 25th percentile of external dependence and located in a country at the 25th percentile of financial development.

Also using column (5) to estimate the economic impact of the asset allocation effect, an industry at the 75th percentile of intangible intensity and located in a country at the 75th percentile of investor protection experiences a three percent greater reduction of the volatility of value added when there is an increase of one standard deviation of the banks' Z-score than in industries at the 25th percentile of intangible intensity and located at the 25th percentile of investor protection.

INSERT TABLE 4 ABOUT HERE

4.2. Influence of Bank Market Competition and Ownership Relationships

We now analyze whether the influence of banking stability on economic volatility, through both the lending channel and the asset allocation channel, varies across countries depending on bank market competition and ownership relationships between banks and non-financial firms. Specifically, we test how bank market power (LERNER and BOONE), concentration (CONC), legal entry requirements into banking (ENTRY), and legal restrictions on bank ownership and control of non-financial firms (RESTOWN) shape the influence of the lending and asset allocation channels on economic volatility. We split the sample of industry-country observations around the median of each country variable. The results are reported in Table 5. Panel A shows the results when we use the Z-score as proxy for banking stability whereas in Panel B we use the NPL as proxy inversely related to banking stability.

In the first four columns of both panels, we use the Lerner and Boone indexes to examine how bank market power affects the impact of banking stability on economic volatility. The results indicate that banking stability reduces more economic volatility in countries with a higher bank market power. The coefficients of both triple interaction terms ($ZSCORE_{j,t}$* ED_i *$FD_{j,t}$ and $ZSCORE_{j,t}$*$INTAN_i$*LAW_j) are significant in countries with a Lerner or Boone

indicator above the median of the sample in columns (1) and (3). The significant coefficients are negative when we use the banks' Z-score (Panel A) and positive when we use the ratio of non-performing loans (Panel B) as proxy for banking stability. These results indicate the relevance of the lending and asset allocation effects of banking stability on economic volatility in countries with relative high bank market power. However, in countries with a Lerner and Boone indicator below the median in the sample, the coefficients of the triple interaction terms are non-significant or less significant. In Panel A, using the Z-score as a proxy for banking stability, we do not obtain significant coefficients of $ZSCORE_{j,t}$* ED_i *$FD_{j,t}$ in columns (2) or (4), suggesting that banking stability does not reduce economic volatility by diminishing the volatility of credit supply in countries with a bank market power below the median of the sample. The coefficient of $ZSCORE_{j,t}$*$INTAN_i$*LAW_j is significant in column (4) but not in column (2). In Panel B, none of the coefficients of the two triple interaction terms are significant in countries with a bank market power below the median when we use the Lerner index as the proxy for bank market power in column (2). We only obtain the expected positive coefficient of the interaction $NPL_{j,t}$* ED_i *$FD_{j,t}$ when we use the Boone indicator as proxy for banking stability.

We obtain similar results when we use CONC and ENTRY as indirect proxies, inversely related, to bank market competition in columns (5) to (8). In countries with a bank concentration or bank entry requirements above the median, we obtain negative and significant coefficients for both triple interaction terms in Panel A and positive coefficients in Panel B. However, in the sub-sample of countries with a bank concentration or bank entry requirements below the median, we do not obtain significant coefficients for the triple interaction terms capturing the lending effect and only the triple interaction term capturing the asset allocation effect has significant coefficients.

These results of our proxies for bank market competition support the hypothesis 3 because they suggest that greater bank market power or less banking competition increases both the lending and asset allocation effects of banking stability on economic volatility. This finding is consistent with bank market power enhancing lending relationships between banks and industrial firms that originate switching costs for firms and impact on firms' investment in case of banks' balance-sheet shocks (the lending effect). Moreover, if greater bank market power and close lending relationships facilitates bank funding for intangible assets, a greater

market power could also explain a higher impact of bank stability on economic volatility through the asset allocation channel.

The evidence is weaker when we focus on the influence of ownership relationships between banks and industrial firms. We do not find significant differences in the lending channel effect across countries depending on country's legal restrictions on bank ownership and control of non-financial firms (RESTOWN). The coefficients of the interaction term $ZSCORE_{j,t}$* ED_i * $FD_{j,t}$, are negative both in columns (9) and (10). Similarly, the coefficients of $ZSCORE_{j,t}$* ED_i* $FD_{j,t}$ are positive in both columns of Panel B. We only find differences in the asset allocation effect of bank stability in Panel B when we use NPL as proxy for banking stability. The coefficient of $ZSCORE_{j,t}$*$INTAN_i$*LAW_j is positive and significant in column (10) but not in column (9). It indicates that bank incentives impact on firm's risk-taking only in countries with lower restrictions on bank ownership of non-financial firms. Mixing banking and commerce increases the impact of banking stability on economic volatility through the asset allocation effect. It is consistent with bank risk-taking incentives affecting more to firms' risk-taking if banks can have equity stakes on firms' ownership.

INSERT TABLE 5 ABOUT HERE

4.3. Systemic Banking Crises and Economic Volatility

We now empirically analyze the influence of a systemic banking crisis on the volatility of industrial value added. Systemic banking crises can be considered an ex-post measure of banking instability in a country and we use it as an alternative proxy to Z-score and NPL for banking stability. Obviously, banking crisis would be inversely related to bank stability. Using the information on financial crises provided by Laeven and Valencia (2012) database, we identify a total of 71 episodes of systemic and borderline banking crises occurred in 66 developed and developing countries over the global sample period 1989-2008. We check that results remain when only systemic banking crises are considered and when we drop information about the recent crisis. Information on banking crises inception dates is provided in Table 1.

Results are reported in Table 6. In Panel A, we define a crisis dummy variable (CRISIS) that takes the value 1 in the period and the following periods after the country has experienced a

systemic or borderline banking crisis. CRISIS takes the value of 0 when a country has not experienced a banking crisis or in the periods before suffering a systemic banking crisis if the country has experienced one. In Panel B, we define CRISIS as a dummy variable that takes the value of 1 in the period in which the country has experienced a banking crisis, and 0 otherwise.

The results are consistent with those reported in Table 4.presented in the above sections, we obtain a negative and significant coefficient for the interaction term $ED_i*FD_{j,t}$ in all the estimations, indicating that industries with higher levels of financial dependence tend to have lower levels of volatility of value added in countries with more developed financial systems. The coefficient of the interaction $CRISIS_{j,t}*ED_i$ is positive and statistically significant and suggests that the volatility of value added of industries more externally financially dependent is higher in countries experiencing an episode of banking distress. The result is consistent with that obtained by Dell'Ariccia et al. (2008). These authors show that banking crises have a more negative effect on economic growth of those industries that are more in need on external finance. Now we show that this kind of industries is the one that suffer more the negative consequences of a crisis in terms of lower stability of value added.

In columns (2)-(4) and (6)-(8) we look at the channels through which banking crises affect the volatility of industrial value added. We obtain a positive and statistically significant coefficient for the triple interaction term $CRISIS_{j,t} * ED_i *FD_{j,t}$ in all the estimations. It indicates that crisis periods affect more positively economic volatility of more financially dependent industries in countries with higher levels of financial development. The result is consistent with that presented in Table 4 for the bank Z-score. According to Kroszner et al. (2007), if industries that depend more on external finance are hurt more severely after a banking crisis, then a banking crisis is likely to have an independent negative effect on real economic activity. Following this reasoning, operating in an environment where banking market is well-developed is an advantage for more financially dependent industries in good times, but a disadvantage (in terms of higher economic volatility) in times of banking crises. In terms of the asset allocation channel, we obtain a positive coefficient of the interactive term $CRISIS_{j,t}*INTAN_i*LAW_j$ in all the estimations. This result is consistent with the previous results and suggests that crisis periods increase more economic volatility of industries more intensive in intangible assets in countries with higher institutional quality.

INSERT TABLE 6 ABOUT HERE

4.4. Robustness Checks

We now compare our approach with the previous literature analyzing the role of banking development to influence economic volatility. The most related paper is Beck et al. (2006) analyzing whether banking development magnifies or dampens real and monetary shocks. They associate monetary shocks with impacts on banks' balance sheets. So, their monetary shocks would be similar to our lending effect of banking stability because both of them would affect to economic volatility through changes on credit supply. They do not consider the asset allocation effect of banking stability or do not use direct measures of banking stability. Their model specification using country data is:

$$SD\_GROWTH_{j,t} = \alpha_0 + a_1 SD\_\Delta TOT_{j,t} + \alpha_2 SD\_INF_{j,t} + \alpha_3 FD_{j,t} + \alpha_4 FD_{j,t} * SD\_\Delta TOT_{j,t} + \alpha_5 FD_{j,t} * SD\_INF_{j,t} + \varepsilon_{j,t} \quad [2]$$

The dependent variable is the standard deviation of real per capita GDP of country j in period t, calculated over three-year periods ($SD\_GROWTH_{j,t}$). $SD\_\Delta TOT_{j,t}$ is the standard deviation of trade changes. Terms of trade volatility attempts to capture changes in the terms of trade associated with changes in input prices or technologies affecting the production function, which in turn lead to changes on the level of productivity of the economy. $SD\_INF_{j,t}$ is the standard deviation of inflation. Monetary volatility refers to changes in monetary policies affecting interest rates, credit supply to the private sector and, therefore, economic performance. $FD_{j,t}$ is the proxy for financial development in a country.

We use their variables for real and monetary shocks in our sample of industrial data and control for our industry, country, and period effects. $SD\_\Delta TOT_{i,j,t}$ and $SD\_INF_{i,j,t}$ are calculated for our periods of analysis using data from the World Development Indicators (WDI) database. In column (1) of Table 7, we simply replicate the basic model of Beck et al. (2006). We confirm their finding that financial development dampens the impact of real shocks (the coefficient of $SD\_\Delta TOT_{i,j,t} * FD$ is negative) whereas magnifies the impact of monetary shocks (the coefficient of $SD\_INF_{i,j,t} * FD_{j,t}$ is positive). In column (2) we only include ISHARE and country-industry, country-year, and industry-year fixed effects as control variables. The influence of banking development reducing the impact of real shocks and increasing the impact of monetary shocks on economic volatility does not change. It is consistent with our fixed effects controlling for differences across countries on banking

development and real and monetary shocks, which allows us to focus on the interaction terms. The results in columns (3) and (4) show additional robustness checks of these results.

Columns (5) to (7) test the relevance of the lending and asset allocation channels using similar proxies for real and monetary shocks and set up than in Beck et al. (2006). In these columns, we extend their model to incorporate our controls for reverse causality (interactions with ED) and the asset allocation effect of banking stability. The positive coefficients $SD\_INF_{i,j,t}*ED_i*FD_{j,t}$ and $SD\_INF_{i,j,t}*INTAN_i*LAW_j$ in column (5) confirm, respectively, the relevance of the lending and asset allocation effects as channels through which banking stability reduces the volatility of industry value added. The results are similar in column (7) when we use the interaction term $SD\_\Delta TOT_{i,j,t} *ED_i*FD_{j,t}$ instead of $ED_i*FD_{j,t}$ to control for the influence of banking development to reduce the impact of real shocks on economic volatility.

In a further analysis, we make additional checks for the robustness of the results. First, we check that the results are robust to alternative definitions of the set of instruments for the interaction terms of banking stability and financial development. For instance, we check that results do not vary when we use additional institutional variables as instruments, such as an index measuring the quality of protection of property rights and the KKZ index. Following Claessens and Laeven (2003), we use 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 also introduce the KKZ index calculated as the average value of the six indicators of governance provided by The World Bank Institute's Governance Group: Voice and Accountability, Political Stability and Absence of Violence, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption (Kaufman et al., 2001). Second, we also consider the provisions to problematic loans-to-total gross loans an alternative proxy for banking stability. The results obtained are similar to those reported.[9]

5. Conclusions

Previous banking literature has documented the positive role of financial development to foster stability in the real economic sector. We provide additional empirical evidence on the

[9] All the robustness tests are available from the authors upon request.

relevance of financial sector to promote lower levels of economic volatility. In particular, we examine the impact of banking stability on the volatility of industrial value added in 23 industrial sectors located in 110 developed and developing countries over the 1989-2008 period. Our results indicate that banking stability reduces the volatility of industrial value added through two channels: the *lending channel* and the *asset allocation channel*. We control for financial development, endogeneity of banking stability, and reverse causality problems between banking stability and volatility of industrial of value added.

Banking instability increases the volatility of credit supply. In imperfect capital markets, firms can not totally substitute banks' funds if banks reduce credit supply and debtors are then obliged to reduce investment. In this situation, a higher volatility of credit supply would increase economic volatility through the lending effect. This lending effect is more relevant in industries with more external financial needs in countries with more developed banking markets.

The asset allocation effect is related to how higher bank risk-taking incentives affect firms' risk-taking. Results highlight that banking stability promotes economic volatility in industries more intensive on intangible assets and in countries with higher institutional quality. The explanation is related to the fact that banks would be less reluctant to a riskier behavior of their debtors if they are less risk-averse. This higher firms' risk-taking behavior promoted by a less risk-averse behavior of banks would increase economic volatility. Moreover, the higher quality of institutions increases firms' incentives to undertake risk and it may explain that bank risk favors greater firm's risk taking in these countries.

The effect of banking stability on economic volatility through the both channels varies across countries depending on bank market competition and bank-firm relationships. We find that banking stability contributes more to reduce the volatility of industrial value added in countries with higher bank market power, high bank concentration, stricter restrictions on bank entry and less legal restrictions on bank ownership of non-financial firms.

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 instabilities as these would become increasingly harmful for real economic stability. Moreover, our results highlight that bank market competition and bank-firm relationship not only influence banking stability, as literature has extensively shown, but also

the impact of banking stability on economic volatility through both the lending and asset allocation channels.

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Table 1: Descriptive Statistics. Country-Level Information

This table shows the mean values of the main variables by country and the information about the inception dates of the 71 crisis episodes occurred during the 1989-2008 period. Volatility VA is the standard deviation (relative) of the industrial value added (in natural logarithms). FD is a measure of financial development and is defined as the ratio bank private credit from commercial banks-to-GDP. ZSCORE is the natural logarithm of bank Z-score, a proxy for insolvency risk that equals the return on assets plus the capital asset ratio divided by the standard deviation of asset returns. NPL is the percentage of non-performing loans over total gross loans. LAW measures the quality of the institutional environment. LERNER is a proxy of the bank market power, measured as the Lerner index, defined as the difference between the price and the marginal cost, divided by the price. BOONE is a proxy for bank competition defined as the impact of efficiency on performance, in terms of profits and market shares. CONC is the bank concentration, measured as the fraction of assets of three largest banks as a share of assets of all commercial banks in a country. ENTRY is an index that measures the legal restrictions to entry to operate into the banking industry. RESTOWN measures the legal restrictions on the bank ownership and control of non-financial firms. The sample consists on 110 developed and developing countries during the 1989 – 2008 period. Industrial information comes from UNIDO Database. Country-level financial information is collected from the World Bank Statistics Database. Information on institutional variables is from The World Bank Institute's Governance Group. Regulatory variables come from the Barth et al. (2006) database. Information on banking crises inception dates comes from the Laeven and Valencia (2012) database.

COUNTRY	Banking Crises Date	Volatility VA (Log.)	FD (%)	ZSCORE	NPL(%)	LAW	LERNER	BOONE	CONC	ENTRY	RESTOWN
Albania	1994	-1.0310	8.9761	1.0814	4.2600	-0.1171	0.1433	-0.0746	96.4009	8	3
Algeria	1990	-0.9967	14.8732	1.0987	n.a.	-1.2130	0.2318	-0.0283	91.4529	7	3
Argentina	1989, 1995	-0.0208	16.0253	0.8327	8.3333	0.1122	0.2340	-0.1514	34.3766	7	3
Australia	n.a.	-0.5544.	77.9046	1.0875	0.6133	1.8120	0.1700	-0.1889	55.2965	8	2
Austria	2008	-0.9636	98.0067	1.5348	2.5150	1.9054	0.2210	-0.0344	80.1006	8	2
Bangladesh	n.a.	-1.4219	25.7188	0.6329	29.9133	-0.7749	0.0860	0.0353	64.2269	n.a.	n.a.
Barbados	n.a.	-0.1858	53.1697	0.9993	n.a.	-0.2407	n.a.	-2.0520	98.1895	n.a.	n.a.
Belarus	1995	-1.5939	9.8210	0.8185	6.0300	-0.9287	0.3825	-0.0255	94.9990	6	2
Belgium	2008	-0.9498	69.0287	1.0681	2.4400	1.5480	0.2059	0.0269	74.1383	8	2
Belize	n.a.	-0.7526	41.8510	1.4416	n.a.	0.7929	n.a.	-0.0303	100	8	2
Bolivia	1994	-0.7016	41.7397	1.1700	8.9600	-0.2890	0.2756	-0.1529	46.9582	8	4
Botswana	n.a.	-1.0513	13.9197	1.1311	1.7000	0.6243	0.5089	-0.0373	98.8207	8	2
Brazil	1990, 1994	-0.5959	32.8792	0.9106	6.5466	-0.2142	0.3751	-0.1042	39.9305	8	1
Bulgaria	1996	-0.3712	38.1601	0.7896	6.4200	-0.1122	0.2320	-0.3344	86.9544	8	2
Burundi	1994	-1.3335	14.1476	1.1822	n.a.	-0.8774	0.2120	0.0167	88.9460	8	3
Cameroon	1995	0.3975	11.7518	0.9542	n.a.	-1.4972	n.a.	-0.0217	83.4034	8	2
Canada	n.a.	-1.3325	93.6822	1.3789	1.0066	1.7634	0.2133	-0.0031	39.3160	8	2
Central African Rep	1995	1.8930	5.5362	0.6008	n.a.	-0.2849	n.a.	n.a.	n.a.	8	2
China	1998	0.3517	94.4337	1.2632	16.0750	-0.2514	0.3843	-0.0566	56.9261	6	4
China, Hong Kong	n.a.	-1.2547	142.0347	1.2420	4.2133	1.1419	0.3494	-0.0221	47.4374	6	2
Colombia	1998	-1.4855	26.0906	0.8877	7.9400	-0.6695	0.2629	0.0340	35.1974	8	3
Congo Rep.	1992	-0.5744	7.5458	0.9644	n.a.	n.a.	0.2742	n.a.	n.a.	n.a.	n.a.
Costa Rica	1994	-1.1110	21.1160	1.3298	2.5667	0.5731	0.2587	-0.0803	86.8226	8	4
Côte d'Ivoire	n.a.	0.8554	20.2979	1.1540	n.a.	-0.6851	0.3199	-0.0440	86.1224	8	3
Croatia	1998	0.0701	39.6786	0.9186	8.0866	-0.5647	0.0765	-0.0329	52.2025	7	2
Cyprus	n.a.	-1.2315	138.4956	3.0520	3.6000	0.7600	0.1844	0.1665	82.4479	6	3
Czech Rep.	1996	-1.2945	48.6932	0.7921	13.1000	0.8678	0.2980	-0.0895	76.1430	8	3
Denmark	2008	-1.3601	90.6305	1.11710	0.8083	1.8736	0.1823	-0.0761	79.9724	8	3
Ecuador	1998	-0.6828	22.1987	0.8484	10.0200	-0.4239	0.5268	0.2338	94.4290	8	4
Egypt, Arab Rep.	n.a.	-0.7991	38.2563	1.4788	19.6025	0.0770	n.a.	-0.0755	55.9305	8	3
El Salvador	1989	-0.7091	3.9972	1.3841	2.8667	-0.9087	0.0946	-0.1623	92.7750	8	4
Estonia	1992	-0.5604	34.5449	0.9158	1.0200	0.5051	0.1647	-0.1566	84.9947	8	2
Ethiopia	n.a.	0.1553	12.6141	0.7834	n.a.	-0.9423	0.2849	-0.0236	94.8891	n.a.	n.a.
Fiji	n.a.	-0.6190	34.5023	0.8911	n.a.	0.2167	n.a.	n.a.	n.a.	7	n.a.
Finland	1991	-1.0951	68.7033	1.1411	0.7200	1.9047	0.2388	-0.1648	90.0564	6	2
France	n.a.	-1.0050	88.9332	1.2670	4.8200	1.4694	0.0847	-0.0679	50.9603	6	2
Gabon	n.a.	0.3468	9.1616	1.1242	10.9275	-0.9281	n.a.	-0.0357	100	8	2
Georgia	1991	-0.8125	9.2803	1.0262	4.8000	-0.8365	0.5365	-0.0771	75.9528	n.a.	n.a.
Germany	2008	-1.4673	105.0687	1.3867	4.3066	1.7916	0.3038	-0.0422	60.8039	7	2
Greece	2008	-1.3542	47.4952	0.7716	9.6000	0.9447	0.2724	0.0768	78.7906	7	2
Honduras	n.a.	-1.2948	32.3087	1.0551	8.6333	-0.7455	0.1346	-0.0821	51.8589	8	3
Hungary	1991, 2008	-0.8975	36.2131	0.9112	3.5200	0.8400	0.0425	-0.1106	60.8105	8	3
Iceland	2008	-1.1509	99.7969	0.1805	1.7711	1.6368	0.3371	0.3349	100	8	2
India	1993	-1.3295	27.8956	1.2421	10.0733	0.2942	0.2960	-0.1079	35.2846	6	3
Indonesia	1997	-0.6614	33.5201	0.6436	26.5666	-0.3666	0.4222	0.0695	41.8002	n.a.	n.a.
Iran	n.a.	-0.7168	21.0447	1.1179	n.a.	-0.9773	0.2604	0.0212	n.a.	n.a.	n.a.
Iraq	n.a.	0.4069	2.2420	0.7820	n.a.	-1.6104	n.a.	-0.0074	91.6376	n.a.	n.a.
Ireland	2008	-0.5979	93.4710	0.8345	1.1000	1.7142	0.4161	-0.0170	74.2916	n.a.	2
Israel	n.a.	-0.7423	70.6800	1.4471	5.6950	1.2208	0.2369	-0.1381	73.9618	3	3
Italy	2008	-1.4049	68.6802	1.1695	8.4733	0.9804	0.2816	-0.0462	51.7879	8	2
Jamaica	1996	-0.6976	20.8116	0.6753	11.000	-0.2970	0.3644	0	83.2784	n.a.	n.a.
Japan	1997	-0.7249	150.0018	1.0443	4.5533	1.5306	0.0142	-0.0244	32.5214	7	3
Jordan	1989	-0.7705	68.0916	1.6794	11.3133	0.4439	0.3617	-0.0883	87.9472	7	3
Kenya	1992	-0.5064	22.6883	0.9901	24.0167	-1.0563	0.0154	-0.1228	55.5506	7	3
Kuwait	n.a.	-0.4676	42.9515	1.4448	8.8200	0.7376	0.1779	-0.2044	68.0861	6	2
Kyrgyz Rep.	1995	-1.1001	6.1315	1.2759	5.0333	-0.6406	0.9548	-0.0542	83.3545	8	2
Latvia	2008	-0.9802	33.8080	0.6321	3.5667	0.1312	0.2443	0.1112	48.3698	8	2
Lithuania	1995	0.7805	22.9431	0.5605	7.5800	0.2943	0.4347	0.2328	82.7638	8	2
Luxembourg	2008	-1.0262	110.8394	1.3740	0.4266	1.6092	0.1279	-0.0412	27.7970	8	3
Madagascar	n.a.	-1.2781	10.6793	0.8309	8.6000	-0.9717	0.2800	-0.0074	88.0090	7	3
Malawi	n.a.	-0.3072	6.2054	0.9942	n.a.	-0.5540	0.5663	-0.0912	93.4230	n.a.	n.a.
Malaysia	1997	-1.0610	108.8048	1.2948	14.2333	0.7308	0.2685	-0.0161	42.6060	7	3
Malta	n.a.	-0.6684	94.9482	1.1748	9.4700	0.4303	0.4190	-0.0750	94.7468	8	3
Mauritius	n.a.	-1.1176	50.9256	1.1398	6.7166	0.7588	0.2236	-0.1508	88.1370	7	2
Mexico	1994	-0.6719	18.8047	1.0671	6.2866	-0.5064	0.2520	-0.3157	68.2782	8	3

Mongolia	2008	-0.1578	13.4382	1.4422	n.a.	0.0684	0.3654	-0.0678	96.2425	n.a.	n.a.
Morocco	n.a.	-0.6728	38.9860	1.4933	14.5600	0.1244	0.0481	-0.0272	51.2471	8	3
Nepal	n.a.	-0.9592	22.3028	1.0727	n.a.	n.a.	0.4537	-0.0846	75.3321	n.a.	n.a.
Netherlands	2008	-1.3744	118.2334	1.3510	2.1466	1.8128	0.3014	-0.0657	82.7982	8	1
New Zealand	n.a.	-0.9174	98.9654	1.2899	n.a.	1.9678	0.2061	-0.8247	100	6	1
Niger	n.a.	0.7209	7.5330	1.1094	n.a.	-0.8860	0.0618	-0.0263	91.7854	8	3
Nigeria	n.a.	-0.0947	12.2506	0.7063	17.7533	-1.3500	0.2020	-0.1103	33.0847	8	3
Norway	1991	-0.7475	65.0625	0.9856	1.2000	2.0251	0.1437	-0.0848	85.2153	8	2
Oman	n.a.	-0.3395	34.0696	1.1945	7.1516	0.8690	0.1791	-0.0591	58.1995	8	3
Pakistan	n.a.	-1.8706	23.5839	0.9077	16.4066	-0.5911	0.3499	-0.2042	65.9154	7	3
Panama	n.a.	-1.5988	68.1749	1.4081	2.0950	-0.1548	0.1192	-0.0438	32.1999	8	2
Paraguay	1995	-1.6272	21.7426	1.1764	9.7416	-0.4610	0.4303	-0.3171	44.7598	7	2
Peru	n.a.	-1.0660	16.0945	1.2531	7.3283	-0.5796	0.3141	-0.0714	59.1234	7	2
Philippines	n.a.	-0.9944	28.8389	1.4854	13.4133	-0.0246	0.4347	-0.0718	76.3924	8	2
Poland	1992	-0.4998	23.5731	0.9675	12.2916	0.6398	0.3708	-0.1397	60.0263	7	1
Portugal	2008	-1.0823	97.3599	1.2885	2.6916	1.1366	0.3768	-0.0590	51.8338	7	3
Qatar	n.a.	-0.4818	27.5282	1.6310	n.a.	0.1035	0.2896	-0.0171	92.5370	4	3
Rep. of Korea	1997	-0.7551	66.2643	0.9555	4.5533	0.6964	0.3194	2.2074	65.6183	8	3
Rep. of Moldova	n.a.	-0.8792	n.a.	1.1715	n.a.	-0.1030	0.3242	n.a.	n.a.	8	2
Romania	1990	-0.6768	12.9461	0.7950	5.8200	-0.1535	0.1851	-0.2679	83.4536	8	3
Russian Fed.	1998, 2008	-0.6405	16.5706	0.7205	9.2666	-0.7285	0.0252	-0.0840	61.7168	7	2
Saint Lucia	n.a.	-0.0476	67.0291	1.1135	n.a.	-0.3314	n.a.	-0.0436	100	8	2
Senegal	n.a.	-0.3027	20.2053	1.2003	16.1925	-0.3885	0.0199	-0.0465	75.4049	8	3
Serbia	n.a.	-0.5156	25.0071	1.1281	18.4083	-0.9848	0.2360	-0.0944	92.5099	7	2
Singapore	n.a.	-0.9977	90.9672	1.4352	4.5900	1.7379	0.3350	0.8436	75.0449	8	4
Slovak Rep.	1998	-0.6871	40.8661	0.9006	15.7200	0.2268	0.2591	0.4054	64.3816	8	3
Slovenia	1992, 2008	-1.0900	34.5603	1.0576	4.4861	0.8662	0.0468	-0.0444	60.7522	7	3
South Africa	n.a.	-1.3614	60.5318	1.3518	3.1416	0.2611	0.2514	-0.0231	81.4810	6	2
Spain	2008	-1.2821	99.6392	1.4111	1.4733	1.3542	0.3754	-0.0578	75.0458	8	1
Sri Lanka	1989	-0.7049	23.0053	1.0905	n.a.	-0.1195	0.2629	-0.07353	77.8773	8	3
Swaziland	1995	-1.2277	15.6046	0.6764	4.7000	0.7929	0.1109	-0.3629	100	7	4
Sweden	1991	-0.5604	65.7767	1.0519	1.6933	1.8365	0.0901	-0.0329	94.4365	8	1
Switzerland	2008	-1.6959	154.6156	1.1334	2.8666	2.0804	0.3481	-0.0619	86.2603	8	2
Syrian Arab. Rep.	n.a.	-0.7434	9.2433	0.5898	n.a.	-0.4874	n.a.	-0.0785	91.2484	n.a.	n.a.
Thailand	n.a.	-0.4158	106.5131	-0.1325	23.6666	0.5820	0.4524	-0.1115	48.4175	8	3
The Yugosl. Rep. Macedonia	1993	0.1831	n.a.	1.1303	n.a.	-0.1540	0.3405	n.a.	n.a.	8	2
Trinidad and Tobago	n.a.	-0.8439	28.7996	1.2154	n.a.	0.5360	0.2735	-0.0975	71.7196	3	2
Tunisia	1991	-1.0038	53.1517	1.4652	21.0500	-0.2020	0.3379	0.0179	46.3998	8	3
Turkey	n.a.	-1.1757	16.0700	0.6402	8.6066	-0.0128	0.1613	0.3588	55.4169	7	2
Uganda	1994	-0.9390	5.2084	0.8499	10.2066	-0.6416	n.a.	-0.0353	54.9132	n.a.	n.a.
United Kingdom	2007	-1.4393	126.6779	1.0945	2.3666	1.8279	0.2870	-0.0561	61.5912	8	1
United Rep. of Tanzania	n.a.	-1.0388	5.9572	0.9088	24.0500	-0.4229	0.4678	0	100	n.a.	n.a.
Uruguay	2002	-0.8602	30.2029	0.3500	10.2725	0.5571	0.1063	-0.2252	48.3848	7	4
Vietnam	1997	-0.9394	39.8182	1.2444	n.a.	-0.6483	0.3017	-0.0559	84.7007	n.a.	n.a.
Yemen, Rep.	1996	-1.1227	4.9534	1.0921	n.a.	-1.1471	n.a.	-0.0149	95.1194	n.a.	n.a.
#Total / Mean	71	-0.8476	46.0077	1.0789	8.4024	0.2461	0.2865	-0.0896	72.3924	7.3085	2.5565

Table 2. Descriptive Statistics. Industry-Level Information

This table shows the mean values of the industry-level variables. Volatility VA is the standard deviation (relative) of the industrial value added (in natural logarithms). ED is the measure of external financial dependence calculated in Rajan and Zingales (1998). INTAN is the ratio intangible assets-to-net fixed assets calculated in Claessens and Laeven (2003) for US data. The sample consists of 23 industrial sectors from 110 developed and developing countries analyzed during the 1989 – 2008 period. Industrial information on value added comes from UNIDO Database.

Industry (ISIC Classification)	ISIC-Code	Volatility VA (Log.)	ED	INTAN
Basic Metals	27	-0.7711	0.09	0.11
Chemicals and Chemical Products	24	-0.8092	0.63	0.96
Coke, Petroleum, and Nuclear	23	-0.6655	0.04	0.02
Electrical Machinery and Apparatus	31	-0.8260	0.77	0.77
Fabricated Metal Products	28	-0.8873	0.24	0.31
Food and Beverages	15	-0.8930	0.11	0.75
Furniture; Manufacturing n.e.c.	36	-0.8004	0.24	0.49
Leather	19	-1.0550	-0.14	0.33
Machinery and Equipment	29	-0.8474	0.45	0.25
Medical, Precision and Optical Instruments, Watches and Clocks	33	-0.8180	0.96	0.90
Motor Vehicles, Trailers and Semi-Trailers	34	-0.7768	0.39	0.24
Office, Accounting, and Computing Machinery	30	-0.6849	1.06	0.25
Other Non-Metallic Mineral Products	26	-0.8446	0.06	0.05
Other Transport Equipment	35	-0.9480	0.31	0.24
Paper and Paper Products	21	-0.8810	0.18	0.20
Publishing, Printing, and Reproduction	22	-0.7978	0.20	4.54
Radio, television and Communication Equipment and Apparatus	32	-0.8504	1.04	0.77
Recycling	37	-0.8075	0.47	2.29
Rubber and Plastic Products	25	-0.9027	0.68	0.46
Textiles	17	-0.8863	0.40	0.21
Tobacco	16	-0.7929	-0.45	0.49
Wearing Apparel	18	-0.8761	0.03	0.53
Wood and Wood Products	20	-0.8361	0.28	1.20
Total		-0.8389	0.3495	0.7113

Table 3: Correlations

The table presents the correlation matrix. Volatility VA is the standard deviation (relative) of the industrial value added (in natural logarithms). FD is a measure of financial development and is defined as the ratio bank private credit from commercial banks-to-GDP. ZSCORE is the natural logarithm of bank Z-score, a proxy for insolvency risk that equals the return on assets plus the capital asset ratio divided by the standard deviation of asset returns. NPL is the percentage of non-performing loans over total gross loans. LAW measures the quality of the institutional environment. LERNER is a proxy of the bank market power, measured as the Lerner index, defined as the difference between the price and the marginal cost, divided by the price. BOONE is a proxy for bank competition defined as the impact of efficiency on performance, in terms of profits and market shares. CONC is the bank concentration, measured as the fraction of assets of three largest banks as a share of assets of all commercial banks in a country. ENTRY is an index that measures the legal restrictions to entry to operate into the banking industry. RESTOWN measures the legal restrictions on the bank ownership and control of non-financial firms. The sample consists on 110 developed and developing countries during the 1989 – 2008 period. Industrial information comes from UNIDO Database. Country-level financial information is collected from the World Bank Statistics Database. Information on institutional variables is from The World Bank Institute's Governance Group. Regulatory variables come from the Barth et al. (2006) database. Information on banking crises inception dates comes from the Laeven and Valencia (2012) database. ***, and ** represent the significance at the 1%, and 5% levels, respectively.

	Volatility VA (Log.)	**FD (%)**	**ZSCORE**	**NPL (%)**	**LAW**	**LERNER**	**BOONE**	**CONC**	**ENTRY**	**RESTOWN**
Volatility VA (Log.)	1.0000									
FD (%)	-0.1913***	1.0000								
Z-SCORE	-0.1191***	0.1438***	1.0000							
NPL (%)	0.1838***	-0.2791***	-0.2743***	1.0000						
LAW	-0.2271***	0.7246***	0.1083***	-0.4763***	1.0000					
LERNER	-0.0182	-0.1508***	0.0372	0.1317***	-0.1903***	1.0000				
BOONE	-0.0284**	0.0700***	0.0150	-0.0132	0.0760***	-0.0706***	1.0000			
CONC	0.0972***	-0.2354***	-0.0237**	-0.0579***	-0.1525***	0.3021***	0.0502***	1.0000		
ENTRY	-0.0168	-0.1517***	-0.0788***	0.1116***	-0.1859***	-0.0151	0.0096	0.0627***	1.0000	
RESTOWN	0.0701***	-0.1915***	0.0585***	0.1885***	-0.2174***	-0.0259**	-0.0259**	-0.0595***	0.0309***	1.0000

Table 4
Banking Stability, Financial Development, and Economic Volatility

This table shows results of regressions analyzing the effect of banking stability on industrial economic volatility after controlling for financial development. Regressions are estimated using OLS for cross-country data at industry-level. PANEL A presents the results using the ZSCORE as a proxy for banking stability. PANEL B presents the results using the ratio non-performing loans-to-gross loans (NPL) proxying for (in)stability of the banking system. The dependent variable is the adjusted standard deviation of industrial value added. ISHARE is the initial share of value added for each industry. ED is the measure of external financial dependence calculated in Rajan and Zingales (1998). FD is a measure of financial development and is defined as the ratio of bank private credit from commercial banks-to-GDP. INTAN is the ratio intangible assets-to-net fixed assets calculated in Claessens and Laeven (2003) for US data. LAW is an index measuring the rule of law of each country. The Durbin-Wu-Hausman statistic tests the null hypothesis that the use of instruments for country-level variables does not change the estimation outcome. We report IV estimates when the test is rejected at the one percent level. The instruments used are: legal origin dummy variables (English, French, German and Scandinavian) and time dummies. Standard errors are clustered by country and industry. T-statistics are between parentheses. ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively.

		PANEL A: Using ZSCORE				**PANEL B: Using NPL**			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
ISHARE	-0.0453***	-0.0298**	-0.0494***	-0.0456***	-0.0448***	-0.0265**	-0.0265**	-0.0330**	-0.0354***
	(-3.84)	(-2.53)	(-4.20)	(-4.08)	(-3.88)	(-2.06)	(-1.99)	(-2.53)	(-2.65)
*ED*FD*	-0.1656***		-0.1534***	-0.1004***			-0.0733***	-0.2726***	
	(-6.74)		(-6.21)	(-4.08)			(-5.89)	(-6.51)	
*BANKSTAB * ED*		-0.1358***	-0.1719***			0.0260***	0.0361***		
		(-4.60)	(-5.61)			(6.34)	(8.38)		
*BANKSTAB * ED * FD*				-0.0518***	-0.1174***			0.0066***	0.0067***
				(-9.09)	(-5.24)			(8.77)	(8.39)
*BANKSTAB * INTAN * LAW*				-0.0236***	-0.0496***			0.0897***	0.0172*
				(-3.08)	(-6.09)			(5.72)	(1.66)
Country-Industry	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Country-Period	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry-Period	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
R-Squared	0.0266	0.0165	0.0324	0.0563	0.0363	0.0268	0.0504	0.0626	0.0473
F-Test	17.20***	12.13***	17.25***	28.49***	18.97***	10.52***	18.04***	15.50***	15.13***
# Observations	4,620	4,856	4,520	4,481	4,481	2,964	2,786	2,786	2,786
Durbin-Wu-Hausman Test	15.78***	0.18	7.68***	8.98***	7.59***	0.66	2.09	13.17***	1.79

Table 5
Banking Stability, Bank Market Competition, and Ownership relationships

This table shows results of regressions analyzing the effect of banking stability on industrial economic volatility by subsamples of countries around the median values of country variables. Regressions are estimated using OLS for cross-country data at industry-level. PANEL A presents the results using the ZSCORE as a proxy for banking stability. PANEL B presents the estimations using the ratio non-performing loans-to-gross loans (NPL) proxying for (in)stability of the banking system. The dependent variable is the adjusted standard deviation of industrial value added. ISHARE is the initial share of value added for each industry. ED is the measure of external financial dependence calculated in Rajan and Zingales (1998). FD is a measure of financial development and is defined as the ratio of bank private credit from commercial banks-to-GDP. INTAN is the ratio intangible assets-to-net fixed assets calculated in Claessens and Laeven (2003) for US data. LAW is an index measuring the rule of law of each country. LERNER is a proxy for bank market power, measured as the Lerner index, defined as the difference between the price and the marginal cost, divided by the price. BOONE is a proxy for bank market power defined as the impact of efficiency on performance, in terms of profits and market shares. CONC is the bank concentration, measured as the fraction of assets of three largest banks as a share of assets of all commercial banks in a country. ENTRY is an index that measures the legal restrictions to entry to operate into the banking industry. RESTOWN measures the legal restrictions on the bank ownership and control of non-financial firms. The Durbin-Wu-Hausman statistic tests the null hypothesis that the use of instruments for country-level variables does not change the estimation outcome. We report IV estimates when the test is rejected at the one percent level. The instruments used are: legal origin dummy variables (English, French, German and Scandinavian) and time dummies. Standard errors are clustered by country and industry. T-statistics are between parentheses. ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively.

PANEL A: Using ZSCORE

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Above Median LERNER	**Below Median LERNER**	**Above Median BOONE**	**Below Median BOONE**	**Above Median CONC**	**Below Median CONC**	**Above Median ENTRY**	**Below Median ENTRY**	**Above Median RESTOWN**	**Below Median RESTOWN**
ISHARE	-0.0472***	-0.0443**	-0.0556***	-0.0323**	-0.0518***	-0.0349**	-0.0543***	-0.0257	-0.0443***	-0.0492***
	(-3.07)	(-2.56)	(-3.10)	(-2.50)	(-3.16)	(-2.40)	(-3.95)	(-1.41)	(-3.02)	(-2.75)
*FD * ED*	-0.2281***	-00.2142	0.0230	-0.2562***	-0.1947***	-0.0553***	-0.0161	-0.0557***	-0.1091	-0.1260***
	(-5.25)	(-0.82)	(0.72)	(-3.90)	(-6.11)	(-3.47)	(-0.89)	(-3.24)	(-0.59)	(-8.31)
*BANKSTAB * FD * ED*	-0.0482***	-0.0179	-0.0423***	-0.0451	-0.0444***	-0.0380	-0.0727***	-0.0522	-0.0409***	-0.0893***
	(-5.85)	(-0.23)	(-4.86)	(-0.63)	(-7.28)	(-1.18)	(-6.69)	(-0.61)	(-5.96)	(-3.41)
*BANKSTAB * INTAN * LAW*	-0.0384***	0.1514	-0.0477***	-0.0303***	-0.0250***	-0.0332**	-0.0301***	-0.2298***	-0.0786	-0.0111
	(-3.55)	(0.69)	(-4.25)	(-2.87)	(-2.62)	(-2.58)	(-3.14)	(-3.48)	(-0.41)	(-1.15)
Country-Industry	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Country-Period	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry-Period	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
R-Squared	0.0700	0.0213	0.0412	0.0639	0.0775	0.0314	0.0853	0.0536	0.0301	0.0819
F-Test	17.41***	5.19***	10.50***	20.53***	22.92***	9.19***	28.05***	9.30***	10.10***	23.62***
# Observations	2,331	2,150	2,224	2,257	2,259	2,222	2,815	1,666	2.435	2,046
DHW Test	29.82***	16.82***	2.89**	34.64***	11.84***	6.88***	1.75	21.82***	15.73***	33.57***

PANEL B: Using NPL

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Above Median LERNER	**Below Median LERNER**	**Above Median BOONE**	**Below Median BOONE**	**Above Median CONC**	**Below Median CONC**	**Above Median ENTRY**	**Below Median ENTRY**	**Above Median RESTOWN**	**Below Median RESTOWN**
ISHARE	-0.0332*	-0.0353*	-0.0445**	-0.0319	-0.0333*	-0.0248	-0.0468***	-0.0116	-0.0283	-0.0529***
	(-1.80)	(-1.94)	(-2.52)	(-1.58)	(-1.91)	(-1.28)	(-3.09)	(-0.49)	(-1.46)	(2.99)
*FD * ED*	-0.3621***	-0.0270	-0.2450***	-0.0318*	-0.1164***	-0.5659***	-0.1062***	-0.6383***	-0.1522***	-0.1244***
	(-5.62)	(-1.31)	(-3.97)	(-1.75)	(-7.05)	(-6.44)	(-6.71)	(-8.79)	(-2.61)	(-7.46)
*BANKSTAB * FD * ED*	0.0071***	0.0005	0.0078***	0.0132***	0.0094***	0.0075	0.0061***	0.0070	0.0143**	0.0068***
	(8.78)	(0.15)	(6.36)	(3.50)	(4.78)	(1.00)	(9.28)	(1.31)	(2.40)	(3.43)
*BANKSTAB * INTAN * LAW*	0.0903**	-0.0017	0.1327***	-0.0022	0.0142	-0.0002	0.0336***	0.1167***	-0.0032	0.0440***
	(3.92)	(-0.70)	(6.69)	(-1.06)	(1.13)	(-0.11)	(2.79)	(4.33)	(-1.42)	(3.07)
Country-Industry	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Country-Period	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry-Period	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
R-Squared	0.1015	0.0183	0.0885	0.0246	0.0590	0.1268	0.0713	0.1114	0.0378	0.0649
F-Test	14.15***	3.19***	12.99***	4.02***	12.20***	18.97***	21.44***	15.48***	7.26***	22.75***
# Observations	1,412	1,374	1,387	1,399	1,383	1,403	1,706	1,080	1,347	1,439
DHW Test	7.49***	3.24**	34.84***	33.36***	1.65	18.82***	2.60*	31.33***	38.49***	12.04***

Table 6. Systemic Banking Crises and Economic Volatility

This table shows results of regressions analyzing the effect of banking stability on industrial economic volatility using a CRISIS dummy variable as an alternative measure of banking stability. In Panel A we use the CRISISPOSTCRIS dummy variable that takes a value of 1 during the crisis period [t; t+2], and the post-crisis periods [t+3; T], and 0 otherwise. In Panel B we use the CRISIS dummy variable that takes a value of 1 during the crisis period [t; t+2], and 0 otherwise. t is the crisis inception date provided in Laeven and Valencia (2012) database. T is the final year in our sample period. Regressions are estimated using OLS or instrumental variables for cross-country data at industry-level. The dependent variable is the adjusted standard deviation of industrial value added. ISHARE is the initial share of value added for each industry. ED is the measure of external financial dependence calculated in Rajan and Zingales (1998). FD is a measure of financial development and is defined as the ratio of bank private credit from commercial banks-to-GDP. INTAN is the ratio intangible assets-to-net fixed assets calculated in Claessens and Laeven (2003) for US data. LAW is the measure of institutional quality. The Durbin-Wu-Hausman statistic tests the null hypothesis that the use of instruments for country-level variables does not change the estimation outcome. We report IV estimates when the test is rejected at the one percent level. The instruments used are: legal origin dummy variables and time dummies. Country-industry, country-period, and industry-period dummy variables are included but are not reported. T-statistics are between parentheses. ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively.

	PANEL A: Crisis & Post-Crisis Periods				**PANEL B: Crisis Periods**			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
ISHARE	-0.0442***	-0.0454***	-0.0443***	-0.0458***	-0.0462***	-0.0460***	-0.0450***	-0.0461***
	(-3.83)	(-3.87)	(-3.83)	(-3.91)	(-3.94)	(-3.93)	(-3.83)	(-3.93)
*ED * FD*	-0.1815***	-0.2703***	-0.2654***	-0.2879***	-0.1744***	-0.2554***	-0.1961***	-0.2605***
	(-7.53)	(-6.41)	(-9.00)	(-6.66)	(-7.21)	(-5.74)	(-7.06)	(-5.79)
*CRISIS * ED*	1.2737***				0.8421**			
	(5.88)				(2.22)			
*CRISIS * ED * FD*		0.0295***	0.1657***			0.0480	0.1116*	
		(3.12)	(5.70)			(0.77)	(1.92)	
*CRISIS * INTAN * LAW*		0.1762**		0.2395***		0.3869*		0.4799**
		(2.51)		(3.42)		(1.94)		(2.53)
Country-Industry	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Country-Period	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry-Period	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
R-Squared	0.0353	0.0330	0.0346	0.0306	0.0288	0.0293	0.0274	0.0292
F-Test	20.79***	15.89***	19.96***	16.63***	16.19***	13.50***	15.22***	15.43***
# Observations	4,612	4,573	4,612	4,573	4,573	4,573	4,573	4,573
Durbin-Wu-Hausman Test	12.46***	12.29***	15.65***	12.37***	8.72***	6.58***	9.14***	10.18***

Table 7. Banking Stability, Financial Development, and Economic Volatility: Real & Monetary Shocks

This table shows results of the effect of banking stability on economic volatility following the approach suggested in Beck et al. (2006b). Regressions are estimated using OLS or instrumental variables for cross-country data at industry-level. The dependent variable is the adjusted standard deviation of industrial value added. ISHARE is the initial share of value added for each industry. FD is a measure of financial development and is defined as the ratio bank private credit from commercial banks-to-GDP. TOT and INF are the adjusted standard deviation of terms of trade and the adjusted standard deviation of inflation, respectively. INTAN is the ratio intangible assets-to-net fixed assets calculated in Claessens and Laeven (2003) for US data. ED is the measure of external financial dependence calculated in Rajan and Zingales (1998). LAW is the measure of institutional quality. The Durbin-Wu-Hausman statistic tests the null hypothesis that the use of instruments for country-level variables does not change the estimation outcome. We report IV estimates when the test is rejected at the one percent level. The instruments used are: legal origin dummy variables (English, French, German and Scandinavian) and time dummies. Country-industry, country-period, and industry-period dummy variables are included but are not reported. T-statistics are between parentheses. *** and **, indicate significance levels of 1%, and 5%, respectively.

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
ISHARE	-0.0272*	-0.0339**	-0.0603***	-0.0588***	-0.0427**	-0.0518***	-0.0320*
	(-1.75)	(-2.03)	(-3.19)	(-3.12)	(-2.48)	(-3.09)	(-1.92)
FD	-0.4140***						
	(-4.15)						
SD_TOT	0.2914***						
	(8.23)						
SD_INF	-0.0465						
	(-0.42)						
*FD * ED*			-0.1483***	-0.1425***	-0.0923***	-0.0866***	
			(-6.75)	(-6.28)	(-4.67)	(-4.20)	
*SD_TOT * FD*	-0.2362***	-0.0009**		-0.0674*		0.0001	
	(-8.33)	(-2.31)		(-1.90)		(1.27)	
*SD_INF * FD*	0.1789***	0.0054**	0.0248*	0.0286**			
	(3.53)	(2.24)	(1.74)	(2.01)			
*SD_TOT * ED * FD*							-0.0019
							(-1.64)
*SD_INF * ED * FD*					0.0156***	0.0173***	0.0163**
					(2.67)	(2.86)	(2.34)
*SD_INF * INTAN * LAW*					0.0014*	0.0282**	0.0480***
					(1.75)	(1.98)	(3.30)
Country-Industry	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Country-Period	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry-Period	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
R-Squared	0.1077	0.0340	0.0916	0.0937	0.0636	0.0617	0.0401
F-Test	22.93***	9.46***	24.55***	21.39***	15.95***	14.78***	9.58***
# Observations	1,653	1,653	1,604	1,604	1,552	1,552	1,653
Durbin-Wu-Hausman Test	7.98***	2.60*	10.67***	10.67***	7.50***	7.21***	8.87***