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Financial dependence and growth during crises: when does bank efficiency really matter?

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Abstract

Many papers have analyzed the relationship between growth and a country's level of financial development using private credit. However, very few have used bank efficiency to gauge the development of the financial sector. The aim of this paper is to analyze the effect of bank efficiency on value added growth of industries that were most dependent on external financing during the financial crisis. Specifically, it uses the data envelopment analysis (DEA) method to measure the efficiency of the banking sector across countries, according to the empirical strategy offered by Rajan and Zingales (1998). Our main result shows that bank efficiency relaxed credit constraints and increased the growth rate for financially dependent industries during the crisis. These findings show the importance of bank efficiency in terms of quality of the financial sector in mitigating the negative effects of financial crises on growth for industries that are most dependent on external finance.

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1 Introduction

Many papers have analyzed and identified a positive relation between country's level of financial development and its growth rate. However, this large literature in finance and growth uses private credit as a measure of a country's level of financial development. The use of this measure poses two problems. First, Hasan *et al.* (2009) showed that private credit measures only the quantity of funds of the financial sector and should not be only used to measure the quality a country's level of financial development. Second, Rousseau and Watchel (2011) found a weak relationship between the level of financial development measured by private credit and growth for developed economies.

In this paper, we specifically investigate how bank efficiency alleviates the effects of financial frictions on economic growth for industries that were most dependent on external finance during the financial crisis. More specifically, we investigate the relationship between a country's bank efficiency and the extent of credit availability for these industries. To measure bank efficiency in financial systems, we use Data Envelopment Analysis (DEA). Growth is the annual growth rate in real value added across industries and countries during the period 2009, when the crisis spread from the U.S. to other countries. Financial dependence is computed at the industry level using data on U.S. industrial firms. Our final sample covers 38 countries and 36 industries, for a total of 1368 country-industry observations. Our first result shows that bank efficiency relaxed credit constraints, permitting externally dependent industries to grow faster during the crisis. Indeed, the reasoning behind of paper is as follows. More efficient banks do a better job of funneling available credit to more externally dependent industries. Thus, bank efficiency positively affects the supply of credit granted to firms, which in turn increases the growth rate in real value added for industries most dependent on external financing. Specifically, if we take one industry at the 75th percentile of external financial dependence and another industry at the 25th percentile of external financial dependence, we find that the difference in growth rate between these two industries is 2.41 percentage points higher in the former. This effect is large relative to mean annual industry value-added growth in our sample (-4.56%). In order to disentangle the impact of bank efficiency from other factors that might be correlated with our measure of bank efficiency, we control for other interactions between external financial dependence with measures of financial development, bank concentration and competition, cross-border banking (international and local claims), domestic and international public debt, bank supervision, net interest margin, banking crisis measures, bank supervision, macroeconomic policies (trade, real GDP, monetary policy, exchange rate and inflation) and other government policy intervention measures put in place during the crisis. Our result continues to hold, and remain robust to the use of several measures of external financial dependence, such as working capital needs and Tobin's Q. It is also robust to the use of several econometric methods, such as weighted least squares and the rank method.

Our paper is related to several strands in the existing literature on the topic. First, few papers have previously investigated the link between bank efficiency and a number of economic outcomes. Ramcharran (2016) empirically estimated the efficiency of bank loans to small and medium enterprises (SME) in India during the period 1979-2013. He found that increasing the productivity of bank loans (i.e. efficiency) increases the performance of SME in India. This paper is different from ours in two main respects. First, he used a parametric

production function, namely the log-quadratic production function, to determine efficiency of the banking sector instead of the non-parametric DEA approach, as we do in this paper. Second, the study focuses on one country, whereas our paper includes 38 countries and uses industry growth as a measure of economic growth. In the same vein, Wijesiri *et al.* (2015) use a bootstrapped DEA method to measure the effeciency of microfinance institutions (MFIs) in Sri Lanka and find that these institutions are financially and socialy inefficient. Even though this paper uses the same method, namely the DEA approach to measure bank efficiency, it does not look at the link between a country's level of bank efficiency and its industry growth. The study conducted by Belke *et al.* (2016) is the one that is closest to our study. Specifically, they analyze the impact of bank efficiency and regional growth across Europe in normal and crisis times. They show that bank efficiency is positively and significantly related to regional growth in both periods. Despite these interesting results, they use a parametric production function to estimate banking sector efficiency across countries. This is problematic since Barth *et al.* (2013) show that parametric function forms impose a specific structure on the shape of the efficient frontier. In addition, their sample only includes European countries, and they did not use industry growth or external financial dependence to avoid the problems related to omitted variables and causality. Using a DEA-based metafrontier, Gulati and Kumar (2016) assess the impact of finance on the Indian banking sector efficiency, finding that the global financial crisis decreased the efficiency of the Indian banking sector. This paper focuses on one country (India) and uses a different DEA-based metafrontier approach to measure the bank efficiency. Finally, Barth *et al.* (2013) use the DEA method to measure bank efficiency and find that strict bank supervision negatively and significantly impacts bank efficiency for a sample of 72 countries during the period 1999-2007.

Second, our paper adds to the empirical literature on the relationship between growth, banking crises and financial frictions. Braun and Larrain (2005) assess the relationship between finance and the business cycle across countries and industries, find that industries that are more dependent on external finance are hit harder during recessions. This result does not take into account the effect of the quality of the financial sector, such as its efficiency, as we do in this paper. For Raddatz (2006), larger liquidity needs create higher volatility, and financially underdeveloped countries experience deeper crises, a finding in line with our main result. Kroszner *et al.* (2007) use the same approach as in our paper to investigate the growth impact of bank crises on industries with different levels of dependence on external finance. However, they measured the level of financial systems using private credit and a dummy variable that takes the value of one if a country was experiencing banking crisis and zero if not. In addition, Dell'Ariccia *et al.* (2008) studied the effects of banking crises on growth in industrial sectors and found that in sectors more dependent on external finance, value added grew slower than in sectors less dependent on external finance. Laeven and Valencia (2013) found that the growth of firms dependent on external financing is disproportionately positively affected by bank capitalization policies. Our paper uses the same approach, but at the industry level, and adds bank efficiency as a measure of a country's level of financial development. Finally, Cetorelli and Goldberg (2011) show that cross-border banking operations were a driving factor behind the 2009 financial crisis. To test if our results are not affected by their finding, we use several measures of cross-border banking interacted with external financial dependence as controls. The remainder of the paper is organized as follows. Section 2 outlines the basic methodology, section 3 presents the empirical investigation, and

section 4 concludes.

2 Methodology

To study the relationship between bank efficiency, financial dependence and growth during the 2009 financial crisis, we first estimate the following econometric specification following, Rajan and Zingales (1998):

$$\text{Growth}_{j,k} = \text{Constant} + \beta_1\text{*Country Indicators} + \beta_2\text{*Industry Indicators} + \beta_3\text{*Size}_j + \beta_4\text{*Financial dependence}_j \times \text{Efficiency Index}_k + \text{Controls}_{j,k} + \epsilon_{j,k}$$

where j and k denote industry and country, respectively. Growth is the annual growth rate in real value added of industry j in country k during 2009. Financial dependence measures industry j's dependence on external financing, and efficiency quantifies bank efficiency in country k. Size is measured by the logarithm of total assets of industry j. The country and industry indicators are based on the IFS country classification code and the International Industry Classification Code, respectively.

As argued by Rajan and Zingales (1998), this method suggests there is a technological reason explaining industries' degree of financial dependence, and that different production technologies can be compared across countries using the U.S. as a benchmark. But the last assumption is debatable because countries from emerging and developing economies in our sample have different initial endowments than the U.S. To solve this problem, Claessens and Laeven (2005) and Fishman and Love (2009) proposed to control for growth opportunities and Tobin's Q as controls. In the same vein, Raddatz (2006) argued that the results obtained using external financial dependence can be driven by a change in working capital financing. For this reason, we also introduce the interaction term between bank efficiency and capital needs in our estimations. Most importantly, as Laeven and Valencia (2013) indicate, an industry-level measure of a firm's growth opportunities should not be constructed using the U.S. as a benchmark. The reason for this is that growth opportunities vary across countries and industries. We also use the interaction term between bank efficiency and Tobin's Q, a proxy of an industry firm's growth opportunities. Introducing all these control variables, our main result remains robust.

Another main advantage of this approach is that it treats for potential omitted variable bias compared to cross-country specifications. The introduction of country and industry dummies in the regression allows us to treat for possible systematic demand effects that are not captured by our measure of financial dependence. Finally, we eliminate the U.S., which is our benchmark for measuring external financial dependence for a potential endogeneity. We also drop countries with only one or two observations, such as the Czech Republic and Nigeria. Our data are composed of 38 countries, and 36 industries for a total of 1368 country-industry observations. The final sample was chosen according to the availability of industry level and bank efficiency data. However, to avoid selection bias in our results, we use the database of Laeven and Valencia (2013) on banking crises and include countries that were severely hit by the 2009 financial crisis, as well as and those in which the financial sector was largely unaffected.[1]

[1]Laeven and Valencia (2012) defined systemic banking crisis if two conditions are met: (i) significant signs

2.1 Data

Growth rate in real value added and financial dependence Growth is the annual growth rate in real value added as a percentage during the year 2009. The external finance dependence denotes Rajan and Zingales' (1998) measure of intensity reliance on external finance, defined as one minus industry cash flow over the industry investment of large publicly traded U.S. firms in the 1980s. In terms of robustness test, we use external dependence computed over the period 1980-2006, taken from Laeven and Valencia (2013).

Bank efficiency measure Bank efficiency is measured over the period 1999-2007 using the data envelopment analysis (DEA) method. The data come from Barth *et al.* (2013), who showed the advantage of a non-parametric method, compared to a parametric model, is that the latter requires one to assume a particular function form, thereby imposing a specific structure on the shape of the efficiency frontier. Importantly, this paper looks at the productive efficiency of the banking sector for different countries. The non-parametric DEA method envelops the multiple input data (deposits, labor and physical capital) and output data (total loans and securities) in the sample of 4050 banks over the period 1999-2007, taken from Bankscope database. They then computed the bank efficiency as an average over country-time. Specifically, the coefficient obtained for bank efficiency does not suffer from the problem of functional form. The bank efficiency score lies between 0 and 1, and a higher value obtained with the DEA method indicates higher efficiency in the banking sector. A lower value means lower efficiency.

To overcome endogeneity problems in our estimation during our period of interest, namely the financial crisis in 2009, our external financial dependence measure is computed over the 1980s and 1980-2006, while bank efficiency is computed during the period 1999-2007. All periods are prior to the financial crisis.

Controls Our specifications use the following control variables from the World Bank WDI[2]: inflation rate, trade, market and stock market capitalization. Private credit provided by the banking sector includes all credit to various sectors on a gross basis, with the exception of credit to the central government, which is net. Inflation, consumer price index, as measured by the consumer price index, reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as annually (the Laspeyres formula is generally used). Trade is calculated as the sum of exports (% of GDP) and imports (% of GDP). Market capitalization, listed domestic companies are the domestically incorporated companies listed on the country's stock exchanges at the end of the year. Listed companies do not include investment companies, mutual funds, or other collective investment vehicles. We control our results for total capitalization, defined as the sum of private credit/GDP and stock market capitalization/GDP. We also control for real GDP growth. Specifically, the introduction of the interactions between external financial dependence and market and stock market capitalizations as controls allows us to replicate the results obtained by Rajan and Zingales (1998).

of financial distress in the banking system (significant bank runs, losses, and/or banking liquidation) and (ii) significant banking policy intervention measures in response to significant losses in the financial sector.

[2]The World Development Indicators are publicly available at `http://www.worldbank.org/`.

To test the sensitivity of our results, we use bank concentration, measured as the share of assets of the three largest banks in terms of total banking system assets. Its value lies between 0 and 1, where 0 indicates a low bank concentration and 1 a high bank concentration.[3] This variable controls for the results obtained by Cetorelli and Gambera (2001), who found that bank concentration increases growth for industries that are most dependent on external financial by facilitating access to credit for younger firms. Also, Diallo and Koch (2013) found that bank concentration is negatively related to growth for countries close to the world technology frontier. In terms of bank competition, we use three measures, namely the Boone indicator, the Lerner index and the adjusted Lerner index.[4] The introduction of these variable allows us to control for the results of Claessens and Laeven (2005). They used the same strategy and found a positive relationship between bank competition measured by the Panzar and Rosse approach and growth across countries for industries that are most dependent on external finance.

Since Cetorelli and Goldberg (2011) found that bank globalization had a significant effect on the transmission of the financial crisis to emerging countries, we evaluate the relationship between measures of bank globalization and our measure of bank efficiency. Most importantly, we use total international claims (as a percentage of GDP) and local claims in local currency (as a percentage of GDP) as controls. These two variables are computed as of 2007 and come from the Bank of International Settlements (BIS) Statistics.[5] In addition, we introduce outstanding domestic public debt securities to GDP (%) and outstanding international public debt securities to GDP (%), also taken from the BIS. More precisely, the domestic public debt securities is measured as the total amount of domestic public debt securities issued in domestic markets as a share of GDP. It covers long-term bonds and notes, treasury bills, commercial paper and other short-term notes. The international public debt securities is measured as the amount of public international debt securities, as a share of GDP. It covers long-term bonds and notes and money market instruments placed on international markets. Barth *et al.* (2013) find a strong, and positive effect of official supervisory power on bank efficiency, we use this variable interacted with external financial dependence as a control. We also use the net interest margin defined as the accounting value of a bank's net interest revenue as a share of its interest-bearing (total earning) assets interacted with external financial dependence as a control, since Beck *et al.* (2010) argue that higher levels of net interest margins or overhead costs indicate lower levels of banking efficiency.[6]

In terms of macroeconomic variables, we control for changes in monetary policy over the period August 2008-March 2009, exchange rate depreciation over the period August 2008-March 2009, the change in monetary base/GDP over the period 2008q3-2009q1, the local currency exchange to USD (end-2009), inflation and real GDP growth. In order to take into account the effect of government policy intervention measures during the crisis, as in Laeven and Valencia (2013), we add assets announced and used, bank guarantees and liquidity support, all interacted with the measure of external financial dependence as

[3]Concentration and supervisory power measures are taken from the 2013 Global Financial Development Database (GFDD) of the World Bank Group.

[4]Data come from the Global Financial Development Database of the World Bank Group (2013).

[5]Publicly available at `http://www.bis.org/statistics/bankstats.htm`.

[6]The data come from the 2013 Global Financial Development Database (GFDD) of the World Bank Group, and are publicly available at `http://www.worldbank.org/`.

controls. These variables of government policies are computed over the period September 2008 to March 2009 and normalized in terms of country's GDP using 2008. Specifically, liquidity support is measured by the change in gross claims of the monetary authorities to financial institutions as a percentage of GDP. Bank guarantees creditors measures coverage of deposits and/or other liabilities, existing or new. Asset purchases are assets acquired by the Central Bank, from bank institutions, including loans from the Treasury to banks, but excluding government bonds.[7]

Finally, we use the interaction terms between bank efficiency and working capital needs, as well as Tobin's Q, as controls. Tobin's Q, is computed as the ratio of the market value of equity of total assets. We use capital needs, taken from Laeven and Valencia (2013), who follow Raddatz (2006) to compute capital needs using the industry median ratio of inventories to sales, plus the ratio of receivables to sales, minus accounts payables to cost of goods sold over the period 2000 to 2006, which is prior to the financial crisis. We also control for other industry characteristics such as leverage and fixed assets. Leverage is measured as the debt-to-asset ratio, while fixed assets is the ratio of fixed assets to total assets. To control for the results of Kroszner *et al.* (2007), who found that sectors most dependent on external financing tend to experience a greater contraction of value added during banking crises in countries with deeper financial systems, we use the dummy variable banking crisis, interacted with our measure of external financial dependence.

3 Results

This section presents the results of our specifications. The dependent variable is the annual growth rate in real value added over the period 2009. In each specification, we introduce the intercept, country and industry indicators. To treat heteroskedasticity problems in our regressions, we use clustered standard errors by country and industry.

Our main result is presented in column (1) of Table 1, where we regress the interaction term between bank efficiency and external financial dependence, and control for size and fixed effects, on growth rate in terms of real value added. The coefficient associated with industry size is positive and significant at the 1% level. This suggests that industry size had a positive and significant direct effect on growth during the crisis. The interaction term between bank efficiency and external financial dependence enters positively and statistically significant at the 5% level. This finding implies that bank efficiency matters for improving growth in industries that are more financially dependent on external finance. The regression in column (1) allows us to find the difference in growth in real value added between industries. The difference in growth during the crisis between an industry at the 75th percentile and the 25th percentile of external financial dependence is 2.41 percentage points higher for the former. This effect is large relative to mean annual industry value-added growth in our sample (-4.56%). Bank efficiency thus makes banks more resilient to financial crisis. The mechanism through which bank efficiency affects growth is the "credit-channel." During the 2009 financial crisis, bank efficiency positively affected the supply of credit granted to firms, which in turn enhanced the growth rate in terms of real value added. Our main result stipulates that bank efficiency alleviated the negative effects of the financial crisis on growth.

[7]Data come from Laeven and Valencia (2013).

The measure of bank efficiency in a country may capture other aspects of financial development. More precisely, our main result could simply be that countries with a high level of financial development have more efficient banking systems. Financial development could have offered alternative sources of industries that are more dependent on external finance during the recent global financial crisis. To disentangle bank efficiency from financial development measures we introduce the interaction term between market capitalization and external financial dependence in column (2) and the interaction term between total capitalization and external financial dependence in column (3) of Table 1. The coefficient of the interaction term between our measure of bank efficiency and external financial dependence is positive and significant at the 5% and 10% levels, respectively. This suggests that bank efficiency enhances the growth rate for financially dependent industries during crisis. However, the interaction term between market and total capitalization, and external financial dependence, enters positively, a finding in line with Rajan and Zingales (1998), even though the coefficients are insignificant. In column (4), we introduce the interaction term between bank concentration and external financial dependence. The coefficient associated with industry size remains positive and significant at the 1% level. The interaction term between bank efficiency and external financial dependence is positively and significantly related to growth at the 5% level. However, the interaction term between bank concentration and external financial dependence is positive and insignificant. Our result is thus not due to bank concentration; instead, we find that the real growth rate in value added is disproportionately positively affected by bank efficiency for financially dependent industries. Columns (5)-(7) control for bank competition using three measures, namely the Boone indicator, the Lerner index and the adjusted Lerner index. In all specifications, bank efficiency interacted with external financial dependence remains positive and statistically significantly different zero at the 5% level. This suggests that industries that are more financially dependent grow faster in financial systems that are more efficient. It also suggests that our main results do not suffer from possible endogeneity problems with bank concentration and competition measures.

Table 1 around here

In Table 2 we control our findings for bank globalization, bank supervision, net interest margin and domestic, and international public debt. Columns (1) and (2) add external financial dependence interacted with international and local claims, respectively. The sign and significance of our variable of interest remain unchanged, but the magnitude of the coefficient increases. We also control our results using the interaction term between supervisory power and external financial dependence in column (3). Again, the sign and significance of bank efficiency interacted with external financial dependence remain unchanged, even though it decreases in magnitude. Bank efficiency had a positive and significant effect on growth for financially dependent industries during the 2009 financial crisis. More specifically, using the coefficient in column (3), we show that the difference in growth during the crisis between an industry at the 75th percentile and the 25th percentile of external financial dependence is 0.52 percentage point higher for the former. This effect is largely relative to mean annual industry value-added growth in our sample (-4.56%). In column (4), we introduce the interaction terms between net interest margin and external financial dependence. As we can

see below, our interest variable, namely the interaction term between bank efficiency and external financial dependence, enters positively and statistically significant at the 1% level. Finally, in columns (5) and (6) we add domestic and international public debt as controls. Our results remain robust to the introduction of the interaction terms between domestic and international public debt interacted with external financial dependence.

Table 2 around here

In Table 3, we control for the level of economic development as measured by real GDP growth, the degree of openness measured by trade, inflation and exchange rates and changes in monetary policy and monetary base. Controlling for these variables reduces concerns about omitted variables. Columns (1) and (2) add the interaction terms between real GDP growth and external financial dependence, as well as trade and external financial dependence. Firm size remains positively and significantly related to growth at the 1% level. The interaction term between bank efficiency and financial dependence remains positive and significant at the 5% level. This suggests that bank efficiency has a positive and significant growth effect for financially dependent industries. Real GDP growth and trade positively affect growth for financially dependent industries, even though the coefficients are insignificant. Inflation and exchange rates are introduced in columns (3) and (4). Our interest variable, namely the interaction between bank efficiency and external financial dependence remains positive and significant at the 5% level. Monetary policy variables are shown in columns (5) and (6). We find that bank efficiency interacted with external financial dependence is statistically significantly different from zero at the 5% level. This suggests that bank efficiency plays a positive and significant role for growth in financially dependent industries during a crisis. We add all variables in column (7), and show that bank efficiency disproportionately increases the growth rate in terms of real value added of industries that are dependent on external financing during the crisis. Our main results remain robust due to the use of real GDP growth rate, trade, inflation and exchange rates, and monetary policy and base as controls, and validate at the same time our conclusion shows that bank efficiency makes countries more resilient to financial frictions.

Table 3 around here

To obtain the results featured above, we conducted some robustness checks using government intervention measures as controls, as shown in Table 4. We first control for the interaction terms between announced asset purchases and asset purchases used, and external financial dependence. The results are presented in columns (1) and (2). Bank efficiency interacted with external financial dependence is positively and significantly related to growth for financially dependent industries at the 5% level, while announced assets and assets used interacted with external financial dependence enter positively but insignificantly. This suggests that our result is not function of bank policy intervention measures during the crisis.

Indeed, bank efficiency exerts a positive and significant effect on growth of industries that are more dependent on external financing. Next, we investigate two other measures used during the crisis by governments, namely bank guarantees and liquidity support. Controlling for the interaction term between bank guarantees and external financial dependence in column (3), we show that our interest variable remains positive and significant at the 5% level. However, bank guarantees interacted with financial dependence enters negatively and insignificantly. Finally, column (4) adds liquidity interacted with external financial dependence as a control. The coefficient of the interaction term between bank efficiency and external financial dependence is positive and statistically significantly different from zero at the 5% level. This suggests that the real growth rate in terms of value added is disproportionately positively affected by bank efficiency for financially dependent industries.

Table 4 around here

It could also be that our result depends on whether the impact of the financial crisis on the banking sector is a function of the measure of bank efficiency, so we control our results for banking crises. We also include countries considered as having a borderline systemic banking crisis.[8] Our interest variable, namely the interaction term between bank efficiency and external financial dependence, remains positive and significant at the 10% level. This suggests that deeper bank efficiency enhances the growth rate in terms of real value added for industries that are more dependent on external financing during the crisis.[9]

To continue to test the robustness of our results, we introduce an alternative measure of external financial dependence. This measure is calculated using the same method of Rajan and Zingales (1998), over the period 1980-2006. We find that bank efficiency interacted with external financial dependence enters positively and statistically significantly different from zero at the 10% level. Finally, we control for Tobin's Q and working capital needs. Our main results remain robust and confirm that efficiency in the banking system matters for improved access to all forms of external financing during a crisis, regardless of whether we control for industry and country characteristics.[10]

4 Concluding remarks

This paper studies the relationship between bank efficiency, financial dependence and economic growth during the 2009 financial crisis. Our study focuses on international evidence from 38 countries over a wide variety of industries. We first find that bank efficiency is positively and significantly related to growth in terms of real value added for financially dependent industries during the crisis. We especially control for the level of financial development, bank concentration and competition, cross-border banking, domestic and international public debt, bank supervision, net interest margin, the level of economic development

[8]These countries are composed of France, Greece, Hungary, Portugal, Russia, Slovenia, Spain, Sweden and Switzerland. For more details, see Laeven and Valencia (2013)

[9]These results can obtained from the author upon request.

[10]These results can obtained from the author upon request.

measured by real GDP growth rate, inflation, and trade. We also control our results for exchange rate, changes in monetary policy, and growth opportunities, as measured by the Tobin's Q and working capital needs as alternative measures of financial dependence. This paper contributes to the literature on financial frictions with new evidence on the importance of bank efficiency through the credit channel. Efficiency makes banks more resilient to shocks, thereby positively and significantly affecting the growth rate of industries that are more dependent on external financing.

In terms of policy recommendations, this paper stresses the importance of the quality of the financial sector, i.e. its efficiency, during financial crises. It encourages governments and policy-makers to reform their banking sectors by increasing bank efficiency in order to mitigate the negative impacts of crisis on their economies. This makes their economies more resilient to external shocks, foster economic growth, and increase prosperity.

Despite these interesting results, our analysis is limited to one year, 2009, which was quite an extraordinary year, both for the real economy across large parts of the globe, as well as for banking systems. The approach and analysis presented in this paper could be extended in two interesting ways. First, one could compare our results to the two other economic crises (1990:3-1992:2 and 2001:1-2003:1). Second, one could analyze the relationship between finance and growth using our new measure of bank efficiency and larger sample periods. We leave this for future research.

Table 1: **Financial dependence, growth and bank efficiency, controlling for the level of financial development and bank competition**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Size	0.961***	0.961***	0.960***	0.968***	0.954***	0.956***	0.958***
	(0.316)	(0.316)	(0.316)	(0.315)	(0.317)	(0.316)	(0.317)
Bank efficiency × Financial dependence	0.348**	0.345**	0.327*	0.315**	0.340**	0.348**	0.353**
	(0.154)	(0.161)	(0.172)	(0.161)	(0.155)	(0.154)	(0.155)
Market capitalization × Financial dependence		0.001					
		(0.015)					
Total capitalization × Financial dependence			0.003				
			(0.013)				
Concentration × Financial dependence				0.089			
				(0.119)			
Boone × Financial dependence					0.244		
					(0.493)		
Lerner × Financial dependence						0.159	
						(0.254)	
Adjusted Lerner × Financial dependence							0.125
							(0.294)
Industry indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1368	1368	1368	1368	1368	1368	1368
Number of countries	38	38	38	38	38	38	38
R^2	0.121	0.121	0.121	0.121	0.121	0.121	0.121

Note that (***, ** and *) indicate significance at the 1%, 5% and 10% levels, respectively. Clustered standard errors by country and industry are in parenthesis, all regressions include a constant, country and industry fixed effects. The dependent variable is the annual growth rate in terms of real value added of an industry during the period 2009.

Table 2: **Financial dependence, growth and banking efficiency controlling for bank globalization, supervision and net interest margin**

	(1)	(2)	(3)	(4)	(5)	(6)
Size	0.640	0.655*	1.111***	1.207***	1.020***	0.999***
	(0.391)	(0.390)	(0.317)	(0.307)	(0.317)	(0.318)
Bank efficiency × Financial dependence	0.550**	0.540**	0.076***	0.111***	0.352**	0.316**
	(0.235)	(0.233)	(0.155)	(0.042)	(0.171)	(0.160)
International claims × Financial dependence	-20.976					
	(24.853)					
Local claims × Financial dependence		-20.030				
		(49.295)				
Supervisory power × Financial dependence			-1.830			
			(1.588)			
Net interest margin × Financial dependence				-0.972		
				(1.021)		
Domestic public debt × Financial dependence					-0.040	
					(0.109)	
International public debt × Financial dependence						-0.093
						(0.219)
Industry indicators	Yes	Yes	Yes	Yes	Yes	Yes
Country indicators	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1368	1368	1368	1368	1368	1368
Number of countries	38	38	38	38	38	38
R^2	0.118	0.118	0.041	0.066	0.114	0.114

Note that (***, ** and *) indicate significance at the 1%, 5% and 10% levels, respectively. Clustered standard errors by country and industry are in parenthesis, all regressions include a constant, country and industry fixed effects. The dependent variable is the annual growth rate of an industry during the period 2009.

Table 3: **Financial dependence, growth and bank efficiency controlling for macroeconomic variables**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Size	0.962***	0.959***	0.952***	0.973***	0.954***	0.966***	0.947***
	(0.316)	(0.318)	(0.314)	(0.316)	(0.316)	(0.316)	(0.318)
Bank efficiency × Financial dependence	0.354**	0.346**	0.417**	0.375**	0.370**	0.366**	0.487***
	(0.156)	(0.154)	(0.190)	(0.152)	(0.155)	(0.157)	(0.183)
Real GDP growth × Financial dependence	0.051						0.299
	(0.424)						(0.425)
Trade × Financial dependence		0.001					0.017
		(0.013)					(0.016)
Inflation × Financial dependence			0.510				0.425
			(0.756)				(0.821)
Exchange rate × Financial dependence				27.062			35.584
				(17.981)			(19.409)
Monetary policy × Financial dependence					-0.599		-0.797
					(1.003)		(1.104)
Monetary base × Financial dependence						-0.322	-0.255
						(0.453)	(0.521)
Industry indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1368	1368	1368	1368	1368	1368	1368
Number of countries	38	38	38	38	38	38	38
R^2	0.121	0.121	0.121	0.122	0.121	0.121	0.123

Note that (***, ** and *) indicate significance at the 1%, 5% and 10% levels, respectively. Clustered standard errors by country and industry are in parenthesis, all regressions include a constant, country and industry fixed effects. The dependent variable is the annual growth rate of an industry during the period 2009.

Table 4: **Financial dependence, growth and bank efficiency using government interventions variables as controls**

	(1)	(2)	(3)	(4)
Size	0.959***	0.958***	0.964***	0.961***
	(0.315)	(0.315)	(0.317)	(0.316)
Bank efficiency × Financial dependence	0.329**	0.328**	0.355**	0.365**
	(0.161)	(0.159)	(0.154)	(0.171)
Assets announced × Financial dependence	0.352			
	(0.717)			
Assets used × Financial dependence		0.430		
		(0.735)		
Bank guarantees × Financial dependence dependence			-0.005	
			(0.020)	
Liquidity support × Financial dependence				-0.076
				(0.334)
Industry indicators	Yes	Yes	Yes	Yes
Country indicators	Yes	Yes	Yes	Yes
Number of observations	1368	1368	1368	1368
Number of countries	38	38	38	38
R^2	0.121	0.121	0.121	0.121

Note that (***, ** and *) indicate significance at the 1%, 5% and 10% levels, respectively. Clustered standard errors by country and industry are in parenthesis, all regressions include a constant, country and industry fixed effects. The dependent variable is the annual growth rate of an industry during the period 2009.

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