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THE IMPACT OF THE GLOBAL FINANCIAL CRISIS ON INDUSTRY GROWTH*

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This article investigates the real effects of the recent global financial crisis by using industry panel data across 82 countries. We find that industry growth indicators experienced a sharp drop following the crisis. However, a closer inspection indicates that an adverse effect is pronounced in industries that are more dependent on external finance, and also in those industries that rely on trade credit due to underdeveloped financial intermediation. It is also found that low- and lower-middle-income countries tend to experience a lesser impact on growth. These findings provide new evidence of the negative externalities associated with credit-market friction.

1 Introduction

Many studies have tested the so-called finance-industry growth nexus, and most of the empirical evidence reports a robust, positive, causal effect of finance on industry growth (e.g. King and Levine, 1993; Rajan and Zingales, 1998; Levine *et al*., 2000). In particular, Rajan and Zingales (1998) find that industries and firms that rely heavily on external financing grow disproportionately faster in countries with well-developed banks than in countries with poorly developed financial systems. These studies employ volume measures of finance and implicitly focus on the quantity effects of financial development on economic growth. A new strand of empirical studies has attempted to investigate the impact of quality-based variables such as bank market structure on industry growth (Claessens and Laeven, 2005; Maudos and Fernandez de Guevara, 2006).

It is recognized that financial markets, in general, and banking systems, specifically, have greater incentives to finance non-financial firms during a period of financial stability. Besides, more financially dependent firms are willing to establish lending relationships with banks, enhancing their access to external finance, consequently increasing economic growth. Previous

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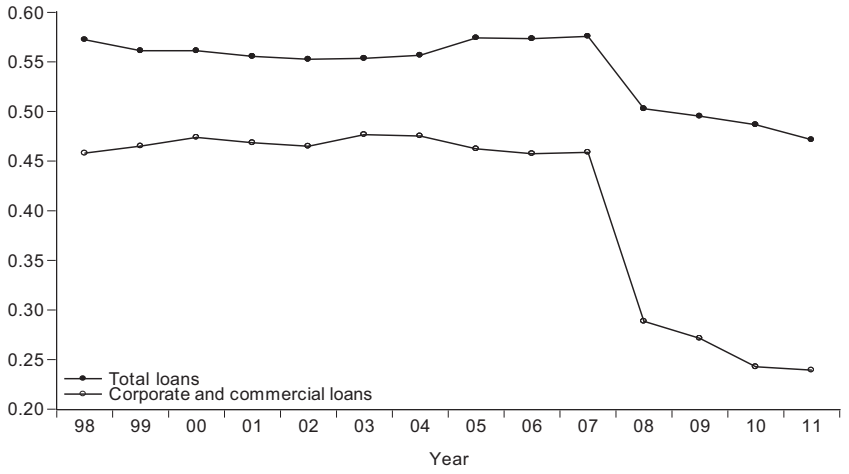

FIG. 1. Corporate and Commercial, and Total Loans as a Fraction of Banking Sector's Total Assets in 79 Emerging and Advanced Economies over the Period 1998–2011

studies have, however, pointed out that private sector growth should slow down in response to credit crunches (Rajan and Zingales, 1998; Demirguc-Kunt *et al.*, 2004; Love *et al.*, 2007). For example, in Love *et al.* (2007), the financial crises of the 1990s in emerging markets presented extreme cases of the collapse of institutional financing. Love *et al.* find that the provision of trade-credit contracts after the crisis that follows a bank credit-crunch. These studies suggest that the amount of credit available for externally dependent firms is likely to fall during a financial crisis. Moreover, firms have fewer incentives to enter into lending relationships with banks if they suspect that banks are unstable, or may be about to go bankrupt due to banking crises.

In terms of the availability of credit during the current financial crisis, Fig. 1 shows the trend of corporate and commercial loans and also the total loans as a fraction of total assets of the banking sectors of 79 economies for the period 1998–2011.[1] As can be seen, up to 2007, the ratio of loans to total assets is constant, however, during the crisis a sharp decline is observed. Specifically, during the period 2007–8 corporate and commercial loans dramatically fall. Kapan and Minoiu (2013) study the role of bank balance sheets with a particular emphasis on capital and structural liquidity in influencing the transmission of shocks to the economy through the conduit of bank lending. Analysing the lending behaviour of more than 800 financial institutions across 55 advanced and

[1]In the empirical analysis in this paper, 82 countries are used for estimation. However, data for loan growth (in BankScope) are available for 79 out of 82 countries.

emerging countries during 2006–10, Kapan and Minoiu find that bank balance-sheet strength matters in curtailing lending faced with adverse shocks: Banks that relied more heavily on wholesale funding with lower structural liquidity were more exposed to liquidity shocks during the crisis, reducing lending more than other banks. On the other hand, better-capitalized banks that were exposed to the shocks decreased their supply of credit less than other banks. The observation of a sharp fall of corporate and commercial loans in Fig. 1 appears to illustrate overall bank vulnerability to liquidity shocks during the crisis, reducing their supply of credit. Industrial sectors, especially, those that are more reliant on external finance, may have suffered from this shortage of credit supply. Raw findings indicate a negative impact of the financial crisis on industry growth. The recent global financial crisis, and the global deleveraging process that ensued, offers perhaps the most convincing evidence to investigate empirically the economic relevance of financial frictions and their real effects.

In an attempt to analyse the link between financial shocks and the real economy, Kroszner *et al*. (2007) examine the impact of banking crises on the growth of industries with different levels of dependence on external finance over the previous crisis period of 1980–2000. Using data for 38 countries which experienced a banking crisis, they find that financial crises had a disproportionately negative impact on sectors that rely more on external sources of finance if they are located in countries with developed financial systems. For instance, in a country experiencing a banking crisis, a sector at the 75th percentile of external dependence and located in a country at the 75th percentile of private credit to GDP would experience a 1.6 per cent greater contraction in growth in value-added between the crisis and pre-crisis period compared with a sector at the 25th percentile of external dependence and private credit to GDP. Recently two studies have attempted to investigate the real effects of the recent financial crisis. Klapper and Love (2011) study the effects of the 2008 global financial crisis on new firm registrations in 95 countries. They find that approximately all countries experienced a significant decline in business formation during the crisis. Moreover, their study reveals that for countries with well-developed financial sectors the crisis had a greater negative impact on business creation. Laeven and Valencia (2013) also study the real effects of disruption in the supply of credit. Using data for the recapitalization of banking sectors as well as firm-level data for 50 countries during the crisis period 2008–9, Laeven and Valencia find that recapitalization policies enhanced the value-added growth of firms that are more dependent on external sources of finance. Overall, these studies highlight the importance of supply-side financial frictions in influencing real economic activities.

The objective of this paper is to empirically examine the real impact of the current global financial crisis by using industry panel data for 23

manufacturing industries in 82 countries.[2] The main feature of our study is as follows: Being distinguished from Klapper and Love (2011) and Laeven and Valencia (2013), we investigate the direct crisis effect on *industry growth* by using industry-level data realized by the UNIDO (United Nations Database on Industrial Statistics). Specifically, we consider two alternative measures of industry growth: investment growth and output growth. The former is measured by the growth of fixed capital formation, and the latter is measured by the growth of industry output and value-added. Our approach is rigorous as we estimate the model in alternative dimensions that embrace (i) the heterogeneity effects of the financial crisis on the performance of industries with different levels of dependence on external finance, which is absent from the work of Klapper and Love (2011), (ii) the monetary policy effects and financial development as control variables, (iii) the different stages of economies measured by the level of income, and (iv) the effects of the market- and bank-based economies.

Kroszner *et al*. (2007) contribute to the literature on the mechanisms linking financial shocks and real economic activity. Kroszner et al. focus on banking crises by investigating the impact of banks on the provision of credit and liquidity to firms during times of banking distress. The attempt is made to assess other types of economic shocks such as currency crises and economic recessions, however, it is found that such shocks do not generate a growth effect on industry.[3] Our approach is distinctive in that we focus on the recent global financial crisis. It engulfed the collapse of large financial institutions in some developed economies together with a sharp drop of stock markets worldwide. In general, this crisis played a significant role in the failure of key businesses, declines in consumer wealth, and a downturn in economic activity leading to the European sovereign-debt crisis. Given that the recent crisis has been unlike anything seen for decades, our study which utilises all 82 countries based on data availability for the period of 2000–2010, is more robust and wider in scope in comparison with that of Kroszner *et al*. (2007), and the findings would be contributory to understanding the effect of the crisis on the real economy.

There are, potentially, a number of linkages, which propagate shocks across borders, leading to the decline of industry growth. For instance, Claessens *et al*. (2012) examine how the 2007–9 crisis affected firms' performance, using accounting data for 7722 non-financial firms in 42 countries. Claessens *et al*. analyse three channels through which the crisis may have affected firms: a business-cycle channel, a trade channel and a financial channel. They find that the crisis had a bigger, negative impact on firms with greater sensitivity to business cycles and trade developments in countries more open to trade,

[2]To enhance comparability of our results with those obtained in earlier works, we limit the sample to manufacturing industries only.

[3]Kroszner *et al*. (2007) argue that the contraction of growth is primarily due to troubles in the banking sector.

while the evidence for the role of financial linkages is considerably weaker. In Yamamoto (2014), it is found that US spillover shocks through both US financial and trade linkages exert a significant impact on production in Asian economies, accounting for around 50 per cent of the production fluctuation with the impact of financial shocks being greater than that of trade shocks. The study of Feldkircher (2014) relates the role of pre-crisis credit growth in shaping the real economy's response to the crisis. Feldkircher argues that buoyant growth in real GDP, accompanied by strong growth of credit, particularly exacerbated the effects of the recent crisis on the real economy. Our identification strategy exploits the crisis itself as a shock to credit supply, as shown in Fig. 1, and measures the impact on industry growth by combining an exogenous measure of firms' dependence on external financing.[4]

Empirical results reveal that, in general, industry growth indicators experienced a sharp drop following the crisis. However, such impact is statistically heterogeneous among industries, since the crisis has had a negative impact mainly on those industries which are more reliant on external finance. The recent financial crisis also appears to alter the growth of those industries that heavily rely on trade credit depending on whether they are located in financially developed countries or in financially under-developed countries. Furthermore, while both bank-based and market-based economies have been negatively affected by the crisis, low and lower-middle-income countries tend to experience less contraction of growth.

The rest of the paper is organized as follows. Section 2 contains the illustration of the model and data. The main empirical results are reported in Section 3. Section 4 applies the model proposed by Rajan and Zingales (1998) by interacting the degree of external-financial dependence of industries with financial development, and Section 5 concludes.

2 Model Specification and Data

2.1 Model Specification

In order to test the impact of the crisis on industry, we formally investigate the relationship between the financial crisis and industry growth. Following Klapper and Love (2011), the base model for estimation takes the form of

$$IndGrow_{ict} = \beta_0 + \varnothing Trend_t + \varphi Cris_t + \gamma ConVar_{ct} + \rho_i + \tau_c + \varepsilon_{ict} \qquad (1)$$

Dependent variable is industry growth in each industry i and each country c with time period t. Industry growth is (i) the growth rate of fixed capital formation, (ii) output growth, and (iii) value-added growth in a particular industry in each country. In order to isolate the impact of the crisis event

[4]It is assumed that other channels are captured by taking country- and industry-specific fixed effects.

from long term trends, we include a linear *Trend* variable into the model. The US subprime crisis triggered the global crisis in 2007, and Lehman Brothers' bankruptcy in September 2008 witnessed the peak of the crisis. The effect began with the data for 2007 for some countries, however, the paramount effect was felt in 2008 in many countries. We specify crisis dummy (*Cris*) to identify the year 2008 with one for crisis period 2008–10 and 0 otherwise.[5] *ConVar* is a vector of control variables. The model also specifies industry (ρ_i) and country (τ_c) fixed effects (though not reported in tables to save space). Errors (ε) is *clustered at the industry level*.

We consider two control variables: a real interest rate to capture the impact of monetary policy and an indicator of financial development (i.e. the ratio of domestic credit to the private sector to GDP). The monetary policy variable determines the availability of credit in economies, and a higher level of interest rate is expected to exert a negative impact on growth, whereas financial development would boost industry growth. It may be argued that government intervention is an endogenous response to real economic activity. However, our empirical strategy is valid as long as government policies are not correlated with financial dependence at an industry level.

2.2 Data

The information needed to measure industry growth is taken from the Industrial Statistics Database which is collected by the United Nations Industrial Development Organisation (UNIDO) for 23 sectors at two digits (classified in International Standard Industrial Classification (ISIC) Rev.3.1). The dependent variables (industry growth) will be the annual growth rate of (i) fixed capital formation, (ii) output and (iii) value-added. The data set for estimation is constituted with 23 industries in each country for each year during the sample period 2000–10.[6] If a country reports the data for at least one of our dependent variables for the crisis period under consideration, then we include that country in our data set. Note that not all countries report the data for all variables during the crisis period 2008–10, hence, the number of observations varies according to the dependent variable. Furthermore, following previous researchers, we eliminate the USA as this country is the source of the financial crisis and also the data for this country is used to measure the degree of external financial-dependence. The final data set includes an unbalanced panel with three dimensions of industry, country and year of observations from 82 countries.

The data on country-level variables such as financial development and real interest rates are obtained from the World Bank-World Development

[5]In the preliminary analyses, the dummy 2008 is well determined, whereas the dummy 2007 performs poorly. Hence, we focus on the dummy 2008.

[6]The year 2010 is the last year of availability of industry data in the UNIDO database as the data are released with a multi-year lag.

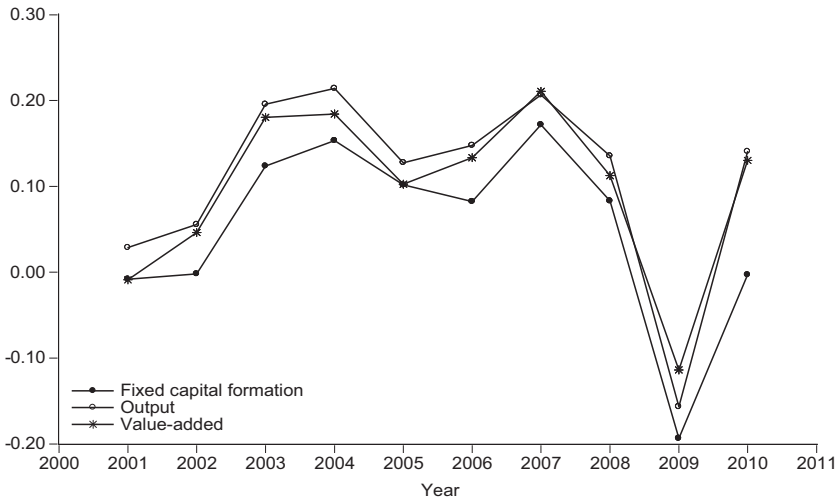

Fig. 2. Growth for 23 Industries in 82 Countries over the Period 2000–10

Indicators (WDI). See the Appendix for the sample selection in Panel A and the definition and source of the variables used in this paper in Panel B.

Figure 2 plots the mean values of industry growth indicators for all 82 selected countries. Three industry growth indicators exhibit a similar movement over the sample period with a moderate fluctuation of growth until 2007. With the onset of the financial crisis, a sharp fall in growth is observed, indicating the contraction of economic growth during the crisis. Figure 3 shows the evolution of the three measures of industry growth by selecting the two countries of the UK (regarded as a market-based economy in terms of finance sources) and Germany (deemed to be a bank-based economy). In both cases, the effect of crisis shock emerges after the year 2007. The bank-based economy, Germany, has shown a relatively radical movement compared with the UK. Overall, these illustrations in Figs 2 and 3 clearly suggest that industry growth has been negatively affected by the recent global financial crisis, and they provide a powerful motivation to statistically investigate the impact in a panel of countries.

3 Empirical Results

3.1 Base Model

The empirical results based on equation (1) are presented in Table 1 for investment growth, output growth and value-added growth respectively. The data appear to fit the model very well, since all coefficients are statistically significant. The trend is positive, indicating that industry was performing better over time. The models (1), (3) and (5) specify crisis dummies without control variables. The crisis dummy is highly significant at a 1 per cent level

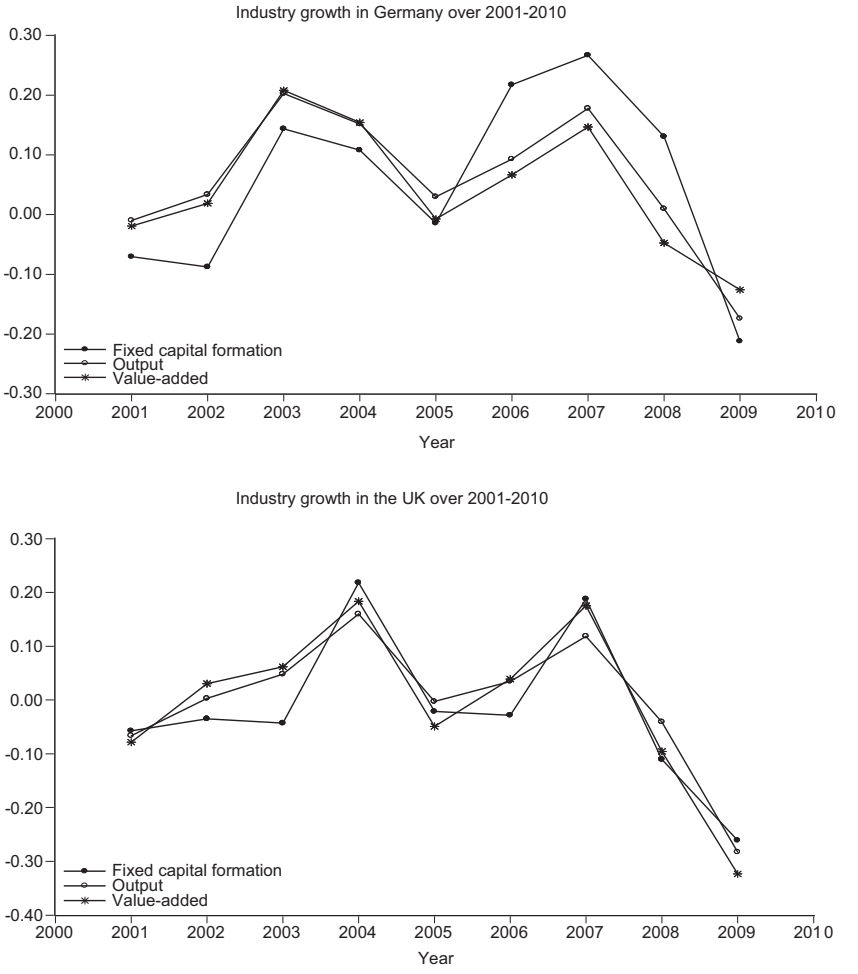

FIG. 3. Growth for 23 Industries in Germany and the UK over the Period 2000–10

with a negative sign in all cases, showing a clear picture of the adverse effects on industry growth. Note that the magnitude of the coefficients are close to each other at around −0.2, implying that the shock is equally felt across different growth indicators. The models (2), (4) and (6) are estimated with control variables. Both control variables are also well determined with the highly significant coefficients at a 1 per cent level in all cases. The coefficient of real interest rates is negative, being consistent with theory. This signifies the effect of the transmission channel of monetary policy on industry growth, although the effect may be less powerful at a time of crisis when banks are capital-constrained. A positive impact of financial development implies that countries with more developed financial systems are more capable of

Table 1
The Impact of the Financial Crisis on Industry Growth

	Industry growth over 2001–10					
	Fixed capital formation		*Output*		*Value-added*	
Models	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Trend	0.021***	0.028***	0.020***	0.024***	0.023***	0.028***
	[7.04]	[6.71]	[14.60]	[13.78]	[14.06]	[13.41]
Crisis	−0.215***	−0.185***	−0.201***	−0.170***	−0.200***	−0.181***
	[−11.03]	[−7.84]	[−23.94]	[−17.76]	[−20.05]	[−15.63]
Real interest rate		−0.004***		−0.005***		−0.004***
		[−2.84]		[−12.39]		[−7.71]
Financial development		0.003***		0.003***		0.003***
		[4.46]		[10.90]		[8.07]
Constant	0.191***	0.236***	0.218***	0.064	0.113***	0.167***
	[3.37]	[3.81]	[5.70]	[1.43]	[3.43]	[4.83]
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
No. of countries	82	82	82	82	82	82
Observations	9186	7369	13753	11269	12676	10260
R-square	0.172	0.173	0.114	0.144	0.186	0.184

Regression results of model $IndGrow_{ict} = \beta_0 + \varnothing Trend_t + \varphi Cris_t + \gamma ConVar_{ct} + \rho_i + \tau_c + \varepsilon_{ict}$. Dependent variable is industry growth in each sector i in each country c over 2000–10. *Trend* is a linear trend variable equal to 1 in 2000, equal to 2 in 2001, etc. *Cris* is equal to 1 for crisis period 2008–10 and 0 otherwise. *ConVar* is a vector of control variables. All models include industry (ρ_i) and country (τ_c) fixed effects (not reported) and standard errors clustered at the industry level. *, ** and *** indicate significance at 10 per cent, 5 per cent, and 1 per cent respectively. The robust *t*-values are presented in double parentheses based on the White heteroscedasticity adjusted standard errors. Growth observations are winsorized at +100 per cent and −100 per cent. For detailed definitions of variables see the Appendix. Sample size varies across regression specifications because not all variables are available for all industries, countries or for the full sample period.

recapitalizing banks and deeper financial systems could offer alternative sources of financing at a time of financial crisis. The effect of the crisis remains robust with these control variables specified in the baseline model. The detrimental effects of the financial crisis have penetrated deeply into the real economy when Lehman Brothers collapsed in 2008.

3.2 Heterogeneous Effects of the Crisis

3.2.1 High External Finance Dependence Effects. One plausible channel through which financial development may affect industrial sectors is financing industries that rely more on external finance (Rajan and Zingales, 1998). If this is the case, those industries that are more dependent on external finance should be affected more severely by the credit crunch that characterizes the financial crisis. They were more likely to experience larger contractions in investment, output and value-added growth, since diminishing finance should have a large negative impact on industries where external finance is more important.

To examine this issue, we first compute each industry's external financial dependence taken from Klapper *et al*. (2006) at a two-digit level by the classification of ISIC Rev.2 based on Rajan and Zingales' (1998) approach.[7] The threshold for differentiating among various industries with different levels of dependence on external financing is set at 0.30, which is the mean of all 23 industries' degree of financial dependence. An industry is classified as more dependent if it exceeds the threshold, and less dependent if it has a degree of financial dependency below the threshold.[8]

In Fig. 4, we plot industry growth indicators over time for two types of industries: one with more dependence on external finance versus the other with less dependence. As can be seen, until 2007 both types of industries had more or less a similar pattern of growth. However, after the 2007 financial crisis, the growth of those industries that rely on external finance has shown a more dramatic decline. In particular, in the case of growth of fixed-capital formation, a wider gap is observed. This supports our argument that industries with greater dependence on external finance were more affected by the crisis.

[7]Klapper *et al*. used US firm-level data to estimate the external financial dependence of different manufacturing sectors over the period 1990–99, which is employed as a benchmark for other countries. This is an industry-level median of the ratio of capital expenditures minus cash flow over capital expenditures. Cash flow is defined as the sum of funds from operations, decreases in inventories, decreases in receivables and increases in payables. Capital expenditures include net acquisitions of fixed assets. See Rajan and Zingales (1998) and. Klapper *et al*. (2006).

[8]For example, industries such as Recycling, and Rubber Products, and Radio, television and communication with 0.47, 0.69 and 1.04, respectively, are classified as industries with greater dependence on external finance, while industries such as Wood Products, Furniture and Tobacco with 0.28, 0.24 and −0.45, respectively, are classified as industries with less dependence on external finance. Overall, 9 out of 23 industries belong to more dependent sectors.

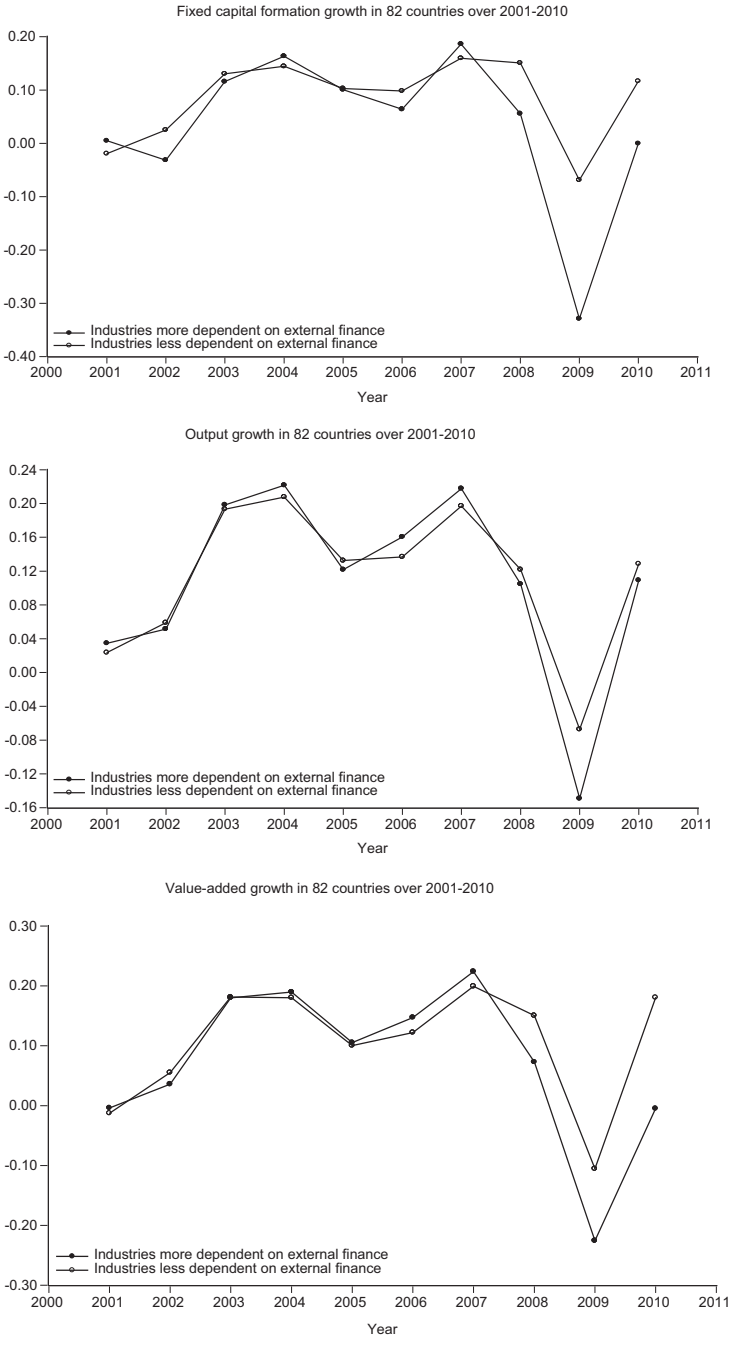

FIG. 4. Industry Growth Indicators for Two Types of Industry

To test statistically whether the financial crisis has had a heterogeneous impact on industry performance, we re-estimate equation (1) by splitting the sample into high and low externally dependent industries. We classify an industry as a high externally dependent industry if it has a score of financial dependence greater than the median of all industries, and as a low externally dependent one, if it is otherwise. We run regression for each panel separately. The result is shown in Table 2 with Panel A for high and Panel B for low externally dependent industries respectively. We find a statistically significant impact of the crisis dummy on industry growth indicators in Panel A. However, in Panel B, there is no statistical evidence for the output and value-added growth models, whereas we see it only at the 10 per cent significance level for the fixed capital growth model. It seems that the crisis had less or no adverse influence on those industries with low external dependence. The result accords with Dell'Ariccia *et al*. (2008), who argue that if banking crises exogenously hinder real activity, then sectors more dependent on external finance should perform relatively worse during banking crises. Our findings indeed suggest that the financial crisis has had a heterogeneous impact on industry performance, confirming our prior observations in Fig. 4.

3.2.2 Countries with Different Levels of Income, Regions and Bank-based versus Market-based Countries. Next, we investigate whether the crisis has had an effect on industry growth which is heterogeneous in terms of the different levels of income (low-, middle- and high-income countries[9]), different regions and the source of finance (bank-based and market based countries[10]).

Table 3 shows the differences in growth in investment, output and value-added between the crisis period and the pre-crisis period for individual countries (together with the different income groups, the different regions and market- and bank-based countries at the end of the table). It seems that the decline given by the negative difference in industry growth during the crisis period is not only prevailing in developed countries but also in emerging and developing countries. For example, emerging economies such as Kuwait, Latvia, Malta and Poland show a more than 40 per cent decline in investment growth. The average decline indicates that high and upper-middle-

[9]We divide our countries into low-, middle- and high-income countries according to World Bank definitions. We have eight countries classified as low-income, 38 countries as middle-income and 36 countries as high-income countries.

[10]Our sample countries are divided into two groups: bank-based countries if the ratio of credit provided by the banking sector to market capitalization is greater than the cross-country average and market-based countries if the ratio is smaller than the cross-country average. Data are taken from World Bank-WDI database. Note that since the classification is purely based on the statistics, it should not be interpreted as the real engine of these economies. The intention is to examine the general tendency across countries.

TABLE 2
THE IMPACT OF THE FINANCIAL CRISIS ON INDUSTRY GROWTH: HIGH VERSUS LOW EXTERNALLY DEPENDENT INDUSTRIES

	Industry growth over 2001–10					
	Fixed capital formation		*Output*		*Value-added*	
Models	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Panel A: High externally dependent industries						
Trend	0.018***	0.031***	0.018***	0.022***	0.021***	0.027***
	[4.32]	[5.16]	[9.46]	[8.82]	[9.47]	[9.10]
Crisis	−0.179***	−0.168***	−0.167***	−0.145***	−0.163***	−0.151***
	[−6.45]	[−4.96]	[−13.87]	[−10.52]	[−11.58]	[−9.21]
Real interest rate		−0.003*		−0.005***		−0.004***
		[−1.71]		[−8.61]		[−4.87]
Financial development		0.004***		0.005***		0.003***
		[4.06]		[8.61]		[5.44]
Constant	0.162**	0.193**	0.186***	0.086	0.072*	0.125***
	[2.17]	[2.35]	[3.66]	[1.43]	[1.67]	[2.74]
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
No. of countries	82	82	82	82	82	82
Observations	4595	3670	6827	5575	6289	5068
R-square	0.171	0.172	0.105	0.137	0.184	0.108
Panel B: Low externally dependent industries						
Trend	0.024***	0.026***	0.021***	0.026***	0.024***	0.029***
	[5.66]	[4.34]	[11.23]	[10.64]	[10.42]	[9.80]
Crisis	−0.151*	−0.101	−0.073	−0.092	−0.102	−0.108
	[−1.71]	[−1.08]	[−0.85]	[−1.18]	[−1.52]	[−1.60]
Real interest rate		−0.004**		−0.005***		−0.004***
		[−2.25]		[−8.84]		[−5.93]
Financial development		−0.002		−0.002		−0.003
		[−1.25]		[−1.30]		[−1.60]
Constant	0.107	0.149*	0.205***	−0.019	0.123***	0.175***
	[1.34]	[1.73]	[3.62]	[−0.29]	[2.62]	[3.60]
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
No. of countries	82	82	82	82	82	82
Observations	4591	3699	6926	5694	6387	5192
R-square	0.183	0.184	0.132	0.158	0.100	0.116

Regression results of model $IndGrow_{ict} = \beta_0 + \varnothing Trend_t + \varphi Cris_t + \gamma ConVar_{ct} + \rho_i + \tau_c + \varepsilon_{ict}$. Dependent variable is industry growth in each sector *i* in each country *c* over 2000–10. *Trend* is a linear trend variable equal to 1 in 2000, equal to 2 in 2001, etc. *Cris* is equal to 1 for crisis period 2008–10 and 0 otherwise. *ConVar* is a vector of control variables. All models include industry and country fixed effects (not reported) and standard errors clustered at the industry level. *, ** and *** indicate significance at 10 per cent, 5 per cent and 1 per cent respectively. The robust *t*-values are presented in double parentheses based on the White heteroscedasticity adjusted standard errors. We classify an industry to high externally dependent one if it has a score of financial dependence greater than the median of all industries, and to a low externally dependent one if otherwise. Financial dependence score for each industry is taken from Klapper *et al.* (2006) at two-digit based on Rajan and Zingales (1998) approach. Growth observations are winsorized at +100 per cent and −100 per cent. For detailed definitions of variables see the Appendix. Sample size varies across regression specifications because not all variables are available for all countries or for the full sample period.

TABLE 3
THE IMPACT OF THE FINANCIAL CRISIS ON INDUSTRY GROWTH IN 82 COUNTRIES

		Industry growth in 82 countries during pre-crisis (2001–7) and crisis (2008–10) periods								
		Fixed capital formation			*Output*			*Value-added*		
Row	*Country*	*Pre-crisis (1)*	*Crisis (2)*	*Diff. (3) = (2) − (1)*	*Pre-crisis (4)*	*Crisis (5)*	*Diff. (6) = (5) − (4)*	*Pre-crisis (7)*	*Crisis (8)*	*Diff. (9) = (8) − (7)*
1	Afghanistan				0.436	0.103	−0.332***			
2	Albania	0.260	0.060	−0.199	0.237	0.041	−0.196***	0.195	0.177	−0.018
3	Armenia				0.197	−0.047	−0.244***			
4	Australia	0.199			0.133	0.035	−0.098***	0.092	0.025	−0.067
5	Austria	0.121	−0.084	−0.205***	0.125	−0.029	−0.154***	0.123	−0.064	−0.187***
6	Azerbaijan	−0.159	−0.151	0.008	0.311	0.132	−0.178**	0.325	0.148	−0.177**
7	Belgium	0.088	0.125	0.037	0.097	−0.108	−0.205***	0.067	−0.069	−0.135***
8	Bermuda	−0.392	−0.389	0.003	0.011	−0.031	−0.041			
9	Botswana				0.104	0.081	−0.023	0.110	0.106	−0.004
10	Brazil				0.142	0.140	−0.001	0.130	0.156	0.025
11	Bulgaria	0.137			0.236	−0.045	−0.281***	0.257	−0.026	−0.283***
12	Canada				0.025	0.024	−0.001	0.019	0.000	−0.019
13	Chile	0.079	0.035	−0.044	0.071	0.086	0.015	0.057	0.064	0.006
14	China				0.268	0.244	−0.024	0.280		
15	Colombia	−0.294			0.144	0.062	−0.083***	0.144	0.054	−0.089***
16	Congo				0.304	0.063	−0.241*	0.311	−0.093	−0.404***
17	Costa Rica				0.088	0.061	−0.028	0.079	0.065	−0.014**
18	Croatia	0.228	−0.050	−0.277***						
19	Cyprus	0.058	−0.023	−0.081	0.122	−0.019	−0.141***	0.120	−0.038	−0.158***
20	Denmark	0.072	−0.137	−0.209***	0.091	−0.123	−0.214**	0.085	−0.117	−0.202***
21	Ecuador	−0.089	0.001	0.090	0.160	0.170	0.010	0.153	0.325	0.172*
22	Eritrea	−0.270	−0.336	−0.066	0.048	0.111	0.063	0.032	0.067	0.035
23	Estonia	0.120			0.201	0.002	−0.199***	0.202	−0.022	−0.224***
24	Ethiopia	0.163	0.058	−0.105	0.139	0.096	−0.043	0.118	0.124	0.006
25	Fiji	0.006	−0.131	−0.137	0.074	−0.066	−0.140***	0.067	−0.025	−0.092
26	Finland	0.120	−0.052	−0.171**	0.112	−0.105	−0.217***	0.108	−0.117	−0.225***
27	France	0.074			0.063	−0.098	−0.161***	0.060	−0.055	−0.115***
28	Georgia	0.002	0.127	0.124*	0.287	0.186	−0.101	0.254	0.244	−0.011
29	Germany	0.080	−0.025	−0.105**	0.097	−0.076	−0.172***	0.081	−0.084	−0.165***
30	Hong Kong	−0.070	−0.281	−0.211	−0.066	0.033	0.099**	−0.090	−0.009	0.081*
31	Hungary	0.162	−0.078	−0.240***	0.166	−0.087	−0.253***	0.168	−0.045	−0.213***
32	India	0.274	0.104	−0.170**	0.199	0.104	−0.096**	0.203	0.071	−0.132***
33	Indonesia	−0.096			0.112	0.062	−0.050	0.111	0.074	−0.037
34	Iran	0.014	0.012	−0.003	0.070	0.182	0.112*	0.057	0.142	0.085
35	Ireland	0.039	−0.192	−0.231***	0.086	−0.119	−0.205***	0.076	−0.167	−0.243***
36	Israel	−0.013	−0.021	−0.008	0.065	0.011	−0.054*	0.063	0.042	−0.021**
37	Italy	0.070	−0.032	−0.102**	0.094	−0.075	−0.168***	0.085	−0.105	−0.190***
38	Japan	0.063	0.014	−0.049	−0.004	0.059	0.063***	−0.012	0.068	0.080***
39	Jordan	0.128	0.118	−0.010	0.153	0.093	−0.060**	0.137	0.119	−0.018
40	Kenya				0.115	0.025	−0.090***	0.117	0.029	−0.088**
41	Korea	0.140	0.236	0.096	0.088	−0.021	−0.109***	0.076	−0.055	−0.131***
42	Kuwait	0.106	−0.342	−0.448***	0.160	0.079	−0.081	0.108	−0.029	−0.137***
43	Kyrgyz Rep.				0.128	0.073	−0.056	0.157	0.136	−0.021
44	Latvia	0.255	−0.154	−0.409***	0.250	−0.054	−0.305***	0.247	−0.100	−0.347***
45	Lithuania	0.243	−0.098	−0.340***	0.238	0.070	−0.168***	0.256	0.013	−0.243***
46	Luxembourg	0.049	−0.181	−0.231	0.099	−0.142	−0.240***	0.093	−0.135	−0.228***
47	Macao	−0.203	−0.370	−0.167	0.054	−0.177	−0.231**	0.069	−0.193	−0.262**
48	Macedonia	0.171	−0.009	−0.180	0.103	0.022	−0.082*	0.169	−0.018	−0.186***
49	Malawi	0.023	0.006	−0.018	0.135	0.223	0.088	0.046	0.381	0.336***
50	Malaysia	0.075	0.061	−0.014	0.108	0.086	−0.022	0.086	0.132	0.046
51	Malta	0.055	−0.459	−0.514***	0.079	0.035	−0.043	0.049	0.025	−0.025
52	Mauritius				0.117	−0.017	−0.134**	0.115	−0.001	−0.116**
53	Mexico	−0.055	0.153	0.208**	0.049	0.127	0.077*	0.028	0.159	0.131***
54	Moldova	0.200	0.031	−0.170	0.238	0.060	−0.178***	0.305	0.111	−0.194***
55	Mongolia				0.224	0.045	−0.180	0.121	0.251	0.131
56	Morocco	0.076	0.349	0.273**	0.129	0.049	−0.079**	0.106	0.113	0.008
57	Netherlands	0.112	0.044	−0.068	0.085	0.024	−0.061	0.068	−0.024	−0.092**
58	New Zealand	0.118	−0.165	−0.282**	0.114	−0.150	−0.265***	0.107	−0.123	−0.230***
59	Norway	0.169	−0.009	−0.178*	0.132	0.065	−0.067*	0.111	0.045	−0.067
60	Oman	0.039	0.182	0.144*	0.157	0.148	−0.009	0.121	0.218	0.097
61	Peru				0.100	0.128	0.028	0.097	0.129	0.031
62	Poland	0.168	−0.255	−0.424***	0.175	−0.035	−0.210***	0.188	−0.018	−0.207***

TABLE 3 (*Continued*)

		Industry growth in 82 countries during pre-crisis (2001–7) and crisis (2008–10) periods								
		Fixed capital formation			*Output*			*Value-added*		
Row	*Country*	*Pre-crisis (1)*	*Crisis (2)*	*Diff. (3) = (2) − (1)*	*Pre-crisis (4)*	*Crisis (5)*	*Diff. (6) = (5) − (4)*	*Pre-crisis (7)*	*Crisis (8)*	*Diff. (9) = (8) − (7)*
63	Portugal	0.049	0.072	0.023	0.088	−0.144	−0.232***	0.090	−0.154	−0.244***
64	Qatar				0.256	0.107	−0.149*	0.190	0.120	−0.071
65	Romania	0.369			0.238	0.000	−0.238***	0.185	0.033	−0.152***
66	Russia				0.308	0.053	−0.255***	0.319	0.071	−0.248***
67	Senegal				0.108	0.054	−0.054	0.111	0.049	−0.062
68	Serbia				0.306	0.006	−0.300***	0.258	−0.015	−0.273***
69	Singapore	0.010	0.077	0.067	0.084	0.051	−0.033	0.055	0.025	−0.031**
70	Slovak Rep.	0.313	−0.021	−0.334***	0.262	0.069	−0.193***	0.255	0.010	−0.244***
71	Slovenia	0.130	−0.083	−0.213***	0.095	−0.054	−0.149***	0.124	−0.059	−0.183***
72	South Africa				0.115	0.042	−0.074***	0.119	−0.011	−0.130***
73	Spain	0.119	−0.078	−0.197***	0.114	−0.096	−0.209***	0.111	−0.098	−0.208***
74	Sri Lanka	−0.604	−0.251	0.353***	−0.288	−0.024	0.264***	−0.178	0.024	0.202*
75	Sweden	0.056	−0.323	−0.379***	0.098	−0.093	−0.192***	0.089	−0.122	−0.211***
76	Tajikistan				0.129	0.393	0.264			
77	Tanzania	−0.043			0.014	0.370	0.356***	−0.017		
78	Turkey	0.312	−0.083	−0.395***	0.231	−0.009	−0.240***	0.124	0.037	−0.088
79	Ukraine				0.264	−0.001	−0.265***			
80	UK	0.032	−0.176	−0.209***	0.043	−0.150	−0.192***	0.053	−0.198	−0.252***
81	Uruguay	0.138	0.185	0.047	0.045	0.158	0.113	−0.002	0.147	0.152*
82	Vietnam	0.233	0.180	−0.052	0.270	0.370	0.100*	0.354	0.221	−0.134**
All countries		0.065	−0.052	−0.115***	0.136	0.036	−0.100***	0.123	0.029	−0.092***
High income		0.075	−0.079	−0.154***	0.106	−0.002	−0.108***	0.090	−0.011	−0.101***
Upper-middle income		0.093	−0.005	−0.098***	0.168	0.068	−0.099***	0.157	0.061	−0.096***
Lower-middle income		0.089	0.047	−0.043	0.191	0.051	−0.140***	0.165	0.110	−0.055**
Low income		−0.025	−0.096	−0.071	0.118	0.118	−0.000	0.079	0.131	0.052
Bank based countries		0.070	−0.051	−0.121***	0.136	0.023	−0.113***	0.121	0.021	−0.100***
Market-based countries		0.110	−0.004	−0.114***	0.144	0.051	−0.093***	0.125	0.057	−0.068***
East Asia and Pacific		0.069	0.078	0.009	0.177	0.130	−0.047**	0.145	0.132	−0.013
Europe and Central Asia		0.172	−0.041	−0.213***	0.234	0.033	−0.201***	0.237	0.054	−0.182***
High-income non-OECD		0.042	−0.100	−0.141***	0.108	0.046	−0.062***	0.081	0.036	−0.046*
High-income OECD		0.108	−0.058	−0.167***	0.105	−0.050	−0.155***	0.098	−0.058	−0.156***
Latin America & Car.		−0.063	0.122	0.185**	0.106	0.110	0.004	0.092	0.126	0.035*
Middle East and North Af.		0.076	0.122	0.046	0.112	0.098	−0.013	0.102	0.123	0.021
South Asia		0.109	−0.105	−0.214***	0.155	0.041	−0.114***	0.129	0.042	−0.087*
Sub-Saharan Africa		−0.025	−0.096	−0.071	0.113	0.076	−0.037*	0.101	0.062	−0.039*

This table shows the differences in growth in fixed capital formation, output and value-added between the crisis period and the pre-crisis period (*source:* UNIDO). Growth observations are the averages of 23 industries and are winsorized at +100 per cent and −100 per cent. *, ** and *** indicate significance at 10 per cent, 5 per cent and 1 per cent respectively. The classification of income level and regions are based on the World Bank.

income countries and regionally, Europe and Central Asian area suffer more from the crisis. Furthermore, industry growth in bank-based countries appears to decline more than that of market-based countries.

We empirically test the heterogeneous effects of the income level and the base of external finance. The results are presented in Table 4. In Panel A, we exclude the high- and upper-middle-income countries and in Panel B, bank-based countries are excluded from the model. For a comparative study, Panel C presents the initial values of the crisis coefficients reproduced from the baseline model in Table 1. When we investigate only low- and lower-middle-income countries in Panel A, the crisis coefficients become statistically insignificant at the 5 per cent level, implying that

TABLE 4
THE IMPACT OF THE FINANCIAL CRISIS ON INDUSTRY GROWTH IN LOW- AND LOWER-MIDDLE-INCOME AND MARKET-BASED COUNTRIES

	Excluding					
	Panel A: *High- and upper-middle-income countries*					
	Fixed capital formation		*Output*		*Value-added*	
Models	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Trend	0.028***	0.036***	0.020***	0.022***	0.026***	0.030***
	[3.89]	[3.87]	[8.27]	[8.05]	[9.11]	[8.69]
Crisis	−0.144	−0.103	−0.118*	−0.117*	−0.101	−0.110
	[−1.43]	[−1.58]	[−1.72]	[−1.83]	[−1.60]	[−1.55]
Real interest rate		−0.003		−0.006***		−0.004***
		[−1.47]		[−10.56]		[−5.95]
Financial development		0.004		0.003***		0.003**
		[1.12]		[2.93]		[2.10]
Constant	−0.062	0.081	0.060***	0.239***	0.011	0.174***
	[−1.56]	[1.34]	[4.64]	[12.60]	[0.71]	[7.35]
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
No. of countries	32	32	32	32	32	32
Observations	2618	2179	5425	4826	5055	4475
R-square	0.102	0.105	0.119	0.115	0.116	0.108
	Panel B: *Bank-based countries*					
	Fixed capital formation		*Output*		*Value-added*	
Models	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Trend	0.025***	0.027***	0.020***	0.022***	0.023***	0.027***
	[4.95]	[3.99]	[10.01]	[8.99]	[9.95]	[9.19]
Crisis	−0.185***	−0.154***	−0.190***	−0.158***	−0.174***	−0.155***
	[−5.50]	[−3.73]	[−15.73]	[−11.79]	[−12.14]	[−9.58]
Real interest rate		−0.003		−0.005***		−0.002**
		[−1.38]		[−7.78]		[−2.40]
Financial development		−0.001		0.002*		0.002*
		[−0.36]		[1.82]		[1.78]
Constant	−0.026	−0.004	0.040***	0.195***	0.002	0.120***
	[−0.95]	[−0.48]	[3.56]	[7.31]	[0.14]	[3.66]
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
No. of countries	32	32	32	32	32	32
Observations	3990	3381	6227	5409	6038	5217
R-square	0.229	0.244	0.260	0.287	0.216	0.233
	Panel C: *Crisis coefficient reproduced from Table 1 (baseline model)*					
	Fixed capital formation		*Output*		*Value-added*	
Models	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Crisis	−0.215***	−0.185***	−0.201***	−0.170***	−0.200***	−0.181***
	[−11.03]	[−7.84]	[−23.94]	[−17.76]	[−20.05]	[−15.63]

Regression results of model $IndGrow_{ict} = \beta_0 + \varnothing Trend_t + \varphi Cris_t + \gamma ConVar_{ct} + \rho_i + \tau_c + \varepsilon_{ict}$. Dependent variable is industry growth in each sector *i* in each country *c* over 2000–10. *Trend* is a linear trend variable equal to 1 in 2000, equal to 2 in 2001, etc. *Cris* is equal to 1 for crisis period 2008–10 and 0 otherwise. *ConVar* is a vector of control variables. In Panel A, we exclude high- and upper-middle-income countries while in Panel B we exclude bank-based countries. Different income groups are classified according to the World Bank classification. All models include industry (ρ_i) and country (τ_c) fixed effects (not reported) and standard errors clustered at the industry level. *, ** and *** indicate significance at 10 per cent, 5 per cent and 1 per cent respectively. The robust *t*-values are presented in double parentheses based on the White heteroscedasticity adjusted standard errors. Growth observations are winsorized at +100 per cent and −100 per cent. For detailed definitions of variables see the Appendix. Sample size varies across regression specifications because not all variables are available for all industries, countries or for the full sample period.

there is no discernible impact from the crisis present in these income-group countries. A similar result is also found in Kroszner *et al*. (2007) that greater contraction of value-added during a banking crisis is only found in countries with deeper financial systems than in countries with shallower financial systems. The result also supports the finding by Klapper and Love (2011) that the decline in new firm registrations is more pronounced in countries with well-developed financial markets. This is either because immature financial markets do not have an adequate mechanism for shocks to be transmitted into the market in the short run, or because some developing markets may have undertaken financial reforms, for example, by increasing foreign reserves, reducing government debt and restricting, or strictly controlling, foreign borrowings (Dooley and Hutchison, 2009; Wang and Moore, 2012).

In Panel B, even though bank-based countries are excluded, the crisis coefficients remain statistically highly significant at the 1% level, *albeit* the magnitude of the coefficients falls slightly as compared with the initial values in Panel C. This is not surprising since the shockwave was not restricted to the banking sector, but prevalent throughout the whole of the financial markets.

4 Rajan and Zingales (1998) Method

As a sensitivity test, we apply an industry growth model of Rajan and Zingales (1998) to examine whether the real effects of the financial crisis remains robust. In order to avoid some problems of identification that arise in the cross-country regressions which are observed in the literature on economic growth, Rajan and Zingales (1998) developed an innovative specification by introducing the interaction between an industry characteristic (external financial dependence) and a country characteristic (financial development) for the cross-section study.[11] Specifically, we estimate the model as given by

$$IndGrow_{ic} = \beta_0 + \varnothing Share_{ic} + \varphi Fin.Dev._c \times Ext.Fin._i + \rho_i + \tau_c + \varepsilon_{ic} \quad (2)$$

Industry growth is defined as in equation (1) but here i indicates industry and c is for country.[12] Since sectors with large initial shares in the industry usually grow at a slower rate, we introduce the beginning-of-period sector share in value-added (*Share*) in order to capture the possible

[11]This approach has been adopted and expanded by a number of studies including that of Kroszner *et al*. (2007).

[12]Note that in Section 3 we estimated the model based on panel data sets with three dimensions of industry, country and year. In this cross-section model, we estimate with the two dimensions of industry and country. Thus, the observations are the averages over time for each industry and country (Rajan and Zingales, 1998).

'convergence' effect at a sectoral level.[13] Financial development variables (*Fin.Dev.*) are considered to be strong indicators of growth. We specify the ratio of domestic credit to private sector with GDP. The data are retrieved from the WDI over the period of 2000–10. *Ext.Fin.* is the measure of external-financing dependence of an industry as explained in Section 3. Any unobserved industry- or country-specific heterogeneity is captured by industry (ρ_i) and country (τ_c) fixed effects. ε is the error term with normal distribution.

Separately, we specify the interaction of financial development with trade credit instead of external finance. Fisman and Love (2003) argue that in poorly developed financial markets, implicit borrowing in the form of trade credit may provide an alternative source of funds. Fisman and Love find that industries with higher dependence on trade credit exhibit higher rates of growth in countries with weaker financial institutions. Applying this concept, we examine the extent to which industries that are more reliant on trade credit are affected by the crisis. The data of industry-level measures of trade credit are taken from Fisman and Love (2003). To obtain a value for each industry, Fisman and Love take the median of the ratio of accounts payable to total assets for US firms for the period 1980–89. A negative sign is expected on the coefficient of the interaction, if our result is in line with that of Fisman and Love (2003).

See Table 5, where the cross-section regressions are estimated using ordinary least squares (OLS) with the country and industry dummies. The result of the interaction of financial development with external finance is found in Panel A and that with trade credit is in Panel B. The coefficient on *Financial development x Ext.Fin*. is positive and significant during the pre-crisis period. During the 'normal' period, financially dependent sectors grow disproportionately faster in countries with well-developed or deeper financial systems, which is consistent with the findings of Rajan and Zingales (1998) and Kroszner *et al*. (2007). During the crisis period, however, it appears that such a relationship is not sustainable, since the coefficients on the interaction term are all insignificant. Moreover, 'Share in value-added' becomes insignificant in the fixed capital formation and output models, and the convergence effect across industries is likely to disappear during the crisis period.

[13] *Share in value-added*$_{ic}$ is the share of industry i in total manufacturing in country c in 2000. It is the beginning-of-period sector share in value-added as given by:

$$Share\ in\ value-added_{ic} = \frac{value-added_{\text{industry } i \text{ in 2000 in country } c}}{\sum_{j=1}^{n} value-added_{\text{industry } j \text{ in 2000 in country } c}}$$

The data are taken from UNIDO and the authors' own computation.

TABLE 5
FINANCIAL DEVELOPMENT AND INDUSTRY GROWTH DURING PRE-CRISIS (2000–7) AND CRISIS (2008–10) PERIODS

	Industry growth over 2001–10					
	Fixed capital formation		*Output*		*Value-added*	
Models	*Pre-crisis (1)*	*Crisis (2)*	*Pre-crisis (3)*	*Crisis (4)*	*Pre-crisis (5)*	*Crisis (6)*
Panel A: External finance						
Share	−0.465***	−0.097	−0.149*	−0.110	−0.162*	−0.094*
	[−3.41]	[−1.10	[−1.89]	[−1.50]	[−1.82]	[−1.88]
Financial development × Ext. Fin.	0.002***	0.001	0.001***	0.001	0.001***	0.001
	[2.61]	[1.54]	[3.03]	[1.38]	[3.31]	[1.16]
Constant	0.001	−0.088***	0.112***	0.017*	0.096***	0.025**
	[0.14]	[−3.82]	[18.80]	[1.66]	[11.77]	[2.16]
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
No. of countries	61	52	77	76	77	74
Observations	1247	967	1576	1449	1573	1415
R-square	0.337	0.237	0.407	0.258	0.282	0.233
Panel B: Trade credit						
Share	−0.509***	−0.072	−0.162**	−0.084	−0.169***	−0.082
	[−3.70]	[−0.33]	[−2.08]	[−0.89]	[−2.88]	[−0.72]
Financial development × Trad.Cred.	−0.001	−0.001	−0.009***	0.011*	−0.005**	0.003*
	[−1.53]	[−0.29]	[−2.69]	[1.74]	[−2.03]	[1.81]
Constant	−0.062	−0.018	0.110***	−0.015	0.148***	0.023
	[−1.06]	[−0.16]	[4.56]	[−0.35]	[4.47]	[0.50]
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
No. of countries	61	52	77	76	77	74
Observations	1247	967	1576	1449	1573	1415
R-square	0.334	0.231	0.403	0.252	0.277	0.232

Regression (cross-section) results of model $IndGrow_{ict} = \beta_0 + \varnothing Share_{ic} + \varphi Fin.Dev_c \times Ext.Fin_i + \rho_i + \tau_c + \varepsilon_{ict}$. Dependent variable is the growth in sectoral value-added in each country over pre-crisis (2000–7) or crisis (2008–10) period. *Share* is the fraction of value-added of each sector in each country in year 2000. *Fin.Dev.* is the credit to private sector (per cent of GDP). *Ext.Fin.* is the external financial dependence of each sector taken from Klapper *et al.* (2006). In Panel B, we use Trade Credit instead of Ext. Fin., which is industry's dependence on trade credit measured by accounts payable over total assets, taken from Fisman and Love (2003). All models include industry (ρ_i) and country (τ_c) fixed effects (not reported) and standard errors clustered at the industry level. *, ** and *** indicate significance at 10 per cent, 5 per cent and 1 per cent respectively. The robust *t*-values are presented in double parentheses based on the White heteroscedasticity adjusted standard errors. Growth observations are winsorized at +100 per cent and −100 per cent. For detailed definitions of variables see the Appendix. Sample size varies across regression specifications because not all variables are available for all industries, countries or for the full sample period.

In Panel B, a negative sign on the coefficient of the interaction of financial development with trade credit in the pre-crisis period indicates that industries that rely heavily on trade credit grow faster in countries with underdeveloped financial intermediation. Industry growth seems to be sustained by trade credit as a method of financing due to weak financial systems. Our result supports the finding of Fisman and Love (2003). However, during crisis periods, such a relationship seems to subside, as we find that the coefficients are positive, although they are statistically significant only at the 10 per cent level. This appears to indicate some crisis-specific feature. While in normal periods trade credit is a source of finance for financially dependent industries in less financially developed countries, however, during the crisis period it becomes a source of finance for financially developed countries. Since the developed countries usually suffer more during a crisis, trade credit can be an alternative source of finance during a credit crunch.

These empirical results serve to provide the heterogeneous effects of the financial crisis in that externally financially dependent industries may have suffered significantly from a contraction of growth, whereas those industries which are less dependent on external finance may have maintained their growth even during the crisis. This confirms the results found in Table 2, where the crisis significantly contributed to the contraction of growth for the high external-finance dependent industries. It is also noteworthy that the effect of trade credit on industry growth wanes with the crisis.

5 Conclusion

While most policy makers and economists agree that the recent global financial crisis has had adverse consequences for the economy as a whole, relatively little empirical work has been done to investigate the mechanisms by which financial crises generate problems in the real sector. In this paper, we analyse data on 23 industries in 82 countries to study the impact of the current financial crisis on industry performance during the period 2000–10. The data appear to show that nearly all industry performance indicators experienced a sharp drop following the crisis. Closer inspection, however, reveals that such an impact is heterogeneous across industries. The crisis has had a negative impact mainly on those industries more reliant on external finance. It is also found that low- and lower-middle-income countries tend to be less affected by the crisis. There is, however, no discernible difference in the effect between market-based and bank-based countries. A shift in the effect of trade credit is also in evidence. Our empirical findings are contributory to understanding the mechanisms through which the financial crisis affects the real economy.

Appendix

Sample Selection, Variables Definitions and Summary Statistics

Panel A: *Sample selection of the main data set*

	All	*Drop*	*Remaining*
All countries included in UNIDO database (over 1963–2010)	166		166
Less			
Years 1963–99	166		166
Countries with no data on main dependent variables during crisis (2008–10)		83	83
USA		1	82
Final sample (for 23 industries over 2000–10)			82

Panel B: *Variables definition and summary statistics of main variables*

Variable	*Definition*	*Mean*	*Sta. Dev.*
Industry growth variables			
Fixed capital formation	Annual growth rate of fixed capital formation in a particular sector for 23 sectors in each country over 2000–10. *Source:* UNIDO database, and own calculation.	0.061	0.531
Output	Annual growth rate of output in a particular sector for 23 sectors in each country over 2000–10. *Source:* UNIDO database, and own calculation.	0.112	0.293
Value-added	Average annual growth rate of value-added in a particular sector in each country over 2000–10. *Source:* UNIDO database, and own calculation.	0.101	0.330
Explanatory variables			
Trend	Trend is a linear trend variable equal to 1 in 2000, equal to 2 in 2001, etc.	6.000	3.162
Crisis	It is a dummy variable that takes value 1 for the crisis period 2008–10, and 0 otherwise.	0.273	0.445
Share (in value-added)	The value-added of each sector for years 2000–10 divided by the total value-added of all sectors in a country for that year. *Source:* UNIDO database, and own calculation.	0.050	0.075
External finance dependence	External financial dependence of US firms by ISIC sector over the period 1990–99. This is an industry-level median of the ratio of capital expenditures minus cash flow over capital expenditures. Cash flow is defined as the sum of funds from operations, decreases in inventories, decreases in receivables and increases in payables. Capital expenditures include net acquisitions of fixed assets. *Source:* Klapper *et al*. (2006) based on the approach of Rajan and Zingales (1998).	0.301	0.296
Trade credit	It is industry's dependence on trade credit calculated as the median of the ratio of accounts payable to total assets for US firms for the period 1980–89. *Source:* Fisman and Love (2003).	0.088	0.015
Real interest rate	Real interest rate is the lending interest rate adjusted for inflation as measured by the GDP deflator. *Source:* World Bank-WDI.	6.007	9.788
Financial development	The ratio of domestic credit to private sector as a percentage of GDP of a country over the period 2000–10, which refers to financial resources provided to the private sector. *Source:* World Bank-WDI and own calculation.	66.263	54.421

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