Stringent bank liquidity and capital requirements and sectoral activity

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Tougher bank liquidity and capital requirements (Compliance to Basel III) is expected to raise the resilience of the financial sector and shield the real economy from financial shocks. Yet opponents argue that tighter regulation may lead to an increase in the cost of capital and, consequently, to a reduction in credit supply and real activity. Using data from 28 manufacturing industries in 61 countries, we explore to what extent bank liquidity and capital requirements under Basel III affect sectoral activity around the recent global financial crisis. We find that external-financial-dependent industries in countries with safer banks—those with higher liquidity and capital ratios—performed better during the crisis. In the pre-crisis period, we do not observe a significant effect. These results, which are robust to different model specifications, suggest that potential adverse effects of tighter bank regulation on economic growth is likely to be negligible.

Key words: Basel III; financial stability; sectoral activity

JEL: G01, G21, G28, L6

1. Introduction

Financial crises are immensely costly: not only may they require public funds to bring banks and other financial institutions back to health but also because they tend to destroy the finance-growth nexus (Klapper and Love, 2011; Laeven and Valencia, 2013). The latter mainly happens through impairment of the credit supply channel (Kroszner et al. 2007; Dell'Ariccia et al. 2008) or of balance sheets (Eggertsson and Krugman, 2012). These costs and the gaps in the regulatory framework exposed by the global financial crisis in 2008–09 motivated policymakers to introduce a new wave of regulations, including the Basel III accord (henceforth, 'Basel III' or 'the Accord') in 2010. The aim was to improve financial stability and accordingly to mitigate the adverse impact of financial shocks on the real economy.

Basel III imposes stronger micro-prudential standards for liquidity and capital positions and adds a macro-prudential overlay. Higher liquidity and capital levels improve bank stability (Chiaramonte and Casu, 2017), but they may at the same time restrict banks' ability to allocate funds to the rest of the economy and, hence, dampen economic growth. For instance, while higher capital requirements are associated with lower costs of financial crises, they may significantly raise the cost of bank lending (Gomes and Wilkins, 2013), reducing consumption and investment and consequently curbing economic activity. Yet, the potential impact of Basel III on the real sector may depend on the economic conditions. A negative association between higher capital/liquidity requirements and economic growth may be the case only during normal times, where tighter requirements reduce bank competition and have an adverse impact on bank performance. The requirements, however, may improve or shield economic performance during financial crises, where resilient banks sustain their lending (Kapan and Minoiu, 2013). Brei et al. (2013) investigate the impact of a change in the capital ratio on bank lending, finding that the effect is positive and that this marginally increase during crises but declines in pre-crises. Levintal' (2013) findings also suggest that in non-crisis periods, a shock to bank balance sheet tend to be less dominant in influencing economic growth, while it is more important during a crisis.

This paper empirically investigates the potential real effects of bank regulations during normal and crisis periods. Specifically, it analyses the costs/benefits of tougher liquidity and capital requirements in terms of their ability to sustain economic growth around financial crises, specifically the 2008 global crisis. To do this, we first use a large bank-level dataset for 50

countries over the period 2003-2010, to measure bank liquidity and capital indicators (as specified in Basel III). By incorporating these scores into an industry-level database, we then analyse the impact of cross-country differences in bank capital and liquidity levels on sectoral activity for 28 manufacturing sectors around the recent financial crisis. In other words, we first quantify measures for liquidity and capital ratios at the country level using individual bank level, and then test whether rigid bank liquidity and capital requirements make industries more resilient. We expect that banks with greater liquidity and capital position in the pre-crises periods are more likely to cut risky lending to businesses and hence dampening economic activity, while during crisis periods stable banks are expected to sustain their lending, making economic sectors more resilient. Methodologically, to evaluate our prediction, we adopt the model initiated by Rajan and Zingales (1998) that applied to test the casual relationship between financial development and economic growth. Using this method, we consider if tougher bank regulations matter for real sector, does it affect disproportionately more financially constraint sectors.

In doing so, we contribute to literature in several aspects. First, the side effects of rigid bank liquidity and capital requirements has been discussed extensively, but usually only on the cost of financial intermediation and not directly on economic growth (Allen et al. 2012). We are the first to study this at the industry level. This is an advance to the literature, because one aim of Basel III is to mitigate the impact of financial crises on the real sector (although the Accord assigns higher risk weight for business loans). Many scholars have reported the crucial role of liquidity and capital for bank loan growth (and hence economic growth) during the recent global financial crisis (Gambacorta and Marques-Ibanez, 2011; Corentt et al. 2011; Kim and Sohn, 2017). Thus, we document the role of higher liquidity and capital requirements in maintaining economic growth using industry data, something that the previous literature has overlooked. Second, we examine the real effects of bank regulation in both pre- and during 2008 crisis periods. This contribute to the argument that higher liquidity and capital levels could sustain economic activity only during financial crises. Our third contribution relates to the geographical coverage of sample. We use international data for 50 countries including both developed and developing countries. With the increasing international capital flows and globalization of trade, the sustainability of industry growth, especially in emerging countries, matters for policymakers. This would help them to improve their relatively weak legal and financial systems. In addition, in most of these countries

there need for traditional financial products, and hence resilient banks are better positioned to supply standardized products (Demirgüç-Kunt et al. 2013; Arcand et al. 2015).

The main results of our paper can be summarized as follows. We find that industries domiciled in countries with safer banks, which are with higher levels of liquidity and capital ratios, performed better during the crisis period. In particular, NSFR, total regulatory capital, and Tier 1 ratios are all positively associated with higher industry growth during crisis period. But in the pre-crisis period, and contrary to our conjecture, we do not observe a negative (nor a positive) effect. These results are robust to different model specifications. Our findings do not agree with those that argue Basel III reforms may reduce economic activity by decreasing credit availability and/or increasing cost of borrowing (Allen et al. 2012), but inversely serve to partially support Basel III proponents. These results are of particular interest to both policy makers and academic researchers, because they contribute to the current discussion on the real effect of tougher bank liquidity and capital requirements.

Our study is linked to several areas of literature. First, it is closely related to those papers that directly measured the real effects of bank liquidity and capital, as indicated in Basel III accord. The economic consequence of stricter liquidity and capital requirements were initially assessed in BCBS (2010a). The authors report that there are indeed potential costs associated with Basel III, although they point that these costs are rather transitionary and that as banks become more resilient such costs will be recovered. Gambacorta (2011) also reports moderate effects of tighter liquidity and capital requirements on the level of long-term economic output. Yan et al. (2012) also find a considerable net positive effect on long-term economic performance. In addition, Angelini et al. (2015) investigate the effect of the Basel III regulation on long-term economic costs. They find that the benefits of Basel III (reducing probability of bank failure) overweigh its economic costs. Fernandez et al. (2016) find that bank financial stability (not measured by Basel III indicators) decreases economic volatility of financially vulnerable industries. Overall, the common point of these studies is that the costs associated with Basel III is rather limited and/or transitory and that stable banks improve economic growth in the long run. Our study supports these studies by using disaggregated sectoral data and goes one step further that even there is positive real effect of Basel III during financial crises.

Second, our study is also complementary to those that consider impacts of bank liquidity and capital standards on bank performance and stability. King (2013) argues that compliance to Basel III reform will change banks' business model. Berger and Bouwman (2013) investigate whether capital improves bank performance (measured as survival and market share) for the US. They find that small banks with higher capital perform better during both pre- and crisis periods, while medium and large banks perform better mainly during banking crises. Chalermchatvichien et al. (2014) find that Basel III capital requirements improve bank financial stability. Demirguc-Kunt et al. (2013) find that before the global crisis bank capital (both quantity and quality) did not affect bank stock returns, but it did during the crisis. Finally, Vazquez and Federico (2015) study the impact of structural liquidity and leverage on the likelihood of subsequent failure in the run-up to the global financial crisis. They find that banks with greater structural liquidity and lower leverage ratios in the pre-crisis period were less likely to fail afterward. Our paper develops these studies by arguing that the impact of Basel III on bank performance may spillover to the real economy.

Third, it is related to those that investigate the impact of Basel III on bank lending. Cornett et al. (2011) find that banks with more stable funding structure remained to lend relative to other banks during the recent global crisis. Similarly, Kapan and Minoiu (2013) examine the credit growth evolution during the recent crisis and find that banks with strong balance sheets and well-capitalized (hypothetically those meeting Basel III) were better able to provide credit to the real economy. However, Altunbas et al. (2016) find that bank capital affect adversely bank lending, but at higher level of capital ratio. We add to these studies by arguing that sustaining lending during financial crises by stable banks may contribute to relative growth of industrial sectors.[1]

The remainder of the paper is structured as follows. In Section 2, we develop our hypotheses. Methodology and model specifications followed by a description of our data presented in Section 3. Sections 4 includes our results and discussions. Finally, we provide a summary and conclusions in Section 5.

[1] Our results complement others that express the importance of bank performance for industrial sectors (Liu et al., 2014; Igan et al. 2016; Mirzaei and Moore, 2017).

2. Background and hypothesis development

The Basel III accord is a comprehensive set of reform measures to strengthen bank regulation, supervision, and risk management.

The basis of the Basel III reform for having resilient banks is a higher (both quantity and quality) regulatory capital together with newly introduced liquidity requirements. The purpose of strengthening liquidity and capital standards is to promote a more flexible banking sector in order to absorb external shocks and hence decreasing the risk of spillover from financial sector to the real sector. The Basel Committee argues that higher capital and liquidity requirements causes a significant decrease in the likelihood of a crisis episode (BCBS, 2010a). For instance, it has been reported that the probability of a crisis decreases from about 5% to less than 2% if total regulatory capital ratio increases from 7% to 9%[2]. This is also the case for higher liquidity requirement. Yet there is an ongoing debate whether such requirements really benefits the economy as a whole. Holding low-yielding liquid assets and long-term maturity funds is costly for banks, which declines lending spreads (Dietrich, et al. 2014)[3]. For instance, King (2013) finds that for a sample of selected banks a possible decline of net interest margins by 70-88 basis points on average if a bank meets the long-term liquidity requirement. Banks would pass the increase of such costs to borrowers in the form of higher lending rates and reducing credit, resulting in declining economic growth.

In addition, Allen et al. (2012) argue that compliance to Basel III rules causes a significant change to the banking sector structure, as banks are forced to pursue liability-driven asset management strategy, in which banks have to first find stable long-term funding and then look for market shares in lending markets. This approach could in turn restrict credit availability and hence decreasing economic growth. In fact, shifting bank funding strategies is assumed to have a serious effect on economic performance, as lending to productive projects becomes inadequate (Dietrich

[2] Banks also respond to higher capital levels in different ways: reducing dividend payments and increasing retention ratios, raising new stocks, improving operating efficiency, shrinking size, and increasing lending spreads.

[3] There are two opposing theories regarding the impact of bank capital on lending, namely the "risk absorption" theory and the "financial fragility crowding" theory. According to the former, bank capital improves risk taking behaviour of banks and hence positively affect lending. Conversely, the latter suggests that banks with a higher capital position might cut lending by crowding out deposits. (Kim and Sohn, 2017).

et al., 2014). Overall, these possible real effects of both[4] banks' low margins and shifting banks' strategies may spillover to the real sector in the forms of increases in cost of capital and decreases in supply of credit. Gambacorta (2011) examine the long-term economic costs associated with compliance to Basel III reform. He finds that tougher liquidity and capital standards have a (moderate) negative effect on the level of output. Also, Angelini et al. (2015) estimate about 0.08% loss of economic output following a one-percent increase in long-term liquidity or the same increase in the capital ratio.

We expect that the greatest impact would be on manufacturing sectors that in most countries traditionally rely mostly on banks as a source of finance. In fact, increases in target capital and liquidity ratios for banks would have a more pronounced economic effect in industrial sectors, because of the greater risk of business loans, as compared to other forms such as mortgages and/or personal loans. For instance, the liquidity requirements in Basel III lead banks to increase their holdings of liquid assets, and to reduce high risky assets such as corporate loans. This indicates that access to finance for non-financial firms become restricted, thus reducing economic growth. Kroszner et al. (2007), Dell'Ariccia et al. (2008), Fernandez et al. (2016), and Moore and Mirzaei (2016) all find that industries that are dependent more on external finance suffer (benefit) more from banking crises (stability).

Yet, we believe that the adverse effect of rigid financial regulations on real economy in general and on manufacturing industries in specific to be the case during normal times. During such periods tougher regulations may reduce bank competition, affect adversely bank profitability and risk-taking behaviour, which all may negatively affect industrial sectors. However, during financial crises, higher bank liquidity and capital requirements make banks resilient and hence they may sustain their lending relative to risky banks (Cornett et al. 2011; Kapan and Minoiu, 2013), and thus improving economic activity. Having a stable financial sector in which banks are in good liquidity and capital positions is unlikely that cut their lending and thus do not reduce economic growth. Puri et al. (2011) investigates the impact of the 2008 crisis on the lending for a sample of German banks, finding that resilient banks accepted more loan applications than fragile banks. Overall, we think it is unexpected that the higher liquidity and capital requirements

[4] In addition, excessive bank liquidity and capital levels reduces bank competition and hence raising the cost of credit and thus limiting access to finance for borrowers (Hakenes and Schnabel, 2011; Dagher at al. 2016).

increases cost of capital and decreases availability of credit during the crisis. Rather, we hypothesis that during the crises period, banks with better positions in liquidity and capital are more resilient and therefore sustain their lending and borrowing costs, as compared to fragile banks, and hence making the economy less vulnerable to crises.

Taking everything into consideration, we conjecture that higher bank liquidity and capital levels place banking sectors on a trade-off between the economic performance and financial safety in pre-crises periods, but during the crises episodes such requirements may not only decrease bank financial fragility but also make real economy more resilient. This leads our main hypothesis to be formulated as:

H1. *Stricter liquidity regulation and higher capital requirements affect adversely economic activity during normal periods, but make the economy resilient during financial crises.*

2. Model Specification and Data

2.1. Model specification

Recall that our aim is to measure the potential effects of higher capital and liquidity requirements on sectoral activity. An important issue with Basel III is that tougher rules on liquidity and capital may affect adversely banks' performance and hinder their ability to extend credit, thus reducing economic growth. To examine this, we estimate the impact of cross-country differences in the levels of bank liquidity and capital positions on the relative activity of financially dependent industries. Thus, we rely on Rajan and Zingales (1998) model as follows:

$$y_{i,c,t} = \alpha_0 + \alpha_1.Share_{i,c,t-1} + \alpha_2.Regulation_{c,t} + \alpha_3.Regulation_{c,t} \times Fin.Dep._i + \alpha_4.Credit_{c,t} + \alpha_5.Credit_{c,t} \times Fin.Dep._i + \tau_i + \tau_c + \tau_t + \varepsilon_{i,c,t} \quad (1)$$

$y_{i,c,t}$ is an indicator of sectoral activity measured as either the average ratio of gross fixed capital formation to output (investment rate) or number of establishments growth of sector i in country c in year t, following Calomiris et al. (2017), Claessens and Laeven (2003) and Beck and Levine (2002). $Share$ is the share of value added of sector i to total value added of all industries in country c in year $t-1$. $Regulation$ is an indicator of bank liquidity or capital ratio in country c in year t.

$Credit$ is an indicator of financial development (i.e. sum of domestic credit to private sector and market capitalization) in country c in year t. $Fin.Dep.$ is external financial dependence of each industry. All specifications contain a full set of sector fixed effects (τ_i), country fixed effects (τ_c) and year fixed effects (τ_t).

The recent global financial crisis has led many banks around the world to face serious liquidity problems or to fail in some cases. To prevent this from happening again, the Basel III framework reported by the Basel Committee on Banking Supervision (BCBS, 2010b) requires higher levels of liquidity and capital. First, the Basel III frame presents two new liquidity standards: the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio ($NSFR$). The LCR and NSFR were designed to enhance short-term and long-term resilience of banks, respectively, against liquidity shocks. As an indicator of bank liquidity and following BCBS (2010a), we focus on NSFR, because it is more relevant for long-term macroeconomic impact than LCR does, and also from empirical point of view it is hard to estimate LCR using available historical financial data. The NSFR suggest that the amount of "required stable funding (e.g. business loans) - RSF" must be smaller than the amount of "available stable funding (e.g. capital and long-term liability) - ASF", that is the ratio of RSF to ASF must be at least 1. Second, Under Basel III capital requirements limits are in terms of quantity capital and quality capital. As proxies for our capital ratio, we rely on two Basel III risk-based measures of capital, it requires 10.5% total (Tier 1 and Tier 2) regulatory capital ratio ($Capital^{Total}$), and 8.5% Tier 1 capital ratio ($Capital^{Tier1}$)[5]. Overall, in this study we use three indicators of Basel III that are NSFR, $Capital^{Total}$ and $Capital^{Tier1}$ as our measure of bank stringent liquidity and capital ratio. Taken at face value, we use three central components of Basel III as our measure of bank regulations: tighter liquidity requirements, higher quantity capital, and better quality of capital. We expect that these requirements although potentially useful macroprudential tool for reducing risk at the bank level they could limit the granting of loans and hence hinder real economic activity (Kauko, 2017).

The coefficient of interest is α_3, which measures the difference between the sectoral activity in financially-dependent sectors in countries with strong and weak bank liquidity and capital requirements. To account for a given level of finance, how higher bank liquidity and capital

[5] Note that the ratios are presented include 2.5% capital buffer. Also, Basel III imposes 7% base capital ratio and 3% leverage ratio.

requirements may affect sectoral activity of financially dependent industries, we add credit ($Credit$) and its interaction with the external financial dependence variable ($Credit * Fin.Dep.$) to the specification.

2.2. Data

We use bank-level, sectoral-level, and country-level data. In this section, we explain their construction, sources, and the way we estimate Basel III liquidity and capital indices.

2.2.1. Data on banks

The source of data for estimating bank liquidity and capital ratios is Bankscope, a comprehensive, international database that includes information on public and private banks. To estimate bank liquidly and capital ratio, we include all commercial banks, because these banks are the main provider of funds for manufacturing firms and also they are subject to Basel III requirements. We obtain data on 28,000 banks from 50 developed and emerging economies over the period 2003 to 2010.

We obtain averages of bank capital both quantity ($Capital^{Total}$) and quality ($Capital^{Tier1}$) across countries as reported in Bankscope. To compute bank liquidity (NSFR) ratio, we apply the method used by Vazquez and Federico (2012) and Kapan and Minoiu (2013)[6]. The NSFR suggests that the amount of "available stable funding (e.g. capital and long-term debts)" must be greater than the amount of "required stable funding (e.g. commercial loans)", computed as: $NSFR = \frac{Available\ stable\ funding\ (ASF)}{Required\ stable\ funding\ (RSF)} = \frac{\sum_i z_i L_i}{\sum_j z_j A_j}$ where L indicates liabilities, A indicates assets, and z stands for weights attributed to distinct liabilities and assets (Kapan and Minoiu, 2013). Weights take a value between 0 and unit, where large weights are assigned to more stable sources of funding and to more illiquid assets. The higher the NSFR is, the lower liquidity risk. The Basel III regulations require banks to maintain a NSFR that exceeds one. Note that in order to estimate the NSFR, we impose some assumptions in the definitions of ASF and RSF, such as classifications of different

[6] The NSFR computed by Vazquez and Federico (2012) is consistent with the formulations proposed in Basel III and applicable to Bankscope data. See also Hong et al. (2014) for a relatively more appropriate calculation of the NSFR for U.S. commercial banks.

liabilities and asset classes, and the weights assigned to these classes (Hong et al, 2014). Appendix Table A1 details the components and factor weights.

Note that the Basel III liquidity and capital requirements have not been implemented fully yet, but following previous studies (e.g. Dietrich et al. 2014), we look back and examine how bank liquidity and capital standards have affected sectoral activity, which would identify the potential real effects of Basel III in the future.

2.2.2. Data on industries

The industry data are from the UNIDO Industrial Statistics Database, which contains highly disaggregated yearly data on manufacturing sectors. UNIDO report data on value added, output, number of establishments, gross fixed capital formation and number of employments. We select 73 industries of mixed 3&4-digit codes. In order to use the industry financial-dependence data of Rajan and Zingales (1998), we regroup these 73 industries of ISIC Rev. 3 data into 28 industries of ISIC Rev. 2. We initially selected all 135 countries included in the UNIDO database. However, we then removed 84 countries for which data on our sectoral activity variables (that is investment rate and establishment growth) are not available around the crisis period 2003-10. We further dropped the U.S. from our dataset, because it is the source of the crisis and also it is used for industry benchmarking. This left us with a sample of 28 industries in 50 countries.

Furthermore, the external financial dependence ($Fin.Dep.$) data for each industry are retrieved from Rajan and Zingales (1998). Rajan and Zingales (1998) used U.S. firm-level data to estimate the external finance dependence of different manufacturing sectors, assuming that financial markets in the US are relatively frictionless and informative and thus industry characteristics based on US firm data reflects technological characteristics of the industry that are relatively stable across space and carry over to other countries. External dependence is defined as the share of capital expenditure not financed with cash- flow from operations.

2.2.3. Data on countries

In terms of data on countries ($Credit$), they are collected from the World Development Indicators (WDI) database

Insert Table 1 here

Table 1 presents the definition, sources and summary statistics of all variables. Appendix Tables A2 and A3 present further information regarding mean values of variables by country and by sector. Regarding sectoral activity, the country-level average of investment rate is observed ranging from 1.4% (Colombia) to 39.2% (Georgia). The industry-level average of investment rate is shown ranging from 5.7% (Wearing apparel, ISIC 322) to 15.6% (Glass products, ISIC 362). The mean and standard deviation of investment rate are at 9% and 11.1%, respectively, over the sample period 2003-2010. Furthermore, the country-level average of number of establishment growth is observed ranging from -22.9% (Sri Lanka) to 23.3% (Mexico). The industry-level average of establishment growth is shown ranging from -4% (Leather and fur products, ISIC 323) to 6% (Fabricated metal products, ISIC 381). The mean and standard deviation of establishment growth are at 1% and 21%, respectively over the sample period 2003-2010. Furthermore, regarding the value of NSFR, we observe that the highest NSFR is for Albania (1.16), on the other hand, several eastern European countries demonstrate a lower NSFR, e.g. Hungary (0.69). It appears that 66% of our sample countries meet the regulatory minimum requirement.

3 Empirical results

Insert Table 2a and 2b here

Table 2 reports the sectoral regression results, where the dependent variable is investment rate in Table 2a and number of establishment's growth in Table 2b. In each table, we report three panels of results: whole sample period (2003-2010) in Panel A, sub-sample of pre-crisis period (2003-07) in Panel B, and crisis period (2008-10). The estimation carried out separately for different types of Basel III liquidity and capital requirements (that is $NSFR$, $Capital^{Total}$, and $Capital^{Tier1}$). Table 2a shows that investment rate (ratio of gross investment to output) in financially dependent sectors in countries with stable banks – that is banks with higher liquidity and capital levels under Basel III – is statistically significantly higher than in countries with unstable banks (Panel A). This is revealed by the positive and statistically significant coefficient on the interaction term between proxies of Basel III and external financial dependency. This association breaks down in pre-crisis (Panel B) but remains during the crisis period (Panel C). In Table 2b, we run the same regression as Table 2a, but with the sectoral establishment growth (growth in number of establishment) as the

dependent growth. We find that tougher liquidity and capital requirements were associated with higher establishment growth in industries that are more financially constrained.

Insert Table 3 here

We now do some robustness checks to ensure that our basic results are not driven by the choice of the econometric models or of the control variables. Starting with the model specifications, we estimate the coefficients using error terms clustered at the industry or country level alone (rather than at the industry-country level), and employing different sets of fixed effects. Table 3 reports the results, where in Section I error terms clustered at the industry level, Section II clustered terms at the country level, and Section III reports results for different set of fixed effects. They confirm the findings from our baseline regressions: investment rate and/or establishment growth in financially dependent industries is higher in countries that during the recent global crisis had banks with better liquidity and capital requirements under Basel III Accord.

Insert Table 4 here

We further check whether our main results remain if we include in the regressions several relevant control variables. First, we include bank overheads ratio, as a proxy for bank efficiency. One might expect that efficient banks are essential for stimulating economic growth. Second, we use foreign direct investment as a proxy for availability of foreign capital. Industries that are located in countries where they receive a considerable amount of foreign capita are expected to grow fast. And finally, we control for trade activities that may influence industrial sectors activity. Table 4 report the results. We find that our main findings do not alter when controlling for these variables. In fact, we find that financially dependent industries performed better during the financial crisis period in countries with stable banking system.

Insert Table 5 here

Finally, we examine whether banks that met minimum capital and liquidity requirements (that is $NSFR \geq 1$, $Capital^{\text{Total}} \geq 10.5\%$, $Capital^{\text{Tier1}} \geq 8.5\%$) have any effect on sectoral activity. Previously, we find that, in general, bank higher capital and liquidity levels enhance sectoral activity during the financial crisis. However, we now consider the change in levels of liquidity and capital only for those banks met minimum requirements. Table 5 reports the results.

We again find that stable banks during the crisis period positively affect sectoral activity in industries more dependent on external finance.

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4 Conclusion

Banks with heavily rely on non-stable funding and with weaker structural liquidity are more likely to cut lending or fail during a financial crisis (Kapan and Minoiu, 2013; Vazquez and Federico, 2015). Because of this, policymakers and regulators have emphasized the important role of sufficient capital buffers and sound liquidity risk management for stability of banks (Kim and Sohn, 2017). In fact, it is believed that better liquidity and capital positions can more effectively maintain banks intermediation capacity and hence reduce their negative externality on real economy. The 2008 global financial crisis supported these arguments: a shortage of liquidity and capital was a main factor affecting banks' ability to allocate loans. Following the crisis, Basel Committee introduced new structural liquidity and capital ratios, as defined in Basel III. Yet higher liquidity and capital levels may limit banks' ability to allocate funds to the rest of the economy and, hence, dampen economic activity especially during normal conditions. So far there is not much direct evidence on whether more stringent bank liquidity and capital requirements decrease or increase economic growth.

In this paper, we examined whether the effects of banking system on sectoral activity differ depending upon the liquidity and capital levels of banks. We find that an increase in bank liquidity and capital is associated with sectoral activity of financially dependent industries. Notably, this relationship is the case only during the recent crisis period. This interaction effect is found to be nonsignificant during pre-crisis period. These results may justify the argument that banks sustain their lending during a crisis period should they maintain their liquidity and capital levels high. However, during normal condition where banks naturally are risk aggressive, having stable banking sector may not be effective in improving economic growth.

This study contributes to the debate on the reaction of the economic performance to banks' balance sheet shocks in terms of new wave of bank regulations. We find that newly introduced rules requiring banks to have higher liquidity and capital positions may not only have no impact on economic activity, but conversely during a financial crisis they make financially dependent

industries more resilient. This suggest that potential adverse effects of tighter bank regulation on economic growth is likely to be negligible. Overall, we find a direct link between Basel III and economic growth, indicating that well-capitalized and well-liquidated banks better absorb adverse shocks and may continue lending to businesses during a crisis episode.

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Table 1: Variable definition, sources and summary statistics

Panel A: Variable definition and sources.		Panel B: Summary statistics (2003-2010)		
Variable	Definition and source	Obs.	Mean	St. Dev.
Industry activity				
Investment rate	The ratio of gross fixed capital formation to output in a particular sector in each country. Nominal value added deflated using producer price index of finished goods index (taken from Economic Research, Federal Reserve Bank of St. Louis). Source: UNIDO database, and own calculation.	7844	0.09	0.11
Establishment growth	Simple growth rate of number of establishments in a particular sector in each country. Source: UNIDO database, and own calculation.	8650	0.01	0.21
Other industry characteri				
Share	The value added of each sector as a share of the total value added of all sectors in an economy. Source: UNIDO database, and own calculation.	9019	0.04	0.06
Fin.Dep.	External financial dependence of U.S. firms by 3-digit ISIC codes. 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: Rajan and Zingales (1998).	28	0.24	0.32
Bank regulation				
NSFR	NSFR is the long-term liquidity requirement defined under Basel III. It is computed in line with the Basel III proposal and weights from Vazquez and Federico (2012) and Kapan and Minoiu (2013), as shown in Table A1. Source: Bankscope and own calculation.	382	0.93	0.16
Capital ^{Total} (%)	Regulatory total capital ratio as reported in Bankscope. It is an indicator of bank total quality and quantity capital. Source: Bankscope.	365	16.65	4.8
Capital ^{Tier1} (%)	Regulatory Tier 1 capital ratio as reported in Bankscope. It is an indicator of bank capital quality rather than quantity. Source: Bankscope.	355	13.53	4.49
Controls				
Credit (%)	Sum of the ratio of domestic credit to private sector and market capitalization of listed companies, as % of GDP, which refers to the relative size of a country's financial sector (banking and stock exchanges). Source: World Bank-WDI.	400	142.45	92.67
Others				
Bank efficiency (%)	Bank overhead costs to total assets. Source: World Bank: The Global Financial Development Database.	400	2.45	1.87
FDI (%)	Foreign direct investment, net inflows (% of GDP). Source: World Bank-WDI.	400	5.89	9.44
Trade (%)	Trade is the sum of exports and imports of goods and services measured, as % of GDP. Source: World Bank-WDI.	400	100.72	65.39

Panel C: Correlation matrix among main variables

		Investment rate	[1]	[2]	[3]	[4]	[5]
Estab. growth	[1]	0.125***	1				
Share	[2]	-0.019*	0.026**	1			
NSFR	[3]	0.129***	0.084***	0.0132	1		
Capital ^{Total}	[4]	0.208***	0.067***	-0.0033	0.557***	1	
Capital ^{Tier1}	[5]	0.197***	0.057***	-0.0001	0.477***	0.862***	1
Credit	[6]	-0.318***	-0.082***	0.001	-0.191***	-0.196***	-0.184***

Table 2a: Bank liquidity and capital regulation and sectoral activity – investment rate

The table presents the results from the regression

$y_{i,c,t} = \alpha_0 + \alpha_1.Share_{i,c,t-1} + \alpha_2.Regulation_{c,t} + \alpha_3.Regulation_{c,t} \times Fin.Dep._i + \alpha_4.Credit_{c,t} + \alpha_5.Credit_{c,t} \times Fin.Dep._i + \tau_i + \tau_c + \tau_t + \varepsilon_{i,c,t}.$

$y_{i,c,t}$ is the average ratio of gross fixed capital formation to output (investment rate) of sector i in country c in year t. $Share$ is the share of value added of industry i to total value added of all industries in country c in year $t-1$. $Regulation$ is an indicator of bank liquidity and capital ratio (*NSFR*, $Capital^{Total}$, $Capital^{Tier1}$) in country c in year t. $Credit$ is an indicator of financial development (i.e. sum of domestic credit to private sector and market capitalization) in country c in year t. $Fin.Dep.$ is external financial dependence of each industry. All specifications contain a full set of sector fixed effects (τ_i), country fixed effects (τ_c) and year fixed effects (τ_t).

For detail definition of variables see Table 1. The statistical inferences are based on robust standard errors (associated t-values reported in parentheses) clustered by industry*country level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Our sample includes 28 industries with three-digit ISIC, Rev.2 for 50 countries. Sample size varies across regression specifications because not all variables are available for all industries, all countries or all years.

	Panel A: Whole sample (2003-2010)			*Panel B: Pre-crisis (2003-2007)*			*Panel C: Crisis (2008-2010)*		
	NSFR	$Capital^{Total}$	$Capital^{Tier1}$	NSFR	$Capital^{Total}$	$Capital^{Tier1}$	NSFR	$Capital^{Total}$	$Capital^{Tier1}$
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Share (t-1)	-0.018	-0.020	-0.024	-0.028	-0.034	-0.040	0.010	0.008	0.008
	(-0.62)	(-0.65)	(-0.78)	(-0.83)	(-0.89)	(-1.05)	(0.27)	(0.23)	(0.23)
Regulation	-0.013	-0.000	-0.000	-0.019	-0.000	-0.000	-0.029	-0.001	0.000
	(-1.15)	(-1.13)	(-1.16)	(-1.56)	(-0.31)	(-0.81)	(-1.06)	(-1.12)	(0.12)
Regulation × Fin.Dep.	0.040**	0.002**	0.001**	0.028	0.001	0.001	0.085**	0.004***	0.003**
	(1.97)	(2.50)	(2.08)	(1.27)	(1.34)	(1.23)	(2.10)	(2.62)	(2.20)
Credit	0.000	0.000	0.000	0.000**	0.000**	0.000*	0.000*	0.000	0.000
	(1.43)	(1.20)	(1.05)	(2.25)	(2.11)	(1.96)	(1.73)	(1.25)	(0.72)
Credit × Fin.Dep.	0.000	0.000	0.000	0.000	0.000	0.000	-0.000	-0.000	-0.000
	(0.21)	(0.52)	(0.30)	(0.90)	(1.05)	(1.00)	(-1.04)	(-1.09)	(-1.18)
Constant	0.123***	0.115***	0.105***	0.148***	0.126***	0.107***	0.107***	0.101***	0.087***
	(6.37)	(6.21)	(6.79)	(5.58)	(4.82)	(6.26)	(3.73)	(4.78)	(4.54)
Sector_FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country_FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year_FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# Countries	50	50	50	50	50	50	50	50	50
# Industries	28	28	28	28	28	28	28	28	28
Observations	7215	6845	6678	5089	4719	4552	2126	2126	2126
Adj. R^2	0.631	0.631	0.635	0.627	0.626	0.632	0.662	0.664	0.662

Table 2b: Bank liquidity and capital regulation and sectoral activity – Establishment growth

The table presents the results from the regression

$$y_{i,c,t} = \alpha_0 + \alpha_1.Share_{i,c,t-1} + \alpha_2.Regulation_{c,t} + \alpha_3.Regulation_{c,t} \times Fin.Dep._i + \alpha_4.Credit_{c,t} + \alpha_5.Credit_{c,t} \times Fin.Dep._i + \tau_i + \tau_c + \tau_t + \varepsilon_{i,c,t}.$$

$y_{i,c,t}$ is number of establishments growth of sector i in country c in year t. $Share$ is the share of value added of industry i to total value added of all industries in country c in year $t-1$. $Regulation$ is an indicator of bank liquidity and capital ratio (*NSFR*, $Capital^{Total}$, $Capital^{Tier1}$) in country c in year t. $Credit$ is an indicator of financial development (i.e. sum of domestic credit to private sector and market capitalization) in country c in year t. $Fin.Dep.$ is external financial dependence of each industry. All specifications contain a full set of sector fixed effects (τ_i), country fixed effects (τ_c) and year fixed effects (τ_t).

For detail definition of variables see Table 1. The statistical inferences are based on robust standard errors (associated t-values reported in parentheses) clustered by industry*country level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Our sample includes 28 industries with three-digit ISIC, Rev.2 for 50 countries. Sample size varies across regression specifications because not all variables are available for all industries, all countries or all years.

	Panel A: Whole sample (2003-2010)			*Panel B: Pre-crisis (2003-2007)*			*Panel C: Crisis (2008-2010)*		
	NSFR	$Capital^{Total}$	$Capital^{Tier1}$	NSFR	$Capital^{Total}$	$Capital^{Tier1}$	NSFR	$Capital^{Total}$	$Capital^{Tier1}$
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Share (t-1)	-0.098**	-0.099**	-0.101**	-0.121***	-0.126***	-0.131***	-0.070	-0.080	-0.081
	(-2.55)	(-2.27)	(-2.28)	(-2.85)	(-2.75)	(-2.76)	(-0.81)	(-0.93)	(-0.94)
Regulation	0.074**	0.004***	0.002*	0.083**	0.005***	0.004***	0.287***	0.016***	0.006
	(2.44)	(3.52)	(1.90)	(2.00)	(3.96)	(3.47)	(3.19)	(4.17)	(1.47)
Regulation × Fin.Dep.	0.148***	0.003**	0.004**	0.055	0.003**	0.003*	0.351***	0.006*	0.008**
	(3.48)	(2.01)	(2.51)	(1.21)	(1.97)	(1.95)	(3.53)	(1.81)	(2.37)
Credit	0.000*	0.000**	0.000**	0.000	0.000	0.000	-0.000	-0.001*	-0.000
	(1.80)	(2.16)	(2.09)	(0.87)	(0.41)	(0.70)	(-0.06)	(-1.68)	(-0.42)
Credit × Fin.Dep.	-0.000	-0.000	-0.000	0.000	0.000	0.000	-0.000	-0.000*	-0.000*
	(-0.19)	(-0.24)	(-0.48)	(0.42)	(1.01)	(0.49)	(-0.88)	(-1.66)	(-1.68)
Constant	0.029	0.071	0.142**	0.011	0.040	0.161	-0.124	-0.082	0.112
	(0.54)	(1.64)	(2.31)	(0.17)	(0.94)	(1.40)	(-1.23)	(-0.93)	(1.38)
Sector_FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country_FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year_FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# Countries	50	50	50	50	50	50	50	50	50
# Industries	28	28	28	28	28	28	28	28	28
Observations	7861	7546	7377	5344	5029	4860	2517	2517	2517
Adj. R^2	0.078	0.079	0.079	0.076	0.079	0.081	0.121	0.121	0.112

Table 3: Bank liquidity and capital regulation and sectoral activity during the crisis – Robust to alternative econometric model

The table presents the results from the regression
$y_{i,c,t} = \alpha_0 + \alpha_1.Share_{i,c,t-1} + \alpha_2.Regulation_{c,t} + \alpha_3.Regulation_{c,t} \times Fin.Dep._i + \alpha_4.Credit_{c,t} + \alpha_5.Credit_{c,t} \times Fin.Dep._i + \tau_i + \tau_c + \tau_t + \varepsilon_{i,c,t}$.

$y_{i,c,t}$ is either the average ratio of gross fixed capital formation to output (investment rate) or number of establishments growth of sector i in country c in year t. $Share$ is the share of value added of industry i to total value added of all industries in country c in year $t-1$. $Regulation$ is an indicator of bank liquidity and capital ratio (*NSFR*, $Capital^{Total}$, $Capital^{Tier1}$) in country c in year t. $Credit$ is an indicator of financial development (i.e. sum of domestic credit to private sector and market capitalization) in country c in year t. $Fin.Dep.$ is external financial dependence of each industry. All specifications contain a full set of sector fixed effects (τ_i), country fixed effects (τ_c) and year fixed effects (τ_t).

For detail definition of variables see Table 1. The statistical inferences are based on robust standard errors (associated t-values reported in parentheses) clustered by industry, country or industry*country level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Our sample includes 28 industries with three-digit ISIC, Rev.2 for 50 countries. Sample size varies across regression specifications because not all variables are available for all industries, all countries or all years.

	Panel A: Investment rate			*Panel B: Establishment growth*		
	NSFR	$Capital^{Total}$	$Capital^{Tier1}$	NSFR	$Capital^{Total}$	$Capital^{Tier1}$
	[1]	[2]	[3]	[4]	[5]	[6]
	I: Cluster at industry level					
Share (t-1)	0.010	0.008	0.008	-0.070	-0.080	-0.081
	(0.22)	(0.19)	(0.19)	(-0.61)	(-0.72)	(-0.72)
Regulation	-0.029	-0.001	0.000	0.287***	0.016***	0.006**
	(-0.97)	(-1.04)	(0.11)	(5.04)	(5.57)	(2.11)
Regulation × Fin.Dep.	0.085**	0.004**	0.003**	0.351***	0.006**	0.008**
	(2.19)	(2.48)	(2.09)	(3.88)	(2.17)	(2.61)
Credit	0.000*	0.000	0.000	-0.000	-0.001*	-0.000
	(1.90)	(1.17)	(0.67)	(-0.06)	(-1.86)	(-0.43)
Credit × Fin.Dep.	-0.000	-0.000*	-0.000*	-0.000	-0.000**	-0.000**
	(-1.48)	(-1.77)	(-1.94)	(-1.26)	(-2.38)	(-2.37)
Constant	0.107***	0.101***	0.087***	-0.124	-0.082	0.112
	(3.55)	(4.49)	(4.25)	(-1.30)	(-0.87)	(1.39)
Sector_FE	Yes	Yes	Yes	Yes	Yes	Yes
Country_FE	Yes	Yes	Yes	Yes	Yes	Yes
Year_FE	Yes	Yes	Yes	Yes	Yes	Yes
# Countries	50	50	50	50	50	50
# Industries	28	28	28	28	28	28
Observations	2126	2126	2126	2517	2517	2517
Adj. R^2	0.662	0.664	0.662	0.121	0.121	0.112
	II: Cluster at country level					
Share (t-1)	0.010	0.008	0.008	-0.070	-0.080	-0.081
	(0.21)	(0.18)	(0.18)	(-0.79)	(-0.90)	(-0.91)
Regulation	-0.029	-0.001	0.000	0.287	0.016*	0.006
	(-1.16)	(-1.10)	(0.14)	(1.25)	(1.71)	(0.62)
Regulation × Fin.Dep.	0.085	0.004**	0.003**	0.351***	0.006**	0.008**
	(1.53)	(2.41)	(2.08)	(3.09)	(2.12)	(2.42)
Credit	0.000	0.000	0.000	-0.000	-0.001	-0.000
	(1.42)	(1.28)	(0.78)	(-0.03)	(-0.77)	(-0.20)
Credit × Fin.Dep.	-0.000	-0.000	-0.000	-0.000	-0.000**	-0.000**
	(-0.57)	(-0.62)	(-0.64)	(-1.18)	(-2.28)	(-2.33)
Constant	0.107***	0.101***	0.087***	-0.124	-0.082	0.112
	(5.69)	(6.70)	(7.72)	(-0.57)	(-0.53)	(1.01)
Sector_FE	Yes	Yes	Yes	Yes	Yes	Yes
Country_FE	Yes	Yes	Yes	Yes	Yes	Yes
Year_FE	Yes	Yes	Yes	Yes	Yes	Yes
# Countries	50	50	50	50	50	50
# Industries	28	28	28	28	28	28
Observations	2126	2126	2126	2517	2517	2517
Adj. R^2	0.662	0.664	0.662	0.121	0.121	0.112

	Panel A: Investment rate			*Panel B: Establishment growth*		
	NSFR	$Capital^{Total}$	$Capital^{Tier1}$	NSFR	$Capital^{Total}$	$Capital^{Tier1}$
	[1]	[2]	[3]	[4]	[5]	[6]
	III: Different econometric specification					
Share (t-1)	0.008	0.006	0.006	-0.080	-0.092	-0.090
	(0.22)	(0.18)	(0.18)	(-0.93)	(-1.06)	(-1.05)
Regulation × Fin.Dep.	0.085**	0.004***	0.003**	0.341***	0.006*	0.009**
	(2.08)	(2.61)	(2.19)	(3.60)	(1.94)	(2.49)
Credit × Fin.Dep.	-0.000	-0.000	-0.000	-0.000	-0.000*	-0.000*
	(-0.99)	(-1.05)	(-1.14)	(-0.96)	(-1.70)	(-1.73)
Constant	0.094***	0.095***	0.099***	0.064	0.094*	0.094*
	(3.97)	(4.11)	(4.30)	(1.12)	(1.68)	(1.66)
Sector_FE	Yes	Yes	Yes	Yes	Yes	Yes
Country*Year_FE	Yes	Yes	Yes	Yes	Yes	Yes
# Countries	50	50	50	50	50	50
# Industries	28	28	28	28	28	28
Observations	2126	2126	2126	2517	2517	2517
R^2	0.680	0.682	0.681	0.297	0.294	0.295

Table 4: Bank liquidity and capital regulation and sectoral activity during the crisis – Robust to other control variables

The table presents the results from the regression
$y_{i,c,t} = \alpha_0 + \alpha_1.Share_{i,c,t-1} + \alpha_2.Regulation_{c,t} + \alpha_3.Regulation_{c,t} \times Fin.Dep._i + \alpha_4.Credit_{c,t} + \alpha_5.Credit_{c,t} \times Fin.Dep._i + X_{c,t} + \tau_i + \tau_c + \tau_t + \varepsilon_{i,c,t}$.

$y_{i,c,t}$ is either the average ratio of gross fixed capital formation to output (investment rate) or number of establishments growth of sector i in country c in year t. $Share$ is the share of value added of industry i to total value added of all industries in country c in year $t-1$. $Regulation$ is an indicator of bank liquidity and capital ratio (*NSFR*, $Capital^{Total}$, $Capital^{Tier1}$) in country c in year t. $Credit$ is an indicator of financial development (i.e. sum of domestic credit to private sector and market capitalization) in country c in year t. $Fin.Dep.$ is external financial dependence of each industry. $X_{i,c,t}$ is a vector of country-year control variables. All specifications contain a full set of sector fixed effects (τ_i), country fixed effects (τ_c) and year fixed effects (τ_t).

For detail definition of variables see Table 1. The statistical inferences are based on robust standard errors (associated t-values reported in parentheses) clustered by industry, country or industry*country level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Our sample includes 28 industries with three-digit ISIC, Rev.2 for 50 countries. Sample size varies across regression specifications because not all variables are available for all industries, all countries or all years.

	Panel A: Investment rate			*Panel B: Establishment growth*		
	NSFR	$Capital^{Total}$	$Capital^{Tier1}$	NSFR	$Capital^{Total}$	$Capital^{Tier1}$
	[1]	[2]	[3]	[4]	[5]	[6]
Share (t-1)	0.010	0.008	0.008	-0.069	-0.081	-0.081
	(0.27)	(0.23)	(0.23)	(-0.80)	(-0.92)	(-0.94)
Regulation	-0.018	-0.001	0.000	0.343***	0.017***	0.007*
	(-0.61)	(-1.15)	(0.14)	(3.63)	(4.30)	(1.69)
Regulation × Fin.Dep.	0.085**	0.004***	0.003**	0.351***	0.006*	0.008**
	(2.10)	(2.61)	(2.19)	(3.53)	(1.84)	(2.40)
Credit	0.000	0.000	0.000	-0.000	-0.001*	-0.000
	(1.26)	(1.06)	(0.50)	(-0.51)	(-1.75)	(-0.61)
Credit × Fin.Dep.	-0.000	-0.000	-0.000	-0.000	-0.000*	-0.000*
	(-1.03)	(-1.09)	(-1.18)	(-0.88)	(-1.65)	(-1.68)
Bank Efficiency	-0.002	-0.002	-0.002	0.016***	0.021***	0.019***
	(-0.35)	(-0.33)	(-0.38)	(2.77)	(3.49)	(3.14)
FDI	0.000	0.000	0.000	-0.001	-0.001	-0.001
	(0.49)	(0.48)	(0.54)	(-0.91)	(-0.83)	(-0.74)
Trade	-0.000	-0.000	-0.000	-0.001	0.001	0.001
	(-1.35)	(-1.26)	(-1.26)	(-1.31)	(1.02)	(0.74)
Constant	0.118***	0.121***	0.107***	-0.111	-0.210*	0.012
	(3.81)	(4.60)	(4.42)	(-1.04)	(-1.91)	(0.11)
Sector_FE	Yes	Yes	Yes	Yes	Yes	Yes
Country_FE	Yes	Yes	Yes	Yes	Yes	Yes
Year_FE	Yes	Yes	Yes	Yes	Yes	Yes
# Countries	50	50	50	50	50	50
# Industries	28	28	28	28	28	28
Observations	2126	2126	2126	2517	2517	2517
Adj. R^2	0.662	0.663	0.662	0.122	0.123	0.114

Table 5: Bank liquidity and capital regulation and sectoral activity during the crisis – Robust to meeting Basel III requirements

The table presents the results from the regression
$y_{i,c,t} = \alpha_0 + \alpha_1.Share_{i,c,t-1} + \alpha_2.Regulation_{c,t} + \alpha_3.Regulation_{c,t} \times Fin.Dep._i + \alpha_4.Credit_{c,t} + \alpha_5.Credit_{c,t} \times Fin.Dep._i + \tau_i + \tau_c + \tau_t + \varepsilon_{i,c,t}$.

$y_{i,c,t}$ is either the average ratio of gross fixed capital formation to output (investment rate) or number of establishments growth of sector i in country c in year t. $Share$ is the share of value added of industry i to total value added of all industries in country c in year $t-1$. $Regulation$ is an indicator of bank liquidity and capital ratio (*NSFR*, $Capital^{Total}$, $Capital^{Tier1}$) in country c in year t. $Credit$ is an indicator of financial development (i.e. sum of domestic credit to private sector and market capitalization) in country c in year t. $Fin.Dep.$ is external financial dependence of each industry. All specifications contain a full set of sector fixed effects (τ_i), country fixed effects (τ_c) and year fixed effects (τ_t).

For detail definition of variables see Table 1. The statistical inferences are based on robust standard errors (associated t-values reported in parentheses) clustered by industry, country or industry*country level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Our sample includes 28 industries with three-digit ISIC, Rev.2 for 50 countries. Sample size varies across regression specifications because not all variables are available for all industries, all countries or all years.

	Panel A: Investment rate			*Panel B: Establishment growth*		
	NSFR>=1	$Capital^{Total}$>= 10.5%	$Capital^{Tier1}$>= 8.5%	NSFR>=1	$Capital^{Total}$>= 10.5%	$Capital^{Tier1}$>= 8.5%
	[1]	[2]	[3]	[4]	[5]	[6]
Share (t-1)	0.010	0.008	0.008	-0.070	-0.080	-0.081
	(0.27)	(0.23)	(0.23)	(-0.81)	(-0.93)	(-0.94)
Regulation	-0.029	-0.001	0.000	0.287***	0.016***	0.006
	(-1.06)	(-1.12)	(0.12)	(3.19)	(4.17)	(1.47)
Regulation × Fin.Dep.	0.085**	0.004***	0.003**	0.351***	0.006*	0.008**
	(2.10)	(2.62)	(2.20)	(3.53)	(1.81)	(2.37)
Credit	0.000*	0.000	0.000	-0.000	-0.001*	-0.000
	(1.73)	(1.25)	(0.72)	(-0.06)	(-1.68)	(-0.42)
Credit × Fin.Dep.	-0.000	-0.000	-0.000	-0.000	-0.000*	-0.000*
	(-1.04)	(-1.09)	(-1.18)	(-0.88)	(-1.66)	(-1.68)
Constant	0.090***	0.095***	0.091***	0.212***	0.092	0.173***
	(5.44)	(5.65)	(5.60)	(3.25)	(1.36)	(2.63)
Sector_FE	Yes	Yes	Yes	Yes	Yes	Yes
Country_FE	Yes	Yes	Yes	Yes	Yes	Yes
Year_FE	Yes	Yes	Yes	Yes	Yes	Yes
# Countries	50	50	50	50	50	50
# Industries	28	28	28	28	28	28
Observations	2126	2126	2126	2517	2517	2517
Adj. R^2	0.662	0.664	0.662	0.121	0.121	0.112

Table A1: Items and weights used for calculation of NSFR

Category	Item	Weight
Assets Side (Required Stable Funding)		
Earning assets	Total earning assets	
Loans	Total loans	100%
Customer loans	Total customer loans	
	Mortgages	
	Other mortgage loans	
	Other consumer / retail loans	
	Corporate & commercial loans	
	Other loans	
Other	Other earning assets	35%
	Loans and advances to banks	
	Derivatives	
	Other securities	
	Trading securities	
	Investment securities	
	Remaining earning assets	
Non-earning assets	Total non-earning assets	
Fixed	Fixed assets	100%
Other	Other non-earning assets	
	Cash and due from banks	0%
	Goodwill	100%
	Other intangibles	100%
	Other assets	100%
Liability & Equity Side (Available Stable Funding)		
Deposits	Deposits and short-term funding	
Customer deposits	Customer deposits	
	Customer deposit-current	85%
	Customer deposit-savings	70%
	Customer deposit-term	70%
Other	Deposits from banks	0%
	Other deposits and short-term borrowings	0%
Other	Other interest-bearing liabilities	
	Derivatives	0%
	Trading liabilities	0%
	Long-term funding	100%
	Total long-term funding	100%
	Senior debt	
	Subordinated borrowing	
	Other funding	
	Other (non-interest bearing liabilities)	100%
Reserves	Loan loss reserves	100%
	Other reserves	100%
Equity	Total equity	100%
	Preferred shares and hybrid capital	100%

Table A2: Average of sectoral activity, bank liquidity and capital indicators and finance by country

			Sectoral activity			Basel III indicators			
Row	Country	Code	Investment rate	Establishment growth	Share	NSFR	$Capital^{Total}$	$Capital^{Tier1}$	Credit
1	Albania	ALB	0.121	0.144	0.082	1.16	16.72	11.88	24.2
2	Australia	AUS	0.048	0.014	0.038	0.86	12.66	9.76	239.0
3	Austria	AUT	0.050	-0.013	0.040	0.92	17.82	13.51	148.6
4	Azerbaijan	AZE	0.121	0.004	0.036	1.08	23.63	18.73	13.1
5	Belgium	BEL	0.044	0.001	0.039	0.82	15.86	11.02	151.8
6	Bulgaria	BGR	0.098	0.031	0.041	1.02	16.39	13.97	74.9
7	Chile	CHL	0.058	-0.026	0.047	1.09	21.82	16.90	192.8
8	Colombia	COL	0.014	0.049	0.039	0.90	12.81	10.55	73.9
9	Cyprus	CYP	0.057	-0.047	0.037	0.87	14.91	11.08	288.9
10	Denmark	DNK	0.051	-0.023	0.043	0.86	15.21	13.38	257.5
11	Ecuador	ECU	0.062	-0.008	0.036	0.95	13.03	9.12	29.2
12	Estonia	EST	0.146	0.027	0.039	0.86	15.10	11.61	108.5
13	Finland	FIN	0.042	-0.019	0.040	0.91	13.97	10.54	171.7
14	France	FRA	0.038	-0.027	0.038	0.77	14.48	15.30	182.9
15	Georgia	GEO	0.392	0.142	0.038	1.08	27.38	22.29	28.9
16	Germany	DEU	0.040	-0.002	0.037	0.95	14.06	10.13	156.4
17	Hungary	HUN	0.080	-0.043	0.036	0.69	12.77	9.33	84.1
18	India	IND	0.074	0.031	0.036	0.98	14.76	10.77	121.4
19	Indonesia	IDN	0.226	0.063	0.036	1.08	21.88	16.66	60.0
20	Ireland	IRL	0.040	-0.019	0.044	0.90	10.89	9.57	228.4
21	Israel	ISR	0.052	0.104	0.045	0.96	12.43	8.88	183.9
22	Italy	ITA	0.044	-0.037	0.037	0.92	15.08	12.98	135.0
23	Japan	JPN	0.039	-0.026	0.036	0.90	11.33	9.12	266.8
24	Korea	KOR	0.077	0.013	0.036	1.15	14.11	10.90	219.1
25	Kuwait	KWT	0.105	0.007	0.041	1.00	17.83	15.75	186.7
26	Latvia	LVA	0.122	0.031	0.040	0.93	14.96	10.69	88.6
27	Lithuania	LTU	0.085	0.033	0.036	0.74	13.73	11.87	71.7
28	Luxembourg	LUX	0.052	-0.015	0.047	1.07	19.50	16.03	338.9
29	Macedonia	MKD	0.052	0.019	0.037	1.15	29.84	24.36	45.1
30	Malaysia	MYS	0.039	0.100	0.036	1.01	16.82	14.63	247.4
31	Malta	MLT	0.068	-0.033	0.038	1.15	18.59	14.94	166.3
32	Mexico	MEX	0.028	0.233	0.037	0.98	19.51	17.63	49.9
33	Morocco	MAR	0.077	0.012	0.036	0.89	11.35	8.75	118.2
34	Netherlands	NLD	0.052	0.002	0.041	0.90	17.12	15.01	267.6
35	New Zealand	NZL	0.042	-0.025	0.085	0.71	13.59	11.04	170.8
36	Norway	NOR	0.041	0.100	0.040	0.74	14.10	12.12	100.2
37	Oman	OMN	0.383	0.057	0.038	0.91	16.51	14.17	73.5
38	Poland	POL	0.070	-0.001	0.036	0.77	16.47	12.89	70.9
39	Portugal	PRT	0.069	-0.028	0.041	0.71	12.81	9.85	200.1
40	Romania	ROM	0.369	0.022	0.038	1.00	20.22	16.79	49.2
41	Singapore	SGP	0.047	-0.005	0.043	1.09	24.10	19.95	295.0
42	Slovak Republic	SVK	0.087	0.049	0.041	1.02	16.91	17.41	34.5
43	Slovenia	SVN	0.072	-0.025	0.038	0.88	13.82	12.05	100.5
44	Spain	ESP	0.047	-0.028	0.037	0.71	16.85	12.22	261.4
45	Sri Lanka	LKA	0.040	-0.229	0.042	0.90	12.60	11.00	52.0
46	Sweden	SWE	0.049	0.008	0.040	0.82	17.06	17.10	226.0
47	Tanzania	TZA	0.126	-0.011	0.052	1.10	20.00	18.91	16.7
48	Turkey	TUR	0.096	0.042	0.041	1.05	20.08	17.59	59.2
49	United Kingdom	GBR	0.036	-0.044	0.037	0.93	19.06	12.51	303.5
50	Vietnam	VNM	0.365	0.122	0.036	0.86	13.83	10.64	87.4

Table A3: Average of sectoral activity and other indicators by industry

Row	Industry	ISIC	Sectoral activity		Share	Fin.Dep.
			Investment rate	Establishment growth		
1	Food products	311	0.077	0.01	0.13	0.14
2	Beverages	313	0.104	0.03	0.04	0.08
3	Tobacco	314	0.064	-0.02	0.02	-0.45
4	Textiles	321	0.093	0.01	0.03	0.40
5	Wearing apparel, except footwear	322	0.057	-0.01	0.03	0.03
6	Leather and fur products	323	0.069	-0.04	0.00	-0.14
7	Footwear, except rubber or plastic	324	0.064	-0.02	0.01	-0.08
8	Wood products, except furniture	331	0.085	0.00	0.03	0.28
9	Furniture and fixtures, excel. metal	332	0.075	0.03	0.02	0.24
10	Paper products	341	0.103	0.03	0.03	0.18
11	Printing and publishing	342	0.089	0.00	0.04	0.20
12	Industrial chemicals	351	0.111	0.00	0.05	0.25
13	Other chemical product	352	0.088	0.02	0.06	0.22
14	Petroleum refineries	353	0.068	0.05	0.09	0.04
15	Misc. petroleum and coal products	354	0.082	-0.01	0.00	0.33
16	Rubber products	355	0.089	0.02	0.01	0.23
17	Plastic products	356	0.094	0.04	0.03	1.14
18	Pottery, china, earthenware	361	0.112	0.01	0.00	-0.15
19	Glass and products	362	0.156	0.03	0.02	0.53
20	Other non-metalic mineral products	369	0.113	0.04	0.05	0.06
21	Iron and steel	371	0.078	0.02	0.04	0.09
22	Non-ferrous metals	372	0.073	0.02	0.03	0.01
23	Fabricated metal products	381	0.091	0.06	0.07	0.24
24	Non-electrical machinery	382	0.085	0.03	0.07	0.45
25	Electrical machinery	383	0.083	-0.01	0.07	0.77
26	Transport equipment	384	0.083	0.02	0.07	0.31
27	Professional and scientific equipment	385	0.096	0.01	0.02	0.96
28	Other manufacturing	390	0.075	0.00	0.01	0.47