

International Capital Flows and the Allocation of Credit Across Firms*

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Abstract

Substantial research yields mixed conclusions regarding the effects of international capital flows on economic growth. However, microeconomic channels that help to explain these inconsistencies are to date underexplored. This paper uses a novel dataset that covers about 20,000 firm-year observations to study the effects of the exogenous fluctuations in European capital flows on the allocation of credit across firms during 1995-2014. We find that bursts of capital inflows are associated with more loans to the least profitable firms within an industry, thereby reducing economic dynamics in the long-run. Consequently, there is evidence for time-varying implications of foreign capital for economic growth.

Keywords: Credit Allocation, Capital Flows, Global Imbalances, Open Economy Growth

JEL classification: F32, F41, F43, G01, G21, O4

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1 Introduction

An empirical strand of research finds that financial development is associated with economic growth (e.g., King and Levine, 1993; Rajan and Zingales, 1998; Levine et al., 2000). In recent years, however, the positive effect of finance on growth has been questioned and some research claims that there can be too much finance (Arcand et al., 2015). In particular, substantial empirical analyses provide mixed conclusions regarding the effects of international financial integration and foreign capital flows on growth (Aizenman et al., 2013; Eichengreen et al., 2011; Alfaro and Charlton, 2007; Kose et al., 2009; Bonfiglioli, 2008; Edison et al., 2002; Grilli and Milesi-Ferretti, 1995). Bussière and Fratzscher (2008) find an effect of international financial liberalization on economic growth that varies in the short- and long-run and, thereby, provide a possible explanation for the mixed empirical results. However, as most of the research only has access to data on the country-level, a microeconomic channel for the time-dependent implications of foreign capital for economic growth has hardly been identified. Precisely, researchers have disregarded the crucial role of the financial system for the intermediation of global liquidity to the real economy. Dinger and te Kaat (2016) take a first step in this direction and examine the implications of global capital flows for bank lending behavior. Their approach, however, is based on aggregated bank-level data and, therefore, their analysis can neither explore how the heterogeneity of firms affects bank lending decisions nor study subsequent real economic effects. The present paper bridges this gap by investigating the impact of international capital on the allocation of credit across firms that differ in their profitability.

Financial institutions that are located in countries with bursts of capital inflows have a better access to funding from international investors with potential effects on their lending and risk-taking behavior. That is why the BIS argues that financial booms (e.g., because of foreign capital inflows) usually lead to a misallocation of resources, reducing long-run economic growth (Bank for International Settlements, 2015).

In the present paper, we test this argument empirically. Our hypothesis is that financial institutions use an increase in loanable funds—as a key result of international capital inflows—to pay out loans to unprofitable firms. From a theoretical perspective, inflows of international liquidity are regularly associated with more bank risk-taking (Dell’Ariccia and Marquez, 2006; Acharya and Naqvi, 2012). As highlighted by Carling et al. (2007), less profitable firms are *ceteris paribus* closer to insolvency and, therefore, they face stronger credit constraints, which, in turn, forces them to pay higher interest rates. Consequently, more loans to less profitable firms are a

sign of increased bank risk-taking.

We test this hypothesis by compiling a sample that rests on the Worldscope database, which is fostered by Thomson Reuters. It comprises annual balance sheet data of European firms during 1995-2014. We match this data with a large vector of macroeconomic variables, allowing us to study global capital flows and their intermediation to the real economy. Firms in the euro area are an ideal laboratory for the empirical identification because capital inflows in the euro area are mainly driven by exogenous push factors, such as the VIX or macroeconomic conditions in the US, which makes them exogenous to loan supply in Europe (Fratzscher, 2012). Beyond this, studying countries under uniform monetary policy conditions allows us to isolate fluctuations in current account positions from changes in the stance of monetary policy. Whereas the existing empirical research focuses on the exploration of monetary policy as a driver of both bank lending and risk-taking (e.g., Kashyap and Stein, 2000; Jiménez et al., 2014; Ioannidou et al., 2015), we thus hold the stance of monetary policy constant and examine the variation in lending that is driven alone by international capital flows.

Our empirical approach encompasses three steps. First, we determine how bursts of international capital affect the efficiency of credit allocation by investigating lending to the least profitable firms within an industry. Theoretical models that relate international capital inflows to credit allocation are based on agency problems in the financial sector. Therefore, building on the baseline test, we then explore the role of agency problems in the financial sector in two dimensions: (i) agency problems that increase in the size of financial systems, raising the probability of “Too-big-to-fail”-related implicit bail-out guarantees and (ii) agency problems that rise in the shares of non-performing loans, which induce financial institutions to roll over bad loans and, thereby, hide loan losses. Both types of agency problems are likely to exacerbate the effects identified in the baseline model, making a model refinement essential. Additionally, this extension also allows us to disentangle loan supply from loan demand, which is typically modeled independently of the characteristics of the financial system.

Second, by investigating whether industries that are most dependent on external finance grow less in countries with international capital inflows, we explore whether the change in the allocation of credit that we observe on a firm-level also affects industry-level dynamics. Our presumption in this specification is that the increase in lending to less profitable firms associated with bursts of foreign capital affects industries that are most dependent on external finance disproportionately and, as a result, lowers their growth rates in the long-run.

Third, we investigate the impact of several alternative model specifications. We start by exploring the effects of foreign capital in episodes in which capital flows are dominated by global push relative to local pull factors. We define push factors to be dominant when capital inflows (outflows) are accompanied by reductions (increases) in interest rates. In these cases, capital flows are unlikely to be attracted by local demand factors, which would rather have the opposite effect on interest rates. By this, we are able to extract the exogenous component of international capital flows and emphasize the consistency of our estimates. We continue by examining the impact of the various types of capital flows by disaggregating our overall measure of net capital flows into net foreign direct investments, net equity flows and net debt flows. As a strand of research in international finance claims that gross capital flows matter more than net flows (e.g., Obstfeld, 2012), we additionally horserace the disaggregated net flow measures with their corresponding gross counterparts. Finally, we stress the robustness of our results and estimate our regressions for alternative time periods, country coverages and profitability definitions.

Our results are as follows: We find inflows of foreign capital to be associated with increased loan volumes to the least profitable firms within an industry. For instance, a 1-percentage point (henceforth pp) increase in capital inflows over GDP increases short-term loan growth of less profitable firms by 1.2 pp—in contrast to profitable firms for which the effect is not statistically different from zero. This effect is exacerbated by agency problems in the financial sector. Large financial systems with high shares of non-performing loans have even higher incentives for increased lending to the least profitable firms, a result that highlights the role of regulation for the allocative efficiency of loan supply. We then also stress that the change in the allocation of credit that we observe on a microeconomic level adversely affects industry-level dynamics. This is the case because industries that are most dependent on external finance grow less in countries with large capital inflows. This result suggests that capital inflows and the related additional funding for low performing firms have adverse effects on the aggregate dynamics of the real economy, constituting a possible negative long-run effect of foreign capital on economic growth. Moreover, we show that our results are particularly pronounced during episodes in which changes in international capital flows are dominated by (exogenous) global push relative to (endogenous) local pull factors, underlining the consistency of our baseline analysis. Last but not least, net debt flows matter more than gross flows in their effect on loan supply to the least profitable firms, a result that provides empirical support for the literature that emphasizes the importance of net capital flows for financial stability (e.g., Catão and Milesi-Ferretti, 2014;

Caballero, 2014).

The present paper contributes to the existing literature in three dimensions: Our main contribution lies in the identification of a microeconomic channel that explains the time-varying effect of financial liberalization on economic growth (Bussière and Fratzscher, 2008), which is likely to be the reason for the mixed results of several empirical studies that explore the relation between financial openness and economic growth (e.g., Aizenman et al., 2013; Eichengreen et al., 2011; Alfaro and Charlton, 2007; Kose et al., 2009; Bonfiglioli, 2008; Edison et al., 2002; Grilli and Milesi-Ferretti, 1995). Second, it contributes to a literature that investigates the real effects of bank lending (e.g., Bentolila et al., 2013; Cingano et al., 2013; Acharya et al., 2014), especially to research that examines the nexus between foreign capital, credit allocation and total factor productivity (e.g., Aoki et al., 2010; Reis, 2013; Gopinath et al., 2015; Samarina and Bezemer, 2016). Whereas the existing literature focuses on a shift in credit allocation across industries, e.g., from the tradable to the non-tradable sector or from business lending to household credit, we show that international capital flows also affect the allocation of credit within industries, with increased lending to the least profitable firms. As these firms are closer to insolvency, we also add to the literature on the relationship between foreign capital flows and the probability for financial crises (e.g., Rancière et al., 2008; Reinhart and Rogoff, 2008; Obstfeld, 2012; Taylor, 2012; Gourinchas and Obstfeld, 2012; Lane and McQuade, 2014). Therefore, it can also be seen as complementary to Dinger and te Kaat (2016), who show that current account deficits increase risks in the financial sector both because banks replace new investments in traded assets with typically riskier loans and because the average quality of these loans deteriorates. Third, our paper adds to the nexus between finance and growth (e.g., Schumpeter, 1934; Gurley and Shaw, 1955; Goldsmith, 1969; McKinnon, 1973; King and Levine, 1993; Rajan and Zingales, 1998; Levine et al., 2000). As large inflows of international capital are associated with an increase in lending to the least profitable firms, we find evidence that there can be too much (international) finance (Arcand et al., 2015) that has adverse effects on economic dynamics in the long-run.

This paper is structured as follows: Section 2 reviews the theoretical literature that allows us to derive our testable hypotheses. The focus of Section 3 lies on the description of our dataset and introduces the empirical strategy. The baseline results are presented in Section 4. In Section 5, we present the effects on industry-level dynamics. The results of several alternative model specifications are the focus of Section 6. Section 7 concludes.

2 Theory

In this section, we build the theoretical foundation for the empirical analysis that follows by presenting the arguments of key theoretical models that relate global capital flows to credit allocation to the least profitable firms. Dell’Ariccia and Marquez (2006) theoretically model the relation between bank liquidity—as a key result of global capital flows—and bank risk-taking incentives. Their approach is based on the assumption that banks face known and unknown borrowers. Due to these informational asymmetries among banks, adverse selection problems emerge that lead banks to screen potential borrowers. Dell’Ariccia and Marquez (2006) show that the incentives of banks to screen borrowers decline when the proportion of unknown borrowers is sufficiently high. In this case, banks soften lending standards and grant credit to all loan applicants, i.e., they choose a pooling equilibrium in contrast to a separating equilibrium. In countries with large inflows of capital, banks face a larger proportion of unknown borrowers and they have access to cheaper funding. This induces them to prefer the pooling equilibrium, which is characterized by higher aggregate loan volumes and lower credit standards.

Similar theoretical implications of global capital flows are also derived by models that focus on agency problems between bank owners and bank managers, where the latter can choose between high and low effort and the former has the possibility of conducting an audit of the managers. Given this model setup, Acharya and Naqvi (2012) show that (i) the bank managers’ earnings increase in the loan volumes of the banks and that (ii) bank owners have an incentive to conduct an audit of the bank manager if and only if bank liquidity shortfalls exceed a certain threshold. The authors derive that, if bank liquidity is sufficiently high, agency problems within banks become more severe, leading to excessive risk-taking. When discussing the sources of excess liquidity, Acharya and Naqvi (2012) put special emphasis on international capital inflows.

The presented theoretical literature finds a nexus between international capital flows, excess liquidity in the financial system and risk-taking. In line with Carling et al. (2007), our argument is that the least profitable firms are *ceteris paribus* closer to insolvency (see also Lepetit and Strobel, 2013). As an implication of this, they are constrained in the supply of credit and have to pay higher interest rates on debt.¹ Therefore, increased lending to such firms can be interpreted as increased risk-taking incentives. It is also in line with a “search-for-yield” behavior of banks.

¹For instance, Kharroubi (2015) shows that low-productivity firms can outbid high-productivity firms through higher interest payments, thereby, leading to large foreign capital inflows and a misallocation of capital. In 1995, before the introduction of the euro and related cross-border capital flows within Europe, the correlation between returns on assets and interest rates is equal to -11.5%, providing evidence for the assumption that less profitable firms have to pay higher interest rates.

In summary, bursts of foreign capital inflows should from theoretical perspectives increase the allocation of credit to low performing firms.²

3 Data and Methodology

To analyze the impact of international capital flows on loan supply to firms that differ in their profitability, the use of disaggregated firm-level data is essential. Therefore, our paper is one of the first that analyzes the impact of international capital on economic growth and that does not exclusively rely on aggregated country- or industry-level data.

We use firms in the euro area as our empirical laboratory for mainly two reasons. First, European capital flows are characterized by large fluctuations that are dominated by global push factors, such as the VIX and US macroeconomic conditions (Fratzcher, 2012). This fact makes them exogenous with respect to credit allocation (compare Section 3.5). Second, firms and banks in the euro area operate under a uniform monetary policy. Whereas the existing empirical research focuses on the exploration of monetary policy as a driver of both bank lending and risk-taking, we thus hold the stance of monetary policy constant and examine the variation in lending that is driven alone by international capital flows.

3.1 Data

Our sample comprises firms that operate in one of the eleven founding members of the euro area, i.e., firms in Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain.³ Our dataset spans the time from the Madrid Summit in 1995, where the introduction of the euro was announced, until 2014.⁴ The focus on an international sample of firms, compared to an analysis based on a credit register in a single country, is advantageous because it also allows us to control for variables that vary mostly across countries but less over time (e.g., the characteristics of the financial system).

Our firm-level data stems from the Worldscope database, which is fostered by Thomson Reuters. It covers all euro area companies that are publicly quoted and a small number of large private companies. Overall, these firms account for about 50% of value added in the euro area (see

²Similar implications can be derived from models in which the financial sector withholds resources from the most productive sectors (e.g., Deidda, 2006; Tobin, 1984).

³We decided to exclude Greek firms from our sample because of the unreliable data accuracy in Greece. However, our results are also robust to the inclusion of Greek firms.

⁴We only have a limited number of observations for 2014. Our results are also robust to the exclusion of 2014.

ECB, 2013). The lack of a substantial number of private firms does not spur our analysis. As private firms are even more dependent on external finance, the inclusion of such firms would even have raised the effects of global liquidity increases on loan volumes.⁵ Therefore, our estimates serve as a lower bound on the effects of international capital flows. Beyond this, the focus on publicly quoted firms is beneficial because the quality of accounting data is generally higher for these firms. An additional advantage of the Worldscope database is that it provides industry identifiers. The number of industries is comparable to the 2-digit Standard Industry Classification (SIC), which is important to include industry dummies and to construct a measure for the dependence on external finance.

We correct our sample for implausible observations (e.g., non-positive equity ratios or liabilities). Furthermore, we exclude firms of the financial industry (including insurance companies).⁶ This results in a sample of more than 20,000 firm-year observations. We match these firm observations with a comprehensive vector of macroeconomic variables that are drawn from several sources, including the World Economic Outlook Database (October 2014), the International Financial Statistics,⁷ the European Central Bank (ECB), the World Bank and the Organisation for Economic Co-operation and Development (OECD). As a result, we obtain an extensive dataset that allows us to study the effects of global capital flows on firms' loan supply.

3.2 Methodology

Theory suggests that bursts of international capital inflows may have adverse effects on economic growth in the long-run because the financial system channels the inflowing liquidity to less profitable entrepreneurs, which has potential adverse effects on economic dynamics. To empirically verify this hypothesis, we estimate the following baseline regression equation:

$$DEBT_{kt} = \alpha_s + \alpha_j + \alpha_t + \beta * CAPITALINFLOWS_{j,t-1} + \gamma * (CAPITALINFLOWS_{j,t-1} * PROFITABILITY_{k,t-1}) + \theta * X_{k,j,t-1} + (\alpha_k + \varepsilon_{kt}), \quad (1)$$

⁵Compare Bertrand et al. (2007), who stress an economically and statistically stronger effect of a banking deregulation on private compared with public firms.

⁶Firms in these industries are indicated by the Worldscope general industry codes 4, 5 and 6.

⁷Both databases are published by the International Monetary Fund (IMF).

where k indexes firms, s industries, t time and j countries. Our dependent variables in this equation are the relative change in debt and short-term debt of firm k at time t . $CAPITALINFLOWS_{j,t-1}$ is our measure of net capital inflows over GDP in country j in year t and $PROFITABILITY_{k,t-1}$ is a dummy that determines whether a firm is profitable (high returns on assets) or less profitable (low returns on assets).⁸ The central coefficients are β and γ . The inference about the former determines whether higher capital inflows lead to increased lending to unprofitable firms. The inference about the latter allows us to identify whether capital flows have an impact on the least profitable firms that is different from highly profitable firms.⁹ Summing up, β measures the effect of capital flows on loan volumes to firms with a low profitability and $(\beta + \gamma)$ measures the same effect for loans to the most profitable firms. In all of these specifications, our regressors enter with a one-year lag to minimize endogeneity concerns.

Additionally, we incorporate industry, country and time fixed effects, α_s , α_j and α_t . Our results are also robust to the incorporation of country-year fixed effects. However, as we would lose the coefficients that describe the aggregate effect of capital flows, we refrain from country-year dummies in our specifications. $X_{k,j,t-1}$ are macroeconomic and firm-level controls that are not absorbed by the set of fixed effects. The vector also contains all of the macroeconomic variables in their interactions with $PROFITABILITY$. The variables will be explained in detail in section 3.3. Our standard errors are clustered at the country-level.

3.3 Variables

3.3.1 Dependent Variables

To explore the effects of external capital flows on loan volumes of (the least profitable) firms, we make use of the relative change in firm debt and short-term debt as our dependent variables. As short-term debt has a lower persistence than overall debt volumes, we expect the implications of foreign capital to be more pronounced for short-term debt. Especially short-term debt is likely to be a proxy for bank loans, which are usually of shorter maturities. However, the use of firm debt as a measure of bank loans granted to firms is controversial because it includes all interest bearing financial obligations (e.g., bonds as well) and is not restricted to bank loans.

⁸For at least two reasons it is unproblematic that the current account balance over GDP is serially correlated: First, the time dimension of our dataset is short. Second, our dependent variables are defined such that they do not exhibit forms of serial correlation. Therefore, we obtain precise standard errors, although our key regressor is not serially uncorrelated (Bertrand et al., 2004).

⁹The strategy of interacting our main regressor with a measure of profitability is based on a specification by Bertrand et al. (2007).

Yet, the euro area is a bank-based financial system and, thus, bank loans are the main source of funding for most firms (e.g., Cecchetti, 1999; Demirgüç-Kunt and Levine, 2001). Beyond this, the correlation between firm debt and bank loans is usually very high because non-bank debt regularly varies little over time (e.g., Bertrand et al., 2007). This leads us to the conclusion that (short-term) firm debt approximates bank loans to large extents.

3.3.2 Regressors

Our main proxy for net international capital inflows is the negative of the current account balance over GDP (*CAPITALINFLOWS*). A country with a current account deficit imports financial resources, which, in turn, endows the financial system with abundant liquidity. We rely on the current account as our main proxy for the net flows of foreign capital into an economy because it is the broadest and most prominent measure of international capital flows and because it is available for every country in the time series. Moreover, we show in Section 6 that (i) the effect of net debt flows is not statistically different from those of the current account and (ii) that net capital flows also matter more than gross flows for the allocation of credit across firms, which makes the current account an ideal variable for the following analysis.

We include additional macroeconomic variables that are likely to affect loan volumes of firms: the economic growth rate (*GROWTH*), the relative change in 10-year sovereign bond yield (*YIELD*) and per capita GDP (*PERCAPITAGDP*) to control for changes in the institutional quality (e.g., Dinger and von Hagen, 2009). Several additional macroeconomic controls (e.g., inflation, changes in fiscal policy, unemployment, output gap) added preliminary regressions with insignificant coefficients and, for reasons of parsimony, we exclude them from our models. Apart from the vector of macro controls, the following large set of firm-level control variables enters our model: the logarithm of total assets (*SIZE*), the share of liquid assets relative to short-term liabilities (*LIQUIDITY*) and the firm equity ratios (*CAPITAL*).

As theory suggests that financial institutions use an influx of global liquidity to pay out loans to the least profitable firms, we also include firms' profitability (*PROFITABILITY*) in our models. In most of the specifications, we measure profitability as a dummy which is equal to 1 if a firm's return on assets is larger than the median of returns on assets for the respective industry-year pair.¹⁰ Interacting our measure of capital flows with this profitability dummy allows us—consistent with theory—to account for non-linearities in the effect of external capital

¹⁰Calculating the median on the industry-year level is important because of obvious industry-specific differences in profitability

on the most and the least profitable firms within a specific industry. Alternatively, in some regressions of Section 4, we define a firm as being unprofitable if its returns on assets are in at least 67% of the years in the lowest 10% of the annual, industry-specific distribution. By this, we highlight the effects of capital inflows on firms that are permanently low performing.

We further strengthen our identification strategy by allowing all of the macroeconomic variables to interact with the profitability dummy. Table A.1 (Appendix) provides more detailed descriptions of our variables.

3.4 Summary Statistics

This section presents the descriptive statistics for our baseline variables, as described in Section 3.3. We lay special focus on the different characteristics for countries with external surpluses (columns 3 and 4) compared with countries with external deficits (columns 5 and 6). Firm debt is growing moderately with a median rate of 0.74%. The change in short-term debt is more pronounced and equal to 3.81%. Firms in countries with external deficits have higher growth rates both of overall and short-term debt, which is a first indication that international capital inflows are likely to ease firms' credit constraints. In general, we obtain an enormous dispersion of all of our firm-level variables. This underlines that there is a strong heterogeneity across firms within a country.

Turning to the summary statistics with regard to our regressors, we find that the average logarithm of total assets is equal to 11.99 thousand €, the average liquidity ratio is equal to 0.99% and the average share of equity to total assets is equal to 41.37%.

Table 1: Summary Statistics of the Baseline Variables

| | Observations (<i>entire sample</i>) | Median | Observations (<i>external surplus</i>) | Median | Observations (<i>external deficit</i>) | Median |
|---------------------------------|--|--------|---|--------|---|--------|
| Dependent Variables | | | | | | |
| DEBT | 24567 | 0.74 | 13243 | -0.25 | 11324 | 2.45 |
| SHORT DEBT | 23221 | 3.81 | 12388 | 1.98 | 10833 | 5.86 |
| Firm-Level Regressors | | | | | | |
| SIZE | 29637 | 11.99 | 16402 | 11.87 | 13235 | 12.14 |
| LIQUIDITY | 28498 | 0.99 | 15751 | 1.01 | 12747 | 0.97 |
| CAPITAL | 29610 | 41.37 | 16390 | 42.44 | 13220 | 40.13 |
| PROFITABILITY | 26833 | 0.00 | 14932 | 1.00 | 11901 | 0.00 |
| Macroeconomic Regressors | | | | | | |
| CAPITAL INFLOWS | 29640 | -0.99 | 16405 | -4.65 | 13235 | 1.30 |
| GROWTH | 29640 | 1.72 | 16405 | 1.86 | 13235 | 1.66 |
| YIELD | 27042 | -5.86 | 14986 | -5.86 | 12056 | -2.93 |
| PER CAPITA GDP | 29640 | 25.47 | 16405 | 26.03 | 13235 | 24.77 |

There is no distinct difference in these firm characteristics for countries with capital in- relative to countries with capital outflows.¹¹

This homogeneity of firm characteristics across countries facilitates identification because our results are unlikely to be driven by differences in unobserved firm attributes in countries with external deficits relative to countries with external surpluses.

Our measure of net capital inflows has a median value of -0.99% relative to GDP. The negative sign implies that the median firm operates in a country with capital outflows. This result is attributable to the large number of German firms, a typical country with external surpluses (compare Table 2). Countries with capital outflows have a higher median per capita GDP, higher economic growth rates and stronger declines in interest rates compared with countries with negative current account balances. These results are driven by observations after 2007 because countries with external deficits suffered most from the financial and the sovereign debt crisis with adverse effects on the economy and the level of interest rates.

¹¹The arithmetic mean for the variable *roa* for firms in countries with external surpluses equals 0.503, whereas it equals 0.454 for firms in countries with external deficits. Although in general firms in countries with external surpluses are slightly more profitable, this difference is unlikely to be the only driver of our results. In our robustness checks, we will further address this issue.

Table 2: The Distribution of Sample Firms over Time

| Country | 1995 | 2000 | 2005 | 2010 | 2013 |
|-------------|------|------|------|------|------|
| Austria | 26 | 48 | 57 | 61 | 61 |
| Belgium | 39 | 64 | 90 | 91 | 79 |
| Finland | 52 | 95 | 103 | 109 | 109 |
| France | 175 | 388 | 492 | 547 | 518 |
| Germany | 246 | 466 | 555 | 578 | 517 |
| Ireland | 11 | 23 | 29 | 31 | 29 |
| Italy | 55 | 125 | 180 | 199 | 192 |
| Luxembourg | 3 | 11 | 18 | 25 | 25 |
| Netherlands | 60 | 83 | 87 | 92 | 86 |
| Portugal | 18 | 34 | 41 | 42 | 39 |
| Spain | 51 | 81 | 99 | 111 | 97 |

3.5 Identification

Our argument of the causal effects of foreign capital on credit allocation across firms relies on the exogeneity of capital flows in the euro area with respect to loan volumes. As a single firm is unlikely to determine aggregate country-level capital flows, we are convinced that reverse causality cannot be an issue. Moreover, a resulting bias would underestimate our estimates because pronounced loan supply to low performing firms rather reduces the amounts of capital inflows. Beyond this, for several reasons, capital flows can be treated as broadly exogenous in our context: First, the correlation between the current account balance and real income is low and, hence, domestic business cycle fluctuations do not seem to be the decisive determinant of international capital flows (Uribe and Schmitt-Grohé, 2015). Second, there exists an extensive literature that shows that capital flows in the long-run are rather influenced by international push than by regional pull factors (Calvo et al., 1996; Bluedorn et al., 2013; Bruno and Shin, 2013; Rey, 2015). Fratzscher (2012) underlines this result for advanced euro area countries by showing that especially before and after the crisis, about 90% of changes in capital flows are determined by international push factors, such as the VIX, TED spread and macroeconomic conditions in the US. This finding implies that the global supply of international capital is a more important determinant than the local demand for foreign capital.

We build on this result in an alternative model specification by restricting our sample to episodes in which surges (reductions) in international capital inflows are accompanied by a decrease (rise) in interest rates. Our presumption is that during these episodes, the global (exogenous) supply of foreign capital dominates the local demand, which would rather change interest rates in the opposite direction. By showing that our results are robust during these sub-periods, we

highlight the consistency of our findings.

Loan volumes are apparently affected by loan demand and loan supply; however, for the policy implications, in particular with regard to the regulation of the financial system, it is crucial to disentangle loan supply from loan demand. We show that the increase in loan volumes to unprofitable firms is strongly driven by changes in loan supply by highlighting that our results are amplified in large financial sectors that have high amounts of non-performing loans. The significant effect in this analysis underlines that loan supply side effects are essential because loan demand—unlike its supply—is independent of these characteristics.

4 Baseline Results

4.1 Capital Flows and Credit Allocation

In this section, we identify the implications of international capital flows for the existing credit constraints of (low performing) firms. In a first step, we estimate equation (1), refraining from the interaction terms in columns (1) - (2) of Table 3. As a consequence, the key coefficient β measures the effect of the current account position on the loan volumes in general. We obtain a significant positive coefficient in both columns of Table 3. This means that a 1-pp increase in international capital inflows relative to GDP increases the loan growth rates of firms by 0.65-0.75 pp. These results obviously highlight that global capital inflows ease the credit constraints of firms, a result that is consistent with earlier research by Igan and Tan (2015).

In a next step, we allow these effects to be heterogeneous across firms. In particular, we verify whether variations in current account positions affect unprofitable firms overproportionally. For this reason, we enable the current account to interact with a profitability dummy in columns (3) and (4), which is equal to 1 if the return on assets of a firm is above the median for the respective industry-year pair.

The results demonstrate that especially the results for short-term debt in column (2) are primarily driven by the least profitable firms, indicated by a significant interaction term in column (4). Whereas a 1-pp increase in capital inflows increases loan growth for low performing firms by 1.2 pp, the effect on the most profitable firms is equal to 0.25 pp, which is not statistically different from zero.¹²

¹²This is the sum of the coefficients in the first two rows.

Table 3: Capital Flows and Credit Allocation

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---------------------------------|----------------------|--------------------|----------------------|---------------------|----------------------|----------------------|
| | DEBT | SHORT DEBT | DEBT | SHORT DEBT | DEBT | SHORT DEBT |
| CAPITAL INFLOWS | 0.653** (2.53) | 0.750*** (2.96) | 0.892** (2.52) | 1.219*** (3.54) | 9.378** (2.42) | 7.301*** (3.07) |
| CAPITAL INFLOWS * PROFITABILITY | | | -0.501 (-1.40) | -0.973** (-2.45) | -8.749** (-2.26) | -6.574*** (-2.62) |
| SIZE | -1.002*** (-2.94) | -0.286 (-1.43) | -0.966*** (-3.07) | -0.255 (-1.33) | -1.061*** (-3.53) | -0.369* (-1.74) |
| LIQUIDITY | 0.220** (2.05) | 1.756* (1.94) | 0.225** (2.07) | 1.748* (1.93) | 0.142 (0.98) | 1.769* (1.95) |
| CAPITAL | 0.726*** (13.80) | 0.462*** (4.54) | 0.726*** (13.98) | 0.463*** (4.48) | 0.726*** (13.73) | 0.464*** (4.61) |
| PROFITABILITY | 7.258*** (6.81) | 6.811*** (7.70) | 2.937 (0.50) | 17.676*** (2.68) | 7.245*** (6.90) | 6.671*** (7.38) |
| GROWTH | 1.583** (2.57) | 1.828** (2.02) | 0.833 (1.21) | 1.502 (1.38) | 0.113 (0.01) | -6.934*** (-3.80) |
| YIELD | 0.027 (0.60) | 0.072 (0.57) | 0.011 (0.15) | -0.004 (-0.03) | 1.863 (1.01) | 0.568 (0.39) |
| PER CAPITA GDP | -0.054 (-0.05) | 0.661 (0.94) | -0.029 (-0.03) | 1.023 (1.35) | 0.821 (0.66) | 0.392 (0.45) |
| GROWTH * PROFITABILITY | | | 1.335 (1.37) | 0.530 (0.44) | 1.490 (0.15) | 8.778*** (5.17) |
| YIELD * PROFITABILITY | | | 0.017 (0.17) | 0.153 (1.31) | -1.838 (-0.99) | -0.498 (-0.35) |
| PER CAPITA GDP * PROFITABILITY | | | 0.075 (0.37) | -0.478* (-1.72) | -0.875* (-1.73) | 0.264 (0.69) |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Obs | 20279 | 19523 | 20279 | 19523 | 20279 | 19523 |
| R-squared | 0.032 | 0.024 | 0.033 | 0.024 | 0.033 | 0.024 |

The table presents the results for our baseline model, in which we examine the effects of net capital flows and its interaction with a firm profitability dummy that is equal to 1 if the return on asset of a firm is above the median for the respective industry-year pair on the growth rate of both firm debt and short-term firm debt (columns (1) - (4)). In column (5) and (6), we interact net capital flows with a profitability dummy being equal to 0 if the return on assets of a firm is in at least 67% of the years in the lower 10% of the annual industry-specific profitability distribution. We also include large vectors of macroeconomic and firm-level controls as described in Section 2 as well as year, country and industry dummies. The t-statistics are shown in parentheses and the standard errors are clustered at the country-level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In columns (1) - (4), we show that international capital inflows increase credit allocation to unprofitable firms. Although returns on assets mainly capture differences in profitability, we argue that this finding is also a sign of increased risk-taking of the financial system because—as shown by Carling et al. (2007)—unprofitable firms are *ceteris paribus* closer to insolvency (see also Lepetit and Strobel, 2013). This implies that they face stronger credit constraints and, therefore, have to pay higher interest rates on debt. However, it might be that the financial sector merely increases lending to safe firms that are temporarily affected by a decline in profitability. In columns (5) and (6), we alternatively explore the effects of foreign capital on firms that are constantly in the lowest 10% of the industry-specific annual distribution of returns on assets. The distinction between a temporary and a long-run decline in profitability is important because it is not necessarily a bad sign when financial institutions lend to firms that are temporarily hit by a reduction in profitability. For instance, it might be that such a lending behavior merely smooths idiosyncratic firm-specific fluctuations. In contrast, increased lending to firms that are permanently in the lowest 10% of the profitability distribution can be interpreted as a sign of long-run lending inefficiencies and a shift in the risk appetite of financial institutions. For this analysis, we define the dummy *PROFITABILITY* as being equal to 0 if a firm's return on assets is in at least 2/3 of years in the lowest 10% of the annual, industry-specific distribution of profitability. Columns (5) and (6) of Table 3 indicate that the effect of international capital flows is even more pronounced for firms that are constantly least profitable. For these firms, a 1-pp increase in capital inflows raises loan growth by 7.3 - 9.4 pp. As a consequence of this result, a financial system that has access to abundant international liquidity structurally impedes the creative economic destruction by funding firms that are low performing. Moreover, this result also stresses the increased risk appetite of financial institutions in countries with large international capital inflows because firms that are constantly in the lowest 10% of the industry-specific profitability distribution are evidently closer to insolvency and, therefore, overproportionally risky. Throughout columns (1)-(6), an increase in firm size, a decrease in the ratio of liquid assets and both lower capital ratios and profitability reduce firm loan volumes. From the macro controls, higher economic growth rates lead to more debt and short-term debt. Economic growth, however, does not affect profitable and less profitable firms differently. Therefore, international capital flows are the main significant driver of credit allocation to the least profitable firms. In sum, section 4.1 shows that inflows of global liquidity ease the credit constraints of firms. This effect is primarily driven by increased lending to low performing firms, suggesting a misal-

location of credit following bursts of foreign capital. Unprofitable firms, especially those in the lowest 10% of the profitability distribution, are in general more risky because they are *ceteris paribus* closer to insolvency (e.g., Carling et al., 2007; Lepetit and Strobel, 2013). Therefore, an increase in lending to these firms can additionally be seen as a sign of an increase in bank risk-taking, a result that is also consistent with Rancière et al. (2008), who show that financial liberalization promotes excessive risk-taking and leads to greater incidence of crises.

4.2 The Impact of Agency Problems in the Financial Sector

Theoretical models that relate international capital inflows—and resulting liquidity increases in the financial system as well as reductions in interest rates—to credit allocation are based on agency problems in the financial sector (e.g., Acharya and Naqvi, 2012; Dell’Ariccia and Marquez, 2006). Therefore, the impact of foreign capital on lending to the least profitable firms is likely to be contingent on the severity of agency problems in financial institutions. This section explores such agency problems in two dimensions. First, agency problems that rise in the size of the financial system, which correlates closely with the likelihood for pronounced (implicit) bail-out guarantees. Second, agency problems that arise because banks have high amounts of non-performing loans in their balance sheets, which induce them to gamble for resurrection and roll over loans to less profitable firms (e.g., Watanabe, 2010; Niinimäki, 2007).

Examining the role of asymmetric information in shaping changes in credit allocation associated with international capital flows is not only important for evaluating whether the theoretical mechanisms hold in our euro area firm-level dataset, but also to disentangle loan supply side effects from demand side effects, which is important for the policy implications of this paper. Whereas loan supply is contingent on the various characteristics of the financial system, loan demand is typically modeled independently of these variables. Therefore, an effect of international capital flows on the allocation of credit across firms that is dependent on financial sector characteristics emphasizes the importance of loan supply side effects.

4.2.1 Differences in Size

We start by exploring the agency problems in the financial sector with respect to size. Large financial systems are usually protected by implicit bail-out guarantees. These guarantees, however, reduce the monitoring incentives of investors and, thus, aggravate the existing agency problems. Consequently, our presumption in the following test is that increased lending to the

least profitable firms is exacerbated in large financial systems located in countries with bursts of capital inflows. We model the contingency on financial sector size by estimating our baseline regression separately for the sub-sample of small and large financial systems, defined as those with a ratio of domestic credit to the private sector in GDP that is below or above, respectively, the median of the annual distribution of size across countries.

Table 4 indicates that the effects of foreign capital differ substantially between both sub-samples. In small financial systems, inflows of international capital only lead to higher loan volumes to the most profitable firms. In contrast, credit supply to the least profitable firms is rather reduced. This result suggests that the inflowing liquidity in small financial systems is allocated efficiently across firms.

Table 4: Agency Problems: The Size of the Financial System

| | <i>small financial system</i> | | <i>large financial system</i> | |
|---------------------------------|-------------------------------|----------------------|-------------------------------|--------------------|
| | (1) DEBT | (2) SHORT DEBT | (3) DEBT | (4) SHORT DEBT |
| CAPITAL INFLOWS | -1.522*** (-4.83) | -3.088*** (-4.89) | 1.207** (2.41) | 0.725 (1.44) |
| CAPITAL INFLOWS * PROFITABILITY | 1.089*** (3.55) | 0.542 (0.49) | -1.007** (-2.18) | -1.055* (-1.70) |
| Macro Controls | Yes | Yes | Yes | Yes |
| Firm Controls | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Country FE | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes |
| Obs | 8184 | 7926 | 10332 | 9913 |
| R-squared | 0.040 | 0.032 | 0.043 | 0.030 |

This table explores the effects of net capital flows and its interaction with a firm profitability dummy that is equal to 1 if the return on asset of a firm is above the median for the respective industry - year pair on debt and short-term debt growth separately in small and large financial systems. We include large vectors of macroeconomic and firm-level controls as described in Section 2 as well as year, country and industry fixed effects. T-statistics are shown in parentheses and the standard errors are clustered at the country-level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Our baseline results of higher lending to less profitable firms only holds for the sub-sample of large financial systems. For this sub-sample, a 1-pp increase in capital inflows increases lending to the least profitable firms by 0.7 - 1.2 pp, an economic effect that comes close to those of our baseline results.

These results stress the role of agency problems in the financial sector in shaping the effect of international capital flows on credit allocation. Moreover, they provide novel empirical evidence for the “Too Much Finance” literature (e.g., Arcand et al., 2015). We contribute to this strand of research by showing that there can be too much international finance that leads financial institutions to increase lending to the least profitable firms within an industry, especially when the financial system is already overproportionally sizable.

4.2.2 Differences in Risk

Having shown that the size of the financial system is an important driver of the sensitivity of credit supply with respect to international capital flows, this sub-section focuses on agency problems that rise in the shares of non-performing loans. Institutions with high amounts of non-performing loans have incentives to gamble for resurrection by rolling over loans to less profitable firms (e.g., Watanabe, 2010; Niinimäki, 2007), which also allows them to hide loan losses and, potentially, to prevent insolvency. As a result, we expect our baseline findings to be most pronounced for financial systems with high non-performing loans ratios. Econometrically, we again split the sample into the sub-sample of financial systems that have shares of non-performing loans that are above and below, respectively, the median of the annual cross-country distribution of this variable.

Table 5 shows that the allocation of credit to low performing firms is disproportionate in financial systems with high shares of loans that are close to default. The coefficient of *CAPITALINFLOWS* is highly significant and increases from 0.9 - 1.2 in the baseline model (Table 3) to 1.7 - 3.5 (Table 5, column (3) - (4)). This implies that the economic effect of global capital flows on lending to the least profitable firms more than doubles in financial systems with high levels of bad loans. The same effects in safer financial systems, characterized by low ratios of non-performing loans, are significantly smaller and equal to 0.7 - 1.2.

In summary, the results of Section 4.2 highlight that our baseline findings are exacerbated by agency problems in the financial sector (that rise in size and riskiness). Therefore, every regulatory approach that successfully reduces the size and the low capitalization of the financial

system might help to induce financial institutions to distribute the inflowing international liquidity more efficiently across firms.¹³ In this sense, this paper also contributes to Prasad et al. (2007), who show that large inflows of capital are associated with a decline in economic growth because underdeveloped financial markets only have limited absorptive capacity for foreign resources. Similarly, our analysis suggests that a well capitalized and smaller financial system might be a prerequisite for international capital flows to have positive implications for the allocative efficiency in lending.

This section also provides evidence on the disentanglement of loan supply from loan demand side effects. As loan demand is unlikely to vary with the financial system's size and riskiness, the overproportional effect in large financial sectors with high amounts of loans being close to default underlines the importance of loan supply for the results of this paper.

Table 5: Agency Problems: The Riskiness of the Financial System

| | <i>sound financial system</i> | | <i>risky financial system</i> | |
|---------------------------------|-------------------------------|-------------------|-------------------------------|----------------------|
| | (1) DEBT | (2) SHORT DEBT | (3) DEBT | (4) SHORT DEBT |
| CAPITAL INFLOWS | 0.744 (1.44) | 1.194** (2.22) | 1.691*** (3.52) | 3.537*** (3.97) |
| CAPITAL INFLOWS * PROFITABILITY | -0.034 (-0.13) | -0.787 (-1.38) | -1.722*** (-9.43) | -1.353*** (-4.58) |
| Macro Controls | Yes | Yes | Yes | Yes |
| Firm Controls | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Country FE | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes |
| Obs | 11483 | 11036 | 7659 | 7387 |
| R-squared | 0.039 | 0.031 | 0.042 | 0.030 |

This table explores the effects of net capital flows and its interaction with a firm profitability dummy that is equal to 1 if the return on asset of a firm is above the median for the respective industry - year pair on debt and short-term debt growth separately in sound and risky financial systems. We include huge vectors of macroeconomic and firm-level controls as described in Section 2 as well as year, country and industry fixed effects. T-statistics are shown in parentheses and the standard errors are clustered at the country-level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5 Industry-Level Dynamics

In the previous section, we stress that episodes of international capital inflows ease the credit constraints of the most unprofitable firms. However, it is also important to identify how the

¹³For a discussion on the effects of higher capital requirements, see Admati et al. (2012).

change in the allocation of credit across firms affects industry-level outcomes and, therefore, aggregate real economic dynamics. To provide answers regarding the aggregate effects of international capital flows, we compile an additional dataset that rests on the Industrial Statistics Database.¹⁴ The UNIDO database provides data on value added for 23 manufacturing industries based on the third revision of ISIC. For the eleven countries in our sample, we match this data with our measure of international capital flows. Our presumption in the following test is that if the overproportional lending to low performing firms associated with substantial international capital inflows leads to a reduction in aggregate macroeconomic dynamics, we should observe that industries that rely most on external finance grow less in countries with external deficits. In particular, we estimate the following regression equation:¹⁵

$$GROWTH_{ij} = \beta * CAPITALINFLOWS_j + \theta * EXTERNALDEPENDENCE_i + \gamma * (CAPITALINFLOWS_j * EXTERNALDEPENDENCE_i) + \varepsilon_{ij}. \quad (2)$$

We define the dependent variable as the average growth rate in value added during 1997-2007. Restricting the analysis to this time period is advantageous for mainly two reasons. First, it allows us to circumvent any cross-industry disruptions that arose during the financial crisis. Second, starting in 2008, the number of observations in the UNIDO database declines decisively. Our key regressor is the interaction of net international capital flows of each country in 1997 and a measure for the dependence on external finance. In the empirical literature, external dependence is usually measured on the industry-level. In the following set of regressions, we proxy an industry's dependence on the financial system by the difference of capital expenditures and cash flows divided by capital expenditures. It measures the fraction of capital expenditures that is not funded by internal cash flows. This share is regularly applied as a proxy for external dependence in the empirical literature (e.g., Rajan and Zingales, 1998).¹⁶ Based on our original baseline dataset, we calculate this fraction for every industry in the year 2006, using German firms as our benchmark.¹⁷ This strategy is beneficial because—due to an expansionary monetary policy, high economic growth rates and a well-developed financial system—German firms

¹⁴It is fostered by the United Nations Industrial Development Organization.

¹⁵See Aizenman and Sushko (2011), who apply a similar framework.

¹⁶Opposed to Rajan and Zingales (1998), we restrict cash flows to operational revenues because the firms in our sample often do not report changes in payables and receivables.

¹⁷Therefore, in the following regressions, we drop German industries from the sample, as they serve as our benchmark.

in 2006 hardly faced any financing (supply) restrictions. Our assumption that there existed few frictions and market imperfections implies that a dependence measure based alone on German data for 2006 mainly captures differences in the demand for external finance. The crucial identifying assumption underlying the following analysis is that the relative German demand for external finance in 2006 matches the relative demand in all other sample years and countries. In column (1) of Table 6, we estimate the model without any fixed effects. In columns (2) and (3), we saturate the model by adding industry and country dummies. In all of these specifications, the coefficient on the interaction term is negative and statistically significant, indicating that industries that are most dependent on external finance grow less in countries with large inflows of foreign capital. Economically, an industry at the 90th percentile of external dependence (metal fabrication) grows by 0.33 - 0.38 pp less per year than an industry at the 10th percentile (publishing) when capital inflows rise by 1 pp. In general, international capital inflows should increase industry growth because they induce the financial system to increase loan supply. However, because it allocates the inflowing liquidity to the most unprofitable firms, we find that industries grow less in countries with capital inflows. As a result, Section 5 provides evidence that the change in credit allocation associated with capital inflows does not only affect firms on a disaggregated level, but that the change in the composition of lending also adversely affects the aggregate industry dynamics. In summary, external deficits can have negative effects on economic growth in the long-run because capital is allocated to less profitable firms.

Table 6: Industry-Level Dynamics

| | (1) GROWTH | (2) GROWTH | (3) GROWTH |
|---------------------------------------|-----------------------|---------------------|---------------------|
| CAPITAL INFLOWS | 0.334** (2.34) | 0.334* (2.21) | |
| EXTERNAL DEPENDENCE | -1.309*** (-12.08) | | |
| CAPITAL INFLOWS * EXTERNAL DEPENDENCE | -0.072*** (-3.27) | -0.085** (-2.59) | -0.087** (-2.48) |
| Country FE | No | No | Yes |
| Industry FE | No | Yes | Yes |
| Obs | 171 | 171 | 171 |
| R-squared | 0.142 | 0.293 | 0.335 |

In this test, we explore whether the change in the allocation of credit across firms following capital flow surges also affects industry-level dynamics. The dependent variable is the average log change in value added of the an industry-country pair from 1997-2007. The main regressor is an interaction between an industry's dependence on external finance and a country's current account balance in 1997. In some specifications, we also include industry and country dummies. The standard errors are clustered at the country-level. The t-statistics are shown in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

6 Alternative Specifications

In Section 6, we present the results of several alternative model specifications.

6.1 Push vs. Pull Factors and the Exogeneity of Global Capital Flows

An extensive literature in international finance that stretches back to Calvo et al. (1996) explores the determinants of international capital flows, which are usually classified as push and pull factors. Push factors, such as the VIX or macroeconomic conditions in the US, are shocks that are common to all countries. In contrast, pull factors are country-specific determinants, such as GDP growth. Disentangling periods in which global push factors dominate the evolution of international capital flows is important for the causal interpretation of our results. In our baseline analysis, we assume international capital flows in the euro area to be broadly exogenous, mainly because global (exogenous) push factors account for about 90% of the changes in foreign capital flows within the euro area (Fratzscher, 2012).

In the following test, we further corroborate the consistency of our estimates by splitting the sample into episodes in which push and pull factors, respectively, dominate changes in capital flows. In line with Martinez-Miera and Repullo (2015), who show that a global savings glut reduces risk-free interest rates, we define push factors to dominate when higher capital inflows (outflows) are accompanied by reductions (increases) in the spread on 10-year sovereign bonds.¹⁸ In these cases, we argue that capital flows are unlikely to be attracted by local demand factors, which would rather have the opposite effect on interest rates.

Table 7 indicates that international capital flows do not have a significant effect on the allocation of credit during episodes in which local push factors dominate. However, when global factors dominate the evolution of international capital flows, an increase in foreign capital raises lending to the least profitable firms overproportionally. In particular, a 1-pp surge in capital inflows increases loan growth to unprofitable firms by 1.7 - 2.1 pp, whereas the effect for the most profitable firms is statistically not significant. Compared to the baseline results, Table 7 highlights that the economic importance of foreign capital even increases during episodes of push factors dominating the evolution of international liquidity flows. Therefore, our baseline estimates rather serve as a lower bound on the causal effect of international capital flows on the allocation of credit across firms.

¹⁸The spread is calculated as the domestic interest rate less the median interest rate in the same year across countries.

Table 7: Push vs. Pull Factors and the Exogeneity of International Capital Flows

| | <i>pull factors dominate</i> | | <i>push factors dominate</i> | |
|---------------------------------|------------------------------|-------------------|------------------------------|----------------------|
| | (1) DEBT | (2) SHORT DEBT | (3) DEBT | (4) SHORT DEBT |
| CAPITAL INFLOWS | 0.569 (0.82) | -0.091 (-0.15) | 1.705*** (3.47) | 2.099*** (4.23) |
| CAPITAL INFLOWS * PROFITABILITY | -0.277 (-0.58) | 0.034 (0.09) | -1.240** (-2.05) | -2.422*** (-3.43) |
| Macro Controls | Yes | Yes | Yes | Yes |
| Firm Controls | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Country FE | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes |
| Obs | 12373 | 11871 | 7906 | 7652 |
| R-squared | 0.034 | 0.027 | 0.049 | 0.042 |

This table explores the effects of net capital flows and its interaction with a firm profitability dummy that is equal to 1 if the return on asset of a firm is above the median for the respective industry - year pair on debt and short-term debt growth separately in periods in which push or pull factors dominate changes in international capital flows. We assume push factors to dominate when inflows (outflows) of capital are associated with a decline (rise) in interest rates. In these cases, it is likely that credit supply (and not credit demand) drives changes in capital flows. We include huge vectors of macroeconomic and firm-level controls as described in Section 2 as well as year, country and industry fixed effects. The t-statistics are shown in parentheses and the standard errors are clustered at the country-level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

6.2 Are Gross Capital Flows Driving the Results?

In our paper, we have not yet disentangled the effects of the various types of capital flows. In the existing literature, foreign direct investments and equity flows are deemed the most stable and growth-enhancing types of global capital flows, whereas especially debt flows are deemed volatile, contributing to higher incidence of crises (e.g., Kose et al., 2009; Aizenman et al., 2013). In the following alternative model specification, we will thus replace our measure of net capital flows with net foreign direct investments, net equity flows and net debt flows and enable them to interact with the profitability of firms.¹⁹

Another strand of the international finance literature emphasizes the central role of gross relative to net capital inflows. Obstfeld (2012) finds that gross international financial flows are important to assess financial stability risks associated with financial liberalization. That is why we will further extend our model specification by horseracing net FDI, equity flows and debt flows in their interactions with *PROFITABILITY* with the corresponding gross inflow variables.

¹⁹In these regressions, we exclude the top and bottom 2.5% of observations because of extreme outliers in Ireland and Luxembourg that serve as international financial centers.

Table 8: Net vs. Gross Capital Flows

| | (1) | (2) | (3) | (4) |
|------------------------------|---------------------|----------------------|----------------------|----------------------|
| | DEBT | SHORT DEBT | DEBT | SHORT DEBT |
| NET FDI | 0.143 (0.29) | -0.258 (-0.27) | 0.272 (0.66) | -0.078 (-0.08) |
| GROSS FDI | | | 0.220 (1.29) | -0.005 (-0.02) |
| NET FDI * PROFITABILITY | 0.069 (0.16) | -0.155 (-0.22) | 0.340 (0.67) | -0.124 (-0.20) |
| GROSS FDI * PROFITABILITY | | | -0.502*** (-2.89) | -0.149 (-0.53) |
| NET EQUITY | -0.129 (-0.29) | 0.619 (0.89) | 0.010 (0.03) | 0.562 (0.64) |
| GROSS EQUITY | | | -0.148 (-1.46) | -0.001 (-0.01) |
| NET EQUITY * PROFITABILITY | -0.292 (-0.59) | -1.603 (-1.48) | -0.027 (-0.06) | -1.215 (-1.01) |
| GROSS EQUITY * PROFITABILITY | | | 0.055 (0.52) | -0.117 (-0.38) |
| NET DEBT | 0.727*** (2.80) | 1.512*** (3.73) | 0.791*** (3.48) | 1.545*** (4.16) |
| GROSS DEBT | | | -0.168*** (-2.59) | -0.186 (-1.57) |
| NET DEBT * PROFITABILITY | -0.577** (-2.02) | -1.042*** (-2.67) | -0.621** (-2.07) | -1.055*** (-2.58) |
| GROSS DEBT * PROFITABILITY | | | 0.276*** (2.79) | 0.239 (1.41) |
| Macro Controls | Yes | Yes | Yes | Yes |
| Firm Controls | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Country FE | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes |
| Obs | 18006 | 17332 | 18006 | 17332 |
| R-squared | 0.032 | 0.025 | 0.033 | 0.025 |

In this specification, we dis- aggregate net capital inflows into net foreign direct investments, net equity flows and debt flows and also examine if gross flows or net flows matter for our results. In columns (1) and (2), we replace net capital inflows with net FDI, equity and debt inflows and in columns (3) and (4), we horserace these net flow measures and the respective interaction terms with a profitability dummy being equal to one if the return on asset of a firm is higher than the median for the respective industry-year pair with corresponding gross inflow measures. We include huge vectors of macroeconomic and firm-level controls as described in Section 2 as well as year, country and industry dummies. The t-statistics are shown in parentheses and the standard errors are clustered at the country-level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

These extensions will not only provide novel insight into the heterogeneity of capital flows in affecting credit allocation, but also buttress the results of our baseline model.

In column (1) and (2) of Table 8, we stress that neither FDI nor portfolio equity flows impact the allocation of credit across firms significantly. Higher net inflows of debt, in contrast, increase loan volumes, with overproportional effects for the least profitable firms. The economic effect of net debt flows is not statistically different from our baseline measure of net capital flows, a result that highlights the high correlation between an overall measure of net capital flows and net debt flows in the euro area.

We continue by horseracing the net capital inflow measures with their gross counterparts. Columns (3) and (4) indicate that most of the gross flow measures are insignificant. Only gross debt capital flows increase lending to the most profitable firms, whereas the coefficients on net debt flows do not change substantially in both significance and economic size. Overall, these results stress the importance of net capital flows, in general, and net debt flows, in particular, in shaping the efficiency in credit allocation associated with international integration. Beyond this, these findings also speak to the literature that emphasizes the similarity between gross and net capital flows in the euro area. Specifically, Shin (2012) shows that, in the euro area, gross cross-border banking flows are well-captured by the current account. Net capital flow measures, and not necessarily their gross counterparts, seem to approximate the financial stability risks associated with financial liberalization in advanced Europe.

6.3 Additional Robustness Checks

In this section, we present the results of several additional robustness checks in which we exclude some time periods or countries from our sample and in which we change the definition of *PROFITABILITY*.

We start by excluding observations (i) during the sovereign debt crisis of 2009-2011 and (ii) before 2005. This test might be important because the crisis, especially in the European periphery, might have changed the allocation of credit across firms. Moreover, our firm-level dataset has a higher coverage of firms during 2005-2014 (see Table 2) relative to 1995-2004, which might potentially bias the results. Table A.2 underlines that our results are robust for both sub-periods. During both episodes, international capital inflows increase credit supply and the effect is most pronounced for the least profitable firms.

The main result of this paper is that inflows of international liquidity are allocated to firms that

are most unprofitable. However, a possible concern regarding our specifications is that the returns on assets approximate other firm-level variables apart from profitability. We next address this issue by alternatively calculating profitability on the industry-level in the following set of regressions. The variable *PROFITABILITY* in these tests is therefore coded as 1 if the median return on assets of all firms in a particular industry is larger than the overall median across our sample, 0 otherwise. Defining profitability as a time-invariant dummy on the industry-level yields two specific advantages: First, it is unlikely to be affected by regulatory (e.g., accounting standards) or macroeconomic (e.g., business cycle fluctuations) changes in a particular country. Second, focusing solely on the cross-sectional variation on the industry-level minimizes concerns that changes in the returns on assets merely capture changes in other firm-level variables apart from profitability. Table A.3 generally confirms our results distinctly. Capital inflows increase the loan volumes of firms significantly (column (1) and (2)). Moreover, the effect is heterogeneous among profitable and less profitable firms. In particular, we find a 1-pp increase in capital inflows to increase loan growth rates for firms in low performing industries by about 0.81 pp. Moreover, the interaction terms in column (3) and (4) are also statistically significant, indicating that loan growth rates of firms in profitable industries are less affected by capital inflows. Overall, the economic effects are similar to those identified in the baseline model.

A further concern regarding our baseline model is that firms in countries with external deficits are slightly less profitable compared with firms in countries with current account surpluses. This difference might potentially affect our results. To overcome this concern, we repeat our baseline analysis; however, we drop those firms from our sample that operate in countries that are outliers in the distributions of profitability. Excluding firms in Finland, Italy, Luxembourg and the Netherlands is beneficial because the distributions of returns on assets in the remaining countries are very similar. Table A.4 shows that foreign capital inflows—even excluding some outliers from our sample—lead to increases in lending, especially for the subset of low performing firms, confirming that our baseline results are not biased by the higher proportion of unprofitable firms in countries with capital inflows.

All in all, the previous robustness checks confirm that bursts of foreign capital inflows increase the allocation of credit to less profitable firms, which potentially has adverse effects on economic dynamics in the long-run.

7 Concluding Remarks

Using a novel firm-level panel dataset, this paper explores the impact of intra-European capital flows between 1995 and 2014 on credit allocation. By this, our paper is one of the first that studies the effects of global capital flows on loan supply and that does not exclusively rely on country- or industry-level data, but that makes use of microeconomic techniques on a disaggregated level.

We find that bursts of international capital inflows increase credit allocation to less profitable firms. In particular, a 1-pp increase in capital flows leads to 0.9 - 1.2 pp higher loan growth rates in less profitable firms, whereas the coefficient for the subset of the most profitable firms is not statistically different from zero. Less profitable firms are in general more risky and, hence, they are constrained in the supply of credit, paying higher interest rates on debt. Consequently, an increase in credit allocation to low performing firms can also be interpreted as a sign of higher risks in the financial system.

We further show that agency problems in the financial sector exacerbate this effect. In detail, large financial systems with high shares of non-performing loans have even higher incentives for increased lending to the least profitable firms, a result that highlights the role of regulation for the allocative efficiency in lending. Therefore, in contrast to Gros (2010) and Goodhart and Tsomocos (2010), who propose restrictions on international capital flows, we emphasize the importance of financial sector regulation as a prerequisite for the efficient allocation of global liquidity to the real economy.

Finally, by showing that industries that are most dependent on external finance grow less in countries with capital inflows, we also identify adverse effects on industry-level dynamics associated with episodes of external deficits. This result indicates that capital inflows and the related additional funding for low performing firms have adverse effects on the aggregate dynamics of the real economy, constituting a possible negative long-run impact of foreign capital on economic growth. All in all, an increase in credit supply following episodes of capital inflows is likely to boost short-term economic growth; however, the decline in real sector dynamics constrains the economic development in the long-run. As a result, we find evidence for time-varying implications of capital flows for the real economy. This time-dependence is a probable reason for the mixed results of the empirical literature that studies the effects of financial liberalization on economic growth.

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Table A.1: Description of the Variables

| Variable | Description | Unit | Source |
|----------------------|---|----------------|--|
| DEBT SHORT DEBT | The growth rate of short-term debt (maturity below one year) | % | Worldscope, own calculations |
| LIQUIDITY CAPITAL | In (total assets) liquid assets / short-term debt equity / total assets | ln(1000€) % | Worldscope, own calculations Worldscope, own calculations |
| PROFITABILITY | Dummy=1 if a firm's return on assets > median return on assets for respective industry-year pair | 0/1 | Worldscope, own calculations |
| CAPITAL INFLOWS | (-1) * The current account balance relative to GDP | % | WEO 10/2014 ^a |
| NET FDI | Net foreign direct investments relative to GDP | % | OECD, own calculations |
| NET EQUITY | Net portfolio equity flows relative to GDP | % | IFS, own calculations |
| NET DEBT | Net portfolio debt flows and other capital flows relative to GDP | % | IFS, own calculations |
| GROSS FDI | The change in international FDI liabilities relative to GDP | % | Lane and Milesi-Ferretti (2007), own calculations |
| GROSS EQUITY | The change in international portfolio equity liabilities relative to GDP | % | Lane and Milesi-Ferretti (2007), own calculations |
| GROSS DEBT | The change in international portfolio debt and other investment liabilities over GDP ^b | % | Lane and Milesi-Ferretti (2007), own calculations |
| GROWTH | The growth rate of real GDP | % | WEO 10/2014 |
| YIELD | The relative change in 10-year sovereign bond yields | % | ECB, own calculations |
| PER CAPITA GDP | Per capita GDP (in prices of the year 1995) | 1000€ | WEO 10/2014, own calculations |
| GROWTH | The log change in value added between 1997 and 2007 of each industry-country pair | % | UNIDO Database, own calculations ^c |
| EXTERNAL DEPENDENCE | An industry's mean of (capex-cashflows) / capex for 2004 -2006 (ISIC revision 3) | - | UNIDO Database, own calculations |

^aWorld Economic Outlook Database, IMF

^bFor all of the capital flow variables, positive values represent inflows

^cUnited Nations Industrial Development Organization

Table A.2: Some Time Periods Excluded from our Sample

| | (1) | (2) | (3) | (4) |
|---------------------------------|---------|------------|-----------|------------|
| | DEBT | SHORT DEBT | DEBT | SHORT DEBT |
| CAPITAL INFLOWS | 0.871* | 1.597*** | 1.732*** | 3.188*** |
| | (1.83) | (4.12) | (5.18) | (3.88) |
| CAPITAL INFLOWS * PROFITABILITY | -0.307 | -0.970* | -0.874*** | -0.690* |
| | (-0.72) | (-1.94) | (-2.71) | (-1.66) |
| Macro Controls | Yes | Yes | Yes | Yes |
| Firm Controls | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Country FE | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes |
| Obs | 15709 | 15136 | 11899 | 11440 |
| R-squared | 0.040 | 0.030 | 0.035 | 0.027 |

This table explores the effects of net capital flows and its interaction with a firm profitability dummy being equal to 1 if the return on assets of a firm is above the median for the respective industry - year pair on debt and short- term debt growth. In column (1) and (2), we drop the sovereign debt crisis from our sample time and in column (3) and (4), we exclude the years before 2004. We add huge sets of macroeconomic and firm- level controls as described in Section 2 as well as year, country and industry fixed effects. T-statistics are shown in parentheses and the standard errors are clustered at the country-level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.3: Profitability Time-Invariantly on the Industry-Level

| | (1) DEBT | (2) SHORT DEBT | (3) DEBT | (4) SHORT DEBT |
|---------------------------------|-------------------|-------------------|----------------------|--------------------|
| CAPITAL INFLOWS | 0.591** (2.52) | 0.550** (2.12) | 0.805*** (3.71) | 0.811** (2.28) |
| CAPITAL INFLOWS * PROFITABILITY | | | -0.397*** (-2.73) | -0.474* (-1.67) |
| Macro Controls | Yes | Yes | Yes | Yes |
| Firm Controls | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Country FE | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes |
| Obs | 21816 | 20860 | 21816 | 20860 |
| R-squared | 0.032 | 0.024 | 0.032 | 0.024 |

In this robustness tests, we calculate roa as a time-invariant dummy on the industry-level. Therefore, it is unlikely to be affected by regulatory or macroeconomic changes on the country- level. The dependent variables are the debt and short-term debt growth rates and the key regressors are net capital flows and their interactions with a firm profitability dummy that is equal to one if the return on asset of a firm is above the median for the respective industry - year pair. We include large vectors of macroeconomic and firm - level controls as described in Section 2 as well as year, country and industry fixed effects. The t-statistics are shown in parentheses and the standard errors are clustered at the country-level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.4: Some Countries Excluded from our Sample

| | (1) | (2) | (3) | (4) |
|---------------------------------|--------------------|--------------------|--------------------|----------------------|
| | DEBT | SHORT DEBT | DEBT | SHORT DEBT |
| CAPITAL INFLOWS | 0.634*** (3.48) | 0.788*** (3.17) | 0.898*** (3.49) | 1.226*** (5.81) |
| CAPITAL INFLOWS * PROFITABILITY | | | -0.566* (-1.91) | -0.933*** (-2.91) |
| Macro Controls | Yes | Yes | Yes | Yes |
| Firm Controls | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Country FE | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes |
| Obs | 15348 | 14723 | 15348 | 14723 |
| R-squared | 0.035 | 0.024 | 0.036 | 0.024 |

In these robustness checks, we drop those four countries from our sample whose distribution of profitability differs from the remaining sample (Finland, Italy, Luxembourg and the Netherlands). The dependent variables are debt and short-term debt growth and the main regressors are net capital flows and their interactions with a firm profitability dummy, which is equal to 1 if the return on assets of a firm is above the median for the respective industry-year pair. We incorporate huge vectors of macroeconomic and firm - level controls as described in Section 2, as well as year, country and industry fixed effects. The t-statistics are shown in parentheses and the standard errors are clustered at the country-level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$