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Global Imbalances and Bank Risk-Taking*

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Abstract

Financial crises are usually preceded by large current account deficits. However, the channel through which international capital flows affect financial stability is hardly identified, yet. In this paper, we study the impact of current account balances on bank risk-taking making use of the exogenous and huge variation in capital flows within the euro area between the years 2001 and 2012. We find that bank risk-taking is positively associated with current account deficits. We provide a series of tests showing that this is the case both because banks in countries with large external deficits substitute new investments in asset markets with loans that are typically riskier and because the average quality of bank loans deteriorates.

Keywords: Bank Risk-Taking, Current Account, Capital Flows, Global Imbalances

JEL classification: F32, F41, G01, G21

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1 Introduction

Substantial research shows that severe financial crises are regularly preceded by current account deficits and increases in the credit volumes of the economy (e.g. Reinhart and Rogoff, 2008 or Gourinchas and Obstfeld, 2012). However, the channel through which a current account deficit increases the likelihood of crises is not fully understood, yet. In particular, while numerous theoretical (Acharya and Naqvi, 2012; Dell’Ariccia and Marquez, 2006) and empirical (Maddaloni and Peydró, 2011; Jiménez et al., 2014; Ioanidou et al., 2013) papers explore the effects of monetary policy on bank risk-taking, the role of current account positions - whose effects can be similar to those of monetary policy - has so far been overlooked.

A country that has a current account deficit invests more than it saves and hence, imports financial resources. As a result, banks that are located in these countries have access to capital imports and thus, to funding from international investors (either via the international interbank market or via the issuance of commercial papers and bonds). Therefore, similar to lax monetary policy, current account deficits increase the quantity and reduce the price of loanable funds with potential adverse effects on bank risk-taking. Furthermore, these effects are likely to be amplified in banks with a low capital base, since these institutions are subject to stronger agency problems (e.g. Holmstrom and Tirole, 1997).

In this paper, we empirically explore the relation between current account deficits (i.e. capital inflows) and bank risk-taking using a comprehensive dataset on banks from eleven euro area countries. In general, the advantage of an international sample of banks is that it allows us to draw conclusions based on time-invariant variables or variables that vary mostly in the cross-section, respectively (e.g. the current account itself). Also, we are able to add various fixed effects to our models. The focus on banks in a single country, for instance using data available in credit registers, could not achieve this. Euro area banks, in particular, are an ideal laboratory for the empirical identification of the role of current account positions since they allow us to make use of the exogenous and huge variation in current account balances within the monetary union between the years 2001 and 2012 which are observable under uniform monetary policy conditions. This setting enables us to focus on the examination of current account effects, while holding monetary policy constant across countries.

Our analysis starts with a parsimonious model which empirically examines the relation between various measures of bank lending and bank risk and the current account position. In order to control for risk-shifting issues, we also interact the current account balance with a bank capital dummy. To strengthen identification and enable causal inferences concerning the effect of the

current account on bank lending and bank risk-taking we include a large vector of macroeconomic (e.g. GDP growth, the EONIA and a measure of long-term interest rates) and bank level (e.g. profitability, liquidity and size) control variables. We also make use of time as well as of country dummies to control for heterogeneity across time and countries, respectively. This is important because, apparently, loan volumes are affected by supply and demand side effects and for our policy implications it is crucial to disentangle loan supply from loan demand. By incorporating time and country dummies, we also control to some extent for changes in loan demand.¹ Therefore, we argue that our results are mainly driven by supply side effects.

Next, we present a series of tests that explore the precise mechanisms through which capital flows affect banks' risk-taking incentives. In a first of these tests, we substantiate the relative importance of loan supply side effects for our results. For these regressions, we include dummies that are equal to one for small and interbank-dependent financial institutions and interact these dummies with the current account. Large, multinational banks whose funding is internationally diversified or banks that fund their activities mainly through deposit-taking are unlikely to be affected by large inflows of global liquidity. In contrast, small banks and banks that depend on interbank loans are likely to benefit from current account deficits. As a result, an overproportional effect for small and interbank-dependent institutions underlines the importance of loan supply side effects because loan demand, unlike loan supply, does not depend on these bank characteristics.

In a next set of regressions, we scrutinize whether the risk-increasing effect of current account deficits is driven mainly by the reduced relative costs of banks' funding or by the increased volumes of loanable funds. This is important from a policy perspective in order to find out whether the effect of capital flows differs from the typical interest rate channel of monetary policy. For this purpose, we extend the baseline analysis by replacing the current account balance (i.e. the overall net flows of capital) by the various components of the capital account (i.e. foreign direct investments (FDI), portfolio debt flows, portfolio equity flows and all the other flows). This specification allows us to find out whether international debt flows and other capital flows that comprise interbank lending and borrowing - as measures of increases in the volume of loanable funds - are the main drivers of increased lending and bank risk-taking in our setting.

To sharpen the evidence on the relative importance of the quantity of loanable funds, we next present a difference-in-differences test. The test explores the variation in current account positions across countries that emerged following the November 2003 stop of any sanctions against France and Germany that repeatedly broke the European Stability and Growth Pact. The stop of

¹ See Gambacorta and Marques-Ibanez (2011) and Opiela (2008) for similar identification strategies.

sanctions was a signal of the incredibility of the legal euro area architecture and increased the expectations that countries might be bailed-out. As a result, the stop of sanctions was followed by a huge divergence of current account positions across the members of the euro area while interest rates were virtually uniform across countries. We make use of this exogenous and unexpected shock and implement a difference-in-differences regression that allows us - because of the absence of interest rate differentials - to attribute changes in bank behavior alone to changes in the quantities of loanable funds.

Finding - as we do below - that the deterioration of current account balances following 2003 was accompanied by higher bank risk-taking suggests that the lenders to those banks in countries with high external deficits were not efficiently monitoring bank risk behavior. This result is consistent with the perception that - since the no bail-out clause of the European Monetary Union contract was not believed by the markets² - international investors deemed investments in the European periphery as safe as investments in the core and thus, restrained from efficient monitoring. Only starting from 2007/2008 when the near collapse of the global financial system generated substantial shifts in risk perceptions investors have been realizing that investments in the euro area's periphery are not entirely risk-free. Our presumption is that starting from that point of time private international capital flows became risk-sensitive and stronger related to risk monitoring. Notably, that shift in risk perceptions led to a drain of private capital which was replaced by risk-insensitive public capital (mostly TARGET 2 balances) from 2008 on.³

To test whether the lack of market discipline is at the core of the risk-increasing effect of current account deficits, we divide our sample into a pre-2008 and post-2008 interval and into those banks that operate in countries that are highly or weakly dependent on public capital, respectively. As a result of these tests, we discover a structural break in the effect of capital flows on bank risks around the financial crisis and we find private agents to have superior monitoring abilities compared to public agents.

Our empirical results show that an influx of external capital leads domestic banks to increase risk-taking and to expand lending activities. In particular, both loan growth and growth of the loan-to-asset ratio are positively affected by capital imports. Moreover, large capital inflows are also associated with lower z-scores and higher risks in banks' loan portfolios. Further, we find these effects to be particularly important for poorly capitalized banks, i.e. banks which have an equity ratio in the first quintile of the distribution of bank capital ratios. For instance, we find that a 1 percentage point decrease in the current account position leads to 2.1% lower z-scores

²See Sinn et al. (2011).

³See Sinn (2014), Chapter 8.

for poorly capitalized banks, while the effect on banks with more capital is significantly smaller, namely 1.6%. This finding is in line with the presence of agency problems.

The increase in the loan-to-asset ratios substantiates a substitution effect following global capital flows. The international capital pouring into a country seems to crowd domestic banks out of the markets for other assets, e.g. (sovereign) bonds, and makes them focus on their core business of granting loans. Moreover, we find that banks are subject to higher future risks because they grant more loans to risky borrowers. Summing up, capital inflows increase risks in the financial sector for at least two reasons: First, since local banks get partially crowded out of the markets for other assets, e.g. (sovereign) debt, they substitute new investments in these assets with loans that are typically riskier. This is not per se a negative sign for financial stability, but simply indicates the deepening of financial intermediation following the influx of capital. What turns financial deepening into a financial hazard is the fact that these additional loans are granted to riskier borrowers. This second reason makes banks more prone to economic downswings.

Turning to the results with regard to the channels driving the risk-increasing effect of current account deficits, our more detailed analysis of the various capital flows (FDI, debt flows, equity flows and other flows) and the difference-in-differences regression show that the results are predominantly driven by the quantity compared to the interest rate effects of international capital inflows. Consequently, the risk-increasing effect of capital flows is distinct from the typical interest rate channel of monetary policy. Beyond this, loan supply side effects (compared to changes in loan demand) seem to be predominant for our results and we find substantial evidence that global capital inflows are generally associated with a loss of market discipline.

Our paper contributes to the existing literature in several dimensions.

First, being the first empirical study to comprehensively examine the effect of current account deficits on bank risk-taking this paper contributes to the understanding of the risk-taking channel as a function of the macroeconomic environment (e.g. Bernanke and Blinder, 1992; Kashyap and Stein, 2000; Jiménez et al., 2012; Jiménez et al., 2014 and Ioannidou et al., 2013) by identifying a strong effect of a so far underexplored macroeconomic variable.

Second, the paper contributes to the literature on early financial crisis warnings by highlighting a channel through which a capital import increases the likelihood of severe crises. Substantial research stresses the importance of current account deficits for the probability of financial crises (e.g. Jagannathan et al., 2013; Jordà et al., 2011; Mendoza and Terrones, 2012 or Reinhart and Rogoff, 2008). The results of these papers also give rise to an academic and policy debate about possible regulatory restrictions on international imbalances (Goodhart and Tsomocos, 2010 and Gros, 2010). An opposing view argues that international debt flows into the banking sectors are

likely to be more important for financial instability than capital flows and the current account balance in general (e.g. Taylor, 2012; Obstfeld, 2012 or Lane and McQuade, 2014). Although our tests advocate that international (bank) debt flows are the principal driver of our results of increased bank lending and risk-taking following current account deficits, we also find evidence for foreign direct investments and portfolio equity flows to increase bank risks. Therefore, policy makers should not stop observing the current account position per se intensely because it can affect financial stability through channels not directly related to the volumes of funds banks attract explicitly from abroad (via bank debt flows).

Third, our analysis contributes to a literature studying factors that affect market discipline. Several papers describe macroeconomic phenomena, e.g. monetary policy, and their importance in determining monitoring abilities (e.g. Dell'Ariccia et al., 2010). A similar strand of research analyzes private and public agents and their monitoring incentives. For instance, Levine (2004) stresses the importance of private agents for market discipline. We enrich the literature by identifying the effects of international capital flows on market discipline with a particular focus on the distinction between private and public agents. To this end, we also contribute to a literature that argues that internationally funded banks are riskier because distance inhibits the monitoring ability of international lenders.⁴

Influential empirical and theoretical findings mention the effects of lower interest rates and liquidity inflows on bank risk-taking. We do not only confirm these channels for a central, so far underexplored macroeconomic variable (the current account balance), but also detect a reinforcing effect of international capital inflows on bank risks through a change in market discipline. The present paper is - at least to our knowledge - the first that studies the interconnectedness of current account fluctuations and banks and which does not exclusively rely on cross-country variation over time (using aggregated data), but applies microeconomic techniques on the bank level. Therefore, our analysis to some extent also relates to Lane and McQuade (2014) who mention microeconomic investigations as directions for future research in this field.

The rest of the paper proceeds as follows: Section 2 reviews the theoretical literature. The data and the empirical identification strategy is focus of Section 3. The baseline findings are presented in Section 4. Section 5 is focused on the exploration of the precise channels driving our results. In this section, we first disentangle loan supply from loan demand more specifically. Moreover, we investigate whether capital inflows affect banks primarily through changes in the price or rather by changes in the volume of loanable funds. In Section 6, we analyze the ability of international investors to impose market discipline. Finally, Section 7 concludes.

⁴See De Haas and Van Horen (2013) for a detailed discussion of this argument.

2 International Capital Flows and Bank Risk-Taking: Theoretical Arguments

In this section, we build the theoretical foundation for the empirical analysis that follows by presenting the arguments of key theoretical models that link liquidity increases and interest rate reductions - as main features of foreign capital inflows - to bank lending and risk-taking.

The relation between liquidity and bank risk-taking is modeled by Acharya and Naqvi (2012). Their model is derived from agency problems between bank owners and bank managers, where the latter can choose between high and low effort and the former have the possibility to conduct an audit of the manager. The paper's key results are that the earnings of bank managers are increasing in the loan volume of the respective bank and that bank owners have an incentive to conduct an audit of the bank manager if and only if the liquidity shortfall of the bank exceeds a certain threshold. The authors derive that, if bank liquidity is sufficiently high, agency problems within banks become more severe. In such cases, the probability of an audit decreases and therefore, bank managers have an incentive to soften lending conditions to achieve a higher loan volume and hence, improve their earnings. Consequently, the authors come to the conclusion that a sufficiently high amount of bank liquidity leads banks to engage in excessive risk-taking.⁵ When discussing the sources of excess liquidity Acharya and Naqvi (2012) put special emphasis on international liquidity inflows (as a result of current account deficits).

A related argument why capital imports can potentially affect bank behavior is structured around the effect of capital flows on interest rates, rather than on liquidity. The theoretical argument in this case is that a decrease in interest rates through the import of capital may lead banks to start searching for yield. Rajan (2006) shows that this effect can lead to a pro-cyclical bank risk-taking and that it is especially precarious for low interest rates following a period of higher interest rates. He additionally gives an illustrative example for such risk-shifting incentives. He names insurance companies that have entered fixed rate commitments. When interest rates start falling, they are forced to invest in riskier projects and risky financial products in order to be able to meet their fixed rate obligations. In situations, where risk-shifting is particularly prevailing, market participants focus on the upside prospects instead of looking at the downside risks.

In sum, theoretical models imply that a current account deficit which leads to lower interest rates and higher quantities of loanable funds generates incentives for banks to engage in exces-

⁵Similar theoretical results are derived by models based on different assumptions, e.g. Dell' Ariccia and Marquez (2006), Allen and Gale (2007) and Diamond and Rajan (2009).

sive risk-taking. Since from a policy perspective - in particular, with regard to the interactions between current account balances and monetary policy - it is essential to empirically evaluate the relative importance of these two channels, we will employ suitable empirical designs to achieve this evaluation.

Beyond this, theory suggests that the effects of more liquidity and lower interest rates on bank risks should be especially pronounced for banks with stronger agency problems. For instance, Holmstrom and Tirole (1997) theoretically show that banks with higher capital buffers intensify the monitoring of their borrowers. They also relate their theoretical argumentation to anecdotal evidence. In particular, they compare commercial banks to venture capital companies and argue that the former have higher leverage ratios and lower monitoring intensities relative to the latter.⁶ Summarizing, these arguments imply that the effect of capital inflows on lending and risk-taking should be amplified in banks with a low capital ratio.

3 Data and Methodology

This paper identifies the effects of the exogenous movements of the current account balances in the euro area between 2001 and 2012 on bank lending and bank risk-taking. Our identification strategy is thus built on investigating differences between banks across time with respect to the capital that is flowing into or out of the country in which a particular bank operates. In general, the focus on an international sample of banks, unlike the analysis of credit registers and banks in single countries, is beneficial because it allows us to draw more precise conclusions based on variables that vary mostly in the cross-section (e.g. the current account itself).

Moreover, the analysis of euro area banks, in particular, is ideal because of at least two reasons. First, the respective countries exhibit huge variations in current account balances that can be seen as driven mainly by the political decisions with regard to the design of the euro area and thus, as exogenous with respect to banks.

In particular, we argue that since the beginning of the monetary union current account balances were driven by the political signals that the safety of investments in the European periphery is comparable to that of the core. These signals were interpreted by the markets as a de facto invalidity of the no bail-out clause of the euro area agreements and were reflected in the shrinking margins between the yields of core countries and the periphery's debt.⁷ These signals were fur-

⁶The same argument is additionally supported by Allen et. al (2011). It is also consistent with the empirical results of Berger and Bouwman (2013) who show that banks with less capital have lower probabilities of survival (especially during banking crises).

⁷Compare Bernoth et al. (2012) for a more detailed analysis of sovereign bond spreads in the euro area.

ther reinforced in November 2003 when the EU finance ministers decided to stop any sanctions against France and Germany that repeatedly breached the European Stability and Growth Pact. This decision - which is exogenous with regard to bank lending behavior - led to further changes in current account balances with immense inflows of capital to the euro area's periphery. The onset of the financial crisis in 2007/2008 prompted additional political interferences related to intra-European capital flows because the outflow of private capital from the periphery, starting in 2007, was replaced by public capital flows and public guarantees with the effect that current account balances were reserved.⁸

The second advantage of using a sample of euro area countries is that banks in these countries act under uniform monetary policy conditions. This fact allows us to isolate the effect of current account fluctuations when holding the stance of monetary policy fixed across countries.

3.1 Data

Our sample consists of those banks that operate in one of the eleven founding members of the euro area, i.e. banks in the following eleven countries: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain.⁹ The time span of our sample starts in the year 2001 and ends in the year 2012. Our bank level data is drawn from the Bankscope database (Bureau van Dijk). We correct our dataset for implausible observations (e.g. negative loan volumes, negative capital-to-asset ratios and negative liquidity ratios) and merging banks.¹⁰ This leaves us with 40,443 bank-year observations.¹¹

Bankscope often provides consolidated and unconsolidated statements for the respective bank. It is not a straightforward question which of the two is superior and the choice crucially depends on the question which is analyzed. We decided to include the unconsolidated statements (i.e. Bankscope codes U1 and U2) because e.g. a consolidated statement may include data for subsidiaries from abroad. As we study the effects of domestic capital imports on domestic bank lending and bank risk-taking, this would obviously spur our analysis because foreign

⁸This was achieved through various instruments: the European Financial Stability Facility, EFSF, the European Stability Mechanism, ESM, loans paid out by the IMF, TARGET 2 balances that measure the amount of money that banks borrow from their national central banks and which is used to finance current account deficits, the Securities Markets Programme, SMP, and the Outright Monetary Transactions, OMT. To this end, our setting also allows us to control for the differences between privately and publicly funded current account deficits.

⁹Greece is excluded in our sample because it entered the common currency area at a later point and in order to circumvent any criticism due to the questionable reliability of Greek micro as well as macro data and any resulting biases. The results are qualitatively the same if Greek banks are included.

¹⁰In particular, we delete observations, where the growth rate of total assets is larger than 100% or smaller than -50%.

¹¹In our specifications, we report a smaller number of observations because our regressors enter with lags and because we make use of variables that are not available for all banks at a particular point in time (e.g. impaired loans).

subsidiaries are subject to an entirely different current account position. Only in cases, where unconsolidated statements are not available, we rely on the consolidated data.

Furthermore, we examine a large vector of important macroeconomic variables mainly drawn from the IMF's World Economic Outlook Database (October 2013), the IMF's International Financial Statistics, the Organisation for Economic Co-operation and Development (OECD), the European Central Bank (ECB), the Deutsche Bundesbank and the Ifo Institute.

3.2 Methodology

The purpose of the present paper is to highlight the channels through which current account deficits increase the likelihood of financial crises, i.e. the effects of capital imports on bank lending and bank risk-taking. In order to identify these channels, we will model the growth rate of a bank's loan volume, the growth rate of a bank's loan-to-asset ratio and a set of bank risk variables as defined in Section 3.4 as a function of the lagged current account balance over GDP (CA)¹² and its interaction with a lagged bank capital dummy (*capital*).¹³

The following two regression equations form the random effects model of our analysis:

$$\begin{aligned} loans_{it} = & \alpha_t + \alpha_j + \beta * CA_{j,t-1} + \gamma * (CA_{j,t-1} * capital_{i,t-1}) + \delta * macro_{j,t-1} \\ & + \theta * bank_{i,t-1} + \phi * (macro_{j,t-1} * capital_{i,t-1}) + (\varepsilon_{it} + \alpha_i) \end{aligned} \quad (1)$$

$$\begin{aligned} risk_{it} = & \alpha_t + \alpha_j + \beta * CA_{j,t-2} + \gamma * (CA_{j,t-2} * capital_{i,t-2}) + \delta * macro_{j,t-2} \\ & + \theta * bank_{i,t-2} + \phi * (macro_{j,t-2} * capital_{i,t-2}) + (\varepsilon_{it} + \alpha_i) \end{aligned} \quad (2)$$

where i indexes banks, t the year and j the country in which bank i operates. In order to clear up our identification strategy, we include a vector of macroeconomic variables, denoted by *macro*, and its interaction with the bank capital dummy. The vector *bank* comprises several bank level controls. All the variables will be explained in detail in Section 3.4.

The coefficients of interest in our setting are β and γ . The inference about the former answers the

¹²For several reasons it is unproblematic that the current account balance over GDP is serially correlated: First, the time dimension of our dataset is short. Second, most of our dependent variables do not exhibit pronounced forms of serial correlation. As a result, we obtain precise standard errors, although our key regressor is not serially uncorrelated (see Bertrand et al., 2004). Beyond this, we cluster standard errors at the country level and hence, obtain very conservative t statistics.

¹³This dummy groups banks into those with a high and low capital ratio, respectively (compare Section 3.4).

question whether capital imports induce poorly capitalized banks to increase lending and risk-taking. The inference about the latter provides information whether current account deficits have - as suggested by theory which sees bank capital as a tool counteracting the severity of agency problems (e.g. Holmstrom and Tirole, 1997) - a different impact on banks with less compared to banks with more capital. Therefore, β measures the effect of current account balances on banks with a small capital endowment and $(\beta + \gamma)$ measures the same effect for highly capitalized banks.

For the vector *loans* all the regressors are lagged once to minimize endogeneity concerns. For the set of risk variables the regressors enter with a two-year lag in order to account for the fact that an easing of credit standards is reflected in the risks of a bank's balance sheet (e.g. non-performing loans) only with some delay.¹⁴

Also, the present panel dataset allows to include bank random effects. Since time-constant bank effects are unlikely to be correlated with the current account positions, the use of bank fixed effects can be avoided. As a result, we use a random effects model which produces unbiased and consistent estimates and which is most efficient (compared to a fixed effects model or pooled OLS regressions).¹⁵ Furthermore, as some of our regressors do not vary extensively over time, fixed effects methods could lead to imprecise estimates.¹⁶

We also include time dummies, α_t , in our regressions. By doing so, we control for time-varying variables that are relevant for all banks in our sample independent of the country in which they operate. Additionally, the use of country dummies, α_j , absorbs any heterogeneity across countries that is constant over time (e.g. long-run demographic characteristics or the institutional framework and quality).

Moreover, the standard errors are clustered at the country level in order to account for the possible correlation within a country.¹⁷

As we have access to a broad dataset and because of our econometric specifications and our identification strategy (compare the detailed discussion in Section 3.3), we are convinced that we are able to make solid inferences on whether current account deficits increase bank risk-taking and bank lending.

¹⁴We also adjust this lag structure in the robustness section.

¹⁵See Wooldridge (2010), Chapter 10.

¹⁶See also Wooldridge (2010), Chapter 10.

¹⁷Some econometricians, e.g. Angrist and Pischke (2009), only recommend clustering in cases, where the number of clusters is larger than eleven. In order to account for this possible criticism, in an alternative (unreported) regression, we made use of the fact that random effects models (which are estimated via GLS) already correct for autocorrelation in the error term and additionally, we only corrected these errors for heteroskedasticity. The results remain qualitatively unchanged and as the standard errors obtained from clustering appear more conservative, we stick to this method.

3.3 Identification Strategy

The key assumption for identification in our setting is the strict exogeneity of the current account balance. Obviously, reverse causality cannot be an issue because a single bank is too small to influence the equilibrium of the economy as a whole. However, some threads to identification emerge from the potential issue of omitted variable bias. To address these threads, this section mainly examines key variables that have been identified in the existing literature as having a crucial impact on current account balances.

Changes in the current account balance are influenced in the short-run by domestic and foreign business cycle fluctuations and in the long-run by various structural variables (e.g. demographic changes). Per definition, the current account is highly affected by the trade balance (net exports) in the short-run. As a consequence, foreign fiscal and monetary policy changes are correlated with the current account and domestic policy measures cannot be very decisive. Consistently with this observation, Uribe and Schmitt-Grohé (2014) list a number of business cycle facts. Among others, they calculate the correlation between some macroeconomic variables and real GDP for 154 countries between 1959 and 2009. They find that the current account balance is only lowly correlated with national income and hence, that the state of the domestic economy is not the main determinant of international capital flows. Therefore, foreign business cycle fluctuations seem to influence domestic current account positions decisively and they are apparently exogenous with respect to domestic bank lending behavior.

In the long-run, the current account balance of an economy is rather determined by capital flows (compared to trade flows). For instance, Bluedorn et al. (2013) observe nearly 150 countries since 1980 and come to the conclusion that changes in the risk-aversion of large international investors and the global financing conditions are highly relevant for capital flows, especially in relatively underdeveloped countries. In addition, Bruno and Shin (2013) find that global factors dominate local factors in determining banking sector capital flows.¹⁸ Hence, changes that are exogenous for a single (European) country can explain large parts of current account fluctuations. This is consistent with Rey (2013). She describes that there exists a global capital flow cycle. Summing up, fluctuations in current account balances are primarily driven by foreign compared to domestic agents, eliminating any endogeneity concerns regarding our methodology.

Beyond this, as mentioned before, we observe that capital flows in the euro area are exten-

¹⁸An early work by Calvo et al. (1996) precisely describes the difference of international push factors and domestic pull factors that determine cross-border capital flows. The authors especially underline the importance of push factors for emerging countries in the 1990s.

sively influenced by political decisions and hence, they appear exogenous with respect to banks. Therefore, we additionally overcome more complicated identification issues by making use of the exogenous fluctuations in European current account balances.

One concern regarding identification is that loan volumes are affected by changes in loan demand and loan supply. However, for the policy implications it is central to disentangle loan supply from loan demand because our purpose is to explore the effects of capital flows on bank lending behavior. This is why we incorporate time and country fixed effects and a large vector of macroeconomic and bank level controls. This strategy should - as argued by Gambacorta and Marques-Ibanez (2011) as well as Opiela (2008) - capture most of the changes on the loan demand side with the result that our central coefficients mainly capture changes in loan supply. Nevertheless, we additionally strengthen the relative importance of supply side effects in Section 5.1 by investigating whether our findings of increased lending and risk-taking following capital inflows are amplified in small and strongly interbank-dependent (in contrast to multinational and deposit-taking) financial institutions. As these banks benefit the most from increases in the quantity of loanable funds (and according interest rate decreases), their supply of credit, unlike loan demand which is independent of such bank characteristics, is likely to react.

Also, in order to clear up our identification strategy, we horserace the current account balance in its interaction with bank capital with the corresponding interactions of other important macroeconomic variables. Summing up, due to this accurate identification strategy we obtain consistent estimators that allow to make causal inferences.

3.4 Variables

In this section, we explain the variables which enter our model in more detail. While we justify the choice and calculation of the dependent variables in Section 3.4.1, Section 3.4.2 is focused on the presentation of our regressors.

3.4.1 Dependent Variables

To identify the effect of the current account on bank lending, one of our dependent variables is the growth rate of the loan volume of a particular bank at a particular point in time (*bankloans*). Furthermore, we include the growth rate of the loan-to-asset ratio as dependent variable (*balancestructure*) in order to find out whether international capital inflows induce banks to change their balance structures.

For the identification of the effects on risk-taking, we employ different risk measures that are

commonly applied in similar empirical research papers. We start by the z-score, defined as the sum of the return on assets and the solvency rate divided by the standard deviation of the return on assets:¹⁹

$$z - score_{it} = \frac{roa_{it} + solvency_{it}}{sd(roa)_i}, \quad (3)$$

where a lower z-score is equivalent to more bank risk-taking.

The z-score is often used as a proxy for bank risks because it can easily be calculated making use of pure accounting data. Consequently, it can also be determined for unlisted banks. Strobel (2014) promotes taking logs of the z-score because the measure per se is highly skewed.²⁰ Furthermore, he comes to the conclusion that the z-score (in logs) is an appropriate bank risk measure because it is negatively proportional to the probability of insolvency.²¹

In order to robustly show that current account balances affect risk-taking, we utilize not only the z-score as proxy for bank risks, but include three risk indicators that measure risks in bank loan portfolios. The first is the ratio of impaired loans to equity (*impaired loans*), the second is the ratio of loan loss provisions to net interest revenues (*loan loss provisions*) and the third is the ratio of impaired loans to gross loans (*loan quality*).²² A higher value for each of the variables indicates more bank risks.²³ While the second ratio is reported by almost all banks of our sample (37,108 banks), the first and last ratio is limited in the number of observations (11,965 and 11,588 financial institutions).

Of particular importance for our analysis is the inclusion of the third ratio because in contrast to the other indicators, it only increases if banks grant more risky loans. The other ratios may also increase if e.g. banks merely increase the number of loans relative to other assets in their

¹⁹Köhler (2012) or Laeven and Levine (2009) calculate the standard deviation over the entire sample period of bank *i*. We make use of this calculation method in our baseline specifications. However, in the robustness section we additionally calculate the standard deviations over a rolling window period of four years. Beyond this, Lepetit and Strobel (2013) divide the sum of the capital-to-asset ratio of every current period and the mean of the return on assets (calculated over the entire sample period of bank *i*) by the the standard deviation (which is also calculated over the entire sample period). We will come back to these extensions and discuss their possible advantages in the robustness section.

²⁰Laeven and Levine (2009) adjust the z-score accordingly as well.

²¹Beck et al. (2009) discuss potential caveats of the z-score. However, most of the arguments do not apply in our setting because we study banks in the euro area with comparable legal and accounting standards.

²²As the latter only takes on values between 0 and 1, usual linear regression models might deliver predictions that lie outside the unit interval. Hence, we implemented the following logit transformation: $\ln\left(\frac{loanquality}{1-loanquality}\right)$. This transformation has some very important key features: First, it removes the scaling boundaries, such that our dependent variable might take values covering the entire real line and thus allows to implement usual linear regression models. Moreover, it provides a symmetric distribution around 0 (compare e.g. Baum, 2008).

²³The three risk variables that measure risks in the loan portfolios of banks are subject to some criticism. For instance, reported impaired loans usually only capture a fraction of the loans that would need to be written off. Banks naturally try to delay any write-offs as far into the future as conceivable. Furthermore, Ahmed et al. (1999) and Hanweck and Ryu (2005) discuss the appropriateness of loan loss provisions and net interest revenues as components of proxies for bank risks. However, the empirical analysis that follows provides homogeneous results for the entire set of risk variables. As a consequence, we are certain that the choice of our dependent variables allows us to identify the effects of international capital flows on bank risk-taking.

balance sheet. Opposed to this, an increase in the third risk variable implies that banks soften lending conditions. This is particularly important for our analysis because we are interested in studying risk-shifting incentives due to global capital flows.

Furthermore, we argue that an easing of credit standards enters a bank's balance sheet only with some delay. Hence, in the baseline specification for the vector of risk variables we include all the regressors with a two-year lag and adjust this lag structure in the robustness section.

3.4.2 Regressors

In this paragraph, we present our explanatory variables more specifically. The central variable in our analysis is the current account balance over GDP. As argued in Section 3.3, it is determined exogenously. Other typical domestic macroeconomic variables are only lowly correlated with the current account. Nevertheless, in order to minimize identification concerns, we include additional macro variables that are likely to affect bank risk-taking and may be (lowly) correlated with the current account.

First, the economic surge of an economy, measured as the growth rate of real GDP (*growth*). Second, monetary policy should affect bank risk-taking extensively. Therefore, we use the change in the EONIA, the overnight interbank interest rate, as proxy for the stance of monetary policy (*eonia*).²⁴ Third, in contrast to the EONIA, banks may also be highly affected by long-term interest rates. Consequently, our analysis includes the growth rate of the 10-year sovereign bond yields because they are the central long-term interest rates that are available for every country over the entire sample period (*bondyield*). Fourth, we include per capita GDP (*percapitagdp*). Although the institutional frameworks in the euro area are relatively comparable it might nevertheless be the case that changes in the legal framework affect bank risk-taking and current account balances simultaneously. Per capita GDP is a frequently applied variable representing the changes in institutional circumstances and in the economic development of a country (e.g. Dinger and Von Hagen, 2009).²⁵

Moreover, we include several bank level controls. First, the growth rate of total assets (*size*). Second, the growth rate of liquidity (*liquidity*) and third, we account for bank agency problems by controlling for bank capital (*capital*). The latter is calculated as a dummy variable that is equal to one if the capital-to-asset ratio of bank *i* at time *t* is larger than the first quintile of

²⁴In various specifications, time dummies will absorb the variation in this variable such that estimated coefficients cannot be reported.

²⁵We included other macroeconomic variables, e.g. inflation, the growth rate of government expenditures (as a proxy for fiscal policy) and the change in the outputgap (as a measure for the current business cycle). The estimated coefficients were mostly insignificant and this is why we exclude them from our regressions.

solvency rates in country j for time t (and zero otherwise). In this sense, we define a bank as poorly capitalized if its equity ratio is smaller than the first quintile for the particular country-year pair. Replacing the solvency rate with a dummy is important to circumvent the caveat of built-in-correlation that would exist because the solvency rate of banks is already part of the z-score. Moreover, this specification also allows us to control for non-linearities in the effect of bank capital on risk-taking.²⁶ Furthermore, we incorporate a measure for a bank's change in its return on assets, ROA (*profitability*). As the ROA exhibits distinct variations with various jumps from negative to positive values and vice versa, it is implausible to calculate growth rates because they may take extreme values and thus spur the analysis. Instead, our measure for changes in profitability is a dummy variable again. Consistent with the calculation of *capital*, this dummy is equal to one if the growth rate of a bank's profitability is larger than the first quintile of ROA growth rates in country j for year t (and zero otherwise).²⁷ For the specifications with *balancestructure* and *bankloans* as dependent variables, we additionally include the loan-to-asset ratio (*balancestructure_level*) and the logged bankloans in levels (*bankloans_level*) as regressors.²⁸

3.5 Summary Statistics

Table 1 contains the descriptive statistics for the dependent and independent baseline variables as defined in Section 3.4.

The mean of the variable *balancestructure* that measures the change in the loan-to-asset ratio is slightly negative implying that over the entire sample period, banks have replaced loans with other assets (with an average loan-to-asset ratio of 56.83%). The loan volume in general has increased by approximately 5.5% per year.

²⁶Nevertheless, the main results remain relatively comparable if we take other thresholds of the distribution of the capital-to-asset ratio in a particular country at a particular point in time or if we - despite the problem of built-in-correlation - stick to the solvency rate as a measure for the capitalization of a bank.

²⁷Our regressors usually enter as growth rates instead of levels mainly because of two reasons. First, changes in bank lending behavior and bank risk-taking are rather affected by changes in the macroeconomic and bank level environment (and not by their levels). Second, we expect a possible correlation (that may lead to omitted variable bias) at most between the current account balances and additional variables that are measured as growth rates. For instance, a capital import may affect changes in interest rates, but it is not the reason for high or low interest rates in absolute terms.

²⁸Hence, the model becomes a dynamic panel model because it could be re-written such that we obtain the loan level on the left-hand side and the lagged dependent variable on the right-hand side. Estimating such a model via GLS yields inconsistent estimates (as e.g. shown by Sevestre and Trognon, 1985). To verify consistency, we estimated the loan regressions making use of the Arellano-Bond estimator (Arellano and Bond, 1991) in an unreported specification. However, the central estimates remain significant and do not change their economic interpretation. Thus, for reasons of simplicity we stick to the RE model not only for the vector of risk variables, but also for the set of loan variables.

Table 1: Summary statistics

	Obs.	Mean	S.D.	25th	Median	75th
<i>Dependent Variables</i>						
balancestructure	39382	-0.09	31.56	-3.96	-0.05	3.78
bankloans	39382	5.47	33.79	-0.78	3.48	9.79
z_score	39354	3.51	1.11	2.89	3.53	4.14
impaired loans	11965	51.07	93.59	17.50	34.93	61.67
loan loss provisions	37108	17.58	43.46	5.29	14.33	24.89
loan quality	11588	-2.99	1.10	-3.50	-2.90	-2.31
<i>Macroeconomic Regressors</i>						
currentaccount	40443	2.36	4.02	-0.78	2.00	6.18
growth	40443	1.05	2.33	0.05	0.93	2.54
percapitagdp	40443	32.90	7.72	28.08	30.55	35.45
bondyield	40443	-5.57	14.86	-14.89	-5.53	1.27
eonia	40443	-7.03	47.89	-38.89	-11.64	35.89
<i>Bank level Regressors</i>						
capital	40428	0.80	0.40	1.00	1.00	1.00
profitability	39256	0.80	0.40	1.00	1.00	1.00
size	40443	5.62	13.76	0.16	3.68	8.90
liquidity	39352	0.00	0.24	-0.06	0.00	0.06
balancestructure_level	39438	56.83	22.00	46.52	60.67	71.37
bankloans_level	39438	5.92	2.06	4.74	5.82	7.08

Capital and *Profitability* are defined as dummy variables and therefore, their means of 0.8 result from the definitions. 20% of the sample banks are poorly capitalized and another 20% exhibit low growth rates of the return on assets. The size of an average bank is also growing across time (with a rate of 5.62%) and the average liquidity endowment hardly changes.

The current account balance for our sample averages 2.36% of GDP. This is due to the fact that a large part of European banks are located in Germany, a typical country with large external surpluses. However, the variation is relatively high with a first quartile of -0.78% and a third quartile of 6.18%. The economic growth rate for our sample equals on average 1.05%. This low value is certainly due to the period since 2008 when growth rates declined as a consequence of the financial crisis. Beyond this, the beginning of the century was dominated by recessions. While there are no striking differences in per capita income across countries, sovereign bond yields as well as the EONIA are decreasing over time with rates of -5.57% and -7.03%. This underlines the fact that the first decade of the twenty-first century was a period of expansionary monetary policy and decreasing interest rates.

4 Baseline Model

4.1 Results

Before turning more specifically to the distinction in the capital endowment of banks (and the related agency problems), we estimate in a first step the equations (1) and (2) without the interaction terms. In this specification, the coefficient β identifies the effect of current account fluctuations on bank lending and risk-taking in general. Table 2 presents the results for our most parsimonious specification. A current account deficit in its entirety leads to weakly significantly higher bank loan-to-asset ratios and highly significantly lower z-scores. Beyond this, capital inflows also affect the variables *loan loss provisions* and *loan quality* highly significantly which indicates that banks subject to high international capital inflows increase the risks in their loan portfolios.

Table 2: The most parsimonious results

	(1)	(2)	(3)	(4)	(5)	(6)
	balancestructure	bankloans	z_score	impaired loans	loan loss provisions	loan quality
currentaccount	-0.315* (-1.94)	-0.307 (-1.40)	0.017*** (3.20)	-2.153 (-1.01)	-1.147*** (-3.81)	-0.054*** (-3.52)
capital	0.086 (0.23)	-2.604** (-2.51)	0.119*** (7.43)	-21.979*** (-3.89)	-2.381** (-2.47)	0.031 (1.54)
profitability	0.358 (0.72)	1.658* (1.95)	0.019*** (4.00)	-9.189*** (-5.84)	-1.288* (-1.84)	-0.057*** (-4.30)
size	0.029 (0.92)	0.085** (2.33)	-0.001*** (-4.59)	-0.339*** (-3.84)	-0.027 (-1.04)	-0.006*** (-6.12)
liquidity	6.237* (1.79)	5.174 (1.52)	0.004 (0.26)	8.207*** (3.26)	2.498 (1.41)	0.182*** (3.31)
balancestructure_level	-0.273*** (-4.31)					
growth	0.018 (0.06)	1.014*** (2.75)	-0.003 (-0.24)	-2.789 (-0.84)	-0.763 (-0.88)	-0.034 (-1.28)
bondyield	-0.195*** (-3.17)	-0.180*** (-6.30)	-0.007** (-2.32)	0.669** (1.97)	1.396*** (4.81)	0.016*** (4.28)
percapitagdp	0.286 (1.43)	0.418 (1.57)	0.031*** (2.94)	-11.234** (-2.16)	-3.032*** (-2.83)	-0.121*** (-3.38)
bankloans_level		-4.751*** (-3.76)				
constant	4.514 (0.60)	14.798 (1.13)	1.936*** (5.72)	465.749*** (2.88)	140.119*** (4.09)	1.108 (0.99)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs	32117	32117	27005	8754	25770	6444
R-squared	0.009	0.018	0.163	0.063	0.060	0.151
Theta	0.471	0.522	0.913	0.400	0.667	0.768

This table shows the results for our most parsimonious random effects model. The dependent variables are (1) the growth rate of the loan-to-asset ratio, (2) loan growth, (3) the z-score, (4) the ratio of impaired loans to equity, (5) the ratio of loan loss provisions to net interest revenues and (6) impaired loans to total loans. The key regressor is the current account position over GDP, all the regressions include a huge set of macroeconomic and bank level controls and we incorporate time and country dummies. The t statistics are reported in parentheses and we cluster standard errors at the country level. Theta is the median proportion of individual means subtracted from the data.

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

In particular, a one percentage point (henceforth pp) decrease in the current account position leads to 0.32 pp higher growth rates of the loan-to-asset ratio and 1.7% lower z-scores. The loan loss provisions to net interest revenue ratio is 1.15 pp higher when the current account drops by one pp. The increase in the loan-to-asset ratio implies that banks substitute new investments in other assets, e.g. (sovereign) bonds, with loans. As loans are generally more risky compared to these assets, this asset substitution effect leads to an increase in bank risks. However, the mere fact that banks change the composition of their balance sheets as a result of capital inflows cannot fully account for the higher bank risks. The increase in the third credit risk measure (impaired loans to total loans) implies that additionally the average quality of bank loans deteriorates.

There are only two macroeconomic variables that have similar effects on banks namely the growth rate of 10-year sovereign bond yields and per capita GDP. The first exhibits highly significant effects on the set of risk variables, but the signs are relatively puzzling. A lower bond yield leads to less bank risk-taking. In contrast, theory finds banks to increase risk-taking when interest rates are low.²⁹ The second significant variable is per capita GDP. A higher income per capita increases the z-score and lowers the credit risks. Thus, banks in relatively developed countries are less prone to take on additional risks. The effects of the set of bank control variables on bank lending and risk-taking are as expected. Banks with less assets, a lower profitability and abundant liquidity take on more risks.³⁰

After having shown that current account deficits in general lead to increases in bank lending and risk-taking, we will now extend the parsimonious model to the specifications (1) and (2), where we include all the interaction terms. Table 3 presents the results for this more saturated specification. Our variables of interest are the current account and its interaction with the bank capital dummy. Obviously, capital inflows increase the loan-to-asset ratios of banks with low capital ratios (column 1). The coefficient (-0.507) is significant with a t-statistic of -2.26. It shows that a decrease in the current account balance of 1 pp leads to 0.51 pp higher growth rates of the loan-to-asset ratio for banks with a low capital base. Beyond this, Table 3 clarifies that current account deficits increase lending (column 2) of poorly capitalized banks.

²⁹Additionally, the correlation between the variables *currentaccount* and *bondyield* is equal to -0.25. Hence, for the entire sample period higher capital imports increase the interest rates on sovereign debt. Obviously, this finding contradicts our theoretical arguments. However, before the onset of the financial crisis the correlation coefficient was positive (as expected by theory). As a result, the interpretation of the variable *bondyield* might be misleading because after onset of the financial crisis, countries with the highest (bank) risks had to bear the strongest increases in interest rates on their sovereign debt. If we drop observations after onset of the financial crisis decreases in *bondyield* theory-consistently lead to more bank risk-taking.

³⁰The effect of bank size on the z-score is negative. Smaller banks have higher risks in their loan portfolios, but in contrast the z-scores are higher.

Table 3: Results including bank agency problems

	(1)	(2)	(3)	(4)	(5)	(6)
	balancestructure	bankloans	z_score	impaired loans	loan loss provisions	loan quality
currentaccount	-0.507** (-2.26)	-0.598* (-1.77)	0.021*** (3.98)	-2.752 (-1.02)	-1.546*** (-3.99)	-0.063*** (-3.25)
capital*currentaccount	0.241* (1.74)	0.364** (2.07)	-0.005* (-1.73)	0.783 (0.40)	0.492 (1.14)	0.009 (0.96)
capital	4.522 (1.22)	-4.591 (-1.19)	0.132* (1.79)	-63.554 (-0.90)	2.041 (0.58)	0.242 (0.79)
profitability	0.372 (0.75)	1.671* (1.96)	0.019*** (4.04)	-9.356*** (-6.60)	-1.285* (-1.86)	-0.055*** (-3.99)
size	0.029 (0.91)	0.085** (2.31)	-0.001*** (-4.54)	-0.326*** (-3.95)	-0.030 (-1.20)	-0.006*** (-6.39)
liquidity	6.239* (1.79)	5.163 (1.52)	0.004 (0.27)	7.915*** (3.05)	2.479 (1.38)	0.183*** (3.33)
balancestructure_level	-0.273*** (-4.33)					
growth	-0.279 (-0.75)	0.882*** (3.01)	-0.003 (-0.21)	-1.114 (-0.32)	-0.824 (-0.90)	-0.037 (-1.38)
bondyield	-0.100 (-1.14)	-0.086 (-1.37)	-0.007* (-1.80)	0.629 (1.49)	1.416*** (4.69)	0.019*** (4.96)
percapitagdp	0.409 (1.57)	0.400 (1.23)	0.030*** (2.65)	-12.493** (-2.17)	-2.883*** (-2.66)	-0.116*** (-2.82)
capital*percapitagdp	-0.179 (-1.53)	0.016 (0.15)	0.000 (0.08)	1.602 (0.74)	-0.206 (-1.28)	-0.007 (-0.65)
capital*eonia	0.002 (0.14)	0.002 (0.15)	0.001*** (2.66)	0.279** (2.15)	-0.062 (-1.26)	0.001 (0.86)
capital*growth	0.372 (1.51)	0.157 (0.78)	-0.000 (-0.06)	-2.163** (-2.40)	0.054 (0.26)	0.003 (0.36)
capital*bondyield	-0.119* (-1.92)	-0.116* (-1.84)	-0.001 (-0.69)	0.085 (0.15)	-0.032 (-0.25)	-0.004*** (-2.94)
bankloans_level		-4.756*** (-3.75)				
constant	1.525 (0.16)	16.592 (1.11)	1.925*** (5.11)	497.379*** (2.80)	137.413*** (3.95)	0.962 (0.75)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs	32117	32117	27005	8754	25770	6444
R-squared	0.010	0.019	0.164	0.064	0.061	0.151
Theta	0.470	0.521	0.913	0.400	0.667	0.768

This table shows the results for our baseline random effects model (including bank agency problems). The dependent variables are (1) growth of the loan-to-asset ratio, (2) loan growth, (3) the z-score, (4) the ratio of impaired loans to equity, (5) loan loss provisions to net interest revenues and (6) impaired loans to total loans. The key regressor is the current account balance over GDP and its interaction with a bank capital dummy. The regressions include a large set of macroeconomic and bank level controls and we incorporate time and country dummies. The t statistics are reported in parentheses and we cluster standard errors at the country level. Theta is the median proportion of individual means subtracted from the data.

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

We observe a significant effect on the 10% level. Summing up, current account deficits lead banks to increase loan volumes and the loan-to-asset ratios. This underlines that banks change their asset structures as a result of capital inflows, focusing on new lending relative to investments in other assets. The interaction variable is positive (as suggested by theory) for both loan variables and significant for the growth rate of bank loans on the left-hand side. Thus, poorly capitalized banks increase lending overproportionally when foreign capital pours into an economy. In particular, a 1 pp decrease in the current account position leads to 0.6 pp higher loan growth rates for poorly capitalized banks. The effect for banks with a high capital endowment is statistically smaller and equals 0.23 pp.

We cannot perfectly distinguish supply and demand effects. However, Table 2 and Table 3 present evidence that banks in countries with capital inflows invest in projects at the higher end of the risk distribution suggesting that loan supply side effects are crucial. This is the case since loan demand effects should have driven the results in the opposite direction.³¹ However, we additionally strengthen the relative importance of loan supply side effects in Section 5.1 by exploring whether our results are amplified in small and strongly interbank-dependent (in contrast to multinational and deposit-taking) financial institutions. These banks benefit the most from increases in the volume of loanable funds (and according interest rate decreases) and therefore, their supply of credit, unlike loan demand which is independent of such bank characteristics, is likely to increase.

Having presented the baseline results related to the loan volumes, we will next present the effects of current account balances on bank risks. Generally, we obtain relatively homogeneous results for the entire set of risk variables. The effect of current account balances on the z-score, the impaired loans to equity ratio, the loan loss provisions to net interest revenue ratio and the impaired loans to gross loans ratio are mostly significant (and often even highly significant) for banks with less capital. Thus, a capital import lowers the z-score and increases the risks in banks' loan portfolios. Both results are consistent with the theory. Beyond this, the interaction effect is significant for the z-score. The coefficient of -0.005 (t statistic: -1.73) leads to the conclusion that poorly capitalized banks in countries with high capital inflows are closer to insolvency compared to highly capitalized banks. While a 1 pp decrease in the current account balance leads to 2.1% lower z-scores of poorly capitalized banks, the effect for highly capitalized banks equals 1.6%.³² The vector of bank level and macroeconomic control variables is

³¹See Boyd and De Nicoló (2005) who show that lower interest rates lead borrowers to implement less risky projects.

³²The relative importance of the bank capital endowments will become even more striking in subsequent robustness regressions.

similar to the presented results in the more parsimonious specification. Hence, we refrain from presenting any more related details.

4.2 Robustness Checks

Our baseline model is very saturated and includes large vectors of explanatory variables that are usually included in similar empirical analyses. Furthermore, our model comprises different dependent variables that deliver perfectly consistent results. Hence, the findings we obtain are very robust with respect to the incorporation of an extensive set of regressors and hold for separate dependent variables.

This section varies some of the definitions of our dependent variables and modifies some of our specifications. As a result, we underline that our results are additionally very robust to these adjustments.

4.2.1 Alternative Z-Score Definitions

In a first robustness check, we calculate the z-score as follows:³³

$$z\text{-score} - robust_{it} = \frac{roa_{it} + solvency_{it}}{sd(roa)_{it,4year}}, \quad (4)$$

where the standard deviation of the ROA is calculated over a 4 year rolling window.³⁴

The advantage of definition (4) (z_score_robust) is that the standard deviations are better comparable. For instance, when calculating it over the entire sample, there are banks that only exist for two periods. Nevertheless, we calculate the standard deviations of the ROA for such banks as for banks that exist during the whole sample period. Therefore, the comparability is limited. The robustness definition ensures that the standard deviations are only calculated for banks that exist for a minimum of four periods.³⁵

In a second variation of the z-score definition ($z_score_robust2$), we stick to a recommendation by Lepetit and Strobel (2013):

$$z\text{-score} - robust2_{it} = \frac{mean(roa)_i + solvency_{it}}{sd(roa)_i}, \quad (5)$$

where $mean(roa)$ is the mean of the ROA calculated over the entire sample period. Instead of taking actual values of the ROA for every period - as in (3) and (4) -, we now include its mean

³³Repeatedly, we take logs of the z-score to account for the skewness of its distribution.

³⁴Even calculating it over a 3 year period does not change results substantially.

³⁵However, as a result of this adjustment the number of observations drops.

in the numerator. Lepetit and Strobel (2013) analyze different z-score definitions making use of a root mean squared error comparison and argue in favor of (5) because it best fits the data.

The first two columns of Table A.2 (Appendix) present the central findings for the alterations of the z-score. Still, a capital import leads to lower z-scores (higher risks) and the effect is overproportionally pronounced for poorly capitalized banks. The coefficients that refer to the theoretical arguments from Section 2 are mostly significant and always have the expected signs. As the results are quantitatively as well as qualitatively similar to the baseline section (Table 2 and 3), we will not present the conclusions in much detail. In sum, we find the current account position to have a crucial impact on a bank's z-score independent of its precise definition.

4.2.2 Different Lag Structure

So far, our risk variables are regressed on variables which enter with a two-year lag because risks in the loan portfolios only become manifest with some delay. This design is derived from an economic perspective and hence, the precise empirical lag structure remains unclear. In a further robustness check, we repeatedly implement our regressions related to bank risks, but include all our regressors with a one-year lag. This strategy should provide further insights concerning the effects of current account balances on banks and therefore, underline the robustness of our previous findings.

Columns (3) - (8) of Table A.2 (Appendix) show the results for the vector of risk variables when the regressors only enter with a one-year lag. A decrease in the current account balance leads to lower z-scores and we obtain significantly stronger effects for banks with a low capital endowment. Related to the variables that measure risks in the loan portfolios, we obtain mostly insignificant results. Thus, while capital imports today seem to affect a bank's z-score with a one-year lag, the effects in the credit portfolios require a delay of at least two years.

4.2.3 Interacting the Current Account with Other Bank Controls

The key finding of our presented analysis is that in particular poorly capitalized banks increase lending and risk-taking following large inflows of capital. However, a possible concern regarding our specifications is that the capital dummy approximates other bank level variables apart from solvency ratios. In Section 4.2.3, we address this issue by including the vector of bank level controls in its interaction with the current account balance. This ensures that our main interaction term *capital * currentaccount* is not likely to capture any bank level effects apart from relative capital endowments. Table A.3 (Appendix) underlines that this is not the case.

The key coefficients referring to the regressors *currentaccount* and *capital * currentaccount* do neither change their significance nor their economic meaningfulness. Therefore, the effect of current account balances on bank lending and bank risks is particularly amplified in banks that are poorly capitalized.

The results of the previous robustness regressions also confirm that especially the profitability and the size of banks affect bank risk-taking significantly. Less profitable banks seem to take on higher risks. Furthermore, smaller banks have higher risks in their loan portfolios.

The only constantly significant macroeconomic variables in Table A.2 and A.3 are the bond yields and per capita GDP. Lower 10y sovereign bond yields and a higher per capita GDP are associated with less bank risks. However, these effects are not unanimously amplified in poorly capitalized banks. The current account balance is the only macroeconomic variable that is mostly significant and which has signs that are universally consistent with theory (also in its interaction with the bank capital dummy).

Summing up, capital imports lead banks to increase their loan volumes and their loan-to-asset ratios. This implies that there is strong evidence for a risk-increasing substitution effect. Banks focus on their core business of granting loans because international investors crowd them out of the markets for safer assets, e.g. bonds. Beyond this, external deficits induce them to grant more loans to risky borrowers. It becomes obvious that changes in the current account position of countries today lead to changes in bank lending and in the z-score one year later, while the effects on the loan portfolio seem to require an additional time lag of at least two years. This is why the following regressions will take exactly this lag structure into account. Beyond this, our baseline model provides results that are consistent with Holmstrom and Tirole (1997). Banks subject to strong agency problems seem to increase risk-taking overproportionally. We confirm this finding in the course of our robustness Section 4.2.

In the following paragraphs, we identify the precise channels through which global capital flows affect bank risk-taking and bank lending. As we thoroughly confirmed the hypothesis related to bank agency problems, we next focus on the effect of the current account on banks in general and we will for reasons of lucidity refrain from the interactions with the bank capital dummy.

5 Capital Flows and Bank Risks: The Channels

In Section 5, we investigate more specifically the channels through which large inflows of capital affect bank lending behavior. In a first of these tests, in Section 5.1, we disentangle loan

supply from loan demand in more detail. In Section 5.2, we explore whether current account deficits affect banks through changes in the price or rather by changes in the quantity of loanable funds.

5.1 Loan Supply vs Loan Demand

In Section 4, we argue that the finding of increased bank lending to risky entrepreneurs is mainly driven by supply side effects because we control to some extent, consistent with Opiela (2008) and Gambacorta and Marques-Ibanez (2011), for changes in loan demand by including time and country dummies and by incorporating a large vector of macroeconomic control variables. Disentangling demand and supply effects is crucial for the policy implications because our purpose is to explore the effects of capital flows on bank lending (in contrast to firm borrowing) behavior. Therefore, the intention of Section 5.1 is to underline that our results are indeed mainly driven by supply side effects.

Precisely, we investigate whether our findings are amplified in small and strongly interbank-dependent, in contrast to multinational and deposit-taking, financial institutions. As these banks benefit the most from increases in the quantity of loanable funds (and according interest rate decreases), their supply of credit, unlike loan demand that does not depend on such bank characteristics, is likely to increase. For the subsequent analysis, we define a bank as being influenced by international capital flows in two different ways.

First, when it is small, i.e. it has total assets in the 90th percentile or lower for the respective country-year pair.³⁶ Multinational banks, in contrast, diversify their funding structure globally and therefore, are hardly influenced by large inflows of capital. Second, when it has interbank liabilities relative to total loans above the 20th percentile.³⁷ Banks below this threshold fund their activities mostly through deposits and as a consequence, they are disproportionately affected by large inflows of global liquidity.

In the following Table 4, we present the results for this analysis. In columns (1) - (6), we measure dependence on foreign capital as a dummy which equals one for small banks. In columns (7) - (12), foreign dependence is a dummy variable that is equal to one for financial institutions with high interbank exposures. Of particular interest are the coefficients in the first row because they measure the effect of current account deficits on banks that are hardly dependent on global capital.

³⁶Large, multinational banks have total assets above the 95th percentile for the respective county-year pair. These definitions follow Cetorelli and Goldberg (2012) and Campello (2002).

³⁷We choose this threshold to be consistent with the dummies *roa* and *capital*. However, the results remain comparable for other thresholds.

Table 4: Supply vs demand

	dependence on foreign capital proxied by a dummy that equals zero for banks with low interbank exposures											
	dependence on foreign capital proxied by a dummy that equals zero for the largest (multinational) banks						dependence on foreign capital proxied by a dummy that equals zero for banks with low interbank exposures					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	balancestructure	bankloans	z_score	impaired loans	loan loss provisions	loan quality	balancestructure	bankloans	z_score	impaired loans	loan loss provisions	loan quality
currentaccount	-0.190 (-0.57)	-0.147 (-0.53)	0.013 (0.91)	-3.934 (-1.58)	0.081 (0.13)	-0.070* (-1.93)	-0.149 (-1.01)	0.165 (1.10)	0.012* (1.71)	-1.123 (-0.53)	-0.610** (-2.24)	-0.038*** (-2.87)
dependence_foreigncapital*currentaccount	-0.104 (-0.43)	-0.188 (-1.05)	0.004 (0.29)	1.443 (1.08)	-1.249** (-2.10)	-0.007 (0.19)	-0.143 (-0.74)	-0.549** (-2.51)	0.006 (1.26)	-1.820** (-2.36)	-0.906*** (-3.65)	-0.010 (-0.50)
capital	-0.205 (-0.54)	-1.649** (-1.81)	0.212*** (5.02)	-24.633*** (-3.73)	-1.954** (-1.99)	0.005 (0.13)	0.070 (0.77)	-2.263*** (-2.66)	0.214*** (5.42)	-23.220*** (-3.57)	-2.281*** (-2.75)	0.030 (1.43)
profitability	0.454 (0.89)	1.867** (2.09)	0.032*** (2.68)	-9.937** (-6.00)	-1.114* (-1.74)	-0.070*** (-1.379)	0.369 (1.10)	1.626* (1.88)	0.032** (2.51)	-9.124*** (-5.51)	-1.199* (-1.79)	-0.055** (-3.18)
size	0.036 (1.02)	0.093** (2.36)	-0.002*** (-3.80)	-0.388*** (-4.45)	-0.029 (-1.15)	-0.006*** (-1.379)	0.031 (1.10)	0.076** (2.36)	-0.002*** (-4.43)	-0.355*** (-3.87)	-0.044 (-1.44)	-0.006*** (-7.01)
liquidity	4.131 (1.62)	2.911 (1.34)	0.023* (1.84)	9.897*** (2.85)	2.883 (1.57)	0.194*** (2.97)	2.040 (1.37)	1.322 (0.81)	0.025** (1.97)	8.621*** (3.90)	2.834 (1.56)	0.178*** (3.53)
dependence_foreigncapital	7.414** (2.49)	-32.842*** (-4.69)	0.580** (2.03)	89.360*** (4.80)	-6.677 (-0.49)	1.513 (1.59)	-3.802 (-1.11)	-0.919 (-0.15)	-0.055 (-0.92)	-33.374** (-2.49)	12.910* (1.89)	-0.235 (-0.51)
balancestructure_level	-0.286*** (-4.20)						-0.275*** (-4.29)					
growth	-0.383 (-0.80)	0.902** (2.03)	0.001 (0.07)	-1.559 (-0.37)	-0.678 (-0.81)	-0.003 (-0.11)	-0.126 (-0.35)	0.730 (1.60)	0.013 (1.42)	-1.633 (-0.52)	-0.041 (-0.03)	-0.021 (-0.84)
bondyield	-0.165* (-1.78)	-0.130* (-1.85)	-0.007*** (-4.94)	0.767 (1.63)	1.531*** (5.39)	0.025*** (5.74)	-0.207** (-2.50)	-0.229*** (-4.66)	-0.004*** (-2.92)	1.243** (2.17)	1.225*** (4.88)	0.013*** (3.57)
percapitagdp	0.428** (2.00)	0.228 (0.97)	0.024*** (3.87)	-9.179* (-1.71)	-3.148*** (-3.15)	-0.101** (-2.43)	0.157 (1.23)	0.299* (1.83)	0.020*** (3.15)	-13.547** (-2.13)	-2.710*** (-2.61)	-0.178** (-3.29)
dependence_foreigncapital*growth	0.403* (1.77)	0.084 (0.26)	0.006 (0.96)	-0.889 (-0.59)	-0.051 (-0.10)	-0.047*** (-5.29)	0.068 (0.40)	0.320 (1.56)	-0.001 (-0.17)	-1.284 (-1.54)	-1.325 (-1.04)	-0.020 (-1.13)
dependence_foreigncapital*eonias	-0.029* (-1.74)	-0.015 (-0.86)	-0.000 (-0.19)	0.085 (0.77)	-0.029 (-0.38)	0.005*** (5.97)	-0.002 (-0.19)	-0.028* (-1.95)	-0.000 (-1.07)	0.133 (1.60)	0.218*** (4.54)	0.001 (0.57)
dependence_foreigncapital*bondyield	-0.038 (-0.76)	-0.047 (-0.83)	0.002* (1.65)	-0.183 (-0.75)	-0.178 (-0.72)	-0.012*** (-3.59)	0.036 (0.78)	0.041 (0.94)	-0.001 (-1.01)	-0.626** (-1.98)	0.005 (0.05)	0.002 (0.86)
dependence_foreigncapital*percapitagdp	-0.172* (-1.88)	0.202 (1.37)	-0.002 (-0.27)	-2.550*** (-3.62)	0.039 (0.09)	-0.031 (-0.99)	0.130 (1.08)	0.110 (0.55)	0.001 (0.36)	1.125*** (2.81)	-0.201 (-1.07)	0.007 (0.44)
bankloans_level		-6.323*** (-3.92)					-4.603*** (-3.72)					
constant	-0.892 (-0.13)	52.177*** (2.83)	1.586*** (7.08)	404.087** (2.41)	147.793*** (4.57)	0.289 (0.22)	8.433 (1.47)	14.975* (1.73)	2.208*** (11.77)	538.216*** (2.67)	121.057*** (3.67)	2.873* (1.71)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	30590	30590	30458	8380	24546	6163	30918	30918	30779	8034	24903	5801
R-squared	0.009	0.021	0.166	0.065	0.057	0.160	0.008	0.017	0.163	0.065	0.068	0.148
Theta	0.488	0.557	0.918	0.399	0.643	0.768	0.471	0.523	0.919	0.373	0.637	0.769

This table displays the results of an analysis in which we disentangle loan demand from loan supply. In general, loan demand is unlikely to depend on characteristics of banks. Then, we define banks as being dependent on foreign capital (dependence_foreigncapital=1) if they are small (i.e. they have assets in the 90th percentile or lower for the respective country - year pair; columns (1) - (6)) or if they have interbank liabilities over total loans above the 20th percentile (columns (7) - (12)). These banks benefit overproportionally from global liquidity inflows and hence, we expect an amplified effect in these banks underlying the importance of loan supply side effects. The key regressor is the current account balance over GDP and its interaction with the dependence_foreigncapital dummy. The dependent variables are as before. The regressions include a large set of macroeconomic and bank level controls and incorporate time and country dummies. The t statistics are reported in parentheses and we cluster standard errors at the country level. Theta is the median proportion of individual means subtracted from the data.

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

Only four of twelve coefficients are (weakly) significant. This underlines that banks that benefit only weakly from external capital inflows hardly increase lending and risk-taking. In contrast, in the second row, ten of twelve interaction terms bear the expected signs. This implies that banks that are small or dependent on interbank borrowing and hence, benefit from a deterioration of the current account position, increase loan volumes and risk-taking. As loan demand is unlikely to vary with these bank characteristics the results of Section 5.1 underline decisively that loan supply side effects are crucial for the risk-increasing effects of current account deficits.

5.2 Price vs Quantity

The baseline results document a positive relationship between capital imports and both bank lending as well as bank risk-taking. As discussed in Section 2, capital imports could affect banks through the price and the quantity of loanable funds. From a policy perspective it is crucial to understand whether the risk-increasing effect of capital inflows is driven by the increase in the volume of loanable funds at the disposal of a bank or rather by the price of these funds (i.e. the refinancing costs of a bank). This distinction is important for several reasons. First, it is essential for the evaluation of an empirical literature that emphasizes debt flows into the banking system as a primary source of financial instability (e.g. Taylor, 2012; Lane and McQuade, 2014). Second, it is important for understanding whether capital flows have an impact that goes beyond the typical interest rate effect that is achieved by monetary policy.

In order to disentangle these channels, we replace the current account position by the various components of capital flows in a first step. In particular, we include foreign direct investments, portfolio equity flows, portfolio debt flows and the (residual) other capital flows in the analysis.³⁸ In this setting, debt flows and other flows (which comprise interbank lending and borrowing) serve as a proxy for changes in the quantity of (external) loanable funds. Again, we include bank random as well as time and country fixed effects. The variables are defined as above. On the one hand, this methodology has the aim to ascertain whether debt flows into the banking system are the main reason for the risk-increasing effects of capital flows in general. On the other hand, this horserace allows to find out whether the current account balances affect bank behavior mainly through a quantity channel.

Table 5 shows that the risk-increasing effects of international capital inflows are mainly driven by portfolio debt flows and other capital flows (that also comprise interbank lending). Eco-

³⁸For these regressions, we exclude the top and bottom 2.5% of observations. This is due to some extreme outliers in Ireland and Luxembourg that serve as international financial centers.

nomically, a 1 pp decrease in portfolio debt flows leads to 1.12 pp higher growth rates of the loan-to-asset ratio, 0.61 pp higher loan growth rates and 1.6% lower z-scores. Additionally, risks in banks' loan portfolios increase substantially. Also, we obtain very similar results for other capital flows. In contrast, foreign direct investments and portfolio equity flows do only have a weak (often insignificant) risk-increasing effect. Therefore, international capital inflows in general (i.e. current account deficits) affect banks primarily through changes in portfolio debt flows and other capital flows (which include interbank credit).

Table 5: Heterogeneity of capital flows

	(1)	(2)	(3)	(4)	(5)	(6)
	balancestructure	bankloans	z_score	impaired loans	loan loss provisions	loan quality
fdi	-0.259 (-0.71)	-0.499 (-1.64)	0.008 (1.58)	4.064 (1.44)	-1.126* (-1.89)	-0.023 (-0.97)
equityflows	-0.388 (-1.21)	-0.384 (-1.43)	0.006 (1.26)	1.933 (0.98)	1.008 (1.41)	-0.038 (-1.59)
debtflows	-1.124*** (-4.03)	-0.613* (-1.80)	0.016* (1.72)	-0.528 (-0.40)	-1.790*** (-3.18)	-0.046** (-2.07)
otherflows	-1.041*** (-3.86)	-0.854*** (-2.65)	0.011 (1.54)	0.095 (0.08)	-1.539** (-1.99)	-0.051** (-2.47)
capital	-0.031 (-0.07)	-2.259** (-2.09)	0.204*** (5.81)	-22.936*** (-3.57)	-1.812** (-2.10)	0.035 (1.28)
profitability	-0.188 (-0.63)	0.866** (2.05)	0.031*** (2.59)	-8.796*** (-4.89)	-0.997* (-1.68)	-0.061*** (-5.88)
size	0.029 (0.82)	0.073 (1.53)	-0.002*** (-4.05)	-0.375*** (-2.74)	-0.020 (-0.82)	-0.007*** (-8.98)
liquidity	5.343 (1.43)	4.289 (1.28)	0.023 (1.53)	9.362*** (3.86)	1.465 (0.93)	0.250*** (8.73)
balancestructure_level	-0.307*** (-4.14)					
growth	0.209 (0.73)	0.463 (1.18)	0.009 (0.59)	0.789 (0.34)	0.619 (0.46)	0.007 (0.23)
bondyield	-0.243*** (-3.47)	-0.146** (-2.29)	-0.006*** (-3.09)	2.186*** (3.16)	1.956*** (4.35)	0.036*** (5.10)
percapitagdp	0.731 (1.27)	1.558*** (4.61)	0.036 (1.59)	-11.518*** (-3.26)	-3.869 (-1.49)	-0.069 (-1.62)
bankloans_level		-4.734*** (-4.54)				
constant	-8.371 (-0.44)	-18.498 (-1.40)	1.659** (2.42)	461.126*** (3.90)	168.794** (2.20)	-0.581 (-0.40)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs	29822	29822	29705	8125	24318	5992
R-squared	0.011	0.018	0.139	0.062	0.073	0.155
Theta	0.578	0.600	0.925	0.384	0.699	0.739

In these regressions, we explore the heterogeneity of several capital flows by replacing the current account with foreign direct investments (fdi), portfolio equity flows, portfolio debt flows and the residual other flows (that comprise interbank lending). As debt and other flows approximate the change in the volume of loanable funds caused by external deficits this test allows to disentangle quantity effects and price effects. This distinction is important for the policy implications in order to find out whether the effect of international capital flows exceeds the typical interest rate channel of monetary policy. The regressions incorporate a huge vector of macroeconomic and bank level controls and we include time and country fixed effects. The dependent variables are as before. We show the t statistics in parentheses and the standard errors are clustered at the country level. Theta is the median proportion of individual means subtracted from the data.

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

As a consequence, consistent with Taylor (2012) and Lane and McQuade (2014), our results suggest that debt flows into the banking systems are the major determinant of bank risk-taking and hence, they are the main source of financial instability. However, our results also suggest that foreign direct investments and equity flows do have a weak (but often insignificant) effect on bank risks. As a result, although bank debt flows are the main impediment for financial stability, policy makers around the world should not neglect observing the current account balance *per se* intensely because it might affect bank risk-taking through channels not directly related to the volume of funds banks attract explicitly from abroad (via interbank borrowing and debt inflows).

Beyond this, the results of Table 5 advocate that changes in the volumes of loanable funds which are proxied by debt flows and the other (interbank) flows are relevant for the risk-increasing effects in banks' balance sheets following current account deficits.

To further strengthen the relative importance of changes in the quantity, compared to the interest rate of loanable funds, we employ an alternative approach to disentangle price and quantity channels in a next set of regressions. In these regressions, we take advantage of the fact that our dataset enables us to run a difference-in-differences estimation around an exogenous shock concerning European current account positions. We identify an exogenous event that led to substantial intra-European capital flows, but which left interest rates virtually uniform across countries. To strengthen our argument, we will next briefly explain the institutional framework of the EU and the event that allows us to implement this test.

The EU introduced a treaty, the European Stability and Growth Pact, in 1997. It is supposed to promote financial stability of the euro area member states through restrictions on their sovereign indebtedness. In particular, the government deficit is not allowed to exceed 3% of GDP and the total sovereign indebtedness is limited to 60% of GDP. In case of disregard, member states face distinct sanctions. As a result of the treaty, interest rate spreads for public and private debtors in the euro area were hardly existing at the beginning of the century, especially from 2002 to 2006. From the year 2002 on, Germany and France repeatedly broke the European Stability and Growth Pact. However, in November 2003, the EU unexpectedly abandoned any sanctions against France and Germany. We argue that this exogenous and unexpected event led to tremendous changes in current account balances (i.e. the quantity of loanable funds) because this decision eliminated incentives for fiscal consolidation with subsequent excessive sovereign debt-taking.³⁹ Furthermore, the stop of sanctions is also likely to have increased bail-out expectations within the euro area with according effects on international capital movements. Making

³⁹See Donges et al. (2005).

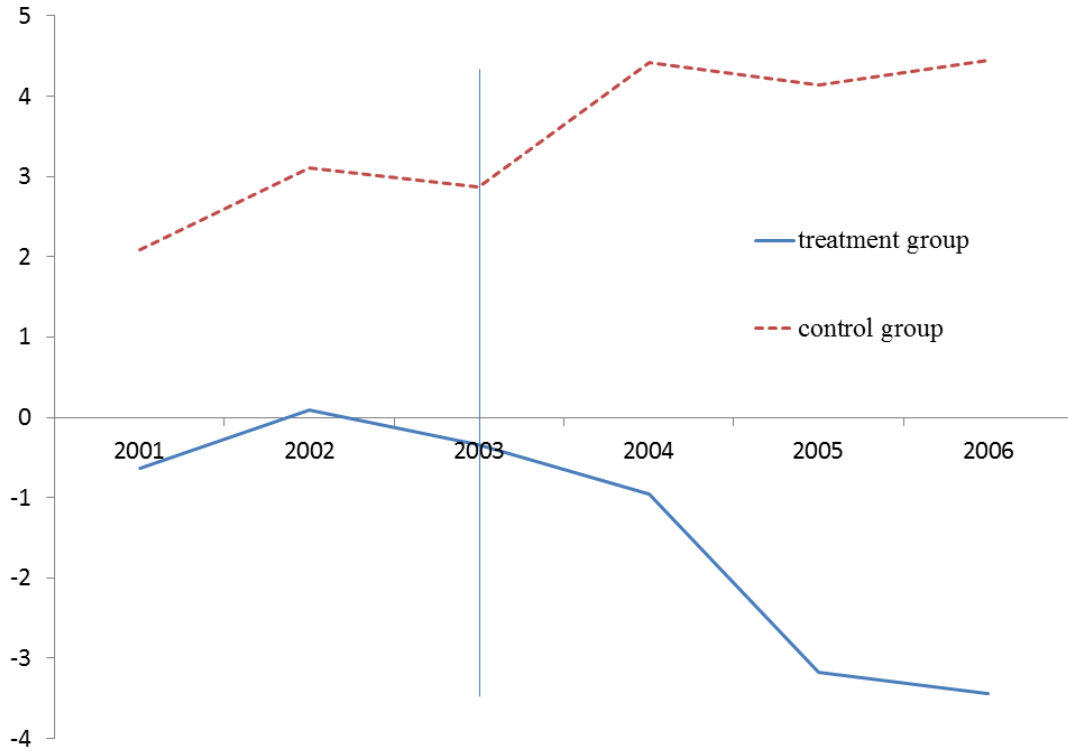


Figure 1: The evolution of current account balances over GDP (in %) around the event. The treatment group comprises banks in countries whose current account position over GDP dropped by more than 1 percentage point (Belgium, Finland, Ireland, Portugal and Spain).

use of this event, we implement a difference-in-differences regression such that any significant effect can be affiliated alone to changes in the quantity of loanable funds because interest rates remained practically uniform in the cross-section (See Figure 1 and 2).

Our difference-in-differences estimation is based on the following (random effects) regressions for the sample period 2002 until 2005.⁴⁰

$$loans_{it} = \alpha_t + \alpha_j + \beta * macro_{j,t-1} + \delta * bank_{i,t-1} + \gamma * (affected * post)_{j,t-1} + (\varepsilon_{it} + \alpha_i) \quad (6)$$

$$risk_{it} = \alpha_t + \alpha_j + \beta * macro_{j,t-1} + \delta * bank_{i,t-1} + \gamma * (affected * post)_{j,t-1} + (\varepsilon_{it} + \alpha_i), \quad (7)$$

where $\alpha_i, \alpha_t, \alpha_j$ are bank random as well as time and country fixed effects and the vectors *macro* and *bank* are the macroeconomic and bank level control variables as defined further above. On the left-hand side, our dependent variables are the growth rate of the loan volume and the loan-to-asset ratio in the first equation and the z-score as well as the variables referring to the risks in the loan portfolio in the second equation.⁴¹ The variable *affected* is a dummy variable that

⁴⁰Because of the lags of the regressors (that are observed from 2002 till 2005), the dependent variables are effectively observed from 2003 until 2007.

⁴¹For the variables measuring risks in the credit portfolio, we repeatedly lag all the regressors twice.

is equal to one if a country's current account balance dropped on average by more than one percentage point after the announcement that any sanctions against Germany and France would be abandoned and zero otherwise. Thus, affected banks are banks in Belgium, Finland, Ireland, Portugal and Spain, while unaffected banks are banks in all other countries.⁴² *Post* is equal to one for the years 2004 and 2005 and zero before.⁴³

The coefficient γ is the classical difference-in-differences estimator and answers whether banks in countries whose current account balance drops by more than one pp increase lending and risk-taking overproportionally (relative to banks in more or less unaffected countries) from the pre-treatment to the post-treatment period. Figure 2 strengthens our argument that interest rates were cross-sectionally constant during the sub-period of 2002- 2006. Precisely, it shows the maximal spreads of different interest rates. Obviously, the spreads of the 10 year sovereign bond yields, the lending margins for house purchases and the interest rates demanded from non-financial corporations were as good as constant for this sub-period.

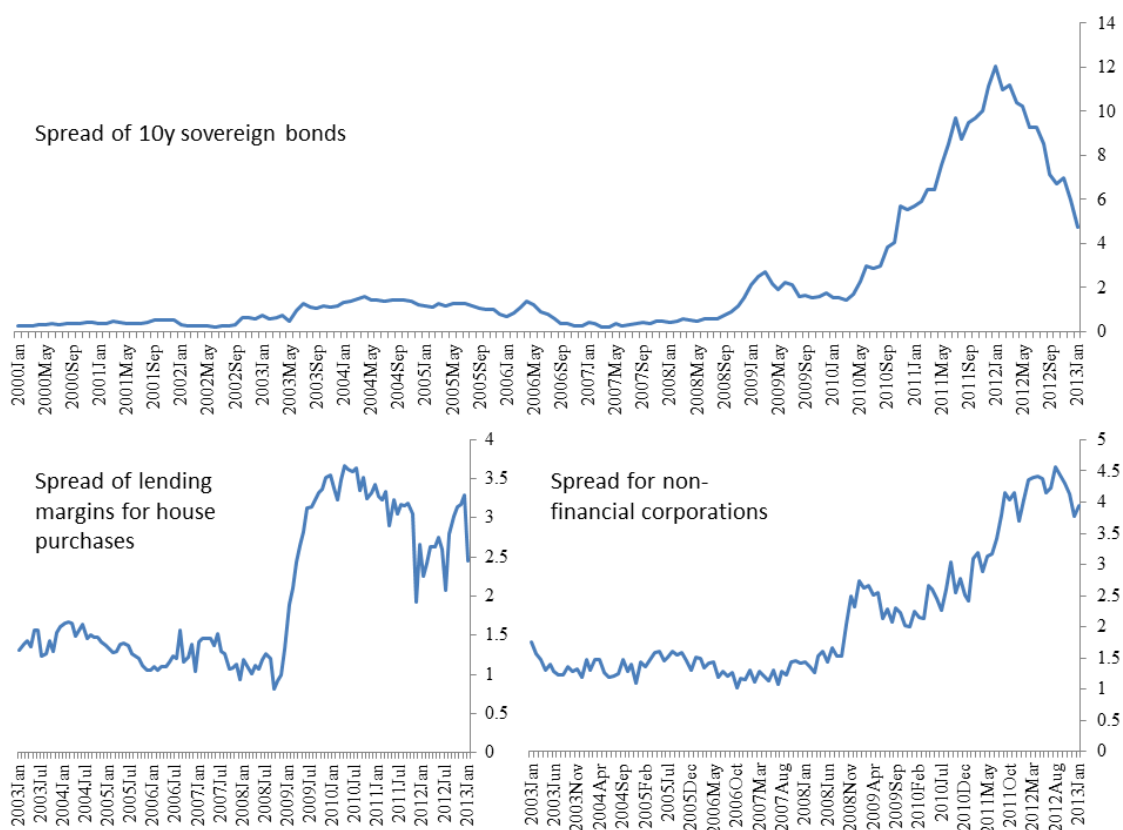


Figure 2: Spreads in percentage points for private and public debtors in the euro area calculated as the difference of the country with the highest and lowest respective interest rate across time. Data source: ECB, own calculations.

⁴²We tried to compare banks in Belgium, Finland, Ireland, Portugal and Spain alone to banks in Austria and Italy because these are the only countries, where current account positions remained perfectly unchanged (in the other countries the balances increased). In this case, the number of observations drops extensively but the results remain similar. For the sake of parsimony we do not report these estimates.

⁴³The regressors *affected* and *post* per se are subsumed in the time and country fixed effects.

Table 6 presents the results for this difference-in-differences analysis. Banks in countries with high capital imports increase their loan volumes overproportionally after the event relative to non-affected banks. Beyond this, the results show that the coefficient referring to the z-score is negative and highly significant on the 1% level. This means economically that an affected bank after 2003 (relative to the period before 2003) exhibits 8.51 pp higher loan growth rates and moreover, the z-score grows by 7 pp less for an affected relative to a non-affected bank.⁴⁴ The coefficients are not only significant, but also economically meaningful. A bank liquidity increase is additionally related to higher impaired loans to equity ratios but lower impaired loans relative to total loans. Therefore, banks' loan portfolios are not consistently negatively impacted by external liquidity inflows between 2002 and 2005.⁴⁵

Table 6: Difference-in-differences

	(1)	(2)	(3)	(4)	(5)	(6)
	balancestructure	bankloans	z_score	impaired loans	loan loss provisions	loan quality
affected*post	3.467 (1.04)	8.509** (2.50)	-0.070*** (-3.08)	2.905* (1.84)	-3.268 (-0.57)	-0.298* (-1.66)
capital	1.428 (1.32)	-1.493 (-1.33)	0.076*** (3.30)	4.620 (0.60)	-0.415 (-0.51)	0.166*** (13.17)
profitability	0.196 (0.25)	1.178 (1.07)	0.022*** (4.63)	-0.391 (-0.38)	0.042 (0.06)	-0.011 (-1.22)
size	0.013 (0.21)	0.004 (0.05)	-0.001** (-2.02)	-0.099*** (-3.44)	0.008 (0.43)	-0.005** (-2.48)
liquidity	14.526* (1.68)	16.635* (1.68)	0.002 (0.16)	0.665 (0.42)	-0.248 (-0.11)	0.241*** (2.97)
balancestructure_level	-0.071 (-1.26)					
growth	0.575 (0.17)	1.083 (0.33)	0.002 (0.17)	-4.325** (-2.11)	-4.369* (-1.88)	-0.039 (-0.23)
bondyield	0.135 (0.47)	-0.093 (-0.32)	-0.006 (-0.94)	1.278 (1.36)	0.106 (0.35)	0.088*** (2.96)
percapitagdp	0.388 (0.76)	1.955*** (4.87)	0.002 (0.17)	-4.925*** (-4.57)	0.335 (0.61)	0.028 (0.51)
bankloans_level		-3.356*** (-2.75)				
constant	-12.982 (-1.14)	-46.321*** (-3.95)	2.881*** (5.90)	214.104*** (9.47)	16.874 (0.92)	-3.577** (-2.57)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs	10763	10763	10729	2403	9231	2089
R-squared	0.014	0.026	0.110	0.005	0.042	0.153
Theta	0.297	0.509	0.928	0.951	0.681	0.757

This table shows the results for our difference-in-differences analysis. The exogenous event is the stop of sanctions against Germany and France in 2003 that repeatedly broke the European Stability and Growth Pact. The dependent variables are (1) the growth rate of the loan-to-asset ratio, (2) loan growth, (3) the z-score, (4) impaired loans to equity, (5) loan loss provisions over net interest revenues and (6) impaired loans over total loans. "Post" equals 1 for the years 2004 and 2005, 0 for 2002 and 2003. "Affected" equals 1 for banks in Belgium, Finland, Ireland, Spain and Portugal (in these countries the current account position over GDP dropped by more than 1 pp around the event), 0 else. The regressions also include a large set of macro and bank level controls and we include time and country dummies. The t statistics are reported in parantheses and we cluster standard errors at the country level. Theta is the median proportion of individual means subtracted from the data.

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

⁴⁴This interpretation follows from the log-transformation of the z-score.

⁴⁵We certainly have a lower precision in these estimates because the number of observations for the variables that measure risks in the credit portfolios is small. This may be the reason for these inconsistent results.

All in all, we nevertheless find convincing evidence that current account deficits between 2002 and 2005 lead to higher loan growth rates and to higher bank risk-taking.

To confirm the robustness of these results, we additionally perform a placebo difference-in-differences test. In this analysis, we do not change the definitions of the treatment and control group. However, we implement these regressions around the year 2002 because at that time, current account balances hardly changed in the cross-section. Therefore, *post* is equal to one for the years 2003 as well as 2004 and zero for 2001 and 2002 in these regressions. The results of this placebo test (Appendix, Table A.4) do not provide a consistent significant effect on bank lending and risk-taking and as a consequence, this test confirms the common trend assumption and the unbiasedness of our difference-in-differences analysis. In the absence of substantial changes in current account balances, we do not identify heterogeneous effects for the treatment group relative to the control group.

Summing up, our quasi-natural experiment studies countries under virtually uniform interest rates and hence, it seems as if the risk-increasing effect of capital flows is principally rooted in a quantity channel compared to a price channel. Therefore, the effects of capital inflows on banks are distinct from the typical interest rate channel of monetary policy. Moreover, this test also underlines that our results of Section 4 are not biased by any remaining endogeneity concerns due to eventual tarrying omitted variables.

6 The Role of Market Discipline

The present paper finds a close relationship between current account deficits and bank risks. This finding suggests that international lenders to banks in countries with high capital inflows were not adequately monitoring banks. It would be consistent with the anecdotal evidence that the no bail-out clause of the European Monetary Union was not believed by the markets and hence, the downside risks of investments were overseen.⁴⁶

As a consequence, international investors may have confined risk monitoring. Only the onset of the financial crisis in 2007/2008 generated substantial shifts in risk perceptions because investors have been realizing that investments in the euro area's periphery are not entirely risk-free. Our presumption is that starting from that point of time international capital inflows became risk-sensitive and stronger related to risk monitoring such that we expect a structural break in our central parameter, β .

⁴⁶See Sinn et al. (2011). If investors expect sovereign debtors to be bailed out this should also have positive spillover effects for other borrowers in the same country (e.g. banks).

To allow the effects of current account balances on banks to differ from the pre-2008 to the post-2008 era, we introduce a variable *crisis* that is equal to one if a particular observation takes place after 2007 and zero otherwise. Precisely, we focus on the set of risk variables and estimate the model - apart from interactions with bank capital - as displayed in equation (2). Additionally, we interact the current account balance with the *crisis* dummy variable.

Table 7: Test of market discipline (1)

	(1)	(2)	(3)	(4)
	z_score	impaired loans	loan loss provisions	loan quality
currentaccount	0.011** (2.17)	-1.553 (-0.99)	-0.751*** (-4.92)	-0.042*** (-2.96)
crisis*currentaccount	0.012*** (4.78)	-1.238 (-0.72)	-1.446*** (-3.32)	-0.029* (-1.75)
capital	0.217*** (5.47)	-21.957*** (-3.87)	-2.411** (-2.47)	0.032 (1.55)
profitability	0.034*** (2.70)	-9.211*** (-5.89)	-1.295* (-1.82)	-0.057*** (-4.37)
size	-0.002*** (-4.14)	-0.338*** (-3.76)	-0.019 (-0.74)	-0.006*** (-6.02)
liquidity	0.023* (1.91)	8.213*** (3.21)	2.146 (1.21)	0.183*** (3.40)
growth	0.011 (1.10)	-3.048 (-0.85)	-0.998 (-1.31)	-0.046 (-1.60)
bondyield	-0.004*** (-2.70)	0.552 (1.49)	0.950*** (2.82)	0.014*** (4.34)
percapitagdp	0.012* (1.86)	-10.542* (-1.80)	-1.748* (-1.66)	-0.107*** (-2.79)
constant	2.411*** (11.84)	442.781** (2.44)	97.388*** (2.90)	0.686 (0.58)
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Obs	31976	8754	25770	6444
R-squared	0.160	0.063	0.063	0.153
Theta	0.918	0.400	0.669	0.768

In these regressions, we allow the effect of global capital flows on bank risks to differ from the pre-crisis to the post-crisis period. This analysis allows us to answer whether international investors changed their monitoring behavior around the year 2007. The dependent variables are (1) the z-score, (2) impaired loans over equity, (3) loan loss provisions to net interest revenues and (4) impaired loans to total loans. The addition is that we interact the current account balance with a "crisis" dummy that equals 1 for the years 2008-2012, 0 else. We incorporate a pervasive set of macroeconomic and bank level controls and include time and country dummies. The t statistics are shown in parentheses and we cluster standard errors at the country level. Theta is the median proportion of individual means subtracted from the data.

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

Table 7 displays the results for this regression. The coefficients of the first row are comparable to those of Section 4. Of particular interest for our purposes is the second row. We find all the effects to be amplified after 2007. The current account position of an economy has a stronger negative effect on the z-score and a stronger positive effect on the risks in the loan

portfolio of banks since the financial crisis. For instance, a 1 pp point decline of the current account balance over GDP reduces a bank's z-score by 1.1% before and by 2.3% after 2007. Therefore, these results rather suggest that international investors did not increase risk monitoring after 2007. However, the shift in risk perceptions following the onset of the financial crisis led to a drain of private capital which was replaced by risk-insensitive public capital (mostly TARGET 2 balances) from 2008 on.⁴⁷

As a consequence, the results of the previous test could be driven by a larger proportion of public capital financing current account deficits. To test whether a larger proportion of public capital financing current account deficits is responsible for the risk-increasing effect of capital flows after 2007 and to distinguish the monitoring incentives of international public and private investors more accurately, the following regressions do not only interact the current account with a *crisis* dummy, but we also include a triple interaction term which makes use of a dummy that measures how dependent a country is on public capital. For this purpose, we calculate the absolute change in TARGET 2 balances relative to GDP. This variable serves as a proxy for the inflows of public capital into an economy.⁴⁸ Finally, we define a country as being dependent on public capital flows (*target* = 1) if its share of public capital flows in relation to its overall capital flows is larger than the sample median of this ratio.

Table 8 suggests that a current account deficit (i.e. a larger private capital inflow) still leads to higher bank risk-taking before the financial crisis (first row). However, the triple interaction term allows us to isolate the effects from the pre-2008 to the post-2008 era for banks subject to private and public capital flows, respectively. The second row of Table 8 leads to the conclusion that the effects in countries with high private capital flows are no longer amplified, but instead reduced after onset of the financial crisis.⁴⁹ In particular, the effect of private capital flows on bank risks is often hardly existent after 2007.⁵⁰ In contrast, higher capital inflows lead banks in countries that rely on public capital to increase risks after 2007. The triple interaction term in the third row is significant for three of the four risk variables and always has the expected sign. Consequently, this test advocates that the risk-increasing effect of capital inflows after 2007 can be explained by a larger fraction of risk-insensitive public capital financing current account deficits. In contrast, there is evidence that private agents imposed more market discipline when they realized that investments are not entirely risk-free.

⁴⁷See Sinn (2014), Chapter 8.

⁴⁸The other sources of public capital are neglectable in comparison to TARGET 2 balances.

⁴⁹However, - due to the small number of observations after 2007 - the interaction term of the second row is insignificant.

⁵⁰This is the sum of the coefficients in the first two rows.

Table 8: Test of market discipline (2)

	(1)	(2)	(3)	(4)
	z_score	impaired loans	loan loss provisions	loan quality
currentaccount	0.010 (1.57)	-2.628 (-1.46)	-1.088*** (-4.14)	-0.039** (-2.33)
crisis*currentaccount	-0.009 (-1.02)	2.925 (0.80)	0.094 (0.09)	-0.013 (-0.58)
crisis*currentaccount*target	0.031*** (2.98)	-6.448* (-1.66)	-2.037* (-1.76)	-0.015 (-0.41)
capital	0.218*** (5.15)	-22.129*** (-3.89)	-2.400** (-2.27)	0.031 (1.57)
profitability	0.034*** (2.68)	-8.990*** (-5.50)	-1.214 (-1.59)	-0.055*** (-3.87)
size	-0.002*** (-4.33)	-0.331*** (-3.54)	-0.020 (-0.74)	-0.006*** (-5.45)
liquidity	0.023* (1.82)	8.411*** (3.42)	2.647 (1.39)	0.184*** (3.37)
growth	0.013 (1.34)	-3.323 (-1.10)	-0.749 (-0.70)	-0.068** (-2.22)
bondyield	-0.003** (-2.28)	0.549** (1.99)	1.037*** (3.02)	0.014*** (4.84)
percapitagdp	0.013** (2.08)	-9.249* (-1.94)	-2.004* (-1.89)	-0.094** (-2.43)
constant	2.421*** (12.49)	381.993*** (2.62)	101.456*** (3.07)	0.305 (0.26)
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Obs	30494	8749	24421	6442
R-squared	0.167	0.067	0.065	0.155
Theta	0.917	0.401	0.633	0.768

In these regressions, we test whether the risk-increasing effect of international capital flows after the year 2007 can be explained by a greater fraction of public capital that finances external deficits. For this analysis, we add a triple interaction consisting of the current account position, a “crisis” dummy that is equal to 1 for the years 2008- 2012, 0 else and a “target” dummy that is equal to 1 if a country is strongly dependent on public capital. Our dependent variables are (1) the z-score, (2) impaired loans over equity, (3) loan loss provisions to net interest revenues and (4) impaired loans to total loans. We incorporate a huge vector of macroeconomic and bank level controls and include time and country fixed effects. T statistics are reported in parentheses and we cluster standard errors at the country level. Theta is the median proportion of individual means subtracted from the data. All the single components of the triple interaction term are also included.

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

In conclusion, the previous two tests lead to the conclusion that international investors did not impose a high degree of market discipline before the financial crisis because they did not believe the no-bailout clause and hence, neglected the downside risks of their investments. Banks hardly faced any limitations on their risk-taking incentives. After onset of the financial crisis, private agents intensified their monitoring activities. However, this did not lead to an overall reduction of risks in the banking sector because public capital flows that are mostly unable to enforce market discipline replaced private agents from then on. In this sense, our findings provide further empirical evidence for research that stresses the importance of private agents for market discipline (e.g. Levine, 2004 and Barth et al., 2004).

7 Conclusion

In this paper, we handle intricate identification issues to study the effects of an important macroeconomic variable, the current account balance, on bank lending and risk-taking between 2001 and 2012 for banks in the euro area. The focus on euro area banks substantially alleviates the identification of the role of global capital flows because European current account fluctuations are strongly influenced by political decisions and as a consequence, they are exogenous with respect to bank lending behavior. Moreover, we study countries under uniform monetary policy conditions such that we can isolate fluctuations in current account balances from changes in monetary policy. In general, the analysis of an international sample of banks is beneficial because it allows us to draw conclusions based on time-invariant variables or variables that vary mostly in the cross-section, respectively (e.g. the current account itself). Also, we are able to control for observed and unobserved heterogeneity across time and countries by including country and time dummies in our models. An investigation which is based on a credit register in a single country could not achieve this.

We find that a current account deficit leads banks to increase their loan volumes, their loan-to-asset ratios and their risk-taking. The increase in the loan-to-asset ratios suggests that when capital pours into an economy local banks get partially crowded out of the market for safer instruments, such as bonds, and thus replace new investments in these safer assets with imminently riskier loans. Furthermore, bank risks increase because the average loan quality deteriorates.

Additionally, the presented effects are overproportionally distinct for poorly capitalized banks. This result closely corresponds to similar findings related to how capitalization modifies the effect of monetary policy on bank risk-taking (e.g. Jiménez et al., 2014). It presents a further justification for policy makers to postulate higher bank capital buffers as for instance proposed by Admati et al. (2012). Such a regulatory approach may decrease agency problems, increase market discipline, induce banks to increase monitoring as well as screening activities and thus, make them fund safer projects.

In order to provide a better understanding of the channels through which current account deficits affect bank risk behavior we also explore the risk effects of different types of capital flows. More specifically, we distinguish between foreign direct investments, portfolio equity flows, portfolio debt flows and other flows (which comprise interbank lending). Our results show that primarily international debt flows and flows of interbank liquidity are significantly affecting bank risk-taking. Therefore, we can confirm the implications of research that puts special emphasis on

external debt flows into the banking systems as the central source of future financial instability (e.g. Taylor, 2012; Lane and McQuade, 2014). In an additional set of regressions, we provide evidence that substantial inflows of capital are also regularly linked to a decrease in market discipline.

All in all, our analysis shows that large current account imbalances seem to have predictive power for financial instability and financial crises through a bank risk-taking channel. The abundant influx of international capital induces banks to lower credit standards and enables entrepreneurs to finance high-risk projects. This process leads to economic growth in the short-run, but supports excessive lending in the long-run. We do not intend to criticize current account deficits in general or postulate any restrictions on current account balances. However, external deficits may be especially problematic if they are associated with a loss of market discipline.

Our tests fit to the anecdotal evidence that market participants in the euro area (at least before the onset of the financial crisis) neglected the downside risks of investments because they did not believe the no-bailout clause. In such a case, international investors fund risky projects with marginally higher returns and hope to be bailed out in case of failure. Obviously, such a behavior reduces screening as well as monitoring incentives, curtails the capital allocation function of financial markets, reduces aggregate welfare and the seeds of financial crises are sown. Hence, while global capital flows generally seem to be beneficial from a welfare perspective,⁵¹ policy makers should always be aware of the danger that may arise if they try to influence capital flows intensely (e.g. through implicit bailout guarantees) and especially if this leads to a decrease in market discipline.

⁵¹Fischer (1997) points out that international capital flows lead to a more efficient global allocation of savings because capital is channeled to its most-productive uses.

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Table A.1: Description of the variables

Variable	Description	Unit	Source
balancestructure	The growth rate of the loan- to- asset ratio	%	Bankscope, own calculations
bankloans	The growth rate of the loan volume	%	Bankscope, own calculations
z_score	(return on assets (ROA) + equity ratio) / (standard deviation of the ROA) ^d , in logs	ln(x)	Bankscope, own calculations
z_score_robust	(ROA + equity ratio) / (standard deviation of the ROA) ^b , logs	ln(x)	Bankscope, own calculations
z_score_robust2	(mean of the ROA + equity ratio) / (standard deviation of the ROA) ^c , logs	ln(x)	Bankscope, own calculations
impaired_loans	Impaired loans divided by equity	%	Bankscope
loan_loss_provisions	Loan loss provision divided by net interest revenue	%	Bankscope
loan_quality	Impaired loans divided by total loans, transformed	$\ln\left(\frac{x\%}{1-x\%}\right)$	Bankscope, own calculations
currentaccount	The current account balance over GDP	%	WEO 10/2013 ^d
fdi	Net change in foreign direct investments over GDP	%	OECD, own calculations
equityflows	Net change in portfolio equity flows over GDP	%	IFS, ^e own calculations
debtflows	Net change in portfolio debt flows over GDP	%	IFS, own calculations
otherflows	(currentaccount - fdi - equityflows - debtflows) / GDP ^f	%	IFS, own calculations
dependence_foreigncapital	Dummy=1 if bank assets in the 90th percentile or lower for country-year pair, 0 if above 95th percentile ^g	0/1	own calculations
dependence_foreigncapital	Dummy=1 if interbank liabilities to total loans above 20th percentile, 0 else ^h	0/1	own calculations
publiccapital	The absolute change in a country's TARGET 2 balance over GDP	%	Ifo Institute, own calculations
targetdummy	Dummy=1 if publiccapital / currentaccount ⁱ > sample median of this ratio	0/1	own calculations
crisis	Dummy=1 for the years 2008-2012, 0 else	0/1	own calculations
capital	Dummy=1 if equity ratio > first quintile of equity ratios for country j and year t	0/1	Bankscope, own calculations
profitability	Dummy=1 if ROA change > first quintile of ROA changes for country j and year t	0/1	Bankscope, own calculations
size	The growth rate of bank assets	%	Bankscope, own calculations
liquidity	The growth rate of bank liquidity ^j	- k	Bankscope, own calculations
balancestructure_level	The loan- to- asset ratio	%	Bankscope, own calculations
bankloans_level	The loan volume of a particular bank, logs	ln(million €)	Bankscope, own calculations
growth	The growth rate of real GDP	%	WEO 10/2013
percapitagdp	PPP adjusted per capita GDP in current international dollars	thousand	WEO 10/2013, own calculations
bondyield	The growth rate of the 10y sovereign bond yield	%	ECB, own calculations
eonia	The growth rate of the EONIA	%	Bundesbank, own calculations

^athe latter calculated over the entire sample.

^bthe latter calculated over a 4 year rolling window.

^cthe first and latter calculated over the entire sample.

^dWorld Economic Outlook Database, IMF.

^eInternational Financial Statistics, IMF.

^fFor all these capital flow variables, negative values indicate net inflows.

^gTable 4, columns (1)-(6).

^hTable 4, columns (7)-(12).

ⁱThis ratio was set equal to 0 for negative values.

^jliquidity equals the difference of total assets and loans divided by total liabilities.

^kAs coefficients would have been too small, we refrained from reporting the growth rates in %.

Table A.2: Robustness checks (1)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	z_score_robust 2 lags	z_score_robust 2 lags	z_score 1 lag	z_score_robust 1 lag	z_score_robust2 1 lag	impaired loans 1 lag	loan loss provisions 1 lag	loan quality 1 lag
currentaccount	0.053*** (3.39)	0.021*** (4.26)	0.023*** (3.33)	0.079*** (4.91)	0.024*** (3.77)	-0.940 (-0.43)	-0.724** (-2.30)	0.010 (0.38)
capital*currentaccount	-0.015 (-1.13)	-0.005 (-1.40)	-0.009* (-1.73)	-0.046*** (-3.91)	-0.009** (-2.13)	0.447 (0.23)	-0.103 (-0.47)	-0.000 (-0.01)
capital	0.091 (0.29)	0.136** (2.04)	0.070 (1.17)	-0.054 (-0.17)	0.097* (1.76)	-47.006 (-0.80)	-1.030 (-0.23)	0.199 (0.53)
profitability	0.447*** (9.13)	0.008** (2.52)	0.034*** (2.70)	0.489*** (19.65)	0.017* (1.93)	-10.792*** (-5.46)	-4.278*** (-4.30)	-0.113*** (-5.57)
size	-0.002* (-1.69)	-0.001*** (-6.39)	-0.002*** (-4.05)	-0.001 (-0.78)	-0.002*** (-4.95)	-0.300** (-2.26)	-0.045 (-1.42)	-0.007*** (-5.94)
liquidity	-0.012 (-0.33)	0.011 (0.79)	0.022* (1.78)	-0.015 (-1.02)	0.028** (2.29)	12.824*** (3.30)	1.462 (1.49)	0.214*** (2.88)
growth	0.073** (2.18)	-0.009 (-0.63)	0.035 (0.39)	0.036 (0.86)	-0.000 (-0.02)	-1.947 (-0.48)	-3.591*** (-3.29)	-0.051 (-1.20)
bondyield	-0.033*** (-3.57)	-0.004 (-1.23)	-0.006*** (-3.55)	-0.010*** (-3.60)	-0.004*** (-2.84)	0.714** (2.21)	0.896*** (10.08)	0.008** (2.27)
percapitagdp	0.070*** (2.65)	0.026** (2.44)	0.017** (2.04)	0.068* (1.69)	0.014* (1.94)	-10.839*** (-2.35)	-1.912** (-2.22)	-0.096*** (-3.42)
capital*percapitagdp	0.002 (0.25)	-0.000 (-0.05)	0.005** (2.52)	0.012 (1.16)	0.004** (2.33)	0.576 (0.33)	-0.066 (-0.43)	-0.006 (-0.51)
capital*eonias	-0.003*** (-4.05)	0.001*** (3.08)	-0.000 (-0.36)	0.002*** (4.38)	-0.000 (-1.00)	0.081 (0.91)	0.031** (2.22)	0.000 (0.42)
capital*growth	0.019** (2.27)	-0.001 (-0.19)	0.003 (0.75)	-0.011 (-1.18)	0.004 (0.87)	0.632 (0.38)	0.287 (1.28)	0.020* (1.85)
capital*bondyield	0.001 (0.81)	-0.001 (-1.21)	0.001 (0.83)	-0.004* (-1.85)	0.000 (0.54)	-0.469** (-2.29)	-0.293*** (-5.07)	-0.001 (-0.58)
constant	-2.224 (-0.21)	2.047*** (4.90)	2.247*** (6.95)	0.210 (0.14)	2.439*** (8.68)	517.117*** (3.22)	112.549*** (3.36)	0.802 (0.77)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	22067	27091	31976	22075	32066	10194	30408	9903
R-squared	0.229	0.163	0.161	0.235	0.159	0.073	0.063	0.174
Theta	0.582	0.926	0.918	0.569	0.930	0.418	0.656	0.656

The table displays the outcomes of several robustness checks. In the first two columns, we report the results when we adjust the z-score definitions. In columns (3)-(8), we repeat our baseline regressions, but we include all the regressors only with a one-year lag. The key regressor is the current account balance over GDP and its interaction with a bank capital dummy. The regressions include a large set of macroeconomic and bank level controls and incorporate time and country dummies. T statistics are reported in parentheses and we cluster standard errors at the country level. Theta is the median proportion of individual means subtracted from the data.

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

Table A.3: Robustness checks (2)

	(1)	(2)	(3)	(4)	(5)	(6)
	balancestructure	bankloans	z_score	impaired loans	loan loss provisions	loan quality
currentaccount	-0.535*** (-2.71)	-0.504 (-1.59)	0.020*** (3.60)	-3.446 (-1.07)	-1.779*** (-3.78)	-0.067*** (-4.31)
capital*currentaccount	0.267** (2.02)	0.366** (2.13)	-0.005* (-1.65)	0.597 (0.30)	0.484 (1.16)	0.010 (1.00)
profitability*currentaccount	-0.010 (-0.08)	-0.066 (-0.37)	0.001 (0.87)	1.325*** (3.63)	0.279 (1.35)	0.002 (0.37)
size*currentaccount	0.004 (0.59)	-0.005 (-1.14)	0.000 (0.38)	-0.024 (-0.74)	0.002 (0.21)	0.000 (0.72)
liquidity*currentaccount	1.127 (1.45)	0.982 (1.24)	0.002 (0.84)	-0.643 (-0.56)	-0.147 (-0.36)	0.023** (2.20)
capital	4.395 (1.13)	-4.549 (-1.17)	0.131* (1.71)	-65.657 (-0.93)	2.093 (0.58)	0.242 (0.79)
profitability	0.360 (0.77)	1.792*** (2.87)	0.016** (2.48)	-8.662*** (-7.72)	-2.005* (-1.78)	-0.052** (-2.55)
size	0.021 (0.53)	0.094*** (2.78)	-0.001*** (-3.06)	-0.355*** (-3.06)	-0.033 (-0.89)	-0.006*** (-4.35)
liquidity	5.177* (1.88)	4.253 (1.49)	0.001 (0.08)	6.974*** (4.10)	2.566 (1.48)	0.236*** (3.75)
balancestructure_level	-0.271*** (-4.31)					
growth	-0.261 (-0.71)	0.898*** (3.18)	-0.003 (-0.20)	-1.238 (-0.36)	-0.822 (-0.90)	-0.040 (-1.48)
bondyield	-0.099 (-1.15)	-0.075 (-1.28)	-0.007* (-1.89)	0.650 (1.59)	1.409*** (4.65)	0.019*** (4.78)
percapitagdp	0.420 (1.61)	0.417 (1.30)	0.031*** (2.64)	-12.558** (-2.22)	-2.885*** (-2.67)	-0.117*** (-2.85)
capital*percapitagdp	-0.177 (-1.44)	0.015 (0.14)	0.000 (0.09)	1.673 (0.77)	-0.206 (-1.28)	-0.007 (-0.64)
capital*eonias	0.002 (0.13)	0.002 (0.17)	0.001*** (2.76)	0.280** (2.12)	-0.062 (-1.26)	0.001 (0.83)
capital*growth	0.357 (1.48)	0.147 (0.73)	-0.000 (-0.09)	-2.080** (-2.29)	0.051 (0.25)	0.003 (0.40)
capital*bondyield	-0.118** (-1.97)	-0.114* (-1.92)	-0.001 (-0.68)	0.079 (0.14)	-0.030 (-0.24)	-0.003*** (-2.96)
bankloans_level		-4.723*** (-3.77)				
constant	1.258 (0.13)	15.833 (1.06)	1.927*** (5.11)	499.014*** (2.86)	137.995*** (3.98)	1.004 (0.78)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs	32117	32117	27005	8754	25770	6444
R-squared	0.010	0.019	0.164	0.064	0.061	0.151
Theta	0.468	0.520	0.913	0.401	0.667	0.768

This table shows the results for a robustness random effects model (including bank agency problems). The dependent variables are (1) growth of the loan-to-asset ratio, (2) loan growth, (3) the z-score, (4) the ratio of impaired loans to equity, (5) loan loss provisions to net interest revenues and (6) impaired loans over total loans. The central regressor is the current account position over GDP and its interaction with a bank capital dummy. The regressions include a saturated set of macroeconomic and bank controls and we incorporate time and country dummies. For robustness, we also interact the current account with other bank level controls. This ensures that the bank capital dummy does not capture any other bank level variables apart from capital endowments. The t statistics are reported in parentheses and we cluster standard errors at the country level. Theta is the median proportion of individual means subtracted from the data.

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

Table A.4: Difference-in-differences: Placebo Test

	(1)	(2)	(3)	(4)	(5)	(6)
	balancestructure	bankloans	z_score	impaired loans	loan loss provisions	loan quality
affected*post	-0.336 (-0.08)	2.323 (0.42)	-0.045** (-2.53)	-3.546 (-0.46)	-6.219 (-0.85)	-0.051 (-0.35)
capital	1.514 (1.30)	-1.779 (-1.30)	0.084*** (2.63)	-0.930 (-1.13)	-1.414 (-0.77)	0.142*** (5.53)
profitability	0.530 (0.91)	1.762* (1.93)	0.019*** (5.72)	0.848 (0.77)	0.277 (0.79)	0.034*** (2.62)
size	0.045 (0.89)	0.022 (0.34)	-0.001** (-2.36)	-0.066 (-1.07)	-0.017 (-0.68)	-0.003*** (-3.11)
liquidity	16.947** (2.02)	15.863* (1.85)	0.015*** (2.88)	-2.546 (-0.70)	-0.896 (-0.45)	0.211*** (3.44)
balancestructure_level	-0.067 (-1.52)					
growth	-1.952** (-2.46)	-1.143 (-1.24)	-0.019 (-1.45)	-5.140** (-2.03)	-1.861* (-1.78)	0.092 (0.55)
bondyield	1.211 (1.38)	1.099 (1.52)	0.003 (1.05)	-2.319** (-2.47)	-0.238 (-0.57)	-0.047 (-1.28)
percapitagdp	4.086** (2.22)	5.493*** (5.15)	0.013 (0.80)	-11.428* (-1.93)	0.031 (0.02)	-0.421*** (-3.64)
bankloans_level		-3.171** (-2.26)				
constant	-108.418** (-2.32)	-131.322*** (-6.92)	2.626*** (5.85)	362.362** (2.09)	21.874 (0.53)	8.337*** (2.88)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs	11206	11206	11148	2528	9564	2204
R-squared	0.023	0.032	0.092	0.007	0.035	0.170
Theta	0.223	0.435	0.927	0.943	0.743	0.770

This table shows the results for a placebo difference-in-differences test. The dependent variables are (1) the growth rate of the loan-to-asset ratio, (2) loan growth, (3) the z-score, (4) impaired loans to equity, (5) loan loss provisions over net interest revenues and (6) impaired loans over total loans. "Post" equals 1 for the years 2003 and 2004, 0 for 2001 and 2002. "Affected" equals 1 for banks in Belgium, Finland, Ireland, Spain and Portugal (this is exactly the treatment group of our baseline difference-in-differences regression), 0 else. The regressions also include a vector of macro and bank level controls and we include time and country dummies. The t statistics are reported in parantheses and we cluster the standard errors at the country level. Theta is the median proportion of individual means subtracted from the data.

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