Current Account and Credit Growth: The Role of Household Credit and Financial Depth

Ekinci, Mehmet Fatih and Omay, Tolga

Atilim University, Atilim University

12 May 2019

Current Account and Credit Growth: The Role of Household Credit and Financial Depth

Mehmet Fatih Ekinci*, Tolga Omay**

Abstract

Understanding the impact of financial variables on the current account balance is one of the priorities of academic literature and policy makers. Evidence from a broad panel of countries shows that an increase in the credit growth causes a significant deterioration in the current account balance. We find that this result is driven by household credit. Furthermore, we show that total and household credit growth rates have a stronger negative effect on the current account balance for lower levels of financial depth. In other words, the demand boom associated with the credit expansion gets weaker for higher levels of financial depth. Thus, our findings are in line with the "too much finance" hypothesis which states that positive impact of financial development on economic growth vanishes as the level of financial depth increases. Our results suggest that targeted policy measures which curb the excessive household credit growth might be more effective to reduce the external imbalances particularly at the early stages of financial deepening.

Keywords: Credit Growth, Current Account Balance, Global Imbalances and Panel Data.

JEL Codes: C33 Panel Data Models, F32 Current Account Adjustment.

*Atılım University, Faculty of Management, Department of Economics, Kızılcaşar Mahallesi İncek Gölbaşı, 06836, Ankara, Turkey, E-mail: fatih.ekinci@atilim.edu.tr.

**Atılım University, Faculty of Management, Department of Economics, Kızılcaşar Mahallesi İncek Gölbaşı, 06836, Ankara, Turkey, E-mail: tolga.omay@atilim.edu.tr.

May 11, 2019

1. Introduction

Persistent widening in the global imbalances prior to the 2008 crisis and rebalancing experience afterwards have been at the center of policy debates especially over the past decade. Therefore, efforts aiming to understand the dynamics of the current account (CA) balance have been intensified[1]. The impact of financial variables on the CA balance started to draw more attention from researchers with the transforming views on financial stability. Since financial and economic cycles do not necessarily coincide[2], financial imbalances could grow undetected even in stable macroeconomic environments. When the financial excess is not dampened by policy authorities, a demand boom via excessive credit growth may cause a weaker CA balance. In order to design the policies aimed at macroeconomic and financial stability, it is important to understand the relation between credit growth and the CA balance.

Private credit to gross domestic product (GDP) ratio is a widely used financial development measure following King and Levine (1993). Using measures of overall bank lending to the private sector provides a useful insight about the impact of credit growth on the CA balance. The risks can be mitigated by interventions of the authorities to guard against excessive credit growth. Moreover, economic theory has different predictions on the effects of household credit and business credit. Considering these different effects on the economy, policy makers can implement targeted measures[3] for different types of credit.

This study focuses on the impact of household credit and business credit on the CA balance as well as examining the influence of total credit growth on the CA balance. Furthermore, recent studies[4] suggest that strength of the demand boom associated with the credit expansion may become weaker as the level of financial deepening increases. These results motivate us to investigate the role of financial depth in the credit growth and CA balance relationship.

Since financial deepening has been viewed as a vital part of economic development process, policy makers have supported enhanced access to credit for households as well as firms. On the other hand, a growing literature argues that rapid credit growth impedes financial stability and

[1] Cheung et al. (2013), Chin et. al. (2014), Lane and Milesi-Ferretti (2012) and Philips et. al. (2013) can be listed as recent studies that examine this issue.

[2] Borio (2012) argues that periods of disconnect between financial and real variables are frequently observed. Hiebert et. al. (2018) shows that financial cycles have a higher amplitude and a longer duration than business cycles.

[3] See Bruno et. al. (2017) and Cerutti et. al. (2017) for a comprehensive discussion of macroprudential policies.

[4] Arcand et. al. (2012) find that positive impact of financial development on growth vanishes after a threshold. This view is supported by an increasing number of studies.

raises the probability of a crisis[5]. Credit growth is perceived as a threat to macroeconomic and financial stability particularly when it reaches excessive levels.

The influence of the level of financial deepening on the CA balance has been discussed in a relatively more detailed way in the literature[6]. However, Biggs et al. (2009, 2010) suggest that the impact of the flow of credit is substantially larger than the effect of the stock of credit on economic growth[7]. This finding motivates us to focus on the influence of the credit growth on the CA balance.

Another important aspect regarding this issue is to understand the relation between credit growth and CA balance for different types of the credit. When the supply capacity of an economy is at a constant level, a demand boom via household credits is expected to have a negative impact on the CA balance. On the other hand, the use of business loans in investments may cause a CA deficit due to reliance on external funds and utilizing imported inputs in investment. An expansion in business credit is also expected to increase the productive capacity of the economy. If this development promotes the economic activity in the exporting sectors, then it may offset the adverse impact on the CA balance. The impact of different types of credit on the CA balance remains as an open question for researchers and policy makers.

In order to make an assessment of the impact of financial excess on the CA balance, we construct a dataset for 43 countries between 1986 and 2015. Our dataset allows us to decompose the bank lending into two categories as household and business credit. We measure financial excess by the ratio of new lendings to the private sector to the GDP. We examine the role of business and household credit growth as well as the total credit growth on the CA balance.

Drawing on a standard empirical CA model, we control for a number of other variables that are identified as the determinants of the CA balance in the literature, such as net foreign assets, relative income, average growth rate, oil trade balance, fiscal balance and demographics. Our findings on the determinants of CA balance are consistent with earlier work on this issue. Regarding the financial variables, we find a significant deterioration in the CA balance in case of an increase in

[5]See Kaminsky and Reinhart (1999), Mendoza and Terrones (2008), Aikman et.al. (2015), Jorda et.al. (2011).

[6]See Cheung et al. (2013), Chinn and Ito (2007), Chinn et. al. (2014), Philip et. al. (2013) and references therein. While the effect of financial development on investment is expected to be positive, that on saving is ambiguous. Results from this literature suggest that an increase in the level of financial depth is associated with a CA deficit.

[7]This view is consistent with recent empirical studies such as Atoyan et al. (2013), Philips et. al. (2013), Ekinci et. al. (2015). Furthermore, Bridges et. al. (2017) find that credit growth is a more statistically and economically significant predictor of a recession's severity than the level of indebtedness.

the total credit growth. When we examine the roles of the components of credit, we find that an increase in household credit causes an economically and statistically significant deterioration in the CA balance, whereas an increase in business loans has no significant effect on the CA balance.

Motivated by the studies which report the non-linearities in the finance and growth nexus, we investigate the role of financial depth on the impact of financial excess on the CA balance. Using the sample average of credit to GDP ratios as a measure of financial depth, we find that the CA balance is more sensitive to total credit growth for those countries with lower levels of financial depth[8]. For the different types of credit, we find no evidence of a significant impact of business credit growth on the CA balance. We observe that the impact of household credit growth for the countries with lower levels of financial depth is substantially larger than those with higher levels of financial depth.

In order to materialize our findings, we report the amount of CA deficits caused by excessive credit growth prior to the global economic crisis. We utilize the estimated coefficients conditional on the level of financial depth for this exercise. We observe that excessive credit growth caused a substantial amount of CA deficits during this period. This exercise also shows that excessive household credit expansion has played a major role in the global imbalances during the pre-crisis period.

We conduct a set of robustness checks on our results. Using different subsamples in the time series dimension, we find that the relation between total credit growth and CA balance is statistically significant for different sub-periods. Similarly, business credit growth does not have a significant impact on the CA balance. Our estimation results show that the negative impact of household credit growth on the CA balance has been stable over time. The influence of financial depth on the impact of household and total credit growth remains similar for the sub-periods considered in our analysis. As a robustness check of the financial depth measure, we consider stock market capitalization as an alternative. We find that the impact of total and household credit growth is also stronger for the lower levels of financial depth when stock market size is used as financial depth measure.

As a policy implication, our findings suggest that policy measures aimed at preventing financial excess might be effective in reducing the external imbalances particularly at the early stages of

[8]This result is consistent with Ekinci et. al. (2015).

financial deepening. Furthermore, our results show that controlling total credit growth mostly by limiting the household loan growth may be more effective to improve the CA balance.

The next section discusses the related literature. The third section describes the data and methodology. The fourth section presents empirical evidence on the impact of the total credit growth as well as different types of credit growth on the CA balance. The fifth section discusses the role of the financial depth on our results. The sixth section provides robustness checks. The seventh section discusses the cross-sectional dependency issue before the last section concluding the paper.

2. Related Literature

Benefits of deeper financial systems to support economic growth has long been recognized as the financial system channels resources to the most productive sectors of the real economy. Levine (2005) and Demirguc-Kunt and Levine (2008) suggest that finance supports economic activity by higher investment, supporting innovation and enabling consumption smoothing[9]. However, an increasing number of studies have been questioning the linearity of finance and growth relationship. Shen and Lee (2005) show that growth and bank development is best described by an inverse U-shape. Cecchetti and Kharroubi (2012) find that the impact of finance on growth is nonlinear[10]. Arcand et al. (2012) find that there is a threshold size for the financial sector beyond which finance does not have a positive impact on growth[11]. These findings suggest that private indebtedness becomes a drag on the economic growth as the level of credit stock increases. We can conclude that an increase in the credit expansion generates a weaker demand boom as the level of financial depth increases.

Regarding the impact of credit growth on the financial stability, Kaminsky and Reinhart (1999), Mendoza and Terrones (2008) argue that rapid loan growth periods are generally followed by

[9]Most of this literature utilizes credit to GDP ratio as a measure of financial development following Levine (1993). Other measures might be more useful to capture the efficient resource allocation in some cases. For example, transition countries exhibit a notable case. Hasan et. al. (2009) find that only capital market depth has a strong influence on growth while the impact of bank lending is not significant and sometimes negative for a panel of Chinese provinces between 1986 and 2002. They argue that Chinese bank loans for most of this period were predominantly government directed and granted to inefficient state owned or related enterprises.

[10]The reason for the non-linearity is the relationship between the size of financial sector and productivity. A rapidly growing financial sector has a negative impact on aggregate productivity growth.

[11]We refer to this view as "too much finance" hypothesis. Beck et. al. (2014), Law and Singh (2014) and Samargandi et. al. (2015) are examples of recent studies which investigate the "too much finance" hypothesis and their findings are in line with Arcand et. al. (2012). Bridges et. al. (2017) finds some evidence that the effect of a credit boom is greater on a recessions severity when the leverage is high.

banking crises, currency crises and sudden stops. Aikman et.al. (2015) and Alessi and Detken (2018) identify excessive credit growth as an early warning indicator of a financial crisis. Jorda et.al. (2011) shows that asset price bubbles tend to be more costly in terms of output if they are driven by unsustainable credit booms.

Motivated by these findings, Atoyan et al. (2013), Philips et. al. (2013), Ekinci et. al. (2015) are examples of some recent studies that include[12] growth rate of aggregate credit stock (to measure the degree of financial excess) as a determinant of the CA balance. These studies report a significant negative relationship between the credit growth and CA balance.

The role of household credit and business credit on the economic dynamics has been extensively investigated after the contribution of Beck et. al. (2012)[13]. However, few studies focus on the link between different types of credit and external balance. Buyukkarabacak and Krause (2009), Coricelli et. al. (2006) and Islam (2017) are examples of this line of research. These studies investigate the impact of household and business credit on the trade balance. When we look at the results, we observe that there is a consensus on the role of the household credit. However, there are different results about the net impact of business credit on the trade balance.

Buyukkarabacak and Krause (2009) finds that household credit reduces net exports, while business credit increases them. The sample consists of 18 emerging market economies between 1995 and 2004. Using a sample of European countries between 1996 and 2004, Coricelli et. al. (2006) confirms the result on the negative impact of household credit on the trade balance. On the other hand, in contrary to Buyukkarabacak and Krause (2009), they report a negative and significant relationship between business credit and trade balance. Islam (2017) finds that household credit is negatively associated with trade balance and business credit does not have a significant impact on the trade balance. Net effect of an expansion in the business credit on the trade balance depends whether the rise of exports due to an increase in credit for business investment is larger than the increase in imports from acquiring foreign capital and intermediate inputs for production.

In this study, we first document the impact of the total credit growth on the CA balance. Then, we investigate the effects of the growth rates of the household and business credit on the CA balance. Next, we examine the role of financial depth considering the non-linearities in the demand generating role of financial deepening.

[12] This view is consistent with Biggs et. al. (2009, 2010) and the findings of Bridges et. al. (2017).

[13] See Bezemer et. al. (2017) for a review of shifts in the bank credit allocation and recent literature on this area.

3. Data and Methodology

Our panel dataset includes 43 countries. Table 1 gives the list of the countries in the sample. We use annual data and the dataset spans the period from 1986 to 2015. Total credit growth is calculated as the ratio of the new lending to the private sector within a year to GDP. Household credit growth and business credit growth variables are calculated as the ratios of change in the respective loan stock within a year to the GDP.

Table 2 provides a description of the data used in this study. Some of these variables are the determinants of the CA balance identified in the literature. We briefly discuss how these variables might influence the CA balance below.

Countries with high productivity growth may attract more capital inflows with higher expected rates of returns in their asset markets. Thus, a higher growth rate should lead to a lower CA balance. To capture this, we include five-year average annual growth rate of GDP to the estimation process.

In addition to the average growth rate, relative income is used as a proxy for the marginal product of capital. It is expected to have a positive impact on the CA balance. We calculate relative income as the ratio of the country's per capita GDP to the per capita GDP of the United States where GDP is measured with purchasing power parity.

Average economic growth and relative income variables also serve as proxies for the stage of economic development. A country which has a high economic growth or which has a low level of income per capita would need more investment and have a lower CA balance.

From an intertemporal perspective, net foreign assets (NFA) to GDP ratio serves as an initial condition, given that CA balance is the sum of the trade balance and the return on a country's stock of NFA. The sign of this variable is expected to be positive due to the fact that the steady-state CA balance is proportional to the equilibrium NFA position. Moreover, we include a level dummy which takes the value of 1 when the level of indebtedness exceeds 60 percent of GDP. Catao and Milesi-Ferretti (2014) suggests that the crisis probability substantially increases if the debt level exceeds this level.

Oil trade balance is a proxy for the impact of oil price and volume changes on the CA balance. When oil prices increase, the share of oil balance for an oil-exporting country would be higher and so would the CA balance.

Fiscal balance is expected to raise national savings thereby increase the CA balance as long as the private sector does not fully offset the changes in public saving. In the case of full Ricardian equivalence, there would be no link between government budget balance and the CA balance. Lane and Milesi-Ferretti (2012) and Philips et. al. (2013) find that the Ricardian equivalence does not hold and fiscal balance is expected to have a positive impact on the CA balance.

We also use the reserve currency countries share in world reserves. This variable is labeled as exorbitant privilege.

In terms of the demography, a larger dependent population is expected to decrease national savings and cause a deterioration in the CA balance. To capture this effect, we consider two measures. Old-age dependency ratio is measured as the ratio of the population over 65 to the working-age population. Second variable is the annual growth rate of the population. These demographic variables are expected to have a negative impact on the CA balance.

In terms of econometric methodology, diagnostic tests[14] support the fixed effects model. In order to analyze the impact of growth rate of total credit stock on the CA balance, we estimate the following equation with country fixed effects,

$$\left(\frac{CA}{GDP}\right)_{i,t} = \beta_{0,i} + \beta_1 \left(\frac{\Delta Credit}{GDP}\right)_{i,t} + \beta_2 X_{i,t} + \epsilon_{i,t} \tag{1}$$

The dependent variable is the ratio of the CA balance to GDP. As explanatory variables, we use the change in the total credit stock extended to the private sector as a ratio to GDP, i.e. credit growth, and other control variables (denoted by $X_{i,t}$) explained above.

To extend our analysis, we include the growth rates of household credit and business credit in our empirical model. In this case, we estimate the following equation,

$$\left(\frac{CA}{GDP}\right)_{i,t} = \beta_{0,i} + \beta_1 \left(\frac{\Delta Household\ Credit}{GDP}\right)_{i,t} + \beta_2 \left(\frac{\Delta Business\ Credit}{GDP}\right)_{i,t} + \beta_3 X_{i,t} + \epsilon_{i,t} \tag{2}$$

In this specification, we use the changes in the household and business credit stock as a ratio to GDP instead of the change in the total credit stock. The results of this estimation provide a deeper understanding of the relation between CA balance and credit growth. We include time dummies

[14] We estimate two empirical models. First model features total credit growth. Second model includes the growth rates of household and business credit. Controlling for the other determinants of CA balance, we conduct Breusch-Pagan Lagrange multiplier tests. Test results suggest that pooled estimation is not appropriate for both models. Regarding the random effects and fixed effects models, we conduct Hausman tests. For both empirical models, results support the fixed effects specification.

in the estimation process which are jointly significant for all specifications.

4. Panel Estimation Results

To understand the relationship between the total credit growth and CA balance, the empirical model given in equation 1 is constructed. To extend our analysis by focusing on different types of credit, equation 2 is estimated. Results of these empirical models are reported in table 3.

4.1. Impact of Control Variables on the CA Balance

Regarding the control variables in our model, we observe that an increase in the average growth rate causes a decrease in the CA balance consistent with the theoretical predictions. Estimated coefficients are significant and negative. Model with total credit growth implies that a 1 percentage point increase in the average real GDP growth of an economy reduces the CA balance by -0.593 percent of GDP. Coefficients on the relative income are positive as expected, although not statistically significant for the model which includes total credit growth as a measure of financial excess.

Estimates for the initial NFA position have the expected positive signs. Coefficients are statistically significant. We observe that a 10 percentage point increase in the NFA level leads to an improvement in the CA balance around 0.15 percent of GDP. Countries with more positive initial NFA positions tend to have higher CA balances. High indebtedness dummy coefficients are negative as expected but not statistically significant.

The coefficients on the oil balance are positive and significant. Value of the coefficient reflects the fact that oil exporters have large oil surpluses, but spend a large part of them on imports of goods and services, leading to a smaller CA surplus. Coefficients on the fiscal balance imply that an increase in the government budget balance leads to an improvement in the CA balance.

The estimates of exorbitant privilege variable show that reserve currency countries such as the U.S. finance their CA deficits by issuing widely accepted money liabilities. The coefficients have the expected negative signs and they are statistically significant.

Finally, coefficient estimates of the demographic variables reflect that a larger dependent population reduces the CA balance.

4.2. Impact of Credit Growth on the CA Balance

Focusing on the financial variables, we observe that the growth rate of total credit stock negatively effects the CA balance in an economically and statistically significant way. Results reported

in table 3 indicate that a 10 percentage point increase in the total credit growth leads to a deterioration in the CA balance around 0.6 percentage points.

Our findings on the total credit growth are consistent with the literature. Philips et. al. (2013) reports a strong negative impact of the demeaned private credit to GDP ratio on the CA balance. According to the results of Atoyan et al. (2013), decline in the real credit growth in European countries after the global crisis substantially contributed to the rebalancing process. Ekinci et. al. (2015) also reports that an increase in the credit growth causes a significant deterioration in the CA balance with a large set of countries.

When we examine the impact of the components of credit by using the results in table 3, we observe that empirical results on household credit growth is in line with theoretical predictions. A demand boom via household credits is expected to generate a negative effect on the CA balance. Our results show that a household credit expansion has a negative and significant impact on the CA balance. We find that if household credit growth increases by 10 percentage points, CA balance deteriorates by 1.93 percent of GDP.

Considering the theoretical predictions, the influence of business credit on the CA balance is ambiguous. Business credit can improve the productive capacity and raise the level exports thereby having a positive impact on the CA balance. If the increase in imports from acquiring foreign capital and intermediate inputs for production dominate this effect, then we may observe a negative impact of business credit expansion on the CA balance. Results reported in table 3 indicates that these opposite effects offset each other. We find that business credit growth has no significant effect on the CA balance.

Overall evidence presented in table 3 indicates a substantial and significant impact of the growth rate of credit stock (especially household credit) on the CA balance. The fact that the effects of household and business loans on the CA balance are different entails informative value regarding impact of the policy measures on the CA balance. The findings suggest that controlling total credit growth by curbing the household loan growth may improve the CA balance. Macroprudential policies targeting the household loans can be more effective for a rebalancing process.

Regarding the magnitude of the impact of financial variables on the CA balance, the non-linearities reported in the finance-growth nexus suggest that the strength of the demand boom via a credit expansion may become weaker as the level of financial deepening increases. A growing

literature[15] suggests that financial deepening contributes to the GDP growth up to a threshold and after this point, the positive contribution of financial deepening on GDP growth disappears. These non-linearities motivate us to study how the influence of credit growth on the CA balance changes with the level of financial depth.

5. The Role of Financial Depth

To investigate the changes on the impact of credit growth on the CA balance with the level of financial depth, we consider the historical average of the ratio of total credit stock to GDP for each country as a measure of financial depth. We form an interaction variable with the credit growth rate and financial depth. We estimate the following equation,

$$\left(\frac{CA}{GDP}\right)_{i,t} = \beta_{0,i} + \beta_1 \left(\frac{\Delta Credit}{GDP}\right)_{i,t} + \beta_2 \left(\frac{\Delta Credit}{GDP}\right)_{i,t} \times financialdepth_i + \beta_3 X_{i,t} + \epsilon_{i,t} \quad (3)$$

This specification allows us to investigate the impact of credit growth conditional on the level of financial depth. If the coefficient of the interaction term is positive, we conclude that the negative impact of the total credit growth on the CA balance is stronger for lower levels of financial depth. Positive interaction term indicates that negative impact of credit growth on the CA balance gets weaker as the financial depth level increases. Results of the model which measures financial excess as the growth rate on total credit growth are reported in table 4. Our results show that interaction term is positive and significant.

In addition, we estimate the following equation to observe the influence of financial depth on the impact of household credit,

$$\begin{aligned}\left(\frac{CA}{GDP}\right)_{i,t} &= \beta_{0,i} + \beta_1 \left(\frac{\Delta Household\ Credit}{GDP}\right)_{i,t} + \beta_2 \left(\frac{\Delta Business\ Credit}{GDP}\right)_{i,t} \\ &+ \beta_3 \left(\frac{\Delta Household\ Credit}{GDP}\right)_{i,t} \times financialdepth_i + \beta_4 X_{i,t} + \epsilon_{i,t} \quad (4)\end{aligned}$$

Estimation results from equation 4 are reported in table 5. We observe that business credit growth has no significant effect on the CA balance under this specification as well. As the coefficient of interaction term is positive, we find that the negative impact of household credit on the CA balance is stronger when the financial depth level is lower.

[15] See Arcand et. al. (2012), Beck et. al. (2014), Law and Singh (2014) and Samargandi et. al. (2015).

Our results show that CA balance is more sensitive to the degree of financial excess for lower levels of financial depth. This finding implies that an increase in the loan growth (especially household credit) might cause a larger deterioration in the CA balance at the early stages of financial development.

In order to materialize the impact of the credit growth on the CA balance, we conduct an exercise on the CA deficits observed prior to the global crisis. We focus on the countries in our sample which experienced a CA deficit above 5 percent of their GDP in 2007. The results are given at table 6. The countries are Australia, Greece, Hungary, Ireland, New Zealand, Poland, Portugal, Spain and Turkey. Countries include both emerging market economies and advanced countries, and level of financial depth ranges between 33.8 percent (Turkey) to 167.3 percent (Ireland). We calculate country-specific coefficients of total credit growth using the estimates from table 4 by utilizing the estimates of equation 3 with control variables. Country specific coefficients are given by $\beta_1 + \beta_2 \times financialdepth_i$. Coefficients range between -0.057 (Ireland) and -0.103 (Turkey). We multiply the coefficient with the demeaned credit growth in 2007 to calculate the amount CA deficit caused by total credit growth.

Our results show that total credit growth explains a substantial amount of CA deficits observed in 2007. For example, rapid credit growth observed in Hungary (30.2 percent) caused a CA deficit at a level of 2.3 percent of GDP in 2007. We conduct the same exercise for household credit growth rates by utilizing the estimates of equation 4 with control variables. The results are given at table 7. In this case, coefficients conditinal on the level of financial depth ranges between -0.180 (Ireland) and -0.323 (Turkey). Our results indicate that household credit growth is an important driver of the CA balance.

The results presented at tables 6 and 7 clearly exhibit that an increase in credit growth rates (total and household) cause a substantial deterioration in the CA balance. Moreover, the impact of the credit growth on the CA balance is more pronounced at the lower levels of financial depth and gets weaker for the higher levels of financial depth.

6. Robustness Checks

To verify our results, we conduct some robustness checks. Our first robustness test is to repeat the estimation for sub-periods. Table 8 reports the estimation results for our full sample which is between 1986 and 2015, as well as 2001-2015. We find that total credit growth causes a deterioration

of CA balance for the sub-samples considered. We observe that the coefficient on the growth rate of business credit remains insignificant and growth rate of household credit has a negative and significant effect on the CA balance. Moreever, impact of both total and household credit declines with the level of financial depth. This exercise shows that our results are robust to the sample period.

Next, we focus on an alternative financial depth measure as a robustness check of our results. We re-estimate the equations 3 and 4 using stock market capitalization as a measure of financial depth. The coefficients of interaction term between financial depth and credit growth are positive and significant with this specification as well. We find that the magnitude of the impact of total and household credit growth decreases with the level of financial depth. Results are given at table 9. This exercise shows that our results are robust to the choice of financial depth measure.

7. Cross-sectional Dependence

One major issue that arises in panel data studies is the possibility that the individual units are interdependent. We provide the cross section dependency test statistics of the panel data models studied in this paper at the top panel of table 10. Results show that the we have a cross-sectional dependency issue in our empirical models.

To overcome this problem, we use Pesaran's (2006) common correlated effects (CCE) estimators[16]. Cross sectional dependence tests on the models estimated by CCE method is reported at the bottom panel of table 10. We find that cross sectional dependency is removed[17] by implementing the CCE procedure.

When we examine the parameter estimates, we observe that estimated coefficients of credit growth and interaction variables are reasonably close to the values with no correction. The parameter estimates are only slightly different than the results reported in tables 5 and 6.

8. Conclusion

Global imbalances have been at the forefront of policy debates especially over the past decade. In this study, we focus on the impact of credit growth on the CA balance. We construct a dataset

[16] Pesaran (2006) suggests that the use of cross-sectional averages provide valid inference for stationary panel regressions with multifactor error structure. Furthermore, time effect terms severely restrict the nature of cross-sectional dependence. To alleviate this problem, we exclude time effect terms from the estimation process.

[17] Null hypothesis of cross-sectional dependency is rejected at 5 percent level for all models except the total credit growth model with control variables. P-value for this model is 0.0488.

for 43 countries between 1986 and 2015, which allows us to decompose bank lending into household and business credit. We examine the impact of total credit growth as well as the components of credit.

Our results indicate that an increase in the total credit growth causes a significant deterioration in the CA balance. When we examine the components of the credit, we find that an increase in household credit causes an economically and statistically significant deterioration in the CA balance, whereas an increase in business loans has no significant effect on the CA balance.

Recent work on the impact of financial development on the economic growth suggests that strength of the demand boom associated with the credit expansion gets weaker as the level of financial depth increases. These results motivate us to investigate the role of financial depth in the credit growth and CA balance relationship. We show that "too much finance" hypothesis is also valid for the impact of credit growth on the CA balance. Measuring financial depth as the ratio of credit stock to GDP, our exercises show that the deterioration of the CA balance as a result of credit growth is larger at the lower levels of financial depth. Examining the dynamics of CA balance by utilizing the data on different types of credit with alternative empirical strategies, we find that this result is driven by household credit.

These findings support the view that targeted policies aimed at limiting household credit growth are more effective in terms of CA adjustments particularly at the the lower levels of financial depth. Furthermore, this exercise also shows that non-linearities in the level of financial depth needs to be more systematically analyzed. For future work, it will be interesting to work on financial cycle asymmetries in this framework.

Acknowledgements

We would like to thank Thorsten Beck for his comments and suggestions. Feedback from the seminar participants at the 4^{th} International Conference on Banking and Finance Perspectives is gratefully acknowledged.

[1] Aikman, D., Haldane, A. and Nelson,B. [2015], "Curbing the Credit Cycle", Economic Journal, vol. 125(585), 1072-1109.
[2] Alessi, L., Detken, C. [2018] "Identifying excessive credit growth and leverage", Journal of Financial Stability, vol. 35(C), pages 215-225.
[3] Arcand, J., Berkes, E. and Panizza,U. [2012] "Too much finance?", IMF Working Paper 12/161.
[4] Atoyan, R., J. Manning and J. Rahman [2013] "Rebalancing: Evidence from Current Account Adjustment in Europe", IMF Working Paper, No: 13/74.
[5] Babecky, J., Havranek, T., Mateju, J., Rusnak, M., Smidkova, K. and Vasicek, B. [2014] "Banking, debt, and currency crises in developed countries: Stylized facts and early warning indicators", Journal of Financial Stability, vol. 15(C), pages 1-17.
[6] Beck, R., Georgiadis, G. and Straub, R. [2014] "The finance and growth nexus revisited", Economics Letters, vol. 124(3), pages 382-385.
[7] Beck T., Buyukkarabacak B., Rioja F. and Valev N. [2012] "Who Gets the Credit? And Does It Matter? Household vs. Firm Lending Across Countries", The B.E. Journal of Macroeconomics, De Gruyter, vol. 12(1), pages 1-46, March.
[8] Bezemer, D., Samarina, A. and Zhang, L. [2017] "The shift in bank credit allocation: new data and new findings", DNB Working Papers 559, Netherlands Central Bank, Research Department.
[9] Biggs, M., Mayer, T. and Pick, A. [2009] "Credit and Economic Recovery", DNB Working Paper No. 218.
[10] Biggs, M., T. Mayer and Pick, A. [2010] "Credit and Economic Recovery: Demystifying Phoenix Miracles", SSRN Working Paper.
[11] Bridges, J., Jackson, C. and McGregor, D. [2017] "Down in the Slumps: The Role of Credit in Five Decades of Recessions", Bank of England Staff Working Paper No. 659.
[12] Borio, C. [2012] "The Financial Cycle and Macroeconomics: What Have We Learnt?", BIS Working Papers, No. 395.
[13] Bruno, V, Shim, I. and Shin, H. [2017] "Comparative assessment of macroprudential policies", Journal of Financial Stability, Elsevier, vol. 28(C), pages 183-202.
[14] Buyukkarabacak, B. and S. Krause [2009] "Studying the Effects of Household and Firm Credit on the Trade Balance: The Composition of Fund Matters", Economic Inquiry, Vol. 47, No. 4, pp. 653-666.
[15] Calderon, C. A., A. Chong and N. Loayza [2002] "Determinants of Current Account Deficits in Developing Countries", Contribution to Macroeconomics, Vol. 2, Iss. 1.
[16] Catao, L. and G.M. Miles-Ferretti [2014] "External Liabilities and Crises", Journal of International Economics, Elsevier, vol. 94(1), pages 18-32.
[17] Cerutti, E., Correa, R., Fiorentino, E. and Segalla, E. [2017] "Changes in Prudential Policy Instruments - A New Cross-Country Database", International Journal of Central Banking, vol. 13(2), pages 477-503, March.
[18] Cecchetti, S. G., and E. Kharroubi [2012] "Reassessing the Impact of Finance on Growth", Bank for International Settlements Working Papers 381.
[19] Cheung, C., D. Furceri and E. Rusticelli [2013] "Structural and Cyclical Factors behind Current Account Balances", Review of International Economics, Vol. 21, Iss.5, pp. 923-944.
[20] Chinn, M. , Eichengreen, B. and Ito, H. [2014] "A forensic analysis of global imbalances", Oxford Economic Papers, vol. 66(2), pages 465-490.
[21] Chinn, M. D. and H. Ito, H. [2007] "Current Account Balances, Financial Development and Institutions: Assaying the World 'Saving Glut'" Journal of International Money and Finance, Elsevier, Vol. 26, Iss. 4, pp. 546-569.
[22] Coricelli, F., Mucci, F., Revoltella, D. [2006] "Household Credit in the New Europe: Lending Boom or Sustainable Growth?", CEPR Discussion Papers 5520.
[23] Demirguc-Kunt, A., and R. Levine [2008] "Finance, Financial Sector Policies, and Long-Run Growth", The World Bank Policy Research Working Paper, WPS 4469.
[24] Ekinci, M. F., Erdem, F. P. and Z. Kilinc [2015] "Credit growth, current account and financial depth", Applied Economics, 47(17), 1809-1821.
[25] Gruber, J. W. and S. B. Kamin [2007] "Explaining the Global Pattern of Current Account Imbalances", Journal of International Money and Finance, Vol. 26, pp. 500-522.
[26] Gruber, J. W. and S. B. Kamin [2009] "Do Differences in Financial Development Explain the Global Pattern of Current Account Imbalances?", Review of International Economics, vol. 17, no. 4, pp. 667-688.
[27] Hasan, I., Wachtel, P. and Zhou, M. [2009] "Institutional development, financial deepening and economic growth: Evidence from China", Journal of Banking and Finance, vol. 33(1), pages 157-170, January.
[28] Hiebert, P., Jaccard, I. and Schler, Y. [2018] "Contrasting financial and business cycles: Stylized facts and

candidate explanations", Journal of Financial Stability, vol. 38(C), pp. 72-80.
[29] Islam, R. [2017] "Credit Composition, Output Composition, and External Balances", World Bank Policy Research Working Paper 8082.
[30] Jorda, O., Schularick, M. and Taylor,A. [2011] "Financial Crises, Credit Booms, and External Imbalances: 140 Years of Lessons", IMF Economic Review, vol. 59(2), pages 340-378, June.
[31] Kaminsky, G.L., Reinhart, C.M. [1999] "The twin crises: the causes of banking and balance-of-payments problems", American Economic Review, 89 (3), 473500.
[32] King, R.G., and Levine, R. [1993] "Finance and Growth: Schumpeter Might be Right", Quarterly Journal of Economics, 108, 71737.
[33] Lane, P. R. and G. M. Milesi-Ferretti [2012] "External Adjustment and the Global Crisis", Journal of International Economics, Vol. 88, Iss. 2, pp. 252-265.
[34] Law, S. and Singh, N. [2014] "Does too much finance harm economic growth?", Journal of Banking and Finance, Elsevier, vol. 41(C), pages 36-44.
[35] Levine, R. [2005] "Finance and Growth: Theory and Evidence", In Handbook of Economic Growth, edited by P. Aghion and S. Durlauf. The Netherlands: Elsevier Science.
[36] Pesaran, M.H. [2004] "General diagnostic tests for cross section dependence in panels", Cambridge Working Papers in Economics, 0435, University of Cambridge.
[37] Pesaran, M.H. [2006] "Estimation and inference in large heterogeneous panels with a multifactor error structure", Econometrica 74 (4), 9671012.
[38] Phillips, S., Catao, L., Ricci, L., Bems, Rudolfs, Das, M., Di Giovanni, J., Unsal, D., Castillo, M., Lee, J., Rodriguez, J. and Vargas, M. [2013] "External Balance Assessment (EBA): Technical Background", IMF Working Paper 13/272.
[39] Samargandi, N., Fidrmuc, J. and Ghosh, S. [2015] "Is the Relationship Between Financial Development and Economic Growth Monotonic? Evidence from a Sample of Middle-Income Countries", World Development, Elsevier, vol. 68(C), pages 66-81.
[40] Shen, C., and Lee, C. [2006] "Same Financial Development yet Different Economic Growth - Why?", Journal of Money, Credit and Banking 38(7), 1907-1944.

Table 1: Countries in the sample

Argentina	Japan
Australia	Korea
Austria	Luxembourg
Belgium	Malaysia
Brazil	Mexico
Canada	Netherlands
Chile	New Zealand
China	Norway
Colombia	Poland
Czech Republic	Portugal
Denmark	Russia
Finland	Saudi Arabia
France	Singapore
Germany	South Africa
Greece	Spain
Hong Kong	Sweden
Hungary	Switzerland
India	Thailand
Indonesia	Turkey
Ireland	United Kingdom
Israel	United States
Italy	

Table 2: Variable descriptions

Variable	**Source**	**Notes**
CA to GDP ratio	Updated Lane and Milesi-Ferretti (2007) dataset.	
Credit growth (Total, Household and Business)	Bank for International Settlements Database	ratio of new lendings to the private sector within a year to GDP.
Average growth rate	IMF WEO database	5-year average growth rate of GDP.
Relative income	IMF WEO database	ratio of own per capita GDP to the US per capita GDP.
NFA to GDP ratio	Updated Lane and Milesi-Ferretti (2007) dataset	lagged one period.
Dummy for high debt		equals 1 if $NFA/GDP \leq -60$ percent.
Oil trade balance	IMF EBA and WEO database	percent of GDP.
Fiscal balance	IMF WEO database	general government net lending/borrowing (percent of GDP).
Exorbitant privilege	IMF WEO database.	own currency share in world reserves.
Dependency ratio	World Bank WDI database	ratio of population over 65 to the working-age population.
Population growth	World Bank WDI database	
Stock Market Capitalization	World Bank Financial Structure and Development dataset	percent of GDP.

Table 3: Panel estimation results
Dependent variable is the ratio of the CA balance to GDP

	Total Credit		Household & Business Credit	
Total credit growth	-0.060***	-0.057***		
	(0.008)	(0.008)		
Household credit growth			-0.187***	-0.193***
			(0.030)	(0.027)
Business credit growth			0.002	0.000
			(0.015)	(0.014)
Average growth		-0.593***		-0.540***
		(0.076)		(0.088)
Relative income		0.019		0.061**
		(0.021)		(0.026)
NFA (lagged)		0.015***		0.014***
		(0.004)		(0.004)
Dummy for high debt		-0.005		-0.001
		(0.005)		(0.006)
Oil trade balance		0.567***		0.437***
		(0.059)		(0.065)
Fiscal balance		0.308***		0.370***
		(0.036)		(0.037)
Exorbitant privilege		-0.123***		-0.114***
		(0.021)		(0.023)
Dependency ratio		-0.106		-0.035
		(0.067)		(0.070)
Population growth		-1.254***		-1.460***
		(0.249)		(0.271)
# of Observations	1209	1063	959	893
# of Countries	43	43	43	43
R-Squared	0.113	0.393	0.107	0.371
Root MSE	0.036	0.030	0.034	0.029

Standard errors in brackets: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 4: Panel estimation results
Dependent variable is the ratio of the CA balance to GDP
The role of financial depth

	(1)	(2)	(3)	(4)
Total Credit Growth	-0.060***	-0.057***	-0.132***	-0.115***
	(0.008)	(0.008)	(0.020)	(0.019)
Credit/GDP			0.046***	0.035***
× Total Credit Growth			(0.011)	(0.010)
# of Observations	1209	1063	1209	1063
# of Countries	43	43	43	43
Control Variables	NO	YES	NO	YES
Country Fixed Effects	YES	YES	YES	YES
R-Squared	0.113	0.393	0.126	0.400
Root MSE	0.036	0.030	0.036	0.030

Standard errors in brackets: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Note: Credit/GDP is the sample average of this ratio for each country and time invariant. This variable is not included in the estimation due to country fixed effects.

Table 5: Panel estimation results
Dependent variable is the ratio of the CA balance to GDP
The role of financial depth

	(1)	(2)	(3)	(4)
Household Credit Growth	-0.187***	-0.193***	-0.482***	-0.359***
	(0.030)	(0.027)	(0.077)	(0.072)
Business Credit Growth	0.002	0.000	-0.002	-0.004
	(0.015)	(0.014)	(0.015)	(0.014)
Credit/GDP			0.193***	0.107**
× Household Credit Growth			(0.047)	(0.043)
# of Observations	959	893	959	893
# of Countries	43	43	43	43
Control Variables	NO	YES	NO	YES
Country Fixed Effects	YES	YES	YES	YES
R-Squared	0.107	0.371	0.124	0.376
Root MSE	0.034	0.029	0.034	0.029

Standard errors in brackets: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Note: Credit/GDP is the sample average of this ratio for each country and time invariant. This variable is not included in the estimation due to country fixed effects.

Table 6: Total credit growth, financial depth and CA deficits in 2007

	CA Balance (% of GDP)	Financial Depth (% of GDP)	$\frac{\Delta K_{Total}}{Y}$ 2007 (% of GDP)	$\frac{\Delta K_{Total}}{Y}$ Mean (% of GDP)	Credit Growth Coeff.	Impact of Total Credit on CA Balance (% of GDP)
Australia	-6.7	146.9	31.2	12.2	-0.064	-1.2
Greece	-15.2	71.9	22.2	3.6	-0.090	-1.7
Hungary	-7.1	77.7	30.2	4.5	-0.088	-2.3
Ireland	-6.5	167.3	44.1	17.3	-0.057	-1.5
New Zealand	-6.9	142.2	40.4	10.3	-0.066	-2.0
Poland	-6.4	50.2	16.7	4.7	-0.098	-1.2
Portugal	-9.7	148.1	33.8	8.9	-0.064	-1.6
Spain	-9.6	132.4	41.1	8.4	-0.069	-2.3
Turkey	-5.7	33.8	11.4	3.8	-0.103	-0.8

Note: Country-specific coefficients of total credit growth using the estimates from table 4 by utilizing the estimates of equation 3 with control variables. Country specific coefficients are given by $\beta_1 + \beta_2 \times financialdepth_i$. Last column is calculated by multiplying the coefficient with the difference between credit growth and mean credit growth.

Table 7: Household credit growth, financial depth and CA deficits in 2007

	CA Balance (% of GDP)	Financial Depth (% of GDP)	$\frac{\Delta K_{Household}}{Y}$ 2007 (% of GDP)	$\frac{\Delta K_{Household}}{Y}$ Mean (% of GDP)	Credit Growth Coeff.	Impact of Household Credit on CA Balance (% of GDP)
Australia	-6.7	146.9	16.0	7.2	-0.202	-1.8
Greece	-15.2	71.9	12.5	2.2	-0.282	-2.9
Hungary	-7.1	77.7	8.4	0.9	-0.276	-2.1
Ireland	-6.5	167.3	18.8	3.8	-0.180	-2.7
New Zealand	-6.9	142.2	19.5	5.7	-0.207	-2.9
Poland	-6.4	50.2	7.8	2.3	-0.306	-1.7
Portugal	-9.7	148.1	14.0	3.8	-0.201	-2.1
Spain	-9.6	132.4	15.0	3.4	-0.218	-2.5
Turkey	-5.7	33.8	4.0	0.8	-0.323	-1.0

Note: Country-specific coefficients of household credit growth using the estimates from table 5 by utilizing the estimates of equation 4 with control variables. Country specific coefficients are given by $\beta_1 + \beta_3 \times financialdepth_i$. Last column is calculated by multiplying the coefficient with the difference between household credit growth and mean household credit growth.

Table 8: Panel estimation results
Dependent variable is the ratio of the CA balance to GDP
Robustness check: sub-samples

1986-2015	(1)	(2)	(3)	(4)
Total Credit Growth	-0.057***	-0.115***		
	(0.008)	(0.019)		
Financial depth		0.035***		
× Total Credit Growth		(0.010)		
Household Credit Growth			-0.193***	-0.359***
			(0.027)	(0.072)
Business Credit Growth			0.000	-0.004
			(0.014)	(0.014)
Financial depth				0.107**
× Household Credit Growth				(0.043)
# of Observations	1063	1063	893	893
# of Countries	43	43	43	43
Control Variables	YES	YES	YES	YES
Country Fixed Effects	YES	YES	YES	YES
R-Squared	0.393	0.400	0.371	0.376
Root MSE	0.030	0.030	0.029	0.029

2001-2015	(1)	(2)	(3)	(4)
Total Credit Growth	-0.045***	-0.125***		
	(0.010)	(0.023)		
Financial depth		0.041***		
× Total Credit Growth		(0.011)		
Household Credit Growth			-0.181***	-0.311***
			(0.028)	(0.072)
Business Credit Growth			0.006	0.002
			(0.014)	(0.014)
Financial depth				0.083**
× Household Credit Growth				(0.042)
# of Observations	645	645	611	611
# of Countries	43	43	43	43
Control Variables	YES	YES	YES	YES
Country Fixed Effects	YES	YES	YES	YES
R-Squared	0.348	0.363	0.385	0.389
Root MSE	0.026	0.026	0.026	0.026

Standard errors in brackets: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 9: Panel estimation results
Dependent variable is the ratio of the CA balance to GDP
Robustness check: alternative financial depth measures

	Total Credit/GDP		Stock Market/GDP	
Total Credit Growth	-0.115***		-0.077***	
	(0.019)		(0.013)	
Financial depth	0.035***		0.026**	
× Total Credit Growth	(0.010)		(0.013)	
Household Credit Growth		-0.359***		0.277***
		(0.072)		(0.041)
Business Credit Growth		-0.004		-0.001
		(0.014)		(0.014)
Financial depth		0.107**		0.126***
× Household Credit Growth		(0.043)		(0.046)
# of Observations	959	893	959	893
# of Countries	43	43	43	43
Control Variables	YES	YES	YES	YES
Country Fixed Effects	YES	YES	YES	YES
R-Squared	0.400	0.376	0.396	0.377
Root MSE	0.030	0.029	0.030	0.029

Standard errors in brackets: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Note: Stock Market/GDP is the sample average of stock market capitalization to GDP ratio for each country. This variable is time invariant and not included in the fixed effects estimation.

Table 10: Cross-sectional dependence

	(1)	(2)	(3)	(4)
Total Credit Growth	-0.057***	-0.115***		
	(0.008)	(0.019)		
Financial depth		0.035***		
× Total Credit Growth		(0.010)		
Household Credit Growth			-0.193***	-0.359***
			(0.027)	(0.072)
Business Credit Growth			0.000	-0.004
			(0.014)	(0.014)
Financial depth				0.107**
× Household Credit Growth				(0.043)
# of Observations	1063	1063	893	893
# of Countries	43	43	43	43
Control Variables	YES	YES	YES	YES
Country Fixed Effects	YES	YES	YES	YES
Time Fixed Effects	YES	YES	YES	YES
R-Squared	0.393	0.400	0.371	0.376
Root MSE	0.030	0.030	0.029	0.029
Pesaran (2004) cross-sectional dependency test statistics				
	-2.530	-2.665	-2.621	-2.671
	(0.0114)	(0.0077)	(0.0088)	(0.0076)

Note: Under the null hypothesis test statistics converge to a normal standard distribution. The values in the parentheses are p-values.

Common Correlated Effect Mean Group Estimators

	(1)	(2)	(3)	(4)
Total Credit Growth	-0.056***	-0.115***		
	(0.008)	(0.019)		
Financial depth		0.035***		
× Total Credit Growth		(0.010)		
Household Credit Growth			-0.189***	-0.365***
			(0.027)	(0.072)
Business Credit Growth			0.000	-0.004
			(0.014)	(0.014)
Financial depth				0.113***
× Household Credit Growth				(0.043)
# of Observations	1063	1063	893	893
# of Countries	43	43	43	43
Control Variables	YES	YES	YES	YES
Country Fixed Effects	YES	YES	YES	YES
Time Fixed Effects	NO	NO	NO	NO
R-Squared	0.390	0.398	0.363	0.368
Root MSE	0.030	0.030	0.029	0.029
Standard errors in brackets: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$				

Pesaran (2004) cross-sectional dependency test statistics				
	-1.877	-1.971	-1.116	-1.249
	(0.0605)	(0.0488)	(0.2642)	(0.2115)

Note: Under the null hypothesis test statistics converge to a normal standard distribution. The values in the parentheses are p-values.