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National Bank of the Republic of North Macedonia



Working paper No. 9
2018

The effect of household and enterprise credit on current account balance: Evidence from the Republic of North Macedonia¹

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Abstract

The empirical literature points the financial intermediation, measured by the level of credits relative to GDP in the economy, as one of the factors which affects the current account dynamics in a given country. This paper tries to estimate and then quantify the possible impact that household and enterprise credits have on the current account deficit in North Macedonia. The motivation stems from the expectation that different kind of borrowers might vary in terms of the use of credit and thus might have different effects on macroeconomic variables. The results we get by using a vector error correction model (VECM) and data covering the 2005q1-2017q3 period, suggest that credits allocated to the household sector have a negative impact on the current account balance, while the enterprise credits have a positive and statistically significant effect on the external balance. The findings are in line with our prior expectation, given the import pressures that households' credits might induce and the positive impact that corporate credit might have on the overall productivity and competitiveness of the economy. The study is policy-relevant as it provides quantification on the effects that different types of credits might have on the current account balance.

JEL Classification: F32, F41, F14, E51

Keywords: household credit, enterprise/corporate credit, current account balance, current account deficit

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1. Introduction

In the economic literature, there is a considerably large theoretical and empirical work aimed at analyzing and understanding the determinants of the current account deficit. However, the bulk of the work has been focused on the effect of fiscal positions, growth prospects, demographic factors, net foreign asset positions and level of oil dependency, while a lesser attention has been paid to the financial variables – namely the credit developments. Moreover, an even smaller body of work is concentrated on the relationship between the sectorial decomposition of the credit growth (household and corporate sector credit) and current account balance.

There are studies showing that credit increases are usually associated with current account worsening (IMF (2013), Atoyan et al. (2013), Ekinci et al. (2014), Unger (2015), Soydan (2016)). Yet, two types of borrowers – households and enterprises, vary in terms of the use of credit and thus could have different effects on the current account balance. An increase in the household credit raises the demand for consumption goods and since some part of the increase most probably is going to be directed towards imported goods, the current account is likely to deteriorate. On the other hand, when enterprise credit grows, it increases the demand for investment goods which, after the initial impact towards widening the current account deficit (due to the probable partial use of imported inputs), will increase the investment-driven production capacity, which will eventually be able to contribute to the supply level and contain the deterioration in the current account deficit. Moreover, the rise in the production capacity can also support the export activities of firms, which can have an additional lowering effect on the current account deficit.

The main objective of our study is to analyze the possible link between the components of private credits and the current account in North Macedonia. We focus on the distinction between household and enterprise credit sector and investigate whether these two types of credit have (un)favorable effects on the current account balance. The eventual relationship between these variables is of enormous relevance for the policy makers in North Macedonia, as it provides quantification on the effects that different types of credits (household and enterprise) might have on the current account balance.

To investigate the implications of household and enterprise credit expansion on current account balance, our study employs a vector error correction model (VECM). The analysis covers the period 2005q1-2017q3. The results of the estimation show that credit allocated to the household sector deteriorates the current account balance, while the enterprise credit improves the external balance.

The paper is organized as follows: the next section reviews the relevant work in the existing literature, whereas section 3 provides an overview of sectorial credit developments and the current account balance in the domestic economy. Section 4 presents the data, methodology and estimation specifications, while section 5 reports and discusses the empirical findings. Finally, Section 6 draws some conclusions.

2. Literature overview

In recent years, the efforts aiming to understand the effect of financial developments on the current account balance have been intensified. Namely, in 2013, in a study by *IMF*², credit growth was included in the group of cyclical factors impacting current account (CA) developments in a selected group of European countries and its empirical findings confirmed that high credit growth pushed the CA balance further into negative territory during the boom period. Moreover, the study showed that the role of credit growth seems to be reinforced during the post-crisis years as reflected by larger and more statistically significant coefficients, highlighting the key role credit crunch played in bringing down private sector adjustment in most countries.

By using cross-section and panel regression techniques and by covering a large and heterogeneous group of countries (18 industrial, 71 developing) over a relatively long time-span (1971-1995), *Chinn and Prasad (2000)* found that indicators of financial deepening have a significant and robust positive effect on the current account in developing countries, but not in industrial countries. Using a broad sample of emerging and developed countries, *Ekinci, Erdem and Kiliç (2015)*, found that there is a strong relation between loan growth and the current account balance, and that the acceleration in loan growth has a deteriorating effect on current account balance which is especially prominent in emerging countries.

Unger (2015) investigates the link between domestic credit developments and the current account balance of euro area countries, by distinguishing between a credit pull and a credit push factor. The pull factor captures flows of bank loans to the domestic non-financial private sector, while push factor measures flows of claims of domestic banks on debtors in other countries. By using a PMG estimator for a panel consisting of the founding members of the euro area and Greece and with annual data covering the period from 1999 to 2013, the author finds that both variables have a statistically significant impact on the current account, while the coefficient for the credit pull factor is considerably larger in all specifications.

While analyzing the determinants of the overall current account balance by employing autoregressive distributed lag cointegration (ARDL), *Unevskaja and Jovanovic (2011)* find that financial intermediation captured through the newly approved loans to the private sector is one among many variables determining the current account dynamics in North Macedonia during the 1998q1-2009q3 period. The effect (captured through the newly approved loans to the private sector) was found to be negative and significant. However, the authors stop short of analyzing the decomposed credit by its sectorial decomposition.

² IMF working paper WP/13/74, "Rebalancing: Evidence from Current Account Adjustment in Europe" Ruben Atoyan, Jonathan Manning, and Jesmin Rahman

As it is evident from these examples, the bulk of the work is focused on the effect of total private credit and its growth on the current account balance, and much less attention is paid to the impact of decomposed private credit. The idea stems from the expectation that different kind of borrowers might vary in terms of the use of credit and thus might have different effects on macroeconomic variables. The idea is backed by an IMF research by *Hilbers et al. (2005)* which states that distinguishing between household and firm credit is a "key element" in assessing the risks that stem from credit expansions.

Buyukkarabacak and Krause (2009) in their paper present evidence that analyzing the effects of the particular distribution of funds between households and firms is more important for explaining foreign trade imbalances than the size of domestic credit per se. By using dynamic panel generalized method of moments (GMM) techniques for eighteen emerging markets³ including North Macedonia, for the period of 1987-2005, the authors find that the ratio of household credit to GDP is negatively and significantly correlated with a change in the trade balance, meaning that household credit fuels consumption and thus increases imports and trade deficit. On the other hand, the coefficient on firm credit ratio is positive and significant, which means that controlling for other variables, the rise in exports due to an increase in credit for business investment is larger than the increase in imports from acquiring foreign capital, raw materials, and intermediate inputs for production.

Following a similar line of thought and methodology, *Alioğulları et al. (2015)* analyze the situation in Turkey, coming to a conclusion that loans to households have a statistically significant negative effect on the current account deficit, whereas an increase in business loans has no significant effect on the current account balance. On the other hand, based on a dynamic approach using the Kalman filter, *Toraganlı and Ertugrul (2016)* show that both types of credit stock have negative effects on the current account dynamics in Turkey for the period 2002Q3–2014Q3. *Turgutlu (2014)* goes one step further in analyzing the situation in Turkey by disaggregating household credit into individual types of credit⁴ and analyzing their impact on the current account balance during the 2000q1-2013q1 period. The results indicate that real estate loans have created the greatest impact on the worsening of the current account balance which is especially evident in the aftermath of the global financial crisis. Similarly, over the sample period, other loans have increased at the expense of higher current account deficits.

Coricelli et al. (2006) analyze the macroeconomic effects of individual loans in seven European countries, over the period from 1999 to 2004, by using the GMM approach. Their results suggest that the trade balance is negatively influenced by households' credit growth, with corporate credit growth having a significant and negative impact on the trade balance in some of the countries as well.

³ Brazil, Costa Rica, the Czech Republic, Egypt, Hungary, India, Indonesia, Jamaica, North Macedonia, Malaysia, Mexico, Poland, South Africa, Thailand, Turkey, Ukraine, and Uruguay.

⁴ Car loans, real estate loans and loans for individual expenditures for durables, professional needs, education, vacation.

As it can be derived from the above-mentioned researches, analyzing the effects of decomposed credit on the current account balances is a relatively "newish" field of research and while the results are more or less similar, a definitive conclusion about the individual effect of household and enterprise credit on the current account has not been reached. These statements are especially true for the case of North Macedonia. To the best of our knowledge, there has been no study focused exclusively on the implications of household and enterprise credit on the external balance in North Macedonia. In such circumstances, this paper offers relevant contributions towards understanding the relationship between these variables as well as providing policy makers with additional and helpful tools to achieve prudent levels of credit growth as well as a sustainable current account – thus contributing towards the overall macroeconomic stability.

3. The case of North Macedonia: Overview of credit activity and current account balance

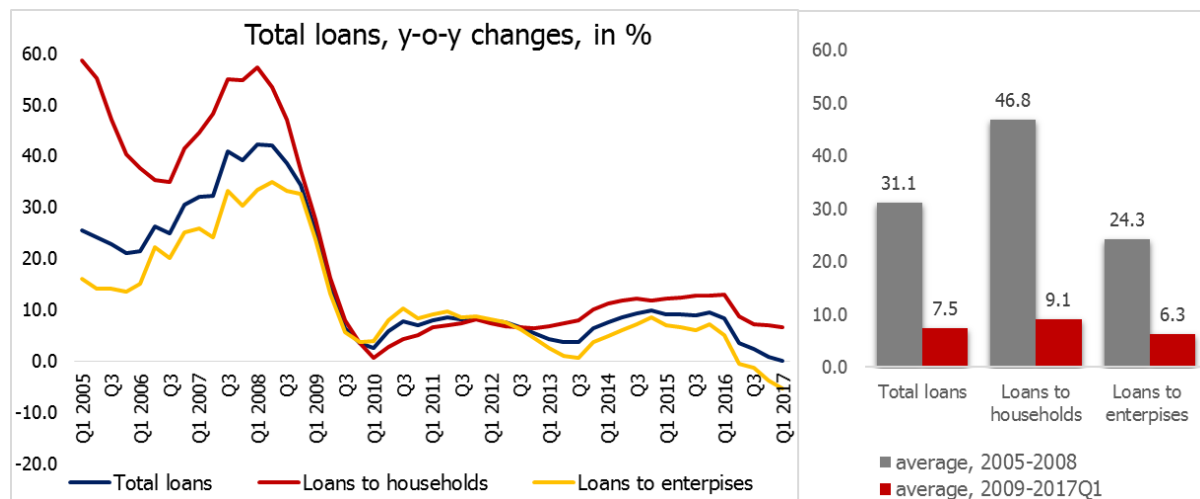
The Macedonian economy experienced a considerable financial deepening during the analyzed period (2005q1-2017q3). The rapid financial deepening during this period was a combined effect of the catching-up process (due to the initial low level of financial development) as well as from the excessive⁵ credit growth prior to the global crisis, on an annual basis. However, the dominant part of the financial deepening happened during the first period, the so-called "boom" period (prior to the global financial crisis), while in the second period (after the crisis) the credit activity is considerably more moderate. In such circumstances, the total credits of the private sector at the end of 2004 amounted to only 20.8% of GDP, and thus significantly lagging behind the developed economies, while at the end of 2008, this ratio has doubled and represented 41.5% of GDP. On the other hand, the annual credit growth during the 2005-2008 period averaged around 31%. A large number of factors from the supply and demand side contributed to this level of credit expansion in the period prior to the crisis. On the supply side, the credit growth was supported by the macroeconomic stability and the strengthened confidence in the financial system, which in return promoted private savings as the main source of funding credit activity in North Macedonia. Additionally, in this period, many foreign banks expanded their activity in the domestic financial system and thus increased competition, stimulated development of new products and contributed towards narrowing the interest rate spreads. On the demand side, macroeconomic stability led to higher credit, both through lower interest rates, due to the low inflation, and through prudent fiscal policies, which "crowded-in" private credit. On top of the "domestic" factors, a favorable external environment provided additional support to the credit growth.

This phase of high credit growth was abruptly ended with the onset of the global financial crisis. Credit growth was suddenly suppressed and over the whole period since the crisis onset, averaged around 7.5% on an annual basis. By the end of the analyzed period, the share of the credit stock as % of GDP has stabilized around 47% of GDP. The negative effects during this period stemmed from the

⁵ According to Jovanovic et al. (2014).

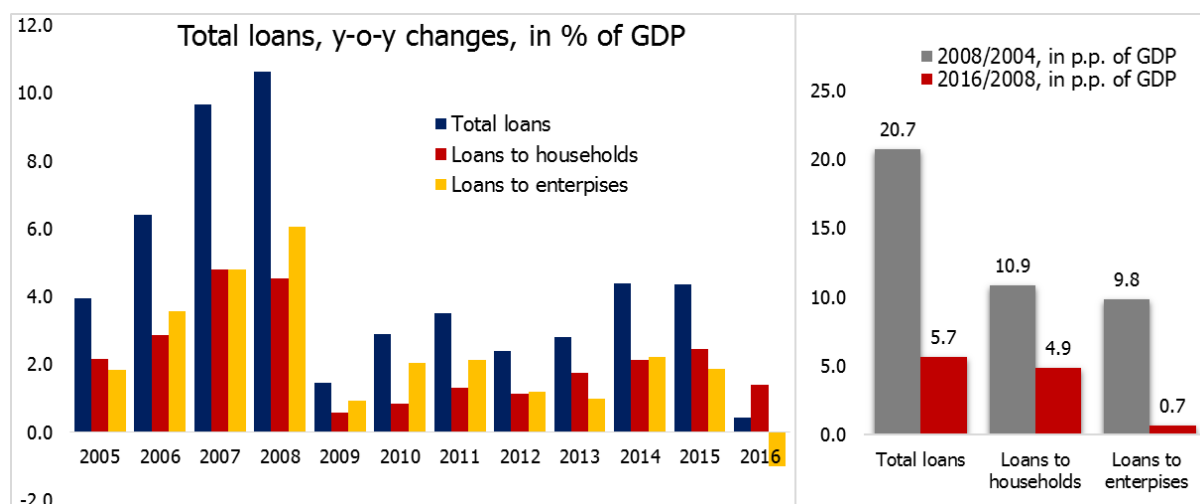
underperformance of the real sector and banks' lack of confidence in the clients' creditworthiness, while the direct repercussions were limited, due to the general soundness of the banking sectors, their robust capital structures and the absence of global exposure to "toxic" assets. Rapidly worsening economic conditions initiated credit defaults - setting the NPLs on a rising path. Banks responded by tightening credit standards and curtailing credit supply. On the back of deteriorating creditworthiness and gloomy economic perspectives, there was a decrease in credit demand as well.

Figure 1. Total loans, annual change, in % of GDP



Source: NBRNM and authors' calculations.

Figure 2. Total loans, annual change, in % of GDP



Source: NBRNM, SSO and authors' calculations.

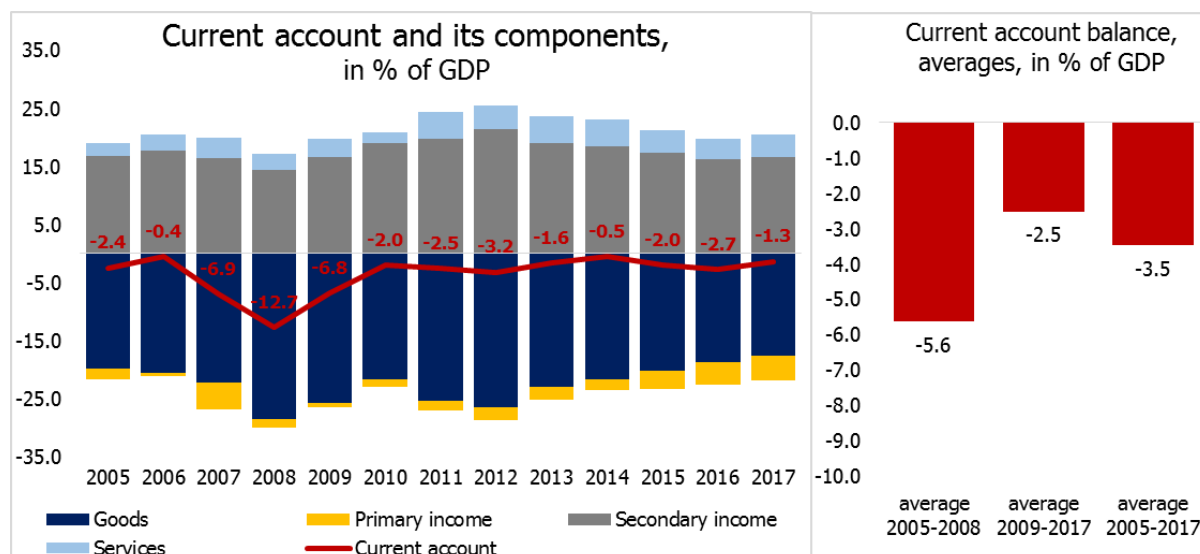
Having in mind the aim of this paper, total credit developments are further disaggregated into household and enterprise credit. A couple of observations can be made about the sectorial credit decomposition in the Macedonian economy.

Firstly, at the beginning of the sample period, the credit allocated to the enterprises was significantly higher compared to the household credit, amounting to 14.8% of GDP and 5.9% of GDP,

respectively, as of the end of 2004. During the first period – prior to the crisis, both sectors registered solid growth on an annual basis, with the household sector registering faster growth on average (46.8% vs. 24.3% on an annual basis). In such circumstances, at the end of 2008, household credit had grown by 10.9 percentage points of GDP while the enterprise credit was higher by 9.8 percentage points of GDP - thus narrowing the difference between the stock of enterprise and household credit. With the onset of the financial crisis, the credit developments in both sectors saw an immediate slowdown. However, the credit allocated to the enterprise sector registered a steeper correction and on average grew by 6.3% compared to 9.1% growth in the household sector. By the end of 2016, household credit amounted to 21.6% of GDP (an increase of 4.9 percentage points of GDP compared to the end of 2008) while the enterprise credit represented 25.4% of GDP (an increase of 0.7 percentage points of GDP compared to the end of 2008). This data shows that household credit, rather than firm credit, has been the main driving force behind the overall credit growth in the analyzed period. In the period after the crisis, this can be partially explained by the banks' perceptions about the household sector as "less risky" compared to the corporate sector (from the supply side) as well as the lack of high quality projects from the firms during this period (demand side).

Regarding the current account developments, after its independence, North Macedonia is continuously characterized by a current account deficit, which during the period 2005-2017 averaged around 3.5% of GDP. Structural analysis shows that the current account deficit stems from the high trade deficit, which in this period averaged 18.9% of GDP. Analyzed in sub-periods, the period prior to the crisis was characterized by higher current account deficit compared to the period after the crisis (5.6% of GDP and 2.5% of GDP, respectively). These developments coincide with the rapid growth of total credit prior to the crisis as well as the moderate growth of total credit after the crisis for the period considered. According to the results from *Unevskva and Jovanovik (2011)*, the sustainable level of the current account deficit for the Macedonian economy ranges between 5.3% and 9.1% of GDP (during the period of their analysis, 1998q1-2009q3). Historical data show that the current account deficit in the analyzed period is moving around this sustainable level, pointing out that the external balance is not threatened. However, in the period from the fourth quarter of 2007, until the first quarter of 2009, under the influence of the two external shocks in this period (global price growth and global recession), the deficit has consistently exceeded the sustainable level, indicating a worsening external equilibrium. This shows that, for a small and open economy like North Macedonia's, the dynamics of the current account deficit is heavily influenced by external factors and the conjuncture of the world markets.

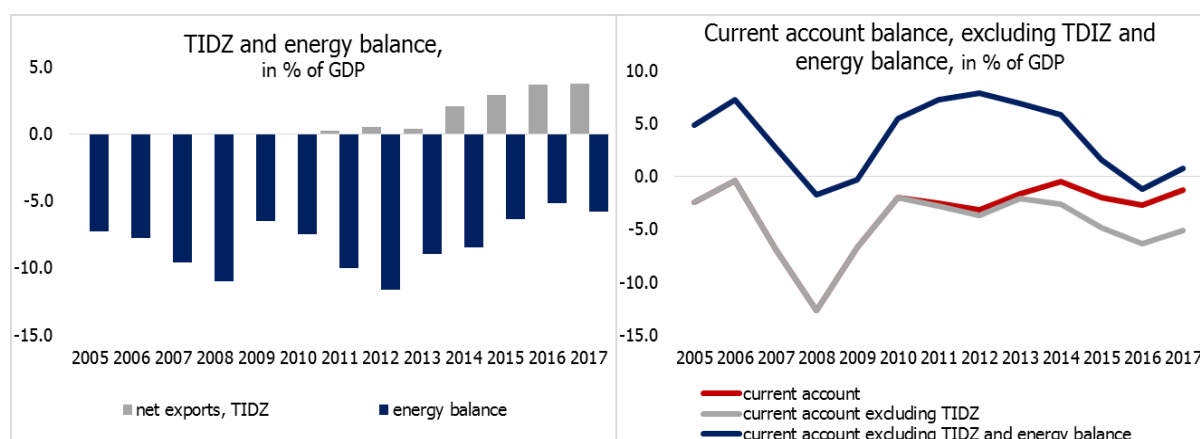
Figure 3. Current account balance, in % of GDP



Source: NBRNM and authors' calculations.

In addition to these external factors, the current account dynamics in North Macedonia is also largely determined by specific domestic factors. Namely, in the last few years there has been a significant shift in the structure of the main drivers of the overall economic growth through the changes in the main drivers of net exports that arise from the functioning of the newly established production facilities in foreign ownership, mainly in the technological-industrial development zones (TIDZ)⁶. Starting from 2011, the activity of the zones, as well as their added value, have shown continuous growth, and as the number of companies has increased over time, so have the positive effects on the economic growth (direct and indirect) and on the overall external position of the country.

Figure 4. Current account balance excluding TIDZ and energy balance, in % of GDP



Source: NBRNM and authors' calculations.

⁶ At the moment, 16 free zones have been established on the territory of the Republic of North Macedonia, out of which three are fully operational, namely Skopje 1 and 2 and the free economic zone in Stip. For more details see Ramadani et al (2017): <http://nbrm.mk/content/publikacii/Analiza-na-efektite-od-novite-izvoznno-orientirani-kompanii-vo-domasnata-ekonomija.pdf>

As it is evident from Figure 4, the net exports of the companies in the TIDZ during the 2011-2017 period average around 1.9% of GDP. If we were to subtract this effect, the overall current account balance during the 2005-2017 period would worsen by 1 percentage point of GDP and would average around 4.5% of GDP.

Having in mind the significant size of this impact on the current account, as well as the fact that these companies usually do not rely on loans from domestic banks, in this paper we have chosen the current account balance *excluding* the effect of the companies from the TIDZ as the main dependent variable to be analyzed. Namely, these new export-oriented entities have relatively low indebtedness to domestic banks, which, as of 31 December 2016, represents only 0.8% of their total liabilities, i.e. 2.6% of their total interest-bearing debt. Even taking into account the off-balance financing used by these enterprises from domestic banks (guarantees, lines of credit etc.), again, the liabilities (total and potential) of these enterprises towards domestic banks remain small. *"This is probably due to the fact that these entities are part of international companies and through them have the opportunity to access international financial markets (including intercompany loans) where the provided funding has usually more favorable conditions than the available financing options in Macedonia"* (NBRM⁷, 2016).

In addition to the TIDZ companies' net exports, another important determinant of the current account movements in North Macedonia is the energy balance, which is negative throughout the analyzed period and averages around 8.2% of GDP. If we were to subtract this effect reflecting the external environment, the non-energy current account balance during the 2005-2017 period would improve significantly, and would be in surplus on average at around 3.6% of GDP.

Building on these characteristics and limitations, this paper estimates the possible link between current account balance excluding the TIDZ companies' net exports and the loans allocated to the household and enterprise sector, respectively, during the 2005q1-2017q3 period.

⁷ For more details see the NBRNM "Financial Stability Report for the Republic of Macedonia in 2016", page 45.

4. Data, methodology and econometric specification

4.1. Data

In order to assess the relationship between the loan sector structure and the current account balance, the following variables have been used.

Table 1: Definition of the variables and data sources

Abbreviation	Dependent/ independent variable	Description	Source
CAB	Dependent	Current account balance excluding the effect from the TIDZ, as a percentage of nominal gross domestic product	NBRNM
ENTERPRISE	Independent	Stock of private enterprise loans as a percentage of nominal gross domestic product	NBRNM and State Statistical Office
HOUSEHOLD	Independent	Stock of household loans as a percentage of nominal gross domestic product	NBRNM and State Statistical Office
LnRGDP	Independent	Natural logarithm of real gross domestic product in millions of North Macedonia denars at 2005 prices	State Statistical Office
LnREER	Independent	Natural logarithm of real effective exchange rate (2010=100) deflated by the Consumer Price Index (CPI), where increase in the variable means appreciation	NBRNM
LnREEREXCPC	Independent	Natural logarithm of real effective exchange rate (2010=100) excluding primary commodities ⁸ , deflated by the CPI, where increase in the variable means appreciation	NBRNM
LnRP	Independent	Natural logarithm of relative prices calculated as a ratio between domestic CPI and foreign CPI (2010=100)	NBRNM
LnRPEXCPC	Independent	Natural logarithm of relative prices (2010=100) excluding primary commodities ⁹ , deflated by the CPI, where increase in the variable means appreciation	NBRNM
LnEARGDP	Independent	Natural logarithm of real gross domestic product of the 19 countries in the Euro area in millions of Euros, chain linked volumes (2010)	Eurostat

⁸ Primary commodities excluded from the real effective exchange rate are the following: crude oil and oil derivatives, iron and steel, ores, imported raw materials for the new industrial facilities in the free economic zones.

⁹ Primary commodities excluded from the real effective exchange rate are the following: crude oil and oil derivatives, iron and steel, ores, imported raw materials for the new industrial facilities in the free economic zones.

Section 3 above provides an explanation for excluding the TIDZ effect from the CAB and it is due to the very small indebtedness of these companies from the banking sector of North Macedonia. Also, the statistics of the NBRNM adjusts the real effective exchange rate and relative prices for the effect of the primary commodities that include imported raw materials for the new facilities in the free economic zones or known as the TIDZ. However, the LnRGDP and the nominal GDP (used for normalizing the CAB, ENTERPRISE and HOUSEHOLD variables) were not adjusted for the effect of the TIDZ because their new value added and positive indirect¹⁰ effects are relatively small in terms of the nominal GDP. According to the analysis made by Ramadani et al (2017), for the period from 2013 to 2016, the cumulative nominal value added as well as the positive indirect effects from the TIDZ are 2.4% from the cumulative nominal GDP. Furthermore, there are no calculations for the new value added from the TIDZ for the following years: 2011, 2012 and 2017. Therefore, having in mind the lack of data for the above-mentioned years and the relative small nominal contribution of the TIDZ to the nominal GDP, we find that removing the TIDZ from the LnRGDP will not have a significant effect on the econometric results.

The dataset consists of quarterly observations for the period from 2005q1 to 2017q3. Also, all the series are seasonally adjusted by using the additive Census X12 option in EViews 10, with the exception being made only for the LnEARGDP because this variable was already seasonally adjusted. The integrative features of the variables were tested by employing two tests: Augmented Dickey-Fuller test (ADF) and Phillips-Perron test (PP). The results from the tests are conflicting for few variables meaning that both tests indicate different level of integration for the same variable¹¹, and also the tests estimate conflicting results depending on the critical values for 1%, 5% and 10% statistical level¹². However, despite these conflicting results, the tests show that all the variables are non-stationary in the level and that are integrated of order 1 - I(1)¹³.

¹⁰ Positive indirect effects are the following: investment purchases from domestic entities and expenditures on goods and services purchased on the domestic market (Ramadani et al, 2017).

¹¹ HOUSEHOLD is such variable.

¹² CAB, LnEARGDP are such variables.

¹³ Results are available upon request from the authors and they are not presented in order to save space.

Figure 5: Plot of the data



Source: NBRNM, State Statistical Office and Eurostat.

Figure 5 presents the data explained above. Dummy variable for encompassing the effect of the global financial crisis (2007-2009) would not be included in the econometric models in the following section of the paper in order not to overparameterize them. Nevertheless, check of the in-sample forecast (fitted) and actual values will be presented for the period during and after the global financial crisis as an indication whether the forecasted values deviate much from the actual ones and thus to inspect the (in)constancy of the estimated coefficients.

4.2. Methodology and econometric specification

Johansen cointegration technique (Vector Error Correction Model-VECM) will be employed to assess the effect of ENTERPRISE and HOUSEHOLD credit on the CAB. The Johansen technique allows variables to be taken with the same order of integration and uses lags in order to mitigate the problem that might arise from the endogenous variables (*Haris and Sollis, 2003*). Additionally, this technique provides long-run equilibrium coefficients and the error correction mechanism (ECM) which presents the speed of adjustment of short-run disequilibrium towards long-run equilibrium. Furthermore, this technique allows estimating multiple regressions by imposing restrictions and that is estimation of more than one cointegrating vectors.

Therefore, the following regressions were constructed and estimated the long-run coefficients¹⁴:

$$CAB_t = f(ENTERPRISE_t, HOUSEHOLD_t, LnRGDP_t, LnREER_t, LnEARGDP_t) \quad (1)$$

$$CAB_t = f(ENTERPRISE_t, HOUSEHOLD_t, LnRGDP_t, LnREEREXCPC_t, LnEARGDP_t) \quad (2)$$

$$CAB_t = f(ENTERPRISE_t, HOUSEHOLD_t, LnRGDP_t, LnRP_t, LnEARGDP_t) \quad (3)$$

$$CAB_t = f(ENTERPRISE_t, HOUSEHOLD_t, LnRGDP_t, LnRPEXCPC_t, LnEARGDP_t) \quad (4)$$

The variables chosen in this paper determine the relationship between the savings and the investments as a precondition for sustainable current account balance in the long run. Namely, the independent variables taken as determinants in the regressions from 1 to 4 are representatives of the smoothing decision-making process between the savings and the investments as noted in Unevska and Jovanovic (2011), and similarly the variables taken in this paper do not deviate much from the variables used in the above-mentioned paper. Furthermore, the rationale for the choice of the econometric technique (VECM cointegration methodology) is testing the long-run relationship between the variables pertinent to the savings and investment identity. The VECM tests the stationarity of the error terms among the variables and if stationarity is ascertained, then the cointegration exists reflecting stable movements between the variables. Therefore, the main advantage of using the cointegration technique is encompassing the long-run concept of the savings and investments as a prerequisite for sustainable current account balance. Moreover, the advantage of the VECM technique is quantifying the long-run effect of each independent variable on the normalized (dependent) variable and therefore obtaining valuable information, unlike the vector autoregression (VAR) model that tracks the shocks between the variables in the short run. In addition to Unevska and Jovanovic (2011), cointegration techniques for the current account determinants are used in: Kovacevic (2017) on a panel sample and more concretely the study by Gosse and Serranito (2014) uses linear and asymmetric panel VECM. Furthermore, Yuksel and Ozsari (2016)¹⁵ provides literature list that also uses cointegration methods for the current account and its determinants among which the VECM technique for Greece (Biztis et al, 2008) and Turkey (Gocer et al (2011) and Begec (2015)). Concerning the length of the series, the period encompassed in this analysis from 2005q1 to 2017q3 is longer than 10 years and includes 51 observation and it is valid for using the VECM technique.

Rational loan financing is expected to improve the CAB especially for the ENTERPRISE variable and its effect is expected to be positive in the long run. ENTERPRISE loans used for investment purposes might initially affect negatively the CAB, but in the long run, higher corporate lending by banks could increase the competitiveness of domestic firms relative to the foreign firms and consequently would improve the CAB. The other type of loans, HOUSEHOLD, is expected to negatively affect the CAB,

¹⁴ The normalization of the regressions from 1 to 4 will be made with respect to the CAB (CAB=-1) and this variable will be considered as dependent variable.

¹⁵ Page 5 and 6.

because these loans are usually mostly used for consumption purposes that increases import. The LnRGDP might have a positive effect on the CAB on condition that the increase in the domestic output is associated with the increase in the domestic savings relative to the investments¹⁶ and accordingly the dependent variable would be positive. In contrast, the effect of the LnRGDP would be negative if higher consumption or investment are the driving factor of the economy and consequently the deficit in the CAB rises. Concerning the variables: ENTERPRISE, HOUSEHOLD and LnRGDP, it should be noted that their possible negative effect should not necessarily mean deterioration of the sustainable current account (CA) deficit on condition that the real economic sector uses the funds for efficient investments, despite they are higher than the savings (Gehringer, 2015). Namely, more efficiently used investments would increase the productive capacity of the economy and would make it more competitive and thus, in the future, it would turn the CA deficit into surplus. Price competitiveness is measured by LnREER, LnREEREXCPC, LnRP and LnRPEXCPC and their upward movement should decrease the domestic price competitiveness and deteriorate the CAB. However, the LnREERCPI/LnREERCPIEXCPC might have a positive effect to some extent, according to the J-curve effect (*Stucka, 2004*). Namely, the real appreciation would make domestic goods and services more expensive for the foreign importing countries and thus it would improve the CAB for the RM in nominal terms. If the foreign importers perceive that the export of North Macedonia becomes more expensive and they are able to replace it with a cheaper one, then the positive effect of the real appreciation weakens and turns into negative. Also, the positive effect of the real appreciation exhausts, when the domestic importers perceive that foreign goods and services are cheaper compared to domestic ones. The LnEARGDP is representative of the foreign demand and the positive movement of this variable should increase the foreign demand for RM's export and affect positively the CAB.

5. Estimation results and robustness check

5.1. Estimation results

The VECM technique requires specifying the number of lags or so-called order of Vector autoregression (VAR) and testing for cointegration. The number of lags was determined by inspecting the information criteria out of three lags¹⁷. The choice of the number of lags or so-called order of the VAR was based on the indications from the majority of the information criteria¹⁸.

The next step is to determine the cointegration among variables. For that purpose, Trace of the Stochastic Matrix and Maximal Eigenvalue tests¹⁹ were considered for the four regressions specified above. Both tests were conflicting between one and more than one cointegrating vectors. In such cases, recommendations are to examine the estimated cointegrating vectors and base the choice on the

¹⁶ The following is valid under $S-I=CAB$ where S is domestic savings and I is investment (IMF, 2013).

¹⁷ The decision on three lags has been chosen in order to balance between including enough lags so as to ensure statistical validity and not including too many lags due to the small sample size and loose degrees of freedom.

¹⁸ Likelihood-ratio test (LR), Final prediction error test (FPE), Akaike information criterion (AIC), Schwarz information criterion (SIC) and Hannan-Quinn information criterion (HQC). Results are available upon request from the authors and they are not presented in order to save space.

¹⁹ Results are available upon request from the authors and they are not presented in order to save space.

interpretability of the cointegrating relations and estimated long-run coefficients (*Johansen and Juselius, 1990*). Therefore, the choice was based on the Maximal Eigenvalue test because it yielded one or two cointegrating vectors for four regressions unlike the Trace of the Stochastic Matrix test. Also, when having obtained more than one cointegrating vectors or concretely two for the regressions (3) and (4) in this research, some coefficients in front of the independent variables have to be restricted, based on the economic arguments, in order to estimate reasonable relationships (*Harris and Sollis, 2003*). That means some of the variables to be excluded from the first cointegrating vector and appear in the second cointegrating vector or vice versa. The economic arguments for restrictions need to be based on theoretical literature that deals with this topic, but such literature that considers the relationship between loan sector structure and current account balance with VECM technique is scarce, according to the knowledge of the authors. Therefore, restrictions were not imposed on the main variables (ENTERPRISE and HOUSEHOLD), because they are central variables whose influence on the dependent variable has to be estimated, but the rest of the independent variables were restricted. The justification for imposing the restrictions is considered by the Likelihood-ratio (LR) test which tests whether the imposed restrictions identify all cointegrating vectors for each possible rank and are binding. Having obtained two cointegrating vectors by Maximal Eigenvalue test was easier to impose restrictions, while it was difficult to impose restrictions with three or more cointegrating vectors, if the choice of the number of cointegrating vectors was based on the Trace of the Stochastic Matrix test.

Table 1 below contains the estimated long-run coefficients in front of the independent variables for the regressions (1), (2), (3) and (4) and ECM term. The regressions (3) and (4) were estimated in separate subregressions (3a), (3b), (3c), (4a), (4b) and (4c) by making combinations of the restricted independent variables. As it was mentioned above, restrictions were not imposed on ENTERPRISE and HOUSEHOLD, but on the other independent variables: LnRGDP, LnREER, LnREEREXCPC, LnRP, LnRPEXCPC and LnEARGDP. The restrictions were imposed on the independent variables by setting zero value in the cointegrating vectors.

Table 2: Estimated long-run coefficients for the regressions (1), (2), (3) and (4) by employing VECM method, CAB is the dependent variable (normalization of CAB=-1)

	Regression (1)	Regression (2)	Regression (3a)		Regression (3b)		Regression (3c)		Regression (4a)		Regression (4b)		Regression (4c)		
	CAB	CAB	CAB		CAB		CAB		CAB		CAB		CAB		
			Probability for not rejecting restrictions of the coefficients (0.32)***		Probability for not rejecting restrictions of the coefficients (0.10)***		Probability for not rejecting restrictions of the coefficients (0.43)***		Probability for not rejecting restrictions of the coefficients (0.64)***		Probability for not rejecting restrictions of the coefficients (0.11)***		Probability for not rejecting restrictions of the coefficients (0.87)***		
Dependent variable			First cointegrating vector	Second cointegrating vector	First cointegrating vector	Second cointegrating vector	First cointegrating vector	Second cointegrating vector	First cointegrating vector	Second cointegrating vector	First cointegrating vector	Second cointegrating vector	First cointegrating vector	Second cointegrating vector	
Independent variables	ENTERPRISE	2.00*	0.45*	0.49*	0.47*	0.43*	0.43*	0.48*	0.48*	0.47*	0.50*	0.42*	0.43*	0.48*	0.46*
	Standard errors	0.24	0.05	0.11	0.09	0.07	0.07	0.08	0.09	0.11	0.10	0.07	0.07	0.09	0.10
	HOUSEHOLD	-1.16*	-0.43*	-0.38*	-0.01	-0.36*	-0.34*	-0.17	-0.54*	-0.55*	0.06	-0.44*	-0.32*	0.01	-0.58*
	Standard errors	0.34	0.10	0.14	0.14	0.07	0.07	0.12	0.1	0.13	0.17	0.07	0.07	0.15	0.11
	LnRGDP	-0.82*	-0.17*	0	-0.14*	0.01*	0	-0.15*		0	-0.18*	0.03*	0	-0.18*	0
	Standard errors	0.13	0.05		0.04	0.003		0.04			0.05	0.01		0.05	
	LnREER	2.05*													
	Standard errors	0.26													
	LnREEREXCPC		0.72*												
	Standard errors		0.09												
	LnRP			0.22*	0	0	-0.01*	-0.18*	0						
	Standard errors			0.06			0.004	0.05							
	LnRPEXCPC									0.08	0	0	-0.02	-0.11	0
	Standard errors									0.09			0.02	0.10	
LnEARGDP	1.69*	0.48*	0.34*	0	0.02*	0	0	0.27*	0.36*	0	0.07*	0	0	0.35*	
Standard errors	0.25	0.08	0.07		0.004			0.06	0.08		0.02			0.07	
ECM	-0.04	-0.36	0.12	-0.36*	3.25	-3.56	-0.39**	0.07	0	-0.24**	0.5	-0.80	-0.27**	-0.002	
Standard errors	0.1	0.27	0.14	0.15	2.23	2.22	0.16	0.16	0.13	0.11	0.58	0.55	0.11	0.13	
Probability for weak exogeneity of LnEARGDP***	0.007	0.000	0.000		0.000		0.000		0.000		0.000		0.000		
No serial correlation (probability obtained by LM test)***	0.02	0.30	0.07		0.04		0.06		0.13		0.07		0.11		
Normality (probability obtained by Jarque-Bera test)***	0.23	0.00	0.00		0.00		0.00		0.00		0.00		0.00		
Homoscedasticity (probability obtained by White Heteroscedasticity test-no cross terms)***	0.38	0.52	0.01		0.01		0.012		0.015		0.012		0.015		

* and ** indicate statistically significant coefficient at 1% and 5% level of significance (H_0 : coefficient=0); *** a figure higher than 0.01 indicates non rejection at 1% statistical level of the following null hypothesis: (1) restricting coefficients, (2) weak exogeneity of LNEARGDP, (3) no serial correlation in the residuals at the first order, (4) normality in the residuals and (5) homoscedastic residuals.

Source: authors' calculations.

The results presented in Table 1 for the regressions (1) to (4), are in accordance with the expectations regarding the loan sector variables. Therefore, the ENTERPRISE loans improve the CAB with an average effect ranging from 0.42 percentage points to 2.00 percentage points, while, the HOUSEHOLD credit negatively affects the dependent variable with an average effect between 0.32 percentage points and 1.16 percentage points, ceteris paribus. Domestic economic activity represented by the LNRGDP has negative influence on the CAB, in most of the estimations, with an average effect spanning from 0.14 percentage points to 0.82 percentage points, and in two cases positive effect of 0.01 percentage point and 0.03 percentage points. The estimated coefficients in front of the LnREER and LnREEREXCPC are positive of 2.05 and 0.72, respectively. As it was explained above, such positive effect might be attributed to the J-curve effect meaning that real appreciation of the exchange rate makes domestic goods and services more expensive for the foreign importers and consequently the value of the domestic export increases. Thus, the results for the LnREER and LnREEREXCPC indicate that the positive effect of the real appreciation has not been exhausted for the period under investigation. The relative prices measured by LNRP have expected negative effect in regressions (3b) and (3c), implying that an increase in the domestic level of prices relative to the foreign ones by 1%, deteriorates the CAB by 0.01 percentage point and 0.18 percentage points, respectively. Unlike regressions (3b) and (3c), this coefficient is positive of 0.22 in the regression (3a). The LnRPEXCPC has two negative coefficients in (4b) and (4c) and one positive coefficient in (4a), but they are statistically insignificant. In accordance with the expectations, the statistically significant effect of the LnEARGDP is positive and ranges from 0.02 to 1.69 in all regressions. Finally, the ECM term is mostly negative suggesting correction of the disequilibrium towards equilibrium.

The diagnostic tests do not indicate problems in the residuals with the exception of the normality assumption. Furthermore, the LnEARGDP was tested for weak exogeneity in the four specified regressions, but the Likelihood-Ratio (LR) test implies rejection of this hypothesis and thus the variable was taken as endogenous in the VECM procedure. This is economically illogical because North Macedonia is a small economy relative to the Euro area and the CAB of the domestic economy cannot affect the LnEARGDP, unlike the reverse relation. Therefore, the interpretation of the coefficient in front of the LnEARGDP should be cautiously interpreted in this paper, given the illogicality of its exogeneity. Nevertheless, the literature provides evidence that such variable could be taken as endogenous variable. For example, *Bardakas (2014)* investigates the effect of the bank credit on the Greek export of goods and amongst other variables, the author considers world demand as endogenous²⁰, since the joint test of weak exogeneity rejects this hypothesis.

In summary, all the results are in line with the expectations with slight deviations regarding the positive long-run coefficients for the LnRGDP and the LNRP. Concerning the main variables of interest,

²⁰ Greece is also a small economy relative to the world.

the results are robust and indicate that companies' indebtedness improves the external balance, unlike the household indebtedness.

Having explained above in section 4.1, the reasons for not including dummy variable for capturing the possible structural break by the global financial crisis, formal check was made by inspecting the constancy of the coefficients²¹. The logic behind the check is the following: constant estimated coefficients provide forecasts for the variables used (fitted values) that do not deviate much from their actual values. Appendix 1 contains the forecasted and actual values for the CAB²² for the period 2008q1 to 2017q3 based on the results in Table 1. If there are large deviations of the forecasted from the actual values of the CAB, then the global financial crisis will change the constancy of the estimated coefficients for the above-mentioned period and the results will not be reliable. The figures in Appendix 1 do not indicate large deviations of the forecasted from the actual values of the variables used in the regressions, in fact, they move together. Thus, the estimated coefficients are constant and not affected by the global financial crisis. This also justifies our decision not to include the dummy variable for the global financial crisis.

5.2. Robustness check

Robustness of the estimated results, especially of the estimated long-run coefficients in front of the ENTERPRISE and HOUSEHOLD will be made by estimating the four regressions specified above by VECM technique and the dependent variable will be substituted for the trade balance (TB) composed of goods and services, excluding the effect of the TIDZ, expressed as a percentage of the nominal GDP²³. The period taken for the estimation is once again 2005q1-2017q3. Furthermore, the robustness will be checked by performing autoregressive distributed lags (ARDL) cointegrating method for the same period under investigation. The purpose of the robustness testing is to inspect whether the sign and the size of the estimated long-run coefficients for the main loan sector variables varies compared to the long-run coefficients estimated in Table 1. The VECM technique is employed following the procedure explained in sections 4.2 and 5.1 and that is determining the order of VAR by majority of the information criteria, the Maximum Eigenvalue test was used for obtaining the number of the cointegrating vectors and restricting coefficients in case of obtaining more than one cointegrating vectors. The results are presented in Table 2.

²¹ The check was technically made in Eviews 10 by making a model of the estimated VECM equations in Table 1 and solving it with deterministic simulation type and the option Fit (static-no equation interactions).

²² Other variables have not been presented in order to save space, however the results are available upon request.

²³ The variable TB was seasonally adjusted by employing Census X12 option in EViews 10. ADF and PP tests were employed to the TB and the results were conflicting, but there is evidence that the variable is I(1). Results are available upon request from the authors and they are not presented in order to save space.

Table 3: Estimated long-run coefficients for the regressions (1a), (2), (3) and (4) by employing the VECM method, TB is the dependent variable (normalization of TB=-1)

		Regression (1a) ²⁴		Regression (2)	Regression (3)	Regression (4)
Dependent variable		TB		TB	TB	TB
		Probability of not rejecting restrictions of the coefficients (0.17) ^{***}				
		First cointegrating vector	Second cointegrating vector			
Independent variables	ENTERPRISE	0.51*	0.23*	0.19*	0.10**	0.08**
	Standard errors	0.07	0.06	0.05	0.03	0.03
	HOUSEHOLD	-0.62*	-0.55*	-0.22**	-0.13**	-0.08
	Standard errors	0.08	0.08	0.11	0.06	0.06
	LnRGDP	0	0.19*	-0.10	-0.05**	-0.03
	Standard errors		0.02	0.05	0.02	0.02
	LnREER	0.37*	0			
	Standard errors	0.04				
	LnREEREXPC			0.46*		
	Standard errors			0.10		
	LnRP				-0.24*	
	Standard errors				0.03	
	LnRPEXCPC					-0.27*
	Standard errors					0.04
LnEARGDP	0.33*	0	0.39*	-0.12*	-0.09*	
Standard errors	0.04		0.08	0.03	0.03	
ECM	0.17	-0.04	-0.12	-0.94*	-0.96*	
Standard errors	0.38	0.39	0.20	0.23	0.23	
Probability of weak exogeneity of LnEARGDP ^{***}	0.000		0.000	0.05	0.14	
No serial correlation (probability obtained by LM test) ^{***}	0.20		0.19	0.10	0.15	
Normality (probability obtained by Jarque-bera test) ^{***}	0.89		0.34	0.00	0.00	
Homoscedasticity (probability obtained by White Heteroscedasticity test-no cross terms) ^{***}	0.52		0.69	0.09	0.08	

* and ** indicates statistically significant coefficient at 1% and 5% level of significance (H0: coefficient=0); *** a figure higher than 0.01 indicates nonrejection at 1% statistical level of the following null hypothesis: (1) restricting coefficients, (2) weak exogeneity of LNEARGDP, (3) no serial correlation in the residuals in the first order, (4) normality in the residuals and (5) homoscedastic residuals.

Source: Authors' calculations.

²⁴ The restrictions on the regressions (1b) and (1c) were rejected by the LR test and therefore these regressions are not considered.

The estimated results for the main loan structure variables are once again in accordance with the expectations i.e. positive for ENTERPRISE and negative for HOUSEHOLD. The long-run coefficients of the ENTERPRISE span from 0.08 to 0.51, while the HOUSEHOLD coefficients range from 0.13 to 0.62. The results in Table 2 are robust concerning the sign of these variables and are slightly lower compared to the results in Table 1. Also, the estimated coefficients for the other variables do not deviate much from the respective coefficients in Table 1, except for the positive coefficient for the LNRGDP in the regression (1a) and the negative coefficient for the LnEARGDP in the regressions (3) and (4). It should be noted that LnEARGDP is weakly exogenous variable in the regressions (3) and (4) in Table 2 because the test of the weak exogeneity does not reject the null hypothesis.

Implementing the ARDL approach, as a second robustness check, for obtaining the long-run relationship between the variables of interest, involves three steps²⁵: firstly, the number of lags²⁶ in the ARDL has to be chosen; secondly, whether there is a long-run relationship between the variables; and finally, if there is, a long-run relationship is estimated (*Pesaran and Pesaran, 1997*). All three steps were fulfilled and the results for the regressions (1), (2), (3) and (4), with the CAB as dependent variable, are given in Table 3.

²⁵ Results of the separate steps are available upon request from the authors and they are not presented in order to save space.

²⁶ The number of lags was determined by inspecting the Akaike information criteria from maximum three lags.

Table 4: Estimated long-run coefficients for the regressions (1), (2), (3) and (4) by employing ARDL method²⁷, CAB is dependent variable

	Regression (1)	Regression (2)	Regression (3)	Regression (4)	
Dependent variable	CAB	CAB	CAB	CAB	
Independent variables	ENTERPRISE	0.07	0.34*	0.19	0.19**
	Standard errors	0.14	0.08	0.10	0.09
	HOUSEHOLD	-0.51**	-0.55*	-0.55*	-0.51*
	Standard errors	0.24	0.15	0.20	0.18
	LnRGDP	0.24**	0.002	0.10	0.10
	Standard errors	0.09	0.08	0.10	0.08
	LnREER	-0.10			
	Standard errors	0.14			
	LnREEREXCPC		0.52*		
	Standard errors		0.16		
	LnRP			-0.21**	
	Standard errors			0.10	
	LnRPEXCPC				-0.30**
	Standard errors				0.11
	LnEARGDP	-0.35**	0.17	-0.23**	-0.20**
	Standard errors	0.12	0.12	0.10	0.09
	ECM	-0.82*	-1.13*	-0.91*	-0.96*
	Standard errors	0.11	0.14	0.12	0.12
No serial correlation (probability obtained by Breusch-Godfrey LM test at 3 lags) ***	0.58	0.39	0.79	0.55	
Normality (probability obtained by Jarque-Bera test)***	0.52	0.07	0.51	0.61	
Homoscedasticity (probability obtained by Breusch-Pagan-Godfrey test)***	0.62	0.97	0.73	0.66	
* and ** indicates statistically significant coefficient at 1% and 5% level of significance (H ₀ : coefficient=0); *** a figure higher than 0.01 indicates that the null hypothesis of no serial correlation in the residuals (F test), normality in the residuals (Chi square test) and homoscedastic residuals (F test), cannot be rejected at the 1% level.					

Source: Authors' calculations.

Table 3 indicates robustness concerning the coefficients' sign of the loan sector variables, and their size is not drastically lower than those in Table 1. The statistically significant coefficients of the ENTERPRISE are 0.34 and 0.19. Regarding the HOUSEHOLD, it has negative effect within the interval from 0.51 to 0.55. Concerning the other long-run coefficients estimated by the ARDL method, the results are not stable for the LnRGDP and LnEARGDP. Unlike Table 1, the coefficients of these variables

²⁷ Diagnostic tests of the residuals for serial correlation, normality and heteroscedasticity are favorable and do not imply problems. Results of the diagnostic tests are available upon request from the authors and they are not presented in order to save space.

in Table 3 changed i.e. from negative to positive for LnRGDP and from positive to negative for LnEARGDP.

6. Conclusion

The purpose of this research is assessing the potential relationship between separate loan types (enterprise and household loans) with the current account balance. The analysis was done by performing VECM cointegration method and ARDL technique for robustness check. The results from both econometric techniques indicate that there is a positive and significant relationship between enterprise loans and current account dynamics, while the household loans have a negative and significant effect on the external balance.

These findings suggest that an increase in the enterprise loans level helps in curbing the permanent deficit in the current account balance, and hence, attempts by banks to support credit expansion to companies, especially exporting companies and companies that try to invest and substitute the import for domestic production, may improve the current account dynamics in North Macedonia. On the other hand, the negative relationship between household loans and the external position of the country, suggests that attempts to control credit expansion to this sector may help to curb current account deficits. However, since the paper does not estimate the equilibrium credit growth that would improve or deteriorate the current account balance, these results should be interpreted as the only indicative of the causal relationship that exists between the sectorial decomposition of the private loans and the current account balance in North Macedonia and not as tools and advice to policymakers to undertake measures to favor or disfavor certain types of private loans. Therefore, a more comprehensive analysis should be made before any activity or measure regarding different credit categories.

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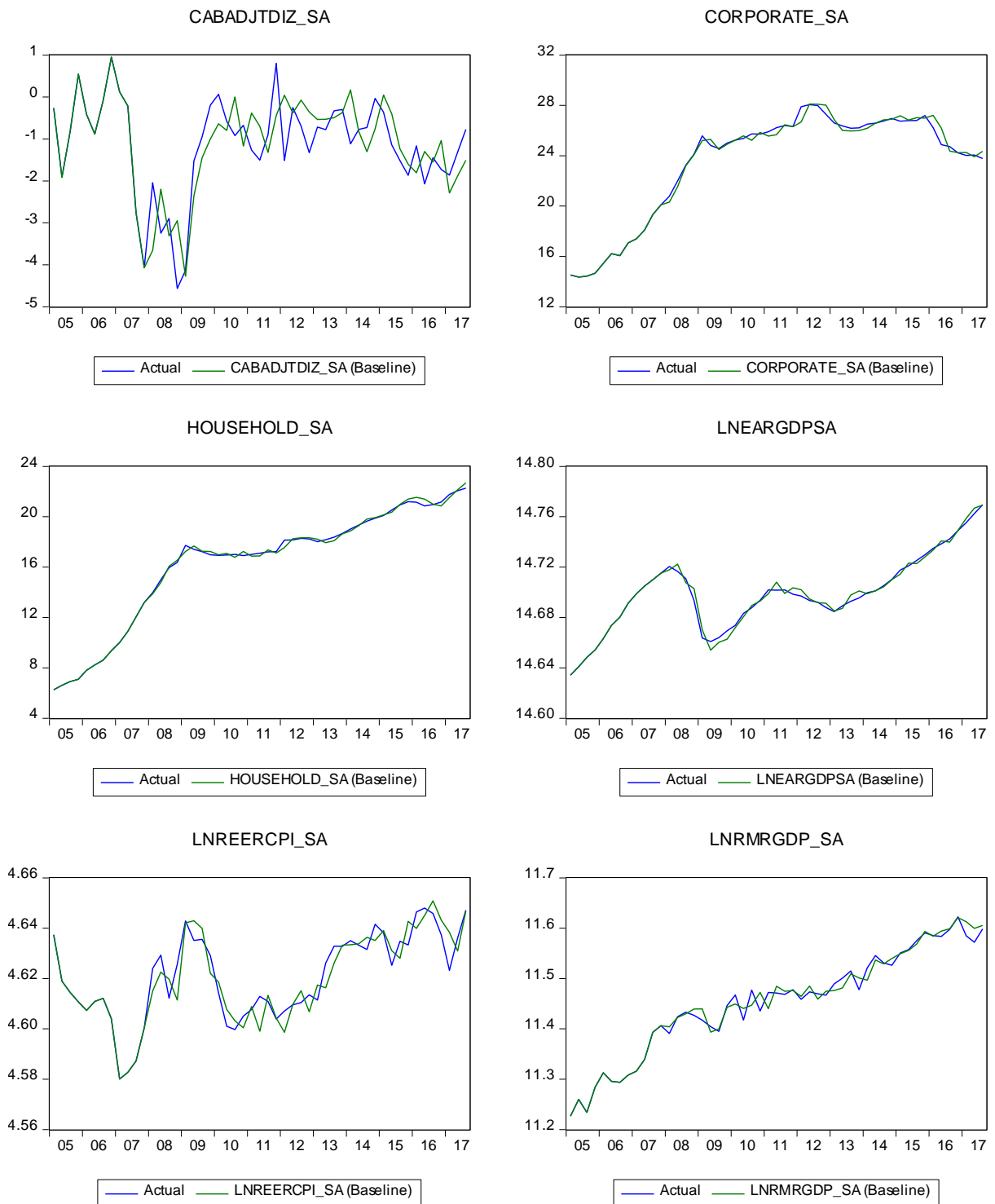
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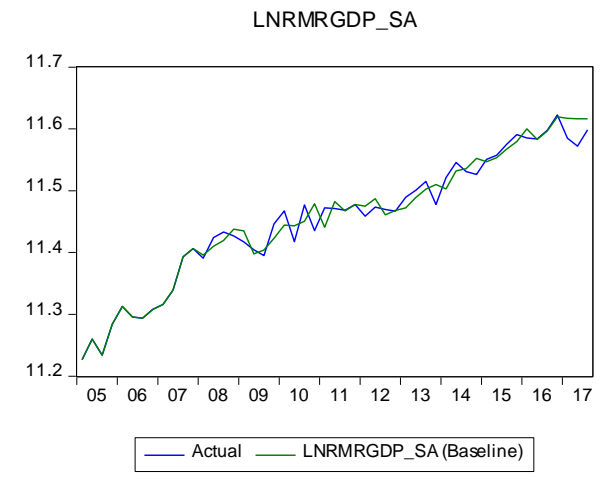
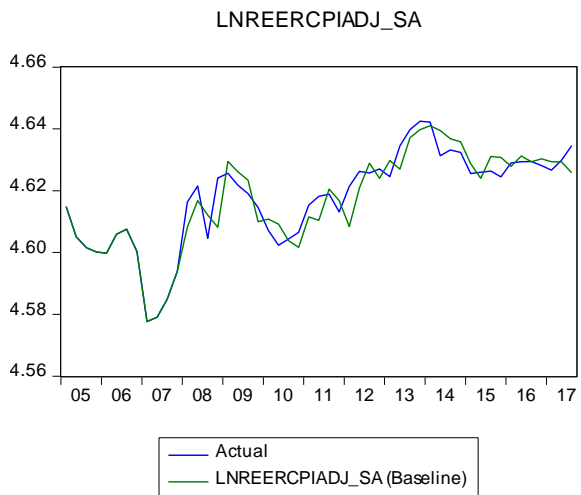
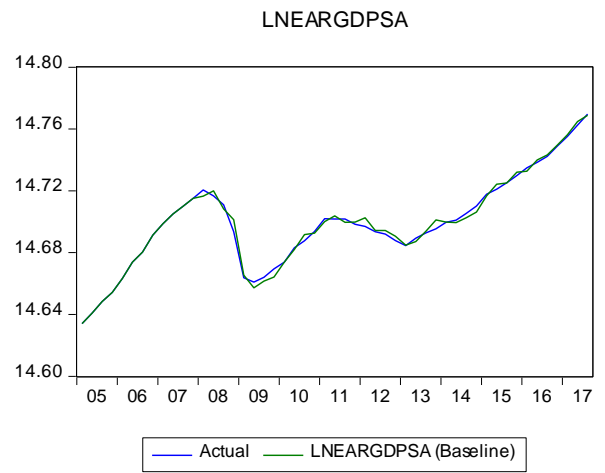
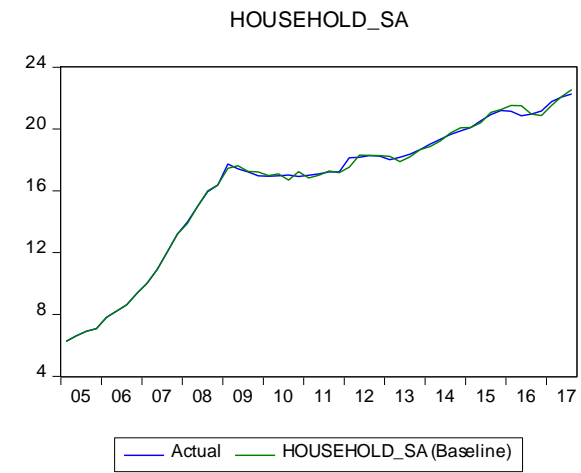
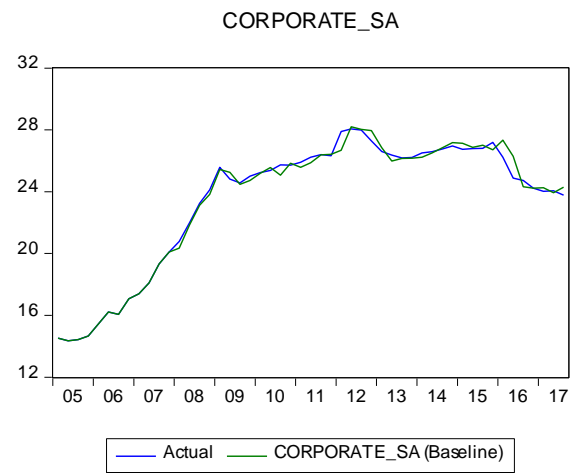
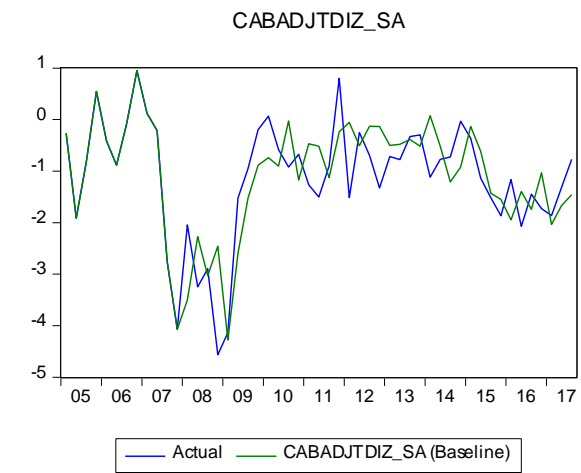
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Appendix 1

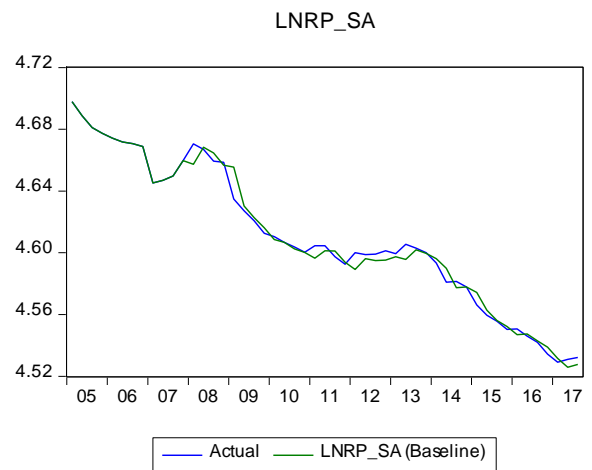
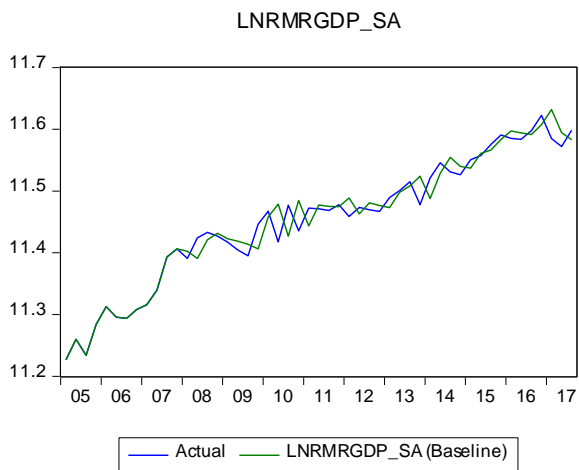
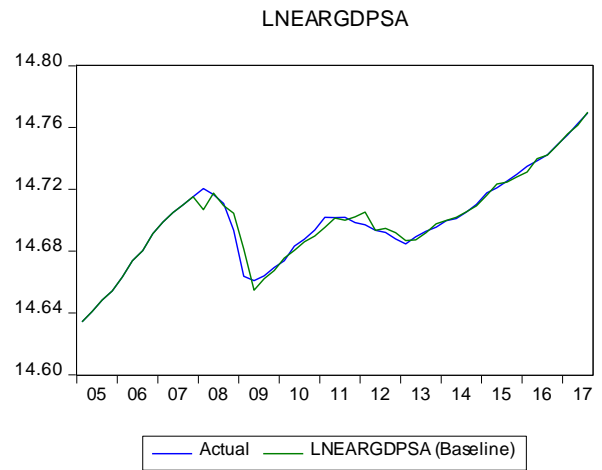
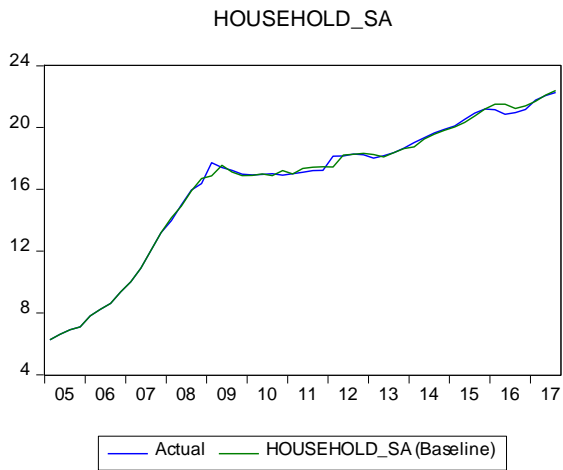
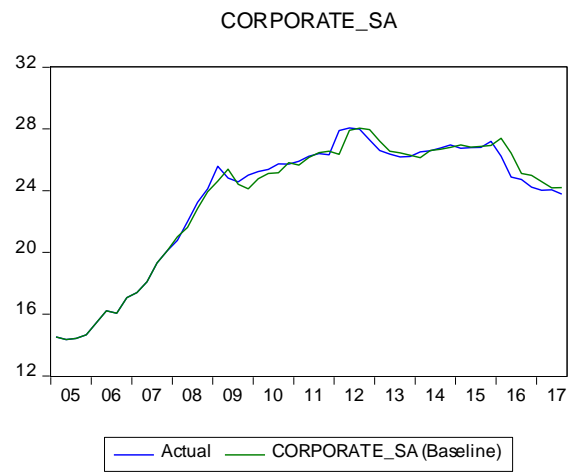
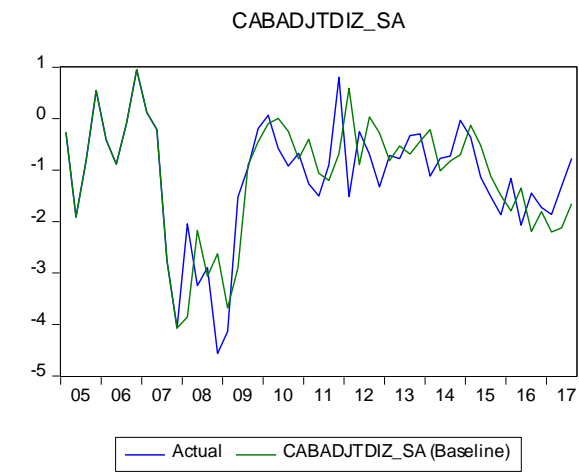
Based on the results from the regression 1 in Table 1



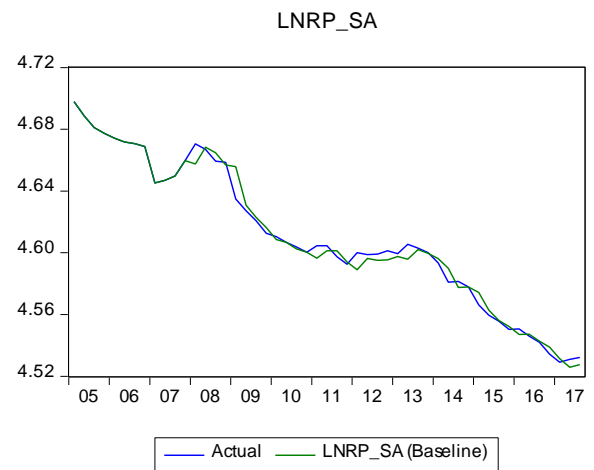
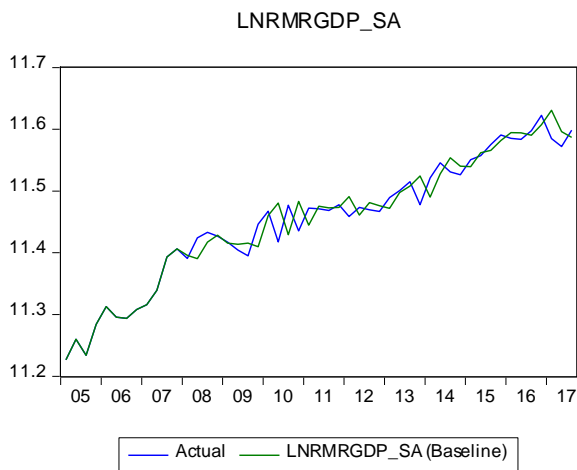
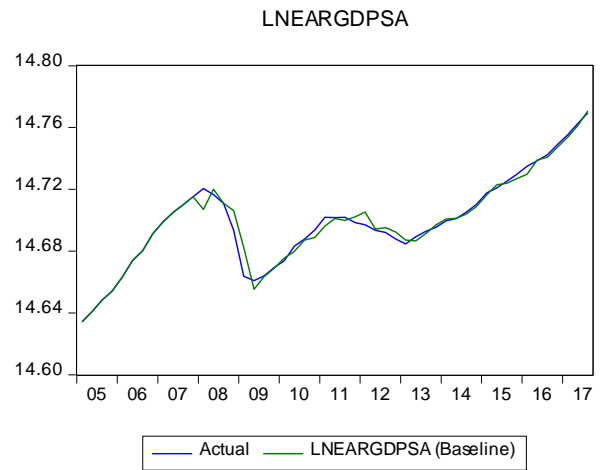
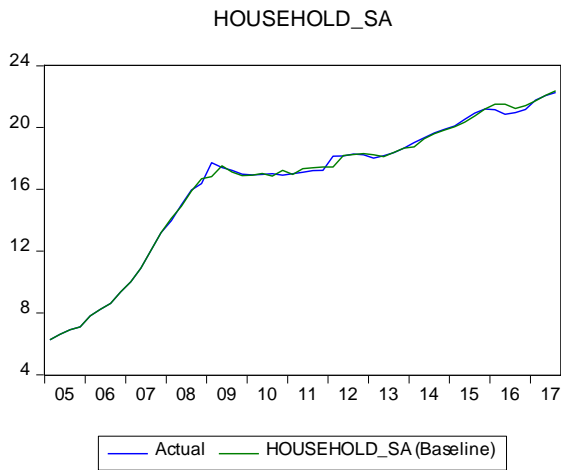
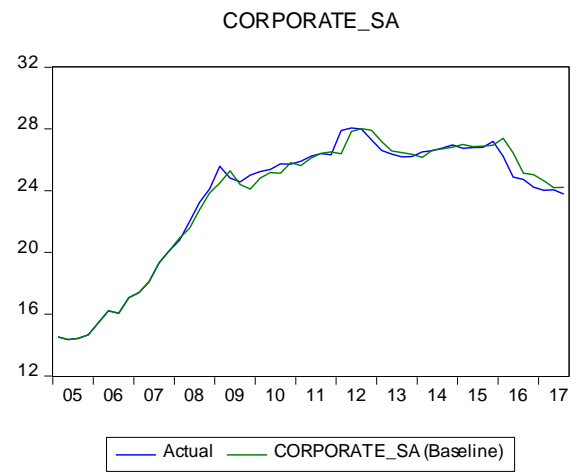
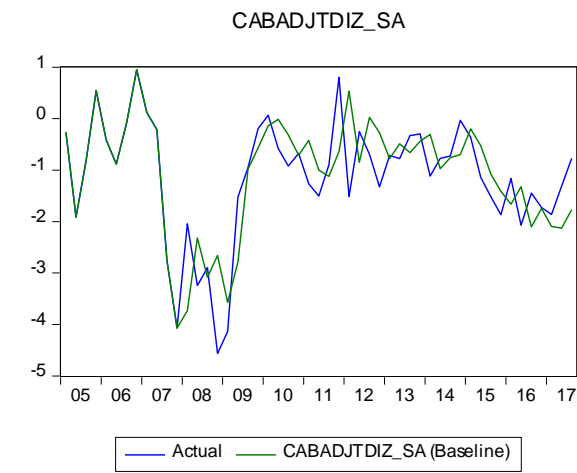
Based on the results from the regression 2 in Table 1



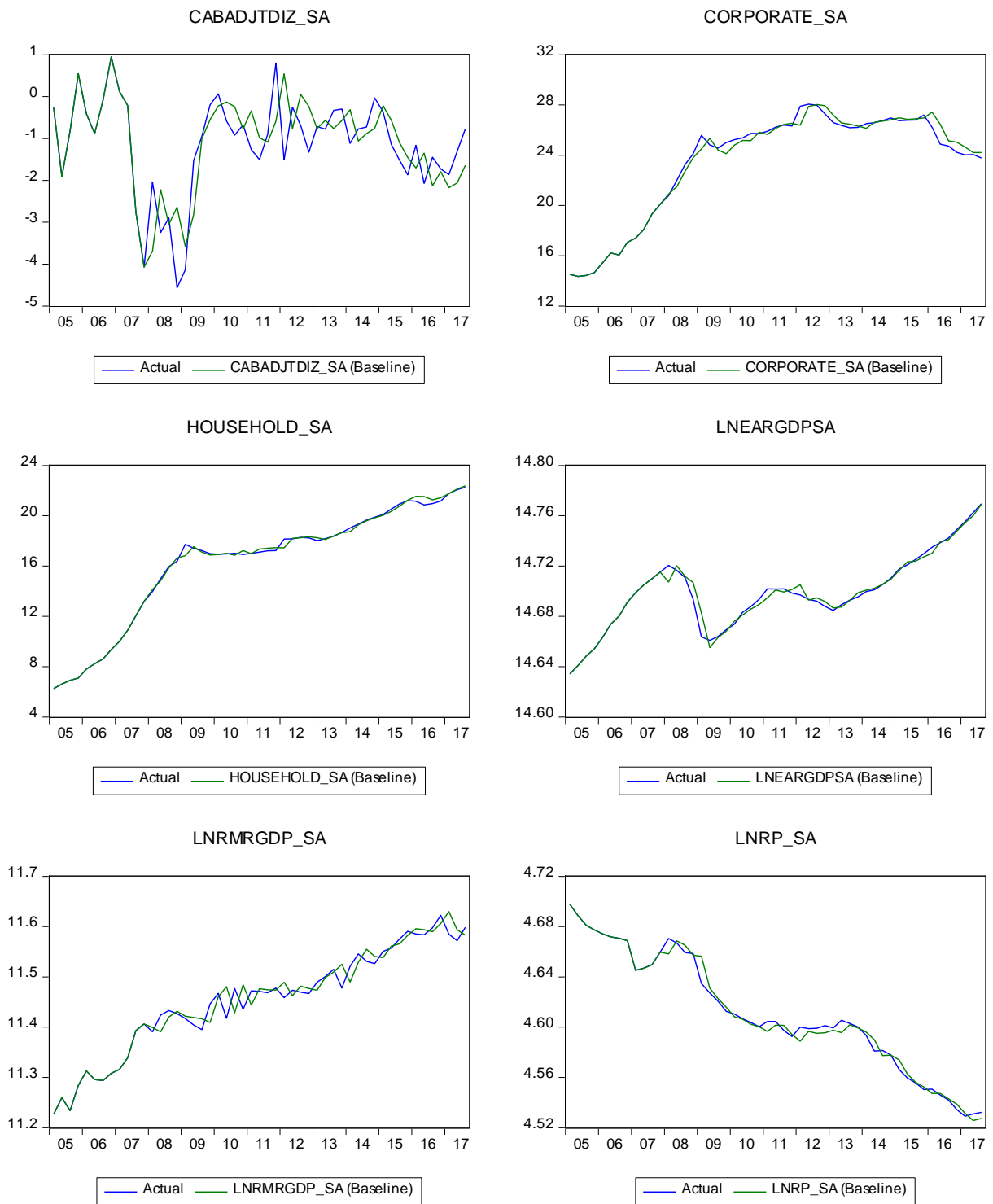
Based on the results from the regression 3a in Table 1



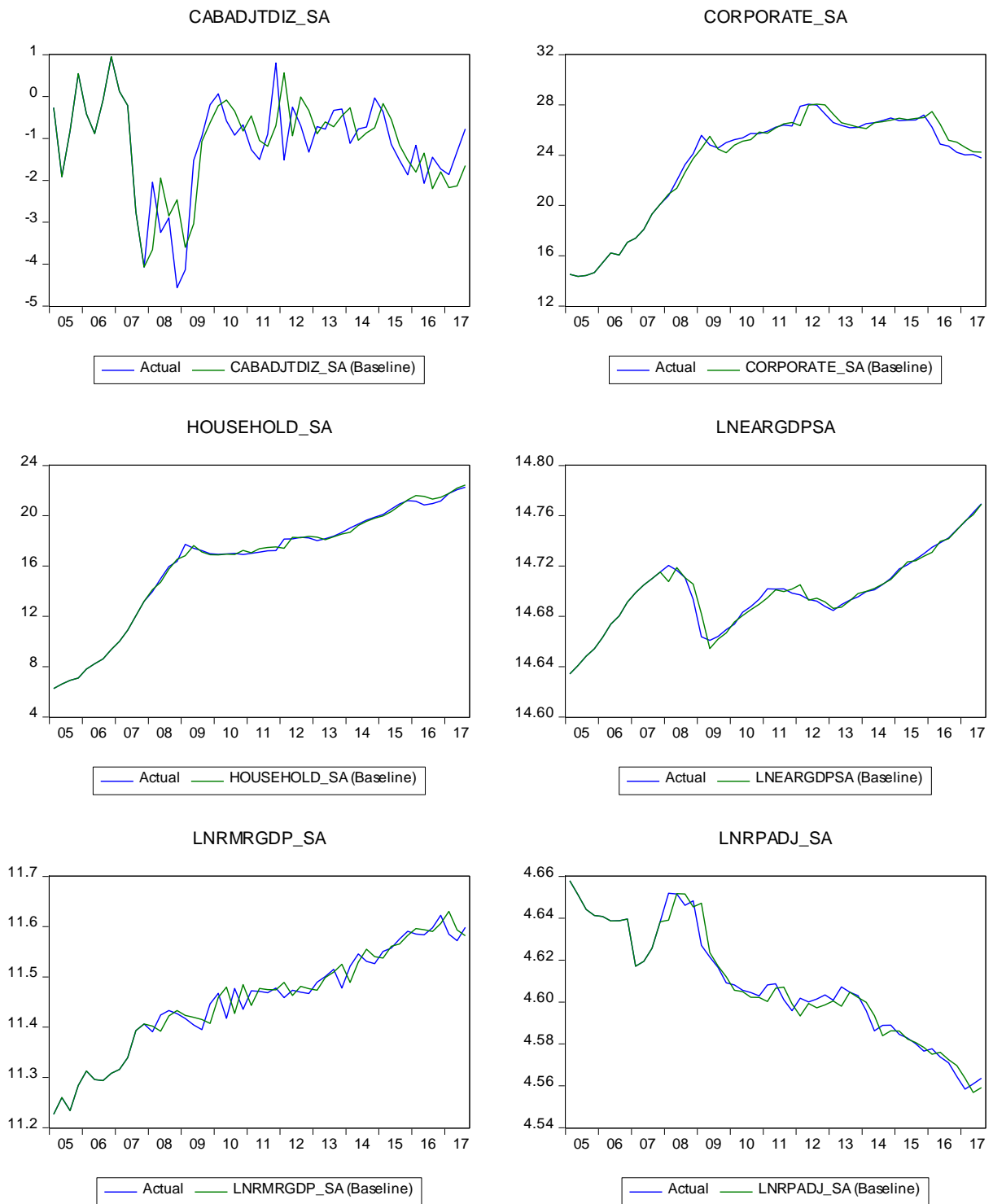
Based on the results from the regression 3b in Table 1



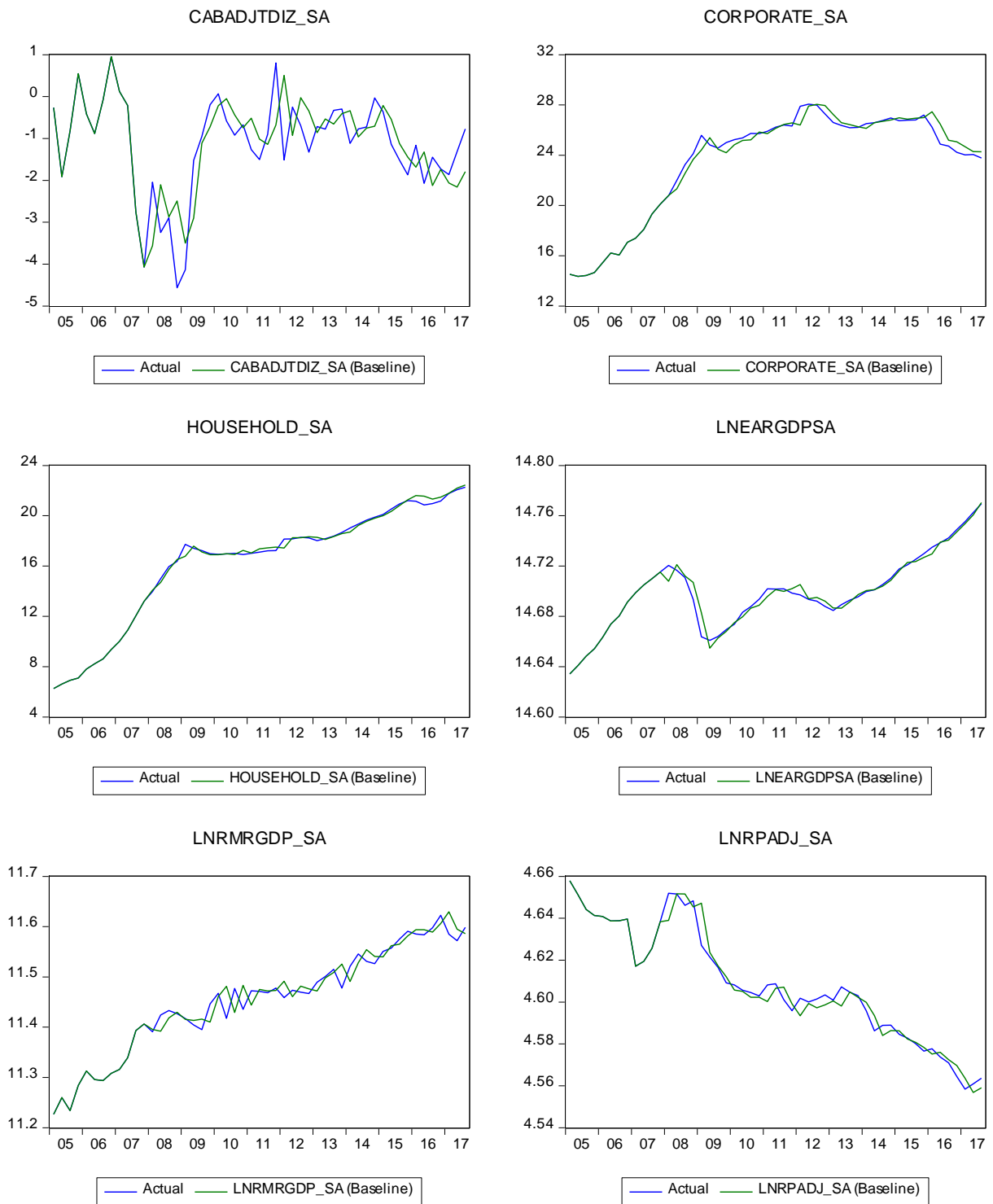
Based on the results from the regression 3c in Table 1



Based on the results from the regression 4a in Table 1



Based on the results from the regression 4b in Table 1



Based on the results from the regression 4c in Table 1

