The Mittelstand Miracle: A Decade of Growth without Credit?*

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Abstract

The German non-financial corporate sector was traditionally known for its strong bank dependence and low equity ratios. The Hausbank principle allowed banks to exert influence on business practice of firms, granting them in turn lavish external financing possibilities. However, in the beginning of the last decade this changed dramatically: the volume of corporate loans and bank dependence diminished, the equity ratios of German firms started growing steadily, enabling them to keep a high degree of financial soundness during the Great Recession. Two factors are mainly stressed by economists in explaining this phenomenon: successful structural reforms in the mid of the last decade as well as quick emerging of alternative financing instruments. We do not deny the role of these factors. However, we argue, that another important factor may be overseen in this context: the existence of the European Monetary Union by itself.

Keywords: credit creation, non-financial corporations, retained profits, monetary union, German economy

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1 Introduction

The recent financial crisis and the subsequent Great Recession resurrected public and professional interest in fundamental questions about the functioning of the modern banking system. Over the Great Moderation period these concerns took a back seat to a view of monetary policy conducted exclusively by changing interest rates. Taylor-like rules became the standard approach to model central bank behaviour in the 1990s (see, for example, Svensson 1997), while money and credit aggregates disappeared from the bulk of monetary policy models (see, for example, Woodford 2003) despite the fact that banks create the major part of money in our financial system. Focusing on money and credit aggregates challenged central banks as standard money demand models had difficulties in explaining monetary dynamics on the basis of developments in the traditional determinants, such as output, prices and interest rates. However, a central bank cannot ignore the information from monetary developments in its assessment and policy considerations and the relevant debate is not whether central banks should conduct monetary analysis, but rather how they should do so (see also Issing 2005).

In academic circles, money and credit aggregates also did not completely disappear, though they rather moved away from mainstream economics. Besides the dominant neo-classical and New Keynesian mainstream the post-Keynesian research paradigm allows for a comprehensive modeling of monetary variables in the stock-flow consistent framework. Godley and Lavoie (2007) provide an excellent compendium to these modeling techniques with many practical examples. Beyond the post-Keynesian school of thought, Werner (1997, 2005) was a distinctive exception in the pre-crisis period. As already claimed long ago by Schumpeter (1917(1956)) Werner repeatedly stresses the fundamental importance of credit creation process and its institutional setup for sustainable growth and financial stability. Analyzing money and credit creation in more detail seems to revive - last but not least due to the crisis. For instance, Benes and Kumhof (2012) provide a comprehensive analysis of the widely known Chicago Plan, firstly proposed by Fisher (1936). In the DSGE framework they find that a full reserve banking system had some significant advantages over the traditional private money creation, both in terms of financial stability and output level as predicted by Fisher. Other groups of researchers try to formulate alternative approaches for considering the

modern money system without disregarding its operational characteristics, see for example Roche (2011).

Since the recovery after the Great Recession turned out to be amenic in a couple of countries including the United States, the importance of credit creation dynamics for economic policy is arising besides the typical financial stability issues. Reluctant bank lending to the real economy due to the delevearing processes is often blamed for sluggisch growth, different steps are discussed how to create incentives for more credit growth in the affected countries, for example funding for lending scheme proposed by the Bank of England (BoE, 2012). However, there is a notable exception among major industrial countries in this sence: The German economy. German GDP fell sharply during the Great Recession, more than in the most other european countries. Nevertheless, after the recession Germany experienced a fulminant recovery that brought down the unemployment rate to the lowest level since 20 years. No signs of credit crunch was reported from Germany during or in the aftermath of the financial crisis. Even more striking: a significant part of German firms seem to deleverage in spite of favorable economic conditions (Bundesbank, 2011), a fact contradicting the commonsence beliefs about how our credit based economic system is functioning, where households act as net lenders and corporate sector as net borrower of funds.

The last fact is ever more surprising as the traditional bank dependency of German economy, especially of its small and medium sized enterprises - the so-called Mittelstand, is well-known. Another catchy German word Hausbank describes the special relationship, which exists or at least existed in the past between banks and the majority of SME's in Germany. Closely related to the anglosaxon term "relationship lending" the Hausbank principle stands for a long-run relationship between a bank and a firm, which goes far beyond the sheer act of money lending. A hausbank provides inter alia also numerous consulting services to the borrowing firm, which in turn reduces information asymmetries and mitigates the classical problem of credit rationing to a large extent. Consequently, the relationship lending implies also an insurance role for the corresponding firm: in the case of an transitory negative shock the credit lines are secured, thus minimizing the default probabilities due to liquidity shortages.

The relationship lending system showed a very good record in German economic history and contributed to the German economic miracle after the World

War II. However, in the past decade the Hausbank principle began to attract an ever growing amount of critisism, mostly because of low equity ratios of German non-bank firms, which enhanced the bank risks substantially. After the German reunification the economy was highly burdened with its costs, loosing a good deal of competitivness. The default probabilities of firms began to rise persistently connected with falling interest rate margins in the SME's segment. Now the Hausbank model was blamed for being an old fashioned, even a stone age form of banking (Mueller, 2002).

The situation worsened further after the bursting of the dot-com bubble. As the weakness of the German economic model became even more apparent, in particular big banks began selling their industry holdings and reducing their traditional credit portfolios. The tight network between industry and banking sector, often called before the Deutschland AG, was vanishing. The non-bank corporate sector started deleveraging, changing its position form a net borrower to a net lender of funds. However, after structural reforms had been accomplished leading to a strong export-driven boom in 2006-2007, the credit growth did not return to old intensity and remained slow. This pattern also persisted in the aftermath of the financial crisis. But how could the German economy revert to strong growth without an external financing boom? Many blame the pronounced export orientation of the German economy for emerging imbalances, since a lack of investement by the corporate sector may be the reason for its net lender financial position. For example, Koo (2008) concludes that German non-bank firms escaped the balance sheet recession by taking advantages of the eurozone's large market and common currency, while keeping domestic labor costs low. Could it also be a driving factor for low credit growth in Germany? However, German is well-known for its export surplues for many decades, which did not impede credit growth in the past.

In the present work we attempt an inspection of driving factors for German low credit growth in an alternative monetary framework proposed by Werner (2005). Our results show that despite the importance of export orientation there is another important reason for slowly rising borrowings of German firms: German membership in the European monetary union by itself. An unique combination of export competitivness and a membership in a large monetary union form the frame (common currency, no exchange rates) where domestic credit is partly substituted by trade surpluses. Hence, in some sence we confirm the conclusions of Koo (2008),

in addition pointing out how operational characteristics of a monetary union can change the credit creation dynamics in the corresponding countries. The rest of the paper is organized as follows: Section 2 establishes the "Puzzle" of German credit growth by identifying a credit gap, which "lacks" respective the observed GDP expansion rate. Section 3 "closes" the gap by relating it to German trade surpluses with the Eurozone countries. The next section reconsiders our findings from the European perspective, indicating that the "closing" of German credit gap was, however, hardly possible without participation of the German banking system. Section 5 outlines the substition mechanics between export cash-flows and domestic credit theoretically in a simple two-country model of post-Keynesian type. The final section concludes.

2 The Puzzle of German Credit Growth

The original motivation for this work stems from an attempt to reestimate the credit restrictions model of Bayoumi and Melander (2008) with German data. Bayoumi and Melander (2008) develop an empirical model for analyzing macro-financial linkages in the United States. Their analysis starts by estimating an effect of shocks to bank capital on bank lending standards. In the next step an equation, that relates changes in lending standards to actual credit growth, is estimated. Thereafter, Bayoumi and Melander proceed by providing an econometric equation for real spending aggregates like private investment or consumption as a function of credit growth. Finally, the loop is closed by considering of income aggregates and their feedback to bank capital through default probabilities of enterprises. The framework allows to quantify the impact of bank capital shocks to actual output of the U.S. economy. Fore example, Bayoumi and Melander (2008) estimate that an exogenous fall in demand of 1 percent of GDP is amplified to around 2 percent through financial feedback loop.

It is trivial to see that a fundamental element of a macro-financial model of this type is a postitive and significant relationship between credit and spending aggregates. If no such linkage can be found empirically then the whole modelling cycle makes no sence anymore. This was exactly the problem with German data. It was hardly possible to find any stable correlations between broad credit aggregates and aggregated measures of economic activity like GDP. To illustrate these

Period	Granger causality		Correlation
	C $\rightarrow$ GDP	GDP $\rightarrow$ C	
1980 - 1990	**0.04**	0.59	0.55
1991 - 2001	0.94	0.56	0.73
2002 - 2012	0.66	**0.09**	-0.25

Table 1: p-values of Granger causality tests (columns 2, 3) and estimated correlations between nonimal GDP and nominal bank credit (for non-bank firms) growth, all data in yoy-rates. All test are computed in EViews, Granger tests are performed with 4 lags.

empirical findings in more detail we compute the results of Granger causality test as well as simple correlations between the growth rates of nominal German GDP and nominal bank credit volume to non-bank firms, see Figure 1. The statistics are calculated for different subsamples of the last three decades, the results are displayed in Table 1. It can be clearly seen that in the decade before the German re-unification credit growth Granger causes GDP growth and the correlation between them is positive. In the first decade after the reunification there is no significant link between credit and GDP growth in terms of Granger causality. During the last decade the direction of Granger causality changes and the correlation become negative.

Now our intention is to analyze the links between the German economic growth and the corresponding credit expansion dynamics in a more structural way. For this purpose we adopt the framework proposed by Werner (1997) and explained in more detail in Werner (2005), called the quantity theorem of disaggregated credit. Werner builds his analysis on the well-known quantity theory of money, agruing that an increase of output, expressed in terms of number and value of transactions in an economy in a given period (Q), can only be achieved by the corresponding expansion of money stock in circulation (M),

$$MV = PQ, \tag{1}$$

where V is the money velocity and P the price level. However, the traditional quantity theory exposed a rather bad performance in terms of the money velocity in the past. Economic theory postulates a constant money velocity, but this is

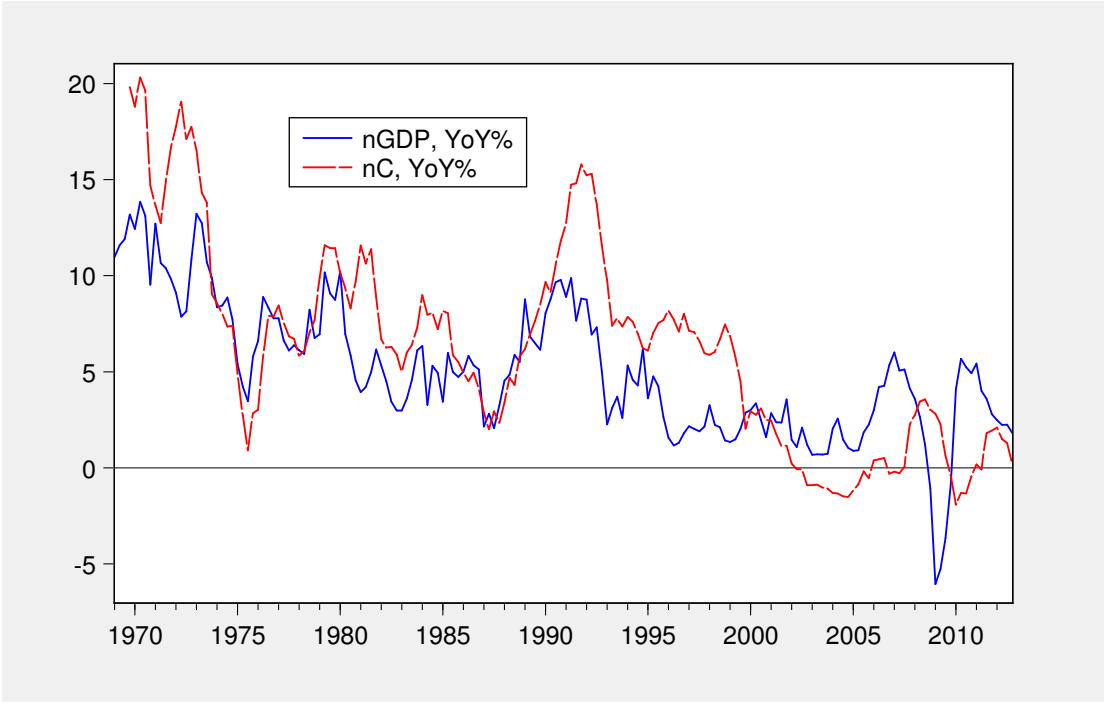

Figure 1: Nominal GDP and nominal bank credit (for non-bank firms) growth in Germany, yoy-rates, notional stocks are used to build credit growth rates. Source: Deutsche Bundesbank.

empirically not the case, since a trending money velocity was required in order to balance two sides of the quantity equation.

Werner (1997, 2005) claims, however, that the quantity equation in its emirical form with the gross domestic product as output measure actually is not an equation since the money stock in circulation is also used in transactions, which are not measured by the GDP, for example, most of financial transactions. For this reason, if the number of non-GDP transactions increases, for example due to a financial market boom, the estimated money velocity has to decrease, otherwise the equation is not balanced. In order to balance the equation we should use a money measure that is only used for GDP transactions, however no such measure exists because it is hardly possible to differentiate between deposits for GDP and deposits for non-GDP purposes. Hence, Werner proposes to change the balance sheet side considering credit aggregates. This change is appropriate since banks expand the size of both sides of their balance sheets by granting loans and creating deposits simultaneously. However, only bank loans or other form of bank investments

are considered, because investments by non-bank institutions do not constitute creation of new means of payments but only a redistribution of available means of payments in the economy. Typically banks are required to report information about borrowers if they lend. This information could be used to discriminate between credit aggregates for different purposes, thus enabling us to approximate credit for GDP and non-GDP uses. So far, we leave out credit to abroad as an important factor of money creation in an open economy.

First, Werner (1997) formulates the Quantity Equation in terms all economic transactions

$$CV = PQ, \tag{2}$$

where C, V, P and Q denote credit, money velocity, price level and the total number of transactions respectively. Second, GDP-based and non-GDP transactions are separated, so that Q is replaced by real GDP Y. However, credit, money velocity and price level are replaced as well, linking new measures to the GDP

$$C^Y V^Y = P^Y Y, \tag{3}$$

with C^Y, V^Y and P^Y denoting credit for GDP-based transactions, money velocity in the real economy and finally the GDP deflator. Assuming a constant money velocity and considering growth rates instead of levels the equation can be simplified considerably as follows

$$\Delta c_t^Y = \Delta y_t^N, \tag{4}$$

where y_t^N and c_t^Y are nominal GDP and credit for GDP transactions in logs respectively. Since nominal GDP series are available for most countries, the main task reduces to finding appropriate measures of credit aggregate for productive purposes.

Now we apply the framework of the quantity theorem of disaggregated credit to study the credit growth in Germany. First, a measure of credit aggregate for productive purposes has to be found. An obvious choice for the productive credit aggregate is bank credit granted to non-bank firms. Since housing credit and mortgages of private households are often used for non-GDP transactions like buying land or already existing real estate, we do not include them in our productive credit measure. Furthermore, consumption credit usually played only

a minor role in Germany, so that we do not include it until now as well. The results turned out to be robust also after including consumption credit.

Growth rates of nominal GDP and bank credit for non-financial firms are plotted in Figure 1. We see that even though the one-to-one relationship between credit and production growth seems to be fulfilled, this is a very rough approximation, since rather large and persistent deviations from the postulated equations are observed. In particular, there are two subsequent periods, where we observe a significant gap between the credit and GDP growth: (a) the decade after the German reunification as well as (b) the subsequent decade which is mainly characterized by the existence and functioning of the European Monetary Union.

In the first period the credit growth exceeded the production growth by far. The time after the German reunification was characterized by strong credit expansion, in particular for real estate purposes. In the second half of the decade the credit growth was intensified by the emerging dot-com bubble. At the beginning of the new millenium a striking turnaround in the credit dynamics takes place. After bursting of the dot-com bubble the German economy undergoes a persistent weakness phase. A part of real estate investments, made in the course of the German reunification, turned out to be non-performing assets as well, burdening bank balance sheets additionally. Now the credit growth became lower than the GDP expansion rate, reaching even the negative area, which means credit destruction. The credit growth stabilizes at the peak of the German export driven boom around 2007, however remains stromgly positive when the economy slacks in the course of the global financial crisis. In the following deep recession we observe a significant credit expansion, which, however, turns to credit destruction during the subsequent strong recovery. Can these observations be explained by the quantity theorem of disaggregated credit? How could the German GDP keep growing during the credit destruction phase in the first half of 2000-2012 period? Why did the credit stock expand at the trough of the Great Recession?

In the framework of Werner (2005) there are two possible explanations for the observed anomalies. First, our productive credit measure, namely the bank credit for non-financial firms, could be biased by a significant volume of non-GDP transactions. The excessive credit growth after the German reunification would confirm this thesis. Second, German firms could acquire other sources of credit than German banks, for instance borrowing from banks in other countries of the

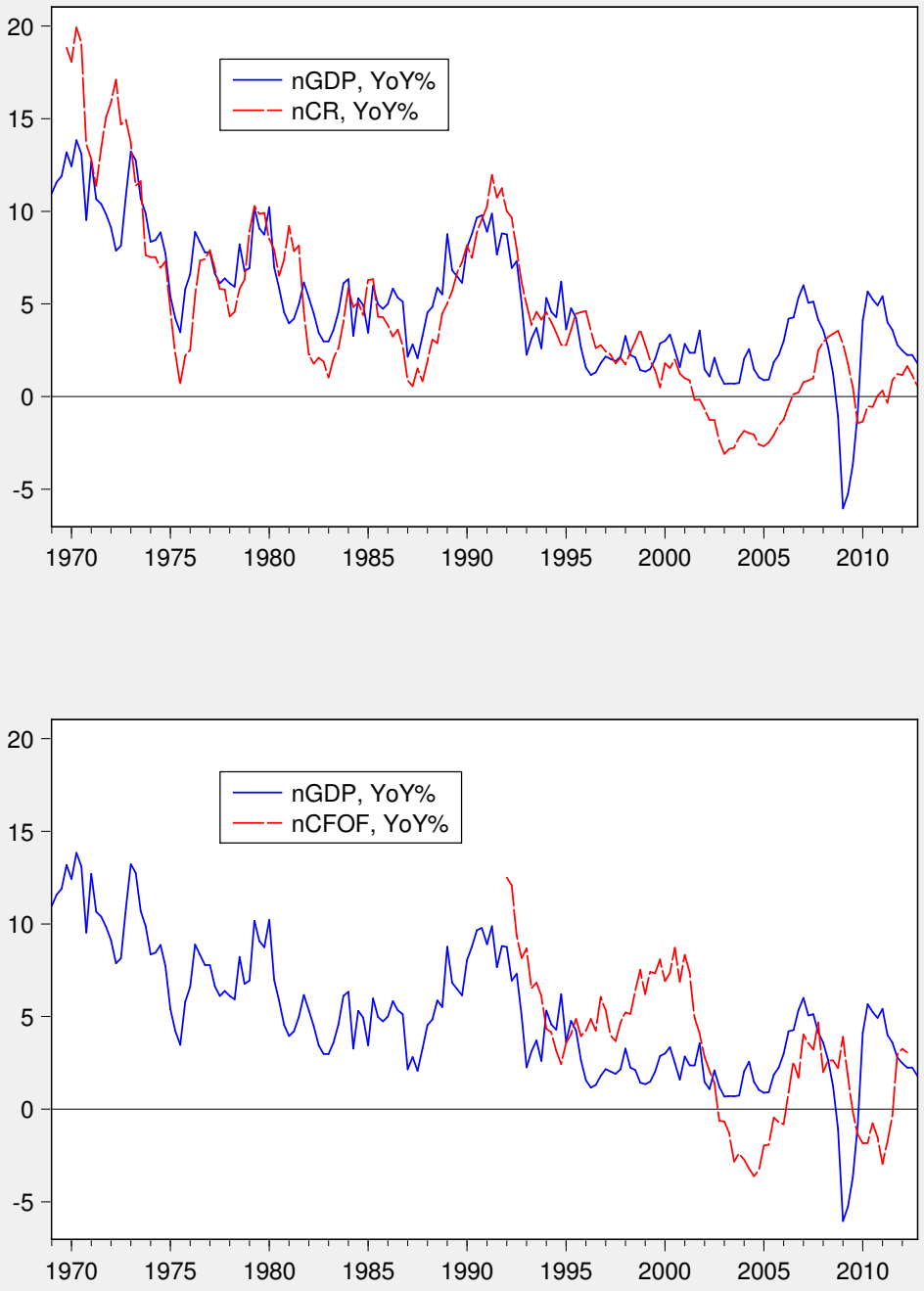

Figure 2: Credit growth for productive purposes vs. nominal GDP growth (upper plot) and growth of total (banks and non-banks, flow of funds) credit granted to non-bank firms (lower plot), yoy-rates. Source: Deutsche Bundesbank.

Eurozone. This hypothesis could match the period with the negative gap between the GDP and credit growth.

In order to test the first hypothesis we consider also bank credit for non-bank firms accordingly to different industry branches. The overall series for bank credit for non-bank firms exhibits a rising GDP-to-credit ratio. It turns out that this is mainly due to the credit granted to the business services branch. The ratio of credit for business services firms to its own value added is also rising, especially in the first decade after the German reunification. The branch of financial services (non-banks) features very high and erratic credit growth rates as well. Hereupon we remove these two components from the overall bank credit to non-financial firms and compare it with the GDP growth rates again, see the upper plot in Figure 2. It is easy to see that the approximation resemble the GDP growth between 1973 and 2000 very closely. However, the subtraction of financial and business services credit from the whole bank credit volue for non-bank firms enlarges the gap between the productive credit series and GDP growth even more. Moreover, the new credit growth series keeps its negative correlation with the GDP growth during the Great Recession and the subsequent recovery. Therefore we conclude that there is an important component that is missed in the non-bank firms' credit series after 2000.

To test the second hypothesis we use a broad credit aggregate for non-bank firms and compare its growth with the GDP growth. Practically we employ the series of consolidated credit volume for non-bank firms from the German flow of funds, see the lower plot in Figure 2. This aggregate includes also the borrowing of German firms from foreign banks. The consolidated series is considered because the lending of non-banks firms to each other do not constitute credit creation, i.e. creation of new means of payments, which can be involved in new economic transactions. However, also if we consider the unconsolidated series, there is no qualitative change in results. The logic behind this experiment is as follows: if the gap between credit and GDP growth is closed by the use of the broad credit aggregate then it is hardly possible to detect whether it is due to additional non-GDP-based credit or due to the previously missing GDP-based credit. However, if the gap is not closed then we can claim that the missing GDP-based component is also not included in the broad credit aggregate. A closer look at the lower plot in Figure 2 suggests that the observed credit gap cannot be closed even by using

broad non-bank credit components. The gap pattern remains largely unchanged: a significant credit destruction after 2000 as well as strong anticyclical behavior of credit during and after the Great Recession. The missing component remains missing.

We did also several robustness checks by adding other credit components to the non-bank credit series, for example consumption credit, borrowings of government institutions or trade credit. However, the credit gap pattern after 2000 remained basically the same: credit destruction when GDP is growing, credit expansion when GDP is falling. Does the quantity theorem of disaggregated credit fail in German case after 2000?

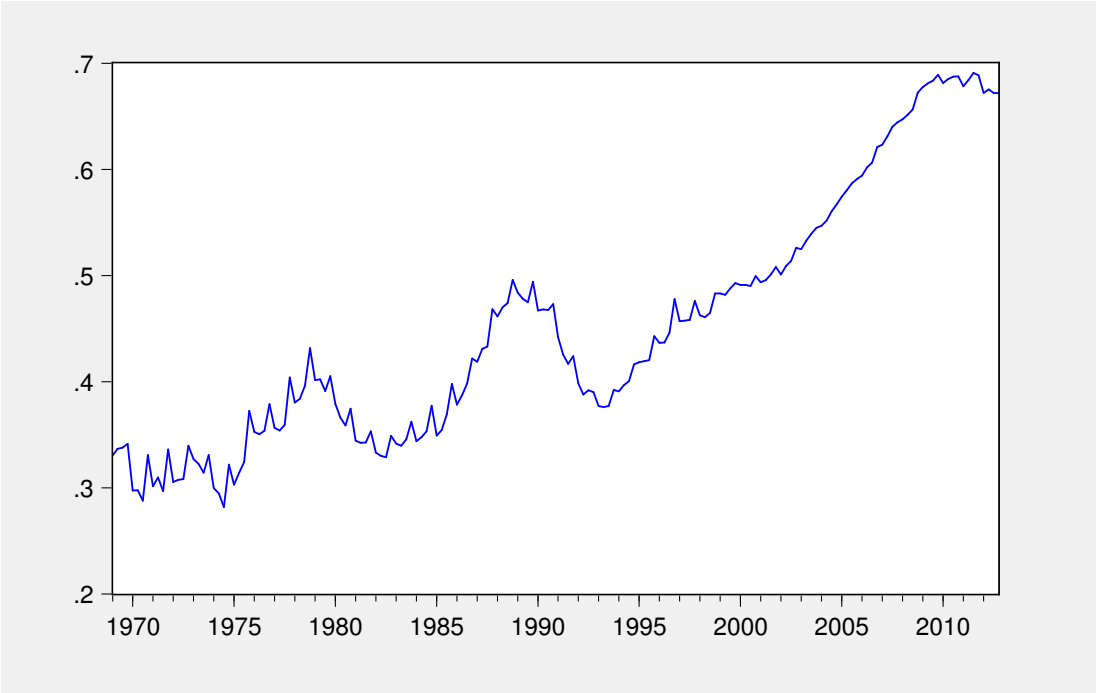

Figure 3: The quotient of deposits and bank credit volume hold respectively borrowed by non-bank firms. Source: Deutsche Bundesbank.

3 The Ebb and Flow of Retained Profits

In the previous chapter we established that the gap between credit growth of non-bank firms and German GDP growth cannot be closed if we allow only for changes in the composition in our credit aggregates. What is the main driver of this gap?

A look at Equation 4 indicates that there may be a source of additional money in the economy, which is not due to the domestic credit creation or to the borrowing of domestic firms from foreign banks. We rewrite the equation in the following way

$$\Delta c_t^Y + g_t = \Delta y_t^N, \tag{5}$$

where g_t denotes the credit gap. Indeed if we consider the consolidated balance sheet of the German banking system and compute the quotient between the volume of all bank deposits of non-bank firms and bank credit granted to non-bank firms, the corresponding picture supports the view stated in Equation 5. In Figure 3 it can be clearly seen that the deposit volume expanded with a higher rate than the credit borrowed by non-bank firms during the last decade. Consequently there was no evident shortage of money, which could hinder the expansion of economic activity. Where did the money come from?

The answer to this question becomes clearer if we recall the German membership in the European monetary union. After the introduction of the Euro a continuing improvement of the German export performance relative to the other member states was under way. Structural reforms initiated in the mid of the last decade boosted German competitiveness leading to even more widening trade balances relative to the Eurozone. Furthermore, money creation in Germany changed considerably. While domestic credit to non-banks was the driving force of money creation in Germany before the monetary union, net foreign assets became the dominating counterpart of the German contribution to money in the euro area. In Figure 5 (upper plot) we present money growth in Germany and the contribution of the main counterparts to money growth from 1990 to 2012. [1] Figure 5 gives evidence that the pattern of money creation changed considerably with the start of the monetary union. Furthermore, an analysis of national contributions to money and its counterparts in the euro area shows that credit creation has increasingly shifted to southern European countries, namely to Spain, before the outbreak of the crisis (see Deutsche Bundesbank 2013, p. 51).

[1] A direct comparison of the two periods is difficult due to statistical breaks and changes in the definition of money and to the fact that currency as part of money cannot be nationally earmarked in a monetary union any more. Furthermore, net foreign assets in Germany include interbank claims in the euro area and also TARGET-balances of the Bundesbank, which did not exist before monetary union.

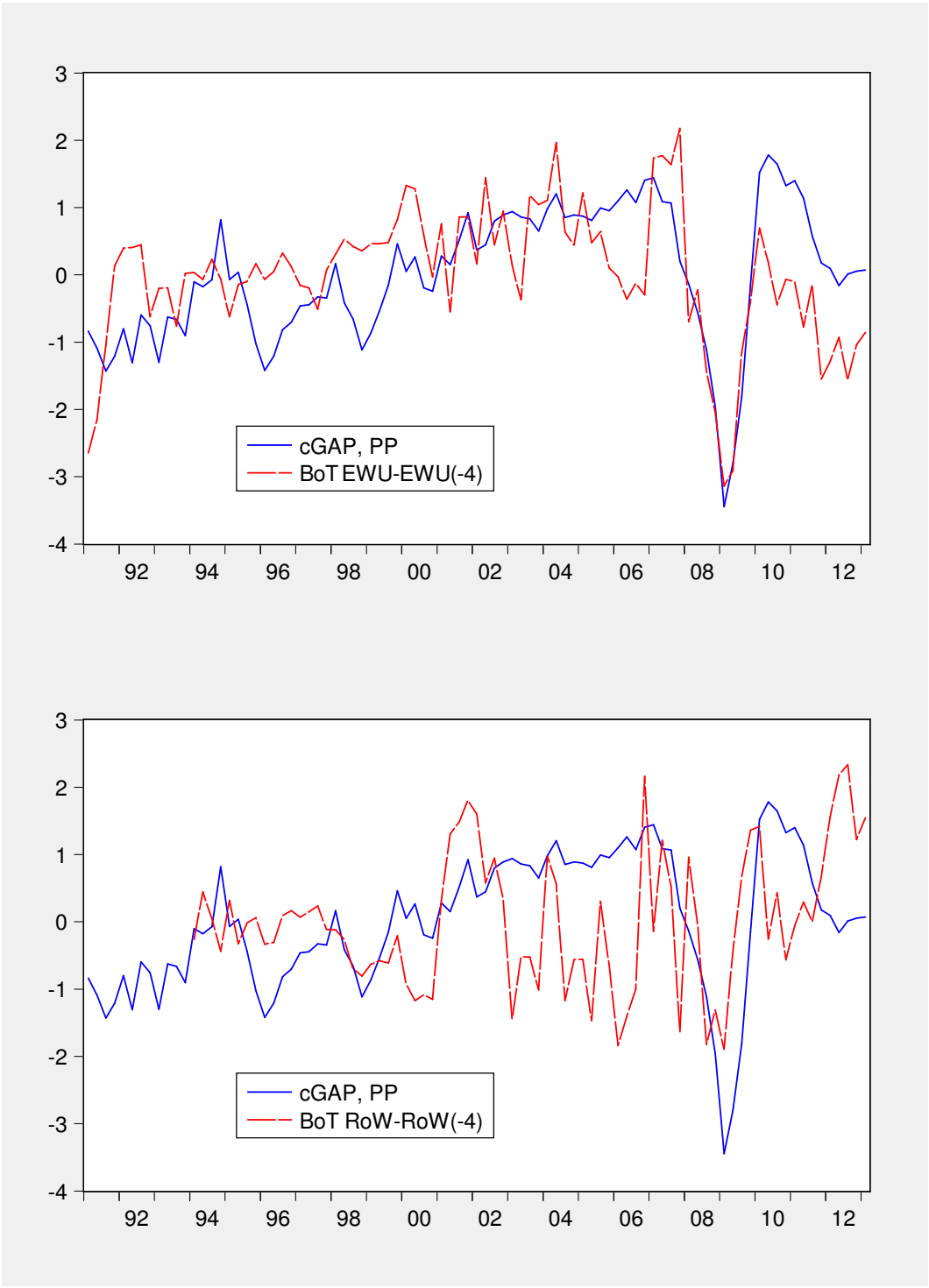

Figure 4: German credit gap (see Figure 2, upper Plot) vs. seasonal absolute differences of German trade balance relative to the EMU-countries (upper plot) as well as vs. seasonal absolute differences of German trade balance relative to the non-EMU (RoW) countries (lower plot).

Thus if trade balances are widening, the demand for domestic credit is expected to decrease. The credit gap g_t defined in Equation 5 is positive and the corresponding credit aggregates tend to contract given some GDP level. This is what we observe in the upper plot of Figure 4. Absolute seasonal differences of German trade balances relative to the Eurozone are fitting the credit gap quite well. The resemblance is especially close at the trough of the Great Recession. Here the credit gap becomes negative, the trade balance contracts rapidly and more domestic credit is demanded in order to compensate for the shortage of inflowing liquidity. It is worth mentioning why we have to differentiate the trade balance. Since the whole economy is expanding, only a growing trade balance can compensate the positive credit gap. Consequently if trade balance stops widening, credit contraction has to revert providing necessary funds for the expanding economy. This is what we observe just before the outbreak of the financial crisis.

Next we check whether the credit gap g_t is only resembled by the trade balance differences relative to the Eurozone. In the lower plot of Figure 4 absolute seasonal differences of German trade balance relative to all non-EMU countries and the credit gap are compared. A visual inspection shows that the comovement is not as pronounced as in the EMU case. Even more striking are the corresponding correlations, computed for 2000-2013 period: 0.66 for the upper plot and 0.17 for the lower plot. There is virtually no significant correlation between the credit gap and the trade balance dynamics relative to the non-EMU countries.

We can draw the following conclusion: if a competitive country is a member in a monetary union and is running a significant trade balance surplus with other members of the monetary union, then differences between domestic and foreign credit creation can fade away. If export revenues are strongly increasing, non-financial firms finance themselves via retained profits which tend to substitute domestic credit. If export revenues sharply decrease due, for example, to some unexpected transitory shock, the firms demand more domestic credit in order to bridge the recession. In such an economy the credit dynamics is supposed to be anticyclical relative to GDP, increasing retained profits correspond with decreasing domestic credit demand. This is in contrast to the standard case where increasing domestic credit creation stimulates production expansion and retained profits.

4 Money Creation in the EMU Perspective

According to the evidence German export firms demand less domestic credit and finance higher production from retained profits, when export revenues are high, at least inside a monetary union. The missing link between GDP growth and credit growth seem to be changes in retained profits, but this is not the end of the story, because also retained profits ultimately need a source of financing. Export revenues of German firms are import expenditures abroad, which are financed by foreign credit to foreign nonbanks. The funding for the foreign credit business increasingly took place abroad, but inside EMU. The reason for the increase of cross-border funding of European banks was the start of the monetary union, or presumably and more precisely, the misinterpretation of what a monetary union means for the pricing of credit risk. We suspect that an underpricing of credit risk unduly eased financing conditions and fostered cross-border flows. Thereby, foreign banks could fund themselves in the converging EMU financial market, for example, by interbank borrowing or by issuing bank securities. [2]

Financing conditions considerably eased with the start of the monetary union in EMU countries, because there was no exchange rate risk any more inside EMU and market participants also decreased their expectations on credit risk, last but not least, because they did not believe in the no bail-out clause of the EU treaty. Two examples support this evidence. For short-term funding in the euro area the spreads between rates for collateralized and uncollateralized interbank transactions (as measured, for example, by Euribor - Eurepo 3M-spreads) is a proxy for the price of credit risk, which banks consider as a benchmark. The average spread remained in single digits pre-crisis and presumably, banks only added very small margins in order to price the individual credit risk of their counterparties. During the crisis, however, the spread reached a maximum of about 180 basis points and many banks drastically decreased credit limits to counterparties indicating that this funding source not only dried up due to lower demand at higher rates but also due to credit rationing. Though the average spread has declined again, market participants may expect that spreads will never return to their low pre-crisis level.

Second, spreads of sovereign bond yields serve as a benchmark for longer term

[2] Not only banks but also special purpose vehicles (SPVs) funded themselves abroad. When the access of SPVs to capital markets deteriorated, banks bought the securities issued by "their" SPVs and thereby assumed the risk formerly held off balance sheet.

financing in the financial market and for indicating sovereign credit risk. The spreads of Italian, Portuguese and Spanish 10-year-government bond yields to German bunds, for example, averaged at about 400 basis points in the mid-1990s [3], before they rapidly converged to a much lower level in the run-up to the monetary union. During monetary union, but pre-crisis, a period which in retrospective is often called the honey moon, the spreads averaged at about 20 basis points.[4] Spreads remained in double digits until the collapse of Lehman in September 2008, however, they increased strongly during the European sovereign debt crisis and peaked to 1400 basis points on average from mid-2011 to mid-2012. In just a few months spreads halved again, which some relate to Draghi's famous "whatever it takes" speech and the following OMT-announcement of the European Central Bank. Despite the rapid decline in sovereign spreads, spreads in retail interest rates remain elevated compared to Germany and other so called "core countries". The usual interpretation is a dysfunctional transmission process (Cicarelli et al. (2013) or Al-Ayd and Berkmen (2013)). This, however, implicitly assumes that the transmission process was properly functioning pre-crisis and that the price of credit risk used to be close to its fundamental value. Given the fact that the pricing of credit risk in the euro area is drastically re-adjusted whenever market sentiments change, the market for pricing credit risk may not always efficiently deal with information and reflect it in the price immediately [5]

The behavior of banks in Germany also changed with the developments of financing conditions in the monetary union. As shown in Figure 5 (lower plot) their net foreign assets to abroad and denominated in domestic currency surged to above 1 trillion euro in the early 2000s, while ranging between 100 and 200 billion euro during the decade before the start of the monetary union. The development was mainly driven by increasing assets towards EMU countries, in particular Southern European countries, though the latest developments are heavily influenced by changes in liabilities to Britain. Net foreign assets denominated in Euro have halved again since they peaked in 2008. The crisis has heightened the risk

[3] Averages of daily spreads from mid-1994 to mid-1996

[4] Averages of daily spreads 1999 to 2006.

[5] Behavioral finance has supplemented the efficient market hypothesis and recognizes that individuals neither are able to process the full set of information at the same time nor evaluate it systematically and rationally as assumed by the extremely strict assumptions of a homo economicus, see Barberis and Thaler (2003) for a survey

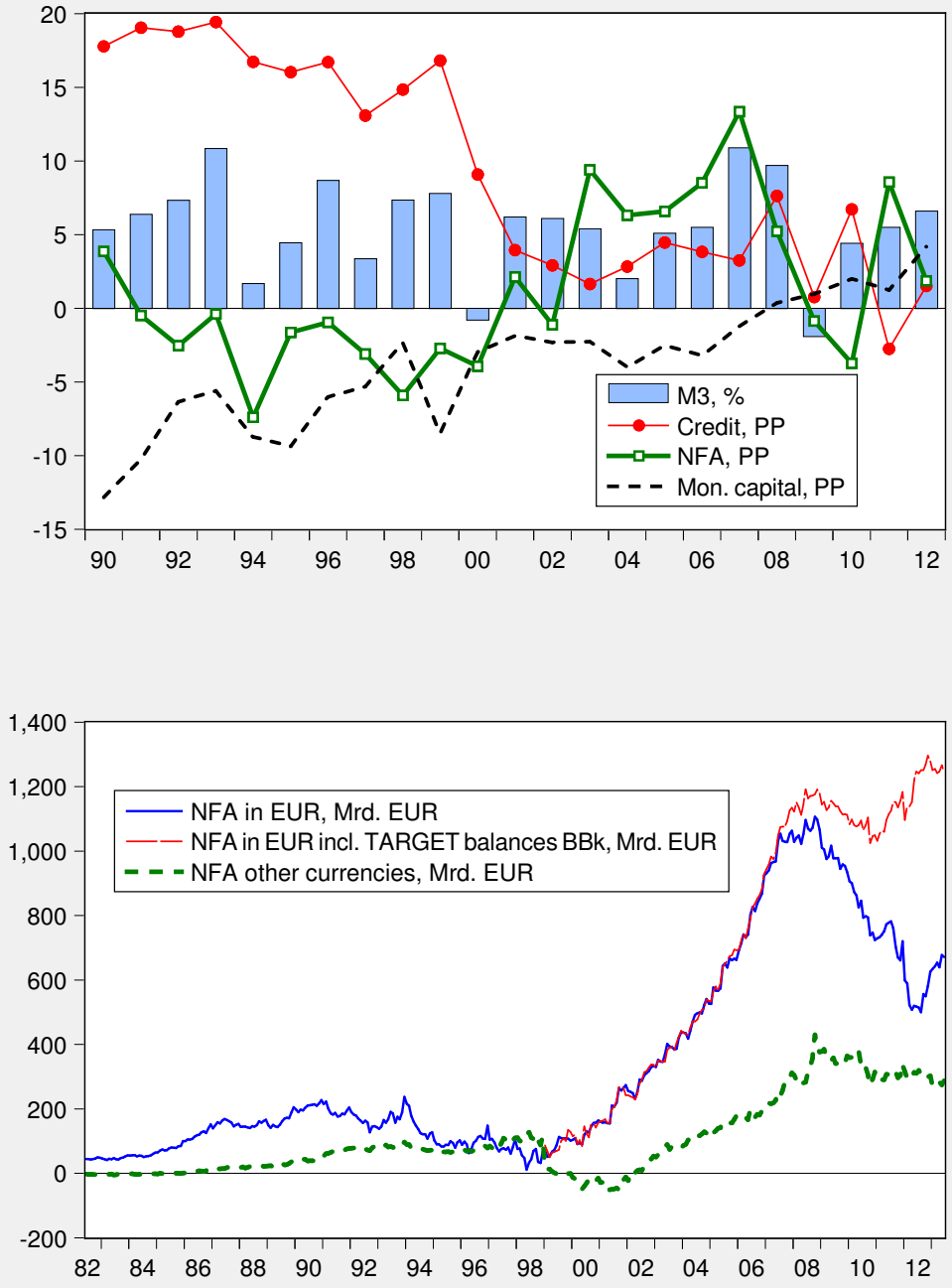

Figure 5: Annual money growth rates in Germany and contributions of main counterparts (upper plot), net foreign claims and TARGET-balances of the Bundesbank (lower plot). In the upper plot NFA denotes net foreign assets outside the euro area, but including inter-MFI claims (deposits minus loans) in the euro area since 1999. Credit before EMU is only credit to German nonbanks, but thereafter, it is credit to nonbanks in the euro area.

awareness of banks and suddenly changed financing conditions. Accumulated trade surpluses, however, continue, because funding from the Eurosystem partly substituted the lack of funding from sources in the private sector. Large and diverging TARGET balances at national central banks in the Eurosystem are a symptom of this asymmetric provision of central bank liquidity in the Eurosystem and signal an alternative reaction to sudden stops of private capital inflows than sharp exchange rate depreciations. [6]

We conclude that the start of the monetary union greatly facilitated financing in EMU countries, which fostered domestic credit booms in some of them and export booms in others, namely in Germany. This contributed to the gap between GDP growth and credit growth in Germany. Credit of foreign banks to foreign non-banks creates money that finances trade between Germany and its export destinations and that eventually increases wealth of exporting firms. Assuming that (at least part of) the wealth is held on accounts at banks in Germany, the banks receive additional funding via the export revenues of their customers, which they can invest abroad. Pre-crisis, increasing net foreign assets of banks in Germany have refinanced foreign credit expansion and have contributed to the easing of financing conditions, while this has been partly substituted by public cross border claims, i.e. TARGET balances of the Bundesbank, during the crisis. Generally speaking, credit still creates money, though it is not necessarily domestic credit that creates the domestic, i.e. the national contribution to money in the euro area. The easing of financing conditions, higher net foreign assets of banks in Germany and stronger foreign credit creation reinforced each other. Eventually, it should be kept in mind that the strongly changing price for credit risk lies at the heart of these developments and could be based on a misperception of the financial

[6]The start of the monetary union is just one of many factors influencing structural changes in the banking sector. In an environment of decreasing levels of interest rates in developed economies, stronger de-regulation and higher competition in the financial sector, the traditional sources of banks' earnings from interest business, became unsatisfactory and were gradually substituted by banks' earnings from commission business and own account trading. The start of the monetary union offered new profit opportunities of banks that were increasingly put under pressure from these structural developments. Additionally, some special developments at Landesbanks, such as the lifting of state guarantees, which eventually took place in mid 2005, for ensuring the institutions' solvency (Anstaltslast) and for indemnifying depositors (Gewährträgerhaftung) triggered large scale issuance of bank securities shortly before and a corresponding search for yield for the new funding, which was increasingly taking place in EMU countries.

	North HHs	North Govt.	North CB	Σ^N
Deposits	$+H_h^N$		$-H^N$	0
Bills	$+B_h^N$	$-B^N$	$+B_{cb}^N$	0
Wealth	$-V_h^N$	$+V_g^N$	$+NFA^N$	0
Σ	0	0	0	0

Table 2: Northern part of the balance sheet matrix. Southern part can be derived by exchanging the index.

sector that yet has not found a fundamental value.

5 A Small Two-Country Model

The goal of the current section is to demonstrate how the negative relation between output and credit in the presence of export trade surpluses outlined above can be resembled even in the context of a simplistic stock-flow consistent model. For this purpose we adopt a slightly changed version of the model OPEN introduced by Godley and Lavoie (2007) in their section 6.6. The model OPEN comprises four economic sectors and two countries. The sectors are households, producers, government and central bank. The countries trade with each other. However, due to the assumption of two different currencies the central banks hold gold reserves which enable import transactions. If the trade is not balanced, the country with trade deficit loses gold reserves and the one with trade surpluses accumulates them. The unbalanced trade can continue as long as the central bank of the deficit country is willing or able to provide gold reserves for import transactions.

For our purposes we abandon the assumption of two currencies, but maintain the framework of two countries with two central banks, which allows to mimic the institutional setup of the Eurozone to some extent. Bearing in mind that in our simplistic model the domestic banking system is amalgamated with the central bank, the trade deficits are financed by incurring net foreign liabilities in domestic currency. Inside the model this process can continue ad infinitum while the system approches a non-stationary steady-state, since no endogenous stabilising mechanisms are considered forcing both countries towards a balanced trade path. Cross border transactions between the two countries are settled by changes in net foreign positions at their balance sheets. In contrast to gold, which

is the international means of payments in section 6.6 of Godley and Lavoie (2007) , increasing net foreign assets of the trade surplus country are financial assets with a liability as their counterpart and are not limited by physical quantity. We outline the main equations and features of the model. For a more detailed treatment of post-keynesian models Godley and Lavoie (2007) is probably the best reference available currently.

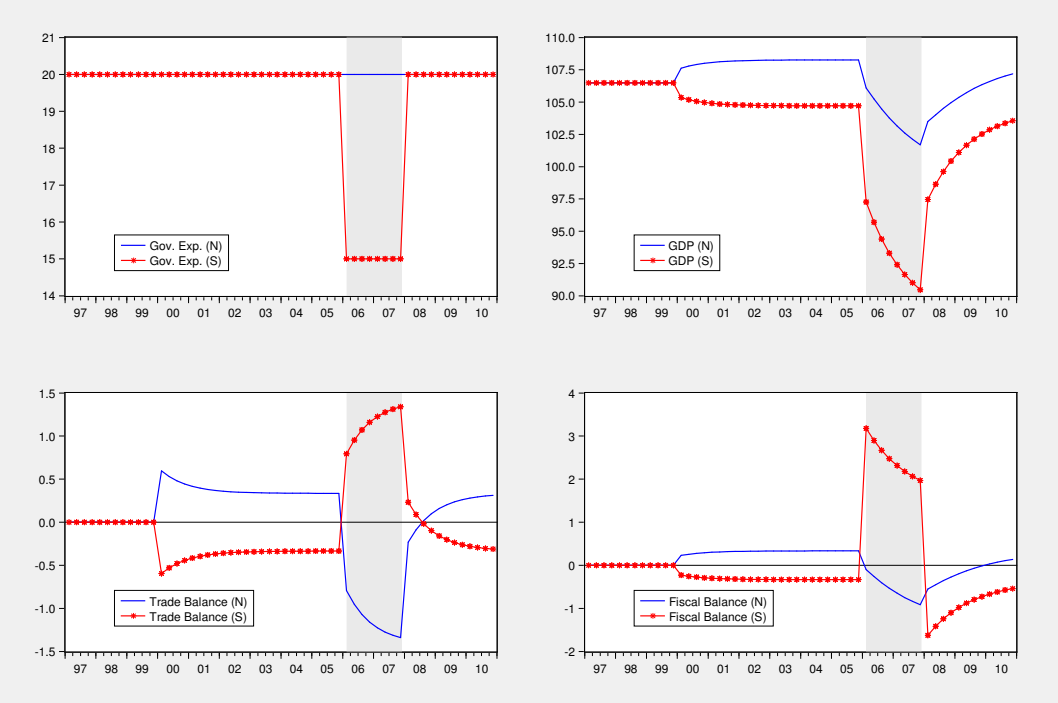

Figure 6: The effect of an exogenous demand shock in the south (temporary reduction of government expenditure, 2006Q1-2007Q4) on economic activity. Starting from a zero trade balance steady-state the system approaches a new steady-state after an increase (2000Q1) of the import prospensity in the south.

First, consider the balance sheet matrix of the model, which is presented in Table 2. The balance sheet matrix comprises of a nothern and southern part, however, due to their analogy and in order to save the space only the northern part is put into the table. The households allocate their wealth in non-interest-bearing deposits and interest-bearing bills. The bills are issued by the government. The central bank purchases government bills and injects high powered money (assumed in forms of deposits) into the economy. If the corresponding country runs trade surpluses, the central bank accumulates net foreign assets. In case of trade deficit

	HHs	Prod.	Govt.	CB	Σ^N
Consumption	$-C^N$	$+C^N$			0
Govt. Exp.		$+G^N$	$-G^N$		0
North Exports		$+X^N$			$+X^N$
South Exports		$-M^N$			$-M^N$
GDP	$+Y^N$	$-Y^N$			0
Int. Payments	$+r_{-1}B^N_{h-1}$		$-r_{-1}B^N_{-1}$	$+r_{-1}B^N_{cb-1}$	0
CB Profits			$+r_{-1}B^N_{cb-1}$	$-r_{-1}B^N_{cb-1}$	0
Taxes	$-T^N$		$+T^N$		0
Δ Deposits	$-\Delta H^N_h$			$+\Delta H^N$	0
Δ Bills	$-\Delta B^N_h$		$+\Delta B^N$	$-\Delta B^N_{cb}$	0
ΔNFA				$-\Delta NFA^N$	$-\Delta NFA^N$
Σ	0	0	0	0	0

Table 3: Northern part of the transaction matrix. Southern part can be derived by exchanging the index and rearranging exports and imports.

net foreign liabilities are accumulated. Finally, the household wealth is the sum of government bills and net foreign assets.

Table 3 contains the transaction matrix for the northern country, however, all columns sum to zero only if the southern part is considered as well. In particular, northern exports and imports correspond to southern imports and exports respectively. The same holds for net foreign assets and liabilities. Government expenditures are the core of the model and correspond to autonomous consumption in models without government sector, since $G = 0$ implies that all other model variables converge to zero as well. The government finances expenditures primarly by taxes. The recurrent fiscal deficits are firstly covered by selling bills to households. If households do not demand the required amount of bills, they will be purchased by the central bank. This is how new money is injected into monetary circuit of the model. If the government runs fiscal surpluses or households demand more bills than needed, the government liabilities are settled to that extent. This is how the money is brought out of the circiut and distructed.

All model equations are adopted from Godley and Lavoie (2007) and are documented in the appendix. We need only four behavioral equation for the model closure: consumption function, import and tax function and portfolio decision function. The households hold non-interest-bearing deposits because of the transaction motive. In order to keep the setup as simple as possible the north and the

south posses equal model coefficients but the import prospensities:

$$M^i = \mu^i Y^i. \tag{6}$$

If $\mu^N = \mu^S$, the trade is balanced and the system reaches a stationary steady-state with zero fiscal deficit and zero level of net foreign assets and liabilities, since

$$\Delta NFA^N = X^N - M^N. \tag{7}$$

If $\mu^N > \mu^S$, the north runs trade and fiscal surpluses, which is offset by equal trade and fiscal deficits in the south, since government expenditures are exogenous. Due to fiscal surplus the northern government pays back its debt to the central bank. First, the balance sheet size of the northern central bank remains constant since the diminishing stock of bills on the assets side is offset by the growing stock of net foreign assets, see Figure 8. An asset swap takes place so that the balance sheet size of the central bank in the north remains stationary in the non-stationary steady-state. If the stock of bills is depleted on the asset side, increasing net foreign assets and increasing government deposits, which are negative holdings of bills at the central bank, lead to balance sheet growth.

Surpluses of the north correspond to deficits in the south financed by issuing new central bank money. Since the stock of bills owned by households converges to a constant level, the central bank purchases additional bills permanently and the asset side of its balance sheet expands. On the liabilities side the growing stcck of bills is compensated by growing net foreign liabilities (Figure 8) while the stock of money remains stationary. Hence, the non-stationary steady-state in the south leads to non-stationary balance sheet growth of the banking system.

Our simulation exercise starts from a stationary steady-state, where all coefficient in the north equals to the southern coefficients. Since the government expenditures levels are also identical, all model variables converges to same levels in the north and in the south, see Figures 6 and 7 before 2000. After 2000 the import prospensity of the south, μ_S, is increased carrying the system to a new non-stationary steady-state. However, all model variables exept the stock of government bills (B^i), the stock of government bills purchased by the central bank (B^i_{cb}) and the net foreign assets (NFA^i) remain stationary, see Figures 6 and 7

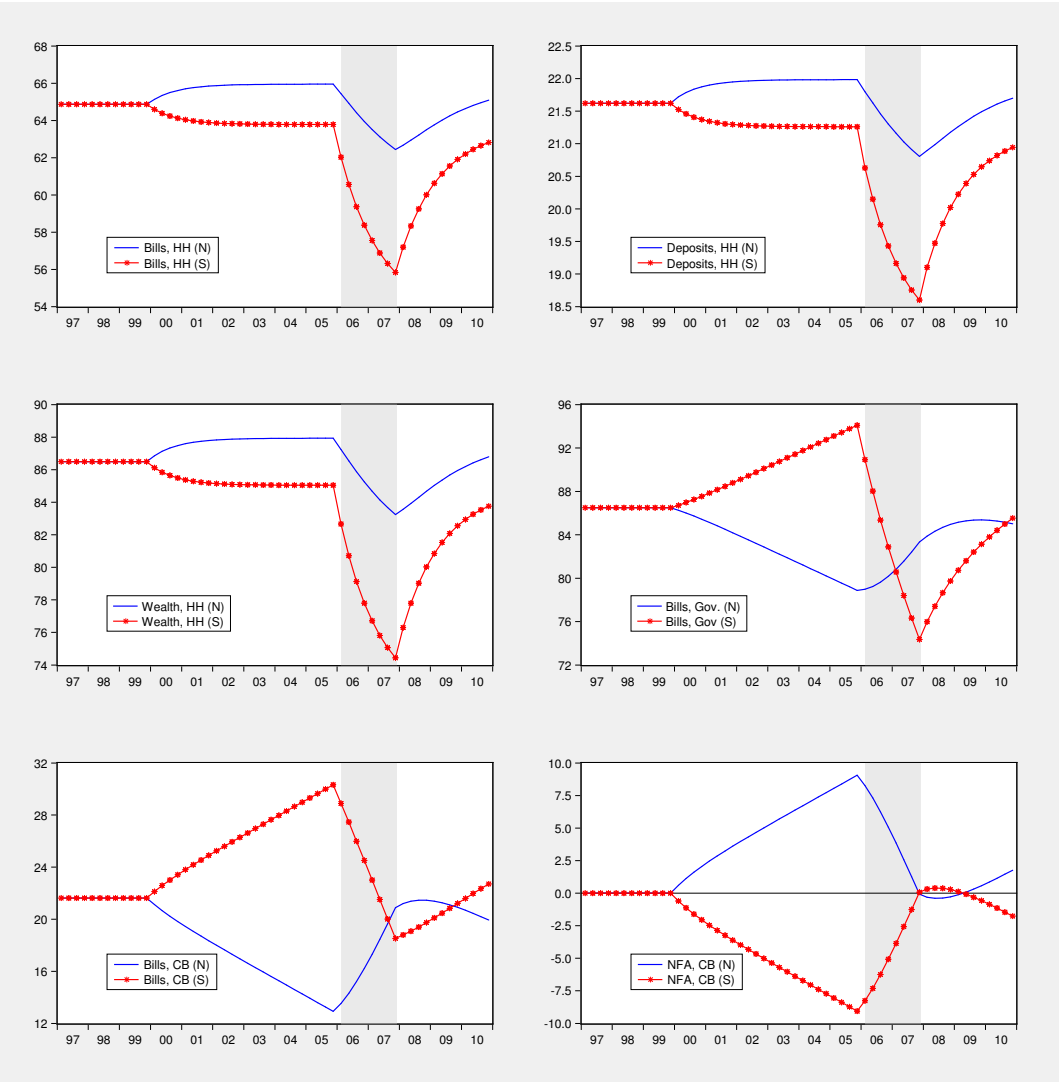

Figure 7: The effect of an exogenous demand shock in the south (temporary reduction of government expenditure, 2006Q1-2007Q4) on flow of funds. Starting from a zero trade balance steady-state the system approaches a new (non-stationary) steady-state after an increase (2000Q1) of the import prospensity in the south. NFA denotes Net Foreign Assets.

between 2000 and 2005. Then the government expenditures in the south are exogenously reduced for a period of two years, while the government expenditures in the north remain constant. Subsequently this shock causes transitory output losses in both countries. The households also reduce their holdings of bills and non-interest-bearing deposits adjusting the lower GDP level. Nevertheless, the government debt in the north reacts in the exactly opposite way - it is increasing. The reason for this negative relation between government indebtness and output in the north is the exogeneity of government expenditure. Since G^N remains constant while export revenues are falling due to weaker import demand in the south, the northern fiscal balance switches into negative area and the government is forced to finance its expenditures by issuing new bills.

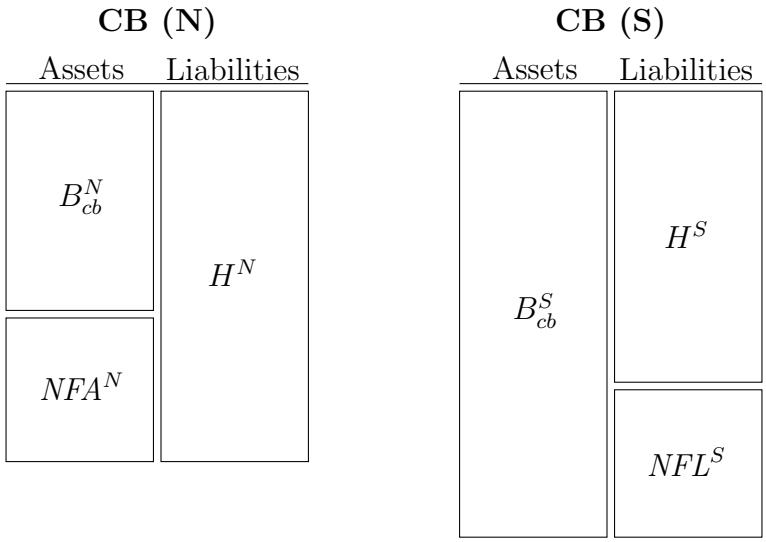

Figure 8: Balance sheet structure of the northern and southern central banks in the non-stationary steady-state with non-zero trade balances.

We bear in mind that the central bank can be considered as a proxy for the whole domestic banking system in our simplistic monetary circiut. It is also reasonable to view the government and producers as including also all private firms which have access to credit via government bills, where the taxes partly play the role of retained profits. Under these assumption the analogy of our simple model outcome to the empircal findings stated above becomes obvious. Since the northern firms expect the demand shock in the south to be transitory and as long as

they believe in their "business strategy", they react to the output decreases by going deeper into debt maintaining the necessary level of money in the monetary circuit, which resembles the negative correlation between GDP and credit flow to the non-bank firms in German data.

6 Conclusions

The easing of financing conditions coincided with the start of the monetary union and facilitated credit booms abroad and trade surpluses in Germany. The start of the monetary union thereby had an impact on the changing pattern of credit. German export firms demand less domestic credit and finance higher production from retained profits, when export revenues are high. Foreign credit to foreign nonbanks developed as an important source of financing for trade surpluses and GDP growth in Germany and contributed to the gap between GDP growth and credit growth in Germany. Pre-crisis, increasing net foreign assets of banks in Germany have refinanced foreign credit expansion and have contributed to the easing of financing conditions, while this has been partly substituted by public cross border claims, i.e. TARGET balances of the Bundesbank, during the crisis. The experience of credit, GDP growth and trade surpluses in Germany supports the fact that export surpluses are not an imbalance of savings and investment, but rather an imbalance of financing and investment. The financing of credit booms abroad may fuel further easing of financing conditions. (We, however, do not argue that there is a direct causality between credit booms in the importing country and the direction of financing from the exporting country to abroad). Furthermore, there is a lesson for monetary analysis in a monetary union: Focusing on money and its counterparts on aggregate misses important regional developments, for example, increasing net foreign assets of German banks may foster credit booms in Spain, which lead to higher deposits of nonbanks that are eventually held in Germany. Last but not least, financing conditions channel the flow of credit and depend on the risk awareness of market participants. Keeping in mind that the pricing of credit risk may be less efficient than commonly believed, credit creation may also be suboptimal.

References

Al-Eyd, A. and S. Pelin Berkmen (2013) Fragmentation and Monetary Policy in the Euro Area, IMF Working Paper 13/208

Bank of England (2012). The Funding for Lending Scheme, Quarterly Bulletin 2012 Q4.

Barberis, N. and R. Thaler (2003) A survey of behavioral finance, in G. M. Constantinides, M. Harris and R. Stulz (eds.) Handbook of the Economics of Finance, pp. 1051-1123

Bayoumi, T. and O. Melander (2008). Credit Matters: Empirical Evidence on U.S. Macro-Financial Linkages, IMF Working Paper WP/08/169.

Benes, J. and M. Kumhof (2012). The Chicago Plan Revisited, IMF Working Paper WP/12/202.

Bundesbank (2011). German enterprises profitability and financing in 2010, Monthly Report, December 2011.

Bundesbank (2013) Differences in money and credit growth in the euro area and in individual euro- area countries, Monthly Report, July 2013.

Ciccarelli, M., Maddaloni, A. and Peydro, J. (2013), Heterogeneous Transmission Mechanism; Monetary Policy and Financial Fragility in the Euro Area, ECB Working Paper Series, No 1527, March 2013.

Fisher, I. (1936), 100% Money and the Public Debt, *Economic Forum*, Spring Number, April-June 1936, 406-420.

Godley, W. and Lavoie, M. (2007). Monetary Economics: An Integrated Approach to Credit, Money, Income, Production, and Wealth. Basingstoke, Palgrave Macmillan.

Issing, Ottmar (2005) The role of money in the monetary policy strategy of the ECB, speech, Eltville 28 October 2005

Koo, R. (2008). The Holy Grail of Macroeconomics: Lessons from Japan's Great Recession. Wiley, Singapore.

Mueller, K.-P. (2002). Wenn das Hausbankprinzip erhalten bleiben soll, führt an höheren Margen im Kreditgeschäft kein Weg vorbei, *Zeitschrift fr das gesamte kreditwesen*, 2002 (23), 1264-1267.

Roche, C. O. (2011). Understanding the Modern Monetary System, mimeo, http://ssrn.com/abstract=1905625.

Schumpeter (1917(1956)) Das Sozial Produkt und die Rechenpfennige : Glossen und Bei-trge zur Geldtheorie von Heute, Archiv fr Sozialwissenschaft, 44: 627-715. Translated from German by A. W. Marget, Money and the Social Product, International Economic Papers, 6, 1956.

Svensson, Lars E. O. (1997). Inflation Forecast Targeting: Implementing and Monitoring Inflation Targets, *European Economic Review* 41(6), 1111-1146.

Woodford, M. (2003). Interest and Prices: Foundations of a Theory of Monetary Policy, Princeton, Princeton University Press.

Werner, R. A. (1997). Towards a new monetary paradigm: a quantity theorem of disaggregated credit, with evidence from Japan. *Kredit und Kapital* 30 (2), 276-309.

Werner, R. A. (2005). New paradigm in macroeconomics: solving the riddle of Japanese macroeconomic performance, Basingstoke, Palgrave Macmillan.

A Model Equations and Parameters

A.1 Transaction matrix

$$Y^N = C^N + G^N + X^N - M^N \tag{8}$$

$$Y^S = C^S + G^S + X^S - M^S \tag{9}$$

$$X^N = M^S \tag{10}$$

$$X^S = M^N \tag{11}$$

$$YD^N = Y^N - T^N + r_{-1}B^N_{h-1} \tag{12}$$

$$YD^S = Y^S - T^S + r_{-1}B^S_{h-1} \tag{13}$$

$$\Delta V^N_h = YD^N - C^N \tag{14}$$

$$\Delta V^S_h = YD^S - C^S \tag{15}$$

$$H^N_h = V^N_h - B^N_h \tag{16}$$

$$H^S_h = V^S_h - B^S_h \tag{17}$$

$$\Delta B^N = (G_N + r_{-1}B^N_{-1}) - (T^N + r_{-1}B^N_{cb-1}) \tag{18}$$

$$\Delta B^S = (G_S + r_{-1}B^S_{-1}) - (T^S + r_{-1}B^S_{cb-1}) \tag{19}$$

$$\Delta B^N_{cb} = \Delta B^N - \Delta B^N_h \tag{20}$$

$$\Delta B^S_{cb} = \Delta B^S - \Delta B^S_h \tag{21}$$

$$\Delta NFA^N = X^N - M^N = -(X^S - M^S) = -\Delta NFA^S \tag{22}$$

$$\Delta H^N = \Delta B^N_{cb} + \Delta NFA^N \tag{23}$$

$$\Delta H^S = \Delta B^S_{cb} + \Delta NFA^S \tag{24}$$

$$H^N + H^S = H \tag{25}$$

$$H_h^N + H_h^S = H_h \tag{26}$$

$$H_h = H \qquad \text{(redundant or hidden equation)} \tag{27}$$

A.2 Behavioral equations

$$M^N = \mu^N Y^N \tag{28}$$

$$M^S = \mu^S Y^S \tag{29}$$

$$T^N = \theta^N (Y^N + r_{-1} B_{h-1}^N) \tag{30}$$

$$T^S = \theta^S (Y^S + r_{-1} B_{h-1}^S) \tag{31}$$

$$C^N = \alpha_1^N YD^N + \alpha_2^N V_{h-1}^N \tag{32}$$

$$C^S = \alpha_1^S YD^S + \alpha_2^S V_{h-1}^S \tag{33}$$

$$\left(\frac{B_h^N}{V_h^N}\right) = \lambda_0^N + \lambda_1^N r - \lambda_2^N \left(\frac{YD^N}{V_h^N}\right) \tag{34}$$

$$\left(\frac{B_h^S}{V_h^S}\right) = \lambda_0^S + \lambda_1^S r - \lambda_2^S \left(\frac{YD^S}{V_h^S}\right) \tag{35}$$

A.3 Model parametrization

$$\mu^N = \mu^S = 0.2 \quad \text{for } t < 2000Q1 \tag{36}$$

$$\mu^N = 0.2 \text{ and } \mu^S = 0.21 \quad \text{for } t \geq 2000Q1 \tag{37}$$

$$G^N = 20 \tag{38}$$

$$G^S = 20 \quad \text{for } t < 2006Q1 \text{ and } t > 2007Q4 \tag{39}$$

$$G^S = 15 \quad \text{for } 2006Q1 \leq t \leq 2007Q4 \tag{40}$$

$$\alpha_1^N = \alpha_1^S = 0.6 \qquad \alpha_2^N = \alpha_2^S = 0.4 \qquad \theta_1^N = \theta_1^S = 0.2 \tag{41}$$

$$\lambda_0^N = \lambda_0^S = 0.635 \qquad \lambda_1^N = \lambda_1^S = 5 \qquad \lambda_2^N = \lambda_2^S = 0.01 \tag{42}$$

$$r = 0.025 \tag{43}$$