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by

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Taking Stock - Credit Measures in Monetary Transmission

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Abstract

Empirical research on the monetary transmission mechanism considering credit developments is almost exclusively limited to the amount of outstanding credit in an economy. Two issues arise out of this. First, stock-flow inconsistencies might occur. Second, the change of the outstanding amount of credit on banks' balance sheets does not consist only of new lending activity, but also incorporates other factors. As central banks should predominantly be focused on the amount of newly created credits in an economy while analysing the impact of monetary policy towards lending activity, using the change in the stock of lending can lead to distorted results, because of the incorporation of data on maturing loans, revaluations, securitization, and write-offs into this variable. The majority of existing credit channel literature does not really account for these issues. This paper makes a case to better caption new lending activity in monetary policy research. What is shown in this paper is that empirical investigations might lead to differing results when accounting for the other factors in the stock data. Central bank policy might therefore be biased.

Keywords: credit channel, monetary transmission, bank lending
JEL Classification: C18, C82, E51, E52

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1 Introduction

Since the global financial crisis of 2007/2008, credit activity is again in the focus of the economic research agenda. The consensus seems to be that overly credit developments in several advanced economies resulted in asset price booms and subsequent busts during the Great Moderation era. With these events in mind, researchers as well as policy makers are again recognising the importance of credit developments for economic and especially financial stability. Although credit developments were monitored by many central banks before the crisis, upward deviations in broad money and credit growth—as measured by the growth in the outstanding stock—in the early 2000s did not lead to changes in the policy stance in developed countries' central banks, since inflation dynamics were relatively benign during this period (Drehmann et al. (2012), Borio (2014)). But due to the fallout from the over-indebtedness of many private sector agents, as a result of these perceived lending booms in many advanced economies, there is a renewed emphasis on research of the role of credit (see e.g. Jordá et al. (2013), Mian and Sufi (2014), Turner (2013)).

As credit developments are getting more into the spotlight of recent research, it can be asked, if the right measure of credit is used in empirical models of the credit channel. While analysing the impact of monetary policy towards credit developments, empirical studies predominantly use the outstanding stock of bank loans as their credit variable (see f.e. Altavilla (2015), Bernanke and Blinder (1988, 1992), Carpenteter and Demiralp (2012), Carpenter et al. (2013), Ciccarelli et al. (2010), Driscoll (2004), Gambacorta and Marques-Ibanez (2011), Giannone et al. (2012), Jacobs and Rayner (2012), Lown and Morgan (2006), de Mello and Pisu (2010), Nieto (2007), Tabak et al. (2010)). But as the stock variable also contains information about previously extended loans, namely the extension of loans minus repayments, write-offs, sell-offs due to securitization, and the net of revaluations, focusing on it could lead to inaccurate policy advice. While the use of the (change in the) outstanding stock of credit in empirical research can probably be attributed to a lack of data availability of newly created loans, one should rather be interested in the amount of new lending which is undertaken in a specific period, since this is the significant variable to assess the effectiveness of monetary transmission via the credit channel, and therefore for the conduct of current and future monetary policy.

The reason is that central banks should mainly be focused on the effects of newly extended loans, and not on the amount of previously extended credit, while focusing on real effects of bank lending. Because the effects of prior extended loans already played out, they should not play a crucial role in assessing the future policy stance, while looking at the monetary transmission through the credit channel. Certainly, the real economy can

be affected from previous lending activities through monetary policy, as f.e. interest rates might be linked to current policy rates, which might lead to higher default rates when policy rates rise. But this is to a lesser degree in the direct control of central banks, and should therefore probably be not as high on the policy agenda as the more direct impact on current and future lending behaviour. This shall not mean that the credit stock is a redundant variable, since it can contain valuable information regarding sustainability of debt levels or about stress in financial markets, but these repercussions might at best be dealt with by other instruments—mainly macroprudential policies (see e.g. Claessens (2014), or IMF (2013) for an overview)—and/or by other empirical setups, rather than in the estimation of the impact of monetary policy towards lending activity.

Due to the inclusion of the other factors into the stock data, the amount between the growth of the outstanding stock of credit and the amount of new lending can differ quite substantially. What is visible in the data is that the change in the stock is highly attributable to economic conditions, which is not explained to a large extend by the underlying trends in new lending activity. It can therefore be expected that the results from using the credit stock in empirical studies could differ from the accompanying results using new loans. Thus, if parts of the composition of the stock, other than new lending, correlate with other objectives of monetary policy, the effectiveness of the credit channel might be overestimated. This might have important implications for the assessment of monetary transmission, and ultimately for the conduct of monetary policy.

The paper at hand accounts for these issues mentioned above and lays out the different theoretical arguments for using the amount of new lending instead of the growth in the outstanding stock of credit in econometric studies. What is shown in this paper is that results in empirical studies could change quite significantly when newly extended loans are considered as the credit variable instead of the outstanding stock of credit, especially in turbulent times.

The rest of the paper is structured as follows. In the second chapter the theoretical case for using new loans instead of the outstanding stock of credit in monetary policy analysis is motivated. The third chapter lays out the points of criticism with the other factors except new lending which comprise the change in the outstanding stock. Chapter four presents literature which is accounting for some of the criticism of the third chapter. To investigate the soundness of the rationale empirically, some stylised facts from credit data of the Euro area, the United States, and Brazil are shown in chapter five. Section six concludes.

2 Motivation for using new lending

Two arguments can be brought forward to justify the use of new lending instead of the outstanding amount of credit in empirical studies of the monetary transmission process via the credit channel. The first one, sometimes mentioned in the literature, is that there might be an issue of stock-flow consistency in the analyis of credit developments (see Huang (2010), Biggs et al. (2009), also see Table 1). While analysing monetary transmission mechanisms or business cycle fluctuations in the literature, the change in the outstanding stock of credit (a stock variable) is often analysed in comparison to the change in the GDP (a flow variable), and therefore on a different level of integration (see e.g. Claessens et al. (2009)).

Level of Integration	GDP	Credit Stock	New Lending
1		D	
2	GDP	ΔD	L
3	ΔGDP	$\Delta\Delta$D	ΔL

Table 1: Stock vs. flow level comparison

Biggs (2008) and Biggs et al. (2009) specifically draw their attention on this stock-flow issue, while trying to explain movements in economic activity as a result of underlying credit trends. Previous studies, like Calvo et al. (2006) and Claessens et al. (2009), using the change in the stock of outstanding credit, only find a loose and lagging relationship between credit developments and economic activity. Biggs et al. (2009) on the other hand try to remedy this puzzle. They state that one has to compare flow with flow variables, and thus use a proxy for new lending as the flow variable in their analysis, by applying what they call the *credit impulse* (see also Biggs and Mayer (2013)). In their view, the change of the credit stock represents the amount of new lending. This is then a flow variable, which should be compared to GDP. As a result they find that domestic demand is highly correlated with their credit impulse— as measured as the second difference of the outstanding stock as a percentage of GDP—, which was not the case in previous studies, who only applied the first difference of the stock of outstanding credit when comparing it to GDP growth. Additionally, their results show that developments in domestic demand can be explained by credit trends with a lag, and not the other way around, as found in earlier studies like Calvo et al. (2006)).

Literature of the credit channel often applies VAR techniques to estimate the impact of monetary policy on credit and real economic variables (f.e. Bernanke Blinder (1988, 1992), Carpenter et al. (2013), ECB (2009), Gambacorta and Marques-Ibanez (2011), Lown and Morgan (2006)). What is found in these studies is that a monetary tightening generally

leads to a slowdown in credit extension. These findings could potentially be linked to the second argument—which is not rigorously brought forward in the existing literature—for using new bank lending instead of the stock of outstanding loans, namely that the inclusion of maturing loans, revaluations, securitization, and write-offs into the stock data, which are to some extend positively correlated with fluctuations in real economic variables, affect these findings. The change in the outstanding stock of credit in an economy incorporates information from all these other factors (see Figure 1):

$$\Delta \textit{ Stock of Credit} = \textit{New Lending - Maturing Loans - Write-offs - Sell-offs due to Securitization +/- Revaluations}$$

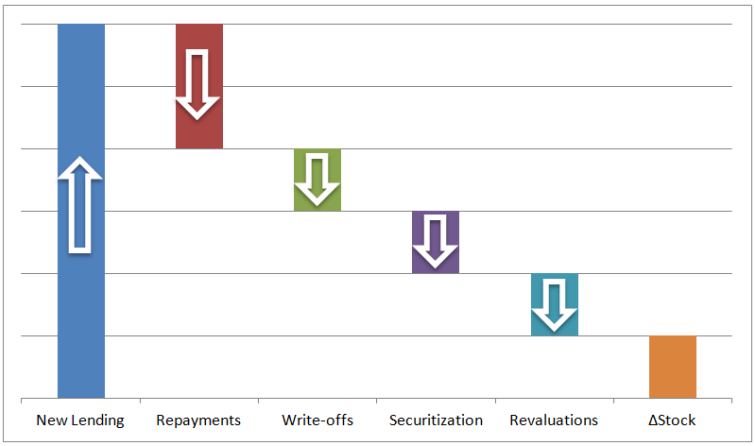

Figure 1: Composition of the change of the credit stock

These inclusions most likely lead to either an under- or over-reporting of the true amount of new lending in an economy, depending on the size of the other factors in relation to new lending, as the change in the outstanding stock of credit depends crucially on the amount of repayments, write-offs, securitization activities, and revaluations. This can have a crucial influence towards the conduct of monetary policy, if a central bank wants to assess credit developments, especially while analysing monetary policy effects using DSGE and VAR techniques. If, for example, c.p. more loans have to be written off because of an exogenous event, there would be a reduction in the growth of the credit stock visible. This might induce the central bank to relax monetary policy in an anticipation of a weaker economy, even though net new lending might not have changed.

In this context one should ask what the economically important variable is, which central banks try to influence in their monetary transmission calculus. As only the actually drawn loans have an immediate impact on aggregate demand, the concern for the impact of monetary policy on bank lending should be on the amount of newly extended (and

withdrawn) credit in a specific period, as otherwise, through the use of the credit stock in monetary policy analysis, all previously granted loans, which are still in the books of the banks, would get incorporated into the estimation. Although repayment structures and the amount of revaluations and written off loans can contain valuable information about financial risks, these information are not really crucial to assess the impact of monetary policy on current and future credit origination, which should be the main objective of central banks in assessing the transmission of their policies into credit markets (ECB (2009)). An existing credit might drain some purchasing power from the creditor as he repays the loan, but the impact on aggregate demand of the initial credit and the multiplier effect already played out, and have therefore no immediate impact on new spending, and thus on monetary developments and inflation dynamics. The inclusion of these other factors into the change in the stock variable could therefore lead to inconsistencies in the conduct of monetary policy.

3 Factors affecting the change in the stock of credit

The stock could be a good proxy for new lending activity, if the other factors, who affect the outstanding amount of credit, would be stable and uncorrelated with other objectives of monetary policy, like inflation or economic output. But the change in the stock is misreporting the underlying amount of new lending in the economy, since these other factors are highly correlated with the state of the economy. This shall be shown in the following paragraphs for each factor.

Repayments in general lead to an underreporting in the true amount of new lending while using the outstanding stock of credit, as they drag the change in the stock downwards. Furthermore, as repayment structures do change over time, variations in the stock data would be generated, which are not be attributable to changes in loan creation. A slowdown of credit growth might therefore be due to lower credit extension, but it can also be due to earlier repayment. Ivashina and Scharfstein (2010) try to include these loan retirements in their analytical framework, but have trouble to account for it by using data from the Federal Reserve Board of Governors (FRB) on C&I loans. That is why they use data from the Reuters' DealScan database on syndicated loans. Although, these loan data are a true flow data covering newly sold syndicated loans, it cannot be traced back when the underlying loans where originally extended, which is of main interest for the conduct of monetary policy.

In addition, data of the growth rate in the outstanding stock can be altered if the average length of the granted loans fluctuates (see Antoniades (2014) for a discussion). But as central banks do not have direct control over private sector contract arrangements, repayment trends should also not affect the immediate decision set of central banks while analysing credit developments. Figure 2 depicts the average maturity of Commercial and Industrial (C&I) loans in the United States, as captured in the Survey of Terms of Business Lending (STBL). As shown in this example, a ceteris paribus movement towards longer running loans would lead to a higher growth path of the outstanding credit stock over the long-run, even if nominal new lending would remain at the same level, as credits are repaid slower, and are therefore longer and for a higher value in the books of the banks. Thus, the prediction of the bank lending channel, that tighter monetary policy reduces loan supply, could stem from banks reducing average maturities, and not necessarily because of a cutting back on loan origination, which is also stressed by Black and Rosen (2007).

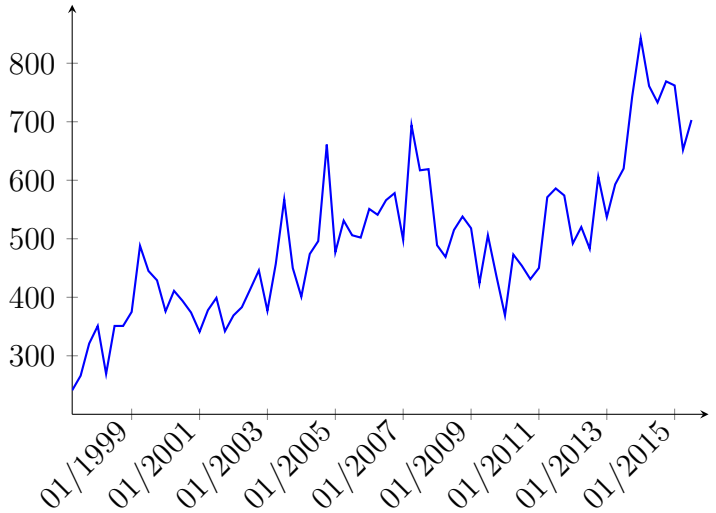

Figure 2: Weighted-average maturity for all C&I loans in days for the U.S. Source: Board of Governors of the Federal Reserve System (US).

Write-offs of existing loans also drag down the stock of credit, and therefore lead to an under-reporting of the actual amount of new lending. As write-offs are quite volatile, policy makers cannot differentiate which amount of the change in the stock is due to new lending activity and which is due to unexpected loan failures. High default rates in an economic crisis could even lead to a contraction in the stock of credit.

Another component which affects the stock of outstanding credit is securitization activity (see Poschmann (2012) for an overview of the securitization process). By offloading loans off the balance sheet through a final sell of the loan portfolio, the amount of credit extended goes generally underreported. Furthermore, it is conceivable that a credit goes

unreported completely in some frameworks. As credit data is mainly published by using bank balance sheet reports, a credit which is extended and then sold off-balance (even if only partially) due to securitization in the same reporting period may not be captured in the data.

Some central banks, like the ECB, specifically report securitizations additionally to the balance sheet data of the banks. These data would have to be added to the stock data in empirical analyses, to gain a more precise picture of new lending activities. Because of securitization activities, the actual amount of new lending might therefore be underestimated using bank balance sheet data, if not accounted for. Altunbas et al. (2009) specifically gather these securitization activities of European banks. They add data on securitization activities onto balance sheet data of individual banks and estimate the bank lending channel. They find that securitization may have a negative influence on the effectiveness of the bank lending channel (see also Loutskina and Strahan (2006)), but securitization strengthens banks' loan supply on the other hand through additional liquidity and an offloading of risks.

Moreover, due to the International Financial Reporting Standards (IFRS) banks have to account for specific risks in their loan portfolios, which have to be recognised through an incurred-loss-model. If there is external, objective evidence (a so called "trigger event") of a possible loss at the reporting date, this impairment has to be accounted within the subsequent re-evaluation at the present amount of the estimated discounted cash flows which seem reasonably feasible. This process is reversed if the origin of the impairment dissipates. Regarding loan portfolios at banks, this means that the stock of outstanding credit is exposed to changes if there are any economic events which significantly lower the probability of repayment. That would lead to movements in the outstanding stock of credit. These movements do not have a direct effect on the real economy, but are just the consequence of past events, although they can have an indirect impact on future loan origination, as these risks might lower the supply of credit due to lower profitability of banks. If such revaluations happen, central banks might be inclined to change their policy, even though new lending might not be affected by these cautionary measures.

What is also visible from seasonally unadjusted loan data of the Euro area is that the stock often drops quite significantly in December, but recovers roughly to the November level almost every January (see Figure 3). One possible explanation might be that banks want to lower their pre-tax profits right before the reporting date by recognising impairments, which they then book in reverse in January. Although, this effect might disappear once seasonal effects are accounted for, it might lead to undesirable reactions from central banks if not, especially since it can be difficult to estimate seasonal effects in real time.

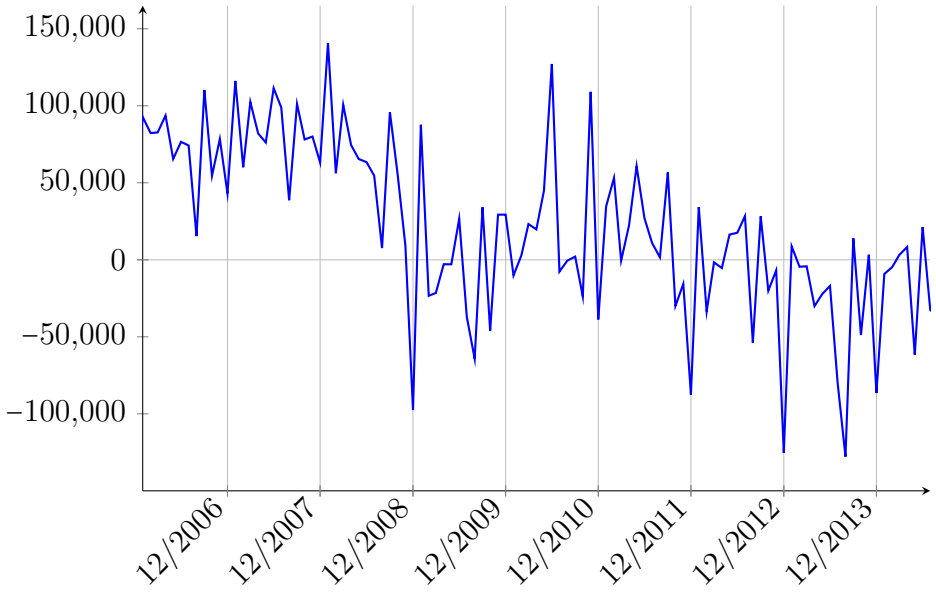

Figure 3: Monthly credit growth from non-seasonally adjusted data for the Euro area (Mill. €). Source: ECB, December data is highlighted by vertical lines.

The ECB tries to account for write-offs and write-downs in their stock data. Their Manual for Balance Sheet Statistics states that data of outstanding amounts should be net of revaluations and write-offs. These shall be reported separately. The ECB then calculates two different series from the balance sheet data of the banks. The stock data contains the stock as reported on the banks' balance sheets, while the transactions (flow variable) are net of the stock adjustments (see ECB (2012)). Although the flow variable does then not suffer from an inclusion of write-offs and revaluations—as evidenced in Figure 4 that the amounts are generally higher than the simple change in the outstanding stock, especially for non-financial business loans who are certainly more prone to be revaluated and/or written-off—, they are still suffering from the incorporation of repayments data. Additionally, absolute flows are negative in some periods. But as new lending activity could only be zero at minimum, one cannot draw a conclusion about new lending from the flow data of the ECB either.

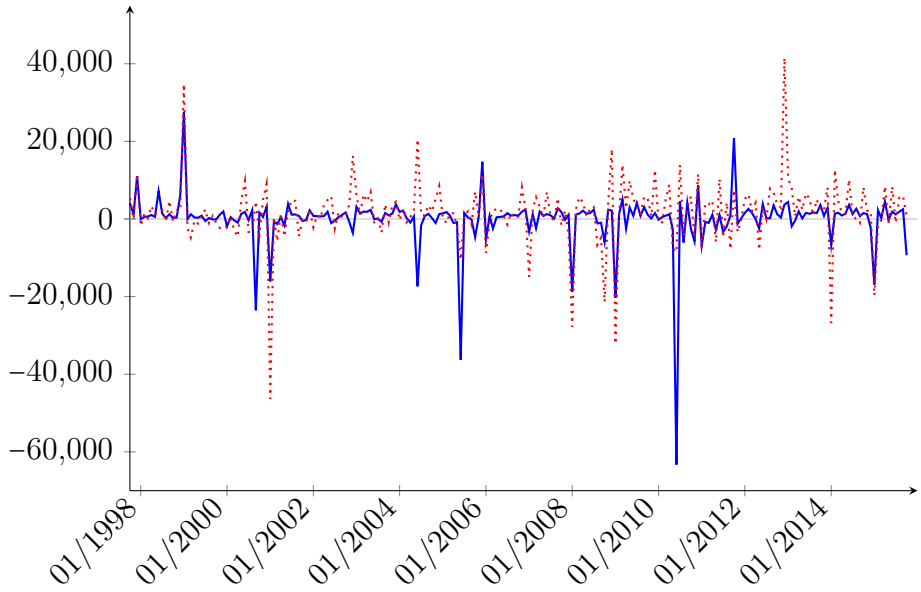

Figure 4: Difference between the flow and the change in the outstanding stock of credit for households (——) and non-financial corporations (·····) for the Euro area (Mill. €). Source: ECB, own calculations.

Therefore, it is evident that from only looking at the change of the outstanding stock, one cannot easily recognize the level of new lending. The ECB for example wrote in their Monthly Bulletin from February 2010 that "... the annual growth rate of loans to the private sector ... was zero" (ECB (2010), p.17). Certainly, credit creation did not come to a complete stop during the financial crisis, as there was actually still a decent amount of credit extended. But from the raw stock data one just does not know if there was no new credit given and no loans repaid, or if all loans matured and the same amount was created in the specific period.

A more general problem with credit data for the conduct of monetary policy is that it is not identifiable if a loan extension really led to spending in the real economy. In the aftermath of the Lehman collapse there was a quite big spike in C&I lending in the United States. The stock of outstanding C&I loans rose by 56 billion US$ in the month of October alone (see Figure 5). This unexpected spike is also visible in new lending data. C&I loans, as captured by the STBL, rose from an average of 85 billion US$ in each of the first three quarters 2008 to 105 billion US$ in the fourth quarter of 2008. This spike in both data series can certainly not be explained by seasonal factors.

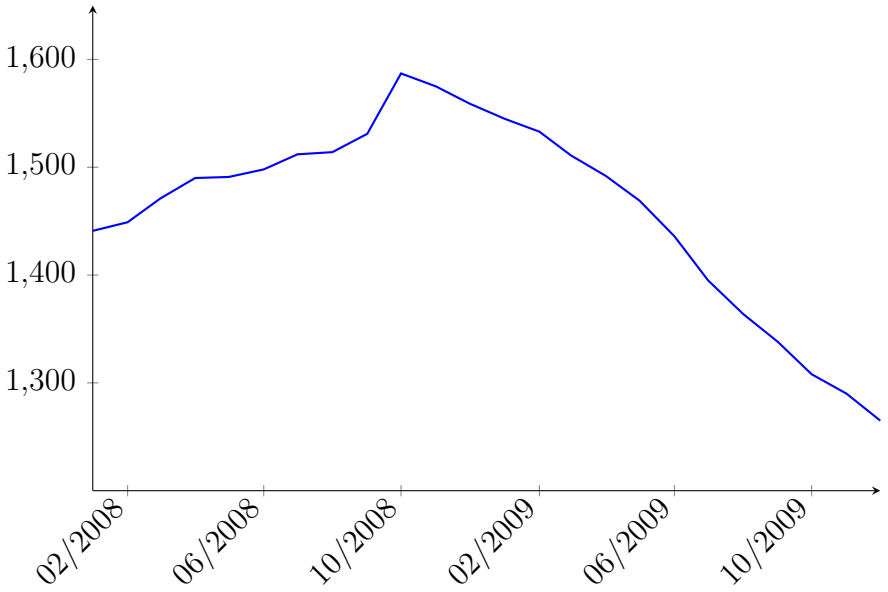

Figure 5: Outstanding stock of C&I loans for the U.S. (Bill. US$). Source: Fed.

The explanation of Ivashina and Scharfstein (2010), that many firms drew down on their previously granted credit lines due to concerns on access to credit in the future, is highly plausible, but not really explained by the data. Whereas, as noted by the authors, unused credit lines fell quite drastically during this period, it is mainly attributable to credit card line and construction loan draw-downs, and not from draw-downs of unused C&I loan commitments (see Figure 6 and Meisenzahl (2014)). Anyway, it seems highly likely that the spike in lending activity poses as insurance for firms in case of a credit market cut off, and does not represent new investments in the wake of this negative shock to the economy. Delta Air Lines for example noted that they want "to increase our cash balance", while General Motors said that they want "to maintain a high level of financial flexibility in the face of uncertain credit markets" (see Ivashina and Scharfstein (2010, p.327); and also Huang (2010) for the same reasoning). It probably makes a huge difference for the operation of the credit channel, if a credit is just sitting idle in the vaults of the firms, or if it is used for new investment projects. But this is certainly not observable by only looking at aggregate stock or new lending data, if not specifically accounted for in the frameworks (which is probably quite hard to accomplish).

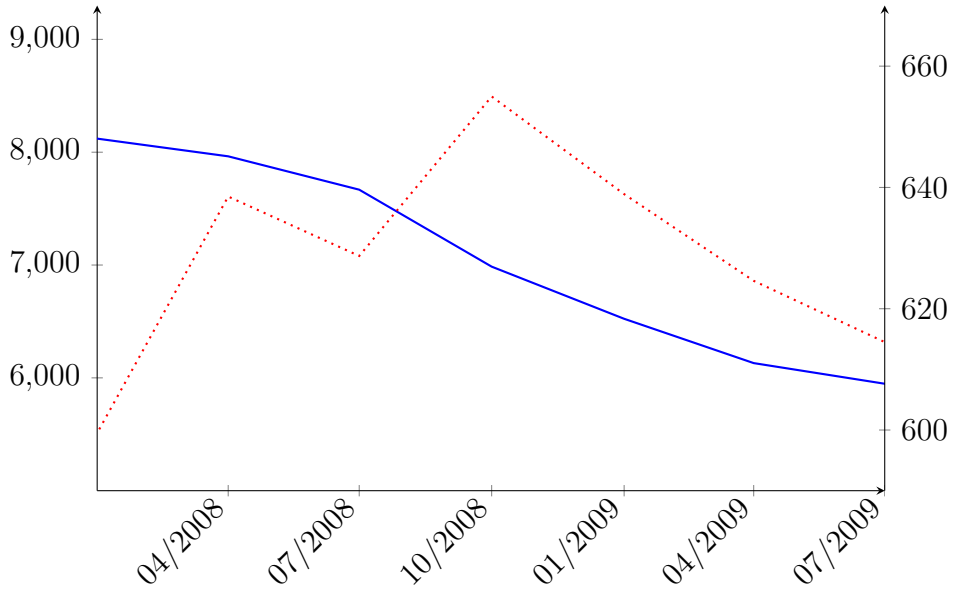

Figure 6: Unused commitments for all loans (——) and C&I loans (·····) for the U.S. (Bill. US$). Source: FRB.

Because of the above mentioned reasons, these accounting issues should not play a big role in monetary decisions, although developments in these variables should be monitored for macroprudential and financial stability purposes. But this cannot be accomplished from looking at the stock data only, since they do not provide clear indications which factor caused the stock to change, although some central banks try to mitigate this issue by subtracting write-offs, revaluations, and securitizations out of the stock data.[1]

[1]Furthermore, what is also not covered in conventional stock data, as reported by central banks and used in most monetary transmission studies, is lending from non-bank financial intermediaries (NBFIs). As these lending activities to the private sector gain more and more importance, central banks should also focus on these developments while formulating their monetary policy decisions. Although NBFIs have no direct access to central bank refinancing, their lending activities have an impact on economic activity and therefore inflation dynamics as well. By only looking at the stock of outstanding credit—and also new lending activities—from MFIs, valuable information about the transmission mechanism could be lost. But this would be a topic for further research and cannot adequately be analysed in this working paper.

4 Literature accounting for the other factors in the credit stock

Recent literature in the line of Kashyap and Stein (2000) tries to capture new lending activities more rigorously in micro banking studies analysing the bank lending and firm balance sheet channels. Jiménez et al. (2014) for example use data from the confidential Credit Register of the Banco de Espana on loan applications to assess determinants for credit extensions or rejections (see also Abuka et al. (2015) for an estimation of the bank lending channel in Uganda; and Garcia-Escribano (2013) for an application to Brazilian data). They have access to information on all business loans granted by all banks in Spain. Although they present valuable insights to what determines credit supply and demand, the impact of monetary policy decisions from a macro perspective is not analysed in these studies.

Even though some authors who are applying macro data to depict the impact of credit to the real economy are aware of certain aspects of the issues with the stock data, they do not account for both mentioned arguments rigorously. As stated above, Biggs (2008) and Biggs et al. (2009), among others, are trying to avoid the stock-flow issue, but do not use data for newly extended loans either. Although, they are explicitly stating that they use a variable of new lending: "consequently our preferred credit measure is the change in ***new credit issued*** as a % of GDP" (Biggs (2008), p.2; highlights by the author), their credit impulse data is just the second derivative of the stock of outstanding credit in the economy, and therefore still contains effects from the other mentioned factors.

For most of the data, they draw on the International Financial Statistics (IFS) from the IMF, which states the outstanding amount of credit. Regarding the U.S., they use flows-of-funds data, which draws on data from the Reports of Condition for U.S.-chartered depository institutions (the so called Call Reports), to construct the credit impulse. Although the usage of the flow-of-funds data might seem like applying new lending data, the flows of total credit market borrowing, as stated by the Fed in the Financial Accounts of the United States, is only the difference between the credit market debt outstanding in each period, adjusted for some general revaluations.[2] Data from the IMF also does

[2]As a technicality, revaluation accounts (labelled as FR) in the Financial Accounts framework of the Fed do not exceed a magnitude of two million US Dollar in any particular quarter during the period from 1990 to 2015 (see the Z1 Data as provided by the Fed at http://www.federalreserve.gov/datadownload/Build.aspx?rel=Z1). Therefore, these revaluations cannot

not take into account the other factors, as they are only the published balance sheet data by the banks. The data in the above mentioned papers therefore still suffers from the accounting of maturing loans, revaluations not captured in the frameworks, securitization, and write-offs. What is also evident is, that the flow of total credit market lending (table F.1 in the Financial Accounts of the United States statement[3]) is negative in some periods, because maturing loans, revaluations, and write-offs were higher in these periods (for example during the Great Recession in 2009) than the amount of new lending plus other debt issuance. But the amount of new lending in an economy can only be zero at minimum. So, one would need to compare the change in new lending to the change in GDP in such frameworks, to eliminate the stock-flow issue, and to account for the inclusion of other factors than newly extended credits in the stock data (see table 1).

Even literature of stock-flow consistent (SFC) models, who specifically try to avoid stock and flow inconsistencies, mostly use only the difference of the stocks as their flow variable. Many studies applying these SFC models to economic data for the United States use data from the flow of funds framework of the Fed (see for example Godley et al. (2007)). The problems with that dataset have been mentioned above. Papadimitriou et al. (2013) motivate their stock-flow identity in a stock-flow consistent model for Greece as

$$Stock(t+1) = Stock(t) + Flow(t) + NCG(t) - DS(t) \tag{1}$$

where the NCG stands for net capital gains and DS for the reduction in the stock, for example defaults. Anyhow, they report that "annual borrowing fluctuated around 7 percent of GDP from 1998 to 2006" (p.18), while only calculating the implied new borrowing from "the stock of loans outstanding" (p.18). By trying to avoid stock-flow inconsistencies by calculating the flow of credit, they also omit to account for the other factors affecting the change in the stock.

explain the drastic differences in the aforementioned data. It is furthermore implausible that revaluations of all commercial banks amount to only such a small amount, while the total loan portfolio exceeds well over 10 trillion US Dollars.

[3]It is to be noted that the data in the F.1 table labelled as "Total Credit Market Debt Outstanding" is constructed by adding up loans and debt securities. Instead of only incorporating bank lending, this framework also considers other forms of debt creation, like commercial paper and corporate bond issuance.

5 Stylised facts of lending activity

Most central banks only disclose information from the aggregated balance sheets—and therefore stock data—of commercial banks, and not data on new lending activity. Therefore, most academic research still incorporates stock data on bank lending.

The Federal Reserve Bank (Fed) tries to capture data on new bank lending in their quarterly Survey of Terms of Business Lending (STBL), where they collect micro bank data. Every 13 weeks the Fed asks a sample of commercial banks to provide certain price and non-price information about their granted commercial and industrial loans during the first full week of the 2nd month of each quarter (see Board of Governors of the Federal Reserve System (2013)). Since it is only survey based at selected institutions and only loans extended during one week, not all new loans are captured.

Anyway, with this data and the stock data on C&I loans, the impact of new lending could be separated from the impact of the other factors on the absolute change in the outstanding stock (see Figure 7). What can be seen is that the change in the stock does not move in sync with the amount of new lending. This can certainly stem from the selection of the reporting week in the new lending variable, as it may not be representable for the whole quarter. But what seems to be more plausible is that the other factors in the stock data influence the change more than the underlying trends in new lending activity. The correlation between the two series is only 0.28, which means that more than 70% of the fluctuation in the stock data are not explained by new lending. While the stock shrank drastically after the dot-com bubble and during the financial crisis after 2008, the fall in new lending cannot explain the drop in the stock alone, especially during the financial crisis after 2008.[4]

[4]Remember, that the spike in new lending in the third quarter of 2008 is because of precautionary borrowing from firms in fear of a credit market shutdown. Without this, the subsequent fall in new lending activity would not be as dramatic as it appears in the graph.

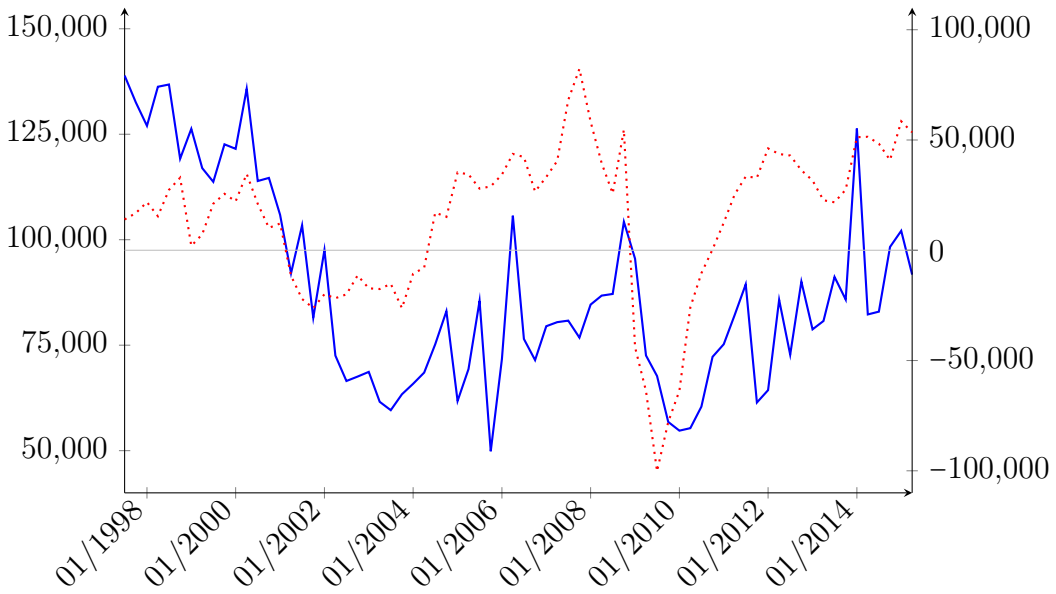

Figure 7: New C&I loans (lhs) (——) vs. the absolute change in the stock of C&I loans (rhs) (·····) for the U.S. (Mill. US$). Source: Fed, own calculations.

Therefore, by looking at the stock data, one could observe changes in the other factors, like revaluations and write-offs, and not the underlying trend in new credit creation. From 2005 on there is a huge acceleration in the growth rate of the stock visible—growing with an average of 15.5% annually between 2005 and 2008—, while new lending only grew with an annual rate of 10.9% during this period (see Figure 8 for the growing gap especially in 2007). This can probably be explained by a fall in non-performing loans, and therefore lower revaluations and write-offs after the turmoil from the dot-com bubble and 9/11 vanished (see Figure 9). Due to these lower write-offs and upward-revaluations, the stock grew at a faster pace than new lending afterwards. Therefore, the seemingly overly credit extension before the Great Recession can partially be explained by a higher growth in the credit stock due to falling write-offs and upward-revaluations of the loan portfolio, and not due to drastically accelerating bank lending (at least in the business sector), as new commercial and industrial lending did not grow with such a high rate. This, among other things, might explain why the perceived lending boom during the build-up of the financial crisis of 2008 did not lead to elevated inflation, since new lending did not grow as fast as implied by the change in the outstanding stock.

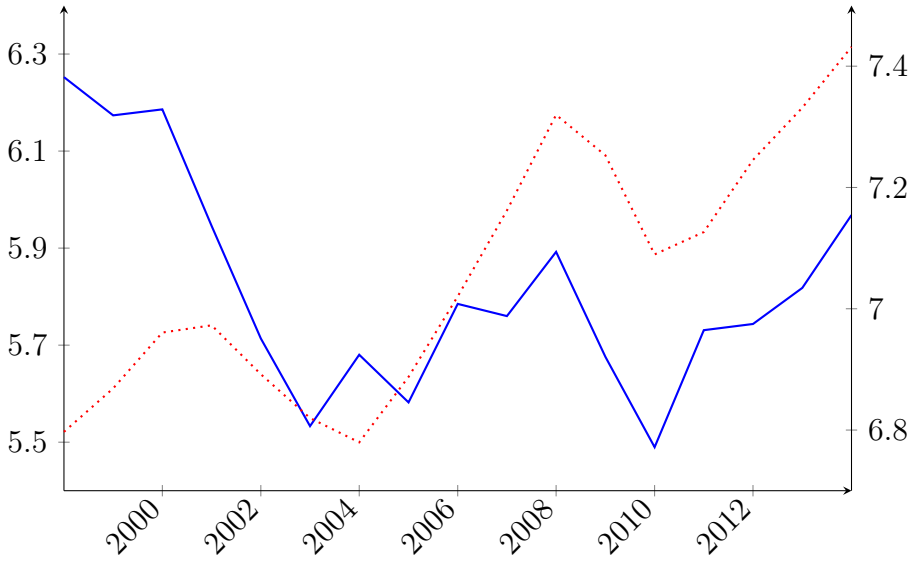

Figure 8: Log new lending (yearly sum, lhs) (——) vs. log of the outstanding stock (average observation, rhs) (·····) for commercial and industrial loans in the U.S. Source: Fed, own calculations.

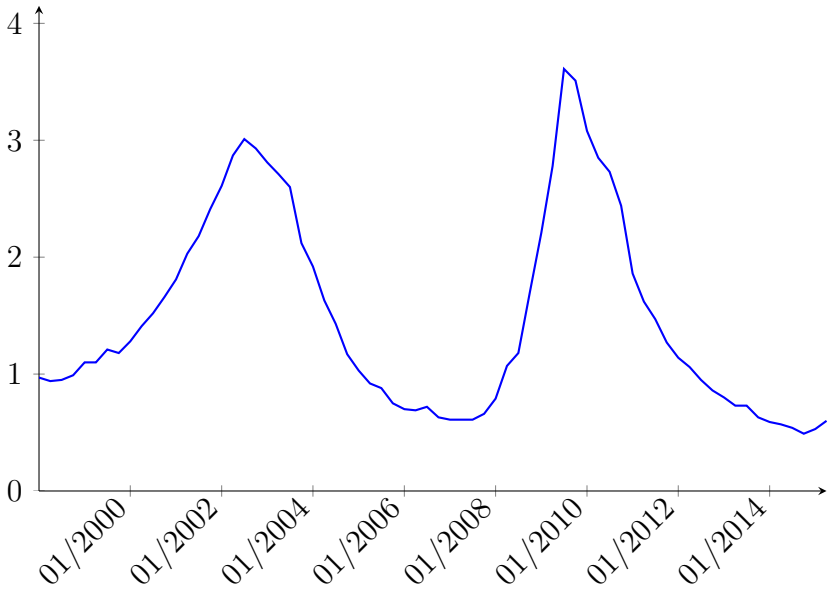

Figure 9: Non-performing loan ratio for the U.S. (in % of total loans). Source: Fed.

This observation might also explain the puzzle of the credit-less recoveries mentioned by Claessens et al. (2009) and Calvo et. al (2006), and picked up by Biggs et al. (2009). After financial crises, NPLs make up a higher portion of the outstanding stock, which drags the outstanding stock downwards, mainly due to revaluations. The change in the stock is therefore to a large extent influenced by the high negative correlation with the

NPLs, which is not supported by the underlying changes in new lending activity. This argument is also confirmed by the fact that new lending rose again since the third quarter of 2003, while the stock reached its low point not until the second quarter of 2004. This observation is especially significant for the paper of Claessens et al. (2009), since they only consider the first three years after a financial crisis in their model setup. As this is precisely the time-span where downward revaluations are especially high, even while new lending might pick up, this must not translate itself through to the stock data.

The same trends as after the dot-com bubble are also noticeable for the period between 2009 and 2011. While the stock still fell until the third quarter of 2010 (albeit slower than before), new lending already reached its low point during the first quarter of 2010. As a result, during crises the stock generally can be expected to drop steeper than the underlying new lending activity, and consequently recovers later, albeit if so with higher rates.[5]

Although, there is no new lending data publicly available for consumer and mortgage loans in the U.S., the same picture probably might apply to a certain extent, as is visible by a quite large drop in the stock data in 2009, followed by a quick recovery after the initial risks vanished.

The ECB also does not compile data on new bank lending in a comprehensive credit register either. Therefore, data from the MFI Interest Rate (MIR) Statistics of the ECB is used here. The ECB collects data of "new business volumes" (basically new lending activity) as weights for the calculation of the aggregated MIRs, i.e. the average interest rate which creditors have to pay for a new loan. By doing this, the volume of the new loans is only aggregated through a sample, and does not cover all new lending activity. There are other deficiencies in this data for the conduct of the analysis in this paper. If for example a loan contract is renegotiated—i.e. if there was an initial rate fixation, but after several years the interest rate can be altered—this loan contract would be counted as a new loan in the MFI framework, even though there was no new loan creation, as the ECB is only interested in current interest rate conditions while collecting this data. The ECB only started publishing the amount of renegotiations in December of 2014. What is visible from this brief period is that renegotiations for loans to corporations make up about 20%, for mortgage loans 35%, and for consumption loans 10% of all new lending in this setup. For data before that, it is not identifiable if these renegotiations make up a huge amount

[5]See for example Berrospide & Meisenzahl (2015) for an argumentation why new lending did not drop that significantly during the Great Recession.

of the new loans. Furthermore, a new loan that is just refinancing an old one would also be counted as an additional loan within this framework, even though no new spending in the real economy would be financed by this. Because of these shortcomings, the exact value of new lending (which is also followed by a transaction in the real economy) might not be illustrated precisely, but should rather be seen as an estimation of the true value. Despite these deficiencies, the data from the ECB MFI interest rate statistics on new business volumes might paint a more precise picture of credit developments, instead of the stock of outstanding credit, until better data becomes available.

The same observations as for the US data also apply here. While the stock of outstanding credit still exhibited a positive (albeit slower) growth trajectory until the middle of 2009 in the Euro area, new lending was already contracting in the end of 2008. As Figure 10 shows by comparing the stock of outstanding credit to total new lending, it becomes apparent that the stock began to fall in the second quarter of 2009, while net new lending already peaked in the third quarter of 2008. With default rates probably coming down again by the end of 2009—visible by a stop in the growth of the percentage of non-performing loans (see Figure 11)—, the growth in the stock of outstanding credit slowly recovered and grew from the fourth quarter of 2009 on.[6] But contrary to the growth in the stock, new lending still contracted further. This apparent return to growth visible in the outstanding stock was therefore not due to higher credit creation, but rather due to the high volatility in revaluations and write-offs, as default rates certainly came down after the initial stages of the financial crisis.

[6]However, one has to be aware that movements in the NPL-ratio cannot be interpreted cleanly, since e.g. a fall in the NPL-ratio could be the reason because of a reclassification of NPL-loans as performing loans or by complete write-downs of previously non-performing classified loans.

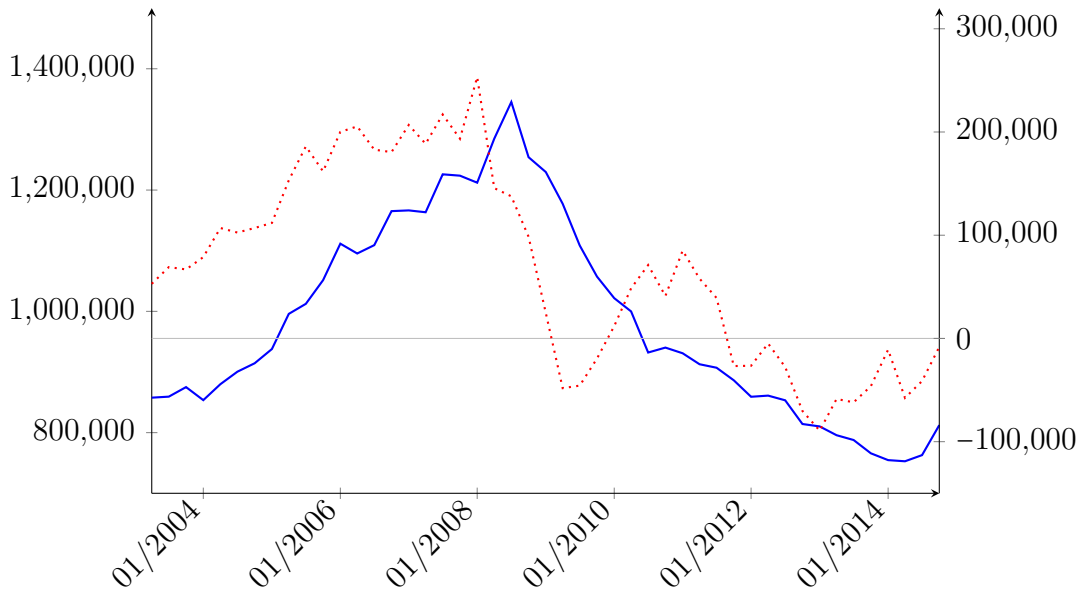

Figure 10: New lending (lhs) (——) vs. absolute change in the stock of credit (rhs) (·····) for the Euro area (Mill. €). Source: ECB.

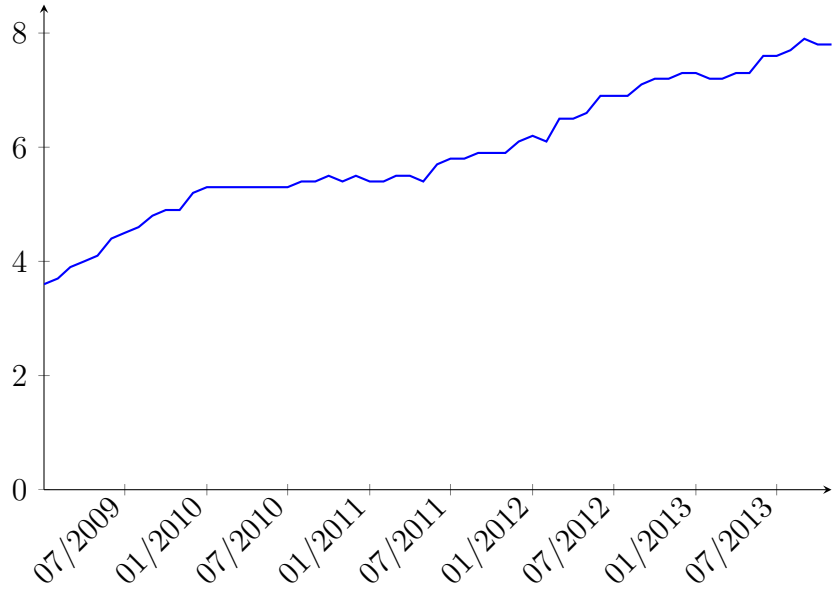

Figure 11: Non-performing loans for the Euro area (in % of total loans). Source: IMF, ECB.

This is also evident while looking at business loans in Figure 12. The outstanding stock of credit to non-financial corporations began to fall in the second quarter of 2009, while new lending already reached its peak during the third quarter of 2008. The stock began to grow again in the fourth quarter of 2009, while new business lending still fell at

quarterly rates of between five and ten percent until the end of 2010, and still contracted further afterwards, albeit at a slower pace.

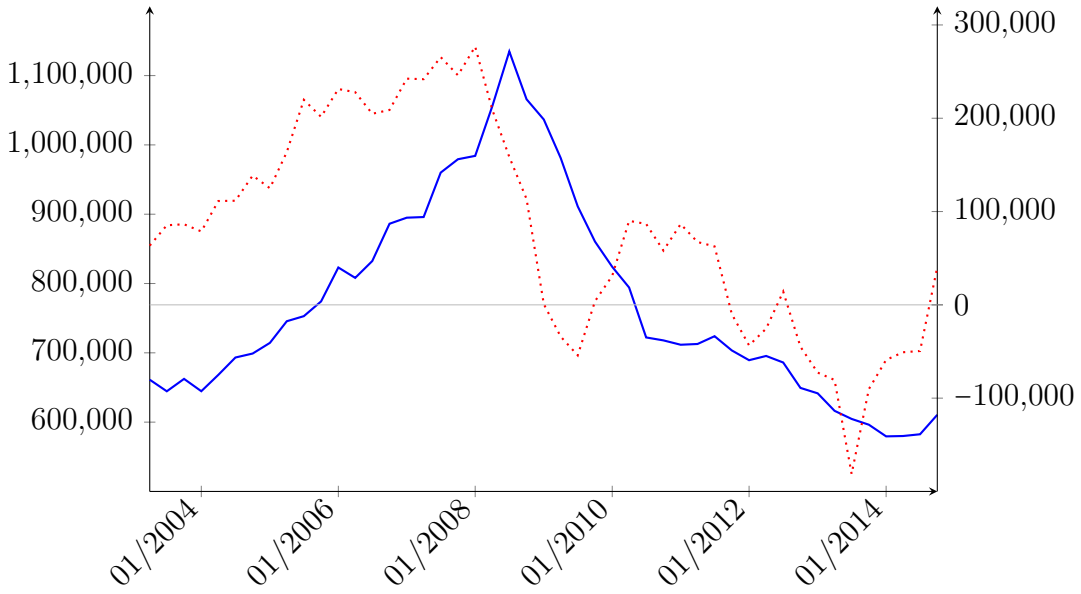

Figure 12: New lending (lhs) (——) vs. absolute change in the outstanding stock (rhs) (·····) for credit to non-financial corporations for the Euro area (Mill. €). Source: ECB.

Evidently, the ECB states that "the annual growth of credit to the private sector gradually strengthened further in the first four months of 2011, albeit remaining moderate. ***The expansion seen in credit*** to the private sector during the first few months of 2011 was driven mainly by MFI loans, with the annual growth rates of both MFI loans to households and MFI loans to non-financial corporations continuing to gradually increase" (ECB (2011), p. 28-29), and "the annual growth rate of MFI loans to the private sector ... continued its modest upward trend, increasing to 2.6% in April, up from 2.4% in the first quarter of 2011 and 1.7% in the fourth quarter of 2010... Thus, the recovery observed since early 2010 in private sector loan dynamics is continuing, albeit at a gradual pace. ... The annual growth rate of lending to non-financial corporations ***turned positive*** to stand at 0.5% in the first quarter of 2011, up from -0.4% in the fourth quarter of 2010, and reached 1.0% in April." (ECB (2011), p.31). Thereafter they note that "the annual growth rate of loans to non-financial corporations remained weak in the first four months of the year, but steadily increased further, continuing the gradual recovery observed since the second quarter of 2010. This ***increase in borrowing*** is in line with business cycle regularities and reflects improvements in business confidence and a gradual increase in the annual growth rate of gross fixed capital formation." (ECB (2011), p.32; highlights by the author). But as shown above, this apparent return to growth was just a slowdown in the

contraction-rate of new lending, and due to lower write-offs and downward-revaluations.

Applying the methodology from Biggs et al. (2009) it becomes visible that the credit impulse moves generally in line with GDP growth. Figure 13 shows the year-on-year growth rates for GDP and new lending, as well as the credit impulse as a percentage of GDP (calculated from the outstanding stock). The credit impulse and GDP growth have a high correlation of 0.80, which would underline the argumentation of the authors. But what can be expected is that the movement in the impulse generally stems from the volatile behaviour of revaluations and write-offs, which certainly have a high correlation with economic activity. This is underlined by the observation that the year-on-year growth in new lending has only a 0.56 correlation with GDP growth, which is still quite high, but not as robust as the correlation while using the stock. By calculating the equivalent of the credit impulse for new lending (using only the absolute difference as a percentage of GDP), the same picture prevails, as there is a correlation of 0.58 with GDP growth (see Figure A1 in the appendix). Due to the co-movement of the other factors in the stock data with real economic events, one could reach the false impression that new lending generally moves in line with economic activity, as predicted by Biggs et al. (2009).

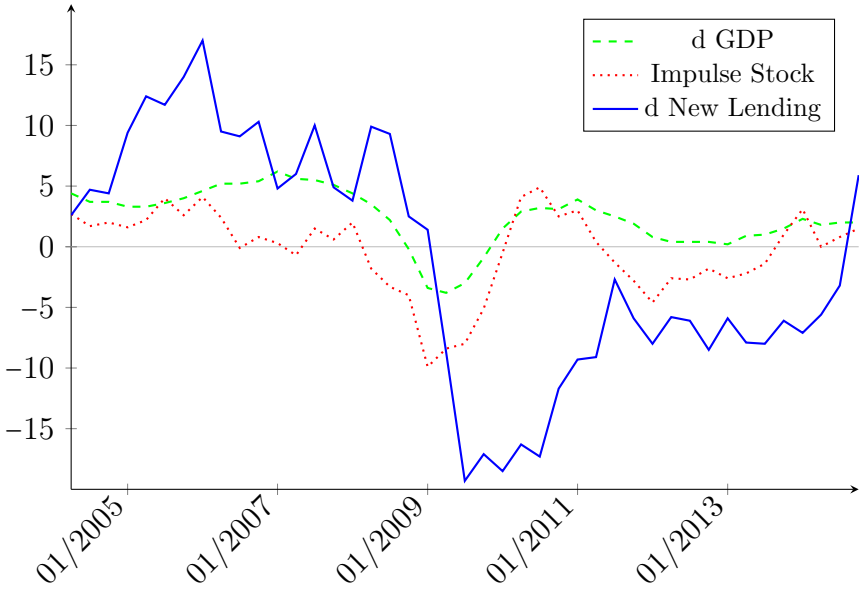

Figure 13: Credit impulse for the Euro area (in %). Source: ECB, Eurostat, own calculations.

The Banco Central do Brazil (BCB) is one of only a few central banks who compile data on new lending activities. They publish series on new credit operations in the economy. One can therefore compare the new lending data to the stock data directly (see Figure 14). Also here, the correlation between both variables is not that high, only 0.35.

Therefore, the trends in the stock cannot be explained to a large degree by new lending, as 65% of the variation remain unexplained. Additionally, while looking at the growth rates in Figure 15, it becomes visible that on average new lending basically did not grow anymore since the beginning of 2014. But by looking at the growth in the stock data, one would still see growth rates of over 10%, even though they are falling. But as a credit is only slowly repaid, it stays on the balance sheets for a certain amount of time. Therefore, the stock does not contract as much and as fast as it did rise while the loan was extended.

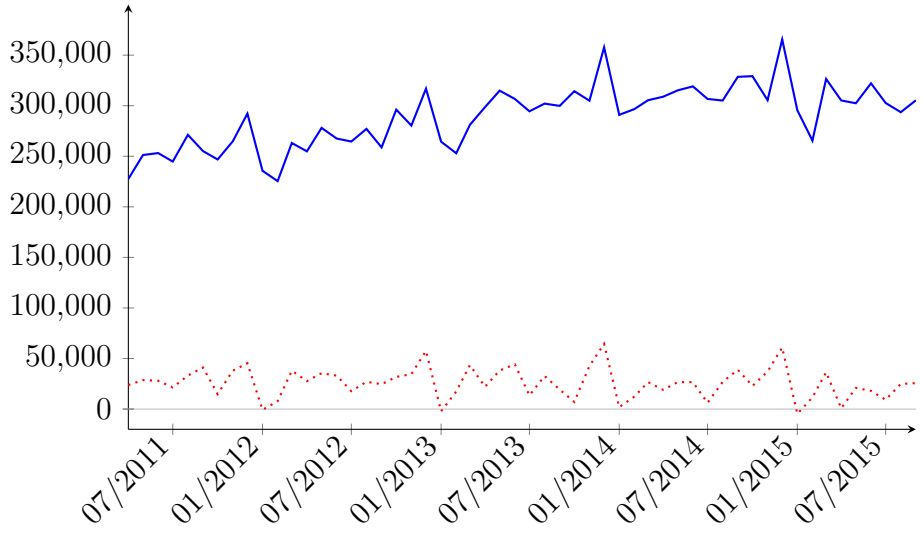

Figure 14: New lending (——) vs. absolute change in the outstanding stock of credit (·····) for Brazil (Mill. R$). Source: BCB.

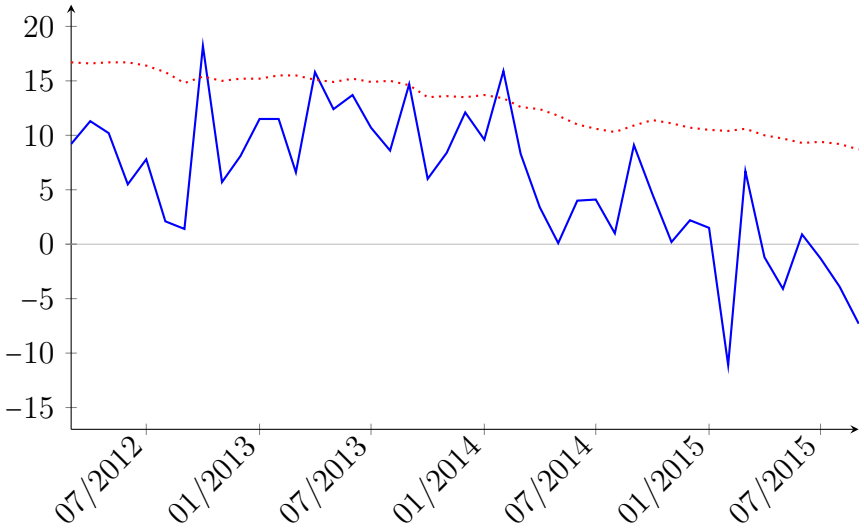

Figure 15: Growth in the total new lending (——) vs. total outstanding stock of credit (·····) for Brazil (yoy in %). Source: BCB.

On the basis of the above observations, it can be argued that premature or delayed movements in the stock data could lead to responses of central banks which are not justified by the underlying fundamentals in new lending activity. The example of Sweden in 2010/2011 might serve well for this argumentation. The Riksbank had fear of financial instability due to perceived risks of overheating in credit markets, especially in the housing market, because of high and rising growth data in lending. Therefore, they tightened policy to contain inflation and, as noted by the deputy governor Stevan Ingves, to curb the "excessive risks in the financial system" (Riksbank (2010)). While raising the policy rate from 0.25 to 2 percent in less than a year, the Riksbank wanted to bring down the "household credit growth ***which*** was about 9 percent" (Carlstrom (2015); additions by the author). Although this number can be challenged (see Figure 16 and also Svensson (2014)), it might nevertheless again be the result of a pick-up in the stock growth due to falling downward revaluations and write-offs after the global financial crisis, and not per se due to a pick-up in new lending activity.

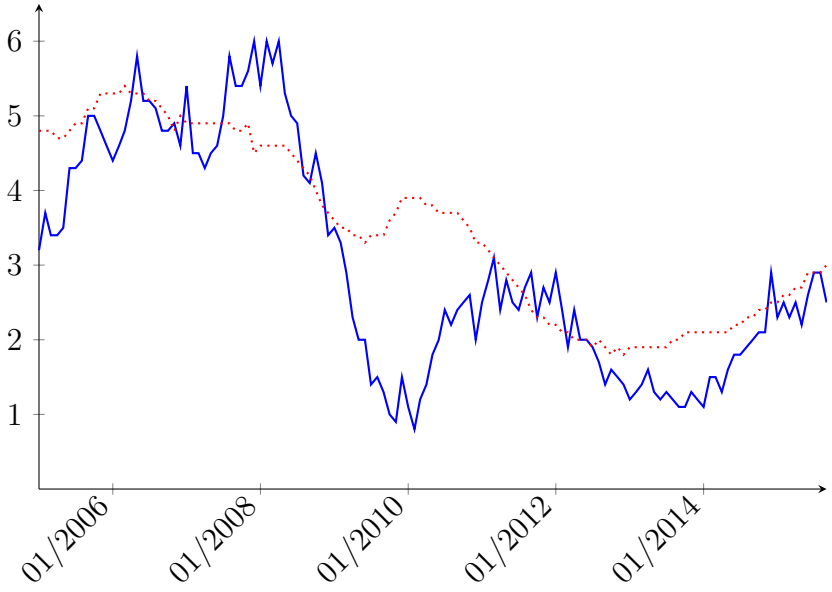

Figure 16: Loan growth for domestic loans to non-MFI (Total (——) and to households (·····)) for Sweden (yoy in %). Source: Riksbank, own calculations.

6 Conclusion

The analysis above identified potential problems for monetary policy conduct when using the outstanding stock of credit while formulating policy decisions. Volatility in the stock does not need to arise from underlying trends in new lending activity, but can merely be a result of other factors, namely revaluations, write-offs, securitization activities, and

maturing loans, which are highly correlated with the state of the economy. As shown above, monetary authorities could formulate decisions which might not be in line with current and future developments in credit markets, if instead being looked at due to the underlying trends in new credit creation.

While the standard literature on the credit channel is mostly looking at the change of the outstanding stock of credit in their empirical parts, the theoretical argumentations in the literature are certainly devised having new lending in mind. But most studies do not follow this thought process rigorously in their empirical sections (see f.e. literature in the line of Bernanke and Blinder (1988)). What is visible from a simple analysis of lending trends is that the impact of monetary policy on new lending could potentially differ from the impact on the outstanding stock, since both measures do not have a common pattern, due to the inclusion of other factors than new lending in the stock data.

With a focus on the change in the outstanding stock in credit in almost all empirical studies and communications of central banks, two flaws have been identified in this paper. First, the outstanding stock of credit incorporates data of maturing loans, revaluations, sell-offs due to securitization, and write-offs. Second, problems can arise because of a mix-up of stock and flow variables.

By using the amount of new lending in a specific period these two flaws can be eliminated. Especially by not incorporating data of maturing loans, revaluations, securitization, and write-offs, estimations do not suffer from distortions of the data due to information which are not in the direct control of central banks, and are therefore less crucial for the impact of monetary policy decisions on current and future lending activity, and their effects on the economy. Deviations arising from the incorporation of these additional factors into the stock data might therefore lead to diverging responses of central banks to monetary developments, which might stand in contrast to the implications of actual new lending activity.

Because of the arguments laid out in the paper, central banks should mainly be interested in the effects of their monetary policy decisions towards new lending activity while analysing the credit channels. The main concern should be on how central banks affect current and future credit supply and demand through their monetary policy decisions, and not on the effects of previously extended credit, which have an influence on the trajectory of the outstanding credit stock. It can be argued that these effects are at best be dealt with other regulatory tools, like macroprudential policies.

Recent studies (f.e. Jiménez et al. (2014), Abuka et al. (2015), Garcia-Escribano (2013)) try to remedy the above mentioned issues by drawing on data from credit registers of certain central banks. In their micro-level studies about determinants of bank lending

they incorporate approved new credit (lines), and try to answer questions about what are the determinants of extending a new loan. But these are generally not applied to macro studies of monetary policy transmission. One problem can be that the use of new lending in macro studies poses to be pretty difficult, especially for academics outside of central banks, as most central banks have no publicly available credit register. While some have detailed credit registers, most central banks only publish data on the outstanding amount of credit, with data of the credit registers only available to the central bank's staff, if at all. Although the Federal Reserve publishes survey data on commercial and industrial loans, not all loans are incorporated in this framework. Especially, crucial loans on mortgages, which can pose large threads to the economy because of possible over-indebtedness in the private sector, are not collected through this framework. Therefore, only a fraction of total new lending is being reported. In the Euro area data on new business lending in the MFI framework also possesses the same difficulties as the U.S. data, as mentioned before.

Summing up, the paper shows that it is crucial to assess to which extend new lending is responsible to the change of the outstanding stock of credit and which amount is affected from repayments, revaluations, securitization activities, and write-offs. The built-up of explicit credit registers is therefore seen as important to formulate thorough analyses about lending and credit developments and the monetary transmission through the credit channel.

7 Appendix

Appendix A1:

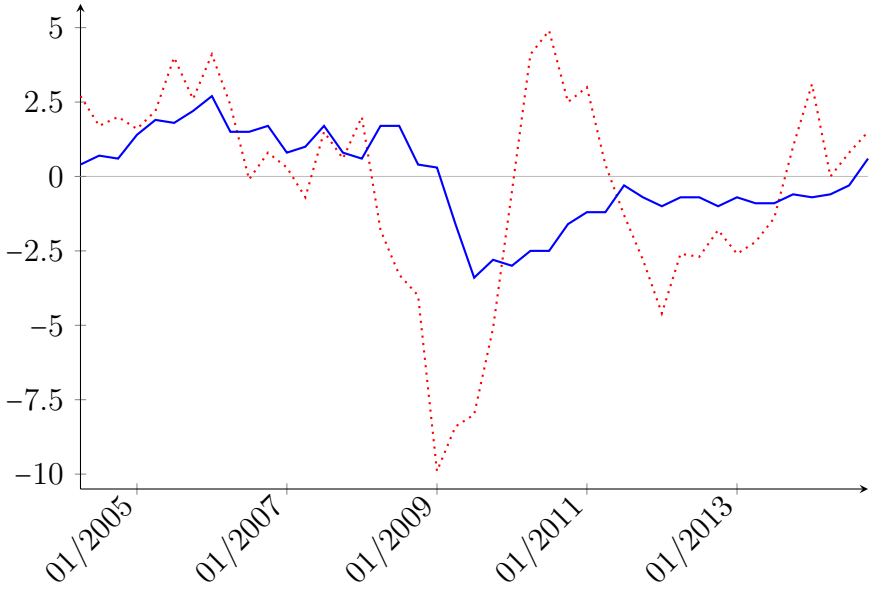

Figure 17: Credit impulse for new lending (——) and the outstanding stock (·····) for the Euro area (in %). Source: ECB, Eurostat, own calculations.

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