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The Impact of a Low Interest Rate Environment: Empirical Evidence from the Euro Area Bank Lending Survey

Taha Khosravi*

Abstract

This paper investigates the effect of a protracted period of low monetary policy rates on loosening of banks' credit standards concerning enterprises, households and consumer loans. Using a balanced panel dataset of 9 countries that have taken part ever since the initiation of the Euro area Bank Lending Survey, this study focuses on three different time frames of pre- (2002Q4-2008Q3), mid- (2008Q4-2010Q4) and post- (2011Q1-2014:Q4) financial crisis. The results indicate that low short term interest rates prior to the crisis produce a disproportionate loosening of credit standards in all three types of loans. In spite of the scope of expansionary monetary policy documented primarily in the post-crisis sample, the data analysed indicates that negative Taylor-rule residuals lead only to a softening of total lending standards for enterprises loans. Additionally, the outcomes of this study indicate that the European Central Bank 3 year long-term refinancing operations brought a fall in the progress of banks' credit tightening. However, the benefits of this have yet to be experienced in the EA9 real economy. While regrouping the original sample in stressed nations, the results suggest that excessive risk-taking in bank lending behaviour took place, especially during periods of low monetary policy rates both pre- and post-crisis.

JEL classification: E44, E50, E52, E58, G01.

Keywords: Monetary policy, Bank lending Survey, Euro area, LTROs announcement, Panel data.

1. Introduction

The euro was introduced to international financial markets in 1999 and was a crucial course of action in European integration, merging the biggest trade bloc at the time and establishing a powerful world currency. The euro is the single currency in 19 of the European Union's Member States which combine to form the 'Eurozone'. The European Central Bank (ECB) functions in part to steer the monetary policy in the 'Eurozone', a world economy trumped only by the United States.

The 2008–2009 Global Financial Crisis (GFC) has had a detrimental impact on bank lending in the main industrialised nations, together with the Euro Area (EA) with significant levels of heterogeneity within the different nations (Ciccarelli *et al.*, 2013; De Santis and Surico, 2013). As a result, this has had negative repercussions for banks' health, with respect to cost of funds and balance sheet; therefore, their capacity to approve loans or credit lines has been diminished. Empirical studies implicate the origin of the financial crisis as stemming from an immoderate relaxation of lending standards as a result of excessively low levels of short-term policies accepted in the central banks (Taylor, 2009; Allen and Carletti, 2010; Maddaloni and Peydro, 2011; Forbes, 2015, among others). Accordingly, with the purpose of assisting liquidity levels within EA banks, the ECB carried out two long-term refinancing operations (LTROs) in December 2011 and February 2012 where a total sum of €1 trillion cheap loans was injected into the EA banking system.

Moreover, in light of the GFC of recent times and the ensuing protracted periods of record low real interest rates prevalent in the more established economic nations, the debate regarding the tendency of economic entities to assume additional risk during periods of low interest rates has been resurrected.¹ Accordingly, this question has fuelled speculation regarding the effects of the risk-taking channel, a further mechanism in monetary policy transmission, on the credit supply. The current available literature regarding this subject is indecisive, meriting additional research.

The aim of this study is to build on the empirical works by Maddaloni and Peydro (2011/2013) through empirically developing the evaluation of the EA Bank Lending Survey (BLS) and highlighting the 9 EA countries that participated since the initiation of the survey.

Having identified a gap in the existing literature, this study attempts to add to the current research by considering the post-financial crisis time frame. Additional new queries

¹ See Diamond and Rajan (2006), Adrian and Shin (2010), Borio and Zhu (2012), Jimenez *et al.* (2014) and Ioannidou *et al.* (2015), among others.

corresponding to consumer credit in parallel with those related enterprises and households will therefore be addressed. In this case the EA embodies a novel institutional environment with a collective monetary policy. Moreover, inside this region, capital to the corporate segment is primarily supplied by banks, which is equal to approximately 80% as proposed by Allen *et al.* (2004).

The contributions of this study to the existing literature are fourfold: (1) the period following the financial crisis experienced an additional decline in short term interest rates, so much so that the value remained negative throughout this period.² Accordingly, the influence of monetary policy rates on lending standards for this time frame is analysed with the purpose of deciding if maintaining policy rates at a previously unsurpassed low value has actually resulted in additional relaxation of bank's credit standards; (2) the time frames pre-, mid- and post-crisis are independently evaluated, given that the ECB does not have a policy of publicly reporting the survey data for Austria, Ireland and Finland in net percentage terms; therefore, the prior results obtained by Maddaloni and Peydro (2011/2013) cannot be the sole basis of reference, given that their conclusions are sourced from the and the U.S. opinion survey and 12 'Eurozone' nations that contributed from the beginning of the survey. Consequently, the nations chosen for empirical analysis are as follows: Belgium, France, Germany, Greece, Italy, Luxembourg, Netherlands, Portugal and Spain; (3) the selected countries are grouped according to the effects as well as the severity of the financial crisis into two panels of A and B. Panel A consists of Greece, Spain, Italy and Portugal, while Panel B contains Belgium, France, Germany, Luxembourg, Netherlands. The purpose of this task is to evaluate the impact of monetary policy rates on banks' margins concerning riskier loans particularly for the pre- and post-financial crisis periods; (4) the efficiency of the ECB 3 year long-term refinancing operations (LTROs) that were carried out in December 2011 and February 2012 are evaluated in great depth in order to determine whether banks' credit standards have been relaxed and ascertain the degree to which demand for loans has risen considering that a total sum of €1 trillion cheap loans was injected into the EU banking system under these operations.

This study is structured in the following layout: Section 2 presents a review of the empirical literature, Section 3 details an in-depth outline of the data and methodological framework, Section 4 discusses the empirical results, while section 5 provides the conclusions.

² **Figure.4** documents the trend of short term interest rates in the EA9 countries.

2. Literature review

In order to fully grasp the concepts discussed in this study, it would be prudent to briefly review the fundamentals of the terms intrinsic to the subject. First, this section offers a crucial analysis of the empirical studies which utilised the lending survey data of the EA in conjunction with data from the US. Subsequently, we examine the topical discussion during the time frame of low interest rates and their effects on banks' lending behaviour. In addition, the recent measures adopted by the ECB in the wake of the financial crisis are examined here, noting the cautious lending behaviour by banks to the public and the private sector. Lastly, research questions with their corresponding supporting rationales are presented.

2.1 What do lending surveys actually reveal about the impact of monetary policy?

Ever since January 2003 after the BLS specific to the EA was initiated, researchers have been increasingly curious to analyse its data. Yet, given the survey's brief nature, such an investigation was delayed and is only now being explored.

De Bondt *et al.* (2010) demonstrate that data in the BLS allows the estimation of realised and expected credit standards in the EA. The study suggests that, in addition to loan demand and the official interest rate, bank loan supply factors, the balance sheet position of borrowers and risk perception in the economy should also be included when determining important factors for bank credit and real GDP growth. Similarly, Hempell and Kok Sorensen (2010) utilise an identical approach and information with the purpose of conducting an investigation that concentrates on the crisis phase while, analysing the comparative significance attributed to different elements responsible for supply limitations.

An examination of the available literature reveals that just a handful of studies have benefited from the bank-level BLS information. The Blaes (2011) study investigates the potential function of limitations applying to banks by characterising the distinct decrease in bank lending to German non-financial corporations (NFCs) throughout the course of the credit crisis. The study reports that the stifling influence of limitations applied to banks was harshest from quarter three of 2009 to quarter one of 2010. Correspondingly, a study by Del Giovane *et al.* (2011) merges micro data regarding the cost of lending together with data concerning loan regulations taken from banks in Italy partaking in the survey. The study concludes that supply elements, for example balance sheet positions and perceived credit risk, are important, yet subtle, influences on the decline of bank loans throughout Italy during the crisis period from 2007 to 2009.

Concentrating on the EA nations, Maddaloni and Peydro (2013) evaluate the influence of short-term interest rates and macroprudential policy on lending standards prior to the recent crisis, and regarding the provision of central bank liquidity throughout the crisis utilising the BLS data from 2002Q4-2010Q4, the outcome implies that monetary policy rates and central bank provision of long-term liquidity function in a supplementary capacity to obviate a potential credit crisis for firms

When examining the US Berger and Udell (2004) utilise individual bank-level data of US banks' lending standards during the period 1980–2000. The research offers supporting data by demonstrating that the reduced capacity of the loan officer may be employed as a reason for the detected pro-cyclicality specific to bank loans. Furthermore, Lown and Morgan (2006) employ a VAR examination through utilising macro-data gathered by the Federal Reserve's Loan Officer Opinion Survey (SOSLP) and demonstrate that variation in the credit supply standards assist in forecasting progress in lending and economic activity.³ The study demonstrates that each recession period has preceded a period of modest constriction of credit standards.

A seminal paper by Maddaloni and Peydro (2011) utilising a novel collection of data from the EA and the U.S. bank lending standards suggests that low (monetary policy) short-term interest rates relax standards for both household and corporate loans. This relaxation—particularly for mortgages—is augmented through securitisation action, supervision for bank capital and low monetary policy rates for a protracted time frame. On the other hand, low long-term interest rates fail to relax lending standards. Ultimately, nations with more relaxed lending standards prior to the crisis corresponding to negative Taylor rule residuals subsequently produced a poorer economic display. Such conclusions aid in elucidating the source of the crisis, while also offering signification implications to policy.

Moreover, Bassett *et al.* (2014) utilise research to take advantage of the bank level reaction to the SOSLP; the results show that modified lending standards, adapted for the macroeconomic and bank-related elements, influence loan demand. Constrictive shocks affecting the credit supply result in a significant decrease in output and the capacity of businesses and households to borrow funds from banks, in addition to broadening credit spreads and an easing of monetary policy.

³ In order to examine empirical investigations which utilise SOSLP, please refer to Lown *at al.* (2000), Lown and Morgan (2002), Cunningham (2006), Basistha & Kurov (2008), Hirtle (2009), Ivashina & Scharfstein (2010) and Becker & Ivashina (2014), among others.

2.2 Low interest rates monetary framework and bank lending behaviour

The debate of whether low interest rates could involve additional risk-taking through bank lending behaviour has developed into a primary point of contention in contemporary economic literature and among practitioners. Yet, the contemporary available literature regarding this subject is indecisive, warranting further investigation.

Indeed the justification for a risk-taking channel in the presence of low interest rates could be that these conditions motivate asset managers to assume additional risk for three types of reasons: behavioural, contractual or institutional (Rajan, 2006).⁴ The aforementioned explanation is known as the ‘*search for yield*’ and leads to an unusually high rise in demand for riskier assets with the potential for higher returns from banks.

The risk-taking channel in the transmission of monetary policy is well-defined by Borio and Zhu (2012) which characterise the channel as the effect of variations in policy rates with respect to either risk-tolerance or perception of risk; specifically, these policy changes affect the magnitude of risk present in portfolios, the valuation of assets and the extension of funding both in price and non-price components.⁵ In contrast, elevated interest rates diminish banks’ net worth resulting in “*gambling for resurrection*” as a solution (Kane, 1989). One method of reinforcing this influence is practicing extensive utilisation of Value-at-Risk approaches for economic and regulatory capital objectives (Danielsson *et al.*, 2004). A study conducted by Gambacorta (2009) highlights that rising markets confer increased stability, which allows financial firms to take advantage of their risk budgets, promoting position-taking.

By the same token, Adrian and Shin (2010) suggest a model in which banks actively modify their balance sheets to reflect economic conditions; specifically, they offer more leverage during economic booms and less during bursts. Therefore, it can be said in this case that leverage is procyclical.⁶

The results from a seminal study by Jimenez *et al.* (2014) indicate that banks are far more inclined to undertake high-risk lending practices as a result of lower overnight interest rates. In fact, these conditions appear to motivate banks with relatively less funding to accept increased numbers of loan applications from firms that were previously considered too risky. If an application was approved, the loan was for an unusually high amount and not secured through

⁴ Similarly, Adrian *et al.* (2010) stress that changes to the monetary policy stance impact the essential “*risk appetite*” of financial intermediaries.

⁵ Borio and Zhu (2012) argue that the procyclical influence from assessments of probability of default, loss given default, correlations and volatilities is a robust indicator of the effect of risk perceptions. See as well Allen and Gale (2000), Diamond and Rajan (2006), and Acharya and Naqvi (2012), among others.

⁶ Leverage of this nature is interpreted as the result of banks’ activity and management which serve to enhance their balance sheets in response to variations in measured risk and prices.

use of collateral. Additionally, loan applications approved by lesser-funded banks are also more likely to default under conditions of low overnight rates. However, long-term lower interest rates along with current account deficits, securitisation and additional important macro variables do not have this impact. The study concludes that monetary policy does have an impact on credit supply composition, especially when analysing credit risk.

From 1999 to 2003 in Bolivia there were substantial fluctuations in the federal funds rate. Ioannidou *et al.* (2015) investigate the effect of this rate on the pricing and risk of new bank loans during this period. The results indicate that reduced US federal funds rates before loan origination increase the likelihood of default for bank loans granted to individuals for each month. Moreover, banks with higher liquidity and lesser funding from foreign sources assume additional risk during periods of low federal funding. Under these conditions such banks even decrease loan distribution in spite of the presumed higher element of risk associated with this strategy.

2.3 Expansionary monetary policy vs. cautious lending by Eurozone banks:

In the subsequent aftermath of contemporary financial turmoil, lending to small and medium-sized enterprises (SMEs) became the number one priority to consider for governing authorities worldwide considering that they are commonly referred to as the backbone of the EU economy; this is particularly the case within the context of cautious lending when banks are disinclined to increase lending activity and volume irrespective of the monetary policy stance.

While analysing the goal of the ECB, Cour-Thimann and Winkler (2012) state that the central bank employs non-standard measures that act as a complement to the standard interest rate policy rather than as a replacement for it. These non-standard measures have been primarily targeted towards banks in order to avoid chaotic deleveraging in the EA economy and enhance liquidity and funding (Cour-Thimann and Winkler, 2012). Accordingly, the ECB's unconventional monetary policies are expected to safeguard the ability of solvent banks in the region to maintain lending to the public and private sectors.

A study by Ciccarelli *et al.* (2013) investigates the monetary transmission via banks of different sizes and finds that, by the end of 2011, the effects of borrower's credit frictions were not attenuated, particularly in the struggling nations. Given that smaller banks generally lend to SMEs, the study suggests that the procedures implemented until 2011 likely failed to rectify issues regarding credit availability which arose from adverse risk conditions and the declining

net worth of firms. This conclusion is especially relevant to smaller firms in distressed EA nations.

Upon examining data from 91 large banks in 45 nations, Beck *et al.* (2011) determine that foreign, domestic private and government-owned banks utilise a variety of lending technologies and organisational structures for the purpose of financing SMEs. Loans to these smaller firms, specifically in the context of extent, type and pricing, are weakly correlated with the aforementioned technologies and structures, signifying that ‘*relationship lending*’ need not be the sole basis for SME loans.⁷

In order to determine the relationship between monetary policy and lending in Europe, De Santis and Surico (2013) evaluate balance sheet data of the four largest economies in the EA sampled from 1999 to 2011. The study reveals that in Germany and Italy, which both house a relatively large number of banks, the impact of monetary policy on lending was pronounced and diverse. In contrast, the impact in Spain was relatively weak and France experienced a more homogenous effect; both nations are characterised by a relatively higher degree of market concentration. Furthermore, some data suggests that monetary policy has a greater influence on the relatively smaller savings banks in Italy, and the savings and cooperative banks that possess relatively low liquidity and capital in Germany.

In the EA the recent economic crisis has had a negative impact on the monetary transmission mechanism (Öztürk and Mrkaic, 2014). When conducting an analysis to determine the level of access that SMEs have to bank financing, data from several thousand firms from the EA reveals that the costs associated with modifications to the leverage of the borrower as well as bank funding affect the aforementioned access to finance for these smaller firms. Specifically, greater borrowers’ debt-to-asset ratios and bank financing costs are adversely and significantly correlated with SMEs’ access to financing.

Furthermore, monetary policy inside the Eurozone experienced ‘*fragmenting*’, specifically in terms of the fact that reduced interest rates determined by the ECB did not influence the banks in periphery nations to stop charging high lending rates by banks in said countries, relative to the ‘*core*’ nations. Accordingly, these higher interest rates documented in the periphery nations exhibited a risk associated with the exchange rate that would normally be absent from a

⁷ In support of this conclusion, Beck *et al.* (2011) also find little significant variation regarding the extent, type and pricing of SME funding among different types of banks. Alternatively, significant variation is found between developed and developing nations, considered to be a result of variation in legal and institutional financial systems.

completely developed monetary union, which served to warp the allotment of capital and hinder lending activity and volume to SMEs especially, leading to poor economic growth in the periphery nations (Mullineux, 2015).

In June 2014 the ECB issued a package of measures utilising a strategy comparable to that of the UK's '*Funding for Lending Scheme*' (FLS) overseen by HM Treasury and the Bank of England. In August 2012 the FLS began offering cheap loans for up to a period of four years to financial institutions that demonstrated increased mortgage and SME lending. However, the FLS has not managed to successfully stimulate a significant increase in lending to SMEs in the UK. Notwithstanding, the ECB is set to enact a '*Targeted LTRO*' (TLTRO) scheme that facilitates expanded access to cheap financing for SME lending (Mullineux, 2015). In order to support this scheme and to stimulate the future SME lending market, the ECB is also considering the benefits of buying SME-loan backed securities. When evaluating studies for relevance to these issues, it is important to note that most of the available literature on unconventional monetary policy does not consider the ECB's 3 year *long-term refinancing operations* (LTROs) which were carried out in December 2011 and February 2012 where a total sum of €1 trillion cheap loans was injected into the banking system in order to facilitate lending by bank to SMEs that were hit by the crisis in the Eurozone.⁸

⁸ One exception to this is Darracq-Paries and De Santis (2015) which used the BLS data from 2003Q1-2011Q4 and just the un-published ad-hoc questionnaire of the BLS in February 2012 to estimate a panel VAR for the Euro area countries.

In this study, we carry out an empirical assessment through evaluating the subsequently outlined research questions in the EA9:

Hypothesis I: do protracted periods of low monetary conditions prior to the financial crisis result in an excessive relaxation of banks' credit standards as applied to approval of loans or credit lines to enterprises, households and consumer credit?

The first hypothesis can be tested by adopting the following reasoning: in the pre-crisis model we expect to substantiate a link between the effect of low level of interest rates and softening of banks' credit standards to three types of loans issued by banks (in keeping with Maddaloni and Peydro (2011)). Accordingly, total banks' credit standards are examined and influencers of this variable originating from cost of funds and balance sheet constraint are investigated.

Hypothesis II: has the intensity of this relationship changed in response to the expansionary monetary policy both during and after the financial crisis?

It is worthwhile to note the scale of the expansionary monetary policy in both mid- and post-crisis periods, characterised by low policy rates, in which 21 successive quarters saw the weighted average for Taylor rule residuals stay negative during 2009:Q4-2014:Q4. The second question is verified through adopting and using the same methodological approach as outlined in the first question; therefore, the potential modification to banks' credit standards is revealed.

Hypothesis III: does the data support the idea of excessive risk-taking behaviour by banks in stressed vs. non-stressed countries of the EA9 prior to the onset of financial crisis and has there been some enhancement in this respect post-crisis?

The third test is conducted by regrouping the selected countries in our original sample according to the effects as well as the severity of the financial crisis into two panels of A and B. Panel A consists of Greece, Spain, Italy and Portugal, while Panel B contains Belgium, France, Germany, Luxembourg and Netherlands. The purpose of this task is to evaluate the impact of monetary policy rates on banks' margins concerning riskier loans, particularly for the pre- and post-financial crisis periods. On a related note, Ciccarelli *et al.* (2013) imply that banks within stressed countries in the EA relied more on the liquidity offered via the Eurosystem. Hence, relative to Panel B countries, Panel A countries are predicted to practice more excessive risk-taking behaviour during the pre-crisis period in connection with the previously mentioned three categories of loans; this may be deemed a potential cause that exacerbated the economic impact of the recent crisis. Accordingly, this present study conducts additional testing to reveal any progress in this respect in the selection obtained in the post-crisis period.

Hypothesis IV: does the ECB's 3 LTROs liquidity injection into the EU banking system translate into a softening of bank lending standards and the degree to which the demand for loans has risen corresponding to enterprises, households and consumer credit?

Fourth, with the purpose of determining the effectiveness of unconventional monetary policy tools, Gambacorta and Marques-Ibanez (2011) and Fungáčová, *et al.* (2014) deliberate the proxy in their respective investigations, which is specified as a ratio of each central total assets to nominal GDP (Assets/GDP ratio). Considering the non-usage of bank level data in this present study, such a method is not feasible here. Consequently, the BLS quarterly data is relied upon, particularly the modification within credit standards and demand during the course of implementing these measures. The aim of this exercise is to determine whether such processes translated into a softening of lending standards/conditions and to ascertain the degree to which the demand for loans has risen corresponding to enterprises, households and consumer credit in the nations being analysed.

3. Data

3.1 Bank Lending Survey

The primary dataset employed in this present research is sourced from the BLS that is directed at senior loan officers of a representative sample of the EA banks and considers the traits of their corresponding national banking structure and in so doing calls upon them to supply quarterly data regarding the lending standards that banks offer borrowers and on the loan demand that banks require. The primary directive of the BLS is to increase comprehension with respect to bank lending behaviour in the EA. The queries differentiate between three types of loan: loans or credit lines to enterprises, loans to households for house purchase, and consumer credit and other lending to households.

The investigation is conducted as a questionnaire comprising qualitative questions regarding modifications to loan conditions and demand logged over the course of the preceding three months, and future developmental projections of the same data in the period of the subsequent quarter. The survey questions outlined in the BLS contain five optional answers. The options span “*tightened considerably*” to “*eased considerably*” for the enquires corresponding to modifications in credit standards and from “*increased considerably*” to “*decreased considerably*” for the enquiries corresponding to loan demands. The replies are communicated with respect to net percentage, a value calculated as the difference between the percentage of banks announcing that credit standards were tightened and the percentage of banks indicating that the standards have been eased.

A positive value for the net percentage shows that a greater share of banks have tightened credit standards (“*net tightening*”), while a negative net percentage means that more banks have eased credit standards (“*net easing*”). Similarly, the expression “*net demand*” represents the difference between the percentage of banks showing a rise in loan demand and the percentage of banks experiencing a fall in said demand. Accordingly, net demand will thus have a positive value if a higher percentage of banks experience greater loan demand, while a negative value for net demand signifies that a higher percentage of banks have experienced decreased loan demand.

Results from the bank data analysed in the BLS sample are subject to a two-step aggregation. In the first step, results from solitary banks are aggregated to that of the EA nations’ national results. Here bank responses are divided into two main categories: those that are aggregated to national results via application of implicit weighting to the sample or aggregation via explicit

weighting derived from the unresolved quantities of loans issued to non-financial corporations and households of lone banks in the corresponding samples taken from each nation.⁹

The second step consists of aggregating the national BLS results to the EA (BLS) results. Accordingly, survey responses from each nation are aggregated to the EA BLS via the application of an explicit weighting scheme founded on the national shares in the values of unresolved loans to the aforementioned borrowers. Following the weighting schemes, the nations' results are combined to form the EA aggregate by utilising each nation's loans from the combined total unresolved loans in the area to residents. Conversely, weighting is not applied at the domestic level, suggesting that the individual banks are equally considered.¹⁰

In 2015 the selection is made up of 142 participating banks spanning the 19 EA nations; yet, for the purpose of this present empirical study, 9 out of 12 nations partaking from the beginning of the survey are also tested here.¹¹

The selected banks are carefully chosen in such a way as to offer an accurate depiction of the EA banking segment, while considering dissimilarities in the banking system between nations. Hence, the problem of sample selection bias may be avoided since the time frame being analysed corresponded with growth in the selection size as a result of the expansion of the EA. Statistics concerning the EA BLS are accessible since the last quarter of 2002.

The model used in this study is built in a manner to factor in any distinct modification on banks' lending standards for the period before (2002:Q4-2008:Q3), during (2008:Q4-2010Q4) and after (2011:Q1-2014Q4) the financial crisis, which should be a sufficient duration of time considering the fact that an entire cycle of monetary policy is encompassed during these periods. In this case it is necessary to sample the aforementioned periods for the following reasons.

The present analysis will first be cut off in 2008:Q3; this point in time serves as a suitable closing window for the pre-crisis time frame, and considers the bankruptcy of Lehman Brothers which occurred on September 15, 2008, in addition to the initiation of the execution of *non-standard monetary measures* by the ECB. Next this paper submits an expanded analysis of the GFC duration until the final quarter in 2010, in which the Eurosystem instigated non-standard measures of liquidity provision to the EA banking segment. Lastly, the post-crisis sample

⁹ In the case that foreign banks are included in the sample, the bank lending standards concern the credit policy executed within the national market.

¹⁰ A comprehensive description of the BLS setup was outlined in Berg *et al.* (2005). Furthermore, Hempell & Sørensen (2010) document an updated account of the BLS results until July 2009.

¹¹ These include a number of nations (Belgium, France, Germany, Greece, Italy, Luxembourg, Netherlands, Portugal and Spain) that introduced the Euro on January 1, 1999. We exclude Austria, Finland and Ireland due to lack of available data.

corresponds to the allotment of the two-three year (LTROs) in 2011 and 2012; as a result it terminates in the final quarter of 2014. Additionally, the methodology implemented in this case to delineate the period sampled corroborates the methodologies accepted in Maddaloni and Peydro (2011/2013) which analyse survey data tailored to the U.S and the EA.

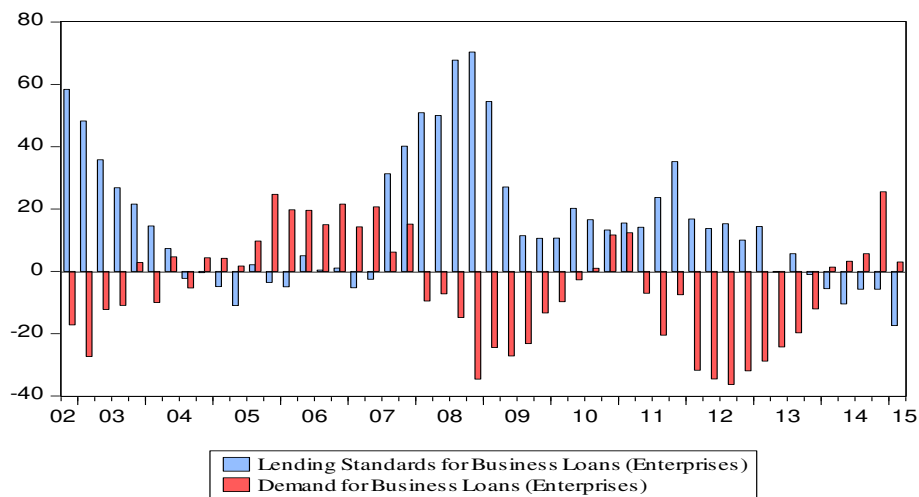
3.2 Macroeconomic and financial indicators

The macro and financial indicators involved in our primary investigation are short-term interest rates rates, long term interest rates (10 year government bond), Taylor rule residuals, GDP growth rate and inflation rates. Here it is noteworthy to clarify that for monetary policy, quarterly average of overnight rates (EONIA) are utilised. The effects of long term interest rates are assessed, since mortgage loans and consumer credits have extended maturity; consequently the credit standards are influenced to a smaller degree by short-term interest rates. Also, monetary conditions are computed by the Taylor rule residuals (see Taylor, 2009) achieved through regressing the EONIA on both GDP growth rate and inflation rates. The residuals corresponding to each nation chosen for our selection are estimated with panel least squares regressions, thereby applying shared coefficients for all 9 countries, considering the shared monetary policy. A negative (positive) Taylor rule residual from a given moment in time represents an expansionary (contractionary) monetary policy.¹²

Figure 1-3 illustrates that the credit standards for business, mortgage and consumer loans exhibited an analogous configuration, particularly mid- (2008:Q4-2010:Q4) and post- (2011:Q1-2014:Q4) financial crisis samples; at this point it is worthwhile to note that business loans underwent the greatest tightening of credit standards relative to both mortgage and consumer loans. The demand for loans underwent moderate growth in the pre-crisis sample (2002:Q4-2008:Q3), throughout the three classes of loans, whereas there was a significant decrease during the crisis time frame with this decline particularly prominent for mortgage loans.

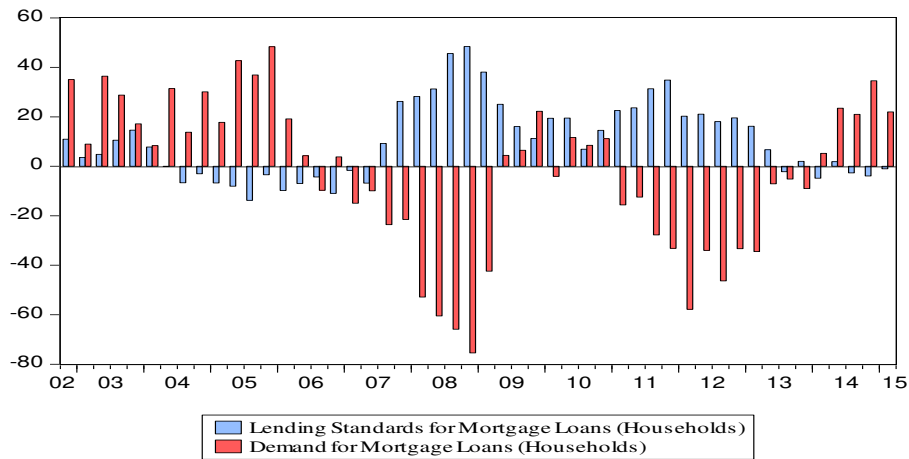
¹² **Appendices I-III** report the descriptive statistics.

Figure. 1 Credit Standards and Demand for Business Loans in EA9 Countries



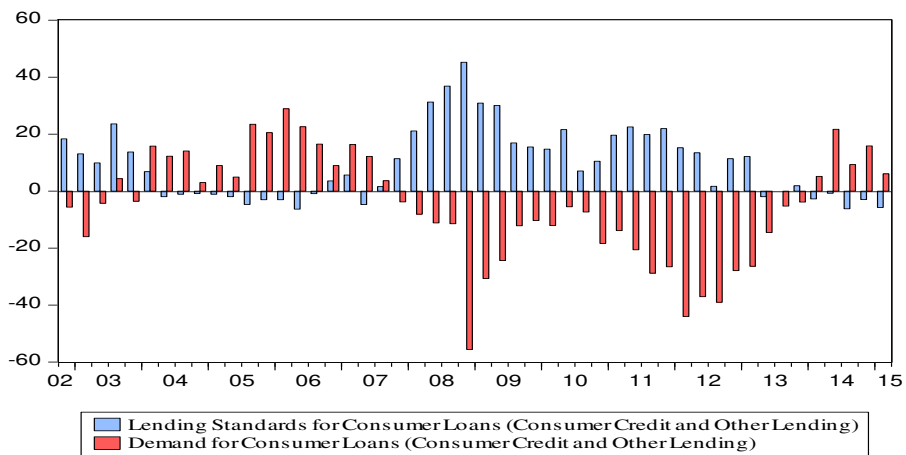
Source: (European Central Bank data warehouse, Bank Lending Survey)

Figure. 2 Credit Standards and Demand for Mortgage Loans in EA9 Countries



Source: (European Central Bank data warehouse, Bank Lending Survey)

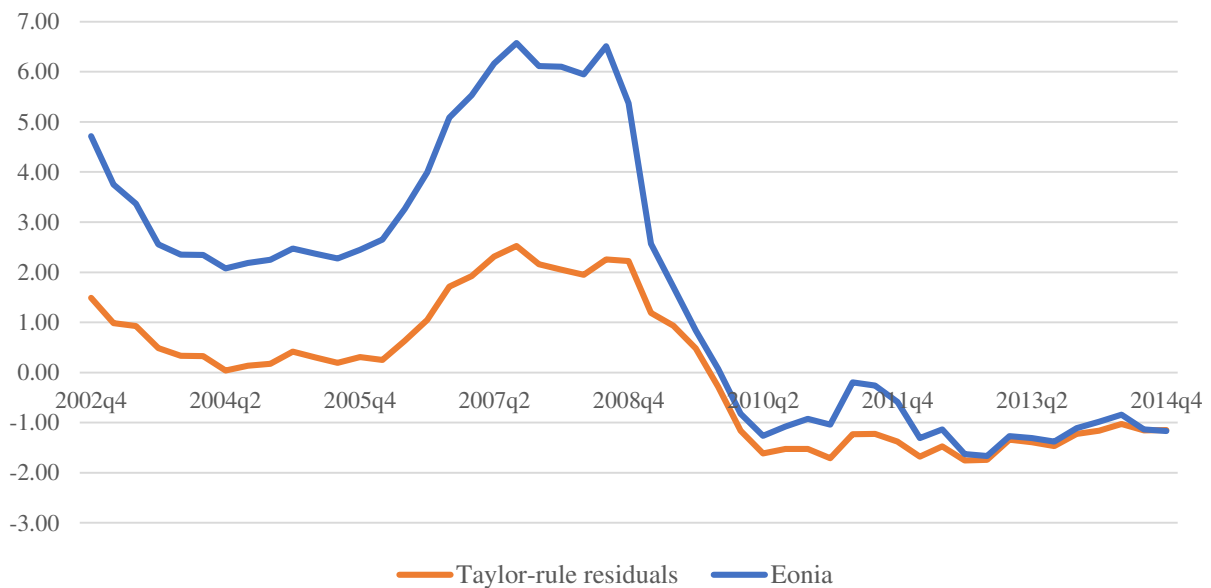
Figure. 3 Credit Standards and Demand for Consumer Loans in EA9 Countries



Source: (European Central Bank data warehouse, Bank Lending Survey)

As shown in **Figure. 4**, substantial discrepancy exists regarding the number of times with protraction of low Taylor-rule residuals. Most notably the Taylor rule residuals remained negative for 21 consecutive quarters from 2009:Q4 to 2014:Q4, suggesting the scale of expansionary monetary policy undertaken in this region; this is similar to that seen in EONIA, especially over the course of this time span.

Figure. 4 Taylor-rule residuals and EONIA rates in the EA9 countries



Notes: **Figure 4** compares the Taylor-rule residuals and the Eonia rates in the EA9 countries. Taylor-rule residuals presented are the residuals of the regressions of EONIA rates on the growth rate of GDP and inflation rate over the period spanning from 2002:Q4-2014:Q4. Here the residuals are determined individually for every member of the EA9, and subsequently a weighted mean is determined utilising each nation’s GDP. The residuals are estimated for 9 EA countries comprising Belgium, France, Germany, Greece, Italy, Luxembourg, Netherlands, Portugal and Spain.

3.3 Model specification

Considering that the issues addressed in the study are contingent on banks’ credit standards and monetary policy stance in the EA, the disturbance of the model is expected to be in violation of traditional assumptions, specifically to be vulnerable to heteroscedasticity as well as being correlated throughout the nations selected for this research. The methodology used to tackle this here is analogous to that employed in Maddaloni and Peydro (2011). In the first part of this present study, the results are collected using generalised panel least squares (GLS) panel regressions methodology, largely considered to be a more efficient approach as indicated in Wooldridge (2007). GLS permits the inclusion of the estimates of the variance and the covariance of the residuals in the EA9 sample. Additionally, it permits the imposition of a parametric structure with the purpose of amending the residuals for autocorrelation. Furthermore, country fixed effects are accounted for in order to guard

against any unseen variation occurring within banking structure of sampled countries in this present research. Given that the coefficient of the lagged dependent variable is found to be significant when analysing the outcomes outlined in **Table 1-3**, GLS estimation methodology could be biased while considering fixed effects. Accordingly, the GMM estimator is employed for the majority of outstanding regressions, which is supported by Arellano and Bond (1991), and additionally expanded upon in Blundell and Bond (1998) which utilise lags of the dependent variable as instruments. Using this method alleviates the endogeneity issues if the instruments are not correlated with the variables in question. Consequently, the Arellano and Bond system estimator with Windmeijer (2005) corrected coefficient standard errors is employed here.

It is important to mention that the BLS data is completely stable for the EA given that the monetary policy stance is common throughout the countries presented in our study. Accordingly, while evaluating the EA9 nations utilising the BLS results, the first section focuses on the period pre- (2002:Q4 -2008:Q3), mid- (2008:Q4-2010:Q4) and post- (2011:Q1-2014:Q4) financial crisis.

Our empirical methodology relies on a sequence of panel regressions which have baselines of the functional form as follows **(1)**:

$$Lending\ conditions_{t,i} = \alpha_i + \beta SRates_{t-1,i} + \gamma LRates_{t-1,i} + \lambda Taylor\text{-}rule\ residuals_{t-1,i} + \theta GDP\ growth_{t-1,i} + \delta Inflation\ rate_{t-1,i} + \rho Demand_{t-1,i} + Lending\ conditions_{t-1,i} + \varepsilon_{i,t}$$

Where *Lending conditions*_{t,i} are indicative of the methods of lending conditions driven directly from the BLS at time *t* for country *i* (expressed in net percentage terms). *SRate*_{t-1,i} and *LRates*_{t-1,i} denote short and long term interest rates, respectively. *Taylor-rule residuals* are the Taylor-rule residuals of the regression of EONIA rates on GDP growth and inflation, both of which are included as macroeconomics variables. Finally *Demand*_{t-1,i} represents the demand for loans. In order to consider the endogeneity bias, each explanatory variable is lagged by one quarter denoted by _{t-1}. Within this present research involving the financial crisis and post-crisis times, additional variables are represented originating directing from the BLS.

4. Results

Tables 1-3 thoroughly examine the effects of monetary conditions on overall lending standards as applied to approval of loans or credit lines specific for business, mortgage and consumer in EA9 countries during the periods including pre- (2002:Q4-2008:Q3), mid- (2008:Q4-2010:Q4) and post- (2011:Q1-2014:Q4) financial crisis. At this point it is prudent to refer to Question 1 and 8 described within the BLS (see **Appendix IV** for a detailed illustration of the survey). The monetary conditions employed in this research include Euro OverNight Index Average (EONIA) and Taylor-rule residuals. Additionally, country fixed effects are considered in order to guard against unseen variation within the banking structure of the designated selection of countries in this present research.

When analysing columns 1-5 illustrated in **Tables 1-3**, the dependant variable is described through using total lending standards calculated using the net percentage of banks detailing tighter credit standards for loans to enterprises during the preceding quarter. Next, country fixed effects are added and macroeconomic variables are included. Columns 1-3 report the outcome when regressing the total lending standards on EONIA. In columns 4-5, EONIA is substituted with Taylor-rule residuals and include macroeconomic variables every designated column. Columns 6-10 show a repetition of the same groups of regressions for total lending standards; however they correspond to households for house purchase. Lastly, columns 11-15 are specific for total lending standards to consumer credit and other lending.

The following section details an analytical evaluation by conducting a thorough review of the effects of monetary conditions on total lending standards regarding the previously mentioned three categories of loans for the periods pre-, mid- and post-financial crisis in **Tables 1-3**. Our coefficient corresponding to EONIA exhibits a comparable configuration throughout the various specifications in the pre-crisis sample, being statistically significant at 1% in most cases, although marginally decreasing following the incorporation of further variables; this is a result of macroeconomic factors or country fixed effects, developing to 11.00*** in the foremost challenging specification in column 2 for business loans. The value of the coefficient of EONIA demonstrates a greater effect of short-term interest rates on total lending standards for loans to enterprises relative to both mortgage and consumer loans; this indicates a creditable hypothesis amid phases of too low levels of monetary policy stance preceding the beginning of the financial crisis as well as a disproportionate softening of total lending standards by banks as applied to approval of loans or credit lines.

During the crisis the coefficient for EONIA underwent an additional decline for all three types of loans, as they were hit badly during this time frame. Considering that EONIA experienced a substantial reduction, our estimation suggests that the decrease in the level of short-term interest rates has failed to manifest as a further softening of bank's credit standards as applied to approval loans relative to the selection sample pre-crisis.

Certainly this has applied to the post-crisis sample, in which monetary policy makers reacted to the GFC by slashing interest rates to levels approaching zero then maintaining those values for a record duration of time in order to facilitate bank lending activity. With respect to such conditions, Keynes (1936) describes monetary policy as analogous to '*pushing on a string*' and additionally posits the concept of a '*liquidity trap*'. Our estimation proposes that softening of total lending standards for consumer loans has been less enhanced from the short-term interest rates reduction. However, it is noteworthy to state that the effect of short-term interest rates on total lending standards for loans to household for house purchase was marginally enhanced in comparison to the model tailored to the crisis period selection.

While substituting EONIA with Taylor-rule residuals, our estimation upholds the previous results obtained by the EONIA particularly in the pre- and post-crisis periods. Yet there is some discrepancy, since the results indicate that negative residuals lead only to a softening of total lending standards for business loans in the post-crisis time frame. At this point it is noteworthy to mention that the coefficient for the growth rate of GDP is negative, yet it stays positive for inflation rate. The results indicate that higher rates of GDP growth are associated with the softening of total lending standards, most specifically in the pre-crisis sample, which supports the justification offered in Maddaloni and Peydro (2011) which argue that banks' credit standards are '*pro-cyclical*'. This present estimation additionally indicates that an increase in the inflation rate confers a constriction of total lending standards, which may soon come as a result of predicted rises in monetary policy rates (these coefficients generally stay statistically significant throughout various specifications and maintain a positive value, which is detailed in **Tables 1-3**).

Table 1 Short term monetary policy stance and the lending standards prior to the financial crisis (2002:Q4-2008:Q3)

	EA9 Countries														
	Business Loans					Mortgage Loans					Consumer Loans				
	Total Lending Standards					Total Lending Standards					Total Lending Standards				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Overnight rates $t-1$	10.69	11.00	11.12			4.28	5.17	6.20			3.55	3.86	4.56		
	(7.09)***	(7.43)***	(6.83)***			(3.18)**	(3.81)***	(4.31)***			(2.71)**	(3.08)**	(3.42)***		
Taylor rule residuals $t-1$				10.77	11.12				4.48	6.20				3.39	4.56
				(6.92)***	(6.83)***				(3.22)**	(4.31)***				(2.50)*	(3.42)***
GDP growth rate $t-1$			-0.46	0.89	1.10			-1.72	0.16	-0.86			-1.46	0.17	-0.83
			(0.52)	(1.33)	(1.32)			(2.16)*	(0.24)	(1.12)			(2.07)*	(0.29)	(1.20)
Inflation rate $t-1$			3.25	7.80	7.81			-1.76	1.67	0.80			-1.01	2.39	0.86
			(1.95)	(5.31)***	(4.71)***			(1.21)	(1.36)	(0.56)			(0.75)	(2.00)*	(0.67)
Lagged Dependent $t-1$	0.66	0.63	0.59	0.60	0.59	0.66	0.53	0.49	0.65	0.49	0.61	0.52	0.48	0.60	0.48
	(16.07)***	(15.04)***	(11.83)***	(12.74)***	(11.83)***	(13.51)***	(9.55)***	(8.35)***	(12.65)***	(8.35)***	(12.65)***	(9.90)***	(8.75)***	(11.81)***	(8.75)***
Country Fixed effect	no	yes	yes	no	yes	no	yes	yes	no	yes	no	yes	yes	no	yes
No of observations	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
No of countries	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Wald Statistics	500.15***	527.92***	506.60***	484.49***	506.60***	224.86***	250.40***	262.14***	224.52***	262.14***	188.11***	211.47***	216.02***	187.40***	216.02***

Table 1 illustrates the outcome from the GLS panel regressions in which the dependant variable is specified via *total lending standards*, estimated through the net percentage from banks from every one of the nations belonging to the EA9 which describes tightening of credit standards when considering the preceding quarter. The net percentages documented within the Bank Lending Survey (BLS) for EA9 countries reflect the approval of loans or credit lines to three elements included in the BLS, which are as follows: *enterprises*, *households* and *consumer credits*. Responses to Question 1 and 8 are outlined in the BLS (see **Appendix IV** for a detailed explanation of the questions posed in the survey). The overnight rates is defined here by the quarterly average of the daily overnight rates (EONIA), the growth rates of GDP are characterised by the annual growth rates of real GDP specific for every one of the nations and inflation rates are denoted by the quarterly average of inflation rates, again, specific to each nation. The Taylor residuals are characterised as the residuals of the regression of EONIA rates on both the growth rates of GDP and inflation rates encompassing the time frame prior to the financial crisis (2002:Q4-2008Q3). Note that each explanatory variables utilised in this case is lagged by one quarter. We have a balanced panel dataset which incorporates 9 Euro-area nations: Belgium, France, Germany, Greece, Italy, Luxembourg, Netherlands, Portugal and Spain. We estimate the panel regression over the pre-crisis period from 2002:Q4-2008:Q3. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively and reported in the brackets.

Table 2 Short term monetary policy stance and the lending standards during the financial crisis (2008Q4-2010:Q4)

	EA9 Countries														
	Business Loans					Mortgage Loans					Consumer Loans				
	Total Lending Standards					Total Lending Standards					Total Lending Standards				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Overnight rates $t-1$	4.54	6.80	3.66			2.48	4.34	3.05			-0.98	1.45	1.53		
	(1.39)	(2.21)*	(1.21)			(1.13)	(2.45)*	(1.27)			(0.43)	(0.88)	(0.71)		
Taylor rule residuals $t-1$				1.61	3.67				1.13	3.05				-2.68	1.54
				(0.49)	(1.21)				(0.44)	(1.27)				(1.06)	(0.71)
GDP growth rate $t-1$			0.33	-0.18	0.85			0.29	0.39	0.72			-0.01	-1.09	0.22
			(0.43)	(0.18)	(0.89)			(0.48)	(0.46)	(0.88)			(0.00)	(1.43)	(0.27)
Inflation rate $t-1$			4.17	7.27	5.67			1.79	3.03	3.03			0.36	2.73	0.99
			(2.05)*	(2.96)**	(2.67)**			(1.00)	(1.77)	(2.04)*			(0.20)	(1.49)	(0.62)
Lagged Dependent $t-1$	0.34	0.24	0.22	0.29	0.22	0.61	0.49	0.51	0.64	0.51	0.51	0.32	0.27	0.49	0.27
	(3.28)**	(2.40)*	(2.03)*	(2.63)**	(2.03)*	(6.50)***	(5.04)***	(4.89)***	(6.69)***	(4.89)***	(4.87)***	(2.86)**	(2.39)*	(4.60)***	(2.39)*
Country Fixed effect	no	yes	yes	no	yes	no	yes	yes	no	yes	no	yes	yes	no	yes
No of observations	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
No of countries	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Wald Statistics	25.74***	74.05***	72.14***	33.31***	72.14***	54.92***	87.14***	85.36***	60.82***	85.39***	25.19***	76.21***	60.69***	29.49***	60.73***

Table 2 illustrates the outcome from the GLS panel regressions in which the dependant variable is specified via *total lending standards*, estimated through the net percentage from banks from every one of the nations belonging to the EA9 which describes tightening of credit standards when considering the preceding quarter. The net percentages documented within the Bank Lending Survey (BLS) for EA9 countries reflect the approval of loans or credit lines to three elements included in the BLS, which are as follows: *enterprises*, *households* and *consumer credits*. Responses to Question 1 and 8 are outlined in the BLS (see **Appendix IV** for a detailed explanation of the questions posed in the survey). The overnight rates is defined here by the quarterly average of the daily overnight rates (EONIA), the growth rates of GDP are characterised by the annual growth rates of real GDP specific for every one of the nations and inflation rates are denoted by the quarterly average of inflation rates, again, specific to each nation. The Taylor residuals are characterised as the residuals of the regression of EONIA rates on both the growth rates of GDP and inflation rates encompassing the time frame during the financial crisis (2008:Q4-2010Q4). Note that each explanatory variables utilised in this case is lagged by one quarter. We have a balanced panel dataset which incorporates 9 Euro-area nations: Belgium, France, Germany, Greece, Italy, Luxembourg, Netherlands, Portugal and Spain. We estimate the panel regression over the crisis period from 2008:Q4-2010:Q4. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively and reported in the brackets.

Table 3 Short term monetary policy stance and the lending standards after the financial crisis (2011:Q1-2014:Q4)

	EA9 Countries														
	Business Loans					Mortgage Loans					Consumer Loans				
	Total Lending Standards					Total Lending Standards					Total Lending Standards				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Overnight rates $t-1$	6.00	6.99	1.69			7.65	8.21	1.22			3.28	4.97	-3.58		
	(2.29)*	(2.80)**	(0.41)			(2.30)*	(2.70)**	(0.25)			(1.31)	(2.23)*	(0.94)		
Taylor rule residuals $t-1$				7.70	1.69				6.87	1.22				2.57	-3.58
				(2.30)*	(0.41)				(1.64)	(0.25)				(0.77)	(0.94)
GDP growth rate $t-1$			0.33	0.25	0.57			0.34	-0.04	0.51			1.28	0.09	0.78
			(0.47)	(0.47)	(1.00)			(0.38)	(0.06)	(0.77)			(1.87)	(0.19)	(1.59)
Inflation rate $t-1$			2.88	3.21	3.58			3.86	4.44	4.36			3.63	1.77	2.16
			(2.08)*	(2.83)**	(3.13)**			(2.44)*	(3.21)**	(3.23)**			(2.95)**	(1.63)	(2.14)*
Lagged Dependent $t-1$	0.61	0.49	0.41	0.55	0.41	0.46	0.37	0.34	0.39	0.34	0.52	0.35	0.32	0.49	0.32
	(9.77)***	(6.90)***	(4.81)***	(7.19)***	(4.81)***	(6.09)***	(4.83)***	(3.89)***	(4.66)***	(3.89)***	(7.00)***	(4.36)***	(3.68)***	(6.03)***	(3.68)***
Country Fixed effect	no	yes	yes	no	yes	no	yes	yes	no	yes	no	yes	yes	no	yes
No of observations	143	143	142	142	142	143	143	142	142	142	143	143	142	142	142
No of countries	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Wald Statistics	110.16***	133.68***	145.89***	120.26***	145.89***	51.95***	69.15***	93.80***	68.23***	93.80***	56.50***	85.78***	101.78***	60.16***	101.78***

Table 3 illustrates the outcome from the GLS panel regressions in which the dependant variable is specified via *total lending standards*, estimated through the net percentage from banks from every one of the nations belonging to the EA9 which describes tightening of credit standards when considering the preceding quarter. The net percentages documented within the Bank Lending Survey (BLS) for EA9 countries reflect the approval of loans or credit lines to three elements included in the BLS, which are as follows: *enterprises*, *households* and *consumer credits*. Responses to Question 1 and 8 are outlined in the BLS (see **Appendix IV** for a detailed explanation of the questions posed in the survey). The overnight rates is defined here by the quarterly average of the daily overnight rates (EONIA), the growth rates of GDP are characterised by the annual growth rates of real GDP specific for every one of the nations and inflation rates are denoted by the quarterly average of inflation rates, again, specific to each nation. The Taylor residuals are characterised as the residuals of the regression of EONIA rates on both the growth rates of GDP and inflation rates encompassing the time frame after the financial crisis (2011:Q1-2014:Q4). Note that each explanatory variables utilised in this case is lagged by one quarter. We have a balanced panel dataset which incorporates 9 Euro-area nations: Belgium, France, Germany, Greece, Italy, Luxembourg, Netherlands, Portugal and Spain. We estimate the panel regression over the post-crisis period from 2011:Q1-2014:Q4. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively and reported in the brackets.

Tables 4-6 document that the aforementioned results (**Tables 1-3**) remain the same after including further variables such as changes in demand for loans and 10-year government bond rates. Our results support the idea that a reduced monetary policy stance characterised by Taylor rule residuals lead to less harsh total lending standards. Such a dynamic is especially seen in total lending standards while revealing the elements specific to the banks' balance sheets for all three types of loans pre-crisis.

In addition, by examining loan demand detailed in approximations 1-8 (see **Tables 4-6**), it can be inferred that this variable has a substantial effect on total lending standards. It is statistically significant in a number of cases and has conceivable negative coefficients; this is explained using the rationale that an increase in net percentage of banks recording a rise in demand for loans while being associated with an additional loosening of total lending standards by banks. This is supported by traditional loan demand research that states that the elasticity of the scale factor, representing financing requirements, is calculated utilising economic components, such as GDP growth rates and inflation rate, for example.

In addition, 10-year government bond rates are mostly not quantified as statistically significant, highlighting the fact that lending standards are not affected by long-term national interest rates prevalent mainly in the pre-crisis sample. Our results support the previous finding by Maddloni & Peydro (2013) while indicating that monetary policy stance influences the total lending standards regarding variations in bank net worth resulting from different levels of banks' liquidity and capital position prior to the financial crisis.¹³

Here it is worthwhile to note the scale of the expansionary monetary policy during and after the financial crisis, in a period of low policy rates, which saw 21 successive quarters in which the Taylor rule residuals stayed negative from 2009:Q4 to 2014:Q4 as depicted in **Figure. 4**. The data indicates a significant reduction in the effect of short-term interest rates concerning their ability to lower banks' total credit standards, while the demand for loan remained relatively unchanged specifically during the crisis period. Of particular note is that despite the labours of the ECB to keep interest rates low and inject liquidity into banking systems, banks' lending standards remain subdued, as documented in the selection of EA9 countries. Such a conclusion is corroborated by the crucial analysis of the Japanese economy in Werner (2012) which stresses that continuous short-term interest rate reductions for a period spanning over a decade were ineffective at stimulating the economy and expanding the money supply.

¹³ This also applies to bank's market financing for business loans and the total lending standards from balance sheet factors concerning both mortgage and consumer loans.

Table 4 The effect of monetary policy on bank's credit standards prior to the crisis (2002:Q4-2008:Q3)

	Total Lending Standards			Total Lending Standards from Balance Sheet Factors				
	Business Loans	Mortgage Loans	Consumer Loans	Business Loans			Mortgage Loans	Consumer Loans
				Bank's Capital Position	Bank's Market Financing	Bank's Liquidity Position	All Factors	All Factors
1	2	3	4	5	6	7	8	
Taylor rule residuals $s_{i,t-1}$	10.24 (4.00)***	7.12 (2.37)*	5.55 (2.19)*	3.64 (3.63)***	7.21 (3.87)***	4.89 (5.04)***	4.22 (2.00)*	3.98 (2.15)*
Demand for Loans $i_{i,t-1}$	-0.02 (0.24)	-0.03 (0.71)	-0.16 (2.25)*	-0.03 (1.12)	-0.05 (1.00)	0.02 (0.76)	-0.06 (2.11)*	0.06 (1.68)
10 Year bond Rate $i_{i,t-1}$	7.27 (1.74)	0.81 (0.24)	2.12 (0.68)	2.27 (1.31)	-2.06 (0.66)	3.75 (1.50)	-0.38 (0.23)	5.86 (2.93)**
Inflation rate $i_{i,t-1}$	8.99 (3.26)**	-0.07 (0.06)	5.64 (1.61)	2.87 (2.68)**	5.09 (2.06)*	6.23 (2.97)**	-2.15 (1.33)	3.90 (2.88)**
GDP growth rate $i_{i,t-1}$	2.06 (2.59)**	-0.46 (0.45)	0.43 (0.39)	0.29 (0.51)	2.40 (1.90)	1.57 (2.63)**	-0.38 (0.77)	-1.60 (2.45)*
Lagged Dependent $i_{i,t-1}$	0.53 (6.64)***	0.47 (3.71)***	0.52 (7.50)***	0.49 (11.91)***	0.58 (5.81)***	0.28 (2.04)*	0.51 (9.86)***	0.64 (26.41)***
Country fixed effect	yes	yes	yes	yes	yes	yes	yes	yes
No of observations	210	210	210	210	210	210	210	210
No of countries	9	9	9	9	9	9	9	9
p(Sargan)	0.709	0.202	0.548	0.216	0.115	0.238	0.150	0.086

Table 4 illustrates the results of a GMM dynamic panel estimation in which the dependant variable is specified via *total lending standards*, estimated through the net percentage from banks from every one of the nations belonging to the EA9 which describes tightening of credit standards when considering the preceding quarter. Responses to Question 1 and 8 are outlined in the BLS presented in column 1-3. . Similarly, the dependant variable described by *total lending standards due to balance sheet factors* noted in columns (4-8) is measured by the net percentage of banks reporting a tightening of credit standards as a result of cost of funds and balance sheet constraints comprising three components which are as follows: *cost related to the bank's capital position, bank's ability to access market financing and bank's liquidity position*. These are specific for business loans, and all factors related to balance sheet constraints for both mortgage and consumer loans. Additionally, these are solutions to Questions 2, 9 and 11 detailed within the BLS. The Taylor residuals are characterised as the residuals of the regression of EONIA rates on both the growth rates of GDP and inflation rates encompassing the time frame prior to the financial crisis (2002:Q4-2008Q3). Additionally the demand for loans is represented via the net percentage of banks documenting a rise in demand regarding business, mortgage and consumer loans (Question 4 and 13 in the BLS). Long term national government bond rate is denoted by the 10-year bond interest rate for every nation. Inflation is measured the quarterly average of inflation rates for each country and the growth rate of GDP is represented in the real GDP yearly growth rate denoted in each country. Note that each explanatory variables utilised in this case is lagged by one quarter. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively and reported in the brackets. Stata 12 was employed in order to obtain results regarding the GMM method through 'Xtabond 2' requirement as highlighted by Roodman (2009).

Table. 5 The effect of monetary policy on bank's credit standards during the crisis (2008:Q4-2010:Q4)

	Total Lending Standards			Total Lending Standards from Balance Sheet Factors				
	Business Loans	Mortgage Loans	Consumer Loans	Business Loans			Mortgage Loans	Consumer Loans
				Bank's Capital Position	Bank's Market Financing	Bank's Liquidity Position	All Factors	All Factors
	1	2	3	4	5	6	7	8
Taylor rule residuals $i, t-1$	6.96 (1.68)	0.34 (0.10)	9.37 (1.79)	5.40 (1.38)	8.54 (1.83)	4.82 (0.60)	-3.30 (1.76)	5.74 (0.73)
Demand for Loans $i, t-1$	0.02 (0.14)	-0.05 (1.04)	-0.03 (0.28)	0.09 (1.65)	-0.28 (3.63)***	0.00 (0.03)	-0.24 (2.39)*	0.06 (0.41)
10 Year bond Rate $i, t-1$	10.15 (1.54)	2.92 (0.98)	11.74 (2.66)**	8.25 (3.25)**	11.14 (2.21)*	10.68 (1.23)	3.65 (0.92)	10.77 (2.61)***
Inflation rate $i, t-1$	-2.42 (1.00)	0.13 (0.04)	-5.11 (2.19)*	-2.84 (1.48)	-5.54 (3.08)**	-5.72 (1.81)	-6.48 (3.14)**	-6.47 (3.05)**
GDP growth rate $i, t-1$	5.82 (3.42)***	1.49 (1.09)	5.27 (2.10)*	2.57 (1.95)	3.84 (1.42)	5.90 (1.49)	1.79 (0.97)	5.61 (1.76)
Lagged Dependent $i, t-1$	0.52 (3.14)**	0.51 (8.89)***	0.39 (2.43)*	0.43 (2.31)*	0.44 (2.63)**	0.54 (3.39)***	0.37 (2.56)*	0.37 (2.03)*
Country fixed effect	yes	yes	yes	yes	yes	yes	yes	yes
No of observations	74	74	74	74	74	74	74	74
No of countries	9	9	9	9	9	9	9	9
p(Sargan)	0.708	0.225	0.892	0.119	0.241	0.161	0.137	0.919

Table 5 illustrates the results of a GMM dynamic panel estimation in which the dependant variable is specified via *total lending standards*, estimated through the net percentage from banks from every one of the nations belonging to the EA9 which describes tightening of credit standards when considering the preceding quarter. Responses to Question 1 and 8 are outlined in the BLS presented in column 1-3. . Similarly, the dependant variable described by *total lending standards due to balance sheet factors* noted in columns (4-8) is measured by the net percentage of banks reporting a tightening of credit standards as a result of cost of funds and balance sheet constraints comprising three components which are as follows: *cost related to the bank's capital position, bank's ability to access market financing and bank's liquidity position*. These are specific for business loans, and all factors related to balance sheet constraints for both mortgage and consumer loans. Additionally, these are solutions to Questions 2, 9 and 11 detailed within the BLS. The Taylor residuals are characterised as the residuals of the regression of EONIA rates on both the growth rates of GDP and inflation rates encompassing the time frame during the financial crisis (2008:Q4-2010Q4. Additionally the demand for loans is represented via the net percentage of banks documenting a rise in demand regarding business, mortgage and consumer loans (Question 4 and 13 in the BLS). Long term national government bond rate is denoted by the 10-year bond interest rate for every nation. Inflation is measured the quarterly average of inflation rates for each country and the growth rate of GDP is represented in the real GDP yearly growth rate denoted in each country. Note that each explanatory variables utilised in this case is lagged by one quarter. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively and reported in the brackets. Stata 12 was employed in order to obtain results regarding the GMM method through 'Xtabond 2' requirement as highlighted by Roodman (2009).

Table 6 The effect of monetary policy on bank's credit standards after the crisis (2011:Q1-2014:Q4)

	Total Lending Standards			Total Lending Standards from Balance Sheet Factors				
	Business Loans	Mortgage Loans	Consumer Loans	Business Loans		Mortgage Loans	Consumer Loans	
				Bank's Capital Position	Bank's Market Financing	Bank's Liquidity Position	All Factors	All Factors
	1	2	3	4	5	6	7	8
Taylor rule residuals $i, t-1$	12.02 (2.40)*	8.92 (1.43)	6.66 (1.21)	-1.60 (0.26)	9.89 (1.69)	16.40 (2.27)*	11.74 (1.63)	6.90 (0.91)
Demand for Loans $i, t-1$	-0.11 (2.65)**	-0.02 (0.51)	-0.01 (0.15)	0.04 (1.13)	-0.01 (0.32)	-0.06 (1.33)	-0.12 (1.51)	-0.14 (2.40)*
10 Year bond Rate $i, t-1$	0.29 (0.51)	-0.81 (1.31)	0.61 (0.98)	1.64 (6.58)***	2.02 (3.01)**	1.76 (2.50)*	-0.36 (1.41)	-0.19 (0.38)
Inflation rate $i, t-1$	5.21 (3.44)***	8.55 (3.62)***	7.99 (2.48)*	0.59 (0.64)	0.88 (0.49)	12.69 (4.88)***	3.41 (1.19)	1.59 (0.64)
GDP growth rate $i, t-1$	2.74 (2.93)**	1.73 (1.13)	3.28 (1.75)	1.49 (1.25)	3.41 (2.00)*	7.56 (2.89)**	1.12 (0.90)	2.61 (2.35)*
Lagged Dependent $i, t-1$	0.51 (4.75)***	0.31 (2.24)*	0.38 (1.96)	0.62 (4.86)***	0.60 (11.45)***	0.36 (6.00)***	0.50 (4.24)***	0.71 (7.13)***
Country fixed effect	yes	yes	yes	yes	yes	Yes	yes	yes
No of observations	142	142	142	142	142	142	142	142
No of countries	9	9	9	9	9	9	9	9
p(Sargan)	0.118	0.176	0.366	0.234	0.220	0.839	0.225	0.224

Table 6 illustrates the results of a GMM dynamic panel estimation in which the dependant variable is specified via *total lending standards*, estimated through the net percentage from banks from every one of the nations belonging to the EA9 which describes tightening of credit standards when considering the preceding quarter. Responses to Question 1 and 8 are outlined in the BLS presented in column 1-3. . Similarly, the dependant variable described by *total lending standards due to balance sheet factors* noted in columns (4-8) is measured by the net percentage of banks reporting a tightening of credit standards as a result of cost of funds and balance sheet constraints comprising three components which are as follows: *cost related to the bank's capital position, bank's ability to access market financing and bank's liquidity position*. These are specific for business loans, and all factors related to balance sheet constraints for both mortgage and consumer loans. Additionally, these are solutions to Questions 2, 9 and 11 detailed within the BLS. The Taylor residuals are characterised as the residuals of the regression of EONIA rates on both the growth rates of GDP and inflation rates encompassing the time frame after the financial crisis (2011:Q1-2014Q4). Additionally the demand for loans is represented via the net percentage of banks documenting a rise in demand regarding business, mortgage and consumer loans (Question 4 and 13 in the BLS). Long term national government bond rate is denoted by the 10-year bond interest rate for every nation. Inflation is measured the quarterly average of inflation rates for each country and the growth rate of GDP is represented in the real GDP yearly growth rate denoted in each country. Note that each explanatory variables utilised in this case is lagged by one quarter. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively and reported in the brackets. Stata 12 was employed in order to obtain results regarding the GMM method through 'Xtabond 2' requirement as highlighted by Roodman (2009).

Tables 7 and 8 highlight the outcomes of the regressions where the dependent variables are categorised as banks' conditions and terms regarding authorising loans or credit lines in conjunction with the aforementioned types of loans designed precisely for the time frame prior to and also following the financial turmoil.

Of particular note is that low short-term monetary policy rates exert a substantial softening effect on margins (lending rates) specific for both average and riskier loans in each of the three loan categories with the most significant effect observed in consumer credit and other lending. Consequently, this implies that prior to the beginning to the crisis, characterised by reduced monetary rates, banks relaxed margins on loans, a practice which unexpectedly included borrowers that were perceived as riskier; however, the post-financial crisis period reduced the effectiveness of low short-term policy rates, especially concerning the margin on riskier loans to enterprises and consumer credit. The aforementioned conclusions are supported by the findings in Rajan (2006), and Borio and Zhu (2012) clarifying and justifying the risk-taking approach in an environment of low interest rates.

The policy rates have an additional significant softening impact on the size of the loans or credit line, collateral requirements and maturity for enterprises loans. Furthermore, the low policy stance influence collateral requirements and loan to value ratio (LTV ratio) specifically concerning mortgage loans, and ultimately effects collateral requirements for consumer credit and other lending. The results support that increased credit risk is assumed by banks when approving and issuing new loans during periods of low monetary policy rates, especially prior to the onset of the crisis within the selection in question.

Accordingly, the post-crisis outcomes imply that negative Taylor-rule residuals have an additional effect on the size of loans and maturity for enterprises loans, a possible result of the scope of expansionary monetary policy carried out within the EA. Moreover, it has increased the maturity of loans for mortgage loans and has additionally exerted an effect on collateral requirements and non-interest charges for approving consumer credit and other lending to households.

Table. 7 Pre Crisis Results

	Business Loans							Mortgage Loans					Consumer Credit & Other Lending					
	Margin on Average Loans	Margin on Riskier Loans	Non-interest Rates Charges	Size of Loan or/ Credit line	Collateral requirements	Loan covenants	Maturity	Margin on Average Loans	Margin on Riskier Loans	Collateral requirements	“Loan-to-value” ratio	Maturity	Non-interest rates Charges	Margin on Average Loans	Margin on Riskier Loans	Collateral requirements	Maturity	Non-interest rates Charges
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Taylor rule residuals $i, t-1$	14.21 (2.86)**	7.06 (2.32)*	0.36 (0.19)	4.58 (2.27)*	6.69 (2.28)*	4.11 (1.50)	6.74 (2.39)*	7.83 (2.75)**	6.09 (2.45)*	2.42 (2.04)*	5.34 (2.40)*	0.44 (0.14)	4.74 (2.01)*	8.65 (5.36)***	5.71 (3.81)***	3.71 (2.09)*	0.94 (0.46)	-0.74 (0.34)
Demand for Loans $i, t-1$	-0.05 (0.66)	-0.13 (1.54)	0.05 (0.81)	-0.05 (1.48)	-0.08 (1.06)	-0.03 (0.53)	-0.08 (1.34)	-0.09 (1.53)	-0.08 (2.00)*	-0.02 (1.35)	-0.06 (3.31)***	-0.09 (2.80)**	-0.08 (1.74)	-0.05 (1.00)	-0.08 (2.18)*	-0.03 (0.61)	0.02 (0.22)	-0.02 (0.63)
10 Year bond Rate $i, t-1$	13.89 (2.02)*	13.55 (2.82)**	9.72 (2.96)**	6.87 (2.00)*	4.25 (1.01)	7.49 (1.97)*	8.13 (2.17)*	9.25 (1.79)	5.66 (1.49)	1.61 (0.80)	1.34 (0.51)	2.34 (0.94)	10.36 (2.25)*	6.06 (1.64)	7.23 (1.94)	3.79 (1.62)	5.50 (1.55)	5.57 (1.72)
Inflation rate $i, t-1$	12.17 (4.00)***	10.21 (4.10)***	1.77 (1.16)	6.15 (5.35)***	6.24 (3.20)**	3.39 (1.57)	4.02 (1.75)	9.84 (2.31)*	5.29 (2.00)*	0.53 (0.54)	2.57 (0.85)	3.19 (1.60)	-1.60 (0.95)	7.28 (3.21)**	6.87 (3.79)***	1.38 (1.50)	3.70 (2.54)*	-0.25 (0.38)
GDP growth rate $i, t-1$	1.14 (0.59)	0.13 (0.11)	0.39 (0.39)	-0.62 (0.88)	-0.22 (0.32)	-0.04 (0.06)	-0.11 (0.12)	1.54 (0.97)	-1.47 (1.29)	-0.58 (1.04)	-0.84 (0.80)	-0.18 (0.20)	-0.43 (0.57)	0.01 (0.01)	-0.95 (1.15)	-1.12 (1.70)	-1.48 (1.51)	0.23 (0.55)
Lagged Dependent $i, t-1$	0.55 (6.89)***	0.43 (4.67)***	0.58 (7.30)***	0.45 (8.09)***	0.58 (8.88)***	0.54 (11.20)***	0.42 (5.49)***	0.52 (4.61)***	0.43 (3.88)***	0.52 (4.44)***	0.48 (3.99)***	0.27 (4.79)***	0.36 (2.75)**	0.35 (4.17)**	0.38 (4.38)***	0.32 (6.75)***	0.21 (2.56)*	0.30 (3.35)***
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of observations	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210
No of countries	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
p(Sargan)	0.547	0.325	0.143	0.585	0.283	0.503	0.595	0.242	0.527	0.689	0.464	0.340	0.187	0.085	0.355	0.566	0.104	0.726

Table 7 illustrates the results of a GMM dynamic panel estimation in which the dependant variable is specified through the net percentage from banks from every one of the nations belonging to the EA9, reporting a tightening of the terms and conditions for approving loans or credit lines to three elements included in the BLS, which are as follows: *enterprises* (columns 1–7), *households* (columns 8–13) and *consumer credits* (columns 14–18), while factoring the preceding quarter. There are the responses to Question 3, 10 and 12 as outlined in the BLS. We have a balanced panel dataset which incorporates 9 Euro-area nations: Belgium, France, Germany, Greece, Italy, Luxembourg, Netherlands, Portugal and Spain. We estimate the panel regression over the pre-crisis period from 2002:Q3-2008:Q3. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively and reported in the brackets.

Table 8 Post Crisis Results

	Business Loans							Mortgage Loans					Consumer Credit & Other Lending					
	Margin on Average Loans	Margin on Riskier Loans	Non-interest Rates Charges	Size of Loan or Credit line	Collateral requirements	Loan covenants	Maturity	Margin on Average Loans	Margin on Riskier Loans	Collateral requirements	“Loan-to-value” ratio	Maturity	Non-interest rates Charges	Margin on Average Loans	Margin on Riskier Loans	Collateral requirements	Maturity	Non-interest rates Charges
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Taylor rule residuals i_{t-1}	26.67 (2.54)*	18.55 (1.66)	11.97 (1.34)	19.38 (3.00)**	2.61 (0.62)	13.11 (1.64)	14.82 (2.88)**	30.41 (3.17)**	19.23 (2.28)*	11.95 (1.78)	15.01 (1.29)	11.88 (2.43)*	2.42 (0.51)	18.99 (2.81)**	13.84 (2.30)*	26.69 (2.62)**	2.06 (0.30)	23.76 (5.28)***
Demand for Loans i_{t-1}	-0.25 (2.89)**	-0.14 (1.41)	-0.13 (1.18)	-0.10 (1.47)	-0.16 (2.50)*	-0.10 (0.94)	-0.06 (0.59)	0.02 (0.31)	-0.07 (0.90)	-0.01 (0.13)	-0.02 (0.35)	-0.03 (0.83)	-0.03 (0.80)	-0.26 (6.49)***	-0.09 (1.26)	-0.01 (0.22)	-0.05 (1.98)*	-0.23 (2.64)**
10 Year bond Rate i_{t-1}	-0.61 (0.65)	0.73 (0.82)	-0.77 (2.05)*	0.75 (2.14)*	0.11 (0.51)	-0.08 (0.25)	-0.01 (0.02)	-1.39 (2.44)*	1.21 (1.24)	1.34 (1.82)	-0.15 (0.37)	-0.48 (1.67)	-0.07 (0.13)	0.28 (0.61)	0.42 (1.66)	1.17 (5.51)***	-0.04 (0.13)	-9.25 (1.32)
Inflation rate i_{t-1}	20.49 (5.14)***	19.96 (3.65)***	7.11 (4.56)***	11.60 (3.03)**	7.59 (2.24)*	9.05 (3.58)***	11.97 (3.09)**	22.14 (4.45)***	13.11 (2.92)**	5.47 (2.34)*	7.08 (2.61)**	4.58 (2.76)**	2.86 (2.09)*	6.22 (3.01)**	9.76 (3.28)**	14.13 (4.54)***	1.12 (0.59)	9.63 (0.41)
GDP growth rate i_{t-1}	7.07 (2.92)**	3.50 (1.58)	2.32 (2.19)*	2.76 (1.87)	2.32 (2.00)*	1.33 (1.59)	3.05 (2.56)*	3.36 (1.57)	3.69 (1.97)*	2.05 (0.99)	0.57 (0.26)	1.69 (1.81)	2.03 (1.70)	3.58 (2.41)*	2.50 (1.61)	6.40 (4.62)***	0.70 (0.90)	1.28 (1.22)
Lagged Dependent i_{t-1}	0.54 (6.15)***	0.10 (0.79)	0.44 (4.32)***	0.42 (3.88)***	0.39 (3.71)***	0.32 (3.82)***	0.47 (7.09)**	0.34 (3.53)***	0.24 (2.85)**	0.23 (2.06)*	0.34 (1.99)*	0.48 (5.35)***	0.51 (4.05)***	0.32 (2.06)*	0.29 (2.55)*	0.32 (1.78)	0.55 (7.49)***	0.74 (2.28)*
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of observations	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142
No of countries	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
p(Sargan)	0.966	0.910	0.283	0.651	0.343	0.109	0.673	0.947	0.641	0.218	0.358	0.174	0.259	0.494	0.908	0.492	0.093	0.336

Table 8 illustrates the results of a GMM dynamic panel estimation in which the dependant variable is specified through the net percentage from banks from every one of the nations belonging to the EA9, reporting a tightening of the terms and conditions for approving loans or credit lines to three elements included in the BLS, which are as follows: *enterprises* (columns 1–7), *households* (columns 8–13) and *consumer credits* (columns 14–18), while factoring the preceding quarter. There are the responses to Question 3, 10 and 12 as outlined in the BLS. We have a balanced panel dataset which incorporates 9 Euro-area nations: Belgium, France, Germany, Greece, Italy, Luxembourg, Netherlands, Portugal and Spain. We estimate the panel regression over the post-crisis period from 2011:Q1-2014:Q4. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively and reported in the brackets.

In **Tables 9** and **10**, this present investigation is further progressed by estimating twelve distinct regressions with the purpose of analysing the concept of ‘*excessive*’ risk-taking—naturally factoring in the stipulation that determining excessive risk is an exceedingly challenging undertaking, which is supported in Madaloni & Peydro (2013). The objective of this undertaking is to identify potential risk-taking behaviour by banks prior to and after the onset of recent crisis. As a result we regroup the designated nations within the original sample in line with both the impact and the severity of the financial crisis into two panels of A and B. Panel A comprises Greece, Spain, Italy and Portugal, whereas Panel B consists of Belgium, France, Germany, Luxembourg and Netherlands.

We first regress banks’ margins as *applied to riskier loans* on Taylor-rule residuals in addition to further macro measurements concerning the three loan types. Then further regressions are conducted to control for the variations in lending conditions as a result of changes in borrowers’ net worth directly from the BLS and other control variables. It is important to mention that banks’ credit standards can be tightened due to a rise in perception of risk as a result of the issues outlined here: *expectation regarding the economic activity, industry or firm specific outlook and risk on collateral demanded* with reference to enterprises loans (see BLS. **Question. 2**), *housing market prospects for household loans* (see BLS. **Question. 9**) and *creditworthiness of consumer credit and other lending* (see BLS. **Question. 11**).

When examining the outcome of the pre-crisis selection from stressed and non-stressed countries of the EA9, it can be deduced that the coefficient of Taylor-rule residuals for the regression utilising banks’ conditions and terms for approving loans or credit lines within the three categories of loans remains significant; this is especially prevalent when analysing stressed countries relative to non-stressed countries. The significance of the coefficient implies that prior to the commencement of the crisis, banks surprisingly relaxed margins for loans to borrowers perceived as riskier, in an environment of low monetary rates. These results uphold the previous findings by Jimenez *et al.* (2014) and Ioannidou *et al.* (2015). Accordingly, this conclusion is robust to the incorporation of the pertinent interest rates, i.e. the 10 year government bond rates, most specifically in the non-stressed nation prior to onset of crisis. The selection in the post-crisis sample indicates a reduction in the effect of low policy rates on softening household and consumers loans in non-stressed nations. However, in stressed nations the data indicates that excessive risk-taking in bank lending behaviour occurred, particularly during periods of low monetary policy rates both pre- and post-crisis.

Table 9. Before and After Crisis (Non-stressed Countries)

	Before						After					
	Business Loans		Mortgage Loans		Consumer Credit & Other Lending		Business Loans		Mortgage Loans		Consumer Credit & Other Lending	
	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans
	1	2	3	4	5	6	7	8	9	10	11	12
Taylor rule residuals i_{t-1}	12.42 (3.23)**	10.62 (2.53)*	3.15 (1.49)	3.46 (1.70)	3.28 (2.27)*	3.62 (3.74)***	24.53 (2.03)*	1.11 (0.07)	2.61 (0.12)	10.77 (0.57)	4.74 (0.74)	7.87 (0.75)
Demand for Loans i_{t+1}	-0.16 (2.05)*	-0.08 (1.09)	-0.12 (2.32)*	-0.12 (2.14)*	-0.07 (2.25)*	-0.08 (2.22)*	-0.29 (3.74)***	-0.17 (1.89)	0.03 (0.88)	0.02 (0.45)	0.03 (0.88)	0.01 (0.38)
10 Year bond Rate i_{t+1}	10.72 (1.76)*	13.71 (1.93)	11.12 (3.70)***	10.69 (2.59)**	11.99 (3.64)***	11.88 (3.27)**	-4.14 (0.69)	0.80 (0.12)	-1.50 (0.16)	1.72 (0.20)	-5.35 (2.26)	-6.35 (2.98)**
Inflation rate i_{t+1}	10.20 (3.34)***	10.07 (2.95)**	5.45 (1.89)	5.45 (1.58)	5.37 (2.52)*	5.18 (2.02)*	18.21 (4.67)***	12.35 (1.80)	7.24 (0.92)	6.10 (0.80)	7.09 (3.15)**	7.56 (2.93)**
GDP growth rate i_{t+1}	-1.30 (0.87)	-0.02 (0.01)	-3.78 (4.31)***	-3.82 (2.65)**	-1.57 (2.20)*	-0.76 (1.02)	1.47 (0.92)	0.08 (0.04)	-2.00 (0.76)	-1.16 (0.50)	0.11 (0.10)	0.22 (0.20)
Expectations regarding general economic activity i_{t-1}		0.33 (2.66)**		-0.17 (0.83)		0.24 (1.46)		0.18 (0.72)		0.31 (1.14)		0.06 (0.74)
Industry or firm-specific outlook i_{t-1}		-0.09 (0.61)						-0.13 (0.88)				
Risk on the collateral demanded i_{t-1}		0.21 (1.16)				-0.22 (1.11)		-0.22 (0.99)				0.27 (0.69)
Housing market prospects i_{t-1}				0.15 (1.44)						0.13 (0.61)		
Creditworthiness of consumers i_{t-1}						0.04 (0.56)						-0.19 (1.95)
Lagged Dependent i_{t-1}	0.34 (2.69)**	0.16 (1.45)	0.19 (2.56)*	0.20 (4.47)***	0.14 (1.45)	0.14 (1.64)	0.20 (1.91)	0.24 (1.57)	0.19 (6.13)***	0.20 (5.53)***	0.25 (2.79)**	0.27 (2.07)*
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of observations	114	114	114	114	114	114	74	74	74	74	74	74
No of countries	5	5	5	5	5	5	5	5	5	5	5	5
p(Sargan)	0.354	0.152	0.252	0.248	0.042	0.250	0.661	0.845	0.055	0.046	0.466	0.440

Table 9 illustrates the results of a GMM dynamic panel estimation in which the dependant variable is specified through the net percentage from banks from every one of the nations belonging to the EA9, reporting a tightening of the terms and conditions for approving loans or credit lines to three elements included in the BLS. We have a balanced panel dataset which incorporates 5 Euro-area nations: Belgium, France, Germany, Luxembourg and Netherlands. We estimate the panel regression over both pre and post crisis period .The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively and reported in the brackets.

Table 10. Before and After Crisis (Stressed Countries)

	Before						After					
	Business Loans		Mortgage Loans		Consumer Credit & Other Lending		Business Loans		Mortgage Loans		Consumer Credit & Other Lending	
	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans
	1	2	3	4	5	6	7	8	9	10	11	12
Taylor rule residuals i_{t-1}	5.83 (2.77)**	5.44 (2.79)**	11.77 (3.37)***	12.15 (3.96)***	6.50 (2.70)**	9.04 (5.60)***	18.22 (2.83)**	16.72 (3.35)***	27.11 (1.75)	35.75 (3.65)***	22.40 (2.07)*	23.98 (2.51)*
Demand for Loans i_{t-1}	-0.06 (0.55)	-0.01 (0.01)	0.03 (0.44)	-0.01 (0.15)	-0.12 (3.13)**	-0.03 (1.02)	0.16 (1.94)	0.02 (0.10)	-0.07 (0.69)	0.03 (0.26)	-0.06 (1.07)	-0.03 (0.15)
10 Year bond Rate i_{t-1}	10.51 (2.50)*	7.50 (1.52)	4.01 (0.76)	5.47 (0.99)	4.18 (0.70)	1.30 (0.25)	1.29 (1.71)	1.93 (2.14)*	1.87 (2.37)*	-0.07 (0.06)	-0.15 (0.78)	-1.49 (2.97)**
Inflation rate i_{t-1}	8.36 (3.25)**	5.80 (2.45)*	3.80 (0.82)	5.46 (1.33)	9.67 (4.49)***	12.91 (4.80)***	21.82 (4.58)***	8.01 (1.53)	16.55 (2.62)**	26.51 (5.48)***	12.04 (3.23)**	13.32 (3.25)**
GDP growth rate i_{t-1}	0.68 (0.64)	0.81 (0.63)	-1.12 (1.18)	0.08 (0.05)	-0.60 (0.54)	-0.83 (0.53)	5.88 (3.93)***	5.60 (4.37)***	7.70 (8.92)***	4.52 (2.99)**	1.90 (1.59)	1.37 (1.09)
Expectations regarding general economic activity i_{t-1}		0.09 (1.05)		0.06 (1.19)		0.55 (2.80)**		0.51 (1.43)		-0.02 (0.38)		-0.26 (1.50)
Industry or firm-specific outlook i_{t-1}		-0.02 (0.12)						-0.37 (1.79)				
Risk on the collateral demanded i_{t-1}		0.22 (0.91)				-0.01 (0.09)		0.02 (0.06)				0.54 (2.26)*
Housing market prospects i_{t-1}				-0.05 (0.86)						0.20 (2.44)*		
Creditworthiness of consumers i_{t-1}						-0.36 (3.31)***						0.26 (1.36)
Lagged Dependent i_{t-1}	0.53 (7.90)***	0.42 (3.19)**	0.59 (5.67)***	0.48 (4.65)***	0.45 (4.03)***	0.14 (0.83)	0.16 (0.75)	0.41 (3.94)***	0.18 (0.74)	0.23 (2.00)*	0.29 (2.63)**	0.01 (0.05)
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of observations	96	96	96	96	96	96	64	64	64	64	64	64
No of countries	4	4	4	4	4	4	4	4	4	4	4	4
p(Sargan)	0.359	0.261	0.709	0.192	0.493	0.360	0.346	0.246	0.160	0.088	0.116	0.132

Table 10 illustrates the results of a GMM dynamic panel estimation in which the dependant variable is specified through the net percentage from banks from every one of the nations belonging to the EA9, reporting a tightening of the terms and conditions for approving loans or credit lines to three elements included in the BLS. We have a balanced panel dataset which incorporates 4 Euro-area nations: Greece, Italy, Portugal and Spain. We estimate the panel regression over both pre and post crisis period. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively and reported in the brackets.

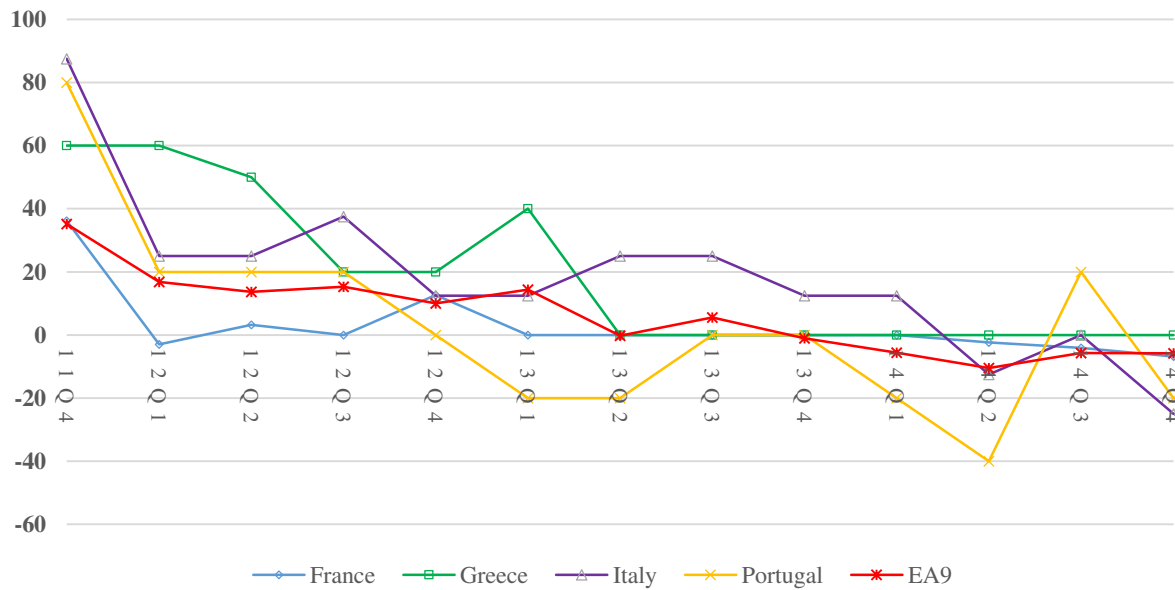
In this section an analytical investigation of the outcomes for the BLS in EA9 is conducted, encompassing the period 2012Q1 to 2014Q4. The basis of this approach is to determine the effectiveness of the ECB's 3 year LTROs with the purpose of learning if the measurements exerted the impact they were intended to.

As illustrated by **Figure. 5**, banks' credit standards for business loans were relaxed in EA9 countries following the execution of these LTROs. In particular, this applies to the first quarter of 2012, in which out of the total bank participants in the survey, just 17% noted a constriction in the accessibility of loans or credit lines to enterprises in contrast to a significantly higher proportion of 36% seen in the preceding quarter. Although this measure stays constricted till the final quarter in 2013, it is substantially more gradual in its development than previous quarters. Accordingly, this progress is probably propelled through more moderate demand on banks stemming from the cost of funds and balance sheet constraints, reflected in **Figure. 7**. Here it can be inferred that costs related to a bank's capital position in addition to a bank's ability to access market financing show significant constrictions before 2012Q1. However, the ECB's €1 trillion cheap loan scheme has achieved its anticipated impact in substantially aiding the relaxation of the previously mentioned issues. Furthermore, banks' liquidity positions saw additional progress within the course of this period. Here it is crucial to highlight that the pattern of credit standards for business loans reflects further relaxation in nearly all EA9 countries. The country analysis indicates that particularly Italy, Portugal and Greece experienced a marked elevation of bank credit. Net tightening of banks' credit standards as applied to the approval of loans available in the two components to households for house purchase and consumer credit and other lending also experienced a substantial decline within same period. Even though the progressive decrease in bank credit constriction is reassuring and necessary in order to dilute the devastating impact of the latest financial turmoil, the benefits of such action can only be experienced in the EA9 economy with a concurrent increase in net demand. Correspondingly, research by Popov and Van Horen (2015) details that the reduced rate of lending persisted, following the ECB's LTRO in December 2011 and these measures evidently failed to stop the total reduction in bank lending in the EA.

An analysis of **Figures. 6 and 8-9** indicates a substantial decline in the demand for loans to enterprises, households and consumer credit. Certainly the net percentage of banks announcing decreased demand from enterprises in EA9 fell from -6% in 2011Q4 to -42% in 2012Q4. Such a significant fall in demand is justified through enterprises being reluctant to invest while the EA crisis progressed with increasing concerns of falling into a recession; this was especially

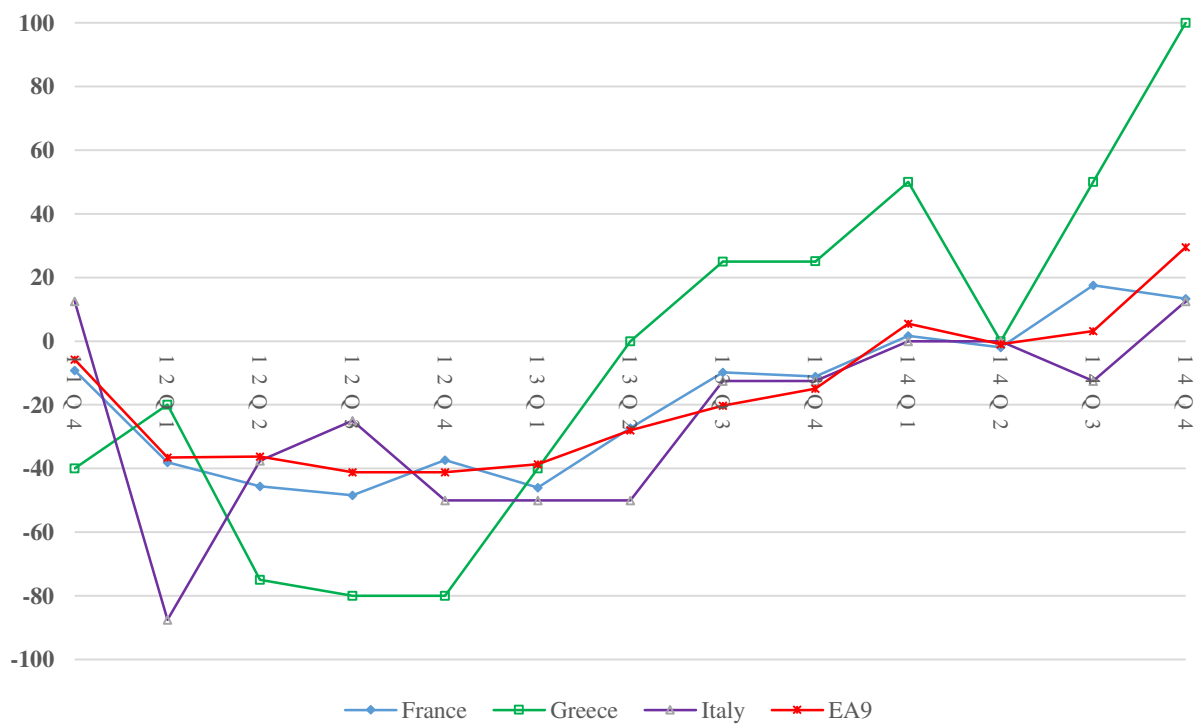
the case in strained EA9 nations. However, banks' credit demand eventually began to increase starting from 2013Q1 to the final quarter of 2014, which implies that the inclination of enterprises to invest, housing market outlook and consumer confidence are largely increasing, especially in the EA9 periphery countries this progress is comparable to the banks' credit standards within the analogous period.

Figure. 5 Credit Standards for Business Loans



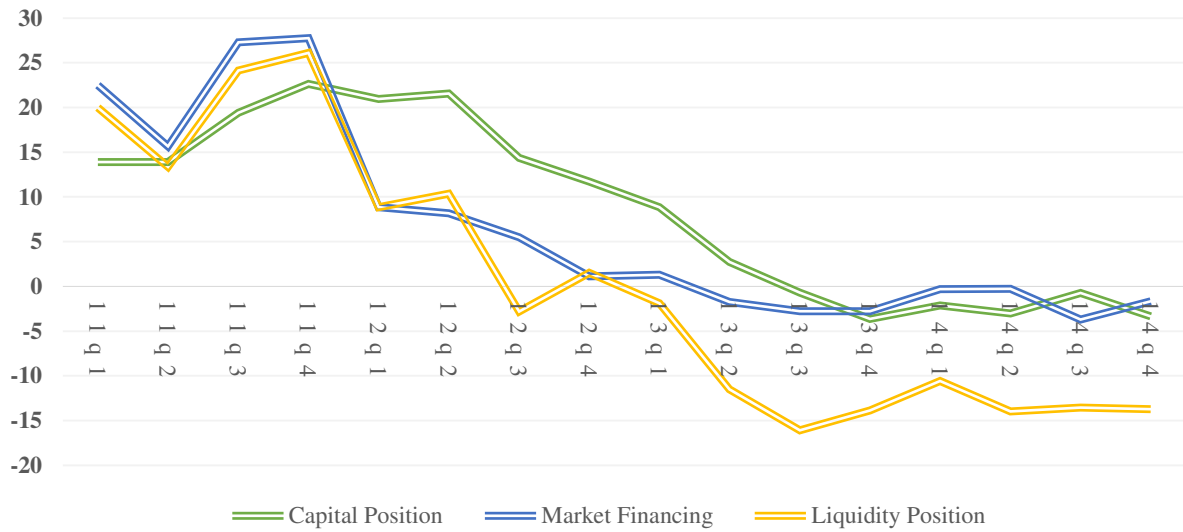
Source: (BLS, 2015)

Figure. 6 Net Demand for Business Loans



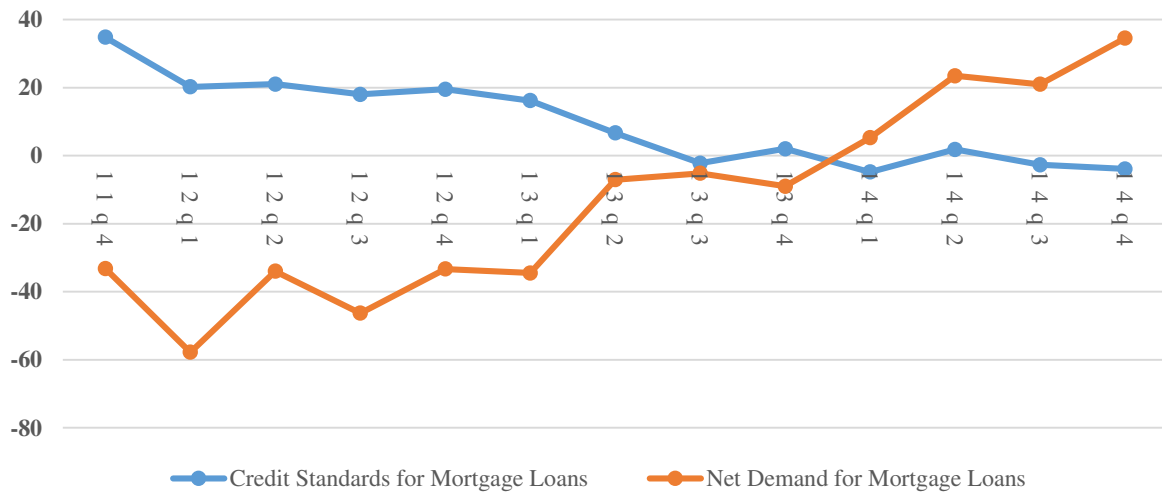
Source: (BLS, 2015)

Figure. 7 Factors influencing Credit standards for Business Loans



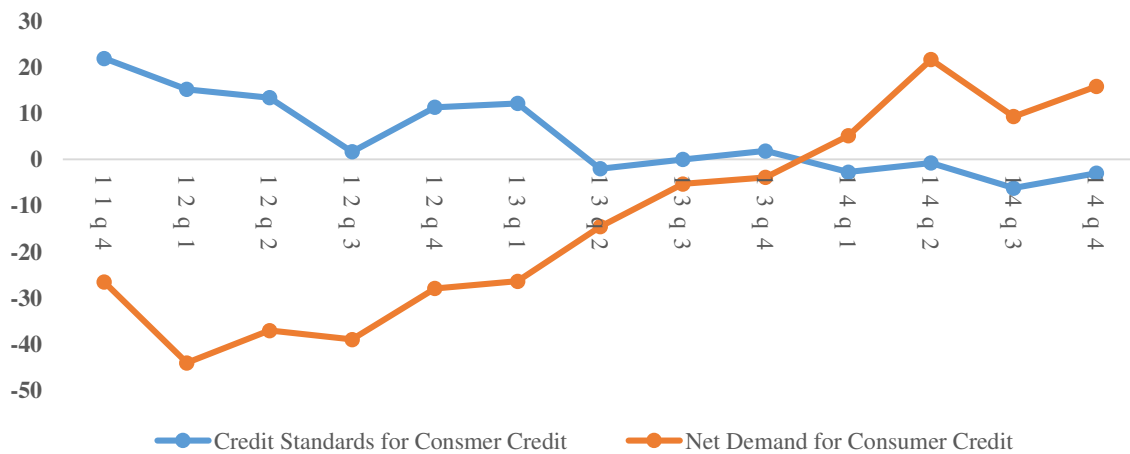
Source: (BLS, 2015)

Figure. 8 Credit Standards vs Net Demand for Mortgage Loans



Source: (BLS, 2015)

Figure. 9 Credit Standards vs Net Demand for Consumer Credit



Source: (BLS, 2015)

5. Conclusion

The recent financial turmoil has exerted a negative influence on bank lending within the primary industrialised nations, in addition to the EA. As a result this has brought attention to the issue concerning the proclivity of economic entities to take on further risk especially during periods of low interest rates. Moreover, when considering the practice of cautious lending in banks which are reluctant to intensify lending activity and volume regardless of the monetary policy stance, with the purpose of enabling bank lending, the ECB initiated a 3 year LTROs in which a combined amount of €1 trillion cheap loans was injected into the EU banking system. In this study, these topics are extensively examined in 9 countries of the EA. We find robust supporting data that low-short term interest rates prior to the crisis induced an inconsistent loosening of credit standards regarding enterprises, household and consumer loans. Despite the scope of expansionary monetary policy reported mainly in the post-crisis sample, this analysis indicates that negative Taylor-rule residuals resulted solely in softening of total lending standards for enterprises loans.

The implementation of the 3 years LTRO by the ECB caused a decrease of the development of banks' credit constriction, which is reassuring and necessary in order to avoid the likely damaging outcomes of the latest financial crisis. Nevertheless, the benefits of this scheme have yet to be experienced within the EA9 real economy considering the disadvantageous decline in demand for all three types of loans. However, the demand eventually began to increase in 2013Q1 till the final quartering of 2014, indicating an encouraging inclination by enterprises to invest. In addition, housing market outlook and consumer confidence are starting to increase, which has not occurred since the commencement of credit crunch. Additionally, the recent TLTRO scheme implemented by the ECB is geared towards enabling increased access to cheap financing for SME lending.

Especially noteworthy are the results from before the onset of the crisis, which indicate that banks unexpectedly relaxed margins for loans to borrowers considered as riskier, in an environment of low monetary rates within stressed and non-stressed nations of the sample investigated. Yet, in stressed nations the data suggests that excessive risk-taking in bank lending behaviour transpired, especially during periods of low monetary policy rates both pre- and post-crisis. Such recklessness should be an important issue for policy makers to note and should be comprehensively tackled in the formulation of future policies.

Appendix: I: Summary Statistics: Bank Lending Survey Indicators and Financial Indicators

<i>Before the Start of the Financial Crisis (2002:Q4-2008:Q3)</i>	Mean	Std.Dev.	Min	Max	Obs
Lending Standards:					
Business Loans	17.75	31.28	-50	100	216
Mortgage Loans	4.61	27.98	-66.67	100	216
Consumer Credit Loans	6.95	24.22	-35.71	100	216
Demand for Loans:					
Business Loans	2.89	30	-83.33	71.43	216
Mortgage Loans	5.17	45.98	-100	100	216
Consumer Credit Loans	6.34	30.48	-100	100	216
Lending Standards Due to Balance Sheet Factors:					
Bank Capital Position	12.51	17.50	-25	80	216
Bank Liquidity Position	4.25	13.37	-33.33	51.20	216
Bank Market Financing	6.92	18.92	-40.00	100	216
All Balance Sheet Factors for Mortgage Loans	4.96	15.30	-66.67	80	216
All Balance Sheet Factors for Consumer Credit Loans	4.37	16.98	-33.33	100	216
Perception of Risk:					
Expectations regarding general economic activity	23.52	33.45	-42.86	100	216
Industry or firm-specific outlook	29.16	33.45	-28.57	100	216
Risk on the collateral demanded	12.52	19.75	-20	80	216
Expectations regarding general economic activity	12.83	24.20	-40	100	216
Housing market prospects	14.80	26.59	-33.33	100	216
Expectations regarding general economic activity	11.86	24.38	-33.33	100	216
Creditworthiness of consumers	16.94	22.44	-25	100	216
Risk on the collateral demanded	7.65	16.97	-33.33	80	216
Loans terms and conditions:					
Margin on average for Business Loans	5.80	44.40	-100	100	216
Margin on riskier Business Loans	38.73	34.61	-50	100	216
Margin on average for Mortgage Loans	-9.236	35.27	-100	100	216
Margin on riskier for Mortgage Loans	13.43	25.48	-33.33	100	216
Margin on average for Consumer Credit Loans	-3.97	26.95	-66.67	80	216
Margin on riskier for Consumer Credit Loans	13.54	23.13	-33.33	90	216
Non-interest rate charges	8.55	21.17	-40	100	216
Size of the loan or credit line	11.06	20.32	-33.33	75	216
Collateral requirements	14.92	25.97	-46.5	100	216
Loan covenants	10.81	21.85	-33.33	83.33	216
Maturity	7.40	24.44	-50	80	216
Financial factors:					
EONIA	2.84	0.82	2.02	4.25	216
Taylor-rule Residuals	0.74	0.85	-0.99	2.46	216
10-year Government bond rates	3.99	0.50	2.20	4.97	216
Growth rate of GDP	2.36	1.92	-2.20	8.10	216
Inflation rate	2.62	0.94	0.80	5.60	216

Appendix: II: Summary Statistics: Bank Lending Survey Indicators and Financial Indicators

<i>During the Financial Crisis (2008:Q4-2010:Q4)</i>	Mean	Std.Dev.	Min	Max	Obs
Lending Standards:					
Business Loans	26.06	33.16	-14.29	100	81
Mortgage Loans	22.14	30.03	-26.4	100	81
Consumer Credit Loans	21.37	25.78	-17	100	81
Demand for Loans:					
Business Loans	-13.64	33.23	-86	50	81
Mortgage Loans	-6.37	48.02	-100	83.5	81
Consumer Credit Loans	-19.62	31.45	-100	50	81
Lending Standards Due to Balance Sheet Factors:					
Bank Capital Position	17.26	23.51	-25	80	81
Bank Liquidity Position	4.09	24.68	-40	80	81
Bank Market Financing	13.01	26.65	-40	100	81
All Balance Sheet Factors for Mortgage Loans	12.96	24.92	-60	100	81
All Balance Sheet Factors for Consumer Credit Loans	13.32	22.23	-25	100	81
Financial factors:					
EONIA	0.86	0.87	0.34	3.15	81
Taylor-rule Residuals	-0.16	1.21	-2.37	2.14	81
10-year Government bond rates	4.14	1.47	2.42	11.03	75
Growth rate of GDP	-1.37	3.66	-9.60	6.30	81
Inflation rate	1.31	1.41	-1.50	5.60	81

Appendix: III: Summary Statistics: Bank Lending Survey Indicators and Financial Indicators

<i>After the Financial Crisis (2011:Q1-2014:Q4)</i>	Mean	Std.Dev.	Min	Max	Obs
Lending Standards:					
Business Loans	8.46	24.73	-50	100	144
Mortgage Loans	12.78	25.12	-50	100	144
Consumer Credit Loans	7.80	21.29	-27.5	100	144
Demand for Loans:					
Business Loans	-12.90	29.08	-80	75	144
Mortgage Loans	-14.48	44.70	-100	100	144
Consumer Credit Loans	-14.76	32.85	-100	75	144
Lending Standards Due to Balance Sheet Factors:					
Bank Capital Position	8.52	20.18	-25	80	144
Bank Liquidity Position	0.39	25.01	-75	80	144
Bank Market Financing	6.55	21.28	-25	100	144
All Balance Sheet Factors for Mortgage Loans	10.18	22.41	-33.33	100	144
All Balance Sheet Factors for Consumer Credit Loans	7.22	19.83	-27.5	100	144
Perception of Risk:					
Expectations regarding general economic activity	15.94	28.89	-40	100	144
Industry or firm-specific outlook	18.13	28.88	-50	100	144
Risk on the collateral demanded	10.39	19.06	-25	80	144
Expectations regarding general economic activity	13.87	27.06	-40	100	144
Housing market prospects	14.68	24.91	-25	100	144
Expectations regarding general economic activity	10.45	25.53	-40	100	144
Creditworthiness of consumers	13.95	27.47	-20	100	144
Risk on the collateral demanded	7.79	20.56	-12.5	100	144
Loans terms and conditions:					
Margin on average for Business Loans	2.94	39.41	-80	100	144
Margin on riskier Business Loans	25.53	29.72	-25	100	144
Margin on average for Mortgage Loans	4.07	31.51	-66.67	100	144
Margin on riskier for Mortgage Loans	18.26	26.28	-28.57	100	144
Margin on average for Consumer Credit Loans	2.89	22.36	-50	100	144
Margin on riskier for Consumer Credit Loans	10.49	22.01	-25	100	144
Non-interest rate charges	4.94	20.37	-60	100	144
Size of the loan or credit line	6.91	25.37	-80	100	144
Collateral requirements	10.87	25.46	-25	100	144
Loan covenants	6.74	22.59	-50	100	144
Maturity	10.82	26.47	-60	100	144
Financial factors:					
EONIA	0.32	0.34	-0.02	1.04	144
Taylor-rule Residuals	-1.02	0.52	-2.20	0.76	144
10-year Government bond rates	4.63	4.49	0.70	25.40	144
Growth rate of GDP	-0.37	2.66	-10.40	6.00	144

Appendix. IV Detailed illustrations of questions posed in the BLS survey and variables used in this analysis

Bank Lending Survey Questions¹⁴		Definition	Measures
<p>Bank's credit standards Over the past three months, how have your bank's credit standards as applied to the approval of loans or credit lines to changed?</p>	<p>Loans or credit lines to enterprises (Qs1) Loans for house purchase (Qs8) Consumer credit and other lending (Qs8)</p>	<p><u>Total lending Standards for:</u> Business Loans Mortgage Loans Consumer Loans</p>	<p>Net percentage of banks reporting a tightening over the previous quarter.</p>
<p>Factors affecting bank credit standards: Over the past three months, how have the following factors affected your bank's credit standards as applied to the approval of loans or credit lines to? <i>A) Cost of funds and balance sheet constraints</i> <i>C) Perception of risk</i></p>	<p>Loans or credit lines to enterprises (Qs2) A.1) Bank's cost of capital A.2) Access to market financing A.3) Bank's liquidity position All factors for house purchase (Qs9) All factor for consumer credit and other lending (Qs11) Expectations regarding general economic activity (Qs2) Industry or firm-specific outlook (Qs2) Risk on the collateral demanded (Qs2) Expectations regarding general economic activity (Qs9) Housing market prospects (Qs9) Expectations regarding general economic activity(Qs11) Creditworthiness of consumers (Qs11) Risk on the collateral demanded (Qs11)</p>	<p><u>Total lending Standards for:</u> Business Loans Mortgage Loans Consumer Loans Business Loans Business Loans Business Loans Mortgage Loans Mortgage Loans Consumer Loans Consumer Loans Consumer Loans</p>	<p>Net percentage of banks reporting a tightening over the previous quarter.</p>
<p>Loans terms and conditions: Over the past three months, how have your bank's conditions and terms for approving loans or credit lines to changed? <i>A) Price</i> <i>B) Other conditions and terms</i></p>	<p>A) Qs(3), Qs(10) and Qs(12) Your bank's margin on average loans Your bank's margin on riskier loans B) Qs(3)</p>	<p>Business Loans Mortgage Loans Consumer Loans <u>Business Loans</u> Non-interest rate charges Size of the loan or credit line Collateral requirements Loan covenants Maturity</p>	<p>Net percentage of banks reporting a tightening over the previous quarter.</p>

	B) Qs(10)	<u>Mortgage Loans</u> Collateral requirements “Loan-to-value” ratio Maturity Non-interest rate charges	
	B) Qs(12)	<u>Consumer Loans</u> Collateral requirements Maturity Non-interest rate charges	
Demand for Loans Over the past three months, how has the demand for loans or credit lines tochanged at your bank, apart from normal seasonal fluctuations?	Demand for loans to enterprises (Qs4) Demand for loans for house purchase (Qs13) Demand for loans for consumer credit (Qs13)	<u>Demand</u> Business Loans Mortgage Loans Consumer Loans	Net percentage of banks reporting an increase in loan demand over the previous quarter.

Data Sources:

Macroeconomic variables	Definition	Data Source	Sample
EONIA	Quarterly average of the EONIA overnight interest rate	Eurostat	2002:Q4-2014:Q4
Taylor-rule Residuals	Residuals of a panel regression of EONIA on growth rate of GDP and inflation rates	Eurostat, ECB	2002:Q4-2014:Q4
10-year government bond yield	Quarterly average of daily government bond yields	Datastream	2002:Q4-2014:Q4
Growth rate of GDP	Quarterly growth rate of real GDP	Eurostat	2002:Q4-2014:Q4
Inflation rate	Quarterly rate of inflation	OECD	2002:Q4-2014:Q4

¹⁴ For a complete summary of the survey carried out by the ECB, refer to <https://www.ecb.europa.eu/stats/money/surveys/lend/html/index.en.html>

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