Issues in Monetary and Fiscal Policy in the Eurozone: An Empirical Investigation

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I would like to dedicate this thesis to my loving parents ...

Declaration

I hereby declare that except where specific reference is made to the work of others, the contents of this dissertation are original and have not been submitted in whole or in part for consideration for any other degree or qualification in this, or any other University. This dissertation is the result of my own work and includes nothing which is the outcome of work done in collaboration, except where specifically indicated in the text.

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Acknowledgements

And I would like to acknowledge ...

Abstract

In the past years, the world experienced not only the worst financial and economic crisis in decades but also fiscal and monetary policy steps of unprecedented scope in response to that crisis. When the financial crisis reached its most critical stage in the autumn of 2008, several central banks and governments put in place rescue and support packages for the financial sector. These efforts were strongest in developed countries, which were most affected by the financial turmoil. In 2009, the economic crisis had taken shape and spread across the globe. Moreover, the burst of 2008 and the subsequent recession have revived a heated debate in policy circles and academic research on whether the monetary and the fiscal policy are effective in stabilizing the economy. The pre-crisis "consensus" among policymakers and academia regarding the stabilization policy due to a negative shock hitting the economy could be summarized as follows:

- Monetary policy should play the primary role in economic stabilization.
- The appropriate monetary policy instrument is the short-term nominal interest rate.
- Policy should pursue a modestly positive, stable rate of inflation, to the exclusion of other goals.
- Active fiscal policy is of limited additional usefulness.
- Financial crises should be addressed via provision of abundant liquidity to contain the propagation of financial instability into macroeconomic instability.

This stems from the fact that the developed economics have experienced a long period of low inflation and growth known as the "Great Moderation" (Stock and Watson (2002) were the first to coin the term Great Moderation to describe the US business cycle since 1984). At the same time, macroeconomists have developed a suite of interconnected DSGE models that account for business cycle dynamics and monetary policy plays a crucial role for stabilizing the economy (output gap and inflation) with respect to fiscal policy that was regarded as useless. The financial crisis led the European policymakers to face formidable

policy challenges. This thesis contributes to the literature on the joint analysis of monetary and fiscal policy in an incomplete monetary union as the Euro zone.

The first chapter investigates how the announcements of conventional and unconventional monetary policies affect the European banking sector. The primary goals of monetary policy interventions during the crisis are to restore monetary stability and reestablish the solidity of the financial and credit system. The financial crisis and the deterioration of the economic outlook led the ECB to embark into a range of conventional and unconventional policy measures to overcome the collapse of the market of value assets, perceived as risky and illiquid. Firstly, the ECB sets out conventional policy, reducing its key policy interest rate to unprecedented low levels (approaching the zero lower bound in 2012 and achieved at the end of 2014). Furthermore, to overcome the malfunctioning of the interbank market, the ECB facilitated a number of non-standard policies. These included the Securities Markets Programme (SMP, May 2010), the Long Term Refinancing Operations (LTROs, December 2011) and the Outright Monetary Transactions (OMT, August 2012) programme. All these policies seemed to have attenuated the funding costs both for private-sector banks and for the domestic sovereigns whose debt was in banks portfolios. Under general condition, a restrictive monetary policy may have different effects on the banking sector: the net interest income effect and the non-interest income effect. The net interest income may have, at least three different mechanisms: the deposit effects (if the banks have some oligopolistic power, a tightening monetary policy will increase the net interest income (Freixas and Rochet (1997)); the quantity effect (if the loan demand is elastic to changes in interest rate and the deposit supply is inelastic, an increase in the central bank reference rate has a positive effect in the net interest income as in Klein-Monti (1972)) and the dynamic effect (price adjustment is lagged in time and the new loans could raise profitability only temporarily due to that losses materialize few year later when the loans become non performing and obviously a restrictive monetary policy might erode the interest margin). Conversely, the non-interest income may have at least two different effects: one on securities (an increase in the policy rate will generate losses on banks securities portfolios) and one on fees and commissions (they are related to investment-banking type activities, on average a higher interest rate might reduce the non-interest income component. Rajan (2005), Albertazzi and Gambacorta (2009)). The empirical literature has adopted two main methods to study the effects of monetary shocks on macroeconomic variables and stock prices: vector autoregressions (VARs) and studies of high-frequency monetary shocks on asset prices. The VARs methodology offers the advantage of directly studying the effects of monetary policy shocks on key variables: prices, output, and employment-rather than indirectly studying them through their effects on asset prices. By the way, a VAR analysis requires controversial identification assumptions

to identify simultaneous causality because time aggregation of data with lower frequencies, generally, produces simultaneous causality in economic data even if there is unidirectional causality at very high frequencies. Kuttner (2001) claims that federal funds futures offer three advantages over other procedures to identify expectations of monetary policy: (i) futures require no model; (ii) futures data are not revised and so there is no data vintage problem; and (iii) futures do not entail an errors-in-variables problem as do VARs. In the first chapter, the estimates follow a modified methodology implemented by Bernanke and Kuttner (2005) and corrects for the joint response bias as Thornton (2009, 2013) has shown in his studies. This method allows one to identify the marginal effect of monetary policy shocks relative to non-monetary policy shocks and second is simple to employ, it requires a simple identification assumption, and it is easily modified to account for the effects of other newsworthy events, such as the market reaction to other headline news. The focus in the euro area is motivated by the fact that the empirical literature is scant and there are no findings on the Eurozone banking sector from the existence of the ECB and during the various crisis periods. The main contribution compared to the related literature is to assess the benefit from conventional (interest rate channel) and unconventional monetary policy (balance sheet channel) on the aggregate Eurozone Banking sector and in the Cross-Country banking sector from the existence of the ECB. In addition, we analyze if the magnitude of the conventional and unconventional monetary policies is time varying during the different period of the crisis. We consider four different stage: 1) The US subprime crisis (1 June 2007-31 December 2009) 2) The European sovereign debt crisis (1 October 2009 -14 September 2015 3) The first phase of European sovereign debt crisis (1 October 2009-31 October 2011) 4) The second phase of European sovereign debt crisis (1 October 2011-14 September 2015).

Another policy concern that is high on the agenda of all the Eurozone Countries and especially of the European Commission and the European Parliament is the use of the fiscal stimulus as the stabilization tool for the economy and its sustainability in the aftermath of the global economic downturn. The second chapter undertakes to fix these issues. As we mentioned before, after the collapse of Lehman Brothers in September 2008 all advanced countries adopted fiscal stimulus in the 2009 in an attempt to speed up the recovery. In the Eurozone, fiscal policy was contractionary in the period 2010-2014 (when the economy was deteriorating) and became neutral and/or lightly supportive in 2015 and 2016. Over the years 2010-2014 a fiscal consolidation was implemented.

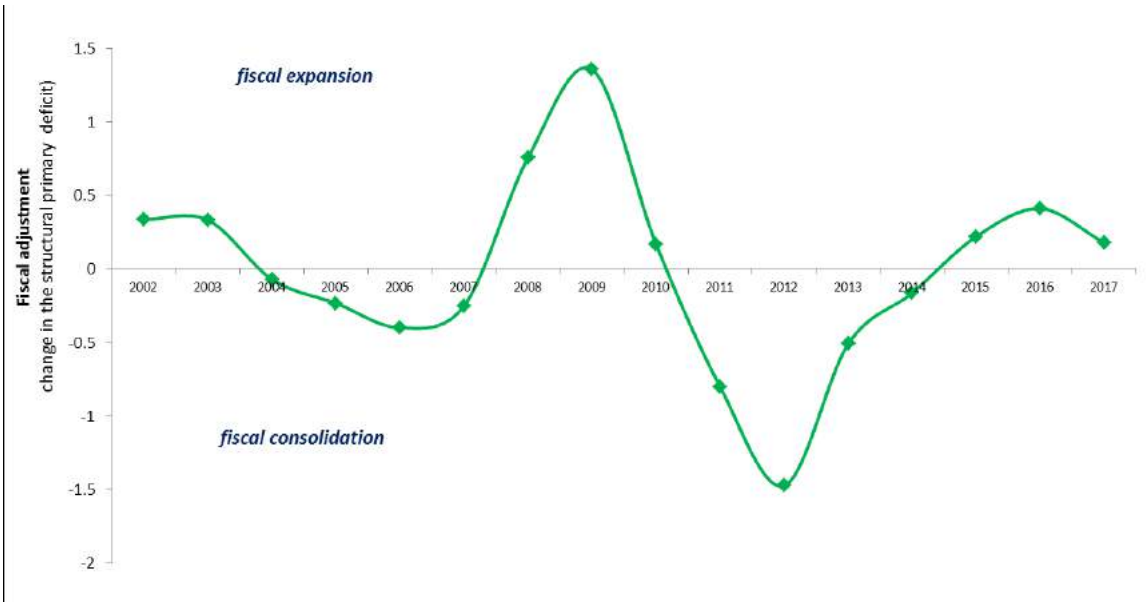

Figure 1 Fiscal Stance Euro Area

Expansionary fiscal stimulus has been a source of disagreement among economists based on widely divergent empirical estimates of the impact of such stimulus. Moreover, as we said above, the beginning of the sovereign debt crisis, in early 2010, with the associated mounting tensions in the sovereign debt markets, have pushed many Euro area Countries to take action in an attempt to reduce fiscal imbalances and keep the credibility of their sovereign debt. Despite, in the countries that have undergone significant, and unprecedented, efforts to divert fiscal imbalances, “austerity" measure did not result, so far (short-medium run), in a reduction in the debt-to-GDP ratio whereas economic growth, employment, consumption and investment turned out weaker than expected. Actual fiscal consolidation plans in the Euro area were criticised. One of the criticism being that fiscal consolidation was front-loaded and untimely, as it took place at time when fiscal multipliers were thought to be larger than most studies suggested (Blanchard and Leigh (2013)). The so-called “expansionary fiscal austerity" has not occurred as Alesina, Favero and Giavazzi (2015) have argued in their paper. In the years following the global crisis, the impact of fiscal policy on output and other macroeconomic aggregates has been a central part of fiscal policy analysis (i.e., Romer and Romer (2010), Ramey (2011), Auerbach and Gorodnichenko (2013)). As mentioned before the fiscal retrenchment occurred when European economies were barely recovering from financial crisis and the sovereign debt crisis had just started (2010) with several Euro countries entering a new recession. The core of the recent literature revalue Keynesian arguments that government spending is likely to have larger expansionary effects in recessions than in expansions. Intuitively, when the economy is in a recession, expansionary government

spending shocks are less likely to “crowd out" private consumptions or investments. The government spending should be used in recessions to stimulate aggregate demand, especially when interest rate have been at or near zero for long time. In the wake of these events, policymakers and researchers have questioned whether the timing and size of the fiscal adjustment in the euro area was appropriate. The second chapter undertakes to settle the debate on the effects of fiscal consolidation in the Eurozone by empirically assessing benefits and costs of increasing government spending in Euro-countries at a time of financial distress and recession. It is, therefore, critical to determine which macroeconomic impact government spending will have on GDP, private consumption, private investment and especially on the “health" of public finance as measured by surplus/deficit-to-GDP, debt-to-GDP and on primary surplus during the different phases of business cycle. Finally, as our findings, the recent studies of European Commission (November 2016) and European Parliament (July 2016) suggest the Euro area guidelines:

- To the extent that sovereign debts remain sustainable, fiscal policy at member state level is able to cushion specific demand shocks. The reason is that crowding out effect (increased interest rate, or euro appreciation) are diluted.

- At Euro area level, fiscal policy is partially compensated by countervailing movements in the interest rate and exchange rate, but since the Euro area is a “large” economy in the macroeconomic sense, these crowding out effects are also limited: the Keynesian multiplier is positive.

- In normal times, fiscal spillovers across member states are limited due to different channels working in opposite directions. In “exceptional times”, however, i.e. at the zero lower bound, or in a deep recession, or when several countries carry out strong fiscal consolidation at the same time, the spillovers can become very significant.

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Chapter 1

The impact of ECB's conventional and unconventional monetary policies on European banking indexes returns

1.1 Abstract

This paper investigates how conventional and unconventional monetary policies announcements affect European banking indexes returns through an event-study analysis. We use data of 11 European banking indices for the periods 1999-2015. We examine the state dependency of such effects and focus on the surprise elements of policy changes derived from the Euribor futures market. Overall, we find a positive relation between the unexpected changes in the ECB's reference rate and European banking indices returns. We also discover that the effect is stronger during the financial crisis, especially during the sovereign debt crisis. Moreover, we identify a positive relation between the announcements of unconventional policies and the European banking indices returns , particularly where the banking system was more risky such as Spain, France and Italy but with a low degree of magnitude than expected. Hence, the Euro banks reactions to monetary policies announcements seem to be more relevant through conventional measures with respect to non-conventional ones.

1.2 Introduction and a review of the literature

The impact of monetary policy on stocks prices has been a topic of great interest to policy-makers and market participants. This is for microeconomic reason, such as to evaluate the substitution and income effects on market agents, and to assess the transmission mechanism

of monetary policy. Since the financial crisis began in 2007, central banks worldwide have performed a series of monetary policies measures: either conventional or unconventional. The ultimate goal of monetary policy interventions implemented during the crisis has been restore monetary stability and thus reestablish the stability of financial and banking system. To face the crisis, the central banks reduced their key policy interest rates to unprecedented low levels. Furthermore, to overcome the malfunctioning of the interbank market, they facilitated with a number of non-standard policies, as monetary easing and liquidity provision. The literature on the effect of monetary policies throughout the years could be divided into two main areas. The first has dealt on the relationship between monetary policies and the relevant macroeconomic variables, such as interest rates and / or inflation; the second analyzed the impact of monetary policies on financial markets. The literature on financial markets is segmented between those who focus on equity portfolios equi-distributed or stock indices, others that analyze the impact on different industries and others investigate the impact on the banking system (which are the main actors of the transmission mechanism of monetary policy). Generally it is found that market interest rates are positively related to changes in the federal funds rate target. Short-term interest rates are more responsive than long-term interest rates to such changes (Cook and Hahn 1989, Thornton 1998; Kuttner 2001). Furthermore, it was found an inverse relationship between general stock market returns and monetary policies shocks. There are several comprehensive reasons why an unexpected funds rate increase may leads to a decline in stock prices: it may be associated with a decrease in expected future dividends, a rise in the future expected real interest rates used to discount those dividends, or an increase in the expected excess returns (e.g., the equity premiums) associated with holding stocks. The literature may be divided into a set of articles that show a strong stock returns respond to surprise changes in federal funds rate and into another set of articles that examine how monetary policy has asymmetric impact on stock returns with asymmetries linked to firm characteristics (sector, size, capital intensity, and financial constraints) or macroeconomic conditions. The first set pass through Thorbecke (1997). He uses a VAR system that includes monthly equity returns, output growth, inflation, and the federal funds rate. He discovers that monetary policy shocks, measured by orthogonalized innovations in the federal funds rate, have a greater impact on smaller capitalization stocks, this is in line with the hypothesis that monetary policy affects firms' access to credit (Gertler & Gilchrist, 1993). He finds that expansionary monetary policy exerts a large and statistically significant positive effect on monthly stock returns. Patelis (1997) and Lastrapes (1998) have also found a positive relation between the expansionary monetary policy and stock market returns. Patelis (1997) examines whether some portion of the observed predictability in excess US stock returns can be attributed to shifts in the monetary policy stance. Following

Fama and French (1989) (they employ the long-horizon regression methodology, using two sets of explanatory variables: monetary policy variables and financial variables), Patelis explains that monetary policy indicators are significant predictors of excess stock returns, that are relate to the financial propagation mechanism (Bernanke & Gertler, 1989) and to the credit channel of monetary policy transmission (Bernanke & Gertler, 1995). Jensen and Johnson (1995) also find that monetary policy developments are associated with patterns in stock returns. Rigobon and Sack (2004) used the policy shocks that take place on certain dates such as the days of FOMC and documented a positive linkage between expansionary monetary policies and stock movements. Cassola e Morana (2004) use a cointegrated VAR system including real GDP, inflation, real M3 balances, short term interest rate, bond yield, and real stock prices in order to examine the transmission mechanism of monetary policy in the Euro area. Their results from impulse response analysis indicate that a permanent positive monetary shock has a temporary positive effect on real stock prices. Others as Jensen, Mercer and Johnson (1996) found that stock return is higher in tight monetary policy regime than expansionary monetary policy regime. Bernanke and Kuttner (2005) follow a more traditional event-study approach where they control directly for certain kinds of information jointly influencing monetary policy and stock return. They show that an unexpected 25-basis point cut in the federal funds target rate leads to a one percent increase in the level of stock prices on average. Policymakers recognize that the stock market is an important conduit of monetary policy that can be used to influence real economic activity. Stock prices affect the real economy through a number of channels. Fluctuations in stock prices affect the firms' cost of capital and their capacity to raise new capital and invest. Another channel is the wealth effect of stock prices on consumption and economic growth. According to them, such a policy action elicits a positive response because it favorably affects the future dividend streams, reduces the discount rate and increases the equity market premium. This line of study has been extended to foreign stock markets, as globalization and the technological revolution have made the global markets tightly interlinked with each other. The other set of articles examine how monetary policy has asymmetric impacts on stock return begin with Kaul (1987). He showed that the relations among monetary policy, inflation, and stock return could be either positive or negative depending on whether monetary policy is pro-cyclical or counter-cyclical. McQueen and Roley (1993) find that in periods of strong economic growth the stock market responds significantly to news about prices and real activity. Conover, Jensen, and Johnson (1999) find that stock returns, in twelve OECD countries over the period 1956-1995, are generally higher in expansive local monetary environments than they are in restrictive environments. As in Jensen and Johnson (1995) and Jensen et al. (1996), the monetary policy proxy used by Conover et al. (1999) is a dummy variable based on discount

rate changes. Jensen et al. (1996) show that this categorization of monetary regimes effectively differentiates US monetary conditions. Ehrmann and Fratzscher (2004) find that more financially constrained firms are strongly influenced by surprise changes of monetary policy. Guo (2004) reports that smaller firms' returns are strongly influenced by monetary policy compared to larger firms, and recession makes this differential even larger. Du (2006) found that changes in money supply and its consequential inflation could have different effects on stock returns during different monetary policy regimes. Empirical results showed a positive relation among money supply, inflation and stock return during pro-cyclical monetary policy regime. The relation becomes negative during counter-cyclical monetary policy regime. Andersen et al. (2007) find that good economic news tend to have negative effect on stock market in economic expansion and positive effect in recession. Andersen et al. (2007) do not find a significant state dependence in the reaction of stock market to monetary news. Chen (2007) points out that monetary policy has a larger effect on stock returns in bear markets then in bull markets. He argues that this asymmetric reaction could be explained by cyclical fluctuations in the level of financial constraints faced by firms. Perez-Quiros and Timmermann (2000) confirm is results. Garg (2008) conducted an empirical research about the effects of changes in federal fund rate on stock prices in different sectors. His work showed that stock prices and interest rate move in the same direction, indicating an expansionary monetary policy might deteriorate stock performance. Basistha and Kurov (2008) argue that stocks' reaction to monetary news is stronger in recessions and in tight credit market conditions than in expansion. They provide evidence that the state dependence in the stock market's response to monetary news is consistent with the credit channel of monetary policy transmission. Kurov (2010) finds that monetary policy shocks have strong influence on market participants' sentiment, and this impact is even stronger in a bear stock market. Jansen and Tsai (2010) showed that monetary policy shocks in bear market is large, negative, and statistically significant. In the international context, Wongswan (2009) has found that a hypothetical 25 basis points Fed rate cut elicits a response of 0.5 to 2.5 percent increase in foreign equity price indices. In the same line Ehrmann and Fratzscher (2009), Hausman and Wongswan (2011) state that foreign equity returns respond positively to unanticipated interest rate cut by Fed. They attribute the cross-country variation in responses to the level of financial market integration and the degree of exchange rate flexibility of the country. Banks are an import part of the monetary policy transmission channel. Two streams of literature emphasize the relationship between banks performance and monetary policies. A strand of literature has focused on the relation between monetary policy shocks and bank profitability through income and balance sheet channel. Others, on the relation between bank stock prices and monetary policy. Demirgüç-Kunt and Huizinga (1999) outline that high

real interest rates are associated with higher interest margins and profitability, especially in developing countries where deposits frequently pay below-market interest rates. Albertazzi and Gambacorta (2009), find a significant relationship between net interest rate income and the yield curve slope. Memmel (2011) discovers that maturity transformation contributes to bank income and exposes banks to interest rate risk, which varies systematically with the slope of the yield curve. Bolt et al (2012) obtain similar results using bank-level data and allowing for asymmetrical effects over the business cycle. Only few studies have specifically focused on the impact of interest rates on bank profitability. Alessandri and Nelson (2014) establish a positive long-run link between the level and slope of the yield curve and bank profitability in the United Kingdom. C. Borio, L. Gambacorta and B. Hofmann (2015) find a positive relationship between the level of short-term rates and the slope of yield curve and bank profitability. The authors suggest that the positive impact of interest rate structure on net interest income dominates the negative one on loan loss provisions and on non-interest income. In addition, they find that the effect is stronger when the interest rate level is lower and the slope is less steep. Recalling that commercial banks play an instrumental role in the transmission of monetary policy through financial market. Due to the interest rate sensitivity of assets and liabilities, bank stock returns seem to be particularly responsive to changes in the federal funds rate target. Bae (1990), Kwan (1991), Akella and Greenbaum (1992), and Lumpkin and O'Brien (1997) analyzed how vary the reaction of bank stock returns to interest rate changes depending on the maturity transformation. Although using a variety of different measures of maturity transformation, the general conclusion reached is that a greater asset-liability mismatch is associated with a greater sensitivity of bank stock returns to interest rate changes. Bank equity prices and bank equity returns, depend on both common and bank-specific factors (e.g., Madura and Schnusenberg 2000; Cooper et al., 2003; Castrén et al., 2006; Fiordelisi and Molyneux, 2010). The existing literature on bank stock returns and federal funds rate target changes suggests that the effects of federal funds rate target changes on bank stock returns vary across banks, depending on specific bank characteristics. For the U.S. banking industry, there are different pre-crisis studies finding an inverse relationship between the soundness of banks and their sensitivity to monetary policy shocks, and hence providing evidence in favor of market discipline. Yin et al. (2010) present a detailed discussion of how interest rate changes may affect bank equity returns. Not only interest rate changes influence the interest margin, also, it affects the loan demand, the value of guarantees provided by debtors, and on their ability to repay the loan. Recalling how banks stock returns respond to monetary policy not only reflects its impact on bank performance, but is also a barometer for the effectiveness of monetary policy in regulating the economy. They find an inverse relationship between bank stock returns and federal funds

rate target changes. More importantly, they point out that bank stock returns only respond to surprise changes in the federal funds rate target. Moreover, banks with higher liquidity ratios are less sensitive to monetary policy interventions than banks experiencing liquidity tensions (Yin and Yang (2013)). More in detail, the authors concentrate on the amount of non-deposit finding. Since it is excluded from deposit insurance, wholesale founding is more sensitive to changes in the credit risk profile of borrowers and to the interest rate environment. Results show that high capitalization, liquidity and market power generally tend to smooth the effects of a change in policy interest rates. Surprisingly, while there are several studies dealing with the effect of monetary policy interventions on bank stock returns, there are only two empirical analyses (Fiordalisi et al. 2014, Ricci 2015) including the financial crisis and focusing on the Eurozone. In addition, there is no evidence, in the literature, on the joint impact of conventional and unconventional ECB's policies announcements in the Eurozone. Consequently, while there are some empirical evidence about the impact of interest rate decisions on bank equity returns, there are no findings on the European Banking sector (only Eurozone), from the existence of European Central Bank neither during the various crisis periods. Accordingly, this paper is the first who investigates the announcement effect of conventional and unconventional monetary policy on the European banking sector (from 1 January 1999 to 14 September 2015) by distinguishing its four stages: 1) the U.S. subprime crisis (from 1 June 2007 to 31 December 2009), 2) the European sovereign debt crisis (1 October 2009 to 14 September 2015), 3) the first phase of European sovereign debt crisis (1 October 2009 to 31 October 2011), 4) the second phase of European sovereign debt crisis (1 November 2011 to 14 September 2015). Specifically, we selected a wide set of monetary policy announcements between January 1999 and September 2015. The different sub-periods have been selected exogenously. With regard to the beginning and the end of the US subprime crisis, we followed the indications of the Business Cycle Dating Committee of the National Bureau of Economic Research[1]. The European debt crisis erupted in the wake of the Great Recession (U.S. subprime crisis) around late 2009, and was characterized by an environment of overly high government structural deficits and accelerating debt levels. We decide to differentiate the US subprime crisis with respect to the Eurozone crisis that erupted at the end of 2009 since several Eurozone member states (Greece, Portugal, Ireland, Spain) were unable to repay or refinance their government debt or to bail out over-indebted banks under their national supervision without the assistance of third parties like other Eurozone countries, the European Central Bank (ECB), or the International Monetary Fund (IMF). The European debt crisis has experienced several stages. In the paper, we decided to consider

[1]In this case, they determine the period of recession from December 2007 (IV) - June 2009 (II), as the macroeconomic data as well as employment and output gap, return to the levels before crisis in the last quarter of 2009, we decided to consider the 2009 entirely.

two different sub-periods. The first from 1 October 2009 to 31 October 2011 and the second from 1 November 2011 until September 2015. The European Central Bank in April and July 2011 raised the referenced interest rate by a total of 50 basis points. From November 2011, the ECB realized that it was in progress the greatest economic crisis in Europe as the negative economic data has depicted, for that reason it has again carried out an expansionary monetary policy. For these reasons, we decided to investigate which are the different impacts of conventional and non-conventional policies in the two different sub-periods of the European sovereign debt crisis[2]. We estimate the European Banks stocks reaction around their announcements. In this framework, the analysis aims to answer at the following question. (1) Which are the effect of ECB monetary policy on the large banks of EU? (2) Are there any changes during the different crisis periods? Which are the Countries mostly affected? (3) What it is the effect of unconventional policies during the different crisis periods? Which are the countries mostly affected?

1.3 Data and Methodology

In this section, we explain our empirical methodology. In Subsection 2.1,we describe our data. In Subsection 2.2, we present our empirical model, which enables the estimation of conventional and unconventional monetary policies effects.

1.3.1 Data

Our data cover the period from January 1999 to September 2015. The number of conventional policy event is 231. Our data set comprises monetary policies indicators (both surprise and expected components), index returns for the European banks (EuroStoxx Bank), Euro country banks specific indices and two types of dummy variables (ECB announcement dummy and unconventional monetary policy dummy). Table 1 presents a statistical summary for the absolute value of expected and unexpected changes. The unexpected interest rate component is defined as the deviations from the 3-month Futures Euribor rate at time t and the 3-month Future Euribor at time t-1 ($News_t = f.Euribor_{m,t}$ - $f.Euribor_{m,t-1}$). In addition, the expected interest rate component, E_ECB, is define as the deviations from the actual target changes (Δ ECB reference rate) on day of the ECB announcement and the surprise component (E_ECB= $\Delta R - News_t$; where E_ECB represents the expected component and ΔR represents the actual target rate changes (by ECB) on the announcement day).

[2]Let us consider how break of the first period the last increase in the ECB reference rate and the latter start with the cut in the ECB reference rate from November 2011

The mean expected change is 1.4 basis points, compared to 0.08 basis points for the unexpected change. In addition, the standard deviation of the expected change is 0.173, whereas that for the unexpected change is only 0.054. If we consider the different sub-periods the mean and the standard deviation changes as a follow. During the Great Recession, the expected change mean is 4.7 basis points, compared to 0.21 basis points for unexpected change. The standard deviation is 0.53 for the expected change, while is 0.165 for the unexpected change. During the first phase of sovereign debt crisis, the mean expected change is 2.3 basis points, as for unexpected change is 0.36 basis points (the s.d. is 0.089 for unexpected change and 0.053 for expected change). Finally, during the second phase of sovereign debt crisis the mean expected change is 4.2 basis points, distinguished to 0.09 basis points for the unexpected change. (the s.d. is 0.024 for unexpected change and for 0.11 expected change). Table 2 shows a statistical summary for the European banking index return (EuroStoxx Bank) and the bank indices returns that make up the EuroStoxx bank index. The figure 1 presents the histogram for the European banking indices returns. In general, EuroStoxx bank index mean is -1.5 basis points and standard deviation is 1.88. Throughout the Great Recession, the EuroStoxx bank index mean return the decrease to -5.77 basis points and standard deviation increase to 2.33. Vice versa, if we consider the first phase of the sovereign debt crisis the mean index return is -14.13 basis points and the standard deviation increase to 2.45 respect to Great Recession. Moreover, during the second phase of sovereign debt crisis the mean return became positive 2.2 basis points and its standard deviation decrease to 1.92. We immediately note that during the various crisis periods the mean and the standard deviation of expected and unexpected changes of ECB's policy rate and the indices returns of European banking varies across time.

1.3.2 Methodology

The efficient markets hypothesis implies that, because financial markets are forward looking, only the unexpected portions of monetary policy change should influence asset prices and it should do so very quickly (Fama, 1970). Therefore, any study of monetary policy must decompose actions into expected and unexpected portions; that decomposition depends on market perceptions of Central bank objectives, procedures, and communications. The large literature has used two main methods to study the effects of monetary shocks on macroeconomic variables and stock prices: vector autoregressions (VARs) and studies of high-frequency monetary shocks on asset prices. The VARs methodology offer the advantage of directly studying the effects of monetary policy shocks on key variables-prices, output, and employment-rather than indirectly studying them through their effects on asset prices. That is, VAR analysis requires controversial identification assumptions to identify simultaneous

causality because time aggregation of data to lower frequencies- such as the monthly or quarterly data used in VAR analysis - generally produces simultaneous causality in economic data even if there is unidirectional causality at very high frequencies. It is far easier to identify the effect of high-frequency (e.g. daily) monetary shocks on asset prices. If monetary policy instrument and market expectations for its value are known, then it is possible to characterize the impact of monetary policy shocks-deviations from expectations - on asset prices, which react quickly to news and transmit monetary policy to the economy. When a central bank makes a discrete change to policy, the monetary surprise changes expectations immediately- by definition - and it is easy to determine the effects of such surprises on asset prices, which inform us about the transmission of all monetary policy. Kuttner (2001) claims that federal funds futures offer three advantages over other procedures to identify expectations of monetary policy: (i) Futures require no model; (ii) futures data are not revised and so there is no "data vintage" problem; and (iii) futures do not entail an errors-in-variables problem as do VARs. "Some would criticize the use of regressions to determine the effect of changes in the federal funds target on the grounds that the effect of the announcement change on asset prices is measured only over one day (monetary policy event) - or a few days - and might be temporary. Such criticisms are misplaced. Because uncertainty about asset prices usually rises with the forecast horizon, no one can know the long-term effects of any event on asset prices. The efficient markets hypothesis implies that the market's best guess must have been that the effects of the rate target change would persist. Otherwise, expectations of a temporary impact of a policy announcement would create a risk-arbitrage opportunity for investors to bet on the reversal of the policy's effects." The approach to measuring the impact of Central Bank policy on the stock market is to calculate the market's reaction to rate target changes on the day of the change. The market may of course also react to the lack of a change in the rate target, if a change had been anticipated. Because this approach involves looking at the response to specific events, it might be described as an "event-study" style of analysis. For the purpose of this paper, the relevant sample of events is defined as the union of all days when the rate target was changed, and days corresponding to ECB meetings. In this paper, the methodology follows a modified methodology implemented by Bernanke and Kuttner (2005) and corrects for the joint response bias as Thornton (2009, 2013) has shown in its studies. Specifically, it uses the market based measure on all days as a latent variable. The latent variable accounts for the relationship between asset prices and the market-based measure of monetary policy shocks on days when there are no unexpected policy actions. The methodology permits one to identify the marginal effect of monetary policy shocks relative to non-monetary policy shocks. The methodology is simple to employ, requires a simple identifying assumption, and is easily modified to account for the effects of other

newsworthy events, such as the market's reaction to other headline news. To estimate the monetary policy effects, we use European banking price indexes as the dependent variable. Equation (1) is estimated using the OLS approach on time series data.

$$\begin{aligned} Return_t = \alpha_0 + \beta_1 News_t + \beta_2 ECBAnnouncement + \\ \beta_3 News_t * ECBAnnouncement + \beta_4 E\_ECB * ECBAnnouncement + \\ \beta_i \sum_{i=1}^{3} Return_{t-i} + \beta_8 QE\_ABS\_CCPP\_COLL + time\ effects + \mu_t \end{aligned} \tag{1.1}$$

where $Return_t$ is the daily return of the European banking index[3](source Thomson DataStream). The surprise interest rate changes, $News_t$ is defined as the changes in the implied 3-month Euribor rate on the ECB's meeting day, *t*, relative to the previous day, *t-1*. i.e.: $News_t = f.Euribor_{m,t}$ - $f.Euribor_{m,t-1}$; where $f.Euribor_{m,t}$ - $f.Euribor_{m,t-1}$ represents the discrepancy between the futures spot rate at day *t* and the prevailing rate at the day before the announcement, *t-1*. In general, we can interpret the futures price at time *t-1* as the conditional expectation (conditioned with respect to the information set I) of the spot rate (r) at the maturity date (m)[4] . The basic idea is that futures prices reflect market expectations of future policy rates. Therefore, changes of futures prices in response to a monetary policy announcement imply that markets were surprised. We use continuous three-month Euribor futures rates as Bernoth and von Hagen (2004) show that these rates are a reliable predictor for the ECB's policy rates. The sample period under investigation is January 1999-September 2015, yielding 231 ECB meetings; the source of Euribor futures prices is Thomson DataStream. Moreover, we define the expected changes in interest rate *E_ECB* as the actual changes minus the surprise: $E\_ECB = \Delta R - News_t$; where *E_ECB* represents the expected component of target changes, and ΔR is the actual target rate changes (by ECB) on day t. *ECBAnnouncement* is a dummy variable that takes value 1 when the ECB announce a conventional policy (interest rate target). The variable for unconventional measures (*QE_ABS_CCPP_COLL*) is a dummy variable that takes value 1 when the ECB announces an unconventional policy (ABS purchase program, providing liquidity, corporate bond purchase program and QE), 0 otherwise. At its press conferences, the ECB announces its policy decisions. We use these dates for the conventional and unconventional monetary policies announcements. It would be useful to give an intuition of what unconventional

[3]We use EuroStoxx Bank price index for all Europe bank system. Therefore, we estimated the same regression for ten banking indexes, which make up the EuroStoxx bank index. (Austria, Belgium, Spain, France, Germany, Greece, Ireland, Italy, Netherlands, and Portugal).

[4]$E(r_m|I_{t-1})=f_{m,t-1}$ and $E(r_m|I_t)=f_{m,t}$

means exactly in the European context. For our purpose, we classify as unconventional monetary policy interventions as follows:

- the announcement of the longer-term refinancing operations (LTRO);
- the announcement of asset eligible as a collateral in Eurosystem credit operation (COLL);
- the announcement of covered bond purchase program (CBPP) start on the 7/05/2009; (CBPP2) 06/10/2011; (CBPP3) 15/10/2014;
- the announcement of Outright monetary transaction (OMT)
- the announcement of Asset back securities purchase program (ABSPP)
- the announcement of Pubblic sector purchase program (PSPP)
- the announcement of expansion asset purchase program (Quantitative easing (QE)).

We identify 19 announcements as unconventional policies. The timeline of the announcements is shown in Table 12. Clearly, not all announcements should be expected to be as relevant and therefore to produce the same (or even significant) quantitative effects. What we will see further is that the impact of unconventional policy, changes according to both the various sub periods considered and when we analyze individual euro area countries.

Finally, as Thornton (2009) and Monticini, Peel and Vaciago (2011) suggest we introduce the futures measure of news for every day ($News_t = f.Euribor_{m,t}$ - $f.Euribor_{m,t-1}$) to correcting for the joint-response bias (Thornton (2013)). Since the dependent variable is an equity index return, it might be possible that estimates are bias if is present an arch effect. Due to this possibility in the residual variance we implement two different GARCH (1,1) model of Engle (1982) and Bollerslev (1986) (the first specification assume a Gaussian errors, the second one assume that errors follow a Student's t distribution) as in Equation(2)[5].

$$\begin{aligned} Return_t = \alpha_0 + \beta_1 News_t + \beta_2 ECBAnnouncement + \\ \beta_3 News_t * ECBAnnouncement + \beta_4 E\_ECB * ECBAnnouncement + \\ \beta_i \sum_{i=1}^{3} Return_{t-i} + \beta_8 QE\_ABS\_CCPP\_COLL + \mu_t \end{aligned} \tag{1.2}$$

$$\sigma_t^2 = \alpha_0 + \alpha_1 \mu_{t-1}^2 + \alpha_2 \sigma_{t-1}^2 \tag{1.3}$$

[5]The same regression is estimated including time effects. The results do not change. The estimates are available on request.

where σ^2_{t-1} represents the conditional volatility and μ^2_{t-1} is the volatility news (squared error arising from an autoregressive (AR) conditional mean equation). The benefit of the GARCH model is that a high-order ARCH may have a more parsimonious GARCH representation that is much easier to identify and estimate. This is particularly true since all the coefficients in the variance equation must be positive. Moreover, to ensure that the variance is finite, all characteristic roots of variance equation must lie inside the unite circle.

1.4 Results

In this section, we show our empirical results. In Subsection 3.1, we present the results for the EuroStoxx Bank index return. In Subsection 3.2, we exhibit the results for ten banking indices, which make up the EuroStoxx bank index.

1.4.1 EuroStoxx Bank index return

This section focuses on the direct impact of monetary policy on EuroStoxx Bank index return. Before analyzing different monetary policy effects in the various crisis period, we first estimate the average impact of monetary policy on EuroStoxx bank index return in the whole sample (1/1/1999 - 14/9/2015). To estimate the average impact of monetary policy by using data on EuroStoxx bank index return, we estimate a time series regression as in equations (1) and (2). The empirical results are reported in Tables 3, 4 and 5. Due to the significant non-normality and serial correlation in the residuals, the standard errors for the OLS estimates are obtained by employing a heteroscedasticity and autocorrelation consistent covariance matrix (HAC) which is recommended by Newey and West for regressions applied to time series data. The empirical results show that an unexpected change in ECB rate target has a significant impact on the EuroStoxx bank index return. On average, an unexpected increase of 100 basis point in the ECB rate target leads to an increase of 9.31 basis points in the one-day holding period return on EuroStoxx bank index. If equity markets are efficient, expected policy changes are reflected in prices and only unanticipated policies will affect stock prices. Curiously, the expected change has a significant influence on the Euro Stoxx Bank index return. This might result by the high volatility that hit the banking sector during the subprime mortgage crisis and the sovereign debt crisis. Since the dependent variable is an equity index, it might be possible that estimates are bias if is present an arch effect. Due to the significant arch effect in the residual variance I implement two different GARCH estimates (the first specification assume a Gaussian errors, the second one assume that errors follow a Student's t distribution). Table 4 reports the first GARCH specification. The average impact

is still positive and statistical significant but with a low degree of magnitude (an unexpected increase of 100 basis points in the ECB reference rate leads to an increase of 4.2 basis points in the announcement day). Moreover, Table 5 reports the second GARCH specification. Even, the average impact of unexpected announcement is positive and statistical significant. Widely, a one per-cent surprise increase in the policy rate leads to an increase in the index of almost 4.53 basis points, which is economically significant. These results imply that the European banking system and market participants perceive positively the announcements of an increase in interest rates by ECB. Under general conditions, the increase of policy rate may have different effects. On one hand, there is the net interest income effect and on other hand, there is the non-interest income effect. In the case of net interest income, at least three mechanisms are relevant: the deposit effect, the quantity effect and the dynamic effect. The deposit effect derives from the fact that bank deposits are priced as a markdown on market rates, reflecting some oligopolistic power of the bank system (Freixas and Rochet (1997)). If there is some oligopolistic power a tightening monetary policy will increase net interest income. The changes in the market rates will also have a quantity effect. The demand for loans is more elastic to interest rates respect to deposit (where is inelastic) as in Klein-Monti (1972) model. If the loan demand is elastic to changes in the lending rate and the deposit supply is inelastic respect to changes in the deposit rate the increase in the policy rate has a positive effect in the net interest income. Finally, the dynamic effect influence the net interest income in two ways. The first is related to lags in price adjustment, reflecting some oligopolistic power of the banking system. Typically, the adjustment takes place within one year. The second form is related to accounting practice. Every benefit from new loans is covered by expected losses. This mean that extending new loans could raise profitability temporarily, since losses materialize few years later where the loans became non-performing. As another consequence, the interest margin might erode in this case. In the case of non-interest income, there are at least two significant effects: on securities, on fees and commission. On balance, a higher interest rate could lead to lower non-interest income and abate the positive effect that it had on net interest income. An increase in the policy rate will generate losses on banks' securities portfolios. The losses will depend from the accounting convention; in fact, if the securities are in the trading book the losses will affect directly the income statement. However, if they are treated as held to maturity, they have an impact only when they are released. Fees and commissions represent the majority of total non-interest income. They come from different business, ranging from lending and deposit activity as credit lines and transactions services. Furthermore, they are related more to investment-banking type activities as trading, M&A and market making. It is very difficult to establish an explicit link between them and the policy rate. On average, a higher interest

rate might reduce the income component (Rajan (2005), Albertazzi and Gambacorta (2009)). In this case, it seems that interest income effect overweight the non-interest income effect.

Table 7 - Bank Balance Sheet	
$Loans_{i,t}$	$Deposits_{i,t}$
$Securities_{i,t}$	$WholesaleFunds_{i,t}$
	$Equity_{i,t}$

The relation will be clear after the example. In Table 7 there is a reduce form of bank balance sheet. In the asset side, there are loans and securities, in the liabilities side there are deposits, wholesale funds and equity. The loan rate is r_L, the deposit rate is r_D and r is the interbank market rate[6]. Banks can borrow on a competitive market by deposit market or wholesale market. The supply of deposit is inelastic respect to the deposit rate r_D (deposit effect); hence, the responsiveness of deposit to ECB rate target becomes low. Conversely, the supply of wholesale fund is sensitive respect to interbank rate r. As mentioned earlier, the demand for loans and its rate r_L, is more elastic to interest rates respect to deposit. In this environment, a policy rate increase has a positive impact in the net interest income (quantity effect), as such $\Delta L_{t+1} r_{L,t+1} > \Delta D_{t+1} r_{D,t+1} + \Delta WF_{t+1} r_{t+1}$[7] . Moreover, a policy rate increase generate losses on bank securities portfolios. The losses depend from the accounting convention but is useful to assume that all securities are discounted at the same interest rate r_t. The expected value at time *t+1* is equivalent to $E(S_{t+1}) = \frac{S_t}{(1+(r_t+\Delta r_{t+}))} \leq S_t$(securities effect) [8] . From empirical results, emerge that during normal times in the Euro(pean) banking system interest income effect dominates non-interest income effect. It seems reasonable that market power will leads banks to quote lower deposit rates and higher rates on loans but it is not obvious that the devaluation of securities overweight the loan effect. Therefore, EuroStoxx bank index is composed mainly by commercial banks that provides services, such as accepting deposits, giving loans and basic investment products (savings accounts and certificates of deposit). The commercial banks are different respect to investment banking; theirs activities includes underwriting, acting as an intermediary between an issuer of securities and the investing public, facilitating mergers and other corporate reorganizations, and acting as a broker for institutional clients. The investment bank provide the large part of their liabilities by short-term wholesale funds. The short-term wholesale funds have been rolled frequently, therefore are more sensitive to the change in

[6]It is useful to assume that the Central Bank policy rate is equivalent to interbank rate r.

[7]Where, $r_{L,t+1} = r_{L,t} + \Delta r_{t+}$, where Δr_{t+} is the change in the Central Bank policy rate; $\Delta D_{t+1} r_{D,t+1} \approx 0$ and $r_{D,t+1} = (r_{D,t+1} + r_{t+}) = r_{D,t}$ (if the interest rate increases the interest rate on deposit doesn't react because the banks have some oligopolistic power (Freixes and Rochet (1997)). Finally, $r_{t+1} = r_t + \Delta r_{t+}$.

[8]Usually the discount rate is equal to $r_t + \Delta r_{t+}$ + equity premium. In this framework, it is useful to suppose that equity premium is equivalent across banks.

the interest rate target (Huang and Ratnovski (2011) studied the ''Dark side" of wholesale funds. They showed that short-term wholesale funds are aggressive lending that compromise credit quality and limited market discipline). The European banking sector seems anchored to classical credit business and prefers deposit funding rather wholesale funding; hence, the loan's positive effect exceeds the negative ones. This emerges from the positive reaction that market participants have during the announcement of a tightening monetary policy. In formula $\Delta L_{t+1} r_{L,t+1} > \Delta D_{t+1} r_{D,t+1} + \Delta WF_{t+1} r_{t+1} + \Delta S_{t+1}$ [9]. Due to the great financial crisis, we investigate if there are breaks in the relation between the return of European banks and the ECB's monetary policy announcements. Accordingly, we re-estimate equations (1) and (2) for four different periods: (Subprime Crisis 1/7/2007-31/12/2009; All Sovereign Debt Crisis; 1/10/2009 - 14/9/2015; First Sovereign Debt Crisis 1/10/2009 -31/10/2011; Second Sovereign Debt Crisis 1/11/2011 - 14/9/2015). The second column of Tables 3, 4 and 5 reports the results obtained from estimating equations (1) and (2) considering the Subprime crisis (1/7/2007 - 12/31/2009). The average impact of unexpected changes in the ECB rate target is still positive and statistical significant. However, with differing degrees of magnitude. On average, an unexpected increase of 100 basis points in the ECB rate target during the crisis seems to leads an increase of 18.65 basis points in the one-day holding period return on EuroStoxx bank index. Conversely, in the whole sample the effect is lower 9.31 basis point. Due to the significant arch effect in the residual variance, we implement the same GARCH estimation as in the total sample. For both GARCH specification, the average impact is still positive and statistical significant but with a higher degree of magnitude compared to the same estimates for the total sample. An unexpected increase of 100 basis points in the ECB reference rate leads to an increase of 9.80/12.34 basis points in the announcement day. The results highlight the increased sensitivity of European banking system during the great financial crisis. This confirms the hypothesis that market participants perceive negatively a constant cut in Central bank's policy rate. Furthermore, the steady decline in interest rates could be a sign that financial crisis is still in progress. The magnitude of the return responses is also outstanding; the positive response to the shock during the crisis was at least twice times greater than the positive response documented before. The European sovereign debt crisis began at the end of 2009, when the peripheral Eurozone member states of Greece, Spain, Ireland, Portugal and Cyprus were unable to repay or refinance their government debt, or bail out their beleaguered banks without the assistance of a third institutions. The third column of Tables 3, 4 and 5 reports the results obtained from estimating equations (1) and (2) considering the sovereign debt crisis (1/10/2009 - 14/9/2015). The empirical analysis does not suggest any relationship between the EuroStoxx bank index return and our variables of

[9] $\Delta L_{t+1} r_{L,t+1} + \Delta S_{t+1} > \Delta D_{t+1} r_{D,t+1} + \Delta WF_{t+1} r_{t+1}$ but $\Delta S_{t+1} = E(S_{t+1}) - S_t < 0$.

interest. All the methodologies implemented confirmed these results. Additionally, both the F and χ^2 test does not reject the null hypothesis that all the slopes of dependent variables are zero. It seems curious that during the sovereign debt crisis neither the conventional and unconventional policies announcements do not have any effects on EuroStoxx bank index. It is likely that the announcements effects of conventional and unconventional policies vary across the different sovereign debt crisis phases. The fourth column of Tables 3, 4 and 5 reports the results obtained from estimating equations (1) and (2) considering the early part of sovereign debt crisis (1/10/2009 - 31/10/2011). The results indicate that unconventional monetary policies announcements have a positive significant effect on EuroStoxx bank index return during the first part of sovereign debt crisis. On October 6, 2011, the Governing Council of the European Central Bank had decided to launch a new covered bond purchase programme (CBPP). The programme had the following modalities: - purchases for an intended amount of €40 billion; - purchases have the capacity to be conducted in the primary and secondary markets and carried out by means of direct purchases; - purchases begin in November 2011 and are expected to be completed by the end of October 2012. On average, the announcement of CBPP by ECB leads to an increase of 2.81 basis point in the one-day holding period return on EuroStoxx bank index. While, an unexpected increase in the ECB policy rate does not have any effect on the EuroStoxx bank index during the early sovereign debt crisis period. It seems reasonable that the purchase announcement of sovereign debt securities (in primary and secondary markets) by ECB had a positive impact on European banking index returns. In the assets of all European banks, there were a percentage of sovereign debt securities (considered risk-free before the crisis). Once the market perceives as risky these securities, their value decreases due to an increase in the risk premium required by the market. Hence, the ECB decision to buy bonds in the primary and secondary market has limited the continuous fall of securities values in the Euro banks portfolio by supporting demand. Ultimately, the last columns of Tables 3, 4 and 5 report the results obtained from estimating equations (1) and (2) considering the second part of sovereign debt crisis (1/10/2011 - 14/9/2015). This period might be regarded as the tangible time of Euro-zone crisis. After having raised interest rates during the first months of 2011, the ECB realized that it was in progress the greatest economic crisis in Europe as the negative economic data in the euro area has depicted. The average impact of unexpected monetary policy announcement during the deep European sovereign debt crisis is positive and statistically significant [10]. The sensitivity of the banking system raise sensibly compared to previously estimates. Indeed, the coefficient of unexpected interest rate surprise changes from the previous 9.31 B.P. to 31.46

[10]The OLS estimates with HAC S.E. and the first GARCH specification GARCH are statistically significant. Conversely, the second GARCH specification is not statistically at 10% but at 16%.

B.P. (on average), with HAC specification. While, for GARCH specification the coefficient of surprise changes from 4.2 B.P. to 30.98 B.P. (on average). The magnitude of return responses is also noteworthy; the positive response to the shock during the second part of sovereign debt crisis was at least three times greater than the positive response documented before. In fact, the different response, before and after the crisis, are economically and statistically significant for each econometric methodologies implemented. A possible explanation is that a decrease in interest rates was signaling worsening prospects for the financial system and the macro economy. Hence, investors fled the stock market liquidating their positions to hoard cash or cash-like instruments, reduce their risk exposure and meet margin calls. During the deep sovereign debt crisis, ECB has implemented only "easy policies", further ECB has embarked unconventional ones (ABS purchase program, providing liquidity, corporate bond purchase program and QE). Generally, ECB's monetary policy announcement has a positive influence on the European banks since the positive effect on interest income (due to the increase of the range between interest income and expenses) exceeds the negative one on non-interest income. Hence, the banks reactions to monetary policy announcement seems to be more relevant through conventional measures with respect to non-conventional ones. The announcement effect of unconventional policies have played a significant role only during the first part of Sovereign debt crisis. More precisely, the Euro(pean) banking system has reacted positively to the announcement of a second covered bond purchase program.

1.5 Cross Country analysis

From the banks' index analysis, a positive relationship between the announcement of both conventional and unconventional policies and the European banks index returns arises. One of the research questions aims to know whether within the Eurozone there are different ''financial behaviour" among various banking systems and conventional and unconventional monetary policies announcements. Therefore, we estimated the same regression for ten banking indices, which make up the EuroStoxx bank index.[11]

1.5.1 Austria

In this case, we shall use the Austria banks price index, in order to verify if results are matched with the ones of the European bank index. Generally, the unexpected interest rate announcement of ECB does not have any impact on the Austrian banking system. This result is confirmed by all the econometric methodologies implemented. The result does not change,

[11] Austria, Belgium, Spain, France, Germany, Greece, Ireland, Italy, Netherlands, and Portugal.

even analysing the various sub-periods. The Austrian banking system did not seem sensible to the conventional/unconventional monetary policies announcements. One of the possible reason is the core business of the Austrian banking system, which is not focus on European country but on the CESEE area. In the recent years, profits were increasingly concentrated in the Czech Republic and Slovakia as well as Russia and Turkey, which are subject to higher volatility. Regarding on the future, due to international issues, this peculiarity may have negative impacts (i.e. negative shocks, due to a sustained increase of the probability of default in country where the Austrian banking system is mainly concentrated).

1.5.2 Belgium

Here, we refer on the FTSE Belgium banks price index. Tables 10, 11 and 12 shows the results. The empirical evidence displays a positive relationship between the Belgium banking index return and the unexpected interest rate announcement by ECB. The result is not confirmed in GARCH specifications. In the latter case, there is no evidence to state (begin sure), that there is a relation among the Belgium bank index return and the announcement of conventional monetary policy by ECB. The 2°, 3°, 4° and 5° columns of Tables 10, 11, and 12 show the results on the sub-periods. Considering the Subprime crisis, seems there is a positive relation between the Belgium bank index return and the unexpected interest rate change by ECB. This is confirmed by 2/3 methodologies involved. If we consider the first period of sovereign debt crisis, the unexpected announcement of interest rate changes by ECB did not have effects on the Belgium bank index return; while the announcement of unconventional policy (asset purchase program on the primary and secondary market) is positive and statistically significant. Indeed, if we consider the second period of crisis, only the announcement of monetary policy by ECB have a positive effect on the Belgium bank index return.

1.5.3 Spain

The index in this case is the FTSE Spain Bank price index. Commonly, the unexpected announcement of the interest rate changes by ECB has a positive effect on the Spain bank index return. The 2°, 3°, 4° and 5°columns of Tables 13, 14, and 15 show the results. The results reveal that during the Great Depression, the relation remain positive and statistical significant with a higher degree of magnitude than before[12]. Indeed, if we consider the first part of sovereign debt crisis, only the unconventional policies have a positive and statistical

[12]This empirical evidence is confirmed only in the last GARCH specification.

significant effect on the Spain bank index return; while on the second part of the sovereign debt crisis neither conventional and unconventional policies seem to be significant.

1.5.4 France

The referred index for the French banking system is the EuroNext Cac banks price index. Tables 16, 17 and 18 show the results. Generally, the unexpected announcement of an increase of the ECB policy rate has a positive and statistical significant effect on the France bank index return. On average, the French banking system reacts positively to an increase in the ECB's reference rate. This might imply that the French banking system could be addicted from the classic banking business. This result is confirmed by all the econometric methodologies implemented. Observing the various sub-periods the results change. During the Subprime crisis, it seems not to be a relation between unconventional monetary policies announcement and the French banking index return, while the effect of conventional policy is still positive and statistical significant. An unexpected rate target increase by 100 basis points implies an increase of French banking index return by 25.44 basis points (14.59/18.46 B.P. GARCH specifications) with respect to 10 basis points (5.70/5 B.P. GARCH specifications) of the previous estimation. Vice versa, if we consider the total period of the Sovereign debt crisis, only the announcement of unconventional policies result to have a positive and statistical significant effect on the French bank index return. The 4° and 5° columns of Table 16, 17 and 18 exhibit results during the first and second phase of sovereign debt crisis. During the first phase, the unconventional policies announcements, such as the CBPP on primary and secondary market, results positive and statistically significant. This implies that the announcement of the CBPP program ''guarantee" on the market that the Euro Sovereign debt securities, on the Banks' portfolios, will not decrease in value as their demand will be sustained by ECB. Finally, in the second phase of sovereign debt crisis, the unexpected change in ECB's reference rate has a positive effect on the French bank index return however with a more sensibility than the periods before the crisis.

1.5.5 Germany

The index for the German banking system is the DAX (XETRA) banks price index. Tables 19, 20 and 21 displays the results. The empirical evidence shows a positive relationship between the unexpected announcement of an increase in the ECB's reference rate and the German bank index return. The 2°, 3°, 4° and 5° columns of Tables 19, 20 and 21 present the results for the various sub periods analysed. During the Subprime crisis the relation is confirmed, however, the response of the German banking system increases respect to the

previous period. An unexpected increase by 100 basis points of the ECB reference rate implies an increase of German banking index return by 27.46 basis points (13.90/15.71 B.P. GARCH specifications) with respect to the 12.84 basis points (5.38 B.P. GARCH specification) of the previous estimation. Columns 4 and 5 of Table 19, 20 and 21 show the estimations results during the first and the second phase of sovereign debt crisis. The results obtained are coherent with estimations on the European banking index (EuroStoxx Bank index). During the first phase, the announcement of unconventional policies is positive and statistically significant; while in the second phase the announcement of conventional policies is positive and statistical significant. Even in those estimations, we observe that the degree of magnitude has substantially increased with respect to previous periods. On average, an unexpected increase by 100 basis point of the ECB reference rate implies an increase of the German banking index return of 37.38 (41.84/40.06 B.P. GARCH specifications) basis points with respect to the 12.84 basis points (5.38 B.P. GARCH specification) of the total sample estimation.

1.5.6 Greece

The index is the FTSE Athex banks price index. Regarding the estimates of the Greek banking index, we consider unbiased only the ones made up with the second GARCH specification that results the one most consistent and robust. Table 24 shows the results obtained considering the total sample. The empirical evidence noticed a positive relation between the unexpected interest rate announcement of ECB and the Greek banking index return. The second column of Table 24 considers the period of the Great Recession. In this case, the relation is not statistical significant. The fourth and fifth columns of Table 24 exhibit the results during the first and the second phase of sovereign debt crisis. The announcement effect of unconventional policies seems to be negative and statistical significant. This result is coherent since the CBPP was aimed only for securities, which had a minimum rating of BBB-. Greek bonds had a ''junk" rating and their were not considered by the ECB purchase program. This would be one of the reason why the market ''punished" the Greek banking system. Finally, in the second phase of the sovereign debt crisis only conventional policies are positive and statistical significant, with a higher degree of magnitude than the previous estimates (53.15 basis points).

1.5.7 Ireland

The Irish index is the ISEQ price index. The econometric approaches made up through other specifications do not give a clear representation among the announcements of conventional

and unconventional monetary policies by the ECB and the Irish financial index return. The univocal aspect that it is clear from the estimates made up is the positive relation between the announcements of unconventional policies and the ISEQ financial index return during the first phase of sovereign debt crisis. The announcement causes an increase of 3.89 basis points of the Irish financial index return during the day of the announcement (2.92/4.55 B.P. GARCH specifications).

1.5.8 Italy

The referred index for the Italian banking system is the FTSE Italy banks price index. Tables 28, 29 and 30 show the results obtained. The empirical analysis shows that an unexpected increase of the ECB reference rate has a positive and statistical significant effect on the Italian banking index return. Generally, the Italian banking system reacts positive to an increase of ECB policy rate; this may imply that Italian banking system is still addicted to the traditional banking business. By analysing the various sub-periods the results change. During the Subprime crisis, the relation is confirmed, anyway, the Italian banking system response increases significantly. On average, an unexpected increase by 100 basis points of ECB reference rate implies an increase of the Italian banking index return by 10.89 basis points (11.11/11.89 B.P. GARCH specifications) with respect to 8.30 basis points (4.78 B.P. GARCH specification) of the previous estimation. The 4° and 5° columns of Table 28, 29 and 30 exhibit the results of estimates during the first and the second phase of the sovereign debt crisis. During the first phase, the announcement of unconventional policies, in particular the covered bond purchase program on the primary and secondary markets, seems to have a positive and statistical significant effect on the Italian banking system. This indicates that the announcement of CBPP ensures to the market that securities of the Banks' portfolio will not decrease in value. Finally, in the second period of sovereign debt crisis, only the announcement of conventional policies had a positive impact on the Italian baking index return but with a degree of magnitude higher than the previous estimations.

1.5.9 Netherlands

The index for this country is the Netherlands banks price index. Generally, the unexpected announcement of the ECB policy rate change has a positive impact on the Netherland banking index return. The Table 31, 32 and 33 show estimates for the various period analysed. During the Great Depression, the relation is not statistical significant. In addition, during the the sovereign debt crisis, the announcement of conventional and unconventional monetary policies do not affect the Netherlands banking index returns.

1.5.10 Portugal

The referred index is the Portugal banks price index. The econometric approaches, made up through other specifications, do not give a clear representation of the relationship between the ECB's announcement of conventional and unconventional policies and the Portugal banking index return. The only aspect, which comes up, is the positive impact of the conventional polices over the all-Sovereign debt crisis and its first phase. The announcement effect shows an increase of 16.63 basis points (15.49/14.47 B.P. GARCH specifications) on the day of the announcement (Sovereign debt crisis); while it increases by 18 basis point (22.95/25.55 B.P. GARCH specifications) if we consider the first phase of sovereign debt crisis. This difference let us to notice that during the first phase the Portuguese banking system sensibility is huge. That result is coherent, since in the first phase, the Portugal banks were the ones most exposed in Europe.

1.6 Sensitivity analysis

In this section, we test the robustness of our results by changing the model specification. We estimate the following GARCH (1,1) regression model for each European bank indices:

$$\begin{aligned} Return_t = \alpha_0 + \beta_1 News_t + \beta_2 News_t * ECBAnnouncement + \\ \beta_i \sum_{i=1}^{3} Return_{t-i} + \beta_6 NoChange + \beta_7 RestrictivePolicy \\ + \beta_8 EasyPolicy + \beta_9 QE\_ABS\_CCPP\_COLL + timeeffects + \mu_t \end{aligned} \tag{1.4}$$

$$\sigma_t^2 = \alpha_0 + \alpha_1 \mu_{t-1}^2 + \alpha_2 \sigma_{t-1}^2 \tag{1.5}$$

where *QE_ABS_CCPP_COLL* is a dummy variable that takes the value 1 when the ECB announces unconventional policy, 0 otherwise. Easy policy is a dummy variable that takes the value 1 if ECB cuts the policy interest rate, 0 otherwise. Restrictive policy is a dummy variable that takes the value 1 if the ECB raises the policy interest rate, 0 otherwise. NoChange is a dummy variable that takes the value 1 if the ECB does not change the policy interest rate, 0 otherwise. ECBAnnouncement*News (our variable of interest) is an interaction variable that is useful to observe the effect of *News* during the ECB announcement day. The regression includes the measure of news on all days in order to avoid the possible bias in estimate the ECB news as well as an intercept shift on the

announcement days as set out by Thornton (2009, 2013) and Monticini, Peel & Vaciago (2011). Tables 37- 48 reports the results obtained from the robustness test. The results are quite similir as the previous analysis. In addition, the empirical evidence exhibits a negative relation between a cut of ECB reference rate and the EuroStoxx bank index return. Also the interaction variable "ECBAnnouncement*News" remains positive and statistically significant with the same degree of magnitude as the previous estimates. As explained previously, these findings confirm the positive effect of an increase in the interest rate on net interest income; additionally the effect is greater regard the negative one on non-interest income. Overall, an unexpected increase of ECB's reference rate has a positive effect on the EuroStoxx bank index return. An additional motivation arises from the fact that the large part of European banks are commercial banks that built their core business providing credit facilities to its customers. Typically, Commercial banks prefer funding based on deposits and less by wholesale funding that is more sensitive to changes in interest rates (obviously, the refinanced short term funding will increase the cost of interest expenses, conversely the supply of new loans at the adjusted rate will be in smaller quantities and the effect is lagged). To manage this hypothesis, we conduct a cross-country analysis. Tables 39-48 report the results. Empirical analysis figure out that for Italy and Ireland there are a statistical significant relations. If we consider the interaction variable among the announcement of central bank and News, the results are still the same as in the previous methodology[13]. Furthermore, there is a strong evidence that "easy" policy caused a significant drop in the return of the European bank indices (Ireland and Italy). Considering the Subprime crisis period (01/07/2007 - 31/12/2009), the positive relation is confirmed. Even cross-country analysis confirms previous findings. Analyzing the periods of all sovereign debt crisis and the first part of the crisis there are no main differences compared to previous estimates. It should be noted that for the period before the sovereign debt crisis, "easy" policy was considered negatively by the market while the restrictive one was not statistical significant. The significant evidence is that neutral monetary policy does not have any impact on banks indices return before the Sovereign debt crisis. Conversely, during the debt crisis period, the same policies became positive and statistical significant (Belgium, Ireland, Netherlands and Portugal). The reaction to the same announcement may differ depending on the stage of financial crisis. One possible explanation is that investors, in the deepest moment of the turmoil, interpreted these measures as a signal of the crisis' severity. After some months, when many banks started to recover from the most problematic situations, investors may have gained more trust in authority's interventions. Finally, it is interesting to notice that prices' reaction is particularly strong in magnitude for contraction

[13] In Belgium, Spain, France, Germany, Italy and Netherlands there is a positive relationship between the increase in the interest rate and the bank indices return.

measures, confirming that the whole banking system is nowadays viewed as dependent from monetary policy interventions and central bank funding. For an even more detailed analysis, we consider the period of acute sovereign debt crisis (01/10/2011 - 14/09/2015). The results reinforce the previously ones, confirming that the countries most sensitive to ECB's policies announcements are France, Germany and Italy.

1.7 Conclusion

In this paper, we investigate the announcement effects of conventional and unconventional policy by ECB on European banks indices return with an "unusual event study approach". Empirical analysis suggests that an increase in ECB's reference rates has a positive impact on European banking indices returns. Moreover, the relation is also positive in the sub-periods analyzed. Empirical evidence confirms the "theoretical" positive effect that an increase in interest rate has on net interest income; mainly for commercial banks (the cross-country analysis suggests that the country's more sensitive are the ones where the core business remains the bank credit, such as France, Germany, Italy and Spain). The positive effect appears higher than the potential losses deriving from intermediation margin (non-interest income) where on average a higher interest rate would reduce the bank's asset portfolio value. In addition, we examine the results stability during the different sub-periods. Throughout the financial crisis periods, the European banking sector's sensitivity to ECB monetary policy announcements increases, especially in the acute sovereign debt crisis where the most responsive countries are France, Germany and Italy (it seems that the Spanish banking sector is not influenced by ECB monetary policies. This may result from the fact that in June 2012 the EU injected more than 40 billion euro in the Spanish banking sector). Overall, monetary policy news could affect the European Banking stock performance in the same direction during normal and turbulent times. This leads to argue that a prolonged "easy" policy might erode the European banks profitability. Additionally, unconventional policy had a positive impact in the country where the Banking system was mostly risky as Spain, France and Italy, but the effect was certainly not what the Eurotower expected. In fact, the announcement effect is still significant but small on impact. The research follows the vast literature which compared "monetary policy" and stock prices, from Patelis (1997), Lastrapes (1998), Cassola and Morana (2004), Bernanke and Kuttner (2005) that found an inverse relations and other as Jensen, Mercer and Johnson (1996), Du (2006), Garg (2008) that found a positive relationship. Others as Basistha and Kurov (2008) found that the reactions of stocks to monetary policy news was much stronger in recession and in tight credit market conditions as we found. At banking level our findings are confirmed by the studies of Demirguc-Kunt and Huizinga

(1999), and Albertazzi Gambacorta (2009), Alessandri and Nelson (2014) and C. Borio, L. Gambacorta and B. Hofmann (2015). They found a positive relationship between the level of interest rates and bank profitability. The authors suggest that the positive impact of interest rate structure on net interest income dominates the negative one on loan loss provisions and on non-interest income. This paper is committed to observe the effect of the announcement of conventional and unconventional monetary policies. It would be interesting to extend the research to USA and UK bank system, also utilizing a VAR methodology.

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Chapter 2

Estimating Fiscal multipliers in the Eurozone. A Nonlinear Panel Data Approach

2.1 Abstract

During the sovereign debt crisis, all euro countries have deployed “austerity packages", believing that they could regain the path of growth implementing structural reforms and cutting government spending. Such policies should have led to an initial decline in GDP followed by recovery and a reduction of the debt to gdp ratio. A key issue is the size of fiscal multipliers when the economy is in recession. We estimate a nonlinear model allowing variations based on the state of the economy and we control for the macroeconomic characteristics across the Euro Area. The empirical evidence suggests that, an increase in government spending will be particularly effective to boost aggregate demand, increase private consumption and investment in the short-to-medium run, without raising the debt to gdp ratio but rather decreasing it.

2.2 Introduction

The burst of 2008 financial crisis and the subsequent recession have revived a heated debate in policy circles and academic research on whether countercyclical fiscal policy is effective in stimulating private activity during times of financial stress. After the collapse of Lehman Brothers in September 2008 all advanced countries adopted fiscal stimulus in an attempt to speed up recovery. Expansionary fiscal stimulus has been a source of disagreement among

economists based on widely divergent empirical estimates of the impact of such stimulus. Moreover, the beginning of the sovereign debt crisis, in early 2010, with the associated mounting tensions in the sovereign debt markets have pushed many Euro area Countries to take action in an attempt to reduce fiscal imbalances and keep the credibility of their sovereign debt. Despite, in the countries that have undergone significant, and unprecedented, efforts to divert fiscal imbalances, “austerity" measure did not result, so far (short-medium run), in a reduction in the debt-to-GDP ratio whereas economic growth, employment, consumption and investment turned out weaker than expected. Actual fiscal consolidation plans in the Euro area were criticised. One of the criticism being that fiscal consolidation was front-loaded and untimely, as it took place at time when fiscal multipliers were thought to be larger than most studies suggested (Blanchard and Leigh (2013)). The so-called “expansionary fiscal austerity" has not occurred as Alesina, Favero and Giavazzi (2015) have argued in their paper.

In the years following the global crisis, the impact of fiscal policy on output and other macroeconomic aggregates has been a central part of fiscal policy analysis (i.e., Romer and Romer (2010), Ramey (2011), Auerbach and Gorodnichenko (2013)). As mentioned before the fiscal retrenchment occurred when European economies were barely recoverying from financial crisis and the sovereign debt crisis had just started (2010) with several Euro countries entering a new recession. The core of the recent literature revalue Keynesian arguments that government spending is likely to have larger expansionary effects in recessions than in expansions. Intuitively, when the economy is in a recession, expansionary government spending shocks are less likely to “crowd out" private consumptions or investmenst. The government spending should be used in recessions to stimulate aggregate demand. In the wake of these events, policymakers and researchers have questioned whether the timing and size of the fiscal adjustment in the euro area was appropriate.

The main goal of this paper is to settle the debate on the effects of fiscal consolidation in the Eurozone by emirically assessing benefits and costs of increasing government spending in Euro-countries at a time of financial distress and recession. It is, therefore, critical to determine which macroeconomic impact government spending will have on GDP, private consumption, private investment and especially on the “health" of public finance as measured by surplus/deficit-to-GDP, debt-to-GDP and on primary surplus during the different phases of business cycle. The following research questions are therefore addressed: 1)How large is the fiscal spending multiplier in the Eurozone? 2)Are Eurozone fiscal multiplier higher in recessions than in expansions? 3)Does higher government spending always increase the public debt-GDP ratio or the impact of fiscal stimulus on debt depends on the state of the business cycle? Does it increase the primary surplus linearly or is conditional on the state of the economy? 4)Are fiscal multipliers higher under a peg exchange rate (as the Euro system,

Corsetti et al. 2012)? 5)Does government spending compositions affect the size of fiscal multipliers?

The answers to these questions are interesting to policymakers in designing stabilization strategies. Also, it can help the economics profession to reconcile conflicting predictions about the effects of government spending shocks considering the different macroeconomic characteristics of the Euro countries (i.e., the openness to trade, the level of government debt, the state of the business cycle) with a unique econometric technique (linear projection approach, Jordá (2005)).

Our starting point is the seminal paper by Auerbach and Gorodnichenko (2013), which estimate multipliers for government spending for a panel of OECD countries on semi-annual frequency. They use as a measure of the unanticipated government spending shock the forecast error between the actual growth rate of government spending and the forecast growth rate prepared by professional forecasters.

Building on Auerbach and Gorodnichenko (2013) and the subsequent studies, our paper extends the existing literature in three ways. First, we estimate different multipliers (i.e., spending multiplier, investment multiplier, consumption multiplier) for the Eurozone both through a linear and a non-linear model. Second, we bring together different branches of the literature on the effects of government spending on the several macroeconomic aggregates (GDP, private consumption, private investment, inflation) and public finance indicators (Deficit, Primary Balance, Debt / GDP) for the Eurozone. The novelty is that we are able to estimate the effects of government spending on several macroeconomic variables with a unique econometric methodology. Third, as different public expenditures may have widely different impacts, we also estimate multipliers for some disaggregate public spending variables such as government consumption and government investment.

We analyze the experience of 12 Eurozone countries over 1985 to 2015 and we find that government spending has a stimulatory effect on output, private consumption, private investment, employment and it is beneficial on public finance during recession. Also, the level of debt does not affects the size of government spending multipliers. Moreover, in times of recession, the countries with a low degree of openness to trade, a fixed exchange regime and high deficit show higher government spending multipliers with respect to the ones with a high degree of openness to trade, a flexible exchange rate regime and low deficit as the simple Mundell-Fleming model predicts. A countercyclical fiscal policy prove to be expansionary while procyclical fiscal policy depresses GDP, private consumption and private investment during a recession.

The paper is organized as a follows. Section 2 examines the literature. Section 3 analyzes the data and the methodology. Sections 4 and 5 present the main results. Section 6 develops and presents some robusteness check and sensitivity analysis. Section 7 concludes.

2.3 Literature Review

Most contributions to the literature rely on two distinct methods to derive fiscal multipliers: one is based on empirical estimation, the other one is a model-based approach. The empirical estimation strand is mainly focused on the advanced economies, with the largest number of studies devoted to the US. The model-based approach has been applied to many different countries, usually changing the models' assumptions. In the empirical literature the size of the government spending multipliers range from negative values to positive values as high as 4. The main question is why estimates vary so widely. Different approaches may contribute part of the explanations. The seminal paper of Blanchard and Perotti (2002) explores this issue in the context of a structural vector-autoregression model (SVAR), which relies on the existence of a one-quarter lag between output response and fiscal impulse. The Blanchard and Perotti (2002) identification strategy has been debated by Ramey (2011), Forni and Gambetti (2012) and others. Ramey (2011) pointed out that what is an orthogonal shock for a SVAR may not be such for private forecasters. Forni and Gambetti (2010) shows evidence that government-spending shocks are non-fundamental for the variables typically considered in standard closed-economy specifications ("fiscal foresight"). This imply that VAR models comprising these variables are unable to consistently estimate the shock. These findings confirm the result obtained in Ramey (2011) that the fiscal policy shock estimated with a VAR as in Perotti (2007) is predicted by the forecast of government spending from the Survey of Professional Forecasters. Briefly, there seems to be, at least for US, a meaningful correlation among orthogonal shocks in a SVAR and private forecasts. In order to fix this, Barro and Redlick (2011) and Romer and Romer (2010) have suggested the use of a "natural experiment approach" or a narrative approach. Barro and Redlick (2011) uses as shocks the military spending, Romer and Romer (2010) identifies exogenous tax changes from the narrative record, such as presidential speeches and Congressional reports. An additional explanation for differing estimates is that the fiscal multiplier may depend on several characteristics of the economy as its degree of openness, the exchange rate regime, and the state of the business cycle. For example, fiscal multipliers may be larger in recession because of a milder "crowding out" of private consumption and investment due to less responsive prices, a constrained reaction of nominal interest rates due to the zero-lower bound, an higher return from public spending due to countercyclical financial frictions and credit constraints and

lower crowding out of private employment due to a milder increase in labour market tightness. Several authors provide empirical evidence in favour of state-dependent fiscal multipliers, such as Tagkalakis (2008), Auerbach and Gorodnichenko (2012a, 2012b, 2013), Bachmann and Sims (2012), Batini, Callegari, and Melina (2012), Mittnik and Semmler (2012), Baum, Poplawski-Ribeiro, and Weber (2012), Fazzari, Morley, and Panovska (2014). Tagkalakis (2008) studies how private consumption responds to fiscal shocks when the economy is in recession or expansion in the presence of binding liquidity constraints agents. Tagkalakis (2008) finds that both tax and spending shocks affect consumption changes more in bad times than in good times in OECD countries and especially in those featuring financially constrained individuals. This enteils that some degree of fiscal flexibility could be helpful in economic downturns, in particular in those countries where people have a limited access to credit. Batini, Callegari, and Melina (2012) use regime-switching VARs to estimate the impact of fiscal adjustment in the United States, Europe and Japan allowing for fiscal multipliers to vary across recessions and booms. The main finding is that smooth and gradual consolidations are to be preferred to frontloaded or aggressive consolidations, especially in recession economies facing high-risk premia on public debt, because sheltering growth is key to the success of fiscal consolidation in these cases. Bachman and Sims (2012), using a standard structural VAR and a non-linear VAR, investigates if confidence is an important channel by which government spending shock affect economic activity. They find that the endogenous response of confidence explains almost the entire output stimulus in a recession, whereas its role in normal times is only minor. However, the positive response of output and productivity to a government spending shock during times of slack is mild on impact, gradual and prolonged. The authors argue that fiscal stimulus in recessions has a different impact than in normal times or during booms. Indeed, spending shocks during downturns predict productivity improvements through a persistent increase in government investment relative to consumption, which is reflected in higher confidence. Steven M. Fazzari, James Morley, and Irina Panovska (2014) investigates the asymmetric effects of government spending on U.S. output by means of a threshold structural vector autoregressive model. The empirical investigations present a strong evidence in favour of non-linear, state-dependent effects of fiscal policy. Fazzari et al. (2014) shows that government spending raises output, but this effect is both larger and more persistent when capacity utilization is low. Although stimulus policy may increase government debt, the effect is smaller than a simple calculation would suggest because higher government spending raises output, income, and therefore tax revenues, and the effect of spending stimulus on public debt is less than one dollar for a dollar. Auerbach and Gorodnichenko (2013) estimates government purchase multipliers for a large number of OECD countries, allowing these multipliers to vary smoothly according to

the state of the economy and using real-time forecast data to purge policy innovations of their predictable components. Authors use direct projections rather than the SVAR approach to estimate multipliers, to economize on the degrees of freedom and to relax the assumptions on impulse response functions imposed by the SVAR method. They find large differences in the size of spending multipliers in recessions and expansions with fiscal policy being considerably more effective in recessions than in expansions. The results of the paper suggest that fiscal policy activism may indeed be effective at stimulating output during a deep recession, and that the potential negative side effects of fiscal stimulus, such as increased inflation, are less likely under these circumstances. These empirical results call into question the results from the standard new Keynesian literature, which suggests that shocks to government spending, even when increasing output, will “crowd out" private economic activity. Corsetti, Meier, and Muller (2012) investigates the sensitivity of government spending multipliers to different economic scenarios. They find fiscal multipliers to be particularly high after financial crisis. Rossi and Zubairy (2011) and Canova and Pappa (2011) show that fiscal multipliers tend to be larger when positive spending shocks are accompanied by a decline in the real interest rate. Blanchard and Leigh (2013) emphasise that during the “Great Recession" the size of fiscal multipliers was underestimated by the IMF and others institutions. This suggests that fiscal multipliers may vary over time. Indeed, the literature focused on the linear effects of a tax or government spending shock on output on a single country (i.e., Pereira and Wemans, 2013; Hayo and Uhl, 2014; Cloyne, 2013), and particularly on the US economy (i.e., Blanchard and Perotti, 2002; Mountford and Uhlig, 2009; Romer and Romer, 2010; Favero and Giavazzi, 2012; Perotti, 2012; Mertens and Ravn, 2014), whereas a few studies have focused on a cross-country panel datasets (see e.g., Guajardo, Leigh, and Pescatori, 2011) or on multi-country analysis (i.e., Bénassy-Quéré and Cimadomo, 2012). The literature focusing on the non-linear effects of government spending is scant especially for the Euro area. This paper tries to fill this gap estimating the non-linear effect of a government spending shock on the various macroeconomic aggregate (i.e., GDP, private consumption, private investment) and on the public finances indicators (i.e., debt to gdp, deficit to gdp). In a single framework, we investigate whether the size of the different multipliers vary based on macroeconomic characteristics of the countries considered in the analysis (Euro Countries). The novelty and the key insight is that estimates are made through a single methodological approach (linear projection Jordá (2005)).

2.4 Data and Methodology

2.4.1 Data

Our sample comprises 12 Euro Countries.[1] The macroeconomic variables come from the OECD's Statistics and Projections database[2]. We use semi-annual frequencies for our macroeconomics aggregate, as government spending (is the sum of real government consumption and real government gross capital formation). As mentioned above, in addition to the real GDP we examine responses of other macroeconomic variables to government spending shocks: real private consumption, real private gross capital formation, real exports and imports. Second, we analyse the reaction of labour market variables such as total employment, employment in the private sector, the unemployment rate and the real compensation per worker in the private sector. Third, we investigate the responses of the variables describing the "health" of public finance: deficit-to-GDP, Debt-to-GDP and the Primary surplus. Finally, we go through how prices, calculated by the consumer price index (CPI), the consumer price index harmonized (CPIH) and the GDP deflator, react to government spending shocks. All the variables except the unemployment rate, deficit-to-GDP, Debt-to-GDP and Primary surplus are in logs.

2.4.2 Methodology

We follow the single-equation approach advocated by Jordá (2005) and Stock and Watson (2007), which does not impose the dynamic restriction that are present in the SVAR methodology and is able to accommodate nonlinearities in the response function. As shown in Jordá (2005) the advantages of local projections with respect to standard VAR are numerous: 1) local projections can be estimated by simple regression technique, 2) local projections are more robust to misspecification, 3) joint or point-wise analytic inference is simple and, 4) local projections easily accommodate experimentation with highly nonlinear specifications. When we use GDP as the dependent variable, the response of Y at the horizon h is estimated by using the following regression:

$$\begin{aligned} Y_{i,t+h} = \alpha_i + \mu_t + F(z_{i,t})\Pi_{R,h}(L)Y_{i,t-1} + (1-F(z_{i,t}))\Pi_{E,h}(L)Y_{i,t-1} + \\ F(z_{i,t})\Psi_{R,h}(L)G_{i,t-1} + (1-F(z_{i,t}))\Psi_{E,h}(L)G_{i,t-1} + \\ F(z_{i,t})\Phi_{R,h}(L)FE^G_{i,t} + (1-F(z_{i,t}))\Phi_{E,h}(L)FE^G_{i,t} + u_{i,t} \end{aligned} \tag{2.1}$$

[1] The countries are Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, Netherlands, Portugal and Spain. The sample periods covers 1985-2015

[2] I am grateful to Prof. Auerbach who shared with me his database from 1960 to 2010.

$$with: F(z_{i,t}) = \frac{exp(-\gamma z_{i,t})}{(1+exp(-\gamma z_{i,t}))}, \gamma > 0 \tag{2.2}$$

Following Auerbach and Gorodnichenko (2013), i and t index countries and time, α_i is the country fixed effect, μ_t is the time fixed effect, $G_{i,t-1}$ is the log of real government purchases[3] $F(\cdot)$ is the transition function for each country in the sample with the range between 0 (strong expansion) and 1 (deepest recession), $z_{i,t}$ is a variable measuring the state of the business cycle, which is based on the deviation of the 1.5 years moving average of the output growth rate. The advantages of using the 1.5 years moving average as z are numerous: one is that we can use the full sample for estimation and this allows us not to miss observations and our estimates will be as precise and robust as possible. The $z_{i,t}$ is normalized such that $E(z_{i,t}) = 0$ and $Var(z_{i,t}) = 1$ for each i. Moreover, we allow the trend to be time-varying inasmuch some countries show low frequency variations in the output growth rate. For this reason, we use the HP filter[4] to extract the trend with a high smoothing parameter $\lambda = 10,000$.

We interpret $FE^G_{i,t}$ as the surprise government shock. It is the forecast error for the growth rate in the forecast prepared by professional forecasters at time *t-1* for time *t*.[5]. We control $FE^G_{i,t}$ for information contained in the lags of Y and G to purify any predictable component from the dynamic effects of output and the effects of past government spending changes. We include $FE^G_{i,t}$ dated by time t because it is consistent with the recursive ordering of government expenditure first in the VARs. Moreover, using $FE^G_{i,t}$ as the surprise government shock we overcome two factors that often are criticized in the literature. First, using forecast errors we eliminate the problem of "fiscal foresight"[6] (Ramey (2010); Corsetti e Muller (2011); Forni and Gambetti (2010); Leeper et al. (2013); Zeev and Pappa (2014) and others). Second, we minimize the likelihood that estimates capture the potentially endogenous response of fiscal policy to the business cycle due to authomatic stabilizers.

In the STVAR or standard VAR analysis of how government spending shocks affect the economy, the impulse response is constructed in two steps. First, the contemporaneous responses are derived from a Cholesky decomposition. Second, the propagation of the

[3]Government consumption + Government investment

[4]We use the Hodrick-Prescott filter to separate a time series into trend and cyclical components. The trend component may contain a deterministic or a stochastic trend. The smoothing parameter determines the periods of the stochastic cycles that drive the stationary cyclical component.

[5]It is the difference between the actual and forecast series of the government spending (Government Consumption + Government Investment)

[6]Fiscal foresight is the phenomenon that legislative and implementation lags ensure that private agents receive clear signals about the tax rates they face in the future and it is intrinsic to the tax policy process. Fiscal foresight produces equilibrium time series with a non-invertible moving average component, which misaligns the agents' and the econometrician's information sets in estimated VARs (Leeper (2008)).

responses over time is obtained by using estimated coefficients in the lag polynomials. The direct projection method effectively combines these two steps into one.

The lag polynomials $\{ \Pi_{R,h}(L), \Psi_{R,h}(L), \Pi_{E,h}(L), \Psi_{E,h}(L) \}$ are used to control for the history of shocks. The impulse response fuction dynamic are constructed varying the horizon h of the Y. In other words, the impulse response function dynamic is estimated by $\{ \Phi_{E,h}(L) \}_{h=0}^{H}$ for expansion and $\{ \Phi_{R,h}(L) \}_{h=0}^{H}$ for recession. The direct projection allows to construct the impulse response fuction as a moving average of the series of interest where the lag polynomial terms control for initial condition and the $\{ \Phi_{E,h}(L) \}_{h=0}^{H}$ and $\{ \Phi_{R,h}(L) \}_{h=0}^{H}$ describe the reaction of the economic system to a structural exogenous shock. In practise, if we think, we regress our variable of interest Y for each time $t+h$ on an unanticipated shock at time t and via this we obtain the average response of the dependent variable h periods after the shock which is our impulse response function.

This estimation method has several advantages. First, it involves only linear estimation. Second, it obviates the need to estimate the equations for dependent variables other than the variable of interest (i.e., GDP) and thus economize on the number of estimated parameters. Third, it does not constrain the shape of the impulse response function , rather then imposing the pattern achived by the SVAR. Fourth, the error term in equation is likely to be correlated across countries and would be particularly hard to handle in the context of nonlinear STVARs but is easy to address in linear estimation by using i.e., Newey-West (1987) standard errors, Driscoll-Kraay (1998) standard errors or clustering standard errors by time period[7]. Fifth, we can use specification (1) to construct impulse responses for any macroeconomic variable of interest as we are not constrained by the VAR's curse of dimensionality. Finally, because the set of regressors in (1) does not vary with the horizon h, the impulse response incorporates the average transitions of the economy from one state to another, this means that we do not have two separate models when z changes. If the spending shock has an effect on the state of the economy, this effect is absorbed within the polynomial $\{ \Phi_{E,h}(L) \}_{h=0}^{H}$ and $\{ \Phi_{R,h}(L) \}_{h=0}^{H}$ (Auerbach and Gorodnichenko (2013)).

The linear specification is given by equation (3), where the response of the dependent variable is constrained to be the same over the business cycle ($z_{i,t}$); i.e. $\Pi_{Lin,h}(L) = \Pi_{E,h}(L) = \Pi_{R,h}(L), \Psi_{Lin,h}(L) = \Psi_{E,h}(L) = \Psi_{R,h}(L), \Phi_{Lin,h}(L) = \Phi_{E,h}(L) = \Phi_{R,h}(L)$ for all L and h.

$$\begin{aligned} Y_{i,t+h} = \alpha_{i,h} + \Pi_{Lin,h}(L) Y_{i,t-1} + \\ \Psi_{Lin,h}(L) G_{i,t-1} + \Phi_{Lin,h}(L) FE_{i,t}^{G} + u_{i,t} \end{aligned} \tag{2.3}$$

[7] To overcome this issue, we re-estimate the model using the FGLS estimator. The findings do not change. We do not show the results in the paper but they are available from the author upon request.

2.5 Result

Panels 1-16 show the impulse responses of our macroeconomic variables of interest to one percent increase in the government spending shock[8]. In each panel there are two subpanels showing the response (black, thick line) in recession[9] and expansion[10]. The thin, dashed lines indicate the 90% confidence bands which are based on Newey and West (1987) standard errors that provide consistent estimates when there is autocorrelation in addition to possible heteroskedasticity of the error term in specification (1). In each subpanel is reported the response of the linear specification (3) (thin red line) and associated 90% confidence bands (shaded region) which are also based on Newey and West (1987) standard errors.

As panel 1 shows the GDP responses are striking by different accross regimes. In the linear model, the response is near zero and not statistically significant. The GDP responses in recession is positive and statistically significant for all periods (approximately 2.5 years). The maximum size of the government multipleir is about 2 with 90% confidence interval being (0-3.52). The average multipleir is about 1.68. The GDP responses during expansions is quite different. In the first two years the GDP responses to an unticipated increase in government spending is near zero and not statistical significant. Conversely, after 2.5 years the response is negative (about -0.8) and statistically significant. The result is consistent with the estimates reported in the recent literature that explores the state-dependence of fiscal multipliers where the multipleirs are approximately zero during expansion and about 1-4 in recession. Auerbach and Gorodnichenko (2012a, 2013, 2014) estimates that the spending multiplier is approximately 0.5 (0) for the OECD countries, 1.7 (-0.2) for US and 2.4 (1.2) for Japan in recession (in expansion). Batini et al. (2012) estimates a spending multiplier of 2.08 (0.82); Baum et al. (2012) of 1.22 (0.72), Hernandez de Cos and Moral-Benito (2013) of 1.3 (0.6); Owyang, Ramey, Zubairy (2013) of 0.8 (0.7) for the USA and 1.6 (0.4) for Canada in recession (in expansion). Vegh et al.(2015) estimates a spending multiplier of 2.3 compared to 1.3 if they distinguish between recession and expansion while in extreme recessions, the long-run spending multiplier reaches 3.1. Vegh et al.(2015) estimates that the linear spending multiplier varies between 0.2 - 1.2. For the Euro Area, the linear model predicts a multiplier near zero. Obviously, the linear model can understimate the fiscal multiplier in recessions and overstimante in expansions.

One might criticize the results that we find because there might be a correlation between the growth of GDP and the spending shock. We recall that we use as spending shock the

[8] All the responses are normalized. We scale all responses so that government spending moves by one percent to a shock in $FE^G_{i,t}$

[9] F is near 1 and the response is given by $\{ \Phi_{R,h}(L) \}_{h=0}^{H}$

[10] F is near 0 and the response is given by $\{ \Phi_{E,h}(L) \}_{h=0}^{H}$

forecast errors of the professionals forecaster and through this we remove any systematic pattern between GDP growth and government spending if there is any. Also, we do not find an economically significant correlation across the $FE^G_{i,t}$ and the state of business cycle $F(z_{i,t})$. This means that when an economy is in one regime a contractionary or expansionary government spending shock is equally probable. Hence, it is scarcely possible that the results are induced by some singularity of the government spending shock (i.e., automatic stabilizer during a downturn).

Panels 2,3 and 4 investigate the effect of an increase in government spending on public finance variables: Debt to GDP, surplus / deficit to GDP and on primary surplus. During the European Sovreign debt crisis most peripheral euro countries have been forced to implement a strong fiscal consolidation, invoked for hight debt countries, also with the admonition that if they did not reduce their debts they would lose their access to the financial market. The empirical evidence shows that there is a large heterogeneity among different regimes. During recession, an increase in government spending does not imply neither an increase in debt-to-GDP ratio (Panel 2a) nor in surplus/deficit to GDP (Panel 3a). Rather, we find that an increase in government spending in recession leads to a decrease in the debt to GDP ratio and an improvement of the surplus to GDP after about two years. Moreover, an increase in government spending leads to an improvement of the primary surplus after two years from the shock (Panel 4a). Instead, when the economy is in expansion either debt to GDP (Panel 2b), the surplus/deficit to GDP (Panel 5b) and primary surplus (Panel 4b) deteriorate, consistent with many results found in the literature (Ilzetzki et al.(2013); Nickel, C. and Tudyka, A. (2013); A. Abiad, D. Furceri and P. Topolova (2015)).

How can we explain this empirical evidence? As demonstrated in Delong and Summers (2012), in the short term an increase in government spending as a share of GDP(Δi) leads to a change in the debt-to-GDP ratio (Δd) given by:

$$\Delta d = (1 - \mu\tau)\Delta i$$

where μ is the fiscal multiplier and τ is the marginal tax rate.

An increase in goverment spending can raise GDP and obviously the Debt-to-GDP ratio over the medium and long term. Over the time the rise in goverment spending will affect the Debt-to-GDP ratio by affecting its debt-financing burden:

$$(r-g)\Delta d = (r-g)(1-\mu\tau)\Delta i$$

In the medium and long run if the growth rate of GDP g is greater than the borrowing rate r the impact of government spending on the pubblic finance variables may be positive

as the empirical evidence shows.[11] The effects of an increase in government purchases on private consumption are strongly countercyclical. Panel 5b exhibits that private consumption is decreasing in expansion (there is a “crowding out" effect), vice versa the government spending shock increases private consumption in recession (Panel 5a). A euro increase in government spending in recessions may increase private consumption up to 2.5 euro with a 90% confidence interval (0-4.40). Furthermore, the linear model shows that an increase in government spending is not equivalent to an increase in private consumption. Vice versa, during an economic boom, the “crowding out" effect of private consumption is consitent (the mean response in expansion is -1.15).

Panel 6 present the estimated effects of a government spending shock on private investment. Over the three years, a unit increse in government spending shock increases private investment in recession by 4 euro (but is not stasticial signifcant, (Panel 6a) and decreases it during expansion by 6 euro (Panel 6b). The joint considerations of Panel 5 and 6 suggests that the stimulus effect of an increased public spending in recession is more effective through increased consumption than through increased private investment that is the supply effect seems to be not statistically significant. Instead, an increased public expenditure in expansion “crowd out" consumption and private investment as the standard New-Keynesian model predicts. The linear model point out that private investment decreases after a government spending shocks, but it is statisical significant only in the short run (1-2 years).

Panel 7,8 and 9 present the impact of a government spending shock on total employment, employment in the private sector and the unemployment rate. During recessions, the increase in government spending is followed by an increase in total employment (Panel 7a). The total employment increases is statistically significant after 1.5 year (before that, the responses is positive but not stastistically significant) and it reaches its maximum after two years (the max response of total employment is 2.02). The increase in total employment could be caused by the rise in the private sector employment. Indeed, after 2 years, the total employment increases by 2% while the private employment increases by 1% in responses to a 1% increase in government spending when the economy is in a recession. Consistent with the response of total employment and private employment, the unemployment rate descreases, during recession, more precisely it becomes statistical significant one year after the government spending shock (Panel 9a). Vice versa, the response of the total employment and the unemployment rate to a government spending shock in expansion is generally negative and statistically different from zero (Panel 9b). Moreover, the response of the private employment is anemic and it is generally close to zero and not statistically significant. Further, we investigate the effects on real wages of an increase in public spending during expansion

[11] $g > r \rightarrow \Delta d < 0$

and recession (Panel 10a, 10b). We find that real wages remain unchanged in response to government spending shocks both when the economy is in recession and in expansion.The same effect results when we consider the economy wide unit labour cost (Panel 11a, 11b).

Panels 12 and 13 exhibit the response of real exports and imports. We do not find a robust reaction of these variables to government spending shocks. Only the response of exports are statistical significant across regimes. During recession the effect is negative (Panel 12a) while during expansion the response is positive (Panel 12b). Vice versa the response of imports are not economically significant in both regimes: recession (Panel 13a) and expansion (Panel 13b).

Finally, Panels 14, 15 and 16 present the reactions of prices measured by Consume price index (CPI), Consumer price index harmonized (CPIH) and GDP deflator. Generally, an increase in government spending leads inflationary effect during recession and deflationary during expansion. The result for prices in expansion is surprising. It should be noted that it is common to expect a stronger positive price response during expansion than in recession as well as standard theory predict. The results that we found for expansion is not consistent with standard theory. However, the multiplier is statistical different from zero only for the Consumer Price Index (Panel 14a, 14b).

2.6 Does Government spending composition matter?

The European Commission writes: “For the countries with high deficits, the budgetary consolidation strategy, based on expenditure restraint, should not be achieved at the expenses of the most “productive" components of public spending (such as public investment, education and research expenditures)." (European Commission (2004), p. 28). In the theoretical literature it is usually maintained that an increase in government investment has a greater impact on GDP than an increase in government consumption of the same size (i.e., Baxter and King (1993), Galí, López-Salido and Vallés (2003)). In the long run, the superiority of public investment seems hard to refute on theoretical grounds. For instance, in the standard neoclassical model government expenditure has all the effects of government consumption, plus a positive externality on the productivity of private inputs. Hence, the “Golden Rule" of public finance states that government should borrow only for investment and not for consumption, as investment pays, through future tax gains covered by the new capital stock (See e.g. Blanchard and Giavazzi (2004)). Additionally, the “Golden Rule" allows potentially socially worthwhile investment opportunities to be undertaken, without violating the “sustainability" of public finances. A strand of the literature uses VAR model to estimates the effects of public investment (i.e., Perotti (2004), Ilzetzki et al.(2013)). Ilzetzki et al. (2013)

finds that the multiplier on government investment in developing countries is positive and larger than one in the long run (2-3 years). This indicates that the composition of expenditure may play an important role in assessing the effect of fiscal stimulus in developing countries consistent with the findings of Perotti (2004). A. Abiad, D. Furceri and P. Topolova (2015) provide that increased public investment rises output, “crowds in" private investment and reduces unemployment. Moreover, when the economy is in a recession and monetary policy is accommodating, demand effects are stronger and the Debt to GDP ratio may decline. In the empirical literature there seems to be an agreement that public investment is likely to have more positive growth effects than public consumption (Nijkamp and Poot(2004), Gechert (2014, 2015) and A. Abiad et al. (2015)). In this section of the paper, we explore whether government investments have a larger multiplier than that of government consumption. To examine the role of spending composition, we estimate the following specification:

$$\begin{aligned} Y_{i,t+h} = \alpha_i + \mu_i + F(z_{i,t})\Pi_{R,h}(L)Y_{i,t-1} + (1-F(z_{i,t}))\Pi_{E,h}(L)Y_{i,t-1} + \\ F(z_{i,t})\Psi_{R,h}(L)G_{i,t-1} + (1-F(z_{i,t}))\Psi_{E,h}(L)G_{i,t-1} + \\ F(z_{i,t})\Phi_{R,h}(L)FE^{j}_{i,t} + (1-F(z_{i,t}))\Phi_{E,h}(L)FE^{j}_{i,t} + +u_{i,t} \end{aligned} \tag{2.4}$$

where *j*= is egual to $FE^{C}_{i,t}$ [12] or $FE^{I}_{i,t}$ [13]

$$with: F(z_{i,t}) = \frac{exp(-\gamma z_{i,t})}{(1+exp(-\gamma z_{i,t}))}, \gamma > 0 \tag{2.5}$$

Just as government multipliers differ according to the state of the economy in which they occur, they can also differ for different components of government purchase. As mentioned above, several studies (i.e., Nijkamp and Poot(2004), Ilzetzki et al.(2013), Gechert (2014, 2015) and A. Abiad et al. (2015)) show that investment multiplier may be higher than consumption multiplier. We shall now investigate such an issue by focusing on Euro Area countries from 1985 to 2015. Panels (17)-(22) show the results of consumption and investment spending shocks on output, debt to gdp ratio, surplus/deficit, private investments, unemployment rate and CPI. One again, the result are heterogeneous by regime and spending composition. Government Consumption and Government Investment have a positive effects on output in recession and negative in expansion. Moreover the effect of investment spending are stronger only in the long run similar with the findings of Perotti (2004) and Ilzetzki et al.(2013), particularly during the last two semester when the impact on output exceeds

[12] Forecast error of Government Consumption

[13] Forecast error of Government Investment, we have data only for 6 Euro Countries: Belgium, Germany, Finland, France, Italy and Netherland.

4 for investment and is around 3.20 for consumption. As F. Skidelsky (2001) stresses, government investment is considered the most powerful policy instrument for the reason that it combine the short-run support of an aggregate demand boost with the long-term supply-side benefits. Indeed, we shows that public investments have a greater effect on output than public consumption only on the medium/long-term.

Panel (18) shows the effects of investment and consumption spending on the debt to gdp ratio. Government consumption shock, in recession, reduces the debt to gdp and the size of consumption multiplier is sizeble (it reaches 8% after 3 years). While in periods of expansion, the estimates suggest a rise in public debt. Public investment shock does not affect the debt to gdp ratio neither in recession nor in expansion.

Panel (19) exhibits the effects of investment and consumption spending on the deficit. We find that a one percent increase in public investment does not have effect on deficit during the recession and the expansion. Vice versa a one percent increases in public consumptions raises surplus during economic slack and reduces it during economic expansion. During recession, either public consumption and investment increase private investment in the medium term and the multipliers reach 5 after 3 years, suggesting the presence of the “crowding in" effect. However, during expansion the opposite happens either for consumption and investment spending, suggesting the possibility of “crowding out" when the economy is outside the recession consistent with the findings of A. Abiad et al. (2015).

Panel (21) shows that both public consumption and investment shocks reduce the unemployment rate with a similar multiplier during economic slack, by about 0.5% for consumption and 0.75% for investment. Indeed, during expansion either consumption and investment spending have a negative effect on the unemployment rate in accordance with A. Abiad et al. (2015).

Finally, an increase in public consumption and investment leads inflationary effect during recession (Panel (22)). Particularly, the inflationary effect is effective only on the short-run for public investment, however, if we consider the public consumption the inflationary effect is observed both in the short and medium run. The opposite happens in expansion where an increase in public consumption and investment leads to a deflation in the short-medium term.

In conclusion, what emerges from the analysis, in accordance with the literature, is that an increase in public investment spending has a stimulus effect on GDP, private investment, unemployment rate and inflation in the long run (after two years) during an economic slack due to the fact that government investment combines the attractions of purchases of goods as a countercyclical tool in the short run with the long run virtues of a supply policy tool (demand and supply effects).

2.6.1 Multipliers when government spending is Procyclical and Countercyclical

Generally, economists believe that countercyclical fiscal policies have stabilizing effects that work through both automatic stabilizers and occasional discretionary actions[14]. However, in economic downturns, countercyclical policies increase government indebtedness, raising future debt service obligations. Also, the new expenditure must be financed by higher taxes, lower spending or with a higher money growth. Than the expectations of how future policies will adjust current savings rates can matter for the efficacy of countercyclical policies (Baxter and King (1993)) that might become recessionary. Alesina et al. (2015) shows that expenditure-based adjustments are not associated with deep and long recessions but, rather, fiscal consolidation can be “expansionary". Conversely, Vegh et al. (2015) shows that the spending multiplier may vary with the sign of government spending changes, i.e. the size of the multipliers can be greater (smaller) when spending is increased than it is when spending is reduced in downtourn (expansion). Moreover, in extreme recession, a cutting in spending reduces output by more than one. As seen in the previous sections the size of fiscal multipliers may depend on the various characteristics of the economy, as the state of the business cycle, the degree of openness, the exchange rate regime, the level of debt, the level of deficit, the composition of government spending and as well if government spending is procyclical or countercyclical. By combining the sign of the spending change with the phase of the business cycle one has four possible outcomes: expansionary/contractionary policy in a downturn, expansionary/contractionary policy in an expansion. Quite normally, two combinations will be examined under the heading of procyclical fiscal multiplier (recession vs expansion), whilst other two combinations will be examined under the countercyclical fiscal multiplier (recession vs expansion). For this purpose, we modify our early specification (1) by including the interaction between recession/expansion and whether government spending is increasing or decreasing:[15]

[14] See, for example, Rommer and Rommer (2010), Ilzetzki et al.(2013), Auerbach and Gorodichenko (2012a, 2012b, 2013) and Vegh et al. (2015).

[15] In other words, $FE^{G_{NEG}}(FE^{G_{POS}}) = FE^{G}$ if $FE^{G} < 0 (FE^{G} > 0)$ and $\Delta G < 0 (\Delta G > 0)$ and zero otherwise. By the same for Y^{POS} (Y^{NEG}) and G^{POS} (G^{NEG}).

$$
\begin{aligned}
Y_{i,t+h} = \alpha_i + \mu_i + F(z_{i,t})\Pi^{NEG}_{R,h}(L)Y^{NEG}_{i,t-1} + (1-F(z_{i,t}))\Pi^{NEG}_{E,h}(L)Y^{NEG}_{i,t-1} + \\
F(z_{i,t})\Pi^{POS}_{R,h}(L)Y^{POS}_{i,t-1} + (1-F(z_{i,t}))\Pi^{POS}_{E,h}(L)Y^{POS}_{i,t-1} + \\
F(z_{i,t})\Psi^{NEG}_{R,h}(L)G^{NEG}_{i,t-1} + (1-F(z_{i,t}))\Psi^{NEG}_{E,h}(L)G^{NEG}_{i,t-1} + \\
F(z_{i,t})\Psi^{POS}_{R,h}(L)G^{POS}_{i,t-1} + (1-F(z_{i,t}))\Psi^{POS}_{E,h}(L)G^{POS}_{i,t-1} + \\
F(z_{i,t})\Phi^{NEG}_{R,h}(L)FE^{G_{NEG}}_{i,t} + (1-F(z_{i,t}))\Phi^{NEG}_{E,h}(L)FE^{G_{NEG}}_{i,t} \\
F(z_{i,t})\Phi^{POS}_{R,h}(L)FE^{G_{POS}}_{i,t} + (1-F(z_{i,t}))\Phi^{POS}_{E,h}(L)FE^{G_{POS}}_{i,t} + u_{i,t}
\end{aligned}
\tag{2.6}
$$

Panel 23 shows that the spending multiplier is higher when government spending is increasing than when it goes down, i.e. an expansionary fiscal policy is more effective than a contractionary one.

Panels (23)-(25) figure out the multipliers for each possibles cases: (i) expansion and decrease in public spending (Countercyclical multiplier); (ii) expansion and increase in public spending (Procyclical multiplier); (iii) recession and decrease in public expenditure (Procyclical multiplier); and (iv) recession and increase in public expenditure (Countercyclical multiplier).

Not surprisingly, the highest multiplier is found in a recession and when public spending is increasing (countercyclical fiscal policy). In this case, the mean response of output to a countercyclical spending shock is 1.44 (and statistically different from zero) and reaches 3.45 after 3 years. The max response multiplier is about twice than the one found in the first econometric specification (1), when we focused only on the state of the economy (recession vs expansion) without discriminate whether the spending shock is procyclical or countercyclical in accordance with Vegh et al. (2015). On the other hand, the effect on output of reducing government spending in recession is not statistically significant[16]. When we consider an expansion, the fiscal multiplier is essentially zero at all horizons when public expenditure is increasing or decreasing. However, when we observe a decrease in public spending during an expansion, the multiplier is only marginally not statistically significant. The effect of a spending cut, in periods of expansion could lead to a decrease in GDP (in the long run the multiplier reaches 3%).

Panels (24)-(25) show the effect of government spending on consumption and investment. The private consumption multiplier is higher than the multiplier that we found in the first specification (1). Specifically, the response of output to an increasing in government spending during times of economic slack has a extraordinary positive impact on private consumption

[16]It should be noted that it is surprising that reducing government spending during economic slack does not affect output. Certainly, it has not an expansionary effect, but the relationship remains unclear.

(the mean response is 3.44 and it reaches 4.81 after 3 years). While the opposite policy during recession has no impact on private consumption. As the economic theory predicts, a procyclical government shock, in times of expansion, “crowds out" the private consumption (the mean response is -2.17%). On the other side, a countercyclical government policy has a negative effect on private consumption but it is not statistically different from zero. When we observe the effect of procyclical and countercyclical fiscal policies on private investment, we notice some interesting results. First of all, a procyclical policy either during times of economic slack, either during a economic boom, will decrease private investment, after 3 years, about -11.30% (on average) in recession and -3.44% (on average) in expansion. Conversely, countercyclical policy, during the downturn, initially will reduce investment and then bring them back to rise after two years. (Top-left, Panel 25).

An important statement with respect to the work of Alesina et al. (2015), is that a cut in government spending depress the private investment in all Euro countries rather than increasing it as Alesina et al. (2015) exhibit, due to the fact that a cut in government spending will “crowding in" private investment. This could take place because the private sector, rather than buy government bonds will invest in private activities. This could work during normal times, but if the economy is in a deep recession, the private sector is reluctant to invest in private activities that are much risky during an economic slack, therefore, there will be not the "crowding in" of the private investment but quite the opposite (“crowding out") as our results show in accordance with Vegh et al. (2015).

In sum, from the empirical results it is confirmed that countercyclical fiscal policy is effective in smoothing GDP fluctuations. Especially, during a recession, the first thing to do seems to be increasing goverment spending. Also, during economic slack a reduction of government spending (procyclical fiscal policy) depress private investment, private consumption and obviously GDP.

2.7 Robustness Check and Sensitivity analysis

In this section, we test the robustness of our findings in 3 ways: 1) we control for several macroeconomic characteristics across countries; 2) we re-estimate the fiscal multipliers distinguishing between countries with similar public finance characteristics, splitting the sample into two groups; 3) we also examine if the size of fiscal multiplier varies according to different sample periods considered, i.e. before the Great Recession (1985-2006) and during the crisis (2007-2015).

2.7.1 Macroeconomic charecteristics across countries matter?

Since we have significant variation in macroeconomic characteristics across countries and time, we can explore how some key characteristics are correlated with the size of government spending multipliers. In the baseline formulation we do not control for macroeconomic characteristics across countries that may change the size of the fiscal multiplier. We will now investigate this issue for six macroeconomic characteristics: the level of government debt (as a share of GDP), openess to trade,[17] the level of spread across countries [18], the introductions of the euro, the level of surplus/deficit (as a share of GDP) and when the interest rate is constrained at the zero lower bound.[19] For this issue, we estimate the following equation:

$$\begin{aligned} Y_{i,t+h} = \alpha_i + \mu_i + F(z_{i,t})\Pi_{R,h}(L)Y_{i,t-1} + (1-F(z_{i,t}))\Pi_{E,h}(L)Y_{i,t-1} + \\ F(z_{i,t})\Psi_{R,h}(L)G_{i,t-1} + (1-F(z_{i,t}))\Psi_{E,h}(L)G_{i,t-1} + \\ F(z_{i,t})\Phi_{R,h}(L)FE^G_{i,t} + (1-F(z_{i,t}))\Phi_{E,h}(L)FE^G_{i,t} + \\ F(z_{i,t})\tilde{\Phi}_{R,h}(L)FE^G_{i,t}I_{i,t} + (1-F(z_{i,t}))\tilde{\Phi}_{E,h}(L)FE^G_{i,t}I_{i,t} + \mu I_{i,t} + + u_{i,t} \end{aligned} \tag{2.7}$$

$$with: F(z_{i,t}) = \frac{exp(-\gamma z_{i,t})}{(1+exp(-\gamma z_{i,t}))}, \gamma > 0 \tag{2.8}$$

where $I_{i,t}$ is the macroeconomic characteristic that we would like to analyze. Coefficients $\Phi_{R,h}$ and $\Phi E,h$ describe the response of Y to a government spending shock $FE?G_{i,t}$ when $I_{i,t} = 0$, while $(\Phi_{R,h} + \tilde{\Phi}_{R,h})$ and $\Phi_{E,h} + \tilde{\Phi_{E,h}}$ describe the response of Y to a government spending shock $FE^G_{i,t}$ when $I_{i,t} = 1$. Generally, high-debt countries have lower multipliers, as fiscal consolidation is likely to have positive credibility and confidence effects on private demand and the interest rate risk premium (Ilzetzki et al. (2013)). Table (2) reports the mean and the max response of output across countries over three year. We find that large government debt does not reduce the positive response of output to a government spending shock: in recession. In detail, when the Debt to GDP ratio is low, a one percent increment in government purchases increses output about 2.42% over three years. Vice versa, if the level of debt is high, the mean response of output is 2.40%. Indeed, when the level of government debt is low, the max response of output is 3.72 whereas when the level of debt is high the max response is 3.70. The results do not show any adverse effect of public debt on the size of the fiscal multiplier.

[17] Openness=(export+import)/GDP, if the proxy for one country is higher than the average, the economy is open vice versa is not.

[18] The spread is the difference in yield between a bond and some comparative benchmark bond. In this case the benchmark is the 10 years German Bund vs other Euro Countries Government bond with the same maturity.

[19] $ZTL = i_s$ if $i_s < 1\%$ where i_s is the short interest rate.

Conventional wisdom wants that countries with a high public debt ratio do not incur in further debt, especially in times of economic recession, as an increase in the public debt ratio could boost the cost of borrowing. Our result shows that an increase in government spending during economic downturns has a similar effect in countries with low and high public debt over three year. Conversely, when the economy is in expansion, an increase in government spending has no effect on GDP for both countries with high or low debt.

Besides the level of debt we investigate whether the presence of a high deficit or spread in the euro zone countries affect the size of the spending multiplier. The empirical results show that an increase in public expenditure in high deficit countries during recession increases GDP approximatelly by 2.50%. In contrast, if we consider the case of an increase in government spending in surplus/low deficit countries, the output response is just 0.26% and is not stastistically significant.[20]

We have similar results as we consider the spread. We find that the spending multiplier associated with an increase in government spending when the spread is above 150 basis point is larger than the one associated with an increase in government spending when the spread is under 150 basis point. In fact, the spending multiplier for the first case is 1.35 on average and reaches a maximum of 2.20 after three years. In contrast, the multiplier when the spread is under 150 basis point is 1.17 on average and reaches a maxium of 1.79 after three years. The Countries that have experienced a high sovereign risk are Spain (1991-1996),(2010-2014); Finland (1991-1995); Italy (1991-1996),(2011-2014); Portugal (1991-1996),(2010-2015); Belgium (2010) and Ireland (2010-2013). The results show that a stimulus of public spending, in downturn, is more effective to rise GDP of high risk countries than in ones that are considered safe. The joint consideration of deficit and spread cases in Table (2) suggests that the stimulus effect of an increased government spending in recession is more effective in high deficit/spread countries than in low deficit/debt countries.[21]

Ilzetki et al. (2013) showed that government spending multiplier is higher in closed economies than in open economies, which is consistent with the standard macroeconomics literature. We find evidence that supports this prediction. We show that for both open and closed economy the mean and max response of output to a government spending shock is sizeble. The size of government spending multiplier is higher for a closed economy, a one percent increse of government spending increses output of about 1.73%, in contrast for a open economy the mean response is lower 1.09%.[22].

[20]The max response in the high deficit case is 3.83%, whilst for surplus/low deficit is 0.77% and is not statistically significant.

[21]That means that a boost in the aggregate demand (particularly for the countries more risky) will help to speed up recovery.

[22]The maximum response for a closed economy is 3.12% rahter for an open economy is 1.75%

Corsetti et al. (2010, 2012) investigates if the exchange rate regime determine the size of fiscal multipleir. In the traditional Mundell-Fleming model, government spending is ineffective in stimulating domestic demand under flexible exchange rates because a fiscal expansion “crowds out" net exports as a consequence of the exchange rate appreciation. In contrast, under fixed exchange rates, fiscal policy becomes effective because the exchange rate appreciation is immediately offset through monetary expansion.

Since the European Monetary Union can be represented as tantamount to a fixed exchange rates regime for the member countries, it is relevant to investigate whether the spending multiplier in a monetary union is as high as in a fixed exchange rate regime. We show evidence that support this prediction. Under fixed exchange rates regime, a one percent increase in government spending during economic slack raises output by approximately 1.87%. In sharp contrast, under a fully flexible exchange rate regime the response of output in recession is never significantly different from zero.

The last, but not the least, macroeconomic characteristic that we investigate is the zero lower bound. Since the financial crisis the European Central Bank adopted several conventional and unconventional policies to spur the recovery in the Eurozone. However, when recession is deep and monetary policy is constrained by the zero lower bound, fiscal stimulus can become effective to avoid the drop of GDP and the deflationary dynamics. Moreover, Canzonieri et al. (2016), Christiano et al. (2011), Hall (2009), Erceg and Lind´e (2010), or Woodford (2011) derive fiscal multipliers on output which exeed one.

We show that in a zero lower bound, the output response is extremerly positive and statistically significant during expansion. More precisely, the mean response of output to a one percent increase in government spending is 2.87% and the max response is 7.29%. Peculiarly, if we observe the spending multiplier in recession is not statistically different from zero. One of the possible explanation is the fact that we have only few observations for the case of a zero lower bound during recession and our results may, therefore be biased.

Table (3) reports the mean and the max response of private consumption across countries over three years. We show that large government debt does not reduce the response of private consumption to a government spending shock. Specifically, the consumption multiplier does not change taking into account the different macroeconomic characteristics, for example the private consumption response to a one percent increase in government spending when the government debt ratio is low is 2.25%, viceversa when the government debt is high the response is 2.24%.[23] An interesting result comes when we consider the presence of a high deficit and an high spread. The empirical evidence shows that a rise in government spending in deficit during recession increases private consumption approximate by 2.93%. Differently,

[23]The max response is about 2.77% when the debt ratio is low and is 2.76% when the debt is high.

if the government spending is in surplus/low deficit the effect is not statistically significant.[24] We have similar results when we consider the spread. We show that a one percent increase in government spending is associated with an increase in private consumption by nearly 2.02%, while if we consider the same increase in government spending in surplus/low deficit, there is not a statistically significant effect. As for output, the mean and max response of private consumption to a government spending shock is higher for a closed economy respect to an open economy. In detail, the spending multiplier associated to a closed economy is 2.27, whilst for an open economy it is 1.62. The empirical results confirm that a spending shock is larger in recession for a closed economy than for an open economy. In expansion, the government spending shock is negative as predicted by theoretical models. Moreover, the spending multiplier is higher and statistically significant during the monetary union. In the case of monetary union in recession, the mean response is 2.85 after three years, whereas the max response reaches a peak of 4.68. Lastly, when we consider the zero lower bound, the mean and max response of private consumption to a one percent increase in government spending is higher with respect to the condition when the interest rate is above 1%. Exactly, the mean response is 2.24 and the max response reaches 4.12 in recession.

Table (4) reports the mean and the max response of private investment across countries over the three year. Traditional economic theory predicts that rises in public sector spending "crouwd out" the private sector spending. Our empirical results confirm that the effect of "crowding out" occurs during periods of economic expansion. However, when the economy is in a recession, the effect of an increase in government spending does not "crowd out" but actually stimulates private investment. Moreover, we look at whether some economic characteristics of the euro area countries, such as the level of public debt, high deficit, high spreads, the introduction of the euro influence the size of spending multiplier. We find that the spending multiplier is quite similar in countries with high and low debt.[25] However, it turns out that countries that have implemented an increase in spending in deficit during recession, have experienced an increase in private investment and the mean and the max response are respectively 4.76 and 7.47. Also, it is interesting to observe that at the zero lower bound, the effect of "crowding in" is big, otherwise an increase in government spending during recession may raise private investment to a maximum of 6.93 over three years.[26] The empirical analysis shows that the spending multiplier (in deficit) is larger than the one when interest rate is at the zero lower bound. This result is the opposite of what you would expect.

[24]The max response with high deficit is 3.82%, on the contrary the max response in surplus/low deficit is not statistical different from zero.

[25]The mean and max response for high debt countries is 4.78 and 9.11, while for low debt countries are 4.84 and 9.24

[26]Before the introduction of the euro the max response is 5.67.

Actually, if the government spending in deficit coincides with the interest rates close to zero, the spending multiplier in deficit may be larger than the one when interest rate is at the zero lower bound[27], as in our case[28].

Table (5) reports the mean and the max response of debt to GDP across countries over three year. The most important statement that emerges from the results is that an increase in government spending, during recession and within a fixed exchange rate system as the European Monetary Union, decreases the debt to GDP ratio of about 2.01%. While the same policy, in expansion, raises the debt ratio to GDP by approximately 1.79.

Table (6) reports the mean and the max response of total employment across countries over three year. We find that in the recessionary regime, an increased government spending leads to higher total employment indipendently of the public debt ratio or the spread level (above or below 150 basis points). An interesting result is that an increase in government spending in deficit during recession increases total employment by approximately 1.84% (and reaches its maximum at 2.66% after three years). To the contrary, the effect of the same policy, in countries with surplus or low deficit, is not statistically different from zero.

2.7.2 Southern Countries vs Northern Countries

In the baseline formulation of the empirical model, we do not distinguish between countries with different patterns in the public finance variable as well as the debt-GDP ratio growth and the deficit trend. As Bacchiocchi et al (2011) finds different behaviour of OECD countries according to the level of their public debt and whether they comply with the Stability and Growth Pact and given the panel structure that we used in the analysis, we choose to re-estimate the baseline empirical model (1) splitting the sample into two groups[29] according to the level of public financial liabilities (as a share of the GDP) during the sample period (1985-2015) [30]. This reflects the fact that there is not a single fiscal stance in the Eurozone and different member countries have different targets and constrains in their fiscal policy making, within boundaries defined by the EU Commission and the Treaties. Panels (26-27)

[27] This due to two effects: the positive demand effect of government spending ($\Delta G_{DEFICIT} = \Delta G + \Delta D$) and the interest rate effect at the zero lower bound, where the conventional negative effect of interest rate on the aggregate demand is zero, i.e. $i \approx 0$.

[28] The countries where the short interest rate is near zero and deficit is above 3% are: Belgium (2012-2013), Spain (2010-2015), France (2010-2015), Ireland (2010-2014), Italy (2010-2012), Netherland (2010-2013), Portugal (2010-2015).

[29] We exclude Greece inasmuch is an outlier.

[30] Sample A (Sud Countries): Belgium, Spain, France, Ireland, Italy, Portugal) vs (Sample B (Nord Countries): Austria, Germany, Finland, Luxemburg and Netherland

show the impulse responses of two macroeconomic variables (GDP and debt-GDP) [31] to a one percent increase in the government spending shock. In each panel, there are two subpanels showing the response (black, thick line for Recession and red, thick line for Expansion) in the two subsamples (Panel (a) Sud Countries, Panel (b) Nord Countries). The thin dashed lines indicate the 80% confidence bands which are based on Newey and West (1987) standard errors that provide consistent estimates when there is autocorrelation in addition to possible heteroskedasticity of the error term in specification (1).[32] Panel (26) shows the result of an increase in government spending on GDP. Panel (a) shows that the spending multiplier is higher and statistically significant over the 3-year horizon during an economic slack. It reaches its maximum after 3-years (more than 5). Conversely, in Panel 26 (b), when we consider the second group of Countries (Austria, Germany, Finland, Luxemburg and Netherland), the spending multiplier is positive over the 3-year horizon but is not statistically significant and its maximum is lower (slightly greater than 2) with respect to the first group of Countries considered (Belgium, Spain, France, Ireland, Italy, Portugal). Vice versa, when we consider the expansionary regime, in both subgroups, the GDP responses are quite equivalent. The GDP responses is positive in both cases. In addition, when we consider the countries of the first group, the spending multiplier is statistically significant only in the first year and turns out to be slightly larger than one. While, when we consider the countries of the second group, the spending multiplier is always statistically significant and reaches its maximum after three years. It should be noted that the maximum reached by the countries of the second group is very similar to the maximum level reached by the countries of the first group when the economy is in recession. Panel (27) shows the results of an increase in government spending on the debt to GDP ratio. Panel 27(a) shows that a positive government spending shock leads to a decrease in the debt to GDP ratio over the 3-year horizon during an economic slack (Belgium, Spain, France, Ireland, Italy, Portugal). However, when we consider the second subgroup (Austria, Germany, Finland, Luxemburg and Netherland) an unexpected increase in the government spending deteriorates the debt to GDP ratio over two years (it is statistical significant only in the first half of the year, Panel 27(b)). It is noteworthy that the debt multiplier remains lower than one for the all time horizons considered (no multiplicative effect). Differently, when we are looking for the expansionary regime, a government spending shock leads to an increase of the debt to GDP ratio for both subgroups considered (Panel 27(a,b), red lines). We also estimated the fiscal

[31] We only show the results for the GDP and debt-GDP. The findings are similar even when we consider other macroeconomic variables, such as: private consumption, private investment, deficits; the results are available upon request.

[32] The choice to increase the confidence interval is due to the fact that the observations of the subsamples are fewer with respect to the total sample.

multiplier dropping one country each time. The multiplier remains positive and statistically significant (GDP, and improve the debt-GDP ratio in recession). The size varies, depending on the country that is not considered (the multiplier is smallest when we exclude countries such as France, Ireland, Italy, Portugal and Spain).[33]

2.7.3 Is the fiscal multiplier time varying?

Another test of robustness for our findings consists in splitting the total sample into two subsamples: one that considers the period before the crisis (1985-2006) and one that considers only the crisis period (2007-2015). As Blanchard and Leigh (2013) emphasises that during the "Great Recession" the size of fiscal multiplier has been underestimated, it is possible that fiscal multiplier may be higher during the Great recession with respect to "standard recessions" due to the combination of low interest rate (ZLB) at the time of a positive government shock. In order to investigate this hypothesis, we therefore re-estimate the baseline formulation of model (1) for the two subsample. Panels (28-29) show the impulse responses of two macroeconomic variables (GDP and debt-GDP) [34] to a one percent increase in the government spending shock. In each panel, there are two subpanels showing the response (black, thick line for Recession and red, thick line for Expansion) in the two subperiods (panel (a) before the Great Recession, panel (b) during the Great Recession). The thin dashed lines indicate the 80% confidence bands which are based on Newey and West (1987) standard errors that provide consistent estimates when there is autocorrelation in addition to possible heteroskedasticity of the error term in specification (1).[35] Panel (28) shows that the spending multiplier is higher and statistically significant over the 3 years horizon in the period following the global financial crisis (Panel 28(b), in recession). While, when we consider the subsample before the Great Recession, the spending multiplier reached is maximum after one year (2.24) and became not statistical significant after the first year (Panel 28(a), in recession). Conversely, when we consider the expansionary regime, in both subsamples, the responses are quite analogous. The GDP response to an unexpected increase in the government spending is negative but not statistically significant, before the 2007 (Panel 28(a)), and it is near zero after the 2006 (Panel 28(b)). Panel (29) presents the effect of an increase in government spending on the Debt to GDP ratio. We control the effect of government spending shock on the Debt to GDP ratio in order to account the effect of

[33] Results are available upon request.

[34] We only show the results for the GDP and debt-GDP. The findings are similar even when we consider other macroeconomic variables, such as: private consumption, private investment, deficits; the results are available on request.

[35] The choice to increase the confidence interval is due to the fact that the observations of the subsamples are fewer with respect to the total sample.

spending shock on the “health” of the public finance. Panel (29)b shows that an increase in the government spending leads to a decrease in the debt to GDP ratio over the 3 years’ horizon in the period following the “Great Recession” (2007-2015, in recession). However, when we consider the subsample that excludes the crisis period (1985-2006), the effect of government spending is strikingly different. Before the outbreak of the crisis, an unexpected increase in government spending deteriorates the debt to GDP ratio over the 3 years’ horizon (Panel 29(a), in recession). It is noteworthy that the debt multiplier follows a bell-shaped curve. The debt multiplier remains lower than one for about one year and a half; the second year it reaches its maximum (1.27) and then after the second year, it still drops below one. Therefore, is interesting to note, that it is true that an increase in government expenditure initially may deteriorate the debt to GDP ratio, however, the multiplier is almost always less than one (no multiplicative effect). Vice versa, when we are looking at an expansionary regime, the impulse responses are quite similar in both subsamples. A government spending shock leads to an increase in the debt to GDP ratio either before 2007 and during the crisis (2007-2015).

2.8 Conclusions

In this paper we brought together a few strand of literature on the effects of government spending on different macroeconomic aggregates in a unified framework of analysis, featuring the linear projection approach advocated by Jordá (2005) that allows to construct impulse responses for any macroeconomic variable of interest and also, we are not constrained by the VAR’s restrictions. We focused on the Eurozone and we estimate the effects of governement spending on the key macroeconomic aggregates (GDP, private consumption, private investment), on pubblic finace indicators (deficit, primary balance, debt to gdp ratio) and allowing the spending multipliers to vary smoothly according to the business cycle. The results suggest that fiscal policy activism have a stimulatory effect on output, private consumption, private investment, employment and it is beneficial on public finance during recession provided fiscal policies is actually countercyclical. Fiscal consolidations in recession (i.e procyclical fiscal policies) prove not to be expansionary, rather, fiscal expansion (i.e. countercyclical fiscal policies) prove to be expansionary and not recessionary. Our main finding are as follows: a) increased government spending rises GDP during economic slack, especially when we consider countercyclical fiscal policy (the procyclical fiscal policy, does not seem to have the desired “expansionary austerity effect"); b) increased government spending, in recession, could have a “crowding in" effect on private consumption and investment (these effects are pronounced if a countercyclical fiscal policy is implemented),

and the predicted “crowding out" effect appears in times of expansion; c) an increase in government spending lowers the debt to gdp ratio and improves the surplus after two years during recession, vice versa worsens the public finance indicators during expansion; d) finally, an increase in government spending reduces the unemployment rate and increase the total and private employment during recession, while in times of expansion it increases the unemployment rate and reduce the total and private employment. All these effects could vary depending on: (1) the level of debt; (2) the exchange rate regime; (3) the openness to trade; (4) how public investment is financed; and (5) the public spending composition: (1) in times of recession, an increase in government spending has the same fiscal multipliers either in countries with low debt either in countries with high debt; (2) when there is a recession and the exchange rate is fixed (as after introduction of the euro), the output effect is greater than in countries experiencing a flexible exchange rate regime; (3) when there is a recession in a closed economy, the output effect is greater than one that has an open economy; (4) when there is recession and the government spending is financed through high deficits, the output effect is larger than one that is in surplus or with low deficit; (5) government consumption and government investment have a positive effects on output in recession and negative in expansion. Hence, the effects of investment spending is stronger only in the long run, particularly after two years when the impact on output exceeds 4 for government investment shock and is around 3.20 for government consumption shock. The same result when we consider the response of private consumption, private investment and the “helthy" of public finance indicator. Everything that has been done by the European countries is the reverse of what our analysis suggests. After few years from the Great Recession, the euro area countries, especially the countries in deep recession as Spain, Italy, Greece, Portugal, have cut more than 70% of the net government investment and they have also cut government consumption spending. These austerity policies have led to an increase of debt to GDP ratio, a decrease in consumption, private investment, employment rate and GDP (in all countries of the euro area). What emerges from our analysis is consistent with the simple Keynes model, an increase in government spending during recession will increase GDP and private consumption. Also, we do not observe the “crowding out" effect of private investment (that is precisely what the simple Keynes model predicted), but rather its rise in the medium term. Such multiplicative effects are much larger if the countries are under a fixed exchange rates regime (as the European Monetary Union) and the government spending is countercyclical in recession. The euro zone still has the option to exit from the so-called “secular stagnation" (Delong and Summers (2012)). It should identify the common policies to revitalize the government spending on consumption and investment that would facilitate economic recovery, especially when monetary policy is accommodative.

Looking on a microeconometrics framework, the seminal paper of Areallano et al. (2016) shows that the impact of earnings shock varies substantially accross earnings histories, and this nonlinearity drives heterogeneous consumption responses. However, further research within a macroeconometric framework should be done in order to understand the effect of income shocks, in particular further research should be done to analyze if non-linear effects of income increases inequalities and if drives asymmetric consumption responses.

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Appendix A

Chapter 1: Figures and Tables.

Table A.1 Descriptive statistics. The monetary policy statistics are measured only on event days.

Variable	N	Absolute mean (B.P.)	Standard deviation	Variance
Total Period (January 1999 – Septmeber 2015)				
News*ECBAnnouncement	231	0.08658	0.054511	0.0029714
E_ECB*ECBAnnouncement	231	1.471861	0.173017	0.029935
CRISIS (June 2007 – September 2015)				
News*ECBAnnouncement	97	0.21134	0.053691	0.0028827
E_ECB*ECBAnnouncement	97	4.78866	0.165949	0.027539
Sovereign debt crisis (October 2009-Sept. 2015)				
News*ECBAnnouncement	69	0.07246	0.037173	0.0013818
E_ECB*ECBAnnouncement	69	1.88406	0.112034	0.0125516
First period sovereign debt crisis (October 2009-October 2011)				
News*ECBAnnouncement	25	0.36	0.053396	0.0028511
E_ECB*ECBAnnouncement	25	2.36	0.089519	0.0080136
Second period sovereign debt crisis (November 2011- Sept. 2015)				
News*ECBAnnouncement	44	0.09091	0.024215	0.0005864
E_ECB*ECBAnnouncement	44	4.29545	0.117193	0.0137341

Table A.2 Descriptive statistics for European banking indices returns

	Total Period (January 1999 – Septmeber 2015)					Crisis (June 2007 – September 2015)				
Bank Index	N	Mean (B.P.)	S.D.	Max%	Min%	N	Mean (B.P.)	S.D.	Max%	Min%
Austria	4356	1.782	2.004	14.322	-13.532	2138	-5.209	2.537	14.322	-13.532
Belgium	4356	-2.691	2.593	19.457	-27.184	2138	-5.771	3.318	19.457	-27.184
Spain	4356	-1.207	1.969	19.808	-12.095	2138	-4.561	2.253	19.808	-12.095
France	4356	1.028	2.211	19.243	-14.758	2138	-3.355	2.762	19.243	-14.758
Germany	4356	-1.8296	2.305	18.713	-17.743	2138	-6.737	2.78	18.713	-17.743
Greece	4356	-11.429	3.428	25.559	-35.559	2138	-26.383	4.566	25.559	-35.559
Ireland	4356	-6.67	3.266	24.94	-67.517	2138	-16.54	4.457	24.947	-67.517
Italy	4356	-2.837	2.138	16.87	-13.386	2138	-5.513	2.671	16.871	-13.386
Netherland	4356	-6.653	2.88	15.116	-129.914	2138	-15.162	3.673	15.116	-129.914
Portugal	4356	-6.474	1.896	16.638	-12.605	2138	-15.856	2.555	16.638	-12.605
EuroStoxxBank	4356	-1.543	1.885	17.763	-10.829	2138	-5.778	2.331	17.763	-10.829

Descriptive statistics for European banking indices returns. Cont'

	Sovereign debt crisis (Oct. 2009-Sept. 2015)					First period Sov. debt crisis(Oct. 2009-Oct. 2011)				
Bank Index	N	Mean (B.P.)	S.D.	Max%	Min%	N	Mean (B.P.)	S.D.	Max%	Min%
Austria	1553	-2.801	2.107	12.89	-10.445	543	-11.028	2.347	12.89	-8.875
Belgium	1553	0.578	2.843	19.209	-13.969	543	-19.81	3.143	19.209	-10.766
Spain	1553	-4.344	2.072	19.809	-8.964	543	-11.007	2.441	19.809	-8.917
France	1553	-0.371	2.457	19.244	-14.758	543	-13.052	2.991	19.244	-12.146
Germany	1553	-3.537	2.171	14.429	-8.928	543	-9.967	2.468	14.429	-8.928
Greece	1553	-31.822	5.037	25.559	-35.56	543	-44.464	3.937	25.559	-18.455
Ireland	1553	-10.859	3.304	18.93	-20.604	543	-51.199	4.416	18.93	-20.604
Italy	1553	-3.076	2.615	16.871	-13.386	543	-17.865	2.743	16.871	-10.945
Netherland	1553	-3.872	1.716	11.766	-9.649	543	-9.036	1.441	5.928	-8.795
Portugal	1553	-14.766	2.735	16.638	-12.605	543	-26.147	2.17	12.788	-7.056
EuroStoxxBank	1553	-3.467	2.125	17.764	-9.291	543	-14.131	2.453	17.764	-9.291

Descriptive statistics for European banking indices returns. Cont'

	Second period Sov. debt crisis(Nov. 2011- Sept. 2015)				
Bank Index	N	Mean (B.P.)	S.D.	Max%	Min%
Austria	1010	1.622	1.966	9.008	-10.445
Belgium	1010	11.539	2.664	13.044	-13.969
Spain	1010	-0.762	1.844	9.854	-8.964
France	1010	6.446	2.114	9.656	-14.758
Germany	1010	-0.08	1.994	9.004	-8.726
Greece	1010	-25.025	5.539	23.849	-35.56
Ireland	1010	10.829	2.485	13.004	-10.5
Italy	1010	4.875	2.542	11.202	-13.386
Netherland	1010	-1.096	1.846	11.766	-9.649
Portugal	1010	-8.648	2.994	16.638	-12.605
EuroStoxxBank	1010	2.266	1.925	8.18	-9.185

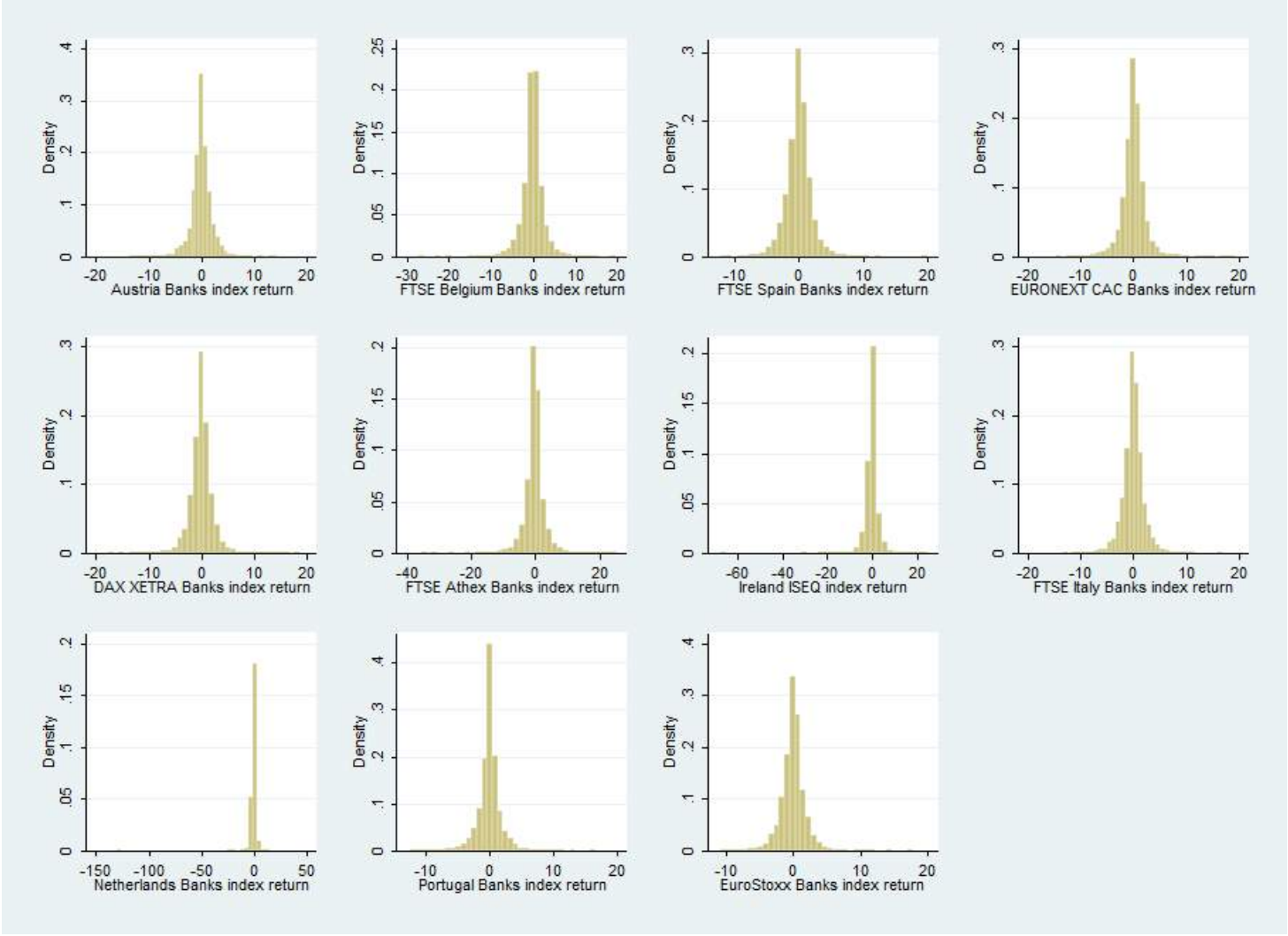

Figure A.1 Figure 1 - Histogram of European banking indexes returns. Total Period (January 1999 – Septmeber 2015)

Date	Program	ECB announcements
15/10/2008	COLL, LTRO, FOR	The Governing Council of the European Central Bank (ECB) today decided on the following measures: 1) The list of assets eligible as collateral in Eurosystem credit operations will be expanded with this expansion remaining into force until the end of 2009. 2) As from the operation settling on 30 October 2008 and until the end of the first quarter in 2009, the provision of longer-term refinancing by the Eurosystem will be enhanced as set out below. 3) The Eurosystem will start offering US dollar liquidity also through foreign exchange swaps.
07/05/2009	LTRO, CBPP	The Governing Council of the European Central Bank has today decided to conduct liquidity-providing longer-term refinancing operations (LTROs) with a maturity of one year. The Governing Council of the European Central Bank (ECB) has today decided that the European Investment Bank (EIB) will become an eligible counterparty in the Eurosystems monetary policy operations on 8 July 2009. As of this date, the EIB will have access, if and when appropriate for its treasury management, to the Eurosystems open market operations and standing facilities through the Banque centrale du Luxembourg under the same conditions as any other counterparty.
04/06/2009	CBPP	Following-up on its decision of 7 May 2009 to purchase euro-denominated covered bonds issued in the euro area, the Governing Council of the European Central Bank (ECB) decided upon the technical modalities today. These modalities are as follows: 1) The purchases, for an amount of EUR 60 billion, will be distributed across the euro area and will be carried out by means of direct purchases. 2) The purchases will be conducted in both the primary and the secondary markets.
06/10/2011	LTRO, CBPP	The Governing Council of the European Central Bank (ECB) has today decided to launch a new covered bond purchase programme (CBPP2). ECB announces details of refinancing operations from October 2011 to 10 July 2012.
03/11/2011	CBPP	Further to its decision of 6 October 2011 to launch a new covered bond purchase programme (CBPP2), the Governing Council of the European Central Bank (ECB) decided today upon the technical modalities of the programme: 1) The purchases of euro-denominated covered bonds issued in the euro area, for an intended nominal amount of EUR 40 billion, will be distributed across the euro area and will be carried out by the Eurosystem by means of direct purchases. 2) The purchases will be conducted in both the primary and the secondary markets. 3) In order to be qualified for purchase under the programme, covered bonds must: - 3.1 be eligible for use as collateral in Eurosystem credit operations.
09/02/2012	COLL	The Governing Council of the European Central Bank (ECB) has approved, for the seven national central banks (NCBs) that have put forward relevant proposals, specific national eligibility criteria and risk control measures for the temporary acceptance of additional credit claims as collateral in Eurosystem credit operations.
22/06/2012	COLL	In addition to the ABSs that are already eligible for use as collateral in Eurosystem operations, the Eurosystem will consider the following ABSs as eligible: 1) Auto loan, leasing and consumer finance ABSs and ABSs backed by commercial mortgages (CMBSs) which have a second-best rating of at least single A in the Eurosystems harmonised credit scale, at issuance and at all times subsequently. These ABSs will be subject to a valuation haircut of 16%. 2) Residential mortgage-backed securities (RMBSs), securities backed by loans to small and medium-sized enterprises (SMEs), auto loan, leasing and consumer finance ABSs and CMBSs which have a second-best rating of at least triple B [2] in the Eurosystems harmonised credit scale, at issuance and at all times subsequently. RMBSs, securities backed by loans to SMEs, and auto loan, leasing and consumer finance ABSs would be subject to a valuation haircut of 26%, while CMBSs would be subject to a valuation haircut of 32%.
26/07/2012	OMT	Draghi's London speech (the ECB is ready to do whatever it takes to preserve the euro.")

Continued on next page

Figure A.2 Table 3: Unconventional Policies Announcements

– **continued from previous page**

Date	**Program**	**ECB announcements**
27/08/2012	OMT	OMT Outright Monetary Transactions
06/09/2012	OMT, COLL	Technical features of Outright Monetary Transactions and Measures to preserve collateral availability
18/06/2013	ABSPP	ECB further reviews its risk control framework allowing for a new treatment of asset-backed securities
04/09/2014	ABSPP	ECB modifies loan-level reporting requirements for some asset-backed securities ABS
02/10/2014	ABSPP CBPP3	ECB announces operational details of asset-backed securities and covered bond purchase programmes
15/10/2014	CBPP3	ECB announces CBPP3, third covered bond purchase programme
19/11/2014	ABSPP	ECB decision on the implementation of the asset purchase program-backed securitizations. ABS
22/01/2015	QE	ECB announces expanded asset purchase programme: Quantitative easing
04/03/2015	QE PSPP	ECB announces the public sector purchase programme (Quantitative easing)
18/03/2015	ABSPP QE	ECB announces new condition for Quantitative easing and asset-backed securities purchase programme
03/09/2015	QE	The ECB increases the upper limit for buying sovereign european securities from 25% to 33% (Quantitative easing)

Figure A.3 Table 3:– continued from previous page

Regression - Table 4

	(1) Eurostoxx	(2) Eurostoxx	(3) Eurostoxx	(4) Eurostoxx	(5) Eurostoxx
EUROSTOXXBANKSReturn					
EUROSTOXXBANKSReturn1	**0.047****	0.026	0.037	0.045	0.012
	(0.021)	(0.043)	(0.033)	(0.058)	(0.036)
EUROSTOXXBANKSReturn2	-0.023	-0.015	-0.045	**-0.092***	-0.003
	(0.022)	(0.043)	(0.031)	(0.047)	(0.036)
EUROSTOXXBANKSReturn3	**-0.051****	-0.079	**-0.064****	**-0.089***	-0.047
	(0.023)	(0.056)	(0.030)	(0.046)	(0.041)
ECBAnnouncement	-0.130	-0.259	0.064	-0.030	0.240
	(0.146)	(0.505)	(0.324)	(0.609)	(0.403)
NEWS	**-8.863*****	**-12.146*****	-3.022	-6.674	5.327
	(1.405)	(2.818)	(4.847)	(6.983)	(4.688)
NEWS *ECBAnnouncement	**9.310****	**18.652****	6.071	2.874	**31.467***
	(3.786)	(9.441)	(10.143)	(11.403)	(17.511)
E_ECB*ECBAnnouncement	**2.192***	**6.204****	1.251	0.570	3.548
	(1.218)	(2.859)	(2.575)	(3.325)	(3.854)
QE_ABS_CBPP_COLL	0.790	-2.703	**1.342***	**2.812****	0.959
	(0.831)	(2.522)	(0.793)	(1.253)	(0.882)
Const.	0.067	-0.280	0.108	0.042	0.053
	(0.149)	(0.620)	(0.326)	(0.541)	(0.582)
Time Effects	YES	YES	YES	YES	YES
N	4353	609	1553	543	1010
R^2	4.2%	12.8%	2.2%	4.00%	2.8%
DW	1.99	1.99	2	2.02	1.98
P-value (F)	0.00%	0.00%	49.7%	4%	9%
LM autocorrelation test	0.04	0.258	0.057	0.05	0.002
Arch test	0.00%	0.00%	0.00%	9.00%	0.00%
Normality test	0.00%	0.00%	0.00%	0.00%	0.00%

Notes: Regression output for EuroStoxx Banks index. The regression model is given by Equation (1). All regressions are estimated with HAC consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.4 Table 4: Eurostoxx Banks Index

Regression - Table 5

	(1) Eurostoxx	(2) Eurostoxx	(3) Eurostoxx	(4) Eurostoxx	(5) Eurostoxx
EUROSTOXXBANKSReturn					
EUROSTOXXBANKSReturn1	0.023	**-0.080****	0.014	0.022	0.002
	(0.016)	(0.040)	(0.027)	(0.051)	(0.035)
EUROSTOXXBANKSReturn2	-0.015	**-0.065****	-0.039	**-0.090****	-0.007
	(0.016)	(0.032)	(0.027)	(0.045)	(0.032)
EUROSTOXXBANKSReturn3	**-0.033****	-0.026	**-0.054****	**-0.093****	-0.041
	(0.016)	(0.033)	(0.027)	(0.043)	(0.040)
ECBAnnouncement	0.027	-0.580	0.375	0.307	0.465
	(0.094)	(0.545)	(0.273)	(0.492)	(0.333)
NEWS *ECBAnnouncement	**4.206***	**9.803****	3.743	2.532	**30.989****
	(2.238)	(4.651)	(7.732)	(8.453)	(15.328)
E_ECB*ECBAnnouncement	0.116	**3.888****	-0.608	1.849	0.744
	(0.665)	(1.651)	(1.479)	(3.538)	(2.426)
NEWS	**-4.306*****	**-11.733*****	-1.466	-5.281	5.523
	(0.789)	(1.302)	(2.911)	(4.147)	(5.172)
QE_ABS_CBPP_COLL	0.029	-1.119	0.310	**2.676*****	0.015
	(0.906)	(1.783)	(0.851)	(0.903)	(0.880)
Const	0.014	-0.187	0.151	0.418	-0.161
	(0.103)	(0.464)	(0.304)	(0.587)	(0.711)
GARCH					
alpha(1)	**0.093*****	**0.094*****	**0.079*****	**0.146*****	**0.041*****
	(0.014)	(0.023)	(0.025)	(0.050)	(0.012)
beta(1)	**0.905*****	**0.888*****	**0.901*****	**0.848*****	**0.945*****
	(0.013)	(0.024)	(0.028)	(0.040)	(0.016)
alpha(0)	**0.016*****	**0.095*****	**0.087****	**0.103***	**0.043***
	(0.005)	(0.034)	(0.036)	(0.060)	(0.023)
Time Effects	YES	YES	YES	YES	YES
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.017	0.81	0.00	0.096
AIC	15826	2882	6513	2421	4120
BIC	16107	3005	6695	2550	4277
Log Likelihood	-7869	-1413	-3222	-1180	-2028

Notes: Regression output for EuroStoxx Banks index. The regression model is given by Equation (2). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.5 Table 5: Eurostoxx Banks Index Garch specification (1)

Regression - Table 6

	(1) Eurostoxx	(2) Eurostoxx	(3) Eurostoxx	(4) Eurostoxx	(5) Eurostoxx
EUROSTOXXBANKSReturn					
EUROSTOXXBANKSReturn1	0.021	0.002	0.019	0.047	-0.012
	(0.015)	(0.039)	(0.026)	(0.047)	(0.031)
EUROSTOXXBANKSReturn2	-0.017	-0.013	-0.025	-0.063	-0.007
	(0.015)	(0.040)	(0.025)	(0.043)	(0.031)
EUROSTOXXBANKSReturn3	**-0.032****	-0.056	**-0.043***	**-0.078***	-0.019
	(0.015)	(0.044)	(0.025)	(0.042)	(0.032)
ECBAnnouncement	0.030	-0.100	**0.455***	0.326	0.555
	(0.092)	(0.338)	(0.269)	(0.502)	(0.351)
NEWS*ECBAnnouncement	**4.532****	**12.344*****	4.888	3.609	27.341
	(2.283)	(5.140)	(8.111)	(9.601)	(19.729)
E_ECB*ECBAnnouncement	0.600	5.028	-0.425	1.103	1.019
	(0.684)	(3.850)	(1.600)	(3.273)	(3.855)
NEWS	**-4.18*****	**-8.807*****	-1.745	-6.618	7.087
	(0.792)	(2.505)	(3.593)	(6.482)	(4.810)
QE_ABS_CBPP_COLL	0.814	-0.320	0.882	**2.836*****	0.625
	(0.670)	(1.089)	(0.594)	(0.981)	(0.545)
Const	0.106	0.010	0.013	0.224	-0.213
	(0.097)	(0.485)	(0.297)	(0.539)	(0.585)
GARCH					
alpha(1)	**0.084*****	**0.111*****	**0.061*****	**0.103*****	**0.043*****
	(0.011)	(0.032)	(0.015)	(0.037)	(0.012)
beta(1)	**0.916*****	**0.882*****	**0.922*****	**0.879*****	**0.944*****
	(0.010)	(0.027)	(0.018)	(0.035)	(0.016)
alpha(0)	**0.011*****	0.075	**0.066****	**0.118***	0.041
	(0.004)	(0.046)	(0.028)	(0.063)	(0.025)
Time Effects	YES	YES	YES	YES	YES
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.00	0.35	0.00	0.089
AIC	15652	9081	6461	2410	4081
BIC	15679	9154	6643	2539	4238
Log Likelihood	-7795	-4527	-3196	-1175	-2008

Notes: Regression output for EuroStoxx Banks index. The regression model is given by Equation (2). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.6 Table 6: Eurostoxx Banks Index Garch specification (2)

Regression - Table 8

	(1) Austria	(2) Austria	(3) Austria	(4) Austria	(5) Austria
AUSTRIADSBANKSReturn					
AUSTRIADSBANKSReturn1	**0.053****	0.033	**0.048***	0.034	0.040
	(0.023)	(0.047)	(0.028)	(0.050)	(0.034)
AUSTRIADSBANKSReturn2	**-0.053***	**-0.087***	-0.050	**-0.132****	0.003
	(0.029)	(0.052)	(0.033)	(0.052)	(0.040)
AUSTRIADSBANKSReturn3	**-0.041***	-0.069	-0.040	-0.062	-0.031
	(0.023)	(0.048)	(0.030)	(0.056)	(0.036)
ECBAnnouncement	-0.049	-0.079	0.088	0.199	0.139
	(0.149)	(0.760)	(0.270)	(0.599)	(0.307)
NEWS	**-5.624*****	**-13.287*****	0.696	-3.609	**9.627***
	(1.434)	(3.296)	(3.786)	(5.207)	(5.501)
NEWS *ECBAnnouncement	2.678	1.700	5.404	6.125	8.101
	(4.169)	(11.157)	(7.150)	(9.692)	(13.883)
E_ECB* ECBAnnouncement	0.089	2.536	-0.302	-0.903	0.467
	(1.515)	(4.290)	(1.852)	(3.377)	(2.830)
QE_ABS_CBPP_COLL	-0.006	-3.476	0.593	0.225	0.493
	(0.853)	(4.171)	(0.543)	(1.192)	(0.608)
Const.	-0.042	-0.595	-0.123	-0.353	0.053
	(0.162)	(0.664)	(0.381)	(0.547)	(0.624)
Time Effects	YES	YES	YES	YES	YES
N	4353	609	1553	543	1010
R^2	2.6%	12.2%	2%	4.8%	2.8%
DW	2	2	1.99	1.99	1.99
P-value (F)	0.00%	0.03%	14.62%	0.00%	8.15%
LM autocorrelation test	0.56	0.907	0.035	0.009	0.009
Arch test	0.00%	0.00%	0.00%	0.00%	0.00%
Normality test	0.00%	0.00%	0.00%	0.00%	0.00%

Notes: Regression output for Austria DS Banks index. The regression model is given by Equation (1). All regressions are estimated with HAC consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.7 Table 8: Austria Banks Index

Regression - Table 9

	(1) Austria	(2) Austria	(3) Austria	(4) Austria	(5) Austria
AUSTRIADSBANKSReturn					
AUSTRIADSBANKSReturn1	**0.034****	0.005	0.036	0.020	0.043
	(0.017)	(0.042)	(0.029)	(0.050)	(0.034)
AUSTRIADSBANKSReturn2	**-0.028***	-0.045	-0.035	-0.069	0.000
	(0.016)	(0.041)	(0.028)	(0.047)	(0.035)
AUSTRIADSBANKSReturn3	**-0.044*****	-0.041	-0.043	-0.051	-0.030
	(0.016)	(0.043)	(0.026)	(0.046)	(0.032)
ECBAnnouncement	0.033	−0.230	0.063	-0.035	0.234
	(0.098)	(0.615)	(0.239)	(0.424)	(0.278)
NEWS*ECBAnnouncement	1.406	9.658	2.736	-1.100	15.699
	(1.966)	(7.400)	(7.108)	(7.502)	(16.023)
E_ECB*ECBAnnouncement	-0.401	1.897	-0.202	-2.141	1.893
	(0.847)	(4.775)	(2.208)	(2.642)	(4.075)
NEWS	**-1.583****	**−11.161****	1.135	-1.165	**9.358***
	(0.776)	(2.912)	(2.640)	(3.201)	(5.398)
QE_ABS_CBPP_COLL	0.133	−1.335	0.347	0.085	0.344
	(0.722)	(2.595)	(0.670)	(0.890)	(0.651)
Const	**0.080*****	−0.923	0.008	-0.004	-0.006
	(0.022)	(0.645)	(0.050)	(0.083)	(0.061)
GARCH					
alpha(1)	**0.078*****	**0.127***	**0.052****	**0.103*****	**0.021***
	(0.017)	(0.069)	(0.024)	(0.032)	(0.013)
beta(1)	**0.915*****	**0.849*****	**0.922*****	**0.892*****	**0.960*****
	(0.019)	(0.078)	(0.036)	(0.030)	(0.025)
alpha(0)	**0.030****	0.276	0.106	0.061	0.060
	(0.012)	(0.214)	(0.070)	(0.044)	(0.053)
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.001	0.484	0.00	0.20
AIC	16729	3093	6548	2360	4192
BIC	16812	3226	6618	2416	4256
Log Likelihood	-8351	−1516	-3261	-1167	-2083

Notes: Regression output for Austria DS Banks index. The regression model is given by Equation (2). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.8 Table 9: Austria Banks Index Garch specification (1)

Regression - Table 10

	(1) Austria	(2) Austria	(3) Austria	(4) Austria	(5) Austria
AUSTRIADSBANKSReturn					
AUSTRIADSBANKSReturn1	0.019	-0.011	0.022	0.026	0.018
	(0.015)	(0.041)	(0.027)	(0.047)	(0.032)
AUSTRIADSBANKSReturn2	**-0.030****	-0.053	-0.028	-0.053	-0.016
	(0.014)	(0.044)	(0.025)	(0.046)	(0.032)
AUSTRIADSBANKSReturn3	**-0.027***	-0.031	-0.022	-0.027	-0.020
	(0.014)	(0.043)	(0.024)	(0.044)	(0.029)
ECBAnnouncement	0.000	-0.001	0.020	-0.082	0.146
	(0.092)	(0.763)	(0.236)	(0.459)	(0.287)
NEWS*ECBAnnouncement	0.847	7.569	3.988	1.106	14.537
	(1.612)	(8.673)	(6.142)	(7.741)	(16.867)
E_ECB*ECBAnnouncement	-0.179	0.267	-0.785	-1.627	0.965
	(0.609)	(6.561)	(1.944)	(2.801)	(4.434)
NEWS	-1.051	**-10.949****	0.611	-1.380	6.812
	(0.797)	(2.810)	(2.486)	(3.797)	(5.097)
QE_ABS_CBPP_COLL	0.403	-0.268	0.467	0.436	0.347
	(0.761)	(1.988)	(0.750)	(0.895)	(0.749)
Const	**0.059*****	-0.891	0.014	0.000	0.011
	(0.019)	(0.582)	(0.044)	(0.070)	(0.055)
GARCH					
alpha(1)	**0.075*****	**0.108***	**0.052*****	**0.091*****	**0.037****
	(0.013)	(0.058)	(0.013)	(0.028)	(0.015)
beta(1)	**0.925*****	**0.870*****	**0.933*****	**0.900*****	**0.945*****
	(0.013)	(0.068)	(0.018)	(0.030)	(0.023)
alpha(0)	**0.018****	0.259	**0.062***	0.069	0.064
	(0.007)	(0.218)	(0.032)	(0.050)	(0.048)
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.01	0.46	0.01	0.01
AIC	16449	3075	6464	2347	4136
BIC	16532	3207	6533	2403	4200
Log Likelihood	-8211	-1507	-3219	-1160	-2055

Notes: Regression output for Austria DS Banks index. The regression model is given by Equation (2). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.9 Table 10: Austria Banks Index Garch specification (2)

Regression - Table 11

	(1) Belgium	(2) Belgium	(3) Belgium	(4) Belgium	(5) Belgium
FTSEBELGIUMBANKSReturn					
FTSEBELGIUMBANKSReturn1	**0.108*****	**0.122****	0.053	0.027	0.049
	(0.028)	(0.054)	(0.040)	(0.070)	(0.046)
FTSEBELGIUMBANKSReturn2	-0.006	0.013	-0.045	-0.085	-0.015
	(0.026)	(0.052)	(0.034)	(0.053)	(0.041)
FTSEBELGIUMBANKSReturn3	**-0.060****	**-0.092***	**-0.059***	**-0.102***	-0.040
	(0.025)	(0.050)	(0.033)	(0.052)	(0.041)
ECBAnnouncement	0.010	0.440	0.335	0.234	0.493
	(0.215)	(1.078)	(0.433)	(0.753)	(0.571)
NEWS	**-8.992*****	**-20.581*****	-1.604	-8.175	**11.705***
	(2.017)	(6.236)	(5.790)	(8.097)	(5.996)
NEWS*ECBAnnouncement	**13.409****	**35.951****	7.914	12.723	20.404
	(6.105)	(14.179)	(11.246)	(14.235)	(17.488)
E_ECB*ECBAnnouncement	3.132	7.283	2.734	2.057	4.099
	(2.254)	(6.775)	(2.162)	(4.085)	(3.327)
QE_ABS_CBPP_COLL	1.066	-0.298	1.150	**4.326****	0.772
	(1.084)	(5.514)	(0.820)	(1.954)	(0.921)
Const.	0.072	0.458	0.373	0.611	-0.907
	(0.190)	(0.951)	(0.528)	(0.856)	(1.053)
Time Effects	YES	YES	YES	YES	YES
N	4353	609	1553	543	1010
R^2	4.5%	12.6%	3.1%	4.6%	4.5%
DW	1.99	2	1.99	2	2
P-value (F)	0.00%	0.10%	9.12%	0.00%	0.63%
LM autocorrelation test	0.727	0.852	0.195	0.025	0.00
Arch test	0.00%	0.00%	0.00%	0.00%	0.00%
Normality test	0.00%	0.00%	0.00%	0.00%	0.00%

Notes: Regression output for FTSE Belgium Banks index. The regression model is given by Equation (1). All regressions are estimated with HAC consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.10 Table 11: FTSE Belgium Banks Index

Regression - Table 12

	(1) Belgium	(2) Belgium	(3) Belgium	(4) Belgium	(5) Belgium
FTSEBELGIUMBANKSReturn					
FTSEBELGIUMBANKSReturn1	**0.041****	0.020	0.018	0.077	-0.008
	(0.017)	(0.054)	(0.028)	(0.050)	(0.036)
FTSEBELGIUMBANKSReturn2	-0.000	-0.009	-0.029	-0.060	-0.015
	(0.016)	(0.056)	(0.026)	(0.046)	(0.032)
FTSEBELGIUMBANKSReturn3	-0.020	-0.021	-0.042	-0.059	-0.038
	(0.016)	(0.079)	(0.026)	(0.048)	(0.041)
ECBAnnouncement	0.018	0.924	0.568	0.003	**0.842****
	(0.096)	(0.665)	(0.356)	(0.675)	(0.388)
NEWS*ECBAnnouncement	2.268	**20.876***	6.796	12.256	24.101
	(2.262)	(12.664)	(10.215)	(11.493)	(16.738)
E_ECB*ECBAnnouncement	0.380	6.974	1.167	5.712	3.075
	(0.837)	(10.069)	(1.378)	(4.005)	(2.343)
NEWS	**-2.965*****	**−13.669****	0.593	-6.014	11.456
	(0.948)	(3.584)	(4.345)	(5.897)	(7.461)
QE_ABS_CBPP_COLL	0.012	0.345	-0.255	**3.451****	-0.662
	(0.767)	(3.507)	(0.724)	(1.567)	(0.808)
Const	**0.050****	−0.471	0.063	-0.093	**0.119***
	(0.020)	(1.206)	(0.054)	(0.105)	(0.065)
GARCH					
alpha(1)	**0.121*****	**0.328***	**0.102*****	**0.185****	**0.047****
	(0.021)	(0.192)	(0.036)	(0.089)	(0.022)
beta(1)	**0.882*****	**0.671****	**0.880*****	**0.775*****	**0.943*****
	(0.019)	(0.320)	(0.043)	(0.112)	(0.026)
alpha(0)	**0.021*****	0.670	**0.125***	0.448	0.040
	(0.008)	(2.189)	(0.075)	(0.368)	(0.029)
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.00	0.38	0.00	0.01
AIC	17536	3310	7191	2661	4541
BIC	17612	3442	7261	2717	4604
Log Likelihood	-8756	-1625	-3582	-1317	-2257

Notes: Regression output for FTSE Belgium Banks index. The regression model is given by Equation (2). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.11 Table 12: FTSE Belgium Banks Index Garch specification (1)

Regression - Table 13

	(1) Belgium	(2) Belgium	(3) Belgium	(4) Belgium	(5) Belgium
FTSEBELGIUMBANKSReturn					
FTSEBELGIUMBANKSReturn1	**0.051*** **	0.052	0.020	**0.096** **	-0.021
	(0.016)	(0.046)	(0.028)	(0.048)	(0.033)
FTSEBELGIUMBANKSReturn2	-0.001	-0.002	-0.025	-0.054	-0.009
	(0.015)	(0.042)	(0.025)	(0.045)	(0.032)
FTSEBELGIUMBANKSReturn3	-0.018	-0.047	-0.029	-0.047	-0.008
	(0.015)	(0.037)	(0.025)	(0.045)	(0.033)
ECBAnnouncement	-0.003	0.493	**0.599***	-0.208	**0.893** **
	(0.093)	(0.532)	(0.338)	(0.673)	(0.366)
NEWS*ECBAnnouncement	1.146	5.778	9.290	16.140	14.536
	(1.933)	(9.033)	(12.732)	(13.098)	(17.737)
E_ECB*ECBAnnouncement	0.630	2.643	1.345	5.713	3.001
	(0.907)	(7.927)	(1.454)	(3.585)	(2.567)
NEWS	**-2.505*** **	**-9.850*** **	-0.211	-9.471	**15.216** **
	(0.769)	(2.988)	(4.489)	(8.285)	(6.343)
QE_ABS_CBPP_COLL	0.651	0.628	0.115	**3.686** **	-0.202
	(0.681)	(3.192)	(0.719)	(1.704)	(0.855)
Const	**0.054*** **	0.687	0.054	-0.116	0.105
	(0.019)	(0.595)	(0.052)	(0.098)	(0.064)
GARCH					
alpha(1)	**0.127*** **	**0.236** **	**0.104** **	**0.177** **	**0.046***
	(0.020)	(0.097)	(0.044)	(0.075)	(0.027)
beta(1)	**0.878*** **	**0.793*** **	**0.883*** **	**0.793*** **	**0.948*** **
	(0.018)	(0.074)	(0.049)	(0.093)	(0.029)
alpha(0)	**0.022*** **	0.200	0.105	0.382	0.026
	(0.007)	(0.180)	(0.077)	(0.321)	(0.026)
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.00	0.40	0.00	0.01
AIC	17396	3263	7165	2647	4517
BIC	17479	3396	7235	2702	4581
Log Likelihood	-8685	-1601	-3569	-1310	-2245

Notes: Regression output for FTSE Belgium Banks index. The regression model is given by Equation (2). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.12 Table 13: FTSE Belgium Banks Index Garch specification (2)

Regression - Table 14

	(1) Spain	(2) Spain	(3) Spain	(4) Spain	(5) Spain
FTSESPAINBANKSReturn					
FTSESPAINBANKSReturn1	0.023	0.012	0.054	0.073	0.026
	(0.022)	(0.049)	(0.038)	(0.069)	(0.037)
FTSESPAINBANKSReturn2	**-0.039***	-0.024	**-0.071*****	**-0.117*****	-0.033
	(0.021)	(0.051)	(0.026)	(0.042)	(0.033)
FTSESPAINBANKSReturn3	**-0.047****	-0.071	-0.033	-0.046	-0.022
	(0.021)	(0.052)	(0.026)	(0.042)	(0.035)
ECBAnnouncement	-0.108	-0.310	-0.007	0.009	0.012
	(0.161)	(0.484)	(0.329)	(0.665)	(0.399)
NEWS	**-8.496*****	**-10.619*****	-1.679	-4.040	3.879
	(1.396)	(2.672)	(4.897)	(7.126)	(3.912)
NEWS*ECBAnnouncement	**8.497****	9.901	3.329	4.290	11.065
	(3.948)	(8.351)	(9.458)	(12.449)	(15.361)
E_ECB*ECBAnnouncement	1.828	**5.215****	1.518	1.441	2.327
	(1.241)	(2.455)	(2.387)	(2.917)	(3.427)
QE_ABS_CBPP_COLL	0.766	-1.934	1.263	**2.263***	1.093
	(0.774)	(2.180)	(0.794)	(1.358)	(0.899)
Const.	-0.008	-0.384	0.152	0.275	0.037
	(0.172)	(0.604)	(0.312)	(0.556)	(0.474)
Time Effects	YES	YES	YES	YES	YES
N	4353	609	1553	543	1010
R^2	3.4%	10.6%	2%	3.7%	2.1%
DW	1.98	1.99	2	2	1.99
P-value (F)	0.00%	0.02%	4.54%	0.00%	44%
LM autocorrelation test	0.061	0.138	0.022	0.03	0.095
Arch test	0.00%	0.00%	0.00%	0.00%	0.00%
Normality test	0.00%	0.00%	0.00%	0.00%	0.00%

Notes: Regression output for FTSE Spain Banks index. The regression model is given by Equation (1). All regressions are estimated with HAC consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.13 Table 14: FTSE Spain Banks Index

Regression - Table 15

	(1) Spain	(2) Spain	(3) Spain	(4) Spain	(5) Spain
FTSESPAINBANKSReturn					
FTSESPAINBANKSReturn1	0.007	0.001	0.032	0.045	0.020
	(0.016)	(0.042)	(0.030)	(0.059)	(0.032)
FTSESPAINBANKSReturn2	**-0.029***	−0.017	**-0.054****	**-0.092***	−0.029
	(0.016)	(0.045)	(0.027)	(0.047)	(0.032)
FTSESPAINBANKSReturn3	-0.025	**−0.076***	-0.025	-0.047	−0.004
	(0.016)	(0.040)	(0.028)	(0.046)	(0.034)
ECBAnnouncement	0.016	0.112	0.276	0.072	0.376
	(0.100)	(0.373)	(0.246)	(0.484)	(0.300)
NEWS *ECBAnnouncement	**4.286***	10.694	3.905	6.204	16.648
	(2.693)	(7.562)	(7.772)	(10.160)	(13.663)
E_ECB*ECBAnnouncement	0.059	3.477	-0.555	2.695	0.111
	(0.832)	(3.289)	(1.485)	(2.639)	(2.080)
NEWS	**-4.921*****	**-7.063*****	-2.420	-7.096	4.453
	(0.835)	(2.243)	(2.845)	(4.402)	(4.152)
QE_ABS_CBPP_COLL	0.301	0.375	0.375	**1.928***	0.054
	(0.900)	(0.722)	(0.749)	(1.115)	(0.786)
Const	**0.044****	−0.377	0.000	-0.064	−0.001
	(0.021)	(0.754)	(0.048)	(0.089)	(0.053)
GARCH					
alpha(1)	**0.098*****	**0.146*****	**0.088*****	**0.151****	**0.046*****
	(0.015)	(0.047)	(0.030)	(0.064)	(0.014)
beta(1)	**0.899*****	**0.853*****	**0.885*****	**0.817*****	**0.934*****
	(0.013)	(0.036)	(0.034)	(0.059)	(0.020)
alpha(0)	**0.025*****	0.063	0.120**	0.250	0.060*
	(0.008)	(0.040)	(0.053)	(0.154)	(0.033)
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.06	0.36	0.00	0.49
AIC	16582	2711	6460	2434	4027
BIC	16665	2843	6530	2490	4091
Log Likelihood	-8278	−1325	-3217	-1204	−2000

Notes: Regression output for FTSE Spain Banks index. The regression model is given by Equation (2). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.14 Table 15: FTSE Spain Banks Index Garch specification (1)

Regression - Table 16

	(1) Spain	(2) Spain	(3) Spain	(4) Spain	(5) Spain
FTSESPAINBANKSReturn					
FTSESPAINBANKSReturn1	0.007	-0.017	0.037	0.068	0.018
	(0.015)	(0.038)	(0.026)	(0.046)	(0.032)
FTSESPAINBANKSReturn2	**-0.025***	-0.009	-0.037	-0.057	-0.025
	(0.015)	(0.041)	(0.025)	(0.043)	(0.031)
FTSESPAINBANKSReturn3	-0.019	-0.055	-0.019	-0.044	0.000
	(0.015)	(0.042)	(0.024)	(0.040)	(0.032)
ECBAnnouncement	0.095	0.026	0.322	0.072	0.421
	(0.100)	(0.302)	(0.224)	(0.382)	(0.313)
NEWS*ECBAnnouncement	**5.239***	**13.260*****	4.787	10.074	13.594
	(3.155)	(3.891)	(9.515)	(11.107)	(16.808)
E_ECB*ECBAnnouncement	0.575	3.658	-0.298	2.597	0.229
	(0.979)	(2.502)	(2.002)	(2.131)	(3.210)
NEWS	**-5.071*****	**-7.395*****	-1.814	-7.694	4.063
	(0.936)	(2.295)	(3.254)	(6.744)	(3.961)
QE_ABS_CBPP_COLL	0.608	-0.075	0.717	**2.317****	0.440
	(0.561)	(0.831)	(0.497)	(1.078)	(0.494)
Const	**0.044****	-0.291	-0.014	-0.116	0.014
	(0.019)	(0.493)	(0.043)	(0.085)	(0.051)
GARCH					
alpha(1)	**0.086*****	**0.111*****	**0.066*****	**0.083****	**0.055*****
	(0.010)	(0.032)	(0.015)	(0.039)	(0.015)
beta(1)	**0.912*****	**0.887*****	**0.914*****	**0.876*****	**0.925*****
	(0.010)	(0.027)	(0.020)	(0.054)	(0.021)
alpha(0)	**0.018*****	0.052	**0.088****	0.229	**0.065***
	(0.006)	(0.038)	(0.038)	(0.155)	(0.037)
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.06	0.34	0.00	0.40
AIC	16430	2690	6377	2404	3983
BIC	16512	2822	6447	2460	4047
Log Likelihood	-8202	-1315	-3175	-1189	-1978

Notes: Regression output for FTSE Spain Banks index. The regression model is given by Equation (2). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.15 Table 16: FTSE Spain Banks Index Garch specification (2)

Regression - Table 17

	(1) France	(2) France	(3) France	(4) France	(5) France
EURONEXTCACBANKSReturn					
EURONEXTCACBANKSReturn1	**0.038***	0.010	0.026	0.009	0.018
	(0.021)	(0.039)	(0.035)	(0.057)	(0.040)
EURONEXTCACBANKSReturn2	-0.011	0.005	-0.020	-0.038	0.009
	(0.028)	(0.048)	(0.045)	(0.068)	(0.046)
EURONEXTCACBANKSReturn3	**-0.065****	-0.043	**-0.106*****	**-0.131****	-0.087
	(0.026)	(0.054)	(0.037)	(0.054)	(0.055)
ECBAnnouncement	-0.100	-0.405	0.231	0.280	0.340
	(0.163)	(0.619)	(0.338)	(0.637)	(0.406)
NEWS	**-10.290*****	**-14.632*****	-4.550	-9.652	6.032
	(1.610)	(3.587)	(5.572)	(8.133)	(5.854)
NEWS*ECBAnnouncement	**10.025****	**25.242****	4.124	0.698	**43.198****
	(4.693)	(10.359)	(11.531)	(11.049)	(17.762)
E_ECB*ECBAnnouncement	1.702	4.712	-0.146	-0.284	2.487
	(1.518)	(4.391)	(2.653)	(3.973)	(3.267)
QE_ABS_CBPP_COLL	1.065	**-3.685***	**1.763****	**5.131*****	1.175
	(0.914)	(2.050)	(0.826)	(1.322)	(0.867)
CONST.	0.191	-0.203	0.158	-0.020	-0.053
	(0.187)	(0.842)	(0.372)	(0.647)	(0.783)
Time Effects	YES	YES	YES	YES	YES
N	4353	609	1553	543	1010
R^2	4%	11.4%	3.1%	5.1%	4.5%
DW	2	2	1.99	2	1.99
P-value (F)	0.00%	0.07%	7.24%	0.00%	0.00%
LM autocorrelation test	0.169	0.67	0.576	0.232	0.00
Arch test	0.00%	0.00%	0.00%	0.00%	0.00%
Normality test	0.00%	0.00%	0.00%	0.00%	0.00%

Notes: Regression output for EuroNext Cac Banks index. The regression model is given by Equation (1). All regressions are estimated with HAC consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.16 Table 17: EuroNext CaC Banks Index

Regression - Table 18

	(1) France	(2) France	(3) France	(4) France	(5) France
EURONEXTCACBANKSReturn					
EURONEXTCACBAKSReturn1	0.019	0.011	0.010	0.031	0.015
	(0.016)	(0.041)	(0.028)	(0.051)	(0.044)
EURONEXTCACBANKSReturn2	-0.021	-0.040	-0.015	−0.041	0.002
	(0.016)	(0.040)	(0.025)	(0.043)	(0.032)
EURONEXTCACBANKSReturn3	**-0.047*****	-0.056**	**-0.068****	**−0.092****	-0.088
	(0.016)	(0.040)	(0.027)	(0.045)	(0.058)
ECBAnnouncement	0.120	−0.083	**0.503***	0.442	**0.624***
	(0.115)	(0.510)	(0.294)	(0.602)	(0.339)
NEWS*ECBAnnouncement	**5.708****	**14.597***	0.907	−6.609	**40.195*****
	(2.876)	(7.919)	(9.140)	(10.807)	(14.329)
E_ECB*ECBAnnouncement	-0.259	3.826	-1.296	1.351	0.208
	(0.921)	(4.726)	(1.051)	(4.809)	(1.276)
NEWS	**-5.563*****	**-11.328*****	0.403	−3.929	5.165
	(1.250)	(2.510)	(3.126)	(4.383)	(6.421)
QE_ABS_CBPP_COLL	0.301	−1.218	0.347	**4.307*****	-0.078
	(0.906)	(1.287)	(0.885)	(1.221)	(0.948)
Const	**0.052****	−0.180	0.036	−0.039	0.049
	(0.021)	(0.875)	(0.048)	(0.092)	(0.056)
GARCH					
alpha(1)	**0.084*****	**0.135*****	**0.078*****	**0.148****	**0.040*****
	(0.014)	(0.045)	(0.022)	(0.059)	(0.011)
beta(1)	**0.910*****	**0.859*****	**0.911*****	**0.848*****	**0.950*****
	(0.014)	(0.037)	(0.024)	(0.056)	(0.013)
alpha(0)	**0.027*****	**0.127***	**0.058****	0.133	**0.027***
	(0.009)	(0.071)	(0.029)	(0.100)	(0.015)
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.00	0.00	0.00	0.00
AIC	16981	3044	6675	2543	4149
BIC	17064	3177	6745	2599	4213
Log Likelihood	-8477	-1492	-3324	−1258	-2061

Notes: Regression output for EuroNext Cac Banks index. The regression model is given by Equation (2). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.17 Table 18: EuroNext CaC Banks Index Garch specification (1)

Regression - Table 19

	(1) France	(2) France	(3) France	(4) France	(5) France
EURONEXTCACBANKSReturn					
EURONEXTCACBANKSReturn1	0.018	-0.004	0.018	0.058	-0.015
	(0.015)	(0.041)	(0.026)	(0.046)	(0.032)
EURONEXTCACBANKSReturn2	-0.024	-0.023	-0.009	-0.032	0.009
	(0.015)	(0.038)	(0.024)	(0.042)	(0.031)
EURONEXTCACBANKSReturn3	**-0.041*****	-0.052**	**-0.058****	**-0.083***	-0.037
	(0.015)	(0.040)	(0.026)	(0.043)	(0.033)
ECBAnnouncement	0.121	-0.098	**0.508***	0.225	**0.660****
	(0.109)	(0.491)	(0.289)	(0.575)	(0.320)
NEWS*ECBAnnouncement	**5.013***	**18.446***	2.357	-4.685	**33.689****
	(3.123)	(10.140)	(9.332)	(11.485)	(14.778)
E_ECB*ECBAnnouncement	-0.062	7.629	-1.172	0.879	0.289
	(1.033)	(7.634)	(1.016)	(3.949)	(1.274)
NEWS	**-4.779*****	**-10.092*****	-0.445	-5.916	8.167
	(0.811)	(2.425)	(3.610)	(6.269)	(5.526)
QE_ABS_CBPP_COLL	1.028	-1.108	**1.079***	**4.467*****	0.694
	(0.697)	(1.548)	(0.612)	(1.291)	(0.573)
Const	**0.054*****	0.300	0.030	-0.061	0.052
	(0.020)	(0.603)	(0.046)	(0.089)	(0.055)
GARCH					
alpha(1)	**0.078*****	**0.111*****	**0.069*****	**0.120*****	**0.044*****
	(0.010)	(0.041)	(0.017)	(0.044)	(0.013)
beta(1)	**0.918*****	**0.882*****	**0.920*****	**0.869*****	**0.947*****
	(0.011)	(0.035)	(0.019)	(0.042)	(0.016)
alpha(0)	**0.023*****	0.127	**0.052****	0.139	0.028
	(0.007)	(0.082)	(0.025)	(0.086)	(0.019)
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.00	0.00	0.00	0.00
AIC	16831	3027	6634	2529	4107
BIC	16914	3159	6703	2585	4170
Log Likelihood	-8402	-1483	-3304	-1251	-2040

Notes: Regression output for EuroNext Cac Banks index. The regression model is given by Equation (2). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.18 Table 19: EuroNext CaC Banks Index Garch specification (2)

Regression - Table 20

	(1) Germany	(2) Germany	(3) Germany	(4) Germany	(5) Germany
DAXBANKSXETRAReturn					
DAXBANKSXETRAReturn1	**0.046***	0.041	0.031	0.033	0.007
	(0.027)	(0.058)	(0.030)	(0.047)	(0.038)
DAXBANKSXETRAReturn2	-0.039	**-0.102***	-0.020	-0.053	0.005
	(0.029)	(0.054)	(0.037)	(0.062)	(0.039)
DAXBANKSXETRAReturn3	-0.032	-0.045	**-0.071****	**-0.138****	-0.029
	(0.030)	(0.067)	(0.035)	(0.062)	(0.041)
ECBAnnouncement	-0.169	-0.238	0.041	-0.219	0.361
	(0.170)	(0.706)	(0.298)	(0.541)	(0.371)
NEWS	**-12.262*****	**-18.475*****	-5.692	**-10.576***	5.477
	(1.853)	(4.232)	(4.234)	(5.933)	(4.578)
NEWS*ECBAnnouncement	**12.845*****	**27.060***	11.868	6.573	**37.381****
	(4.942)	(14.063)	(9.529)	(8.976)	(15.864)
E_ECB*ECBAnnouncement	**3.410****	**9.432****	2.209	1.402	**5.077***
	(1.695)	(4.087)	(2.555)	(2.207)	(2.724)
QE_ABS_CBPP_COLL	0.696	-3.031	**1.296***	1.507	0.920
	(0.951)	(4.279)	(0.675)	(1.051)	(0.742)
Const.	0.030	-1.090	0.021	-0.480	0.254
	(0.194)	(0.945)	(0.365)	(0.584)	(0.645)
Time Effects	YES	YES	YES	YES	YES
N	4353	609	1553	543	1010
R^2	4.9%	14.6%	2.5%	6.8%	3%
DW	1.99	1.99	1.99	2	1.99
P-value (F)	0.00%	0.00%	18.00%	0.00%	0.00%
LM autocorrelation test	0.01	0.21	0.12	0.039	0.012
Arch test	0.00%	0.00%	0.00%	0.00%	0.00%
Normality test	0.00%	0.00%	0.00%	0.00%	0.00%

Notes: Regression output for DAX XETRA Banks index. The regression model is given by Equation (1). All regressions are estimated with HAC consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.19 Table 20: Dax Banks Index

Regression - Table 21

	(1) Germany	(2) Germany	(3) Germany	(4) Germany	(5) Germany
DAXBANKSXETRAReturn					
DAXBANKSXETRAReturn1	**0.030***	-0.045	0.037	**0.076***	0.026
	(0.016)	(0.043)	(0.026)	(0.045)	(0.036)
DAXBANKSXETRAReturn2	-0.003	-0.067	-0.010	-0.006	-0.005
	(0.015)	(0.042)	(0.025)	(0.044)	(0.031)
DAXBANKSXETRAReturn3	-0.020	**-0.079***	-0.031	**-0.094****	-0.017
	(0.016)	(0.047)	(0.027)	(0.046)	(0.042)
ECBAnnouncement	0.135	−0.008	0.392	0.233	**0.588***
	(0.116)	(0.396)	(0.245)	(0.416)	(0.309)
NEWS*ECBAnnouncement	4.221	**13.903****	8.978	4.180	**41.846*****
	(2.670)	(6.533)	(7.635)	(7.029)	(13.431)
E_ECB*ECBAnnouncement	-0.134	5.214	1.180	1.561	**3.428***
	(0.939)	(4.282)	(2.457)	(2.076)	(1.965)
NEWS	**-5.431*****	**-7.212*****	-1.905	-4.786	3.039
	(0.923)	(2.284)	(2.714)	(3.557)	(5.174)
QE_ABS_CBPP_COLL	0.396	0.722	0.388	**1.586****	0.070
	(0.793)	(1.656)	(0.783)	(0.734)	(0.806)
Const	0.026	-0.046	-0.033	-0.047	-0.031
	(0.023)	(0.043)	(0.046)	(0.086)	(0.056)
GARCH					
alpha(1)	**0.089*****	**0.141*****	**0.058*****	**0.088****	**0.043*****
	(0.014)	(0.033)	(0.014)	(0.035)	(0.013)
beta(1)	**0.905*****	**0.858*****	**0.930*****	**0.911*****	**0.946*****
	(0.014)	(0.025)	(0.016)	(0.037)	(0.016)
alpha(0)	0.905	**0.096***	**0.049****	0.041	0.036
	(0.010)	(0.052)	(0.023)	(0.051)	(0.022)
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.00	0.55	0.00	0.01
AIC	17332	3108	6496	2359	4153
BIC	17415	3240	6566	2415	4217
Log Likelihood	-8653	-1524	-3235	-1166	-2063

Notes: Regression output for DAX XETRA Banks index. The regression model is given by Equation (2). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.20 Table 21: Dax Banks Index Garch specification (1)

Regression - Table 22

	(1) Germany	(2) Germany	(3) Germany	(4) Germany	(5) Germany
DAXBANKSXETRAReturn					
DAXBANKSXETRAReturn1	**0.033****	-0.032	**0.044***	**0.084***	0.019
	(0.014)	(0.041)	(0.025)	(0.044)	(0.031)
DAXBANKSXETRAReturn2	-0.005	-0.053	-0.004	-0.004	0.001
	(0.015)	(0.041)	(0.025)	(0.044)	(0.031)
DAXBANKSXETRAReturn3	-0.022	-0.044	-0.030	**-0.085***	-0.000
	(0.015)	(0.047)	(0.027)	(0.047)	(0.034)
ECBAnnouncement	0.123	-0.063	**0.425***	0.210	**0.602***
	(0.108)	(0.368)	(0.246)	(0.432)	(0.310)
NEWS*ECBAnnouncement	**5.381****	**15.718*****	10.651	4.088	**40.065*****
	(2.640)	(5.951)	(7.679)	(6.455)	(13.986)
E_ECB*ECBAnnouncement	0.685	**8.225***	1.818	0.681	**4.113****
	(0.852)	(4.897)	(2.630)	(1.689)	(1.609)
NEWS	**-4.741*****	**-10.811*****	-2.452	-5.387	4.406
	(0.900)	(2.858)	(3.116)	(4.634)	(4.860)
QE_ABS_CBPP_COLL	0.949	1.479	0.888	**1.606****	0.565
	(0.628)	(1.238)	(0.638)	(0.628)	(0.610)
Const	0.033	-0.180	-0.026	0.628	-0.011
	(0.021)	(0.641)	(0.045)	(0.081)	(0.055)
GARCH					
alpha(1)	**0.085*****	**0.130*****	**0.051*****	**0.077*****	**0.040*****
	(0.012)	(0.037)	(0.012)	(0.027)	(0.013)
beta(1)	**0.912*****	**0.874*****	**0.938*****	**0.920*****	**0.953*****
	(0.012)	(0.028)	(0.013)	(0.031)	(0.015)
alpha(0)	**0.024*****	0.096	**0.041****	0.043	0.027
	(0.008)	(0.074)	(0.020)	(0.049)	(0.021)
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.00	0.58	0.00	0.01
AIC	17179	3081	6471	2350	4133
BIC	17262	3213	6540	2406	4197
Log Likelihood	-8576	-1510	-3222	-1162	-2053

Notes: Regression output for DAX XETRA Banks index. The regression model is given by Equation (2). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.21 Table 22: Dax Banks Index Garch specification (2)

Regression - Table 23

	(1) Greece	(2) Greece	(3) Greece	(4) Greece	(5) Greece
FTSEATHEXBANKSReturn					
FTSEATHEXBANKSReturn1	**0.086****	0.033	**0.079***	-0.076	**0.103***
	(0.038)	(0.041)	(0.047)	(0.055)	(0.056)
FTSEATHEXBANKSReturn2	-0.030	-0.040	-0.030	**-0.152*****	-0.008
	(0.025)	(0.047)	(0.031)	(0.044)	(0.036)
FTSEATHEXBANKSReturn3	-0.019	-0.035	-0.027	**-0.101****	-0.019
	(0.030)	(0.054)	(0.039)	(0.048)	(0.049)
ECBAnnouncement	-0.022	0.253	-0.274	-0.086	-0.219
	(0.226)	(0.656)	(0.602)	(0.756)	(0.839)
NEWS	**-3.851****	**-8.301****	0.977	-7.000	17.420
	(1.581)	(4.049)	(5.758)	(7.127)	(12.133)
NEWS*ECBAnnouncement	4.909	7.776	-6.800	-3.072	28.331
	(3.628)	(8.643)	(11.376)	(13.096)	(28.410)
E_ECB*ECBAnnouncement	1.323	**5.846****	-7.494	5.757	-6.908
	(1.317)	(2.880)	(4.793)	(9.048)	(5.283)
QE_ABS_CBPP_COLL	-0.690	**-5.482*****	-0.015	**-3.255****	-0.458
	(1.204)	(1.733)	(1.248)	(1.351)	(1.275)
Const.	**0.558****	0.195	0.447	0.725	0.405
	(0.252)	(0.563)	(0.699)	(0.935)	(0.974)
Time Effects	YES	YES	YES	YES	YES
N	4353	609	1553	543	1010
R^2	2.3%	12.8%	2.3%	6.3%	3.5%
DW	2	2	2	2	1.99
P-value (F)	1.30%	17.00%	37.00%	2.53%	5.44%
LM autocorrelation test	0.074	0.387	0.345	0.029	0.379
Arch test	0.00%	0.00%	0.00%	0.00%	0.00%
Normality test	0.00%	0.00%	0.00%	0.00%	0.00%

Notes: Regression output for FTSE Athex Banks index. The regression model is given by Equation (1). All regressions are estimated with HAC consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.22 Table 23: FTSE Athex Banks Index

Regression - Table 24

	(1) Greece	(2) Greece	(3) Greece	(4) Greece	(5) Greece
FTSEATHEXBANKSReturn					
FTSEATHEXBANKSReturn1	**0.077*** **	0.029	**0.053** **	-0.004	**0.069** **
	(0.012)	(0.039)	(0.026)	(0.043)	(0.033)
FTSEATHEXBANKSReturn2	**-0.051*** **	-0.031	**-0.054** **	**-0.132*** **	-0.015
	(0.009)	(0.043)	(0.023)	(0.048)	(0.029)
FTSEATHEXBANKSReturn3	**-0.026*** **	-0.040	-0.024	**-0.089** **	-0.008
	(0.008)	(0.043)	(0.018)	(0.037)	(0.023)
ECBAnnouncement	0.206	0.074	-0.010	0.223	-0.217
	(0.159)	(0.430)	(0.532)	(0.873)	(0.719)
NEWS *ECBAnnouncement	6.037	**9.419***	-1.805	-0.114	26.312
	(4.324)	(5.842)	(24.699)	(32.512)	(42.408)
E_ECB* ECBAnnouncement	0.707	4.424	-3.874	4.891	-5.640
	(1.067)	(3.580)	(5.608)	(15.651)	(9.028)
NEWS	**-4.779*** **	**-8.017*** **	-1.643	**-9.516** **	**12.920** **
	(0.940)	(2.645)	(4.234)	(3.868)	(5.224)
QE_ABS_CBPP_COLL	-0.748	**-4.566** **	0.661	-3.712	0.462
	(0.470)	(2.030)	(0.936)	(3.3e+08)	(1.086)
Const.	-0.043	-0.084	**-0.293*** **	**-0.506*** **	**-0.230***
	(0.034)	(0.569)	(0.104)	(0.166)	(0.134)
GARCH					
alpha(1)	**0.315*** **	**0.136*** **	**0.207*** **	**0.124*** **	**0.223*** **
	(0.011)	(0.036)	(0.021)	(0.035)	(0.028)
beta(1)	**0.685*** **	**0.863*** **	**0.793*** **	**0.876*** **	**0.777*** **
	(0.011)	(0.032)	(0.021)	(0.035)	(0.028)
alpha(0)	**0.333*** **	0.111	**1.008*** **	**0.495***	**1.203*** **
	(0.064)	(0.74)	(0.258)	(0.261)	(0.407)
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.00	0.18	0.00	0.04
AIC	21696	3000	9148	3010	6114
BIC	21766	3127	9207	3057	6168
Log Likelihood	-10837	-1471	-4563	-1494	-3046

Notes: Regression output for FTSE Athex Banks index. The regression model is given by Equation (2). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.23 Table 24: FTSE Athex Banks Index Garch specification (1)

Regression - Table 25

	(1) Greece	(2) Greece	(3) Greece	(4) Greece	(5) Greece
FTSEATHEXBANKSReturn					
FTSEATHEXBANKSReturn1	**0.104*** **	0.030	**0.046***	-0.023	**0.058***
	(0.015)	(0.036)	(0.026)	(0.043)	(0.033)
FTSEATHEXBANKSReturn2	-0.026	-0.050	-0.029	**-0.082***	-0.003
	(0.015)	(0.048)	(0.024)	(0.043)	(0.029)
FTSEATHEXBANKSReturn3	0.003	-0.013	0.000	-0.019	0.002
	(0.015)	(0.043)	(0.025)	(0.044)	(0.003)
ECBAnnouncement	0.180	0.030	0.248	0.474	-0.131
	(0.125)	(0.496)	(0.415)	(0.650)	(0.454)
NEWS*ECBAnnouncement	**3.928***	10.806	-1.333	-0.910	**53.159*** **
	(2.242)	(6.763)	(9.108)	(12.829)	(20.556)
E_ECB*ECBAnnouncement	0.969	5.096	**-6.248** **	6.222	**-7.244*** **
	(0.786)	(3.531)	(2.679)	(7.918)	(1.491)
NEWS	**-4.267*** **	**-8.469** **	-3.356	-6.355	6.783
	(1.112)	(3.642)	(4.562)	(6.654)	(10.381)
QE_ABS_CBPP_COLL	-1.148	**-4.355** **	0.180	**-2.689** **	-0.234
	(1.452)	(1.762)	(1.304)	(1.168)	(0.965)
Const	-0.007	0.354	**-0.285*** **	**-0.591*** **	-0.129
	(0.026)	(0.565)	(0.082)	(0.146)	(0.096)
GARCH					
alpha(1)	**0.118*** **	**0.139*** **	**0.181*** **	**0.038** **	**0.263*** **
	(0.027)	(0.041)	(0.039)	(0.015)	(0.076)
beta(1)	**0.886*** **	**0.864*** **	**0.795*** **	**0.958*** **	**0.772*** **
	(0.025)	(0.035)	(0.036)	(0.022)	(0.038)
alpha(0)	**0.058** **	0.135	**1.088*** **	0.113	**1.029** **
	(0.023)	(0.089)	(0.349)	(0.187)	(0.446)
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.00	0.18	0.00	0.04
AIC	19702	2983	8774	2936	5827
BIC	19785	3115	8843	2992	5891
Log Likelihood	-9838	-1461	-4374	-1455	-2900

Notes: Regression output for FTSE Athex Banks index. The regression model is given by Equation (2). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.24 Table 25: FTSE Athex Banks Index Garch specification (2)

Regression - Table 26

	(1) Ireland	(2) Ireland	(3) Ireland	(4) Ireland	(5) Ireland
IRELANDSEFINANCIALISEQPReturn					
IRELANDSEFINANCIALISEQPReturn1	**0.129*** **	**0.143** **	0.061	0.051	0.056
	(0.038)	(0.060)	(0.038)	(0.054)	(0.038)
IRELANDSEFINANCIALISEQPReturn2	0.013	0.039	**-0.057***	-0.077	-0.047
	(0.023)	(0.037)	(0.031)	(0.048)	(0.035)
IRELANDSEFINANCIALISEQPReturn3	-0.011	-0.020	-0.046	-0.074	-0.022
	(0.030)	(0.048)	(0.033)	(0.050)	(0.033)
ECBAnnouncement	0.067	0.390	**0.757***	1.179	**0.856***
	(0.209)	(1.050)	(0.418)	(0.857)	(0.471)
NEWS	**-8.117*** **	**-12.958***	-2.848	-4.223	0.712
	(2.384)	(6.753)	(5.669)	(7.505)	(9.060)
NEWS*ECBAnnouncement	**14.087***	20.712	7.627	3.490	15.331
	(7.247)	(19.583)	(10.862)	(11.343)	(20.473)
E_ECB*ECBAnnouncement	**5.896** **	**14.496** **	2.917	-5.522	5.817
	(2.509)	(6.443)	(2.650)	(4.303)	(3.976)
QE_ABS_CBPP_COLL	1.002	-0.628	0.831	**3.890*** **	0.548
	(0.748)	(2.536)	(0.807)	(1.302)	(0.880)
Const.	0.186	1.052	-0.772	-1.459	0.354
	(0.264)	(1.937)	(0.692)	(1.277)	(0.709)
N	4353	2138	1553	543	1010
R^2	4.2%	10.4%	3.6%	5%	4.3%
DW	2	2	1.99	2	1.98
P-value (F)	0.00%	0.00%	6.90%	0.02%	5.00%
LM autocorrelation test	0.00	0.00	0.99	0.25	0.00
Arch test	0.00%	0.10%	0.00%	0.00%	0.02%
Normality test	0.00%	0.00%	0.00%	0.00%	0.00%

Notes: Regression output for Ireland ISEQ index. The regression model is given by Equation (1). All regressions are estimated with HAC consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.25 Table 26: Ireland Financial Index

Regression - Table 27

	(1) Ireland	(2) Ireland	(3) Ireland	(4) Ireland	(5) Ireland
IRELANDSEFINANCIALISEQPReturn					
IRELANDSEFINANCIALISEQPReturn1	**0.063*** **	**0.101***	0.026	−0.020	0.043
	(0.009)	(0.053)	(0.023)	(0.052)	(0.030)
IRELANDSEFINANCIALISEQPReturn2	**-0.093*** **	-0.078	**-0.072*** **	**-0.126** **	-0.052
	(0.008)	(0.055)	(0.024)	(0.049)	(0.036)
IRELANDSEFINANCIALISEQPReturn3	**-0.056*** **	-0.074	**-0.060*** **	−0.063	-0.019
	(0.006)	(0.046)	(0.021)	(0.043)	(0.033)
ECBAnnouncement	0.103	−0.292	**0.884*** **	**1.831***	**1.029*** **
	(0.109)	(0.729)	(0.326)	(1.112)	(0.384)
NEWS*ECBAnnouncement	**7.949** **	**22.519** **	11.674	−2.951	25.977
	(3.239)	(11.170)	(13.619)	(15.606)	(18.981)
E_ECB*ECBAnnouncement	**2.922*** **	**18.938*** **	3.129	−6.020	**6.055***
	(0.974)	(7.075)	(5.178)	(5.842)	(3.546)
NEWS	**-5.546*** **	**−9.604*** **	0.834	−4.721	2.577
	(0.728)	(3.708)	(2.810)	(5.746)	(3.467)
QE_ABS_CBPP_COLL	**2.532*** **	−4.624	0.726	**2.921***	0.459
	(0.201)	(4.256)	(0.682)	(1.718)	(0.552)
Const.	0.017	2.098**	-0.078	**−1.735***	0.043
	(0.025)	(0.873)	(0.077)	(1.004)	(0.079)
GARCH					
alpha(1)	**0.505*** **	**0.316*** **	**0.217*** **	**0.217** **	**0.113*** **
	(0.013)	(0.068)	(0.024)	(0.089)	(0.023)
beta(1)	**0.495*** **	**0.683*** **	**0.783*** **	**0.546*** **	**0.887*** **
	(0.013)	(0.060)	(0.024)	(0.131)	(0.023)
alpha(0)	**0.237*** **	**0.769** **	0.055	**4.446*** **	0.109
	(0.055)	(0.371)	(0.145)	(1.653)	(0.079)
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.00	0.00	0.00	0.02
AIC	20734	3694	7952	3126	4684
BIC	20804	3826	8011	3255	4738
Log Likelihood	-10356	-1817	-3965	-1533	-2331

Notes: Regression output for Ireland ISEQ index. The regression model is given by Equation (2). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.26 Table 27: Ireland Financial Index Garch specification (1)

Regression - Table 28

	(1) Ireland	(2) Ireland	(3) Ireland	(4) Ireland	(5) Ireland
IRELANDSEFINANCIALISEQPReturn					
IRELANDSEFINANCIALISEQPReturn1	**0.070*** **	**0.095** **	**0.062** **	0.035	**0.068***
	(0.016)	(0.043)	(0.029)	(0.044)	(0.035)
IRELANDSEFINANCIALISEQPReturn2	-0.019	0.001	-0.016	-0.020	-0.022
	(0.014)	(0.040	(0.032)	(0.049)	(0.028)
IRELANDSEFINANCIALISEQPReturn3	-0.000	-0.027	-0.003	-0.004	-0.011
	(0.014)	(0.041)	(0.023)	(0.038)	(0.026)
ECBAnnouncement	-0.017	0.378	**0.799** **	0.351	**1.199*** **
	(0.093)	(0.662)	(0.352)	(0.857)	(0.436)
NEWS*ECBAnnouncement	3.297	**15.039** **	2.359	9.273	-0.087
	(2.831)	(7.008)	(13.719)	(10.945)	(32.643)
E_ECB*ECBAnnouncement	1.302	**9.931** **	1.780	1.419	6.927
	(1.157)	(4.627)	(2.295)	(4.517)	(8.172)
NEWS	**-4.086*** **	**-8.671** **	1.043	-6.690	**12.361** **
	(0.956)	(0.662)	(4.180)	(6.079)	(5.968)
QE_ABS_CBPP_COLL	**1.422** **	-0.123	**1.168***	**4.551*** **	0.575
	(0.701)	(2.492)	(0.666)	(0.998)	(0.772)
Const.	**0.050** **	**2.524*** **	-0.070	**-0.627*** **	-0.036
	(0.020)	(0.855)	(0.078)	(0.161)	(0.067)
GARCH					
alpha(1)	**0.068*** **	**0.193** **	0.045	**0.132*** **	**0.218*** **
	(0.014)	(0.088)	(0.115)	(0.048)	(0.065)
beta(1)	**0.934*** **	**0.828*** **	**0.946*** **	**0.725*** **	0.084
	(0.012)	(0.066)	(0.145)	(0.079)	(0.163)
alpha(0)	0.012**	0.498	0.101	**2.950** **	**5.573*** **
	(0.005)	(0.307)	(0.421)	(1.199)	(1.257)
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.00	0.00	0.50	0.02
AIC	18174	3646	7696	3069	4592
BIC	18257	3779	7766	3124	4655
Log Likelihood	-9074	-1793	-3835	-1521	-2283

Notes: Regression output for Ireland ISEQ index. The regression model is given by Equation (2). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.27 Table 28: Ireland Financial Index Garch specification (2)

Regression - Table 29

	(1) Italy	(2) Italy	(3) Italy	(4) Italy	(5) Italy
FTSEITALYBANKSINDEXReturn					
FTSEITALYBANKSINDEXReturn1	0.020	0.029	-0.002	0.008	-0.024
	(0.021)	(0.045)	(0.031)	(0.054)	(0.041)
FTSEITALYBANKSINDEXReturn2	-0.013	-0.012	-0.021	-0.086*	0.021
	(0.022)	(0.046)	(0.030)	(0.049)	(0.035)
FTSEITALYBANKSINDEXReturn3	**-0.049****	**-0.116***	-0.049	-0.064	-0.040
	(0.024)	(0.063)	(0.031)	(0.050)	(0.040)
ECBAnnouncement	-0.257	-0.313	-0.122	-0.367	0.313
	(0.171)	(0.473)	(0.435)	(0.747)	(0.549)
NEWS	**-7.336*****	**-9.842*****	-2.905	-6.508	5.482
	(1.410)	(2.256)	(5.211)	(7.208)	(6.625)
NEWS*ECBAnnouncement	**8.906****	**10.891***	11.074	-1.526	**59.934****
	(3.877)	(6.509)	(16.004)	(16.298)	(29.126)
E_ECB*ECBAnnouncement	**2.956****	**7.789*****	2.183	-3.269	7.419
	(1.259)	(2.409)	(4.727)	(5.467)	(7.393)
QE_ABS_CBPP_COLL	0.847	-2.245	1.381	**3.686****	0.728
	(0.960)	(2.464)	(1.008)	(1.615)	(1.100)
Const.	-0.058	-0.444	0.185	0.119	0.122
	(0.169)	(0.529)	(0.422)	(0.598)	(0.700)
Time Effects	YES	YES	YES	YES	YES
N	4353	2138	1553	543	1010
R^2	2.8%	10.3%	1.5%	3.8%	2.8%
DW	1.99	1.99	1.99	2	1.97
P-value (F)	0.00%	0.20%	96%	0.00%	9.50%
LM autocorrelation test	0.00	0.017	0.026	0.005	0.000
Arch test	0.00%	0.00%	0.00%	0.00%	0.00%
Normality test	0.00%	0.00%	0.00%	0.00%	0.00%

Notes: Regression output for FTSE Italy Banks index. The regression model is given by Equation (1). All regressions are estimated with HAC consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.28 Table 29: FTSE Italy Banks Index

Regression - Table 30

	(1) Italy	(2) Italy	(3) Italy	(4) Italy	(5) Italy
FTSEITALYBANKSINDEXReturn					
FTSEITALYBANKSINDEXReturn1	**0.022***	-0.023	-0.006	0.038	-0.029
	(0.013)	(0.040)	(0.027)	(0.046)	(0.037)
FTSEITALYBANKSINDEXReturn2	**-0.016***	-0.003	-0.014	-0.078	0.019
	(0.009)	(0.041)	(0.029)	(0.051)	(0.033)
FTSEITALYBANKSINDEXReturn3	**-0.036*****	**-0.097****	-0.033	-0.038	-0.030
	(0.009)	(0.042)	(0.026)	(0.044)	(0.036)
ECBAnnouncement	-0.141	−0.024	0.284	-0.002	0.594
	(0.107)	(0.434)	(0.329)	(0.461)	(0.437)
NEWS*ECBAnnouncement	**4.781*****	**11.114****	10.222	2.284	**53.889****
	(1.886)	(4.743)	(11.001)	(10.812)	(24.583)
E_ECB*ECBAnnouncement	0.873	**6.165****	0.806	0.017	4.222
	(0.665)	(3.032)	(3.132)	(4.923)	(5.139)
NEWS	**-5.599*****	**−7.190*****	-2.188	-5.832	3.148
	(0.514)	(2.032)	(3.690)	(4.539)	(7.453)
QE_ABS_CBPP_COLL	**0.901*****	0.281	0.478	**3.248*****	-0.011
	(0.199)	(1.585)	(0.987)	(1.060)	(1.024)
Const	0.012	−0.338	0.012	-0.111	0.064
	(0.026)	(0.507)	(0.058)	(0.092)	(0.074)
GARCH					
alpha(1)	**0.253*****	**0.111*****	**0.072*****	**0.136*****	**0.037*****
	(0.015)	(0.033)	(0.021)	(0.044)	(0.011)
beta(1)	**0.746*****	**0.877*****	**0.908*****	**0.852*****	**0.949*****
	(0.015)	(0.030)	(0.025)	(0.040)	(0.016)
alpha(0)	**0.091*****	**0.088***	**0.127****	**0.149***	**0.071***
	(0.034)	(0.051)	(0.056)	(0.082)	(0.042)
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.013	0.89	0.00	0.26
AIC	18249	2784	7160	2513	4656
BIC	18320	2919	7230	2569	4720
Log Likelihood	-9113	-1362	-3567	-1243	-2315

Notes: Regression output for FTSE Italy Banks index. The regression model is given by Equation (2). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.29 Table 30: FTSE Italy Banks Index Garch specification (1)

Regression - Table 31

	(1) Italy	(2) Italy	(3) Italy	(4) Italy	(5) Italy
FTSEITALYBANKSINDEXReturn					
FTSEITALYBANKSINDEXReturn1	0.009	-0.003	-0.011	0.033	-0.047
	(0.015)	(0.039)	(0.026)	(0.045)	(0.033)
FTSEITALYBANKSINDEXReturn2	0.005	0.018	0.003	-0.043	0.019
	(0.015)	(0.041)	(0.026)	(0.048)	(0.032)
FTSEITALYBANKSINDEXReturn3	-0.021	**-0.084****	-0.025	-0.029	-0.018
	(0.015)	(0.042)	(0.025)	(0.042)	(0.032)
ECBAnnouncement	-0.040	-0.116	0.375	0.069	0.702
	(0.098)	(0.481)	(0.339)	(0.496)	(0.486)
NEWS*ECBAnnouncement	3.063	**11.897*****	9.486	4.820	53.479
	(3.024)	(4.540)	(11.145)	(11.217)	(41.855)
E_ECB*ECBAnnouncement	1.211	**6.707*****	0.430	-0.858	5.827
	(0.828)	(2.524)	(4.007)	(5.070)	(12.795)
NEWS	**-3.714*****	**-7.671*****	-3.138	-7.556	6.607
	(0.774)	(2.095)	(4.508)	(6.718)	(6.180)
QE_ABS_CBPP_COLL	0.846	0.066	0.988	**3.572*****	0.547
	(0.943)	(1.427)	(0.962)	(0.973)	(0.887)
Const	**0.046****	-0.110	0.023	-0.116	0.105
	(0.018)	(0.504)	(0.056)	(0.092)	(0.071)
GARCH					
alpha(1)	**0.075*****	**0.094*****	**0.060*****	**0.103*****	**0.039*****
	(0.010)	(0.026)	(0.015)	(0.034)	(0.014)
beta(1)	**0.927*****	**0.894*****	**0.923*****	**0.885*****	**0.948*****
	(0.009)	(0.024)	(0.019)	(0.033)	(0.019)
alpha(0)	**0.006****	0.090	**0.107****	**0.123***	0.075
	(0.003)	(0.057)	(0.048)	(0.070)	(0.052)
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.00	0.90	0.00	0.15
AIC	16733	2770	7122	2505	4623
BIC	16816	2902	7191	2560	4687
Log Likelihood	-8353	-1355	-3548	-1239	-2298

Notes: Regression output for FTSE Italy Banks index. The regression model is given by Equation (2). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.30 Table 31: FTSE Italy Banks Index Garch specification (2)

Regression - Table 32

	(1) NETHERLANDs	(2) NETHERLANDs	(3) NETHERLANDs	(4) NETHERLANDs	(5) NETHERLANDs
NETHERLANDDSBanksReturn					
NETHERLANDDSBanksReturn1	0.022	0.040	**-0.069***	-0.042	**-0.083****
	(0.020)	(0.043)	(0.036)	(0.074)	(0.041)
NETHERLANDDSBanksReturn2	0.064	**0.098*****	0.008	-0.023	0.012
	(0.043)	(0.034)	(0.028)	(0.053)	(0.032)
NETHERLANDDSBanksReturn3	**-0.052****	**-0.065****	**-0.049***	-0.045	-0.055
	(0.021)	(0.028)	(0.029)	(0.058)	(0.035)
ECBAnnouncement	-0.058	-0.416	0.246	-0.051	**0.513***
	(0.159)	(0.782)	(0.200)	(0.298)	(0.287)
NEWS	**-7.501*****	-8.972	1.856	-0.861	7.826
	(2.185)	(5.913)	(2.585)	(2.963)	(5.312)
NEWS*ECBAnnouncement	**9.987****	14.286	0.511	-2.755	8.374
	(4.299)	(10.855)	(5.131)	(5.816)	(12.093)
E_ECB*ECBAnnouncement	**1.858***	**5.285****	-0.028	-2.373	1.523
	(0.996)	(2.431)	(1.261)	(3.197)	(1.765)
QE_ABS_CBPP_COLL	0.395	1.835	0.181	-0.186	0.074
	(0.547)	(1.594)	(0.601)	(0.542)	(0.671)
Const.	0.080	1.091	-0.136	-0.302	-0.270
	(0.170)	(1.313)	(0.242)	(0.272)	(0.427)
Time Effects	YES	YES	YES	YES	YES
N	4353	609	1553	543	1010
R^2	2.5%	4.5%	02%	2.5%	3.2%
DW	2	2	1.99	2	1.99
P-value (F)	0.00%	0.00%	23%	97%	5.50%
LM autocorrelation test	0.00	0.00	0.136	0.215	0.178
Arch test	99%	100%	0.00%	0.00%	0.00%
Normality test	0.00%	0.00%	0.00%	0.00%	0.00%

Notes: Regression output for Netherlands DS Banks index. The regression model is given by Equation (1). All regressions are estimated with HAC consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.31 Table 32: Netherland Banks Index

Regression - Table 33

	(1) Netherlands	(2) Netherlands	(3) Netherlands	(4) Netherlands	(5) Netherlands
NETHERLANDDSBanksReturn					
NETHERLANDDSBanksReturn1			**-0.088*** **	-0.027	**-0.108*** **
			(0.032)	(0.059)	(0.038)
NETHERLANDDSBanksReturn2			0.019	-0.034	0.034
			(0.031)	(0.047)	(0.037)
NETHERLANDDSBanksReturn3			0.019	-0.033	-0.025
			(0.031)	(0.049)	(0.038)
ECBAnnouncement			0.215	0.000	**0.534** **
			(0.167)	(0.250)	(0.257)
NEWS*ECBAnnouncement			0.290	1.114	17.457
			(10.018)	(7.510)	(17.935)
E_ECB*ECBAnnouncement			-0.219	-1.498	0.720
			(2.372)	(2.853)	(1.705)
NEWS			1.988	-0.257	5.528
			(2.481)	(2.307)	(5.657)
QE_ABS_CBPP_COLL			-0.237	0.372	-0.167
			(1.019)	(0.738)	(0.658)
Const			**-0.081***	**-0.110** **	-0.056
			(0.041)	(0.054)	(0.066)
GARCH					
alpha(1)			**0.155*** **	**0.192*** **	**0.127***
			(0.056)	(0.068)	(0.067)
beta(1)			**0.744*** **	**0.674*** **	**0.701*** **
			(0.102)	(0.116)	(0.208)
alpha(0)			0.330	**0.290** **	0.600
			(0.181)	(0.136)	(0.536)
N			1553	543	1010
P-value(Chi^2)			0.03	0.65	0.02
AIC			5982	1888	4078
BIC			6052	1943	4142
Log Likelihood			-2978	-931	-2026

Notes: Regression output for Netherlands DS Banks index. The regression model is given by Equation (2). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.32 Table 33: Netherland Banks Index Garch specification (1)

Regression - Table 34

	(1) Netherlands	(2) Netherlands	(3) Netherlands	(4) Netherlands	(5) Netherlands
NETHERLANDDSBanksReturn					
NETHERLANDDSBanksReturn1			**-0.103*****	-0.069	**-0.115*****
			(0.026)	(0.048)	(0.032)
NETHERLANDDSBanksReturn2			0.011	-0.017	0.019
			(0.024)	(0.044)	(0.029)
NETHERLANDDSBanksReturn3			-0.001	0.003	-0.003
			(0.023)	(0.042)	(0.027)
ECBAnnouncement			0.239	0.008	**0.473***
			(0.179)	(0.292)	(0.246)
NEWS*ECBAnnouncement			3.498	1.464	15.516
			(7.328)	(12.639)	(10.695)
E_ECB*ECBAnnouncement			-0.656	-0.180	1.710
			(0.989)	(7.057)	(2.079)
NEWS			-2.529	-1.345	-3.431
			(2.353)	(3.491)	(3.458)
QE_ABS_CBPP_COLL			**0.775***	0.383	0.567
			(0.439)	(1.133)	(0.448)
Const			**-0.073****	**-0.111****	-0.048
			(0.032)	(0.044)	(0.045)
GARCH					
alpha(1)			**0.253****	**0.256****	**0.216*****
			(0.125)	(0.112)	(0.076)
beta(1)			**0.575****	**0.688*****	**0.338*****
			(0.266)	(0.135)	(0.123)
alpha(0)			0.734	0.239	**1.813*****
			(0.649)	(0.161)	(0.478)
N			1553	543	1010
P-value(Chi^2)			0.03	0.68	0.03
AIC			5787	1828	3948
BIC			5851	1884	4012
Log Likelihood			-2881	-901	-1961

Notes: Regression output for Netherlands DS Banks index. The regression model is given by Equation (2). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.33 Table 34: Netherland Banks Index Garch specification (2)

Regression - Table 35

	(1) Portugal	(2) Portugal	(3) Portugal	(4) Portugal	(5) Portugal
PORTUGALDSBANKSReturn					
PORTUGALDSBANKSReturn1	**0.089*** **	0.044	**0.088*** **	0.068	**0.094*** **
	(0.025)	(0.047)	(0.030)	(0.053)	(0.035)
PORTUGALDSBANKSReturn2	-0.011	-0.013	-0.014	**-0.105** **	0.011
	(0.022)	(0.040)	(0.029)	(0.044)	(0.036)
PORTUGALDSBANKSReturn3	-0.003	-0.028	-0.016	-0.075	-0.007
	(0.023)	(0.048)	(0.030)	(0.054)	(0.035)
ECBAnnouncement	0.206	-0.247	**0.974** **	0.003	**1.477*** **
	(0.137)	(0.344)	(0.386)	(0.558)	(0.555)
NEWS	**-2.356** **	-3.063	-0.100	-2.353	5.375
	(1.106)	(2.229)	(4.111)	(5.308)	(6.977)
NEWS*ECBAnnouncement	1.746	-6.254	**16.634***	**18.052***	37.996
	(2.724)	(5.287)	(9.094)	(10.579)	(26.488)
E_ECB*ECBAnnouncement	-0.176	-1.649	3.008	**9.936***	4.151
	(0.699)	(1.338)	(2.602)	(5.856)	(3.942)
QE_ABS_CBPP_COLL	0.347	0.877	0.013	0.084	-0.340
	(0.675)	(1.955)	(0.739)	(0.987)	(0.881)
Const.	0.081	**-0.829** **	0.078	0.253	0.097
	(0.125)	(0.391)	(0.328)	(0.512)	(0.738)
Time Effects	YES	YES	YES	YES	YES
N	4353	609	1553	543	1010
R^2	2.1%	8.6%	2.9%	4.3%	4.4%
DW	1.99	1.99	1.99	2	1.98
P-value (F)	0.58%	0.00%	0.68%	0.02%	2.90%
LM autocorrelation test	0.713	0.14	0.662	0.62	0.121
Arch test	0.00%	0.00%	0.00%	0.00%	0.00%
Normality test	0.00%	0.00%	0.00%	0.00%	0.00%

Notes: Regression output for Portugal DS Banks index. The regression model is given by Equation (1). All regressions are estimated with HAC consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.34 Table 35: Portugal Banks Index

Regression - Table 36

	(1) Portugal	(2) Portugal	(3) Portugal	(4) Portugal	(5) Portugal
PORTUGALDSBANKSReturn					
PORTUGALDSBANKSReturn1	**0.084*** **	0.024	**0.104*** **	0.076	**0.107*** **
	(0.017)	(0.046)	(0.028)	(0.046)	(0.035)
PORTUGALDSBANKSReturn2	0.007	0.027	0.013	-0.057	0.053
	(0.017)	(0.049)	(0.026)	(0.042)	(0.033)
PORTUGALDSBANKSReturn3	0.004	−0.028	-0.031	-0.059	-0.021
	(0.017)	(0.047)	(0.027)	(0.046)	(0.035)
ECBAnnouncement	0.008	−0.009	0.643	0.465	**0.820***
	(0.061)	(0.370)	(0.292)	(0.371)	(0.474)
NEWS*ECBAnnouncement	1.261	−4.152	**15.496** **	**22.952*** **	27.886
	(1.473)	(4.700)	(6.549)	(7.415)	(23.195)
E_ECB*ECBAnnouncement	0.148	−1.910	4.949	**13.012*** **	3.848
	(0.317)	(1.586)	(3.023)	(3.668)	(3.408)
NEWS	**-1.135** **	−1.915	-1.488	-2.635	5.276
	(0.450)	(1.528)	(3.083)	(3.702)	(7.658)
QE_ABS_CBPP_COLL	0.789	0.545	0.381	-0.343	0.105
	(1.201)	(1.090)	(1.173)	(0.604)	(1.005)
Const	0.042	**−0.821** **	-0.089	**-0.164** **	-0.052
	(0.016)	(0.407)	(0.056)	(0.078)	(0.085)
GARCH					
alpha(1)	**0.110*** **	**0.171** **	**0.121*** **	**0.143*** **	**0.099*** **
	(0.041)	(0.080)	(0.028)	(0.039)	(0.034)
beta(1)	**0.895*** **	**0.774 *** **	**0.857*** **	**0.828*** **	**0.831*** **
	(0.036)	(0.076)	(0.034)	(0.049)	(0.053)
alpha(0)	**0.011***	**0.246** **	**0.218** **	**0.169***	**0.616** **
	(0.006)	(0.113)	(0.104)	(0.099)	(0.270)
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.24	0.00	0.00	0.01
AIC	14985	2514	7318	2292	5016
BIC	15055	2647	7388	2347	5080
Log Likelihood	-7481	-1227	-3646	-1133	-2495

Notes: Regression output for Portugal DS Banks index. The regression model is given by Equation (2). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.35 Table 36: Portugal Banks Index Garch specification (1)

Regression - Table 37

	(1) Portugal	(2) Portugal	(3) Portugal	(4) Portugal	(5) Portugal
PORTUGALDSBANKSReturn					
PORTUGALDSBANKSReturn1	**0.058*****	0.022	**0.071*****	0.064	**0.069****
	(0.016)	(0.044)	(0.027)	(0.045)	(0.034)
PORTUGALDSBANKSReturn2	-0.002	-0.032	0.009	-0.036	0.032
	(0.015)	(0.042)	(0.023)	(0.042)	(0.029)
PORTUGALDSBANKSReturn3	0.003	-0.017	-0.040	-0.061	-0.028
	(0.015)	(0.043)	(0.025)	(0.046)	(0.030)
ECBAnnouncement	-0.013	-0.338	**0.629****	0.409	0.807
	(0.050)	(0.315)	(0.310)	(0.370)	(0.506)
NEWS*ECBAnnouncement	0.929	**-6.208***	**14.773****	**25.550*****	24.980
	(1.163)	(3.288)	(7.096)	(8.738)	(25.868)
E_ECB*ECBAnnouncement	0.112	-1.576	3.147	**13.113*****	2.216
	(0.317)	(2.075)	(3.695)	(4.043)	(2.865)
NEWS	**-0.889****	-0.845	-2.553	-5.680	6.222
	(0.372)	(1.228)	(3.503)	(5.767)	(6.137)
QE_ABS_CBPP_COLL	0.330	0.074	0.266	-0.160	-0.050
	(0.785)	(0.879)	(0.957)	(0.587)	(0.970)
Const	**0.020***	**-0.888****	**-0.112****	**-0.181****	-0.075
	(0.012)	(0.376)	(0.053)	(0.073)	(0.080)
GARCH					
alpha(1)	**0.159*****	**0.177****	**0.125*****	**0.154*****	**0.092*****
	(0.029)	(0.075)	(0.025)	(0.042)	(0.028)
beta(1)	**0.865*****	**0.727*****	**0.851*****	**0.811*****	**0.837*****
	(0.022)	(0.108)	(0.028)	(0.051)	(0.042)
alpha(0)	**0.009*****	**0.428***	**0.259*****	**0.204***	**0.661*****
	(0.003)	(0.235)	(0.096)	(0.110)	(0.255)
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.18	0.00	0.00	0.02
AIC	14508	2472	7228	2275	4949
BIC	14591	2605	7298	2331	5013
Log Likelihood	-7241	-1206	-3601	-1124	-2461

Notes: Regression output for Portugal DS Banks index. The regression model is given by Equation (2). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.36 Table 37: Portugal Banks Index Garch specification (2)

Sensitive analysis Regression - Table 38

	(1) Eurostoxx	(2) Eurostoxx	(3) Eurostoxx	(4) Eurostoxx	(5) Eurostoxx
EUROSTOXXBANKSReturn					
EUROSTOXXBANKSReturn1	0.007	**-0.082****	0.039	0.058	0.025
	(0.013)	(0.040)	(0.027)	(0.051)	(0.032)
EUROSTOXXBANKSReturn2	**-0.042*****	**-0.065****	**-0.049****	**-0.116*****	-0.013
	(0.010)	(0.032)	(0.023)	(0.043)	(0.030)
EUROSTOXXBANKSReturn3	**-0.027****	-0.026	**-0.044***	-0.067	-0.040
	(0.011)	(0.033)	(0.026)	(0.047)	(0.029)
NEWS	**-6.451*****	**-11.521*****	-1.243	**-5.692****	5.290
	(0.475)	(1.315)	(1.613)	(2.389)	(3.400)
NEWS*ECBAnnouncement	**5.193*****	5.654	3.944	0.485	**30.419****
	(1.661)	(4.444)	(7.442)	(11.657)	(13.712)
Nochange	-0.063	-0.691	0.197	0.048	0.425
	(0.119)	(0.588)	(0.264)	(0.582)	(0.313)
RestrictivePolicy	0.207	2.657	0.735	0.572	
	(0.354)	(2557.700)	(2.527)	(3.446)	
EasePolicy	**-0.532****	**-2.354*****	-0.192		-0.862
	(0.262)	(0.801)	(0.625)		(0.667)
QE_ABS_CBPP_COLL	**1.034*****	-0.730	**1.147*****	2.468	**0.931*****
	(0.192)	(1.678)	(0.353)	(3.4e+08)	(0.341)
Const.	0.150	-0.189	0.133	0.019	-0.060
	(0.149)	(0.465)	(0.372)	(0.628)	(0.376)
GARCH					
alpha(1)	**0.260*****	**0.260*****	**0.128*****	**0.129*****	**0.101*****
	(0.018)	(0.051)	(0.022)	(0.049)	(0.024)
beta(1)	**0.740*****	**0.740*****	**0.872*****	**0.871*****	**0.899*****
	(0.018)	(0.051)	(0.022)	(0.049)	(0.024)
alpha(0)	0.046	0.249	0.023	0.047	0.026
	(0.028)	(0.157)	(0.049)	(0.135)	(0.046)
Time Effects	YES	YES	YES	YES	YES
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.00	0.00	0.00	0.00
AIC	17129	2883	6716	2525	4189
BIC	17403	3011	6892	2646	4336
Log Likelihood	-8522	-1413	-3325	-1235	-2064

Notes: Regression output for EuroStoxx Banks index. The regression model is given by Equation (4). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.37 Table 38: Sensitivity Analysis - Eurostoxx Banks Index Garch specification (2)

Sensitive analysis Regression - Table 39

	(1) Austria	(2) Austria	(3) Austria	(4) Austria	(5) Austria
AUSTRIADSBANKSReturn					
AUSTRIADSBANKSReturn1	**0.051*** **	-0.015	**0.055** **	0.037	0.050
	(0.012)	(0.037)	(0.026)	(0.046)	(0.032)
AUSTRIADSBANKSReturn2	**-0.052*** **	**-0.091** **	**-0.056** **	**-0.181*** **	0.003
	(0.011)	(0.036)	(0.022)	(0.038)	(0.029)
AUSTRIADSBANKSReturn3	**-0.019***	-0.037	**-0.043***	-0.050	-0.031
	(0.011)	(0.035)	(0.025)	(0.038)	(0.034)
NEWS	**-3.165*** **	**-12.817*** **	1.039	**-4.444***	**10.529*** **
	(0.497)	(1.512)	(1.879)	(2.344)	(3.608)
NEWS*ECBAnnouncement	2.618	8.527	3.552	1.118	11.185
	(2.576)	(11.986)	(9.515)	(9.715)	(19.183)
Nochange	-0.095	-0.749	0.105	0.039	0.216
	(0.133)	(0.628)	(0.304)	(0.455)	(0.421)
RestrictivePolicy	0.102	**7.727*** **	0.041	-0.103	
	(0.329)	(2.054)	(2.822)	(3.173)	
EasePolicy	0.354	-1.592	0.266		-0.213
	(0.363)	(1.037)	(1.007)		(0.943)
QE_ABS_CBPP_COLL	0.117	0.333	0.534	-0.504	0.482
	(0.291)	(2.783)	(0.492)	(5.3e+07)	(0.481)
Const.	0.018	-0.903	-0.122	-0.143	-0.056
	(0.141)	(0.628)	(0.354)	(0.606)	(0.403)
GARCH					
alpha(1)	**0.239*** **	**0.215*** **	**0.090*** **	**0.193*** **	**0.055*** **
	(0.017)	(0.047)	(0.018)	(0.057)	(0.020)
beta(1)	**0.761*** **	**0.785*** **	**0.910*** **	**0.807*** **	**0.945*** **
	(0.017)	(0.047)	(0.018)	(0.057)	(0.020)
alpha(0)	0.029	**0.494** **	0.010	0.046	0.014
	(0.030)	(0.219)	(0.046)	(0.145)	(0.046)
Time Effects	YES	YES	YES	YES	YES
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.00	0.03	0.01	0.00
AIC	17726	3143	6712	2460	4251
BIC	18000	3271	6889	2580	4398
Log Likelihood	-8820	-1543	-3323	-1202	-2095

Notes: Regression output for Austria DS Banks index. The regression model is given by Equation (4). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.38 Table 39: Sensitivity Analysis - Austria Banks Index Garch specification (2)

Sensitive analysis Regression - Table 40

	(1) Belgium	(2) Belgium	(3) Belgium	(4) Belgium	(5) Belgium
FTSEBELGIUMBANKSReturn					
FTSEBELGIUMBANKSReturn1	**0.048*** **	0.026	**0.070*** **	**0.097** **	**0.056***
	(0.012)	(0.041)	(0.024)	(0.043)	(0.029)
FTSEBELGIUMBANKSReturn2	**-0.017***	-0.005	**-0.039***	**-0.118*** **	-0.003
	(0.010)	(0.033)	(0.023)	(0.045)	(0.029)
FTSEBELGIUMBANKSReturn3	**-0.029*** **	-0.012	**-0.069*** **	**-0.116*** **	**-0.059** **
	(0.010)	(0.037)	(0.023)	(0.039)	(0.027)
NEWS	**-5.680*** **	**-12.877*** **	-0.840	**-5.800** **	**8.522***
	(0.602)	(1.997)	(2.188)	(2.868)	(4.618)
NEWS*ECBAnnouncement	**4.097** **	8.963	5.520	3.286	23.089
	(1.753)	(5.529)	(6.834)	(8.527)	(22.275)
Nochange	0.018	-0.149	**0.572** **	0.137	**1.003** **
	(0.119)	(0.592)	(0.277)	(0.511)	(0.402)
RestrictivePolicy	0.191	0.105	1.407	1.545	
	(0.344)	(1.739)	(4.962)	(6.424)	
EasePolicy	0.377	1.799	0.137		-0.511
	(0.408)	(1.570)	(1.299)		(1.178)
QE_ABS_CBPP_COLL	**0.725*** **	1.136	0.356	2.853	0.064
	(0.240)	(1.854)	(0.453)	(5.7e+05)	(0.471)
Const.	-0.172	0.892	-0.085	0.432	-0.613
	(0.146)	(0.606)	(0.401)	(0.681)	(0.433)
GARCH					
alpha(1)	**0.513*** **	**0.459*** **	**0.348*** **	**0.374*** **	**0.303*** **
	(0.019)	(0.060)	(0.042)	(0.072)	(0.051)
beta(1)	**0.487*** **	**0.541*** **	**0.652*** **	**0.626*** **	**0.697*** **
	(0.019)	(0.060)	(0.042)	(0.072)	(0.051)
alpha(0)	**0.242*** **	0.228	0.191	0.173	0.102
	(0.051)	(0.445)	(0.155)	(0.334)	(0.165)
Time Effects	YES	YES	YES	YES	YES
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.00	0.00	0.00	0.00
AIC	19063	3358	7452	2729	4743
BIC	19337	3486	7629	2850	4891
Log Likelihood	-9488	-1650	-3693	-1337	-2342

Notes: Regression output for FTSE Belgium Banks index. The regression model is given by Equation (4). All regressions are estimated with robust consistent standard errors The standard errors are provide in parentheses.. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.39 Table 40: Sensitivity Analysis - FTSE Belgium Banks Index Garch specification (2)

Sensitive analysis Regression - Table 41

	(1) Spain	(2) Spain	(3) Spain	(4) Spain	(5) Spain
FTSESPAINBANKSReturn					
FTSESPAINBANKSReturn1	-0.006	-0.044	**0.057****	0.080	0.048
	(0.013)	(0.039)	(0.028)	(0.053)	(0.033)
FTSESPAINBANKSReturn2	**-0.067*****	**-0.069****	**-0.089*****	**-0.143*****	**-0.053***
	(0.011)	(0.031)	(0.023)	(0.050)	(0.027)
FTSESPAINBANKSReturn3	**-0.025****	**-0.060***	-0.005	-0.025	0.009
	(0.011)	(0.033)	(0.026)	(0.049)	(0.031)
NEWS	**-5.835*****	**-10.482*****	-1.548	**-5.171****	3.935
	(0.526)	(1.314)	(1.611)	(2.629)	(3.588)
NEWS*ECBAnnouncement	**5.411*****	**8.666****	3.099	3.998	13.790
	(1.806)	(3.781)	(7.596)	(12.284)	(13.759)
Nochange	0.007	-0.282	0.094	-0.073	0.255
	(0.127)	(0.508)	(0.281)	(0.604)	(0.319)
RestrictivePolicy	0.266	-1.756	1.013	0.751	
	(0.310)	(1.405)	(3.009)	(5.670)	
EasePolicy	-0.344	**-2.074****	-0.349		-0.773
	(0.271)	(0.895)	(0.677)		(0.666)
QE_ABS_CBPP_COLL	**1.422*****	-0.460	**1.211*****	2.408	**1.006*****
	(0.220)	(1.417)	(0.384)	(5.2e+06)	(0.357)
Const.	0.108	**-0.928***	0.164	0.145	0.096
	(0.137)	(0.495)	(0.362)	(0.604)	(0.371)
GARCH					
alpha(1)	**0.284*****	**0.398*****	**0.142*****	**0.132****	**0.136*****
	(0.018)	(0.079)	(0.026)	(0.053)	(0.029)
beta(1)	**0.716*****	**0.602*****	**0.858*****	**0.868*****	**0.864*****
	(0.018)	(0.079)	(0.026)	(0.053)	(0.029)
alpha(0)	0.001	0.159	0.006	0.031	0.008
	(0.032)	(0.210)	(0.051)	(0.146)	(0.046)
Time Effects	YES	YES	YES	YES	YES
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.00	0.00	0.01	0.00
AIC	17596	2830	6638	2523	4100
BIC	17870	2958	6815	2644	4248
Log Likelihood	-8755	-1386	-3286	-1234	-2020

Notes: Regression output for FTSE Spain Banks index. The regression model is given by Equation (4). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.40 Table 41: Sensitivity Analysis - FTSE Spain Banks Index Garch specification (2)

Sensitive analysis Regression - Table 42

	(1) France	(2) France	(3) France	(4) France	(5) France
EURONEXTCACBANKSReturn					
EURONEXTCACBANKSReturn1	0.014	-0.024	0.027	-0.015	**0.055****
	(0.012)	(0.044)	(0.024)	(0.043)	(0.027)
EURONEXTCACBANKSReturn2	**-0.029*****	**-0.058***	-0.007	-0.050	-0.005
	(0.009)	(0.034)	(0.019)	(0.034)	(0.032)
EURONEXTCACBANKSReturn3	-0.012	0.014	**-0.057****	0.022	**-0.106*****
	(0.010)	(0.033)	(0.025)	(0.042)	(0.023)
NEWS	**-7.298*****	**-14.831*****	0.029	**-5.115***	**7.281****
	(0.574)	(1.508)	(1.890)	(2.619)	(3.665)
NEWS*ECBAnnouncement	**6.247*****	**8.394***	1.010	-8.203	**37.938****
	(1.696)	(4.319)	(9.009)	(12.664)	(16.843)
Nochange	-0.004	**-1.043***	0.285	0.637	0.429
	(0.129)	(0.629)	(0.277)	(0.546)	(0.332)
RestrictivePolicy	0.197	4.472	1.080	1.525	
	(0.313)	(2.3e+08)	(1.741)	(2.395)	
EasePolicy	-0.027	**-1.976***	0.792		-0.138
	(0.290)	(1.076)	(0.938)		(1.004)
QE_ABS_CBPP_COLL	0.082	-1.355	**0.653***	4.524	**0.657***
	(0.250)	(2.185)	(0.383)	(2.4e+06)	(0.378)
Const.	**0.334****	0.072	-0.015	-0.040	-0.273
	(0.135)	(0.524)	(0.410)	(0.633)	(0.408)
GARCH					
alpha(1)	**0.321*****	**0.264*****	**0.252*****	**0.623*****	**0.145*****
	(0.019)	(0.053)	(0.030)	(0.087)	(0.029)
beta(1)	**0.679*****	**0.736*****	**0.748*****	**0.377*****	**0.855*****
	(0.019)	(0.053)	(0.030)	(0.087)	(0.029)
alpha(0)	0.014	0.268	0.059	**1.103*****	0.067
	(0.041)	(0.251)	(0.087)	(0.371)	(0.063)
Time Effects	YES	YES	YES	YES	YES
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.00	0.01	0.02	0.00
AIC	18325	3146	7036	2692	4322
BIC	18599	3274	7213	2813	4470
Log Likelihood	-9119	-1544	-3485	-1318	-2131

Notes: Regression output for EuroNext Cac Banks index. The regression model is given by Equation (4). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.41 Table 42: Sensitivity Analysis - EuroNext Cac Banks Index Garch specification (2)

Sensitive analysis Regression - Table 43

	(1) Germany	(2) Germany	(3) Germany	(4) Germany	(5) Germany
DAXBANKSXETRAReturn					
DAXBANKSXETRAReturn1	0.011	**-0.080****	0.024	-0.005	0.015
	(0.011)	(0.037)	(0.023)	(0.037)	(0.031)
DAXBANKSXETRAReturn2	0.000	**-0.088*****	-0.003	**-0.062***	0.002
	(0.009)	(0.032)	(0.019)	(0.034)	(0.030)
DAXBANKSXETRAReturn3	**-0.039*****	-0.029	**-0.060****	**-0.172*****	-0.039
	(0.009)	(0.028)	(0.024)	(0.038)	(0.027)
NEWS	**-7.883*****	**-16.068*****	-2.751	**-8.455*****	**5.655***
	(0.509)	(1.721)	(1.839)	(2.250)	(3.355)
NEWS*ECBAnnouncement	**5.639****	11.265	6.979	0.148	**29.920****
	(2.295)	(11.673)	(7.554)	(10.752)	(14.061)
Nochange	-0.078	-0.581	0.155	0.055	0.439
	(0.146)	(0.821)	(0.276)	(0.518)	(0.339)
RestrictivePolicy	0.005	1.870	0.606	0.456	
	(0.510)	(5911.920)	(5.043)	(4.067)	
EasePolicy	-0.490	**-3.428****	0.032		-0.449
	(0.302)	(1.387)	(0.534)		(0.636)
QE_ABS_CBPP_COLL	0.431	1.034	**0.741***	1.854	0.602
	(0.275)	(2.001)	(0.395)	(2.9e+06)	(0.411)
Const.	0.196	**-2.774*****	0.220	0.596	-0.054
	(0.159)	(0.530)	(0.367)	(0.591)	(0.382)
GARCH					
alpha(1)	**0.284*****	**0.261*****	**0.160*****	**0.275*****	**0.101*****
	(0.018)	(0.042)	(0.025)	(0.074)	(0.026)
beta(1)	**0.716*****	**0.739*****	**0.840*****	**0.725*****	**0.899*****
	(0.018)	(0.042)	(0.025)	(0.074)	(0.026)
alpha(0)	**0.074***	**0.958*****	0.008	0.029	0.016
	(0.040)	(0.261)	(0.055)	(0.186)	(0.051)
Time Effects	YES	YES	YES	YES	YES
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.00	0.01	0.00	0.00
AIC	18646	3245	6750	2485	4267
BIC	18920	3373	6926	2605	4414
Log Likelihood	-9280	-1594	-3342	-1214	-2103

Notes: Regression output for DAX Xetra Banks index. The regression model is given by Equation (4). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.42 Table 43: Sensitivity Analysis - Dax Banks Index Garch specification (2)

Sensitive analysis Regression - Table 44

	(1) Greece	(2) Greece	(3) Greece	(4) Greece	(5) Greece
FTSEATHEXBANKSReturn					
FTSEATHEXBANKSReturn1	**0.048*** **	-0.000	**0.052***	-0.027	**0.063***
	(0.014)	(0.044)	(0.028)	(0.048)	(0.035)
FTSEATHEXBANKSReturn2	**-0.067*** **	**-0.064***	**-0.055** **	**-0.153*** **	-0.014
	(0.010)	(0.035)	(0.024)	(0.051)	(0.031)
FTSEATHEXBANKSReturn3	-0.012	-0.051	-0.029	**-0.117*** **	-0.017
	(0.008)	(0.034)	(0.019)	(0.040)	(0.025)
NEWS	**-5.031*** **	**-8.450*** **	-1.103	**-9.500** **	**13.743** **
	(0.903)	(1.256)	(4.548)	(4.204)	(6.457)
NEWS*ECBAnnouncement	4.516	6.315	-0.879	-2.817	28.722
	(3.347)	(9.398)	(20.498)	(29.177)	(35.033)
Nochange	0.041	-0.189	-0.205	0.669	-0.294
	(0.175)	(0.785)	(0.604)	(0.927)	(0.785)
RestrictivePolicy	0.740	5.206	2.060	2.315	
	(0.796)	(2.0e+05)	(4.682)	(2.753)	
EasePolicy	0.349	**-2.652** **	2.050		1.300
	(0.490)	(1.246)	(1.573)		(1.901)
QE_ABS_CBPP_COLL	-0.218	-3.511	0.582	-3.308	0.455
	(0.447)	(2.446)	(1.028)	(2.2e+05)	(1.209)
Const.	**0.534** **	0.033	0.548	0.902	0.493
	(0.216)	(0.665)	(0.821)	(1.017)	(0.983)
GARCH					
alpha(1)	**0.413*** **	**0.179*** **	**0.229*** **	**0.143*** **	**0.258*** **
	(0.017)	(0.044)	(0.024)	(0.042)	(0.034)
beta(1)	**0.587*** **	**0.821*** **	**0.771*** **	**0.857*** **	**0.742*** **
	(0.017)	(0.044)	(0.024)	(0.042)	(0.034)
alpha(0)	0.077	0.267	**0.928*** **	0.421	**1.140** **
	(0.085)	(0.181)	(0.283)	(0.299)	(0.471)
Time Effects	YES	YES	YES	YES	YES
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.01	0.21	0.00	0.04
AIC	21636	3067	9166	3027	6128
BIC	21910	3195	9343	3148	6275
Log Likelihood	-10775	-1505	-4550	-1486	-3034

Notes: Regression output for FTSE Athex Banks index. The regression model is given by Equation (4). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.43 Table 44: Sensitivity Analysis - FTSE Athex Banks Index Garch specification (2)

Sensitive analysis Regression - Table 45

	(1) Ireland	(2) Ireland	(3) Ireland	(4) Ireland	(5) Ireland
IRELANDSEFINANCIALISEQPReturn					
IRELANDSEFINANCIALISEQPReturn1	**0.048*** **	**0.070***	0.008	-0.001	0.032
	(0.010)	(0.042)	(0.024)	(0.044)	(0.030)
IRELANDSEFINANCIALISEQPReturn2	**-0.075*** **	-0.062	**-0.085*** **	**-0.104** **	-0.059
	(0.009)	(0.038)	(0.025)	(0.047)	(0.036)
IRELANDSEFINANCIALISEQPReturn3	**-0.044*** **	**-0.065** **	**-0.064*** **	**-0.088** **	-0.024
	(0.006)	(0.032)	(0.021)	(0.042)	(0.034)
NEWS	**-5.675*** **	**-12.071*** **	0.763	-2.289	4.841
	(0.741)	(2.910)	(2.957)	(5.653)	(4.117)
NEWS*ECBAnnouncement	**5.283***	10.705	8.357	8.921	17.969
	(3.065)	(17.389)	(13.272)	(21.003)	(21.659)
Nochange	0.012	-0.651	**1.008*** **	**1.731** **	**0.888** **
	(0.138)	(1.155)	(0.369)	(0.841)	(0.408)
RestrictivePolicy	0.300	3.036	0.167	-0.047	
	(0.420)	(7.740)	(13.337)	(12.472)	
EasePolicy	**-0.997** **	**-9.764*** **	-0.196		-0.773
	(0.462)	(2.770)	(1.570)		(1.504)
QE_ABS_CBPP_COLL	-0.159	-3.650	0.704	3.321	0.670
	(0.265)	(4.258)	(0.672)	(9541.804)	(0.560)
Const.	-0.041	1.248	**-1.045***	**-2.893*** **	-0.039
	(0.190)	(0.894)	(0.547)	(1.073)	(0.531)
GARCH					
alpha(1)	**0.496*** **	**0.546*** **	**0.223*** **	**0.249*** **	**0.118*** **
	(0.015)	(0.062)	(0.027)	(0.057)	(0.025)
beta(1)	**0.504*** **	**0.454*** **	**0.777*** **	**0.751*** **	**0.882*** **
	(0.015)	(0.062)	(0.027)	(0.057)	(0.025)
alpha(0)	**0.148** **	1.216	0.055	0.136	0.100
	(0.064)	(1.018)	(0.145)	(0.486)	(0.090)
Time Effects	YES	YES	YES	YES	YES
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.00	0.00	0.55	0.02
AIC	20711	3881	7958	3132	4688
BIC	20985	4009	8134	3252	4836
Log Likelihood	-10312	-1911	-3946	-1538	-2314

Notes: Regression output for Ireland ISEQ index. The regression model is given by Equation (4). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.44 Table 45: Sensitivity Analysis - Ireland Financial Index Garch specification (2)

Sensitive analysis Regression - Table 46

	(1) Italy	(2) Italy	(3) Italy	(4) Italy	(5) Italy
FTSEITALYBANKSINDEXReturn					
FTSEITALYBANKSINDEXReturn1	0.008	**-0.078***	0.004	0.054	-0.019
	(0.014)	(0.042)	(0.027)	(0.050)	(0.032)
FTSEITALYBANKSINDEXReturn2	-0.013	0.005	-0.013	**-0.146*****	0.033
	(0.010)	(0.033)	(0.022)	(0.038)	(0.029)
FTSEITALYBANKSINDEXReturn3	**-0.046*****	**-0.123*****	-0.023	-0.020	-0.021
	(0.009)	(0.032)	(0.024)	(0.040)	(0.029)
NEWS	**-5.426*****	**-10.576*****	-0.833	**-4.554***	6.318
	(0.544)	(1.458)	(1.949)	(2.537)	(3.841)
NEWS*ECBAnnouncement	**3.567****	4.337	8.214	3.941	**49.155*****
	(1.695)	(5.084)	(7.625)	(11.149)	(15.241)
Nochange	-0.167	-0.572	0.143	-0.159	0.478
	(0.128)	(0.567)	(0.303)	(0.570)	(0.394)
RestrictivePolicy	-0.110	1.677	0.127	0.405	
	(0.422)	(3.676)	(2.656)	(2.925)	
EasePolicy	**-0.762*****	**-4.147*****	-0.928		**-1.812*****
	(0.290)	(1.195)	(0.595)		(0.648)
QE_ABS_CBPP_COLL	**0.766*****	-0.177	**1.011****	3.466	**0.737***
	(0.212)	(1.724)	(0.397)	(1.3e+04)	(0.423)
Const.	-0.002	-0.072	0.290	0.071	-0.050
	(0.161)	(0.499)	(0.482)	(0.642)	(0.485)
GARCH					
alpha(1)	**0.276*****	**0.251*****	**0.145*****	**0.229*****	**0.109*****
	(0.018)	(0.055)	(0.021)	(0.065)	(0.022)
beta(1)	**0.724*****	**0.749*****	**0.855*****	**0.771*****	**0.891*****
	(0.018)	(0.055)	(0.021)	(0.065)	(0.022)
alpha(0)	0.071*	0.192	0.100	0.114	0.110
	(0.038)	(0.167)	(0.074)	(0.211)	(0.077)
Time Effects	YES	YES	YES	YES	YES
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.00	0.03	0.00	0.00
AIC	18257	2901	7344	2620	4741
BIC	18532	3029	7520	2740	4888
Log Likelihood	-9086	-1422	-3639	-1282	-2340

Notes: Regression output for FTSE Italy Banks index. The regression model is given by Equation (4). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.45 Table 46: Sensitivity Analysis - FTSE Italy Banks Index Garch specification (2)

Sensitive analysis Regression - Table 47

	(1) NETHERLANDs	(2) NETHERLANDs	(3) NETHERLANDs	(4) NETHERLANDs	(5) NETHERLANDs
NETHERLANDDSBanksReturn					
NETHERLANDDSBanksReturn1	0.022	0.037	**-0.081*** **	-0.078	**-0.096*** **
	(0.023)	(0.047)	(0.023)	(0.048)	(0.029)
NETHERLANDDSBanksReturn2	0.064	**0.093***	0.019	-0.043	0.031
	(0.049)	(0.048)	(0.027)	(0.049)	(0.034)
NETHERLANDDSBanksReturn3	**-0.053** **	**-0.073** **	-0.026	**-0.094** **	-0.022
	(0.021)	(0.036)	(0.025)	(0.039)	(0.034)
NEWS	**-7.494*** **	-10.633	1.189	-0.081	**4.407***
	(2.102)	(10.143)	(1.534)	(1.836)	(2.413)
NEWS*ECBAnnouncement	**7.977** **	11.148	5.185	5.284	14.839
	(3.859)	(13.171)	(5.731)	(5.663)	(13.951)
Nochange	-0.053	-0.118	0.264	-0.126	**0.581***
	(0.169)	(0.938)	(0.230)	(0.266)	(0.336)
RestrictivePolicy	0.279	0.680	-0.395	-0.492	
	(0.450)	(0.933)	(1.105)	(0.630)	
EasePolicy	-0.685	**-2.586***	0.313		0.284
	(0.505)	(1.443)	(0.814)		(1.409)
QE_ABS_CBPP_COLL	0.435	1.967	-0.152	0.696	-0.175
	(0.558)	(1.972)	(0.304)	(2094.195)	(0.388)
Const.	0.080	1.776	**-0.081*** **	-0.078	**-0.096*** **
	(0.171)	(1.537)	(0.023)	(0.048)	(0.029)
GARCH					
alpha(1)			**0.160*** **	**0.335*** **	**0.120*** **
			(0.024)	(0.078)	(0.028)
beta(1)			**0.840*** **	**0.665*** **	**0.880*** **
			(0.024)	(0.078)	(0.028)
alpha(0)			0.027	0.045	0.040
			(0.035)	(0.080)	(0.047)
Time Effects	YES	YES	YES	YES	YES
N	4353	609	1553	543	1010
P-value(Chi^2)			0.06	0.54	0.01
P-value(F)	0.00	0.00			
LM autocorrelation test	0.00	0.00			
Arch test	0.99	1.00			
Normality test	0.00	0.00			
DW	2	2			
R^2 adj.	1.4%	1.3%			
AIC	21506	11607	6042	1914	4097
BIC	21557	11653	6106	1961	4151
Log Likelihood	-10744	-5795	-3009	-946	-2038

Notes: Regression output for Netherlands DS Banks index. The regression model is given by Equation (4). All regressions are estimated with robust consistent standard errors. The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis. * p < 0.1, ** p < 0.05, *** p < 0.01

Figure A.46 Table 47: Sensitivity Analysis - Netherland Banks Index Garch specification (2)

Sensitive analysis Regression - Table 48

	(1) Portugal	(2) Portugal	(3) Portugal	(4) Portugal	(5) Portugal
PORTUGALDSBANKSReturn					
PORTUGALDSBANKSReturn1	**0.063*** **	0.020	**0.081*** **	0.073	**0.086*** **
	(0.011)	(0.041)	(0.026)	(0.050)	(0.033)
PORTUGALDSBANKSReturn2	-0.009	-0.049	0.029	**-0.105** **	0.059
	(0.009)	(0.044)	(0.027)	(0.046)	(0.037)
PORTUGALDSBANKSReturn3	**0.021*** **	-0.003	-0.024	-0.064	-0.016
	(0.008)	(0.039)	(0.022)	(0.040)	(0.029)
NEWS	**-1.320*** **	**-3.435*** **	-0.109	-2.633	7.340
	(0.391)	(1.076)	(2.679)	(2.389)	(5.676)
NEWS*ECBAnnouncement	1.545	-3.268	12.532	10.389	36.449
	(1.871)	(6.795)	(12.701)	(12.654)	(28.272)
Nochange	-0.065	-0.271	**0.612***	0.529	**1.088***
	(0.082)	(0.584)	(0.369)	(0.521)	(0.570)
RestrictivePolicy	0.088	-1.305	3.589	3.631	
	(0.291)	(1.6e+07)	(3.043)	(2.361)	
EasePolicy	0.313	1.019	0.832		0.184
	(0.333)	(0.828)	(1.302)		(1.731)
QE_ABS_CBPP_COLL	**1.506*** **	0.257	0.506	-0.321	0.253
	(0.163)	(2.141)	(0.491)	(4.9e+05)	(0.652)
Const.	0.036	**-1.208*** **	0.006	-0.063	0.322
	(0.106)	(0.362)	(0.568)	(0.547)	(0.605)
GARCH					
alpha(1)	**0.549*** **	**0.226*** **	**0.192*** **	**0.181*** **	**0.152*** **
	(0.018)	(0.063)	(0.025)	(0.053)	(0.030)
beta(1)	**0.451*** **	**0.774*** **	**0.808*** **	**0.819*** **	**0.848*** **
	(0.018)	(0.063)	(0.025)	(0.053)	(0.030)
alpha(0)	**0.155*** **	0.022	0.049	0.025	0.001
	(0.028)	(0.099)	(0.096)	(0.123)	(0.129)
Time Effects	YES	YES	YES	YES	YES
N	4353	609	1553	543	1010
P-value(Chi^2)	0.00	0.00	0.00	0.08	0.00
AIC	16666	2536	7477	2375	5068
BIC	16742	2664	7653	2496	5216
Log Likelihood	-8321	-1239	-3705	-1160	-2504

Notes: Regression output for Portugal DS Banks index. The regression model is given by Equation (4). All regressions are estimated with robust consistent standard errors.The standard errors are provide in parentheses. Column (1) shows the total sample estimates. Column (2) exhibits the estimates during the subprime crisis. Column (3) presents the estimates during the all-sovereign debt crisis. Column (4) displays the estimates during the first phase of the sovereign debt crisis; finally, the fifth column reflects the estimates during the second phase of the sovereign debt crisis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.0$

Figure A.47 Table 48: Sensitivity Analysis - Portugal Banks Index Garch specification (2)

Appendix B

Chapter 2: Figures and Tables.

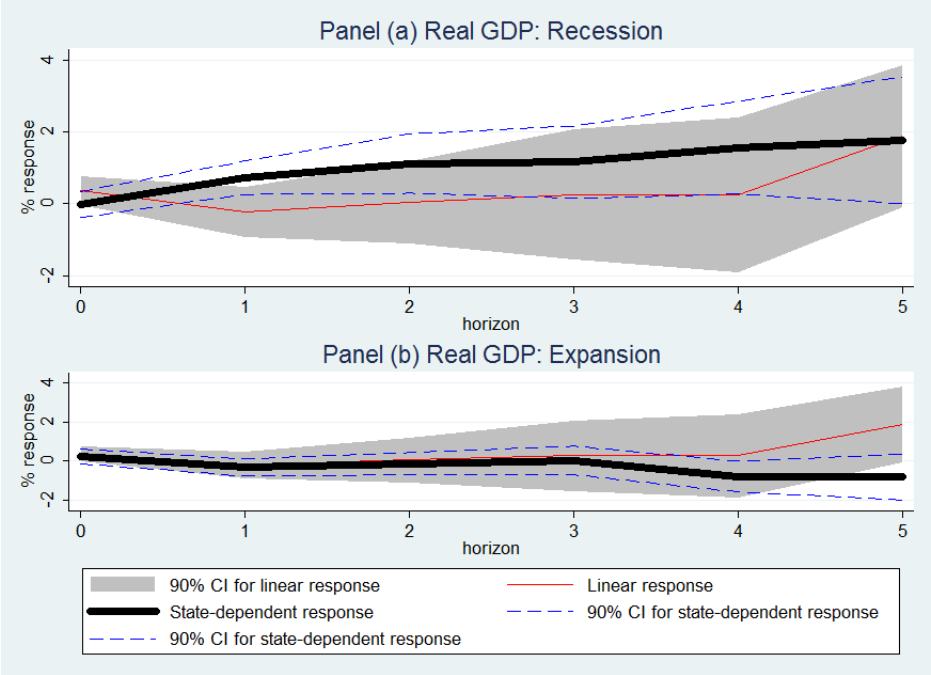

Figure B.1 Panel 1. Real GDP

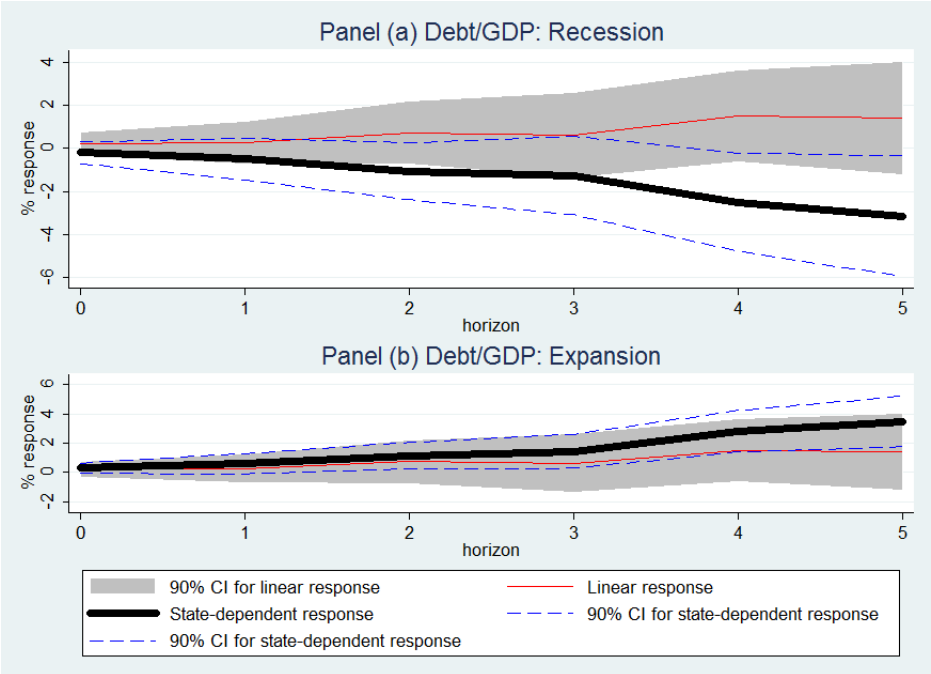

Figure B.2 Panel 2. Debt-to-GDP

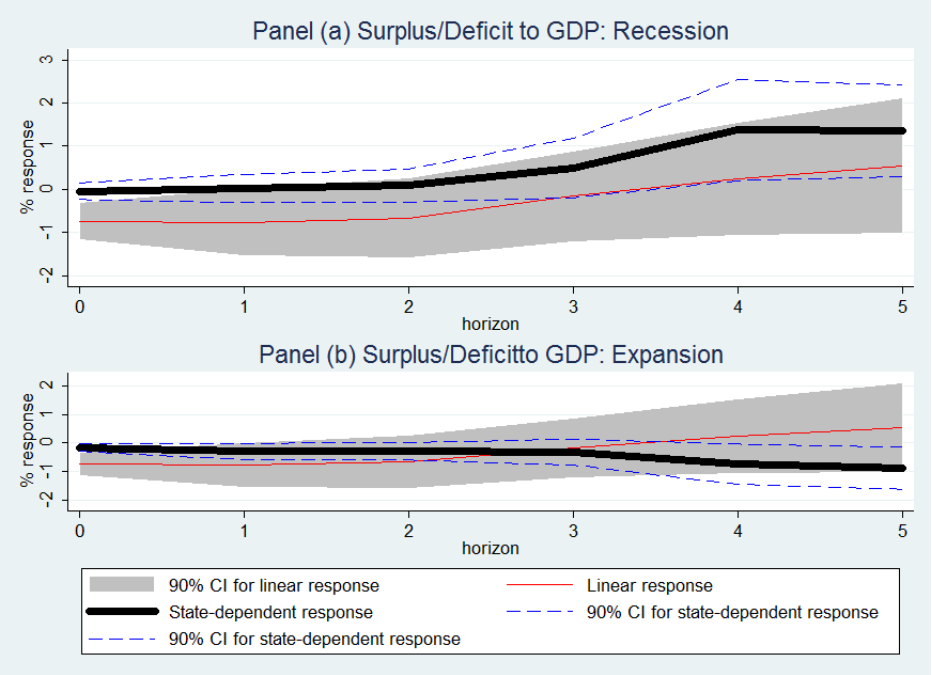

Figure B.3 Panel 3. Surplus/Deficit

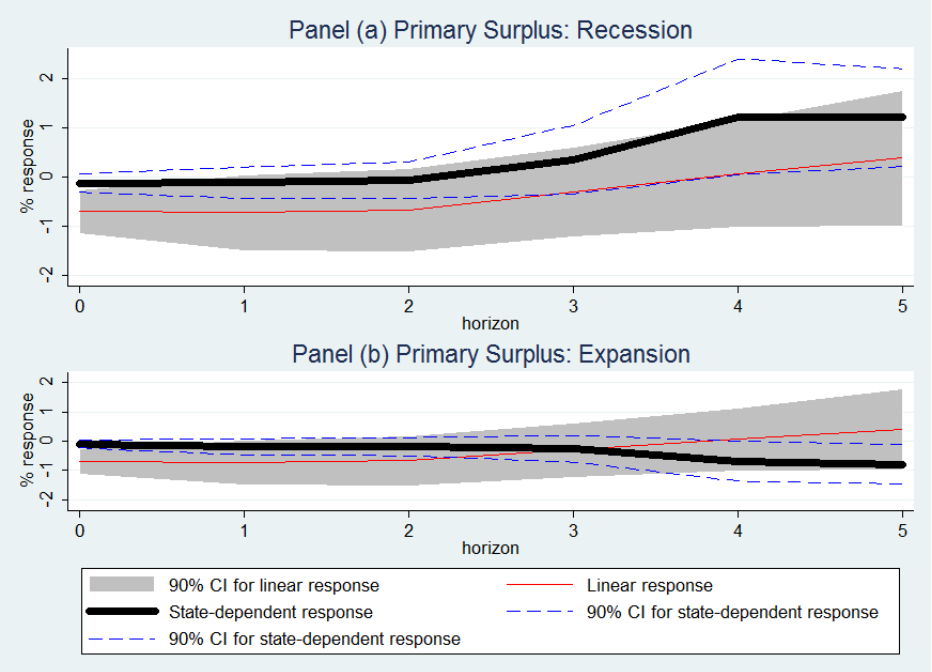

Figure B.4 Panel 4. Primary Surplus

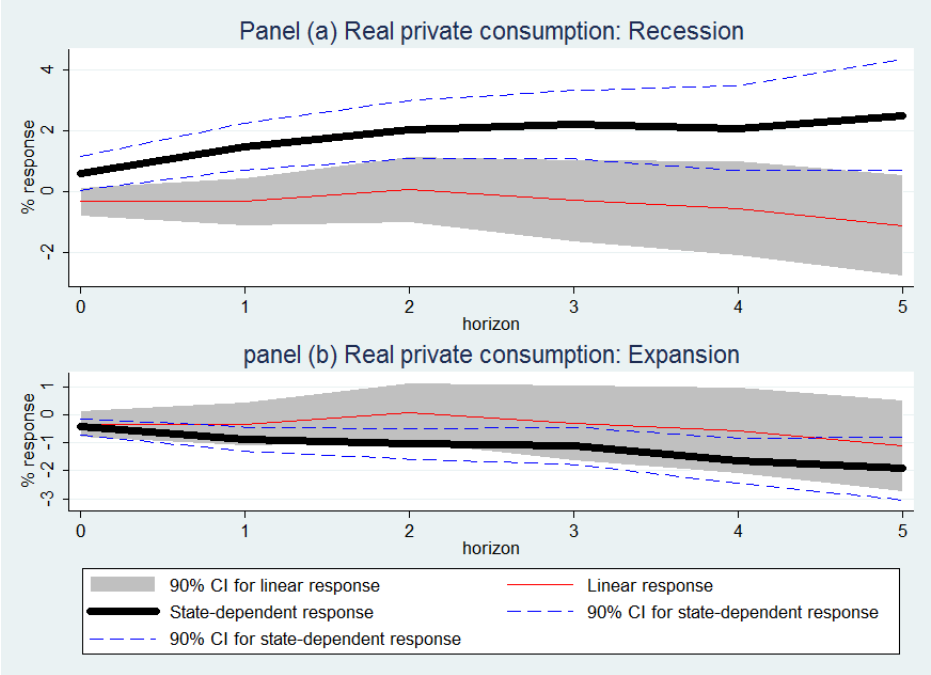

Figure B.5 Panel 5. Real Private Consumption

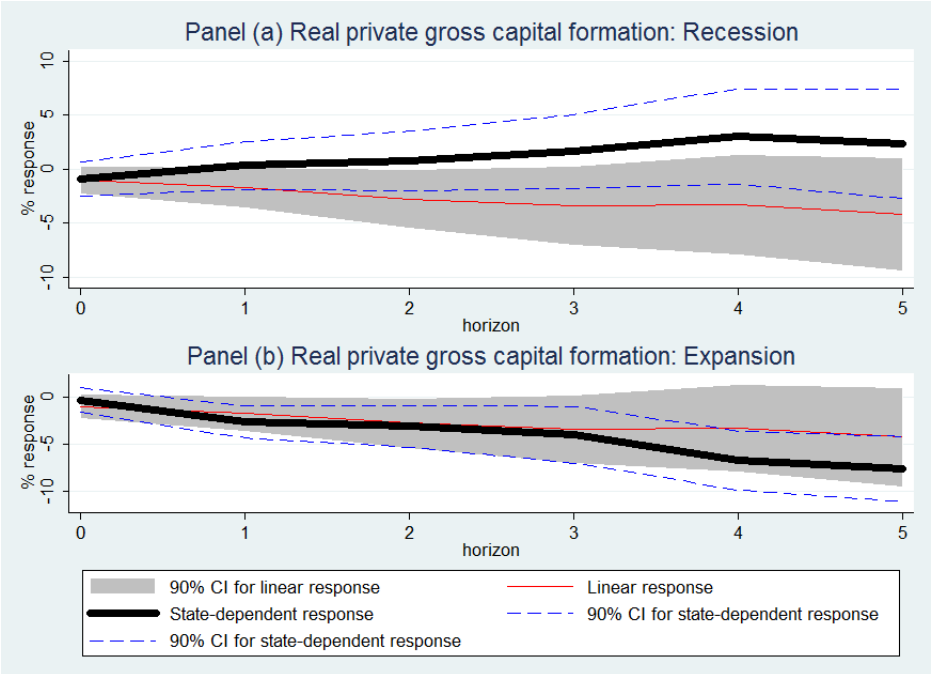

Figure B.6 Panel 6. Private Capital Formation

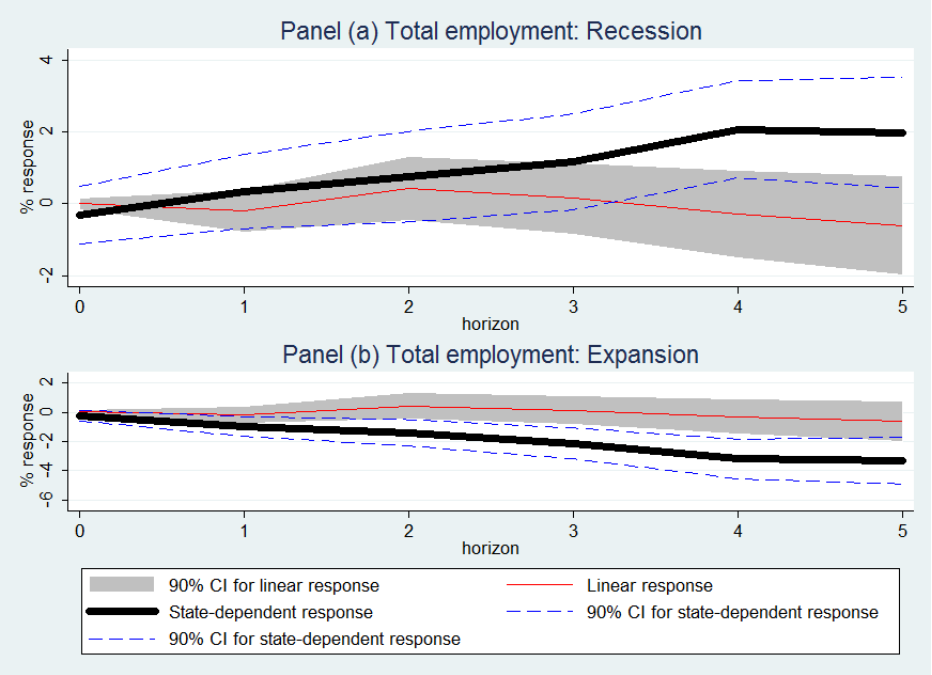

Figure B.7 Panel 7. Total Employment

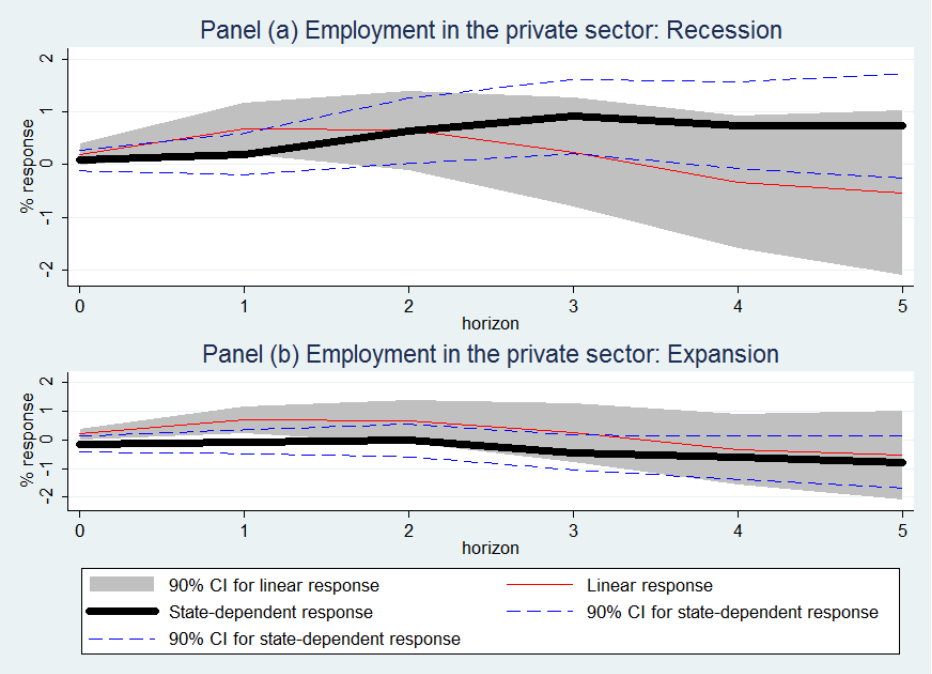

Figure B.8 Panel 8. Employment in Private Sector

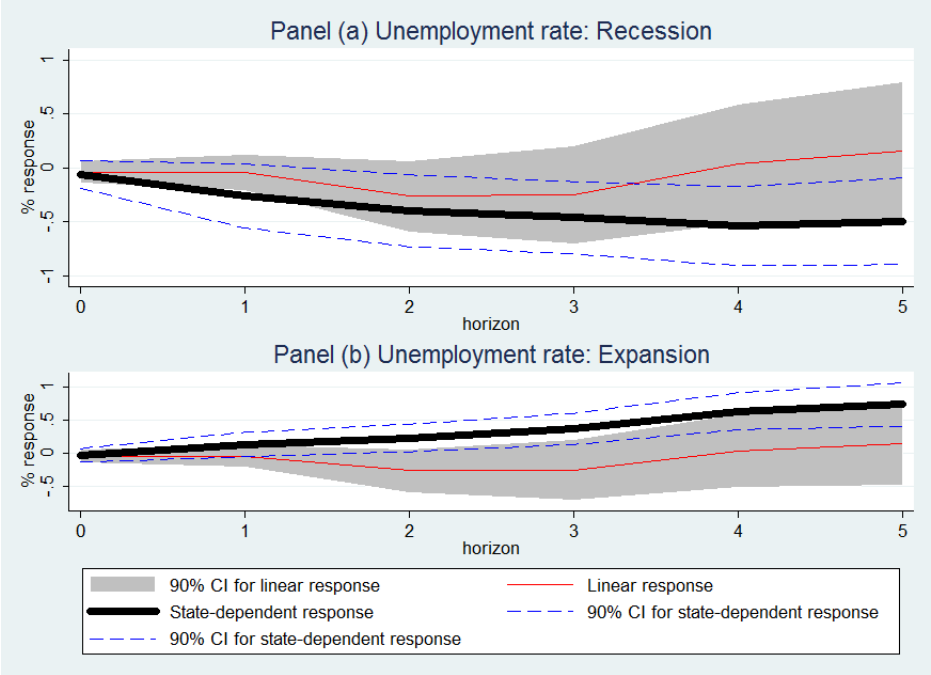

Figure B.9 Panel 9. Unemployment Rate

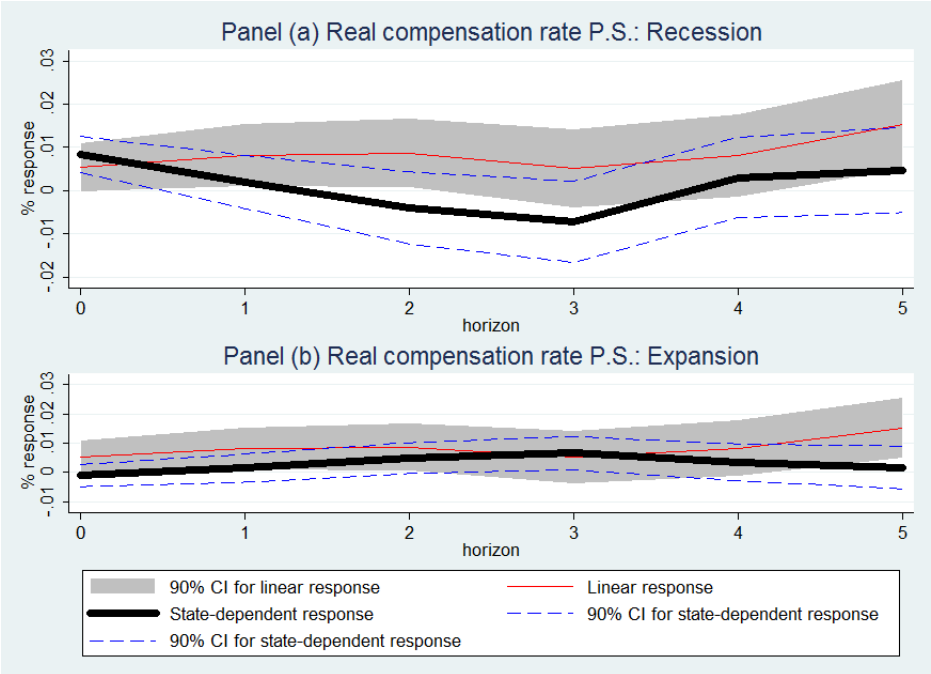

Figure B.10 Panel 10. Real compensation rate of the private sector

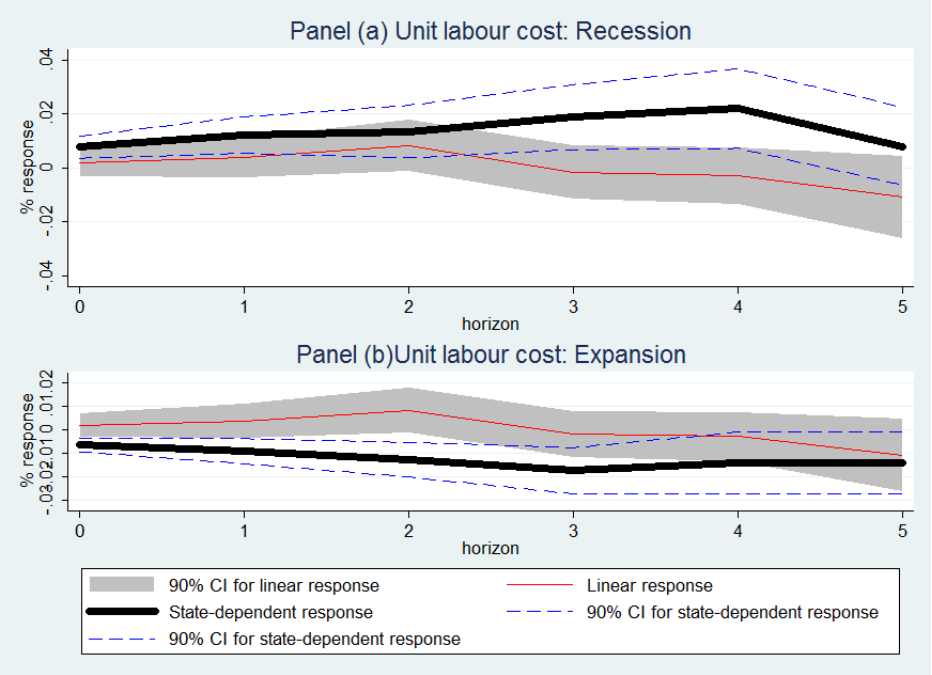

Figure B.11 Panel 11. Unit labour cost in total economy

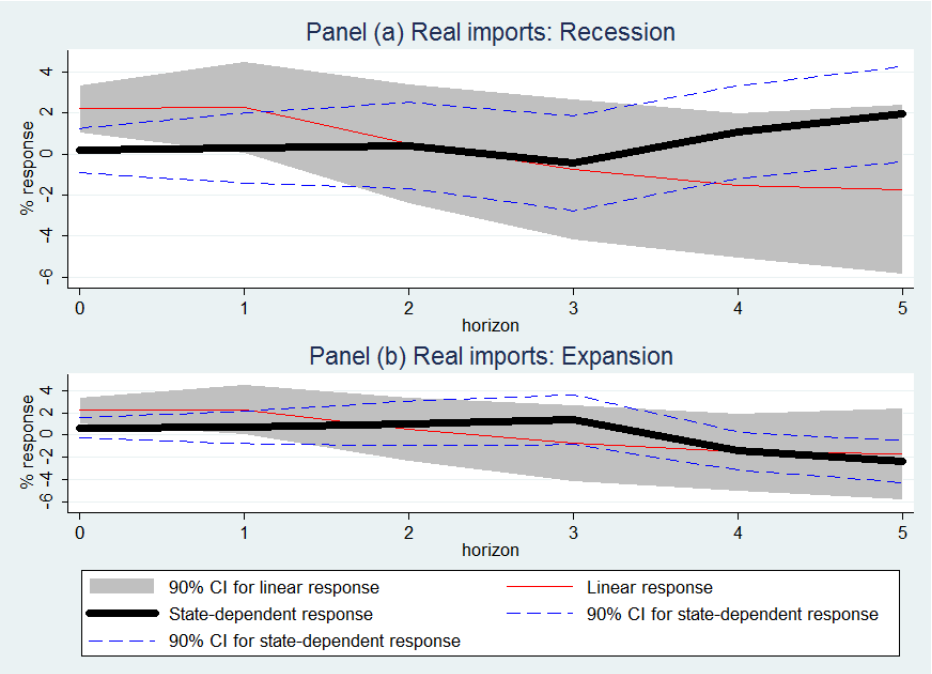

Figure B.12 Panel 12. Real Imports

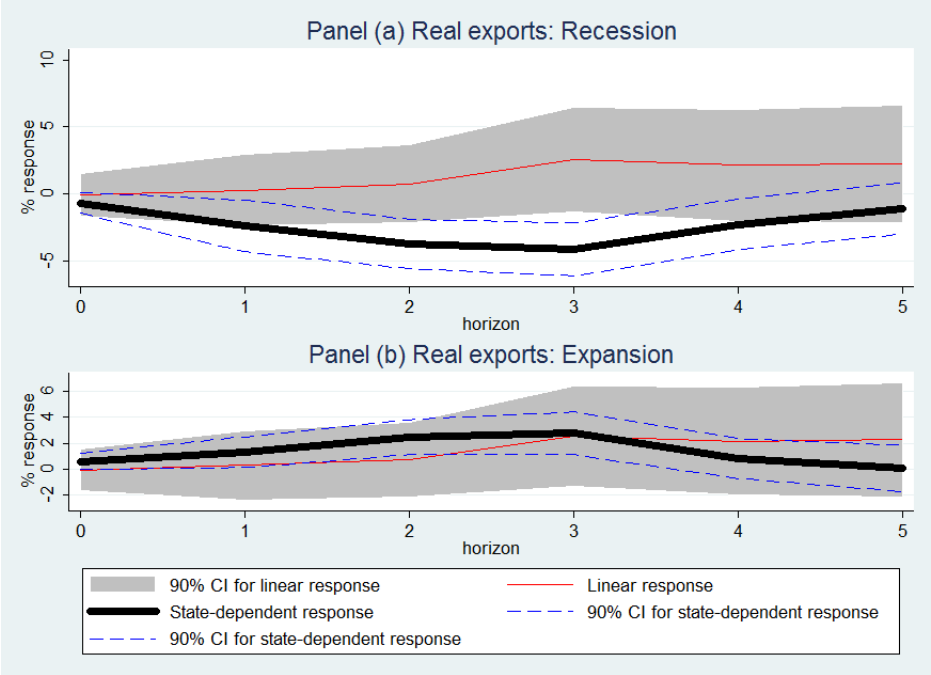

Figure B.13 Panel 13. Real Exports

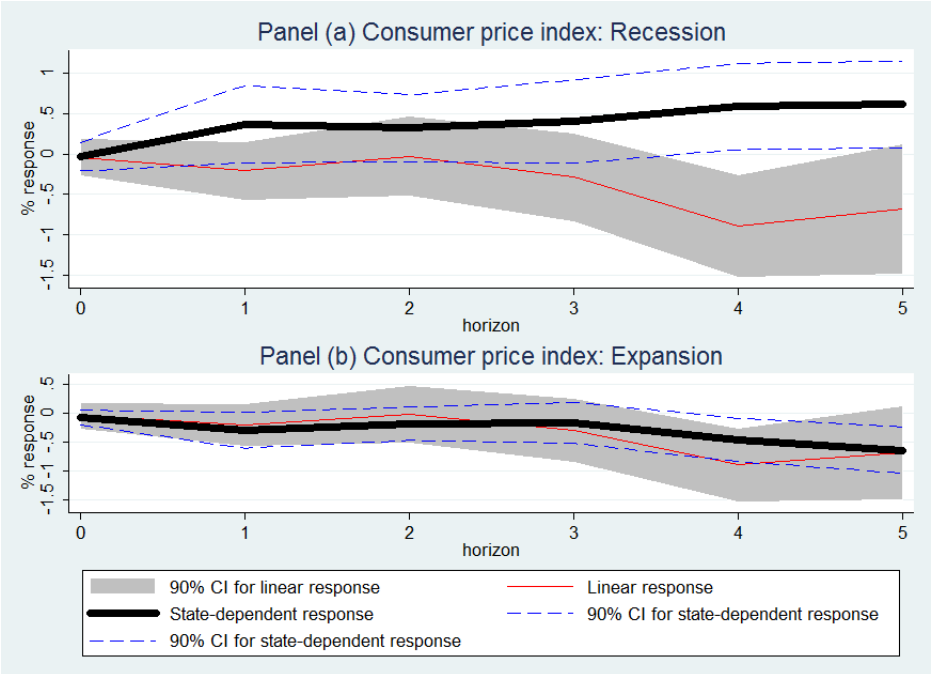

Figure B.14 Panel 14. Consumer price index

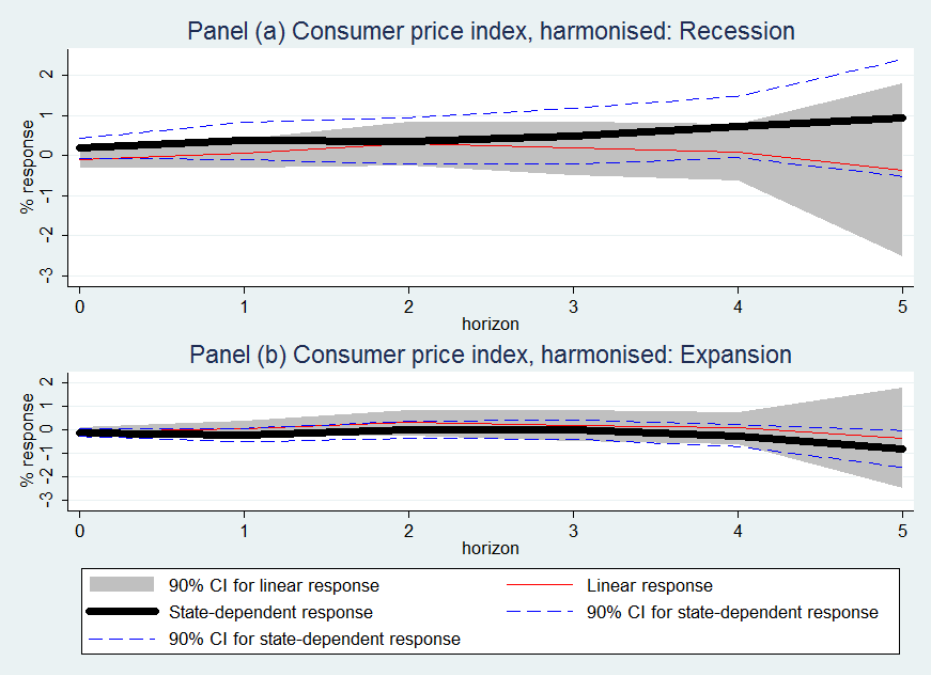

Figure B.15 Panel 15. Consumer price index harmonized

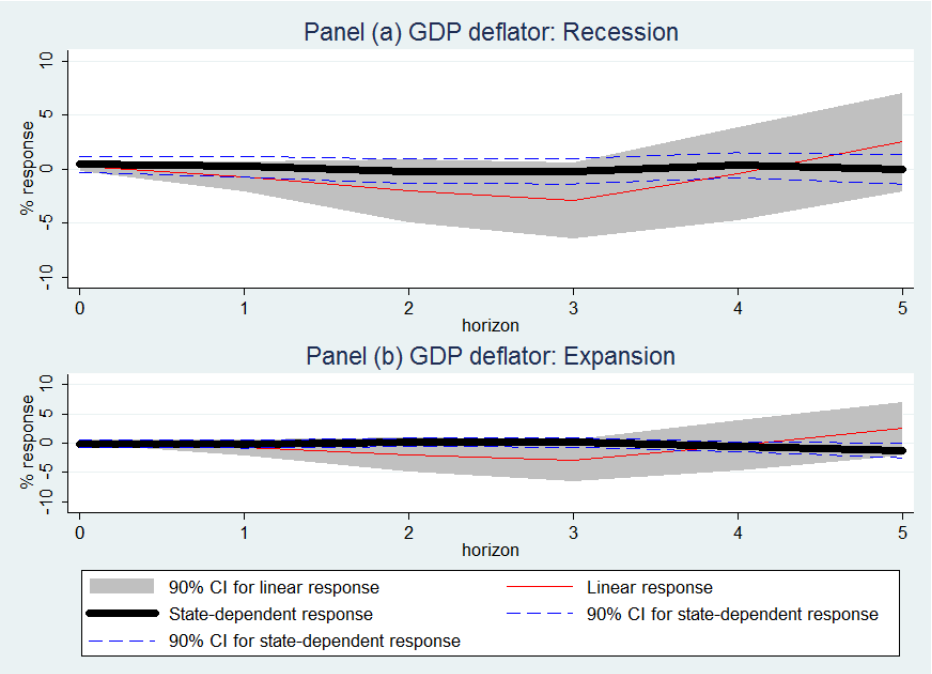

Figure B.16 Panel 16. GDP Deflator

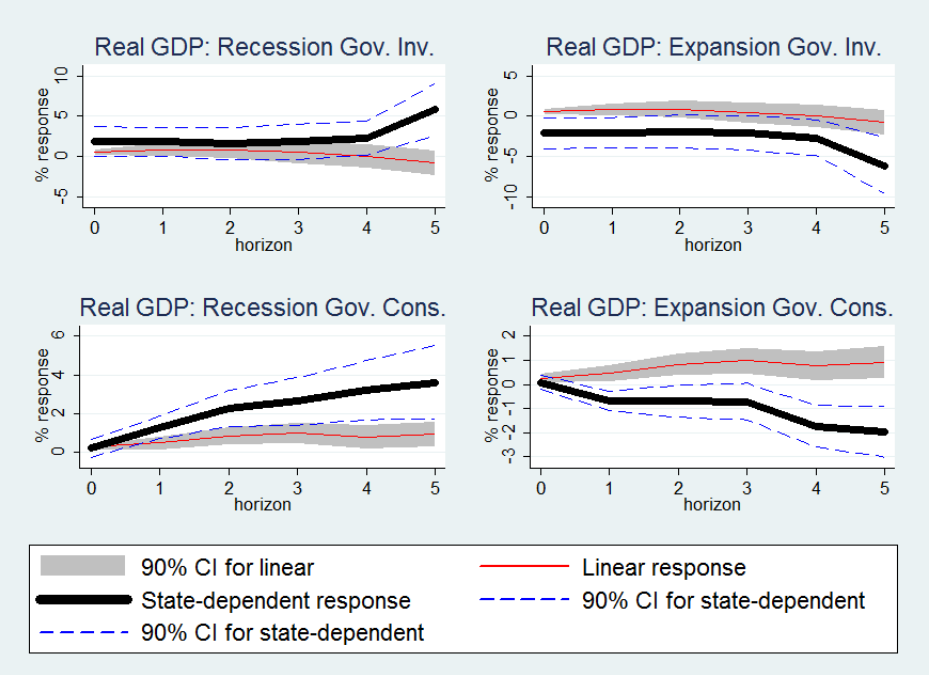

Figure B.17 Panel 17. GDP Response to Consumption and Investment Government Spending

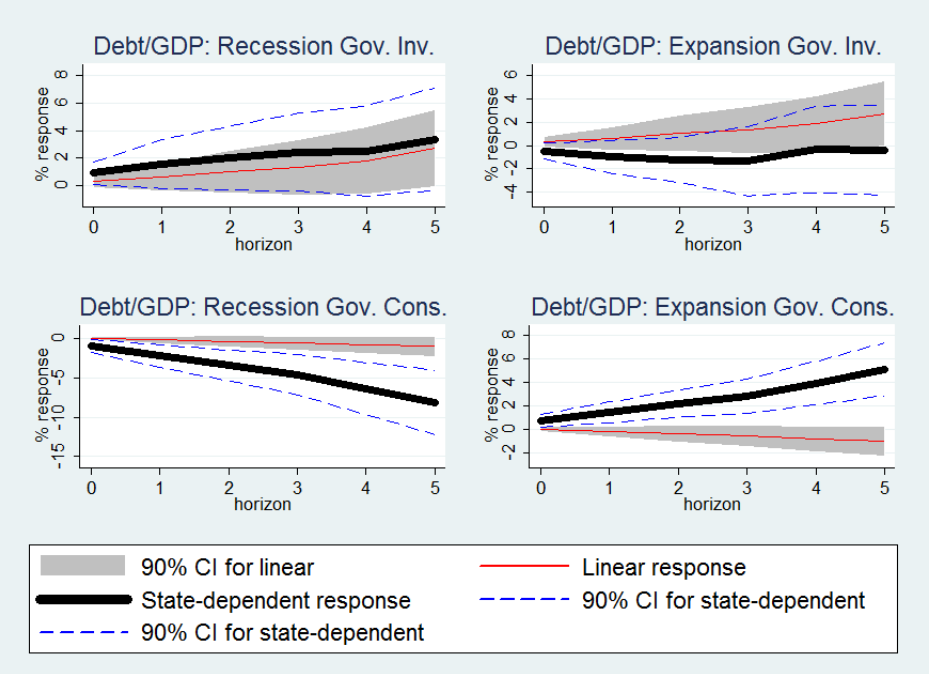

Figure B.18 Panel 18. Debt/GDP Response to Consumption and Investment Government Spending

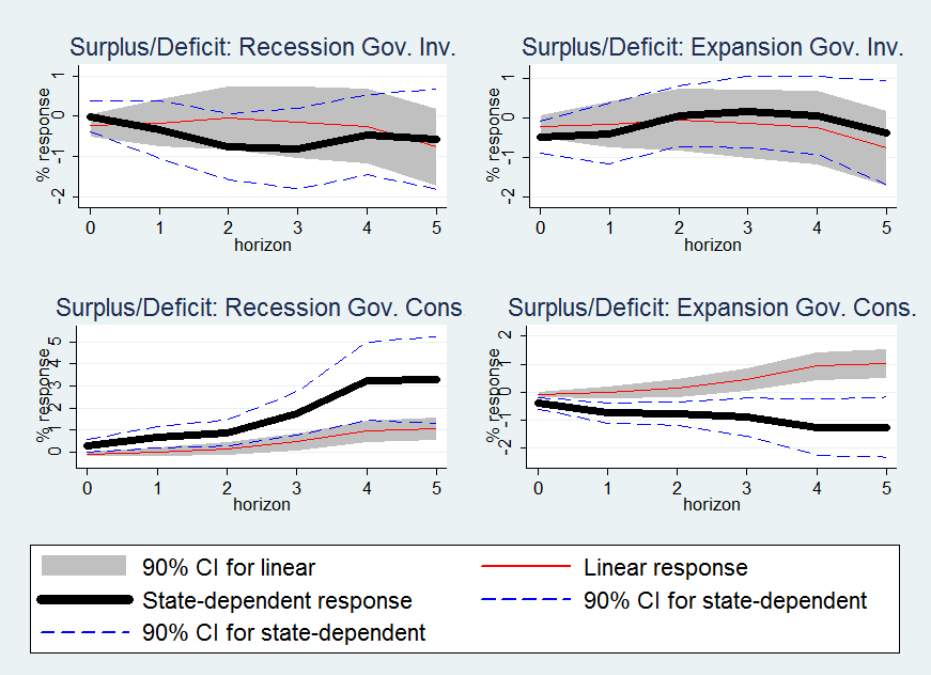

Figure B.19 Panel 19. Surplus/Deficit Response to Consumption and Investment Government Spending

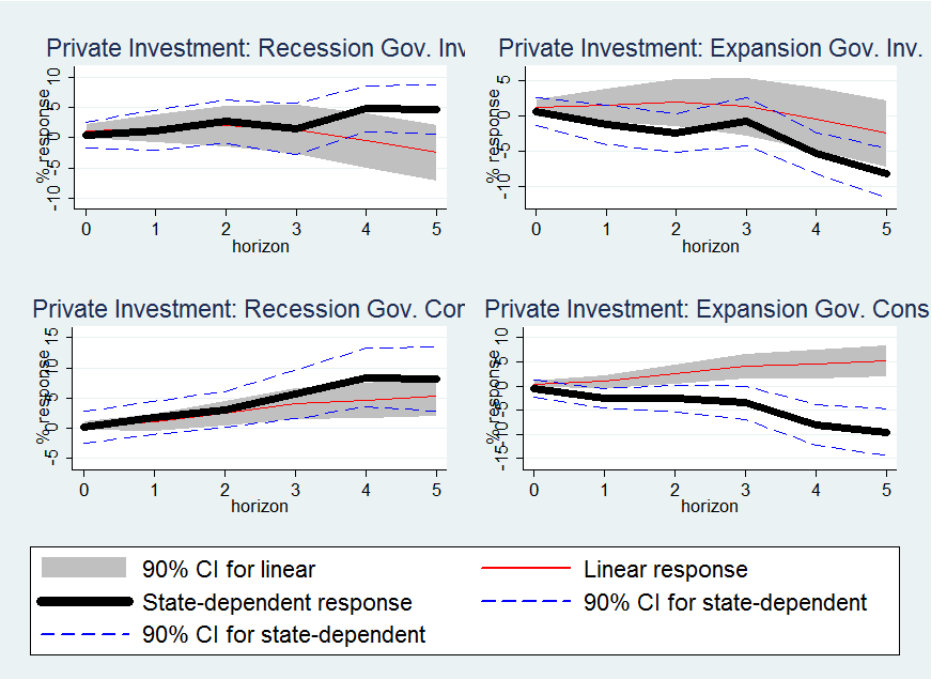

Figure B.20 Panel 20. Private Investment Response to Consumption and Investment Government Spending

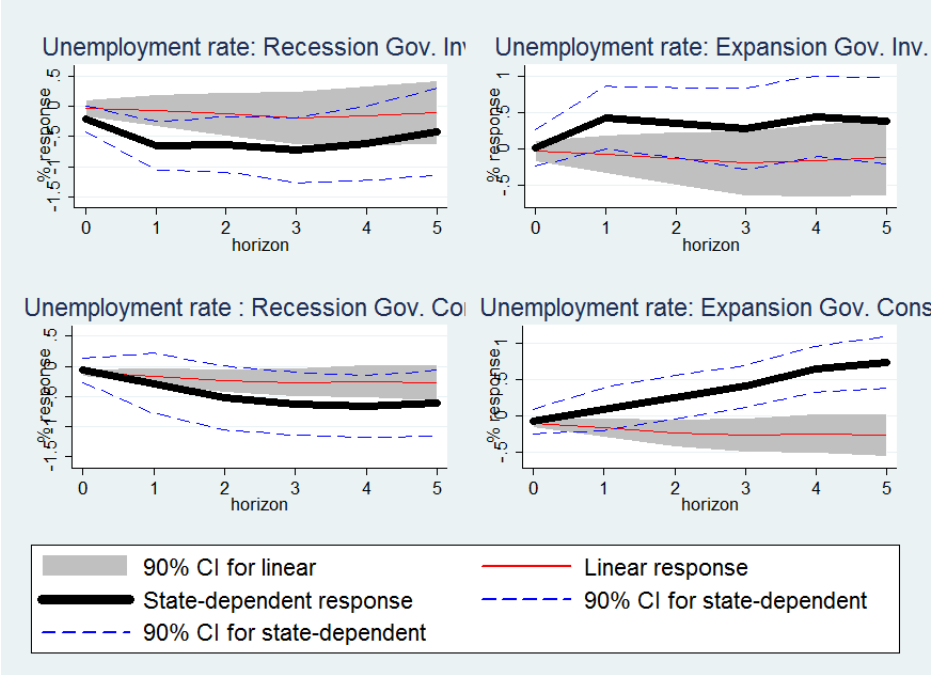

Figure B.21 Panel 21. Unemployment rate Response to Consumption and Investment Government Spending

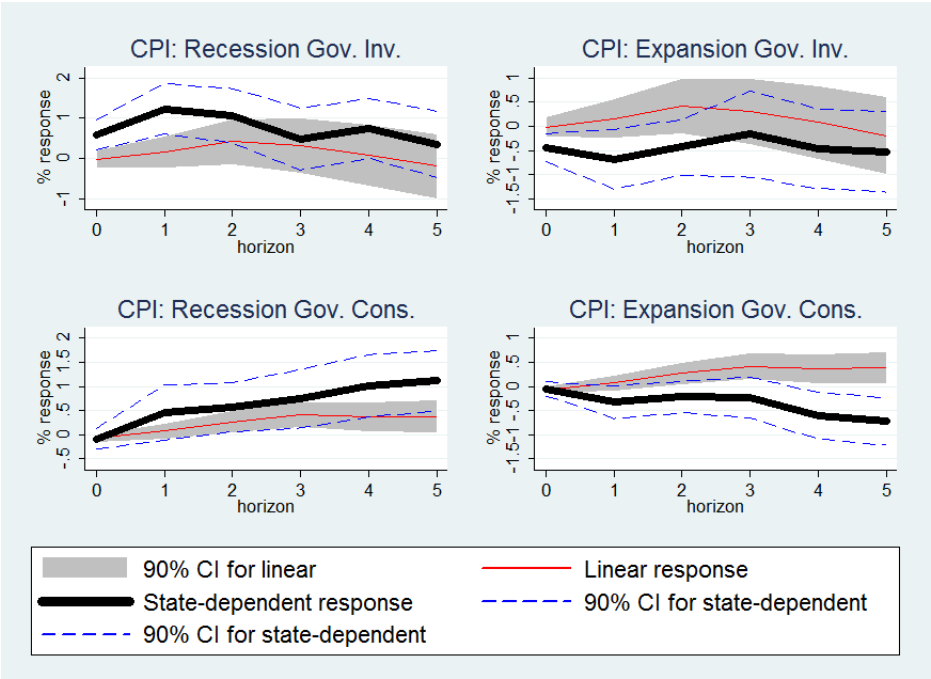

Figure B.22 Panel 22. CPI Response to Consumption and Investment Government Spending

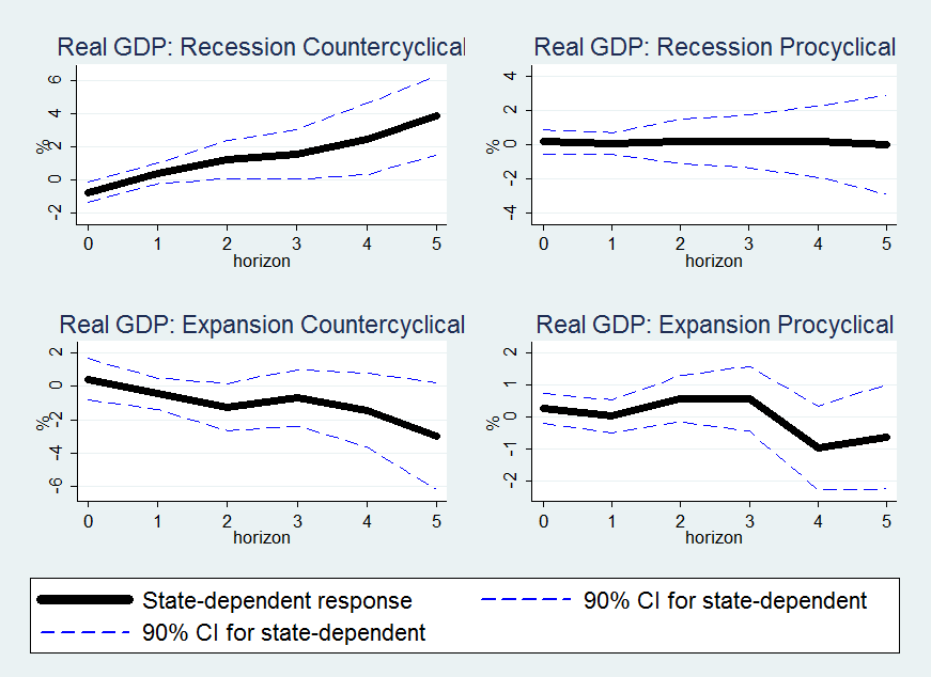

Figure B.23 Panel 23. GDP Response to Countercyclical and Procyclical Fiscal policy

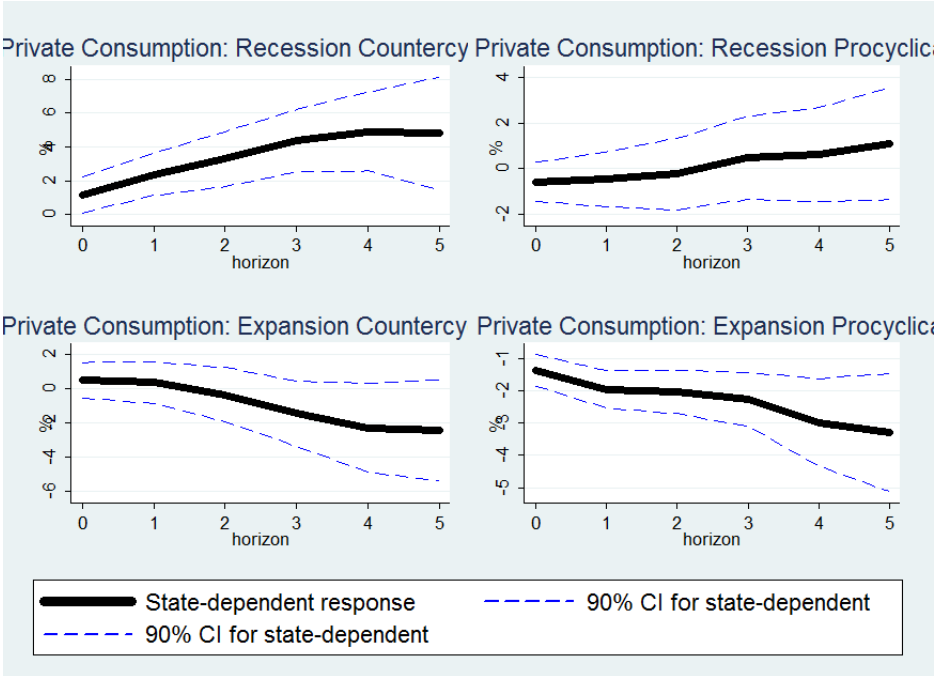

Figure B.24 Panel 24. Private Consumption Response to Countercyclical and Procyclical Fiscal policy

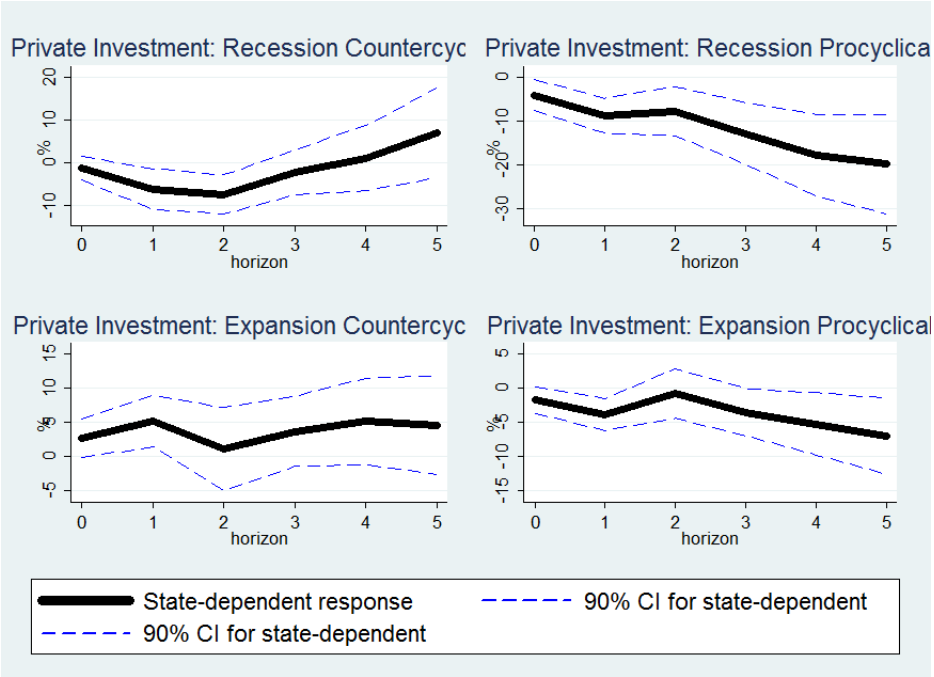

Figure B.25 Panel 25. Private Investment Response to Countercyclical and Procyclical Fiscal policy

Table B.1 Mean and maximum response to an unanticipated one percent government spending shock, control for year and country fixed effects

	Mean Response			Max Response		
	Recession (1)	Expansion (2)	Linear (3)	Recession (4)	Expansion (5)	Linear (6)
Real GDP	1.17***	-0.34	0.60***	1.91**	0.29	0.87***
	(0.48)	(0.39)	(0.21)	(0.96)	(0.18)	(0.26)
Debt to GDP ratio	-1.45	1.62***	-0.09	-0.21	3.47***	0.01
	(1.00)	(0.68)	(0.29)	(0.29)	(1.20)	(0.10)
Surplus/Deficit to GDP	0.55*	-0.45**	0.08	1.37*	-0.15*	0.32
	(0.30)	(0.21)	(0.12)	(0.74)	(0.08)	(0.25)
Primary Surplus to GDP	0.41	-0.37*	0.09	1.23*	-0.10	0.42
	(0.29)	(0.21)	(0.13)	(0.74)	(0.08)	(0.47)
Real Private Consumption	1.77***	-1.15***	0.42	2.38**	-0.41***	0.62*
	(0.55)	(0.39)	(0.29)	(1.08)	(0.17)	(0.33)
Real private gross capital formation	1.17	-4.03***	-0.34	2.99	-0.35	0.22
	(2.12)	(1.16)	(1.01)	(3.43)	(0.91)	(1.23)
Real Total Gross Capital Formation	2.95*	-2.01**	0.80	3.76**	-0.57	1.45
	(1.59)	(0.99)	(0.72)	(1.94)	(1.54)	(1.13)
Real Gross fixed capital formation, housing	1.38	-1.99	1.01	2.27	0.23	1.59
	(1.85)	(1.32)	(0.83)	(2.93)	(0.86)	(1.47)
Total Employment	0.99	-1.86***	-0.51*	2.02***	-0.23	-0.26
	(0.61)	(0.48)	(0.31)	(0.81)	(0.18)	(0.23)
Employment in the Private Sector	0.52*	-0.35	0.23	0.85**	-0.01	0.43*
	(0.27)	(0.32)	(0.19)	(0.42)	(0.32)	(0.24)
Unemployment rate	-0.39***	0.46***	0.00	-0.05	0.90***	0.09
	(0.13)	(0.11)	(0.05)	(0.04)	(0.20)	(0.10)
Real Exports	-2.38***	1.35***	-0.35	-0.67	2.77***	0.12
	(0.62)	(0.57)	(0.30)	(0.42)	(1.04)	(0.18)
Real Imports	0.56	0.01	0.67	1.94	1.36	1.21***
	(1.16)	(0.97)	(0.42)	(1.47)	(1.56)	(0.51)
Consumer Price Index	0.38**	-0.30*	0.03	0.62*	-0.07	0.13
	(0.19)	(0.16)	(0.09)	(0.33)	(0.06)	(0.13)
Consumer Price Index Harmonized	0.50*	-0.24	0.12	0.93	0.01	0.22*
	(0.29)	(0.21)	(0.12)	(0.61)	(0.24)	(0.13)
GDP Deflator	0.09	-0.32	0.03	0.42	0.13	0.18
	(0.57)	(0.40)	(0.19)	(0.42)	(0.51)	(0.15)
Real Compensation rate of the private sector	0.12	0.29	0.34*	0.84***	0.66**	0.51*
	(0.41)	(0.26)	(0.20)	(0.23)	(0.34)	(0.28)
Unit Labour Cost Economy	1.36**	-1.24***	0.00	2.19*	-0.65***	0.32
	(0.69)	(0.51)	(0.25)	(1.14)	(0.20)	(0.38)

Notes: The table reports percent responses of variables indicated in the left column. The estimated specification is given by equation (1). For unemployment, columns (9)-(11) show the minimal response. Mean and maximum responses are calculated over three years. Robust standard errors are reported in parentheses. *, **, *** indicate statistical significance at 10, 5, and 1 percent levels.

Table B.2 Variation in the mean response of output across countries, control for time and country fixed effects

	Response when characteristic is equal to zero				Response when characteristic is equal to one			
	Mean Response		Max Response		Mean Response		Max Response	
	Recession (1)	Expansion (2)	Recession (1)	Expansion (2)	Recession (1)	Expansion (2)	Recession (1)	Expansion (2)
Level of Government Debt	2.42***	-0.88	3.72***	0.23	2.40***	-0.87	3.69***	0.24
	(0.87)	(0.83)	(1.01)	(0.24)	(0.85)	(0.82)	(0.99)	(0.24)
Surplus/Deficit	0.26	0.28	0.77	0.90**	2.50***	-1.64***	3.83***	-0.04
	(0.51)	(0.39)	(1.00)	(0.46)	(0.66)	(0.65)	(1.23)	(0.17)
Spread	1.17***	-0.30	1.79***	0.33***	1.35***	-0.58	2.20***	0.32
	(0.49)	(0.29)	(0.74)	(0.14)	(0.40)	(0.56)	(0.84)	(0.25)
Openness	1.73***	-1.15***	3.12***	0.02	1.09**	0.03	1.75**	0.73***
	(0.52)	(0.46)	(0.84)	(0.15)	(0.52)	(0.25)	(0.84)	(0.31)
Currency Union	-0.86	0.26	-0.27	0.46	1.87***	-0.43	3.19**	0.53
	(0.74)	(0.37)	(0.24)	(0.65)	(0.62)	(0.46)	(1.39)	(0.63)
Zero lower bound	1.20***	-0.63***	1.74***	0.10	0.98	2.87***	1.85	7.29**
	(0.37)	(0.27)	(0.50)	(0.09)	(1.27)	(0.72)	(2.41)	(3.26)

Notes: The table reports estimate of equation (3). *Level of government debt* is measured as a percent of GDP (Source: OECD). *Surplus/Deficit* is measured as a percent of GDP (Source: OECD). *Spread* is the difference in yield between a bond and some comparative benchmark bond. In this case the benchmark is the 10 years German Bund vs other Euro Countries Government bond with the same maturity(Source: OECD). *Openness to trade* is measured as (export+import)/GDP, if the proxy for one country is higher than the average, the economy is open vice versa is not (Source: OECD). *Currency Union* is a dummy that takes the value 1 after the introductions of the euro. *Zero lower bound* is measured as $ZTL = i_s$ if $i_s < 1\%$ where i_s is the short interest rate (Source: OECD). Robust standard errors are reported in parentheses. *, **, *** indicate statistical significance at 10, 5, and 1 percent levels.

Table B.3 Variation in the mean response of private consumption across countries, control for time and country fixed effects

	Response when characteristic is equal to zero				Response when characteristic is equal to one			
	Mean Response		Max Response		Mean Response		Max Response	
	Recession (1)	Expansion (2)	Recession (1)	Expansion (2)	Recession (1)	Expansion (2)	Recession (1)	Expansion (2)
Level of Government Debt	2.25*	-1.16*	2.77**	-0.56*	2.24*	-1.16*	2.76**	-0.56*
	(1.31)	(0.63)	(1.26)	(0.32)	(1.29)	(0.62)	(1.24)	(0.32)
Surplus/Deficit	0.87	-0.65*	1.47	-0.27	2.93***	-2.08***	3.82***	-0.61*
	(0.99)	(0.38)	(1.32)	(0.32)	(0.98)	(0.72)	(1.18)	(0.35)
Spread	1.07	-0.49	1.46	-0.19	2.02***	-2.07***	2.90***	-0.71***
	(0.74)	(0.36)	(0.96)	(0.34)	(0.72)	(0.40)	(1.08)	(0.30)
Openness	2.27**	-1.55**	3.16***	-0.49*	1.62**	-1.00***	2.47***	-0.39
	(1.00)	(0.68)	(1.24)	(0.30)	(0.72)	(0.32)	(0.97)	(0.29)
Currency Union	-0.69**	0.15	0.17	0.87	2.85***	-2.37***	4.68***	-0.79***
	(0.30)	(0.26)	(0.64)	(0.59)	(0.79)	(0.50)	(1.32)	(0.31)
Zero lower bound	1.58***	-1.04***	2.10***	-0.34*	2.24*	-1.57**	4.12**	-0.79***
	(0.37)	(0.21)	(0.46)	(0.19)	(1.26)	(0.77)	(2.07)	(0.29)

Notes: The table reports estimate of equation (3). *Level of government debt* is measured as a percent of GDP (Source: OECD). *Surplus/Deficit* is measured as a percent of GDP (Source: OECD). *Spread* is the difference in yield between a bond and some comparative benchmark bond. In this case the benchmark is the 10 years German Bund vs other Euro Countries Government bond with the same maturity(Source: OECD). *Openness to trade* is measured as (export+import)/GDP, if the proxy for one country is higher than the average, the economy is open vice versa is not (Source: OECD). *Currency Union* is a dummy that takes the value 1 after the introductions of the euro. *Zero lower bound* is measured as $ZTL = i_s$ if $i_s < 1\%$ where i_s is the short interest rate (Source: OECD). Robust standard errors are reported in parentheses. *, **, *** indicate statistical significance at 10, 5, and 1 percent levels.

Table B.4 Variation in the mean response of Private investment across countries, control for time and country fixed effects

	Response when characteristic is equal to zero				Response when characteristic is equal to one			
	Mean Response		Max Response		Mean Response		Max Response	
	Recession (1)	Expansion (2)	Recession (1)	Expansion (2)	Recession (1)	Expansion (2)	Recession (1)	Expansion (2)
Level of Government Debt	4.84***	-6.58**	9.24***	-0.70	4.78***	-6.47**	9.11***	-0.69
	(1.81)	(2.91)	(1.58)	(1.71)	(1.78)	(2.86)	(1.55)	(1.68)
Surplus/Deficit	0.80	-1.75*	2.60*	-0.04	4.76**	-1.43	7.47***	2.16
	(0.81)	(0.97)	(1.39)	(0.89)	(2.42)	(1.42)	(3.09)	(2.31)
Spread	4.22***	-2.88**	6.26***	-0.23	2.96***	-1.11	4.78***	2.18
	(1.52)	(1.39)	(2.00)	(1.15)	(1.19)	(2.25)	(1.87)	(3.91)
Openness	-0.12	0.23	1.12	0.86	4.17***	-2.73***	5.38***	-0.68
	(1.55)	(0.78)	(1.18)	(1.26)	(1.44)	(0.93)	(2.01)	(1.03)
Currency Union	4.28***	-2.71***	9.01***	0.51	2.35	-1.47	5.11**	2.85***
	(1.19)	(1.01)	(2.32)	(1.26)	(1.55)	(1.42)	(2.48)	(1.19)
Zero lower bound	4.27***	-3.07**	5.67***	-0.41	-0.69	1.75	6.93**	12.98**
	(1.39)	(1.49)	(1.86)	(0.84)	(2.00)	(3.12)	(3.50)	(6.50)

Notes: The table reports estimate of equation (3). *Level of government debt* is measured as a percent of GDP (Source: OECD). *Surplus/Deficit* is measured as a percent of GDP (Source: OECD). *Spread* is the difference in yield between a bond and some comparative benchmark bond. In this case the benchmark is the 10 years German Bund vs other Euro Countries Government bond with the same maturity(Source: OECD). *Openness to trade* is measured as (export+import)/GDP, if the proxy for one country is higher than the average, the economy is open vice versa is not (Source: OECD). *Currency Union* is a dummy that takes the value 1 after the introductions of the euro. *Zero lower bound* is measured as $ZTL = i_s$ if $i_s < 1\%$ where i_s is the short interest rate (Source: OECD). Robust standard errors are reported in parentheses. *, **, *** indicate statistical significance at 10, 5, and 1 percent levels.

Table B.5 Variation in the mean response of Debt to GDP across countries, control for time and country fixed effects

	Response when characteristic is equal to zero				Response when characteristic is equal to one			
	Mean Response		Max Response		Mean Response		Max Response	
	Recession (1)	Expansion (2)	Recession (1)	Expansion (2)	Recession (1)	Expansion (2)	Recession (1)	Expansion (2)
Zero lower bound	-2.26**	2.10***	-0.28	3.84***	0.34	0.33	1.45	4.68
	(1.02)	(0.55)	(0.43)	(0.97)	(2.21)	(0.97)	(2.74)	(4.05)
Openness	-1.53	1.95**	-0.98**	2.69	-1.80***	1.48***	-0.04	3.73***
	(1.56)	(1.01)	(0.49)	(1.73)	(0.72)	(0.29)	(0.36)	(0.72)
Currency Union	0.27	1.08*	0.95	2.00*	-2.01**	1.79***	-0.42	5.27***
	(1.61)	(0.65)	(0.97)	(1.15)	(0.95)	(0.43)	(0.35)	(1.30)
Spread	-1.04	0.75	0.15	2.39***	-1.81***	2.85***	-0.32	5.51***
	(1.08)	(0.46)	(0.41)	(0.91)	(0.71)	(0.39)	(0.28)	(0.89)

Notes: The table reports estimate of equation (3). *Level of government debt* is measured as a percent of GDP (Source: OECD). *Surplus/Deficit* is measured as a percent of GDP (Source: OECD). *Spread* is the difference in yield between a bond and some comparative benchmark bond. In this case the benchmark is the 10 years German Bund vs other Euro Countries Government bond with the same maturity(Source: OECD). *Openness to trade* is measured as (export+import)/GDP, if the proxy for one country is higher than the average, the economy is open vice versa is not (Source: OECD). *Currency Union* is a dummy that takes the value 1 after the introductions of the euro. *Zero lower bound* is measured as $ZTL= i_s$ if $i_s < 1\%$ where i_s is the short interest rate (Source: OECD). Robust standard errors are reported in parentheses. *, **, *** indicate statistical significance at 10, 5, and 1 percent levels.

Table B.6 Variation in the mean response of Total employment across countries, control for time and country fixed effects

	Response when characteristic is equal to zero				Response when characteristic is equal to one			
	Mean Response		Max Response		Mean Response		Max Response	
	Recession (1)	Expansion (2)	Recession (1)	Expansion (2)	Recession (1)	Expansion (2)	Recession (1)	Expansion (2)
Level of Government Debt	1.30	-4.02***	5.02***	-0.44	1.28	-3.97***	4.96***	-0.43
	(2.27)	(0.75)	(1.70)	(0.45)	(2.25)	(0.74)	(1.68)	(0.44)
Surplus/Deficit	-0.13	-1.73***	1.07	-0.08	1.84*	-1.57***	2.66**	-0.21
	(0.44)	(0.41)	(0.87)	(0.16)	(1.03)	(0.67)	(1.20)	(0.24)
Spread	1.03	-2.13***	2.55**	-0.21	0.98*	-1.05**	1.96***	0.16
	(0.87)	(0.57)	(1.21)	(0.25)	(0.56)	(0.53)	(0.57)	(0.34)
Openness	0.06	-0.38	0.42	0.18	1.22	-2.58***	2.64***	-0.46**
	(0.43)	(0.49)	(0.64)	(0.21)	(0.83)	(0.50)	(1.13)	(0.21)
Currency Union	1.60***	-2.52***	4.01***	-0.53***	0.65	-1.04**	1.33*	0.06
	(0.54)	(0.49)	(1.21)	(0.22)	(0.67)	(0.51)	(0.76)	(0.20)
Zero lower bound	1.44*	-2.34***	2.88***	-0.39*	-0.50	1.73**	-0.09	5.86***
	(0.84)	(0.66)	(1.13)	(0.22)	(0.61)	(0.81)	(1.01)	(2.43)

Notes: The table reports estimate of equation (3). *Level of government debt* is measured as a percent of GDP (Source: OECD). *Surplus/Deficit* is measured as a percent of GDP (Source: OECD). *Spread* is the difference in yield between a bond and some comparative benchmark bond. In this case the benchmark is the 10 years German Bund vs other Euro Countries Government bond with the same maturity(Source: OECD). *Openness to trade* is measured as (export+import)/GDP, if the proxy for one country is higher than the average, the economy is open vice versa is not (Source: OECD). *Currency Union* is a dummy that takes the value 1 after the introductions of the euro. *Zero lower bound* is measured as $ZTL = i_s$ if $i_s < 1\%$ where i_s is the short interest rate (Source: OECD). Robust standard errors are reported in parentheses. *, **, *** indicate statistical significance at 10, 5, and 1 percent levels.

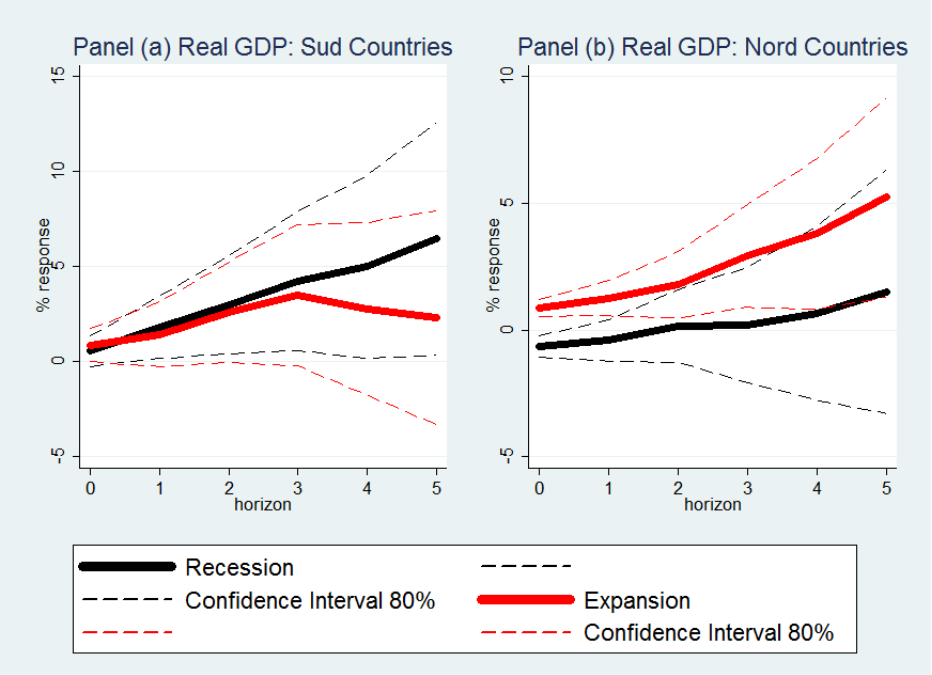

Figure B.26 Panel 26. Real GDP: Nord vs Sud Countries

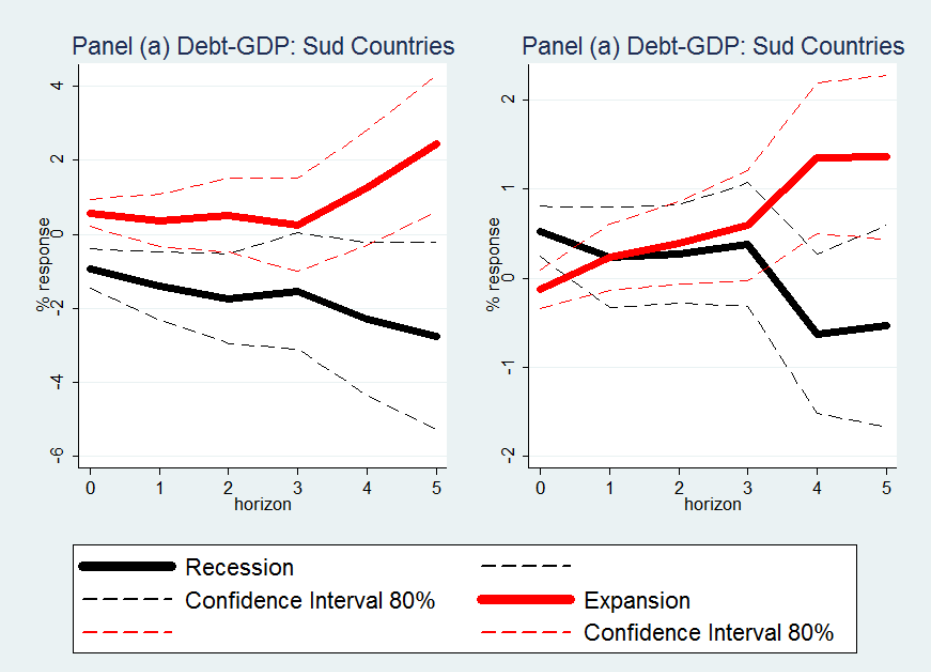

Figure B.27 Panel 27. Debt-GDP: Nord vs Sud Countries

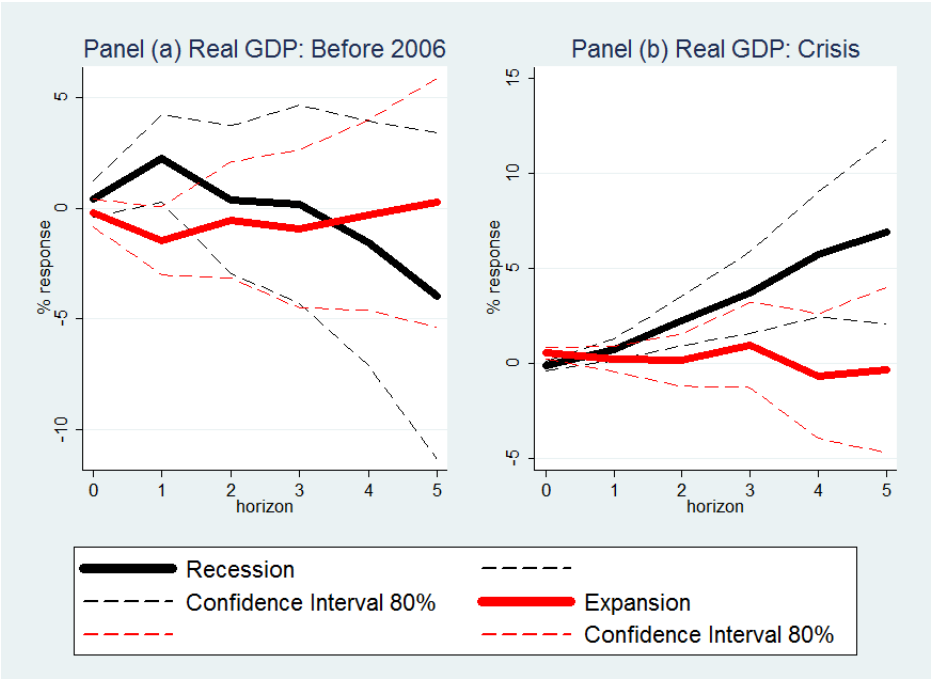

Figure B.28 Panel 28. Real GDP: Before crisis vs Crisis

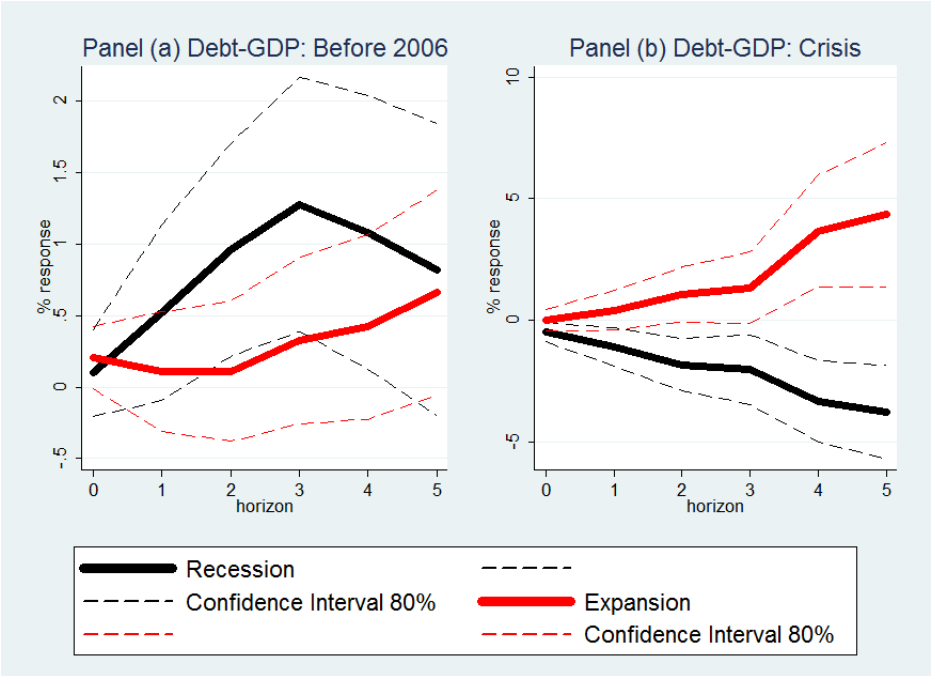

Figure B.29 Panel 29. Debt-GDP: Before crisis vs Crisis