THE FINANCIAL CRISIS RESPONSE. COMPARATIVE ANALYSIS BETWEEN EUROPEAN UNION AND USA

FLORENTINA MELNIC*

Abstract: This paper reviews the measures adopted by central banks from the most important economies during the crisis and assess their effectiveness. It is important for policy makers to identify which measures were effective in limiting the financial system distress in order to adopt the appropriate measure during future crisis. In case of US, TARP was the most important program for banking system and it was effective in reducing banks’ contribution to systemic risk and banks’ default probabilities. But TARP also conducted to a reduction in loans growth and create incentives for higher risk-taking behavior. The unconventional monetary policies adopted by ECB during the period 2008-2016 reduced the impact of the crisis on the European economy and achieved their objectives: to support banks’ funding and to increase lending to real economy (LTROs), to calm tensions from bond markets (CBPP, SMP, OMT), to support economic activity and to stabilize inflation rate (SMP, OMT, LTROs, APP).

Keywords: unconventional monetary policy, TARP, refinancing operations, financial crisis

1. INTRODUCTION

In response to the global financial crisis central authorities around the world adopted, in the first phase, a series of traditional rescue measures directed at individual institutions. These measures consisted of liquidity support to failing institutions, that, subsequently, were sold or merged with stronger partners. The

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1 We can mention here the case of Bear Stearns from the United States that was sold to JPMorgan Chase (March 2008), Northern Rock and Bradford and Bingley from UK nationalised in February 2008, respectively, September 2008 (and partly sold to Santander), SachesenLB from Germany sustained with liquidities (August 2007), and eventually merged with LBBW (April 2008).
takeover of Fannie Mae and Freddie Mac by the government and the collapse of Lehman Brothers worsen the financial conditions and send a sentiment of uncertainty among participants, that led to a drying up of funding markets (Stolz & Wedow, 2010). The shock generated by the Lehman Brothers’ collapse and the liquidity pressures were felt rapidly by the European banking systems.

In this situation, the Federal Reserve and European Central Bank were forced to adopt non-standard measures designed to ease credit and liquidity constraints in order to restore financial stability and to maintain the lending to real economy (Carpeter, Demiralp, & Eisenschmidt, 2014). The measures implemented refer to expansion of the volume of lending facilities, longer-term financing, more frequent auctions or even changes in the auctioning process, a wide range of accepted collateral, direct asset purchases and liquidity facilities for intermediaries other than banks (Stolz & Wedow, 2010).

In general, the measures implemented in EU have been broadly similar to those adopted in the US. In both cases, the authorities have employed broadly the same tools (e.g. government guarantees, capital and liquidity injections, and asset protection) and have relied on a mix of ad hoc measures for individual institutions and schemes addressing the wider needs of the financial system. But, there are also some differences between the policies adopted in the US and the EU. The measures adopted by Federal Reserve System have been more expansive and have targeted also individual financial intermediaries, while the European Central Bank actions have been limited to liquidity extension. Another difference between the policies adopted in these two economies refer to the fact that capital injections were a requirement in the US, while in Europe capital support has typically been voluntary (Stolz & Wedow, 2010).

In this paper, we review the unconventional measures adopted by Federal Reserve System and European Central Bank and assess their effects. It is important for policy makers to establish which measures were effective in limiting the financial system distress in order to adopt the appropriate measure during future crisis. For US, TARP was the most important measure for banking system, US Treasury investing $245 billion in financial institutions. TARP was effective in reducing banks’ contribution to systemic risk, in reducing banks’ default probabilities, but conducted to a reduction in loans growth and higher risk-taking. The unconventional monetary policies measures adopted by ECB during the period
2008-2016 achieved their objectives: to support banks’ funding and to increase lending to real economy (LTROs), to calm tensions from bond markets (CBPP, SMP, OMT), to support economic activity and to stabilize inflation rate (SMP, OMT, LTROs, APP).

2. US RESPONSE TO FINANCIAL CRISIS

2.1. Policy interventions during financial crisis

The US central authorities implemented during financial crisis a range of programs to sustain the affected sectors: small business, auto industry, financial markets, final consumers, pension funds and housing market. In this section we focus on the financial markets’ measures, but mainly on bank based measures adopted by the American authorities. The authorities that have the power to intervene into American economy are Feb, FDIC and the Government.

*Measures directed to financial markets*

The measures adopted by the Fed had a direct or indirect impact on financial institutions or financial sectors. For example, the Recovery Act through the tax relief applied to the American taxpayers improved the financial conditions of banking clients. The supplementary amount could be used to obtain a larger amount of loans or to deposit it.  

The main programs adopted by central bank that meant to support financial markets were: Term Asset-Backed Securities Loan Facility (TALF), Commercial Paper Funding Facilities (CPFF), Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF), Primary Dealer Credit Facility (PDCF), and Term Securities Lending Facility (TSLF).  

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2 According to U.S. Department of the Treasury the tax relief appointed in The American Recovery and Reinvestment Act of 2009 (February 17th), will deliver an estimated $150 billion of direct relied to Americans and their families. This program was designed to stimulate the US economy by investing in infrastructure, job creation, educational opportunities, improve health care – [https://www.treasury.gov/initiatives/recovery/Pages/recovery-act.aspx](https://www.treasury.gov/initiatives/recovery/Pages/recovery-act.aspx)

3 CPFF was created on October 2008 and closed in February 2010; AMLF was announced on September 2008 and closed on February 2010; PDCF was launched in March 2008 and closed on February 2010; the first auction of TSLF was on March 2008 and the program was closed on February 2010.
**Table 1** US Government response to financial crisis

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Foreclosure-prevention and refinancing initiatives

- Making Home Affordable (MHA)
- Home Affordable Modification Program (HAMP)
- Home Affordable Refinance Program (HARP)
- Other federal loan modification programs
- Hardest Hit Fund
- Neighborhood Stabilization Program

Legacy Securities Public-Private Investment Program

Financial Markets, Consumers, Housing

Small Business Administration lending program,
Small Business Lending Fund,
State Small Business Credit Initiative

Small Business, Financial Markets, Consumers

Treasury mortgage-backed securities purchase program

Financial Markets, Consumers, Housing


TALF was created to support market participants to meet the credit needs of households and small businesses by supporting the issuance of asset-backed securities. In order to restore liquidity in short-term debt markets, Fed recourse to CPFF and AMLF. CPFF was designed to provide liquidity to US issuers of commercial paper by purchasing highly rated unsecured and asset-backed commercial papers. AMLF had the objective to facilitate the sale of assets by money-market mutual funds in the secondary market to increase their liquidity. Dealers were sustain through PDCF and TSLF. PDCF referred to an overnight loan

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4 TALF was a joint Federal Reserve - Treasury program, launched in March 2009 and closed in June 2010. The final outstanding loan was repaid in October 2014.
facility that provided funding to primary dealers in exchange for a specified range of eligible collateral. TSLF provided liquidity to Treasury and other collateral markets by lending Treasury securities held by System Open Market Account to primary dealers against eligible collateral. Mortgage market was supported by Fed’s actions of direct purchase of securities issued by Fannie Mae and Freddie Mac and of the mortgage-backed securities guaranteed by these institutions. Other individual institutions that were supported by Fed were Bear Stearns and AIG.

**Measures directed to banking system**

The main bank based measure adopted by Fed was Term Auction Facility. The objective of this facility was to provide liquidity to financial institutions in the early stages of the crisis when the bank funding markets confronted with severe pressure. This program was established in December 2007 based on the discount window. Through this program, Fed auctioned loans to a broader range of financially sound depository institutions against collateral. During the period 2003-2006, discount window and TAF usage averaged $170 million per day, while during the financial crisis (August 2007 to December 2009) both facilities averaged $221 billion per day (Berger, Black, Bouwman, & Dlugosz, 2017). Based on Federal Reserve data 416 different banks benefit from this program, that ended on March 2010.

The American Government launched the Troubled Asset Relief Program (TARP), one of the most important measure for banking system. The aim of this program was to ensure the stability of banking system by purchasing mortgage-related toxic assets and by injecting capital into banks. The intermediary objectives of TARP program were to restore liquidity to a market with frozen credit, promote economic growth, curb unemployment and to prevent foreclosures. This was followed through several sub-programs with different objectives: Asset Guarantee Program (AGP), Supervisory Capital Assessment Program (SCAP) and Capital Assistance Program (CAP), Capital Purchase Program (CPP), Community Development Capital Initiative (CDCI) and Targeted Investment Program (TIP). As of February 2017, the only programs that have outstanding investments are

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5 Part of the United States’ Emergency Economic Stabilization Act (EESA), signed into law by President Bush on October 3, 2008
Capital Purchase Program (0.19 billion dollars) and Community Development Capital Initiative (0.10 billion dollars) (US Department of the Treasury, 2017).

Through TARP bank investment program, Treasury invested $245 billion in financial institutions, being considered the largest government bailout in the United States history (Montgomery & Takahashi, 2014). The impact of the adopted measures on the Fed’s balance sheet can be observed in Graphic no 1.

**Graphic 1** *The evolution of the FED’s balance sheet during 2002-2017 (million US)*

![Fed Balance Sheet](https://example.com/fed_balance_sheet.png)


The largest program within TARP was Capital Purchase Program (CPP) to which have been allocated approximately $205 billion that were invested in 707 financial institutions from 48 states (Office of Financial Stability, 2013). Under this program banks could sell equity to the Treasury of maximum $25 million or 3% of its risk-weighted assets with a dividend rate of 5% for the first five years and 9% thereafter. The first funds were disbursed on October 28, 2008 to the biggest US financial institutions including Goldman Sachs Group, Morgan Stanley, Bank of America, Citigroup, JPMorgan Chase and Wells Fargo & Co (Semaan & Peterson Drake, 2016). As of February 2017, there have been recovered from CPP program $226.7 billions through repayments, auctions, dividends, interest and warrant income, mening an additional return for the taxpayers.
2.2 The effectiveness of policy interventions in US

Discount window and TAF program were the first programs aimed to sustain the US financial system. Berger, Black, Bouwman, & Dlugosz (2017) studied the effects of these facilities on bank lending, concluding that the received funds were used to increase lending by both small and large banks. The positive effects of TAF program were confirmed by Frank & Hesse (2009) this program being effective in reducing the LIBOR-OIS spread, but the economic magnitude was not very large. In contrast, Taylor & Williams (2008) found that TAF had no significant effect on LIBOR-OIS spreads.

In their retrospective report, US Treasury sustain that TARP helped stop the widespread of financial panic, prevented what could have been a devastating collapse of the American financial system and helped many struggling homeowners to keep their homes (Office of Financial Stability, 2013).

However, literature offers divided opinions regarding the effectiveness of TARP program. There are studies that sustain the effectiveness of TARP program in reducing banks’ contribution to systemic risk (Berger, Roman, & Sedunov, 2016), in reducing banks’ default probabilities in the short term (Calabrese, Degl'Innocenti, & Osmetti, 2017), mitigating the propagation of housing market shocks across US (Jang, 2016), in reducing stock market volatility (Huerta, Perez-Liston, & Dave, 2011) and in creating real economic value through job creation (Berger & Roman, 2015). In contrast, the implementation of TARP conducted to a reduction in loan growth (Montgomery & Takahashi, 2014; Black & Hazelwood, 2013), higher-risk loans and risk-taking (Duchin & Sosyura, 2014; Black & Hazelwood, 2013), increase systemic risk (Farruggio, Michalak, & Uhde, 2013), declined operational efficiency (Harris, Huerta, & Ngo, 2013).

The immediate effect of TARP’s announcement on financial markets was negative, deepening the uncertainty. The announcement was made in the second week after the decision not to intervene in Lehman Brothers by Federal Reserve Board Chairman Ben Bernake and Treasury Secretary Henry Paulson providing a 2½-page draft with no mention regarding the oversight and a few restrictions on the use. The uncertainty and the confusion about the procedures or criteria for future government intervention to prevent financial institutions from failing increased risk spreads in the interbank market. The original idea of TARP of buying troubled assets from financial institutions was changed as it was not clear how it will work.
The announcement that this program would simply inject capital into banks improved the financial conditions, removing the uncertainty. However, the longer-term effects on different variables are questionable.

Through TARP’s capital injections, FED wanted to increase confidence in banks and to stimulate bank lending. Literature provides evidence regarding the failure of this program to achieve the latter goal (Montgomery & Takahashi, 2014; Black & Hazelwood, 2013; Duchin & Sosyura, 2014). Montgomery and Takahashi (2014) analyzed 9042 commercial banks for the period of 2001-2010 and found evidence that banks that received capital injections through TARP program reduced their loan growth. Taliaferro (2009) reports evidence that banks that received funds under CPP program used them to strengthen their capital position (about sixty cents of every dollar received) rather than support lending (thirteen cents of every dollar received). The evolution of bank lending during financial crisis has been documented by Ivashina and Scharfstein (2010), concluding that in the final quarter of 2008 there was a sharp drop in the new loans (credit lines) provided to large borrowers of 47% compared to the previous quarter of 2008. The lack of liquidity to finance larger businesses, determined banks to shift their loans to smaller and riskier businesses. Puddu and Walchli (2014) concluded that TARP banks provided higher new loans to small business of about 19% than no TARP banks in the years after receiving TARP equity (2008-2010). Li (2013) concluded that one-third of the TARP funds was directed to new loans while the rest was kept to strengthen their balance sheets.

Current research sustain the fact that banks shifted their portfolios toward riskier borrowers and the manifestation of moral hazard (Black & Hazelwood, 2013; Duchin & Sosyura, 2014). Black & Hazelwood (2013) concluded that, compared with non-TARP banks, large banks that received TARP capital increased the risk of the new granted loans, while small banks decreased it. The increased level of banks’ risk-taking in the absence of increased lending may be the result of moral hazard, the offered bailout creating the perception for ‘Too-big-to-fail’ banks of implicit government support going forward. This result is confirmed by Duchin and Sosyura (2014) who found that an increase in banks’ capital did not conducted to a credit expansion, but instead lead to riskier lending and investments, TARP banks offering favorable loan contract terms especially to high-risk borrowers (Berger, Makaew, & Roman, 2016). Wilson & Wu (2010) provide evidence
regarding the fact that banks that face insolvency and participate in a preferred stock recapitalization are tempted to reject good loans and accept the bad ones in order to shift risk to their creditors. This suggest that the size of the capital injection and the lack of any leverage-increasing limit may have lead to inefficiency in the TARP program.

Farruggio, Michalak & Uhde (2013) revealed a light and a dark side of TARP program. They studied the impact of both announcements of TARP program (initial and revised), of capital injections and capital repayments on changes in bank shareholder value and risk exposure of 125 recipient banks. In their study, the dark side of this program refers to the fact that the announcements of TARP program as well as capital injections increased systemic risk. Capital injections are perceived by investors as a signal of higher expected default risk of supported banks. On the other hand, the announcements of TARP and capital repayments increased bank shareholder value. These results are confirmed by Ncube (2016) who concluded that the announcement of TARP program increased investors’ confidence, but the receipt of TARP funds determined a negative market reaction with important stock price declines. Another negative effect of TARP capital injections was the reduction in operational efficiency for TARP recipients banks. Harris, Huerta, & Ngo (2013) argue this result through the moral hazard generated by bailouts, the political pressure to increase lending that reduced loans quality, the requirements imposed by TARP program and the government involvement in bank management decisions.

In contrast with the previous work, there are studies that prove the positive effects of TARP program on US banks (Berger, Roman, & Sedunov, 2016; Calabrese, Degl'Innocenti, & Osmetti, 2017; Jang, 2016). Berger, Roman, & Sedunov (2016) empirically demonstrated that TARP program reduced banks’ contributions to systemic risk, but especially for larger and safer banks located in areas with better economic conditions. Furthermore, Calabrese, Degl'Innocenti, & Osmetti (2017) sustain that Capital Purchase Program, the largest bank bailout programme under TARP, helped banks to reduce their default probabilities in the short term, during the peak of financial crisis. This is confirmed by Croci, Hertig, & Nowak (2015) study, suggesting that bailing-out more banks would have
reduced the number of banks that were subject of FDIC resolution process.\(^6\) Another positive effect of TARP program, highlighted by Liu, Kolari, Tippens, & Fraser, (2013) was the CPP banks’ stock prices recovery and, furthermore, large and significant gains after the repayments of CPP funds.

To conclude, the literature does not offer a general accepted opinion regarding the overall effect of TARP program on US banking system. This effect is depending on the analyzed time-horizon (short vs. long term), the different stages of TARP program (announcements, capital injections or repayments), the computation of dependent variables (e.g. systemic risk vs. lending growth) and the independent financial variables used. Calabrese, Degl'Innocenti, & Osmetti (2017) concluded that TARP program reduced banks’ default probabilities on the short term, while Semaan & Peterson Drake (2016) concluded that the idiosyncratic risk of CPP participants remained higher compared to those not participating in CPP four years following CPP. Regarding the impact of TARP equity on systemic risk Berger, Roman, & Sedunov (2016) estimated systemic risk through Normalized SRISK and Systemic Expected Shortfall, while Farruggio, Michalak, & Uhde (2013) defined systemic risk as the change in the correlation of bank stock returns with returns of the market portfolio. Both studies have obtained conflicting results.

3. EU RESPONSE TO FINANCIAL CRISIS

Traditionally, the ECB provides to central banks two standing facilities that can be used on their own initiative whenever they need liquidity or to deposit liquidity. These facilities refer to Marginal lending facility and Deposit facility but normally banks use them in the absence of other alternatives, as the interest rates are higher, respectively lower than money market rates.

3.1. Policy interventions during financial crisis

To manage the liquidity in the money market, ECB uses, through National Central Banks, open market operations. The most important operations are Main refinancing operations (MROs) and Longer-term refinancing operations (LTROs). Another instrument used by ECB to manage liquidity is the Minimum reserve

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\(^6\) From February 2007 to March 2017, 526 banks were resolved by the Federal Deposit Insurance Corporation - https://www.fdic.gov/bank/individual/failed/banklist.html
requirements, banks being bound to hold a specific value of their liabilities as deposits to central banks. The reserve ratio was reduced in December 2011 to 1% from 2% as a measure to improve banks liquidity conditions (ECB, 2016). During the financial crisis, ECB reacted by several interest rates rises and cuts both for refinancing operations and standing facilities. ECB had recourse to unconventional monetary policy as the conventional ones proved ineffective. The ECB’s Governing Council decides the measures, but the Eurosystem as a whole implements them.

The European banking system faced significant losses since the fallout of the subprime mortgage crisis in the United States. Consequently, banks started to have doubts about the solvency of their counterparties from the interbank market, which conducted to important shortage of liquidity and the collapse of activity in many financial market segments (Boeckx, Dossche, & Peersman, 2017). To respond to the increased and unpredictable demand of liquidity, ECB started with several Liquidity-providing operations in July 2007. These operations continued until the collapse of Lehman Brothers and the intensification of the financial crisis in September 2008. Starting from that point, ECB implemented several monetary policies that were “unprecedented in nature, scope and magnitude”. The aim of these policies was to achieve the primary objective of price stability (HICP inflation rates below, but close to 2%) and to ensure an appropriate monetary policy transmission mechanism to real economy. The adopted measures during the period 2007 – 2016 can be analyzed in Table 2.1.

On 15 October 2008, Governing Council decided that all ECB’s operations to be carried out through fixed rate tender procedures with full allotment. This means that all refinancing operations in euro and US dollars to be conducted through tender procedures with fixed rate (equal to the ECB’s policy rate in the case of operations denominated in euro) and full allotment (all bids were satisfied). On the same day, Governing Council announced the extension of the collateral list and the foreign exchange swaps. Traditionally, collateral refers to marketable financial securities, such as bonds⁷ and other types of assets, such as fixed term and

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⁷ Central and regional government securities, covered and uncovered bank bonds, corporate bonds, asset-backed securities and other marketable assets
cash deposits and credit claims. In addition, ECB offered liquidities in US dollars and Swiss francs through foreign exchange swaps.

Table 2 Unconventional monetary policies conducted by ECB during July 2007 – September 2016

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<th>Monetary operations</th>
<th>Period</th>
<th>Details</th>
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<tr>
<td><strong>Liquidity-providing operations</strong></td>
<td>July 2007 – September 2008</td>
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</table>
| **Fixed interest rate operations**         | 15 October 2008 – January 2015 | • Marketable debt instruments denominated in other currencies that the euro, namely US dollars, the British pound and the Japanese yen, and issues in the euro area  
  • Euro-denominated syndicated credit claims governed by UK law  
  • Debt instruments issued by credit institutions which are traded on the accepted non-regular markets that are mentioned on the ECB website  
  • Subordinated debt instruments when they are protected by an acceptable guarantee in section 6.3.2 of the General Documentation on Eurosystem monetary policy instruments and procedures. |
| **Extension of the list of collateral assets** | 15 October 2008          | • Reduced the rating threshold for certain asset-backed securities  
  • Allowed national central banks to accept as collateral additional performing credit claims (i.e. bank loans) that satisfy specific eligibility criteria |
| **Swap lines with Fed and Swiss Central Bank** | Beginning with 15 October 2008 | 1. Three months (October 2008)  
  2. Six months (February 2009, August 2011)  
  3. Twelve months (June 2009, October 2011)  
  4. Thirteen months (October 2011)  
  5. Thirty-six months (December 2011, February 2012) |
| **Covered Bond Purchase Programs (CBPP)**  | 1 June 2009 – June 2010 2. November 2011 - October 2012 | Purchased in the primary and secondary markets of covered bonds eligible for use as collateral for Eurosystem credit operations |
The objective of these interventions was to address the malfunctioning of securities markets and to restore an appropriate monetary policy transmission mechanism.

The differences between the two programs refer to:
- OMTs are attached to a European Financial Stability Facility/European Stability Mechanism programme, ensuring that the Member States remain under considerable pressure to implement reforms and maintain fiscal discipline;
- the maturity of OMT programme is between one and three years;
- publication of relevant information on OMT interventions;
- the size of the programme is unlimited;
- Possibility to sell the bought government bonds under OMT with their valuation based on market prices rather than on final maturity.

In order to support bank lending and liquidity in the euro area money market, Governing Council announced during 2009 additional non-standard measures. ECB decided to extend the maturity of longer-term refinancing operations to six months in February 2009 and, after that, to twelve months in June 2009. The volume of outstanding open market operations reached a value of 663 billion EUR on 12 May 2009, declining from the historical high of 857 billion EUR at the end of 2008 (ECB, June 2009). Longer-term refinancing operations accounted for 64% of total outstanding refinancing operations in May 2009, while main refinancing operations only 36%.

During this year, Governing Council also announced the Covered Bond Purchase Program, through which ECB will purchase euro-denominated covered bond issued in the euro area. The objectives of this program were to reduce money
market term rates, to ease funding conditions for credit institutions and enterprises, to encourage credit institutions to maintain or to expand their lending to households and enterprises and to improve market liquidity in important segments of private debt securities markets (Gonzales-Paramo, 2011). This program ended in June 2010, when the announced nominal amount of 60 billion EUR was reached. Eurosystem purchased 422 different bonds, from the primary market (27%) and secondary market (73%) (ECB, 2010).

In order to reduce the severe tensions from securities markets in the first phase of sovereign debt crisis, Governing Council launched in May 2010 Securities Market Programme. Through this program, central authorities conducted interventions in the euro area public and private debt securities markets to ensure liquidity to dysfunctional market segments. The objective of the decision to purchase distressed European government bonds was to address the malfunctioning of securities markets and to restore an appropriate monetary policy transmission mechanism (ECB, May 2010). The injected liquidity under this program will be re-absorbed through specific operations. In 2012, the outstanding amount reached a nominal value of 218 billion EUR, Italy having a debt of 102.8 billion, followed by Spain (44.3 billion), Greece (33.9 billion), Portugal (22.8 billion) and Ireland (14.2 billion) (ECB, 2013). In 2016, the outstanding amount accounted for 105 billion EUR, of which Italy has 54.9 billion, Spain 20.1 billion, Greece 13.2 billion, Portugal 9.5 billion and Ireland 7.3 billion.

In 2011, given the renewed tensions in the financial markets related to the sustainability of public finances in both the US and the euro area and to the increased concerns regarding the global economic outlook, Governing Council decided to offer supplementary liquidity under LTROs with six-month (August 2011), twelve-month (October 2011) and, finally, three-year maturities (December 2011 and February 2012). Through these measures, ECB is ensuring that banks continue to have access to stable funding with longer maturities and thereby, supporting the ability of banks to maintain and expand lending to euro area households and non-financial corporations. This condition is necessary to

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8 The 12-month LTRO announced in October 2011 was replaced by the three-year LTRO, giving the permission to shift all the outstanding amounts into the latter. In addition, under the three-year LTRO, banks have the option to repay the outstanding amounts received after one year, which gives them a high degree of flexibility.
safeguard price stability in the euro area, the final objective of monetary policy conducted by ECB (ECB, 2012). Under the first three-year LTRO, ECB provided liquidities to 523 counterparties of around 489.2 billion EUR, while under the second operation ECB financed 800 counterparties with 529.5 billion EUR (ECB, February 2013). Additionally, on 8 December 2011 the Governing Council decided to temporary expand the list of collateral eligible for Eurosystem operations. The list of collateral contains a very wide range of assets – about 40,000 of around 14 trillion EUR or around 150% of GDP in 2012 (Cour-Thirmann & Winkler, 2013).

The increased fears among investors regarding the reversibility of the euro conducted to severe cases of malfunctioning in the price formation process in the government bond markets – the largest capital market in the euro area. In an economic environment characterized by high spreads between the yields on the government bonds of euro area countries, ECB introduced in September 2012 Outright Monetary Transactions. OMT programme was designed starting from SMP but made it more targeted. Under the OMT, ECB makes purchases of bonds from Eurozone countries in the secondary market to calm the market interest rates in countries subject to speculation.

Expanded Asset Purchase Program, implemented in January 2015, includes all purchase programmes under which private and public sector securities are purchased to address the risks of a too prolonged period of low inflation. Under this program, ECB creates new money to purchase euro-denominated, investment-grade securities issued by euro area governments and European institutions (quantitative easing). At the end of April 2017, Eurosystem holdings under this program amounted 1,834 billion EUR of which PSPP covers 1,511 billion.

The measures previously described are part of a package of measures that also includes targeted longer-term refinancing operations (TLTROS). Under the first series of TLTROs, Eurosystem provided financing to credit institutions for periods of up to four years, based on the amount of their loans to non-financial corporation and households (targeted operations). The second TLTRO provided even more attractive interest rates based on the loans issued to non-financial corporations and households.

The liquidity distributed to banking system through the above measures between October 2008 and December 2016 conducted to an important expansion of ECB’s balance sheet.
Starting from 2008, there is a significant increase in the variables with monetary policy purposes, namely lending to credit institutions from euro area and securities holdings of euro area residents. In 2008, the volume of lending to credit institutions (mainly through LTROs) increased by 220% compared with 2000, while the peak was achieved in 2012, increasing by 320% compared with 2000 and by 30% compared with the value from 2008. ECB started to hold securities in 2009 through CBPP, representing then only 1.5% from ECB’s assets and reaching in 2016 a percent of 54% of ECB’s assets.

3.2. The effectiveness of policy interventions in EU

The main aim of the adopted measures was to support the transmission of ECB’s standard interest rates policy. As the economy financing is mostly bank-based in Europe, ECB’s monetary policy focused primarily on banks, aiming at supporting their funding and liquidity conditions, to ensure that banks will continue to provide credit to the economy.
The overall impact of the unconventional monetary policies adopted during crisis has been studied by Falagiarda & Reitz (2015) and Gambacorta, Hofmann & Peersman (2014). The ECB monetary policies decreased the perceived sovereign risk of the stressed euro area countries\(^9\), with the exception of Greece (Falagiarda & Reitz, 2015) and determined a temporary increase in economic activity and consumer prices (Gambacorta, Hofmann, & Peersman, 2014). Falagiarda & Reitz (2015) studied the measures adopted during 2008-2012, while Gambacorta, Hofmann & Peersman (2014) studied the measures adopted by the eight advanced economies\(^{10}\) over the period 2008-2011.

The measure taken at the beginning of the financial crisis, in October 2008 and May 2009, have been crucial in stabilizing the financial system and the economy, in ensuring price stability (Cour-Thirmann & Winkler, 2013) and in avoiding a more disruptive collapse of the macro-economy (Fahr, Motto, Rostagno, Smets, & Tristani, 2011). Furthermore, Giannone, Lenza, Pill, & Reichlin (2012) found that ECB’s interventions conducted to higher bank loans to households and non-financial corporations and also, to higher levels of industrial production and lower unemployment rates compared with the counterfactual situation when no non-standard monetary policy were implemented.

The extension of the longer-term refinancing operations’ maturities contributed to the stabilization of the real economy. Cahn, Matheron & Sahuc (2014) confirmed that longer maturities result in larger macroeconomic effects. The authors compared the effects of the six-months LTROs with the twelve-months LTROs effects, concluding that the effects of the latter measure were even double than the previous ones.

The literature also provides evidence regarding the impact of the largest central bank liquidity injection – three-year LTROs. As pointed out by Darraaq-Paries & De Santis (2015) this measure conducted to increases in GDP (by 0.8 percentage at the peak in mid-2013, compared with previous period), goods prices (by 0.30-0.35% at the peak in the beginning of 2014), loan volume to non-financial corporations (by 2.7-2.9% at the peak in the second half of 2014) and a reduction of lending rate spreads (by 19-20 basis points by mid-2014). The positive effects

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\(^9\) Greece, Ireland, Italy, Portugal, Spain

\(^{10}\) Canada, the euro area, Japan, Norway, Sweden, Switzerland, UK and US
on bank credit supply to non-financial corporations are confirmed for the largest users of LTROs - Italy (Carpinelli & Crosignani, 2017), Spain (García-Posada & Marchetti, 2015) and France (Andrade, Cahn, Fraisse, & Mesonnier, 2015). The three-year LTRO increased the credit supply by 2% in the Italian case, while for Spain the increase was more moderate, of about 0.8-1%. Indeed, the cash holdings increased for corporations that used bank loans and credits as their main source of debt financing following the LTRO interventions. However, the effects on real economy were not visible, as the additional cash received was not employed in a productive manner, corporations even reducing their investments and the level of employment (Daetz, Subrahmanyam, Yongjun Tang, & Qian Wang, 2016). In contrast, Van der Kwaak (2017) found that banks did not expand credit to real economy, but they invested in government bonds that allow them to obtain more low-interest-rate central bank funding and thereby to increase their profits. Szczerbowicz (2012) confirmed that the three-year refinancing operations succeeded in reducing bank refinancing costs.

The first Covered Bond Purchase Program succeeded in achieving all its policy objectives during the implementation period (Beirne, et al., 2011) and to revitalise the primary market for these bonds (ECB, July 2009). Markmann & Zietz (2017) confirmed the results obtained by Beirne et al. (2011) finding a 10-11 basis points tightening of covered bond spreads that lasted for seven weeks. The authors also analysed the impact of following two CBPPs on secondary markets concluding that the effects of these programs were lower than the effect of the first CBPP. These results are explained by the fact the covered bond markets was in a rather healthly shape when the second CBPP was announced and did not show any signs of weakness at the time of the third CBPP (Markmann & Zietz, 2017). However, the programs were implemented in order to accomplish macroeconomic objectives.

Gibson, Hall & Tavlas (2016) studied the effects of the ECB’s asset purchase programs, CBPP and SMP, on sovereign bond spreads and covered-bond prices for Greece, Ireland, Italy, Portugal and Spain. The results suggest that both programs reduced the sovereign spreads and raised the covered bond prices. The same results have been obtained by Szczerbowicz (2015), while Kilponen, Laakkonen & Vilmunen (2015) did not find lasting impact on government bond spreads. The impact of CBPP and SMP is also studied on commercial bank CDS
spreads by Gerlach-Kristen (2015), who finds that individual bank default risks decreased after the purchases under the two programs by the Eurosystem.

Kilponen, Laakonen & Vilmunen (2015) analyzed the impact of a package of monetary policies\textsuperscript{11} on sovereign bond spreads and concluded that SMP and OMT had the largest negative impact on bond spreads. This result is confirmed by Watfe (2015), Szczerbowicz (2015), Falagiarda & Reitz (2015). Moreover, Altavilla, Giannone & Lenza (2014) concluded that the reduction of government bond yields due to OMT is associated with a significant increase in real activity, credit and prices in Italy and Spain. The impact of SMP, OMT and of the three-year LTROs on the Italian economy has been studied by Casiraghi, Gaiotti, Rodano & Secchi (2016) confirming the fact that these measures induced a cumulative output growth response equal to 2.7 percentage points in 2012-13. Acharya, Eisert, Eufinger & Hirsch (2015) found that the OMT conducted to a reduction in the sovereign yields for the GIIPS countries that lead to an increase in the supply of loans to firms and to a decrease in bank credit risk, but with no impact on the employment level or investments.

The \textit{Expended Asset Purchase Programme} or qualitative easing measure, is a more recent measure and its effects are still ongoing. However, there a few studies that assess its effectiveness on sovereign yields (De Santis, 2016; Andrade et al., 2016) and on macroeconomy (Andrade et al., 2016). Andrade et al. (2016) found that APP contributes to the economy stabilization through asset price and inflation rate increases. On the other side, the \textit{Public Sector Purchase Programme}, part of the APP, had no significant effects on sovereign bonds spreads (Watfe, 2015).

To sum up, the unconventional monetary policies adopted by ECB during the financial crisis succeeded in supporting the transmission of its standard interest rate policy. The monetary policy conducted by ECB stabilized the financial system and the economy by achieving their objectives: to support banks’ funding and to increase lending to real economy (LTROs), to calm tensions from bond markets (CBPP, SMP, OMT), to support economic activity and to stabilize inflation rate (SMP, OMT, LTROs, APP).

\textsuperscript{11} ECB collateral requirements relaxed and restricted, ECB liquidity support, CBPP, SMT, OMT, Draghi ‘Whatever-It-Takes’ Speech, Support Package Request/Decisions/Relaxed, Greece Debt Restructuring, Decisions on ESM, widening of the Mandate of EFSF/ESM, European Economic Recovery Plan, Other decisions related to European Economic Governance
4. US VS. EU APPROACH

Despite the US monetary approach, the adopted non-standard monetary policies from EU aimed at supporting the effective transmission of its standard policy. Therefore, the non-standard measures are a complement rather than a substitute for interest rate policy. Through this approach, ECB succeeded in improving the financial conditions and credit flows (Cour-Thirmann & Winkler, 2013).

Another difference between the two economies and their monetary policy decisions refers to the financial structure. Given that the economy is largely financed by banks in Europe, the ECB non-standard monetary policy focused mainly on banks, by lending to a large number of banks against collateral in order to improve their funding and liquidity conditions (Rodriguez & Carrasco, 2014). While monetary policy decisions are centralized at the level of the ECB’s Governing Council, their implementation is decentralized and conducted by the Eurosystem, which comprises the 19 national central banks of the Euro area countries and the ECB. For US, the Federal Reserve Bank of New York implements monetary policy on behalf of the entire Federal Reserve System. The operations conducted by ECB mainly consist of refinancing operations to which a large number of counterparties have access, while in the US case the operations consist mainly of outright purchases and sales of assets in the open market with relatively small number of counterparties (Cour-Thirmann & Winkler, 2013).

The first stage of crisis (2007-2009) manifested similar in both economies and the policy responses were quite similar (Gros, Alcidi, & Gionvanni, 2012). When the global financial crisis started, in late August 2007, both central banks responded by cutting interest rates and by adopting several unconventional monetary policies. These policies included the extension of the maturities for the existing facilities – refinancing operations, lowering the standards for eligible collateral applied to banks and opening a series of swap facilities. The Lehman Brothers collapse generated a lack of confidence and liquidity in the interbank market. In order to facilitate the access to liquidities, central authorities intervened by expending the availability of credit to financial institutions, reducing the main interest rates and by asset purchases. Fed purchased under TALF commercial papers, asset-backed securities and other private assets, while ECB implemented CBPP, fixed-rate tender procedure with full-allotment, extended the collateral list and the maturity of LTROs to six months and established swap lines with Fed.
In the second stage of the crisis (2010-2012), the problems were not the same in these two economies. While the euro area was confronting with high degree of financial distress, the main concern in the US was the fact the economy and the labour market were not recovering. Fed continues with asset purchases through open market operations and quantitative easing. In Europe, the crisis became a sovereign debt crisis with the epicenter in the Euro area. Starting from this point, the ECB’s policies differed substantially from those of Fed, by implementing SMP, CBPP and three-year LTROs.

Gros, Alcidi & Gionvanni (2012) highlighted some more differences between the Fed’s and ECB’s policies. The Fed bought mostly risk-free assets like US government bonds and government-guaranteed bonds, while ECB invested in risky assets, the Fed lent very little to banks, while ECB lent huge amounts to banks and, consequently, Fed did quantitative easing, while ECB did credit easing. Hancock & Passmore (2011) concluded that the Fed’s purchase of mortgage-backed securities as part of its first quantitative easing improved market functioning the primary and secondary markets for these instruments.

For Europe, the CBPP can be comparable with the QE1 conducted by Fed. As confirmed by Beirne et al., (2011) and Markmann & Zietz (2017) this program succeeded in tightening to reduce money market term rates, to ease funding conditions for credit institutions and enterprises, to encourage credit institutions to maintain or to expand their lending to households and enterprises and to improve market liquidity in important segments of private debt securities markets.

5. Conclusion

In response to the global financial crisis central authorities around the world adopted a series of non-standard measures designed to ease credit and liquidity constraints in order to restore financial stability and to maintain lending to real economy.

As affirmed by Farruggio, Michalak, & Uhde (2013), TARP had a light and a dark side. The light side refers to the positive effects had on financial system - reduced the contribution of banks to systemic risk, the default probabilities on the short-term, increased shareholder value. In contrast, there are studies that proved the program inefficiency - reduced banks' loan growth and increase their risk-
taking. However, TARP helped stop the widespread of financial panic and restored the investor's confidence.

The ECB's policies achieved their primary objective of supporting banks to continue lending to real economy. After reviewing the literature, we can conclude that banks increased their supply to households and non-financial corporations, but the impact on economy was limited. However, the adopted measures succeeded in calming the tensions from primary and secondary markets.

If we review the US and ECB approaches we can see that at the beginning of the financial crisis, central authorities acted broadly similar. The two important governments responded by cutting interest rates and by adopting several unconventional monetary policies - extension of the maturities for the existing facilities, lowering the standards for eligible collateral applied to banks and opening a series of swap facilities. If we refer to the differences between the central authorities’ approaches we have to take into account that the US economy is market-based, while the ECB’s economy is bank-based. The differences intervened after the collapse of Lehman Brothers and the manifestation of the sovereign debt crisis in Europe. The measures adopted by Federal Reserve System have been more expansive and have targeted also individual financial intermediaries, while the European Central Bank actions have been limited to liquidity extension. Another difference between the policies adopted by the two economies refer to the fact that capital injections were a requirement in the US, while in Europe capital support has typically been voluntary.

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