

**Comparing monetary policy instruments  
of Federal Reserve System and European Central Bank  
after the global financial crisis of 2008**

## Summary

As it was shown in this project, the monetary policy is differentiated even in developed countries; therefore, the comparison of its instruments claims necessity of the analysis from different perspectives. In this project, we analyzed monetary policy instruments of the Federal Reserve System (FED) and European Central Bank (ECB), and found that the monetary policy instruments portfolio of ECB was more developed than of FED before financial crisis of 2008. However, the financial global crisis of 2008 and collapse of Lehman Brothers fixed the portfolio of FED through additional two instruments: quantitative easing and interest rate on excessive banks reserves, which ECB was reluctant to use. The first quantitative easing of ECB was started only in March of this year, but the interest rate is still paid only on required reserves – in fact, banks pay ECB only for required balances because the interest rate is negative (-0.2%).

The analysis of balance structure has not added new information but the neediness to analyze also the central banks balances of all 19 EU countries (NCB) because the main work for direct market operations and lending to banks in each countries are done by NCB and not ECB. Even though, the balances of NCB and FED were grown in line before 2012, their monetary policy was diverged after that – the NCB balances started to decrease only to start to grow in 2015 again. Meantime, we do not expect that FED balance will start to decrease in the near future.

The last part of analysis shows us that relation between macroeconomic indicator and central bank balances is hidden and is not fundamental. At the same time, the correlation between central bank balances and stock markets are huge in time of quantitative easing programs. It is not possible to say about 100% probability that this relation is casual; however, we think that this relation is exactly casual, and we have two confirmations on real examples: FED balance and S&P 500 Index after November 2008; and NCB balance and EURO STOXX 50 Index in first months of 2015.

## Introduction

Term “monetary policy” is used in modern world along with “economic”, “fiscal”, “budget”, “government”, and other “policies”. Despite the fact that term “monetary policy” is treated as something defined, understandable, and monolithic, in fact, different countries understand it variously. Differences start in defining state agency that provides policy, continue in financial instruments that are used for its providing, in goals that monetary policy has, and in impact which the monetary policy instruments cause on stock markets. However, there are some basic principles that are the same for any “monetary policy”. State agency that provides policy is usually central bank of a country or other agency with similar functions. Main criterion is that agency should be capable to influence money market through money demand and money supply. Also, monetary policy main goal is focusing on one-two key economic indexes: exchange rate, inflation, etc., which is seen as main measurement of policy effectiveness.

Usually, central bank of a country performs several complementary functions to influence money market, as a provider of “monetary policy”. Primary function of any of them (except money emission in some countries) is to be the lender of last resort for national financial system. It means that, in case of urgency, central bank has to perform necessary actions to rescue individual financial institutions or financial system in the whole. The consequences of this function quality performance may be various. Mostly they depend on features of national financial system, but also they are affected by attitude of government to the moral hazard<sup>1</sup> problem. Also, in some countries, central banks often perform several secondary functions such as monitoring of financial institutions and system, control of reserves requirements, maintain the payment system, and providing of banking services for other state agencies.

At the same time, as additional functions of monetary policy agents could conflict with his main goal, the structure of money market has bigger influence on the impacts of monetary policy agents’ decisions. For example, the Federal Reserve System (FED) in United States of America (USA) and the European Central Bank (ECB) in European Union (EU) impact on stock markets, gross domestic product (GDP) growth, and other macroeconomic and financial factors could be highly tied on the foundations of the money market. In USA, the economy is functioning under Anglo-Saxon capitalism or Anglo-Saxon model. That model is originated from the ideas of Adam Smith. The main characteristic of this system are follows: levels of

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<sup>1</sup> Moral hazard – knowledge of possibility to take money from the monetary policy agents may cause financial institution to take excessive liquidity risks.

government regulations and taxes are low, public sector provide fewer services, and the enterprises borrow long-term capital mainly from the capital markets. At the same time, another model functions in European Union: higher level of government regulations and taxes, higher share of public sector services, and the enterprise borrow long-term capital mainly from the commercial banks. All this difference is obligated to influence the effects from the monetary policy instruments.

Within this project, we will investigate the relation between monetary policy instruments usage and different financial and macroeconomic factors after the global financial crisis of 2008 in two economies: USA and EU. In Chapter 1, it will be provided the analysis of monetary policy instruments and historical tendencies in central banks interest rates (alike specific sectorial analysis). In Chapter 2, it will be discussed the structure of FED and ECB balance sheets from the last annual report and, also, the tendencies in theirs balance sheets from 2007 (the year before the global financial crisis of 2008) to 2014. Chapter 3 will be presented analysis of relations between central banks' balance sheets and some macroeconomic factors: GDP growth and inflation, and stock market index.

## Chapter 1. Monetary policy instruments and interest rates overview

The European model could be observed already in the monetary policy instruments and mechanisms which are used to influence money market. As it could be seen from Table 1.1, ECB has the instruments for all situations which may emerge. It has the short- and long-term facilities for lending facilities (liquidity provision) and borrowing facilities (liquidity absorption). At the same time, FED used, in general, only short-term instruments which enter strongly into practice only after global financial crisis of 2008 (Table 1.2). Before that crisis, financial institutions did not like to turn to FED for the help due to possible reputational risks. Seasonal credit is available only for the special financial institutions that can approve strong dependence of liquidity volatility on the seasonal basis. If it is approved, a financial institute can borrow money till the season end. Also, FED has no instruments for absorption liquidity<sup>2</sup> but the bank reserves; however, they are so small that it is rather formal liquidity absorption than monetary policy instruments: \$103 bln. from \$ 2 687 bln. bank balances in FED as of April 01, 2015. For example, bank reserves in ECB are equal €111 bln. from €278 bln. of bank balances in ECB as of April 01, 2015.

Table 1.1

ECB interest rate instruments as of April 09, 2015

Purpose	Facility	Auctions frequency	Term	Interest rate
Liquidity provision	Marginal lending facility	Daily	Day	0.30%
	Main refinancing operations	Weekly	Week	0.05%
	Long-term refinancing operations	Monthly	3 months	Determined by auction
Liquidity absorption	Debt certificates	Occasionally	To 12 months	-
	Deposit facility & required balance in ECB	Daily	Day	-0.20%

Source: European Central Bank ([www.ecb.europa.eu](http://www.ecb.europa.eu))

The interest rates of ECB as of April 09, 2015, are more “loose” than interest rate of FED or, in other words, they are significantly lower. At the same time as FED pays banks 0.25% on excessed balances in central bank, ECB charges the financial institutes 0.2% on excessed accounts – the difference is 0.45% as of April 09, 2015. Also, the lending instruments of FED charges higher interest rate than ECB - 0.75% for FED primary credit and 0.3% for ECB marginal credit facility. However, the looseness of ECB policy could be stronger than ECB only currently. For solid conclusion, it is necessary to look on the historical tendencies in rate of both FED and ECB.

<sup>2</sup> They are experimenting with some of them, but their usage is limited for small banks.

Table 1.2

## FED interest rate instruments as of April 09, 2015

Purpose	Facility	Auctions frequency	Term	Interest rate
Discount Window liquidity provision)	Primary credit	Daily	Day	0.75%
	Secondary credit	Daily	One Day and more	1.25%
	Seasonal credit	Daily	1-9 Months	0.15%
Liquidity absorption	Balance in FED	Daily	Day	0.25%

Source: Federal Reserve System ([www.frbdiscountwindow.org](http://www.frbdiscountwindow.org))

From September 2007, the monetary policy of FED, in fact, was more loose or equal to the policy of the ECB according to actual central bank interest rates. On September 2007, the effective federal fund rate<sup>3</sup> fell lower, 4.94%, than marginal lending facility of ECB, 5.0%. However, interest rates from Table 1.1 and Table 1.2 also do not show the difference in monetary policy of FED and ECB. As it is seen from Fig. 1.1, effective federal fund rate as of march 2015 was lower than marginal lending facility of ECB. However, the situation is changing: the monetary policy in USA is tightening (The Economist, 2015a) and in EU is easing (The Economist, 2015b). Why is it so difficult to compare the monetary policy of ECB and FED? At first, the huge difference with regard to the bank's balance in central banks. The policy-makers of FED believe that the interest rate on bank's deposits in central bank makes the monetary policy more flexible (FED, 2014). Additionally, the differences in money market foundations also influence the perception of monetary policy. FED was quicker in decision making (it is also could be seen in Fig. 1.1) and, as it will be shown in Chapter 2, also used direct market operations as important monetary instrument more stable than ECB.

Source: Economic Research Division of Federal Reserve Bank of St. Louis ([research.stlouisfed.org](http://research.stlouisfed.org))

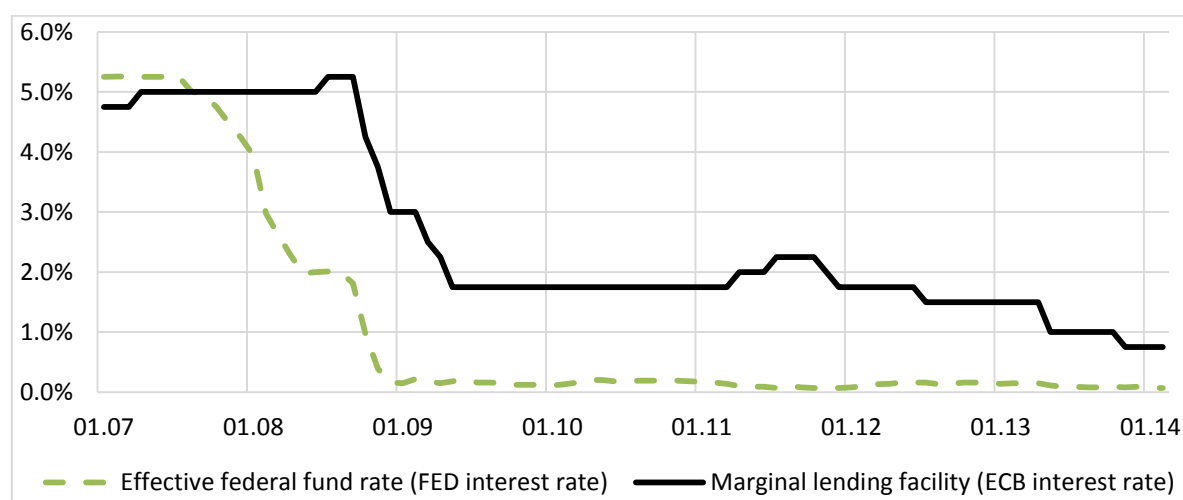


Fig. 1.1 The Fed and ECB interest rate

<sup>3</sup> Effective federal fund rate is calculated through the average interest rates on actual deal that is closed on money market.

## Chapter 2. Balance sheet analysis

### 2.1 Analysis of FED balance sheet

During world economic crisis in 2008, FED balance increased greatly - by 147% comparing to 2007. In absolute numbers, this increase was more than \$1.3 trillion. FED balance volume had two main periods of growth after 2008. In the period 2010-11, assets grew on 28%. The second period was in 2013-14, the growth rate was almost twice of the first period - 50%. In summary, balance of FED grew more than 392% for last 8 years and reached almost \$4.5 trillion in the end of 2014.

Most significant statements of assets are “U.S. government, federal agency, government sponsored enterprise securities” and “Treasury securities”. In some years, statement “Loans to depository institutions” takes also huge share of assets, i.e. 24% of total assets in 2008 (Fig. 2.1.2). On Fig. 2.1.1, it could be seen that “Other assets” does not take the significant share of FED assets in 2014 comparably to other asset statements.

Source: FED annual report (federalreserve.org).

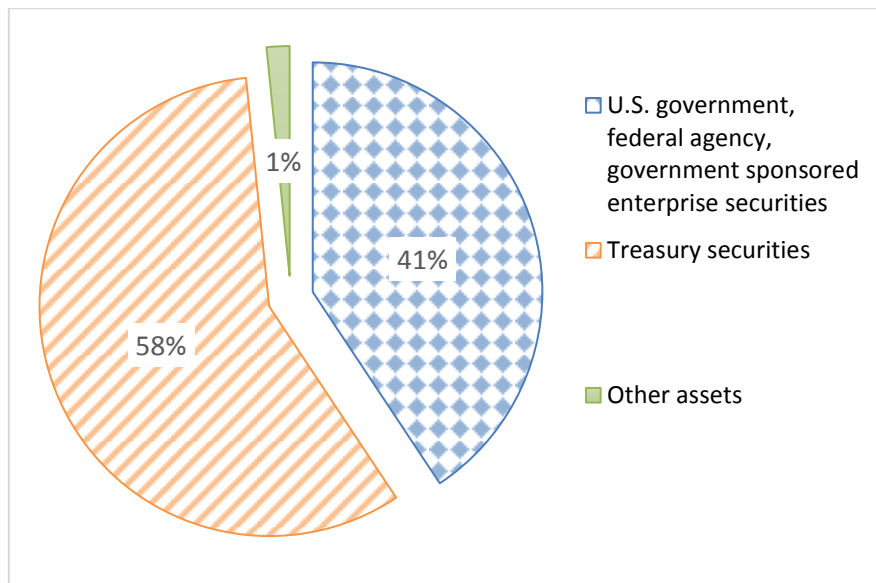


Fig. 2.1.1 Structure of FED assets in 2014

In 2008, structure of assets was totally different (Fig. 2.1.2). Statements “U.S. government, federal agency, government sponsored enterprise securities” and “Loans to depository institutions” had almost the same share. Additionally, statement “Treasury securities” appeared for the first time in FED balance sheet. Appearance and significant increase in this statement was a result of economic crisis - FED had to change the system of the direct market operation execution.

Source: FED annual report (federalreserve.org).

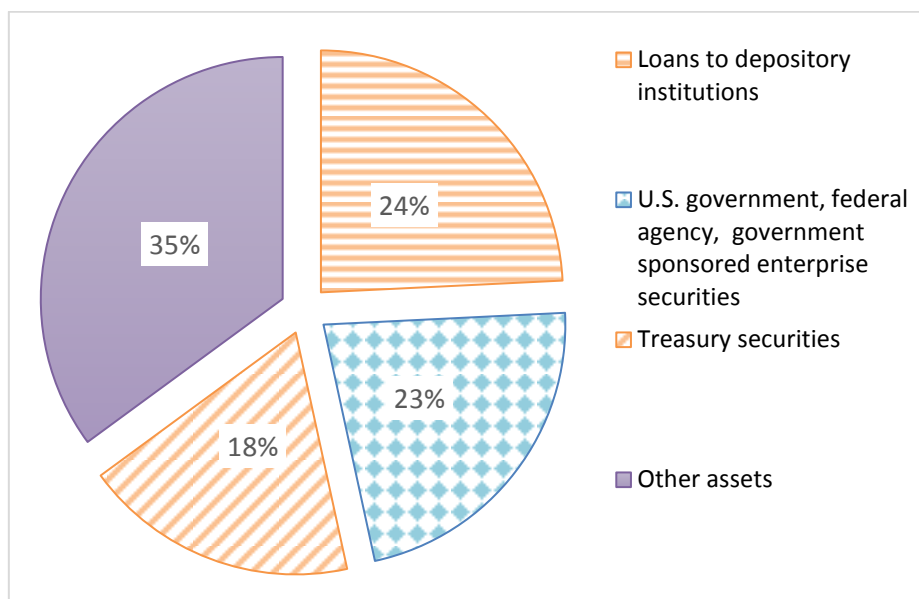


Fig. 2.1.2 Structure of FED assets in 2008

Huge changes in FED assets structure was only in 2008 and in 2009. After that, the allocation of FED assets did not change in whole. Fig. 2.1.3 shows that difference in asset statements values changed only in terms of total assets volume between 2013 and 2014 years. We think, that the same allocation could be observed till the time when “Treasury securities” statement will be de-escalated.

Source: FED annual report (federalreserve.org).

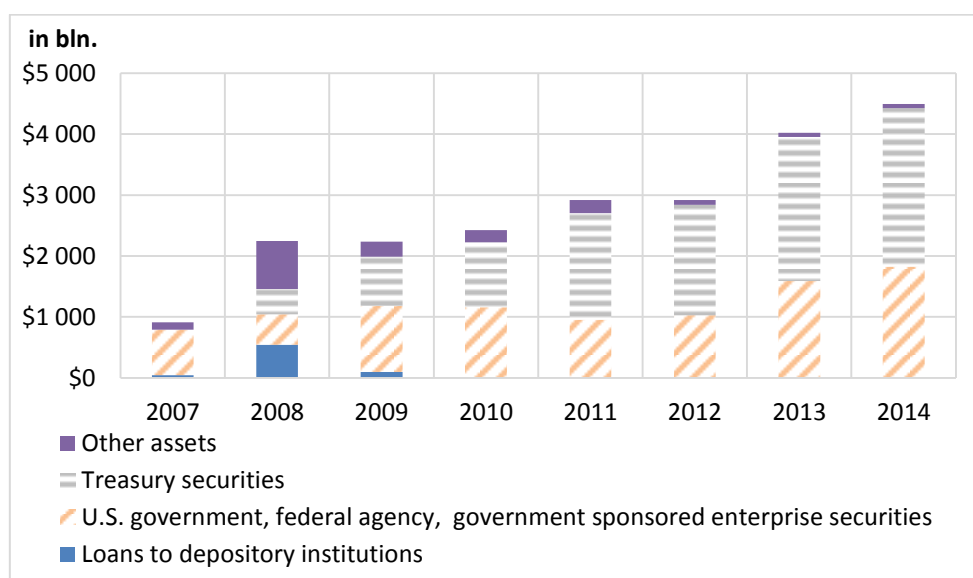


Fig. 2.1.3 Historical tendencies in FED assets structure



FED liabilities have similar structure to assets. There are only two main statements, and others do not play significant role. However, FED liabilities are more stable than assets. “Other liabilities” held 18% of total liabilities in 2014 (Fig. 2.1.4), almost the same share as in average for the last 8 years - 16%. At the same time, statements “Federal reserve notes outstanding, net” and “Deposits, depository institutions” held in total 82% share in 2014 (in average for the last 8 years these two statements held 84% of liabilities).

Source: FED annual report (federalreserve.org).

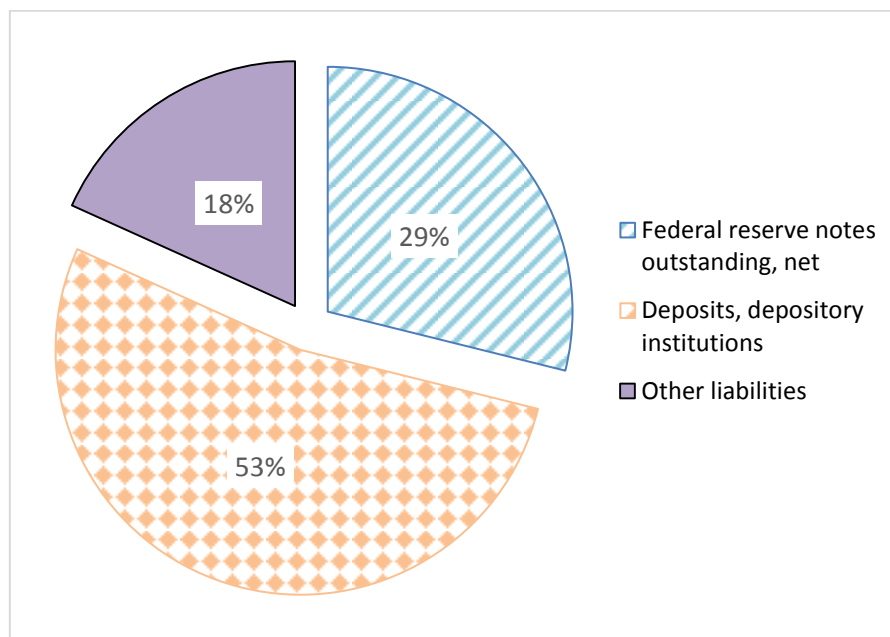


Fig. 2.1.4 Structure of FED liabilities in 2014

Minor changes affected allocation of total liabilities between “Federal reserve notes outstanding, net” and “Deposits, depository institutions”, in favor of the last (Fig. 2.1.5). These changes reflected increasing meaning of FED as a holder of excessive bank reserves which cost FED 0.25% annually. That can be approved if we take a look on this statement in 2007: “Deposits, depository institutions” held only 2% in total liabilities. That proves that bank reserves requirements are too low comparing to excessive bank balances in FED due to high money supply what was mentioned already in Chapter 1.

On Fig. 2.2.6, it is shown that statement “Federal reserve notes outstanding, net” did not increase as fast as “Deposits, depository institutions”. Also, it should be mentioned that volume of “Other liabilities” decreased in 2009, 2011 and 2012, but these reductions were temporary due to quick increase in statement “Deposits, depository institutions”, and in 2014, “Other liabilities” grew by 42% comparing to 2013; however, its share remain relatively low.

Source: FED annual report (federalreserve.org).

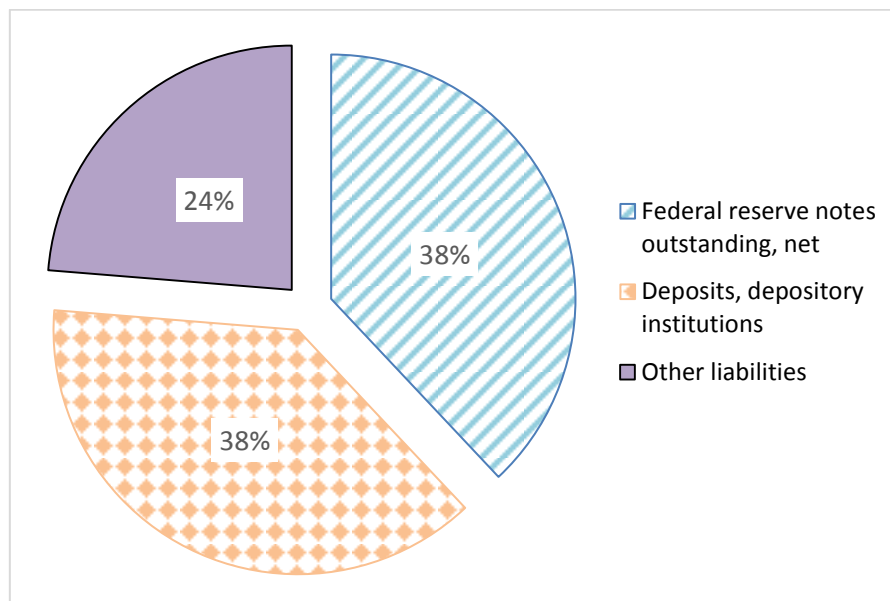


Fig. 2.1.5 Structure of FED assets in 2008

## 2.2 Analysis of ECB balance sheet

Structure of ECB balance sheet changed a little since 2007, but at the same time, balance volume grew by 47% or €59 bln. In 2008, when world economic crisis affected money market of euro zone, the huge upsurge of balance volume took the place due to problems with US dollar liquidity that appeared. ECB balance value grew three times (comparing to 2007) due to dollar swap with FED in amount of €220 bln. Except this upsurge, ECB balance volume changed rather stable and grew for 7.97% in average for last 5 years.

Source: FED annual report (federalreserve.org).

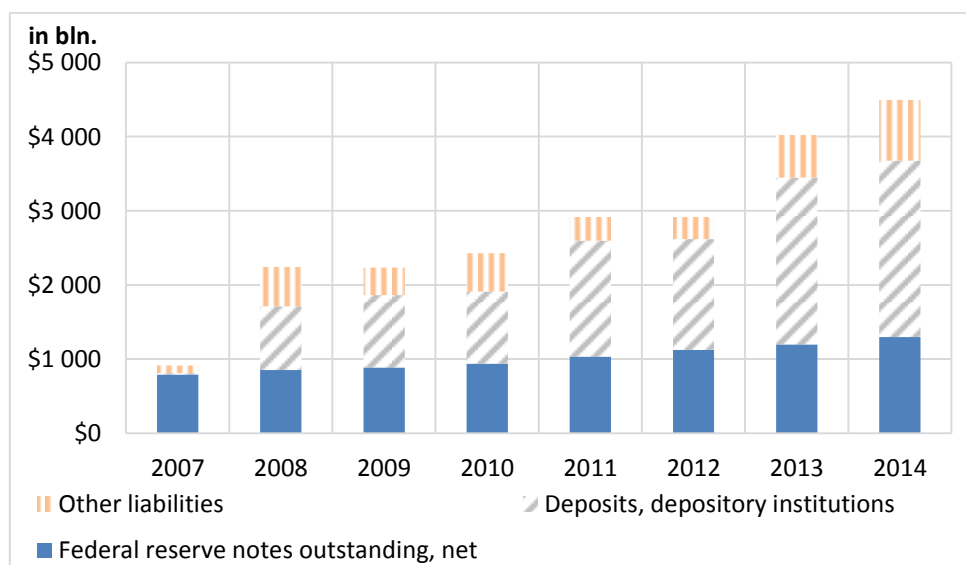


Fig. 2.1.6 Historical tendencies in FED liabilities structure

Source: ECB annual report (ecb.europa.eu).

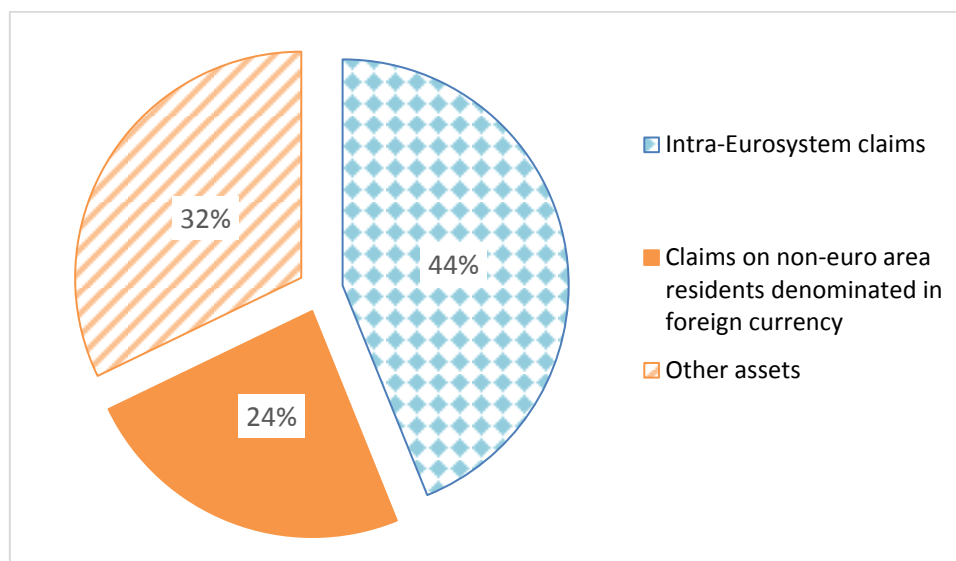


Fig. 2.2.1 Structure of ECB assets in 2014

On the asset side of ECB balance sheet, most significant statements are “Intra-Eurosystem claims” and “Claims on non-euro area residents denominated in foreign currency”. “Other assets” held 32.15% (Fig. 2.2.1) of total assets in 2014, and they held 27.31% in average for the last 8 years. “Other assets” includes these statements: “Gold and gold receivables”, “Claims on euro area residents denominated in foreign currency”, “Other claims on euro area credit institutions denominated in euro”, and “Securities of euro area residents denominated in euro and others”. Statements of “Other assets” do not show significant changes for the analysis period and is residual asset of ECB balance sheet.

Source: ECB annual report (ecb.europa.eu).

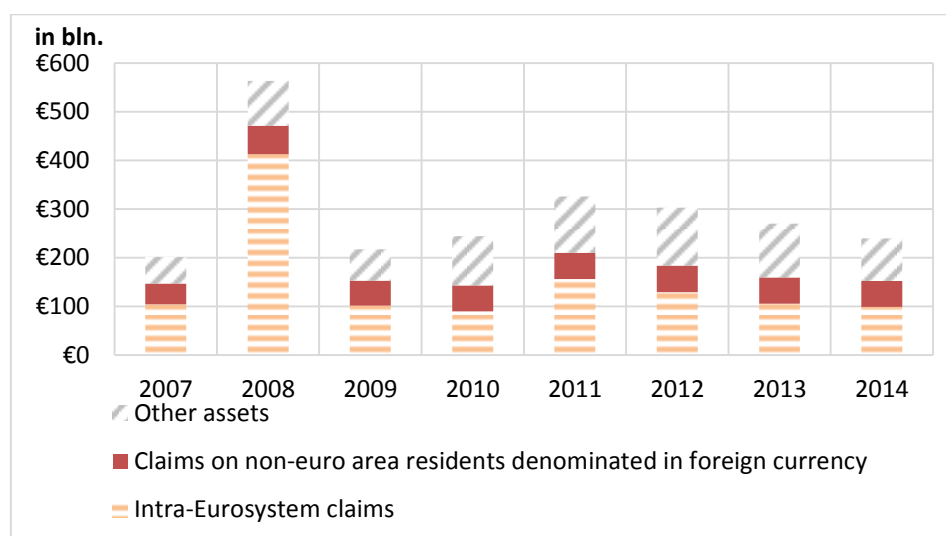


Fig. 2.2.2 Historical tendencies in ECB assets structure

Source: ECB annual report (ecb.europa.eu).

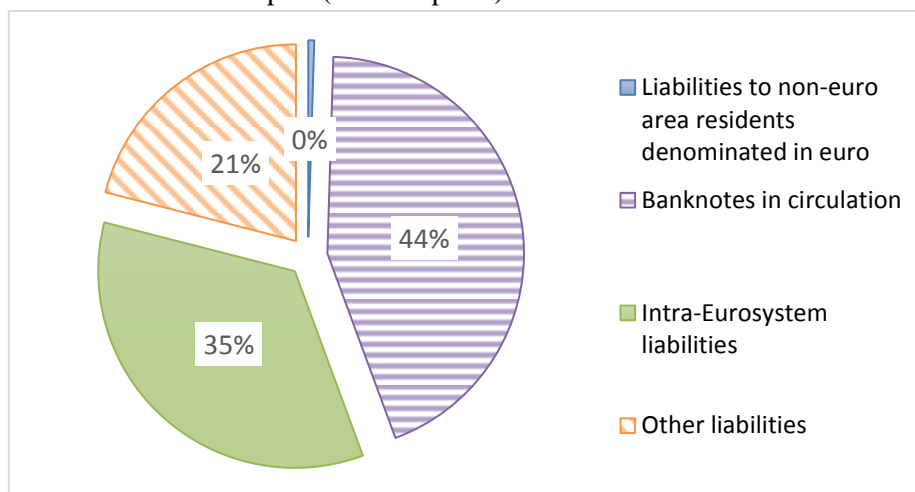


Fig. 2.2.3 Structure of ECB liabilities in 2014

ECB assets structure was quite stable for the last 8 years (Fig. 2.2.2). Main statements “Intra-Eurosystem claims” and “Claims on non-euro area residents denominated in foreign currency” held 73% share of assets during 2007-14 in average. Exception was observed only in 2008, when beforementioned swap operations between FED and ECB increased significantly statement “Intra-Eurosystem claims” by €257 bln. (77% assets share).

ECB liabilities consist of “Liabilities to non-euro area residents denominated in euro”, “Banknotes in circulation”, and “Intra-Eurosystem liabilities” (Fig 2.2.3). Statement “Other liabilities” consists of “Liabilities to other euro area residents denominated in euro”, “Liabilities to non-euro area residents denominated in foreign currency”, “Provisions, Revaluation accounts, Capital and reserves”. These statements held 21% of total assets in 2014 (17% share in average for the last 8 years).

Source: ECB annual report (ecb.europa.eu).

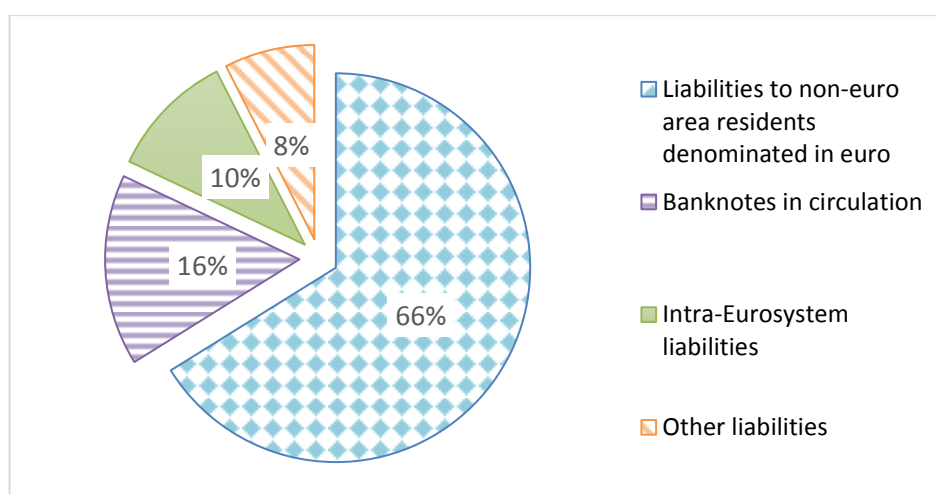


Fig. 2.2.4 Structure of ECB liabilities in 2008

ECB liabilities structure was also quite stable for last 8 years if year 2008 is excluded when beforementioned swap operations with FED boosted “Liabilities to non-euro area residents denominated in euro statement” (Fig. 2.2.4). The swap operations with FED shifted ECB liabilities structure as it is shown on Figure 2.2.5., where “Liabilities to non-euro area residents denominated in euro” increased from 11% liabilities share in 2007 to 66% share in 2008. Additionally, this statement held in average 24% share of liabilities during 2011-2013, but in 2014 statement moved to “Intra-Eurosystem liabilities” due to operation reclassifications.

Source: ECB annual report (ecb.europa.eu).

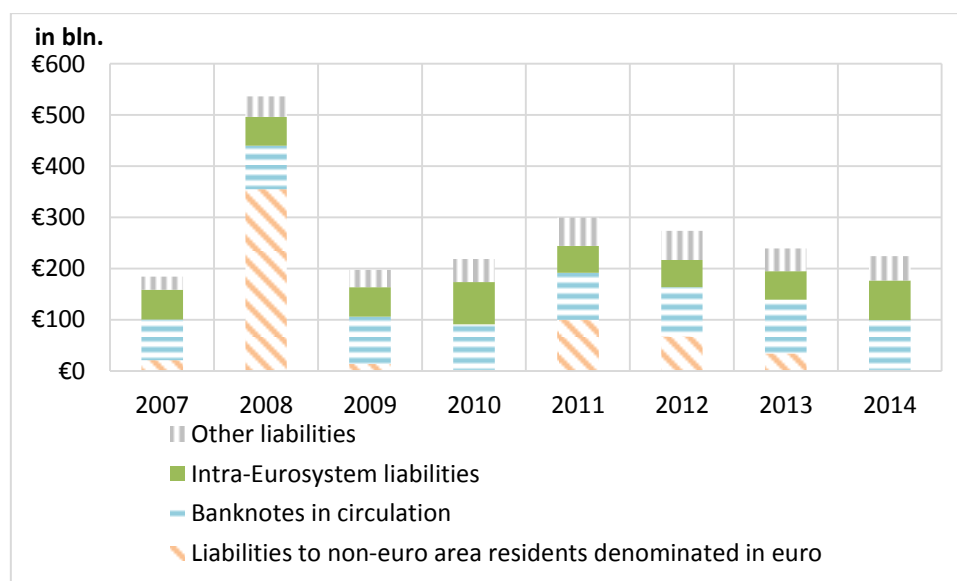


Fig. 2.2.5 Historical tendencies in ECB liabilities structure

### 2.3 Comparing ECB and FED balance sheets

Main difference between ECB and FED balances is the size - FED balance is much bigger. During last 8 years, FED balance grew more than 4 times, unlike ECB balance which has stayed rather stable. Both central banks showed significant balance increase in 2008, at the beginning of world economic crisis, this reflects help to the financial systems of their countries in quick mode. After 2008, FED continued increasing balance that corresponds to the implementation of QE but more moderately than in 2008. On the other side, ECB balance was decreased. That corresponds with EU regulations when main support for financial systems of countries is provided through national central banks – central banks of all 19 EU countries (NCB).

Source: FED annual report (federalreserve.org), Bloomberg, ECB annual report (ecb.europa.eu).

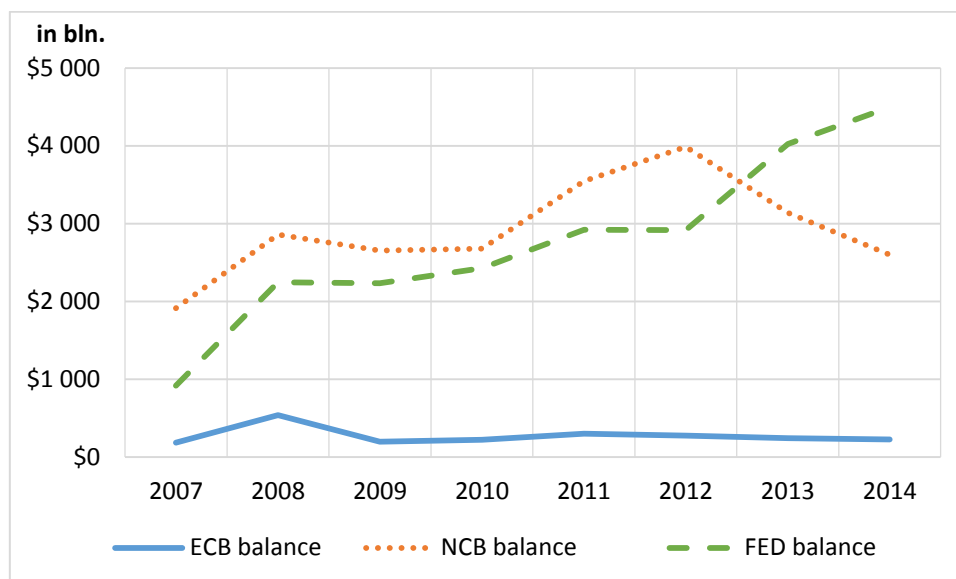


Fig. 2.3.1 Comparing balances of ECB, NCB, and FED

From Fig. 2.3.1, it is seen that NCB balance is comparable to the FED one. In 2008, NCB assets grew by 56% comparing to 2007 that is mainly due to growth of ECB balance and is comparable to FED balance growth. Further NCB balance growth was in line to FED balance growth but only until 2012. At that time, EU banks, which lost faith in the stability of monetary policy and in possibility of fiscal stimulus enlargement, started to return credits within LTRO program. Although no decisions about changing monetary policy was made at this time, the actual monetary policy started to become tougher due to lowering of money supply, and that put high negative pressure on economic recovery.

## Chapter 3. Influence of monetary policy instruments on stock markets

### 3.1 Influence of FED monetary policy on U.S. economic indicators

All the monetary instruments affect different economic indicators. The main macroeconomic indicator on which the central bank wants to influence through monetary policy instruments is the growth rate of gross domestic product after excluding effect of inflation (real GDP growth rate). Also, the monetary policy instruments, in one or other way, influence the inflation (the growth rate of price) what is the main postulate of economic school – monetarism (Friedman and Schwartz, 1963). However, the monetary policy instruments could as well influence the stock markets, and according to our expectations, this effect is greater in USA than in EU due to money market foundations. The relations between FED balance, which is the best proxy of the monetary policy instruments in the time of zero-lower-bound, and the economic indicators, which were mentioned before, are presented on Fig. 3.1.1-3.1.3.

Source: FED annual report (federalreserve.org), International Monetary Fund (imf.org)

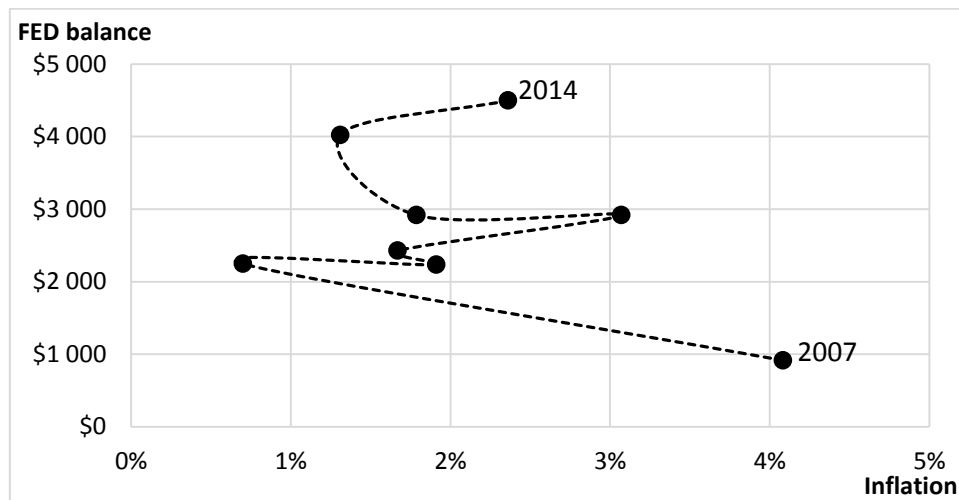


Fig. 3.1.1 Relation between U.S. inflation and FED balance in bln.

On Fig. 3.1.1, it is possible to see that the influence of the monetary policy instruments on inflation is almost absent from 2007 to 2014. In general, three years: 2007, 2011, and 2014, show that the tendency in inflation is opposed to FED balance tendency: when FED balance grew, inflation fell. That situation is impossible according to monetarist school (Friedman and Schwartz, 1963). All this facts prove that inflation was changed by economic factors from 2007 to 2014, but it was not FED balance and the usage of monetary policy instruments.

Source: FED annual report (federalreserve.org), International Monetary Fund (imf.org)

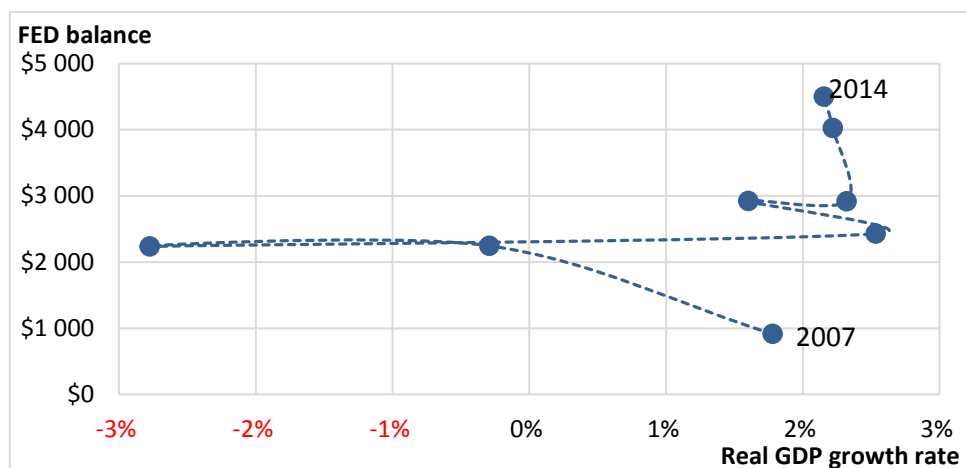


Fig. 3.1.2 Relation between U.S. real GDP growth rate and FED balance in bln.

Almost the same situation could be observed on Fig. 3.1.2. There is no correlation between GDP real growth rate and FED balance. Of course, it is hard to say that the expansionary monetary policy of FED has no influence on real GDP growth rate at all due to absence of correlation, but it is obvious that this influence is not fundamental.

Source: FED annual report (federalreserve.org), Bloomberg.

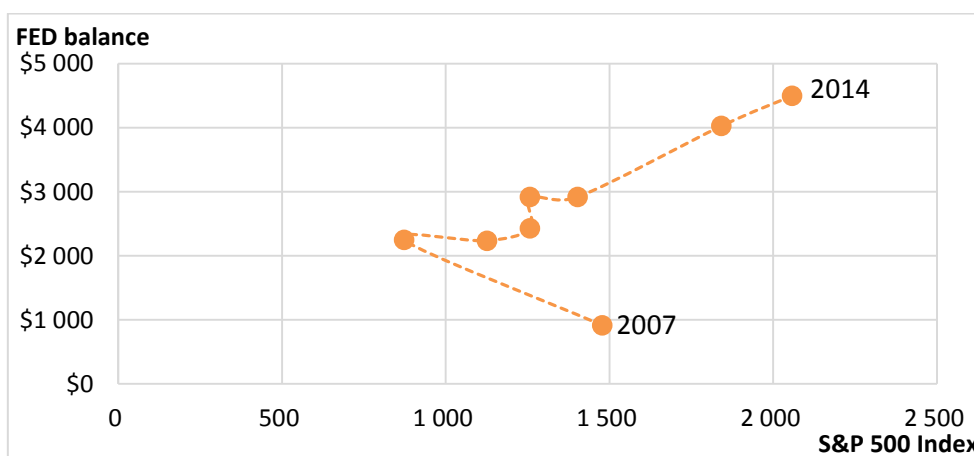


Fig. 3.1.3 Relation between S&P 500 Index and FED balance in bln.

At the same time, the relation between the central bank balances and stock market indexes is theoretically ambiguous. However, as could be seen from Fig. 3.1.3, the relation between FED balance and S&P 500 index is univocal, as we think, due to indirect impact after 2007. The correlation between FED balance sheet and S&P 500 Index after the start of QE in November 2008 is higher than 95%. Correlation does not say that this relation is causal relation (Kassen, 2013), but we think that there is more argument for causal relation than against it.



Source: ECB annual report (ecb.europa.eu), Bloomberg, International Monetary Fund (imf.org)

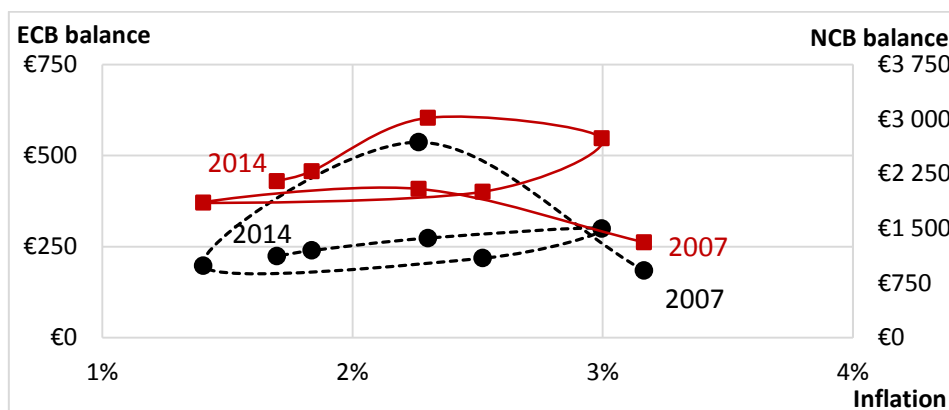


Fig. 3.2.1 Relation between EU inflation and ECB and NCB balance (solid line) in bln.

### 3.2 Influence of ECB monetary policy on EU economic indicators

The relation between ECB balance, inflation, and real GDP growth rate is the same as for FED balance (Fig. 3.2.1 and Fig 3.2.2). However, it is also not possible to say that it does not influence these macroeconomic indicators at all, but the direct influence is not observed in the data from 2008 to 2014. The influence is absent even if the influence from NCB balance is tried to be find. However, the relation between EU stock markets and its balance is different from the situation in USA.

Source: ECB annual report (ecb.europa.eu), Bloomberg, International Monetary Fund (imf.org)

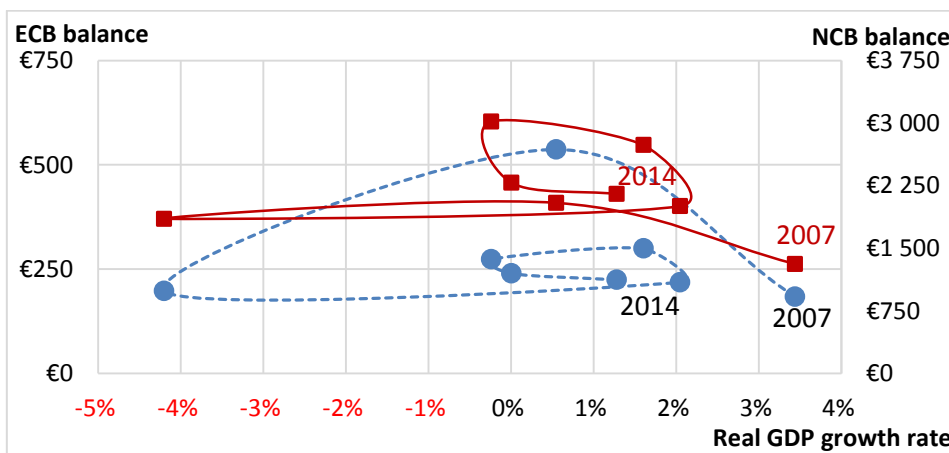


Fig. 3.2.2 Relation between EU real GDP and ECB and NCB balance (solid line) in bln.

From Fig. 3.2.3, it is possible to see that there is no straight relation between ECB (and also NCB) balance and EU stock markets (i.e. EURO STOXX 50 Index) in period from 2007 to 2014. But for short period of time and for NCB balance, it is possible to define some relation. For example, if the periods from 2009 to 2011 and from 2012 to 2014 are examined separately than it is possible to suggest the negative relation between central banks' balance

and EU stock markets. From 2009 to 2011, the NCB balance was growing but EU stock markets were falling. From 2012 to 2014 the relation was the same but tendencies went in other side.

Source: ECB annual report (ecb.europa.eu), Bloomberg.

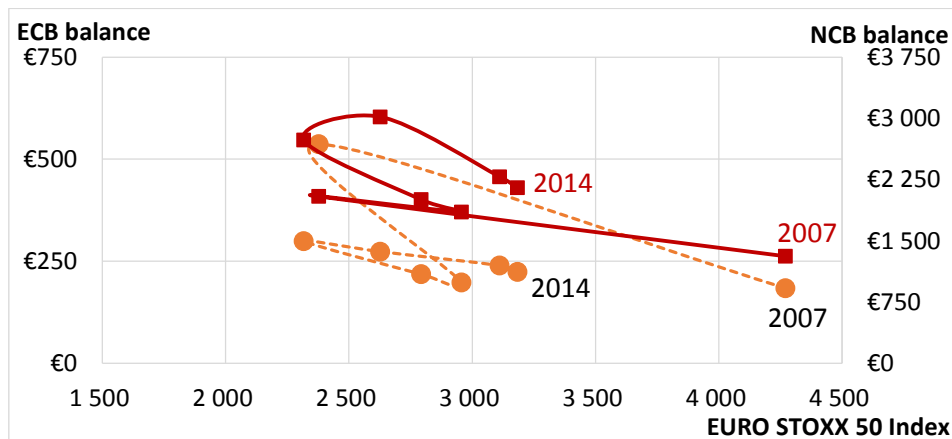


Fig. 3.1.3 Relation between EURO STOXX 50 and ECB and NCB balance (solid line) in bln.

Due to differences with FED situation, it is possible to suggest that negative relation is determined by other macroeconomic and financial environment. Differences in financial stability, market volatility, forecasted economic growth, market confidence, expectations about continuation of hard monetary policy, etc., could lie in the foundations of this difference. However, differences with USA was ceased to exist from October 2014 when the gossips about possibilities of monetary policy easing in EU started to spread. From this period and till currently (Fig. 3.1.4), the relation between central bank balance and stock market indexes have become the same as for the FED and U.S. stock markets: NCB balance growth stimulated stock market indexes growth (i.e. EURO STOXX 50 Index).

Source: Bloomberg.

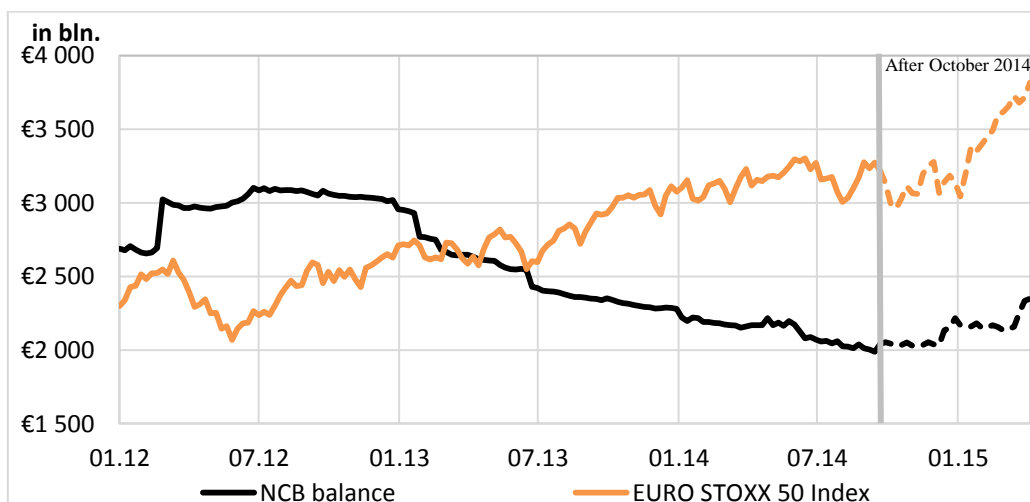


Fig. 3.1.4 Relation between EURO STOXX 50 Index and ECB and NCB balance

## **Conclusion**

The monetary policy is different through the world, and its comparison is very hard even for such huge and developed countries as USA and EU. The differences lie not only in foundations of economy or money market, but also from situation on the markets or from different interpretation of words from the central bank policy-makers. As it was shown in Chapter 1, the monetary policy instruments of ECB are wider in coverage than the instruments of FED.

Historically, the FED monetary instruments were not used far and wide due to high potential reputational risk, but this situation started to change after the financial global crisis. At the same time, the attitude to central bank loans was more loyal in ECB even before the global financial crisis of 2008. Due to this discrepancy, the usage of other mechanism simultaneously with lowering of interest rate was critical for quick reaction of FED on liquidity crisis which was developed after the Lehman Brothers collapse. FED used the next additional instruments: the interest rate on bank balances (required and excess) and the quantitative easing programs which was used to buy the market assets after the interest rates fell in zero lower bound trap. Meantime, the developed system of ECB was too complex for quick reaction on the market environment development and, sometimes, can even allow reversing of monetary instruments usage by political pressure.

As it was seen from Chapter 2, the structure of FED and ECB balances is very simple; however, only the balance structure of FED was developed after financial crisis because ECB retains main work for NCB. Chapter 3 shows that changes of bank balances are not accompanied very often by changes of macroeconomic factors; therefore, we can suggest that this influence was not fundamental in 2008-14. At the same time, the changes of FED balance were accompanied heavily by S&P 500 Index after 2008, and the changes of ECB balance were not accompanied by EURO STOXX 50 Index changes before October 2014 – the time of first gossips about possibility of quantitative easing program in EU. Therefore, the differences in monetary policy instruments should be more closed in future and will be dictated by money market expectations (Bernanke, 2015) and not by money market foundations as it was before the financial global crisis of 2008.

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