Vysoká škola ekonomická v Praze

Fakulta financí a účetnictví

Katedra měnové teorie a politiky

DIPLOMOVÁ PRÁCE

2016 Bc. Salome Lekishvili

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Analýza vztahu kvality bilančních aktiv centrální banky a účinnosti monetární politiky

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Autor diplomové práce: Bc. Salome Lekishvili

Vedoucí diplomové práce: Prof. Ing. Martin Mandel CSc.

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University of Economics, Prague

Faculty of Finance and Accounting

Department of Monetary Theory and Policy

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Central bank's balance sheet and its relationship to monetary policy effectiveness

DIPLOMA THESIS

Diploma Thesis author: Bc. Salome Lekishvili

Diploma Thesis supervisor: Prof. Ing. Martin Mandel CSc.

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Čestné prohlášení

Prohlašuji, že diplomovou práci na téma „**Analýza vztahu kvality bilančních aktiv centrální banky a účinnosti monetární politiky”** jsem vypracovala samostatně a veškerou použitou literaturu a další prameny jsem řádně označil a uvedl v přiloženém seznamu.

V Praze dne ……. ……..

Podpis

Poděkování

Laskavě bych na tomto místě poděkovala svému vědoucímu diplomové práce **Prof. Ing Martinovi Mandelovi CSc**. Za odborné vedení práce, cenné rády, konsultace a věnovány čas během psaní diplomové práce a za podporu a inspiraci během celého studia.

Abstrakt

Táto diplomová práce se věnuje problematice finančního hospodaření centrálních bank. Centrální bankovnictví je považováno za ziskovou oblast ekonomiky a finančního trhu. Tato práce se však zaměřuje na problematiku ztrátovosti centrálních bank a dává větší důraz na banky s akumulovaným záporným výsledkem hospodaření. V této práci je podrobně sledován vztah mezi kvalitou bilančních aktiv a hospodaření centrálních bank a zároveň je analyzován vliv negativního výsledku hospodaření na hlavní cíle a poslání centrální banky jakožto monetární autority.

Účinnost monetární politiky je ovlivněna několika faktory, jako jsou nezávislost a samostatnost centrální banky, vyspělost ekonomiky a finančního systému, analytické schopnosti zaměstnanců. U faktorů ovlivňujících úspěšnost monetární politiky, a tím pádem i centrální banky, se velmi zřídka setkáváme s faktorem hospodaření centrální banky. Právě primárním cílem této práce je hledání hlavních způsobů, kterými hospodaření centrální banky ovlivňuje rozhodnutí o měnové politice i v případě dlouhodobého nepříznivého finančního hospodaření, existuje-li hrozba negativního vlivu na tato rozhodnutí.

Klíčová slova: Centrální banka, finanční hospodaření, finanční výkaz, rozvaha centrální banky, monetární politika.

Abstract

The diploma thesis deals with the issue of financial performance of central banks. Central banking is generally considered as a profitable part of financial system. However, this paper focuses on the loss-making central banks and emphasizes the examples of central banks with large accumulated financial losses. Relationship between the quality of balance sheet assets and financial performance of central banks is closely examined in the thesis. Alongside, it analyses the impact of negative financial performance on the main objectives of central bank, in the role of monetary authority.

Effectiveness of monetary policy is conditioned by many factors, among them are independence of central bank, the level of development of financial markets - central bank operates in, analytical skills of employees and etc. However, the case, where financial performance of central bank is discussed in connection with monetary policy performance, is extremely rare.

The primary goal of this diploma thesis is to reveal and describe the main ways in which financial performance of the central bank influences monetary policy decisions. It also tries to find out whether there is hidden threat of a damaging impact on the decisions in case the central bank accumulates the negative financial results.

Key words: Central bank, financial performance, financial statement, balance sheet of central bank, monetary policy

Contents

Introduction

"History proves... that a smart central bank can protect the economy and the financial sector from the nastier side effects of a stock market collapse."

Ben Bernanke

Central banks are main decision makers and navigators of domestic monetary economy, their core objective is to maintain price stability, support economic growth and general welfare in the country. Recently a lot of central banks have taken responsibility of stability and supervision of the banking and financial systems. Central banking is inseparable part of financial markets and banking system with special obligations and unique mandate.

Due to this exclusive position of central banks in the economy and financial system, main measurement of their success is ability and historical experience to meet their objectives. Financial performance in term of profitability is irrelevant for central banks activities. Central banks are not commercial entities, established with the aim to generate profit or boost market capitalization. They exist with the different purpose than commercial banks. Thus, central bank's profitability should not be taken into account, when discussing their achievements. Financial performance and profit is poor conductor to their success. Basically this approach is correct and widely accept, since accumulated loses of central banks' reach the point, when net capital of institute is negative and its ability to meet monetary policy objectives and remain political independence is under doubts.

There was short story behind my decision to choose the topic for my diploma thesis. From fall 2014 Georgian Lari sharply depreciated. For the country as Georgia, with high level of household and business credit dollarization changes in exchange rate was very unfavorable. Depreciation was caused by external shocks, by worldwide appreciation of US dollar, by financial crisis in Russia and as there is free floating system in Georgia, exchange rate absorbed all negative information. Theoretically, central banks role in developed situation was minimal. But, problem has provoked when government start blaming central bank in this situation and its image and credibility was seriously damaged. It was easy way to avoid responsibility from the government institutes, but the trap was very dangerous for countries development. Long story short, I started thinking what would have happened generally, if

National bank of Georgia operated with losses, would Central banks losses have had any influence in this crisis situation or would it have had influence on central banks decisions how to solve the problems?

Despite several sceptic opinions, about relevance the financial results to the monetary policy performance, I have decided to work on the topic. First because of my general interest in central banking as a part of financial markets and as a monetary authorities and second, central bank losses have arisen in some countries, recently in Latin America and in countries of central Europe and for some of them it became real concern.

Main purpose of the thesis is to analyze and discuss if profitability of central banks have spectacular influence on its behavior, in other words if financial strength matters when speaking about monetary policy outcomes and central banks macroeconomic performance. Question arise also when central banks financial results are negative. Do central banks' losses itself, cause any constraints in their monetary policy and threaten ability to meet the monetary policy goal?

The thesis is organized as follows. In section one central banks balance sheet and statement of income is described. What are the main items of balance sheet and how it has been changing during the last years? How central banks' balance sheet is linked to the financial statement? Also, income statement is defined according to the items, it includes and sources of income or expenses. Section I also includes general rules and framework of accounting standards for central banks.

Section II talks about monetary policy regimes. Financial performance of central bank is thus a function not only of the accounting valuation of balance sheet but also the nature of the policy regime, central banks' chose. Four main monetary policy regimes are introduces in this part:

- Monetary policy with and implicit
- Exchange rate targeting
- Monetary targeting
- Inflation targeting.

They are briefly described, with the more focus on inflation targeting, as a comparatively new regime, which is deployed both in Czech Republic and Georgia.

Section III provides more detailed information about central banks financial performance with greater focus on losses. Central banks profit does not create any concern or any additional value for central banks performance, but this effect if not symmetric in case of losses, which can arise some perceptions about central banks' ability to deliver desired and needed results of monetary policy. Problematic concern is the methods or channels, how central banks' losses are covered and who provide additional capitalization for them. So, subsection of this chapter discuss more precisely whether financial strength is sensible question for central banks.

Section IV and V provides the reader with the overview of central banks financial development in Czech Republic and Georgia accordingly. Main methodology for this section is to analyze ex post financial results of central banks, find main sources of its financial performance and predict their development in the future. Based on the simple regression model central banks' financial performance sensitivity toward main sources of historical profits or losses will be calculated. Regression model allows us to simulate future development of potential financial result of central banks in Czech Republic and in Georgia as well.

Finally, based on theoretical reasoning and empirical analysis of two counties in transition, with different historical development and central banks financial performance, author will summarize overall finding of the thesis.

1. Balance sheet and statement of loss and gain of Central bank

Central banks are not commercial entities. For the most of the modern economies, central banks are monetary authorities responsible for the certain macroeconomics objectives. They are not standard members of financial system that is why central banks mostly are not analyzed from the corporate finance point of view. Financial structure and financial performance of Central Banks is considered as unimportant dimension for external users, they rather follow monetary performance of Central banks. Except for this reason different authors define several factors, which have led to the view, that Central Banks' finance can be ignored (Stella P., Lonnberg A., 2008), as it is:

- Macro economically insignificant[1]
- Irrelevant, owing to the Central Banks unlimited ability to create money.
- Legally central banks cannot become financially insolvent.

Our view in this paper is that it is very important to evaluate and analyze corporate financial structure of the Central Banks as an independent entity, especially when we want to evaluate monetary policy credibility and effectiveness of the independent Central Bank. Many factors, that are not relevant for commercial entities effect central banks financial position and performance, due to its special rights, objectives and responsibilities in every economy and special status in the financial market.

Before analyzing central banks' balance sheet, income statement and external forces effecting them, I think, it is right place here to shortly mention and define accounting standards valid for central banks.

1.1 accounting framework for central banks

Very important question to be mentioned is accounting rules for Central banks, as well as form and frequency of publishing central banks' balance sheets and statements of losses and profits in the wide range for stakeholders. There is no standard format or frequency for publishing one. The most common place is annual reports and evidently it's published once

[1]Fed profits average about ¼ of one percent of GDP and the profit/loss of the European Central bank, during its brief existence, have remained less than 0.03 percent of Euro-area GDP in absolute value.

a year and very often with significant lag. In central banks annual report one can notice, that financial performance of the institute is placed at the end of the report, mostly, without any detailed information or explanation. That can be good sign of central banks attitude toward this question as well. Consequently, some central banks practice to publish their balance sheet and statement on financial situation more often independently from annual report. This approach is widely debated question as well. There is several reason in favor for publishing balance sheet only once a year (Garreth R., 2015):

- It is less costly;
- Central bank's balance sheet is less relevant for stakeholders, so no need to invest so many time and energy to publish it more often.

Relevance of central bank's balance sheet and statement of losses and profits is the main idea of my paper, which I am going to discuss along whole thesis that is why, I prefer not to go deep in this place.

After global financial crisis, there is worldwide demand for transparency to be strengthened especially in financial and management reporting from central banks as well as from commercial banks. European Central Bank (later on ECB) agrees to take measures to strengthen financial reporting further on an ongoing basis and according to them, above mentioned financial and management report aims to provide detailed information to stakeholders about portfolio management, financial accounts, and different risk management aspects (Constâncio, Vítor, 2014).[2] We meet same inconsistence when speaking about accounting rules for central banks. In this context "accounting" includes accounting framework, profit distribution rules and loss coverage arrangement. Establishment of the single set of global accounting standards is vital for the sake of consistency, international comparability and transparency that is crucially important for healthy system. Accounting rules, therefore profit distribution rules and loss coverage arrangement differs around the world, so international comparability is difficult and one should always take account on legal framework and national accounting standards, where the central bank cooperates. Nevertheless some accounting standards could be resistance enough to maintain financial

[2] https://www.ecb.europa.eu/press/key/date/2014/html/sp140604.en.html

transparency and international comparability as for example International Financial Reporting Standards (later on: IFRS).

Central banks' activities lead to specific accounting considerations and challenges, as for example ownership of BIS shares and treatment of foreign exchange gains or losses.

In principle, 4 general types of reporting frameworks can be identified, used by most of the Central banks in the world (Finnegan M., Schickner D., Smith R., 2012).

- IFRS
- IFRS based
- ECB accounting guideline
- Local GAAP or specific legislation

More and more central banks are adopting IFRS standards, nevertheless banks often use IFRS as a basis of reporting, when special local legislation gives them chance to choose appropriate accounting or reporting framework.

The ECB Accounting Guideline "shall apply to the ECB and to the NBCs[3] for Eurosystem accounting and financial reporting purposes." The ECB Accounting Guideline is proper example of a framework that arises from specific central banks legislation and as it is declared in the rules, is used by all Eurosystem Central Banks.

The classification of financial instruments, held by central banks varied widely according to the adopted framework, but measurement of the instruments is mostly similar and consistence across central banks.

According to the IFRS, loans and receivables are measured at amortized cost, unlike ECB rules, where loans are measured by nominal values.

One of the main problem and major difference in central bank accounting reporting is the recognition of unrealized results (gain or losses) on financial assets or liabilities.

[3] NBC means the national central bank of a Member state whose currency is Euro.

According to IFRS unrealized gains and losses on FVTPL[4] and hold for trading assets are including in profit and loss. Unrealized gains and losses on available-for-sale assets and financial instruments are recorded in other comprehensive income, except for foreign currency differences on monetary assets and impairment. So reporting of unrealized results according to IFRS has reflection on the statement of gains and losses of central bank in actual year.

Foreign currency assets and liabilities make up significant part of central banks' balance sheet, so the accounting treatment of gains and losses on those instruments requires special accounting policy.

Two approaches is known for treatment unrealized results from foreign currency fluctuation – income approach and liability approach. Under the income approach, banks generally present realized and unrealized foreign exchange gains and losses in the income statement. However, if a bank applies IFRS, then the accounting for foreign exchange translation on non-monetary items requires the remeasurement to follow the instrument – i.e. for an available-for-sale asset that is revalued through other comprehensive income, any change that relates to changes in foreign exchange rates is also recognized in other comprehensive income.

According to the liability approach, foreign exchange liabilities are recorded in a balance sheet liability account. As liability approach is mainly driven by ECB Accounting guidelines, there are instances, when gains and losses are not treated symmetrically. Unrealized gains on the foreign currency are recorded as liabilities in the revaluation account, while unrealized losses in excess of gains are recognized in net income.

In other cases of ECB and Eurosystem, which, as already mentioned, has unique statutory power to create its own accounting rules, framework the recognition of unrealistic results are asymmetric (Schwarz C., Karakitsos P., , 2014): unrealized gains are sent to a revaluation account, when unrealized losses directly affect the profit and loss account if they exceed any

[4] Fair value through profit or loss. IFRS rules for classification of financial assets are stricter than rules from ECB guideline

related exciting revaluation account balance. (This applies to both fair value measurements and foreign exchange fluctuations).

There is indeed some pros and cons of usage IFRB by central banks. As disadvantage is considered (Mandel M., Zelenka V. , 2009)the fact that rules for unrealized results in IFRS is processed for commercial entities based on going concept to give clear picture of their cooperation to internal and external users. In case of central banks, profits are not the main indicator of successful work, moreover, central banks' management are not paid according to the institutions' financial results. In most cases, central banks main aim is clearly given by law and it is more reasonable to evaluate central banks work by fulfilling those aims. As a cons we can define the fact, that often Central banks trade on financial market and they issue treasury bonds. In this case investors must be eligible to judge issuer according to standard steps, which contain evaluation of financial results of issuer institute.

However, we often meet view that analyzing central banks as a corporate financial entities, discussing their financial performance, accounting rules is overwhelming and at the end, it is not important at all. For example, Vítek Constancio, vice president of the ECB, at the fourth ECB conference on accounting, financial reporting and corporate governance for central banks proclaimed: "we should never forget that central banks exist to conduct policies of price and financial stability and must be judged by their success in ensuring those goals for the general welfare of our societies."

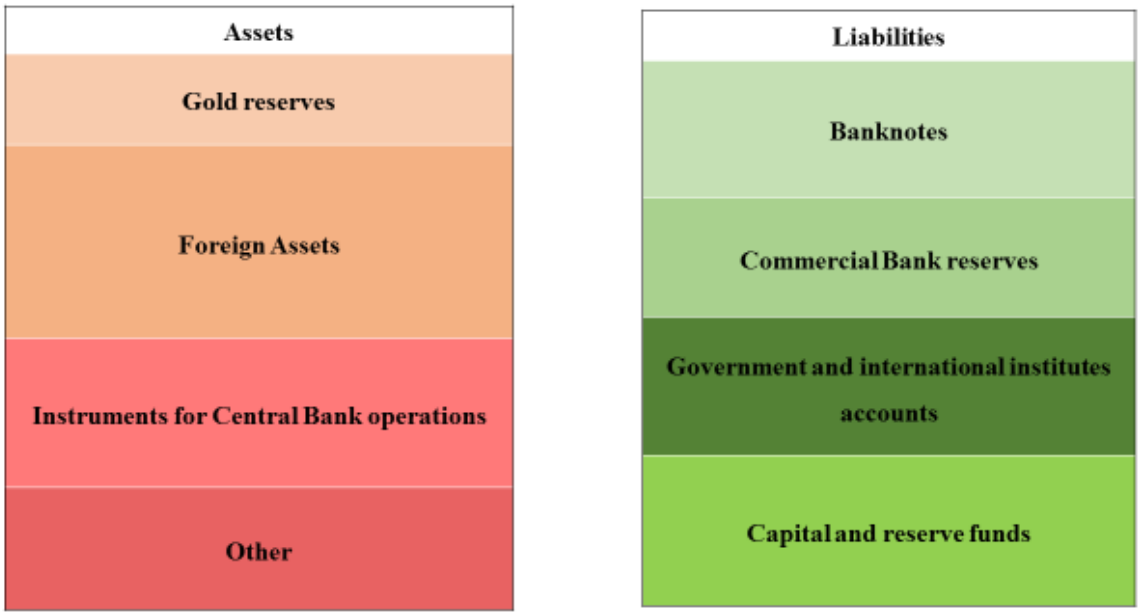
1.2 Balance sheet of Central banks

Balance sheet is statement of assets, liabilities and capital for firms and other organizations at a particular point of time. Balance sheet shows organizations disposal properties in the assets side and on the liability side is shown, how the property is financed. Balance sheet is very important statement for analyzing businesses' financial situation.

Balance sheet is also important for non-business entities. A central bank's balance sheet shows its financial position by summarizing its assets, liabilities and equity. Main difference of balance sheet of central bank from the one of corporation is that currency in circulation is

a liability for central bank. Actually, central bank can easily increase its balance sheet without any costs simply by creating new money.

Table 1 Stylized balance sheet of central banks



Source: Garreth Rule, understanding the central bank's balance sheet, Bank of England - Handbook 32, authors modification

For the fully understanding of monetary policy, one should fully understand the structure and composition of central bank's balance sheet. Balance sheet plays critical role in performance of monetary policy. Recent changes in central bank's balance sheet due to financial crisis has reopen interest to this phenomena. Analyzing of whole balance sheet of central bank can be helpful in clarifying into the goals of central bank - is it inflation targeting, an exchange rate targeting, or post-crisis period, when central bank tries to respond actual requirements of economy.

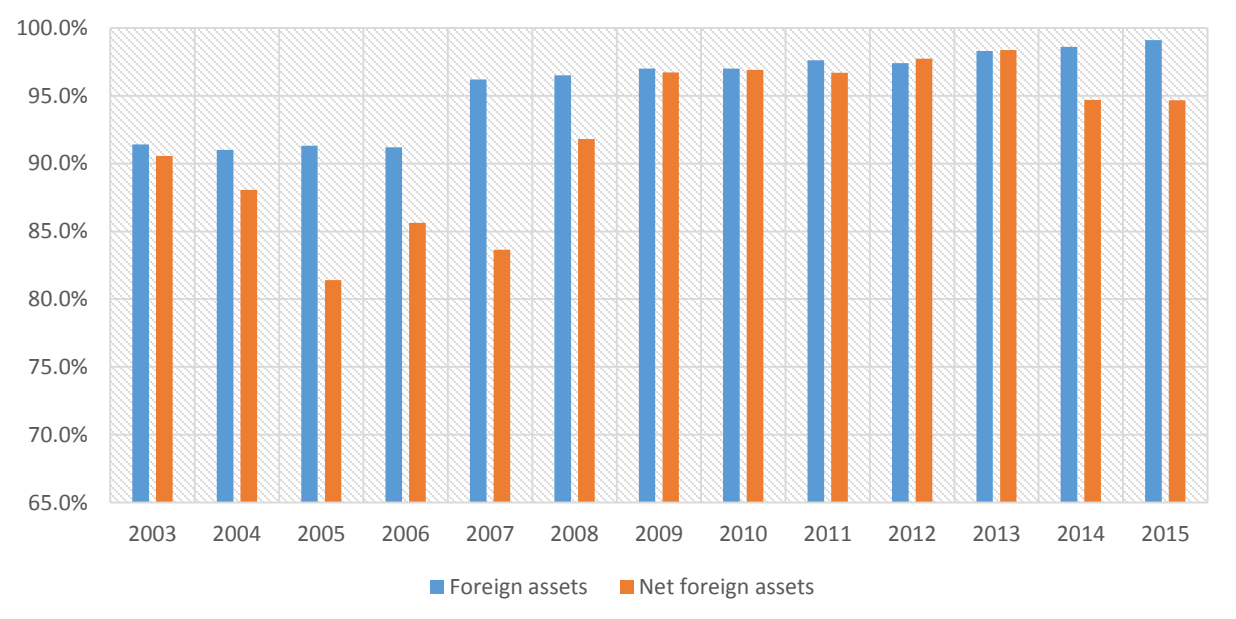
1.2.1 Assets

Historically, **gold reserves** played key role in central banks operations and they had great reserves of gold in their assets. 7-8 of January in 1976 gold was demonetized by Jamaica agreement. The agreement withdrew the status of the IMF and all references to gold and replaced it and its core functions with SDR whose dollar value is posted daily on the IMF website. Nowadays gold reserves play miserable role central banks operations and

consequently its share in balance sheet is very small. One of the reasons, selling out gold reserves by central banks, for example by Czech national bank, was that gold was unprofitable assets and they cared losses.

Foreign assets (liabilities as well) are those dominated in foreign currency. Main form of foreign assets today are foreign exchange reserves. Central bank needs them for different purposes including interventions, the need to meet external debts and to cover trade balance. Nowadays, in a lot of cases foreign exchange reserves have the greatest share on central banks' balance sheet, for instance in Czech republic, see figure 1. Very often they became source of unrealized profits or losses, as appreciation (depreciation) in home exchange rate cause decrease (increase) in value of foreign exchange reserves. The most liquid assets central banks keep on their nostro accounts. They invest in other international monetary authorities bonds or buy state bonds of foreign countries. Currency mix of foreign assets in highly depend on monetary policy objectives and economical partners of the country.

Figure 1 Ratio of foreign and net foreign asset to total balance sheet in Czech Republic



Source: Czech National Banks annual reports..

Instruments for Central bank operations can take a variety of forms. Instruments to supply liquidity on the market including both active and passive operations. Active operations could be defined as operations open for the wide range of counterparties, initiated

from central bank (Open market operations, for instance). Passive operations are initiated by commercial banks and are conducted bilaterally between commercial bank and central bank. Central bank instruments are characterized by different range of maturity. Central bank can settle outright purchase of long term assets or can offer to bank system overnight repo of securities. Character of central banks' instruments for operations is determined in what kind of system central bank operates, namely – if there is shortage or surplus of liquidity in banking system.

When central bank inject liquidity in the market, so lands to the banking system, it affects asset side of central banks' balance sheet. When central bank lands to bank unsecured, in its balance sheet appears claims on the commercial bank. But most trades between central bank and commercial banks have secured character. For the purpose of risk management and avoidance of future losses from the trade, central bank takes collateral (in this kind of trade central bank faces market and credit risk).

Collateral takes important place in central bank operations and at the same time they play important role in our analysis, as they could became one of the source of central banks' losses. Detailed discussion about collateral will take place in later chapters.

In many countries, Central bank plays role of the **banker of Government**. If over time, government cannot cover its expenditures by taxation, landing on financial market or from commercial banks, central bank will land it to cover fiscal deficit. There is many examples in the history, when this direct monetization of government debts led to the high inflation and poor macroeconomic outcomes, as a result in many country it is outlaw for central banks to monetize government debts. The Maastricht treaty includes such a clause as well.

Other assets combine all the elements of central banks' balance sheet which do not appear in the components discussed above. Generally central banks' own investment portfolios, some other property as buildings, expensive hardware and software etc.

1.2.2 Liabilities

In most countries Central banks are in charge of issuing **banknotes** in circulation. Even more, they are the only institutions who has right to issue banknotes. Banknotes in circulation are held by commercial banks in vaults or in automatic teller automats (ATMs) or by the wider

population. We should notice that banknotes printed but held by Central banks are not considered as notes in circulation (Garreth R., 2015).

Banknotes are supplied on demand. They enter the economy through commercial banks. Short term demand for banknotes is volatile and often linked to the seasonal factors, holiday's etc. volatility can be observed during the month, week or even day. Yet long term trend is one steady linear growth. In long run this growth of demand is connected to growth in nominal gross domestic product (GDP). Over time as value and volume of payments increase, that causes increase in demand for banknotes. Other factors that influence the long-run demand for banknotes are cost of opportunity of holding cash and payment technologies. Very interesting aspect in money demand creates credibility and confidence in the central bank. If the general public has limited confidence in the central bank to maintain the value of currency, then they try to use other ways to settle transactions. The most common manifestation is dollarization.

Commercial bank reserves are commercial banks' accounts hold at the central bank. Together with banknotes reserves are the most liquid, risk free assets in the economy. Commercial banks reserves and banknotes create **monetary base** in economy.

Commercial bank reserves could be grouped into two big groups: required reserves and free reserves (Gray S., , 2011). Many central banks oblige commercial banks to hold minimum reserve requirement against their liabilities, in the way that depositary institutions are required to have certain amount of reserves on their account at the central bank. The balance of required reserves could be set for one specific point of time, on average over the period or at all times.

There is several reasons, why Central bank imposes required reserves.

- *Monetary control:* required reserves can be employed for monetary policy if they are unremunerated or remunerated by interest rate, lower than prevailing market rate. This situation, which is normal for most countries, creates deadweight loss on commercial bank lending. To cover the lost, commercial banks set higher lending rates or lower deposited rates. Required reserves are effective enough mechanism for central banks to control spread between deposit and lending rates.

Usage reserve requirements as a monetary policy tools fell out of favor many years ago. Effect of varying reserve requirements are equivalent to altering interest rates. Aiming to avoid confusion central banks decide to use single instrument. Still, required reserves remain their place as a monetary policy tool used for different purposes.

- *Liquidity management* if averaging[5] is allowed, that creates very effective way for commercial banks to manage their short term liquidity. The ability to vary reserve balance every day allows banks to trade on the market late-day that potentially reduces money market volatility. Averaging is especially effective, when central bank due to different reasons is not able to forecast accurately all flows across its balance sheet, since averaging creates an intertemporal liquidity buffer to offset errors in the central bank's forecast.
- *Revenue purpose.* Reserve requirement can also be used for revenue purposes by central banks. If reserves are unremunerated, this balance can be invested by central banks that generates revenues for them. Nowadays, most required reserves held at central banks are remunerated by very law interest rate. For instance, in United Kingdom commercial banks over a certain size are required to hold small unremunerated balance at the Bank of England, known as Cash ratio Deposit. (Garreth R., 2015)

In addition of required reserves, commercial banks can hold free reserves at central banks. Free reserves can be described as reserves that do not contribute to the fulfillment of reserves requirements. In most of the countries free reserves do not pay remuneration, so free voluntary reserves are not very attractive, commercial banks hold them for short term liquidity management and they are nearly always very small. Existence of wide level of free reserves is always result of central banks' activities, in this case we meet excess free reserves.

As I have already mentioned, central banks play role of the banker of government. Government, as well as international financial and non-financial institutions can have their

[5] "Averaging" means that a bank's average end–of–day reserve balance over a given period (the reserve maintenance period, RMP) must be equal to or above the required level; but that on any individual day it can be lower or higher. (Gray S., , 2011)

accounts in central banks. **Governments and international institutes' accounts** appear as central banks' liabilities in their balance sheet.

Central banks carry, as private corporations, **capital** in their balance sheet and similar to them capital buffer becomes the channel to absorb generated losses. Unlike to the commercial banks, capital of Central banks is not subject of regulatory rules. In contrast with Central banks, commercial banks are forced to hold capital buffer proportional to the size and riskiness to their lending activities.

Determination of adequate level of capital is one of the most important question of my thesis. For the first sight, it seems that commercial entities and central banks' capital in balance sheet is similarly built, their ultimate goals vary significantly. When private sector is focused to increase shareholders value, central bank is concentrated on their monetary policy goals. Theoretically, we can say that central banks do not need capital, but most of the governors of central banks say that right level of capital is crucially important for central banks. How can something that seems not to matter in theory be so important in practice?

Monetary policy goals can create situation, where it may be socially optimal for central banks to lose money or take greater risk. One example can be, recently very popular Quantitative easing, which seemed to be the central banks' optimal decision during resection or depressed growth of economy. A mark of success of such a programme is recovery of economy. Despite the financial loss it is socially optimal for central bank to undertake this programme to meet monetary goals and support economy growth. So the question, "do central bank need capital?" will be observed during whole my thesis and we will come back to this question several times with more detailed explanation.

The past eight years were tough economic period for financial markets and in many times central banks had to step in with unconventional measures to ensure stability and provide liquidity to the system.

Importance of balance sheet was emphasized during the global financial crisis. European Central bank proclaim that during the financial crisis central banks activities around the world moved beyond the traditional framework and monetary authorities deployed central banks' balance sheet as a tool of monetary policy.

In meeting of challenges of global financial crisis in 2007, the world's leading central banks have deployed non-standard measures largely revolving around changing the size and composition of their own balance sheets. (Curdia V., Woodford M, 2010) Quantitative easing performed by Federal Reserve Bank, European central bank, Bank of England or by Bank of Japan. As a nonconventional measure could be considered foreign Exchange interventions conducted from Czech national bank, or People's banks of China.

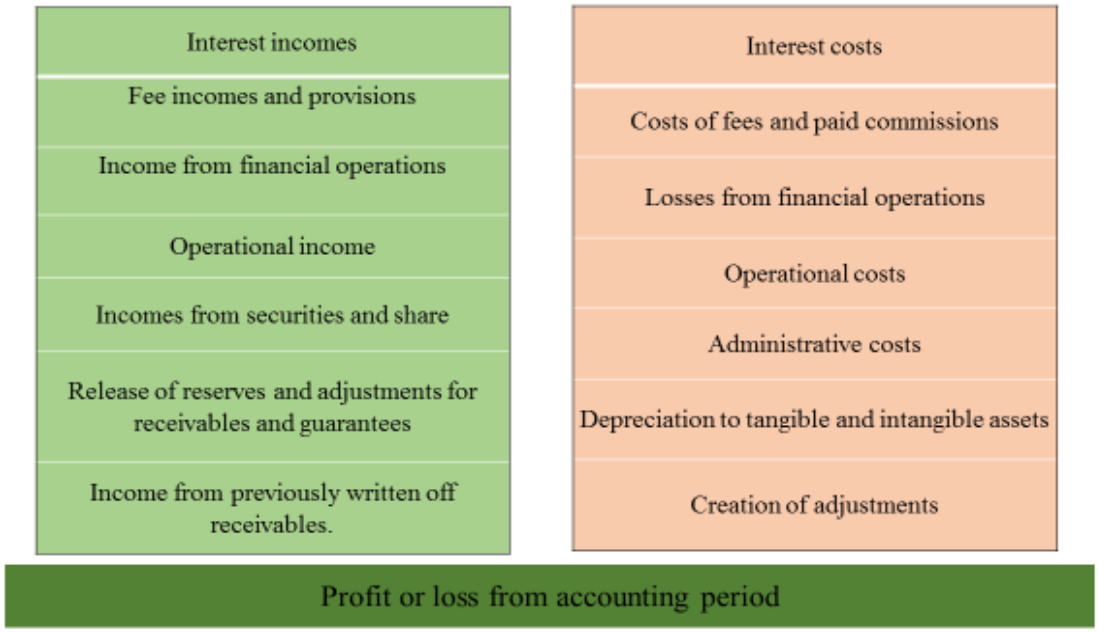
1.3 Statement of gains and loss

The profit and loss statement, called income statement in USA, shows the profit or loss of the company, made over the period of time. Central bank's income statement provides information about its profitability or unprofitability. This information can be used for better understanding how economic resources have been consumed or increased by central banks. However, we have already mentioned, that central banks profit is an inappropriate measure of central banks' performance. This however, do not guarantee, that losses accumulated by central banks can be ignored and that, they do not threaten institutional credibility, independence and ability to meet monetary goals. Main goal to discuss and describe statement of income and expenditures is to understand how monetary policy operations influence on profitability of central banks and learn about courses of profit and loss of central bank.

To analyze Statement of gains and loss, sources of profit or losses, Czech national bank's balance sheet will be described by components in the next text[6].

[6] For Income statement of Czech national bank, see appendix 1

Table 2 Stylized statement of profit and loss



Source: Author

Entries of income statement can be divided according to connection to monetary policy of central bank and from the other side, to operation of central bank as a business subject.

Salaries of employees, social and health insurance, depreciation of tangible assets are standard components of income statement and they are not connected to the special purpose of existence of central banks to provide monetary policy and fulfill its goal, often set by law.

What makes central banks income statement special are components related to monetary policy and those profits or losses, that are connected to implementation their policy.

First item, we meet in central bank's statement of gains and losses is income/loss from securities held by bank. Type of securities, held by central banks are determined by policy and goals of monetary policy. Central banks can invest in Treasury bill, long term state bonds, or they can diversify their portfolio with bonds and securities, issued by international institutes.

According to Czech national bank, financial operations can have huge impact on profitability of central bank. Under financial operations they mean revaluation of foreign exchange reserves. Foreign exchange reserves make up a considerable part of balance sheet of most central banks nowadays. Holding of foreign reserves is directly related to the monetary policy, central bank choose to follow and rich the target, they undertake. Level of currency reserves are defined by different factors of national economy, by need to sterilize foreign capital inflows, especially speculator capitals etc. Central banks Reserves act as a shock absorber against factors that can negatively affect a country's exchange rates and, therefore, the central bank uses reserves to help maintaining a steady rate.

Revaluation incomes/losses can have another character than the one from foreign exchange reserves. As the central banks function often causes unmatched structure of assets and liabilities, this create gap for large valuation gains. Main question in this case is accounting framework for central banking, in most of the cases, revaluation is recognized as an income before realization and it is always recognized in income statement, if revaluation cares losses.

Very important item in income statement is operational incomes/losses. According to Czech National Bank, it includes income from issuing currency and costs, related to this activity. Central banks are only institutions with monopoly right to issue currency into circulation, which means, they have power to create zero or very low cost liabilities, so there is opportunity for central banks to reinvest them with higher market interest rate. The same effect have commercial banks' reserves. With currency, banks' unremunerated reserves are the most profitable items in central banks' balance sheet. Even if they are remunerated, generally interest rate is very law.

In many countries, central banks care responsibility for stability of financial system. They play role of supervising authority on financial market, manage payment system for economy. For this activities central banks get provision and different fees. Provisions and fees can be grouped together in another component of income statement.

Even if we prove that income is not proper measurement of central banks' performance, it still plays very important role. Firstly, some central banks are joint-stock companies, so there are private interests in their profitability and secondly, incomes are the safest sources to cover

losses of central banks, otherwise, in many countries, they are covered from country budget. That could create problems for independence of central banks.

To summarize, balance sheet structure, central banks assets, their quality and way of financing defines financial performance of central banks. Balance sheet itself is built according to the monetary policy objectives and regimes, central banks decide to deploy.

In the next chapter we will briefly describe monetary policy regimes, their advantages and disadvantages with greater focus on inflation targeting.

2. Monetary policy

Monetary policy is the process by which monetary Authority of the country controls supply of money, often targeting the inflation rate or interest rates in economy to ensure price stability in the economy and general trust in currency (Bordo D.M., Schwartz J. A, 1997). In most of the countries, monetary authorities are central banks and very often monetary policy goals are defined by the law about central banks. Monetary policy is maintained through actions such as modifying the interest rate, buying or selling government bonds, and changing the amount of money banks are required to keep in the vault (bank reserves) - those are called monetary policy tools. Between tools and policy objectives there are so called middle goals, though that central banks can meet their long term objectives.

Broadly, there are two types of monetary policy, expansionary and contractionary (Mishkin S. F., 1999).

Expansionary monetary policy is a policy by monetary authority to expand money supply, which boost economic activities by keeping interest rates low to encourage borrowing by companies, individuals and even by banks. Central bank likely use this type on monetary policy when according to predictions, economy is entering the recession. By expansionary monetary policy central bank tries to avoid recession, decrease of aggregate demand and high unemployment.

Contractionary monetary policy slows the rate of growth of money supply or outright decrease money supply in order to control inflation rate in the economy. Effect of contractionary monetary policy is precisely the opposite of an expansionary monetary policy.

Negative effect side of contractionary policy is that it can slow economic growth, increase unemployment and depress borrowing and spending of individuals, households of businesses.

Central banks use a number of tools to shape monetary policy. Open market operations directly effects the money supply through buying (to expand money supply) or selling (to contract it) government bonds. Changes in benchmark interests rates effects the demand for money by changing the cost of borrow – essentially by changing price of money. For example if Central bank targets expansionary monetary policy, it will lower the interest rates in economy. When borrowing is cheap, firms will take on more debt to invest in hiring and expansion; consumers will make larger, long-term purchases with cheap credit; and savers will have more incentive to invest their money in stocks or other assets, rather than earn very little—and perhaps lose money in real terms – through saving accounts. In case of Czech national bank, discount and Lombard rates define price of Automatic facilities, which are instruments of monetary policy to provide or deposit liquidity overnight. Another tool for managing monetary policy is mandate reserves that commercial banks should keep on the accounts at central banks. Central banks try by this tool also for managing risks in banking system, but main point is, that for instance higher reserve requirements put a damper on lending and rein in inflation. FX interventions are purchases or sales of foreign currencies against the Czech koruna on the foreign exchange market by the CNB. They are aimed at dampening foreign exchange market volatility and/or easing/tightening monetary policy. Regular usage of the instrument is strongly depended on the monetary police regime.

To summarize, classic tools of monetary policy are:

- Open market operations;
- Central banks interest rates; (Automatic facilities)
- Required reserves;
- FX interventions.

Those instruments are called conventional monetary policy tools. They are regularly used in normal times. After global financial crisis in 2008, a lot of central banks start to carry non-standard monetary policy, so called unconventional monetary policy. Central banks deployed new tools and instruments, unconventional monetary policy tools to reach the goals.

In recent years, unconventional monetary policy has become more common. This category includes quantitative easing, the purchase of varying financial assets from commercial banks. In the US, the Fed loaded its balance sheet with trillions of dollars in Treasury notes and mortgage-backed securities between 2008 and 2013. The Bank of England, the European Central Bank and the Bank of Japan have pursued similar policies. The effect of quantitative easing is to raise the price of securities, therefore lowering their yields, as well as to increase total money supply. Since the intensification of the financial crisis in September 2008, the ECB has introduced a number of non-standard monetary policy measures that are unprecedented in nature, scope and magnitude with the aim to safeguard the primary objective of price stability and ensure an appropriate monetary policy transmission mechanism (Giannone D., Lenza M., Pill H., Reichlin L, 2011) .

The ECBs response to multi-layered crisis had two measures – standard and non - standard monetary policy approach. Standard measure was to change and adjust key interest rates in economy according to the crisis development, so ECB was decreasing its main interest rates and nowadays we have short term interest rates close to zero. But standard monetary policy was judged as an insufficient because interest rate channel of the monetary transmission mechanism was weakened. This was new challenge for ECB, thus it started to deploy new unconventional non-standard monetary policy. It tried with new approach to restore the appropriate monetary policy transmission. ECBs new policy included lending operations through the fixed rate tenders with full allocation, the provision of liquidity with longer maturity and a softening of requirements on collateral used in trade with ECB.

During the financial crisis, inter banking market was ruined and weakened. The further steps taken by ECB in developing its unconventional monetary policy were linked to ECB's supervisory function on financial market, especially on banking system. Eurosystem started directly intervening in security markets. The first action of this type the Security Market Program (SMP) started in 2010, followed by a purchase programme for bank issued covered bonds launched in 2011 and finally the Outright Monetary Transactions programme announced in September 2012, which actually was primary PIGS[7] countries (ECB press release, Sep.6, 2012).

[7] Portugal, Italy, Greece, Spain.

Credit easing was unconventional monetary policy tool as well, involving the purchase of private-sector assets to boost liquidity. Finally, important in new approach was the use of public communication to ease markets' worries about policy changes: for example, a promise not to raise interest rates for a given number of quarters.

Central banks decision, which monetary tools to be deployed is strongly effected by monetary policy regime (Mishkin S. F., 1999) discuss 4 basic types of monetary regimes in his paper from 1999.

1) Monetary policy with an implicit but not an explicit nominal anchor.
2) Exchange rate targeting
3) Monetary (money) targeting
4) Inflation targeting

A central feature of all the above listed monetary regimes is the use of a nominal anchor in some form. "A nominal anchor is a constraint on the value of money, and in some form it is a necessary element in successful monetary policy regimes." (Mishkin S. F., 1999) The importance of nominal anchor first of all can be defined from its technical viewpoint, a nominal anchor provides conditions that make the price level uniquely determined. This helps to promote price stability, because it helps tie down inflation expectations directly through its constraint on the value of domestic money. With all this, nominal anchor can be described widely as a constraint of discretionary policy that helps weaken the time-inconsistency of monetary policy, so that in long run, price stability is more likely to be achieved. The point is that the population's expectations put an extra limitation (constraint) on policy and so if the policy maker has an incentive to deviate, consistent policy will not be optimal and an optimal policy will not be time consistent. According to Mishkin F. (1999) even if the source of time inconsistency is not within central banks, a nominal anchor may be needed to limit external pressures to pursue overly expansionary, time-inconsistent, monetary policies.

2.1 Monetary policy with an implicit but not an explicit nominal anchor

A regime with an implicit nominal anchor means targeting a certain nominal variable adopted only internally within the monetary authority, mostly within the central bank without being this variable announced explicitly. A prerequisite of successful deployment of this monetary

policy regime is high credibility of central bank. In recent years several countries, notably the United States, have achieved excellent macroeconomic performance without using an explicit nominal anchor such as targeting for the exchange rate, a monetary aggregate or inflation. Absence of explicit strategy does not mean that coherent strategy for the conduct on monetary policy is missing. This strategy involves an implicit, but not explicit nominal anchor in the form of an overriding concern by the Federal Reserve to control inflation in the long run.

As has been emphasized by Milton Friedman, monetary policy effect have long lags. The presence of long lags means that central bank cannot wait until inflation has already lunched to respond or take proper actions. If central bank waited until the concrete signs of inflation appeared, it would already be late to react and try to maintain stable price level, at least without critical tightening of the policy. In order to prevent inflation from getting started, monetary policy needs to be forward-looking and preemptive. Those characteristic of monetary policy is also feature for inflation targeting regime, we will describe later. However, Monetary policy with an implicit but not an explicit nominal anchor, for instance used in United States, differs from inflation targeting in that it does not officially have a nominal anchor and is much less transparent in its monetary policy strategy.

The main pros of this strategy is simply its demonstrated success. The Federal Reserve has been able to bring down inflation in the United States from double digit levels in 1980 to around 3% level by 1991. Since then, inflation has been stable at about that level or a slightly below. But, naturally, this strategy has its cons as well.

A considerable disadvantage of this policy, as it might be described as a “just do it” (Mishkin S. F., 1999) policy regime, is lack of transparency. As a result, central bank is more vulnerable to the time-inconsistency, which can cause short-term objectives at the expanse of long-run ones. Probably the most severe problem with the “just do it” strategy is strong dependence on the preferences, skills, and credibility of the individuals in charge of the central bank. In 1980th Federal Reserve Chairman Alan Greenspan and other Federal Reserve officials have emphasized forward looking policies and inflation control with great success so far. The FEDs prestige and credibility have risen accordingly. But the FEDs leadership is

not permanent, it will change and there is no guarantee that the new team will be committed to the same approach.

2.2 Exchange rate targeting

Targeting the exchange rate in a monetary policy regime with a long history. Under the exchange rate targeting regime, the central bank tries to ensure nominal exchange rate stability vis-à-vis the currency of a so-called anchor country via interest rate changes and direct foreign exchange interventions, thereby "importing" price stability from the country. It can take the form of fixing the value of the domestic currency to a commodity such as gold, the key feature of the gold standard in its historical form. More recently, fixed exchange-rate regimes have involved fixing the Value of the domestic currency of the countries with low inflation and large economy. As an alternative some countries adopted a crawling peg which allows domestic currency to be depreciated so that domestic inflation can be higher than that of the anchor country.

Exchange rate targeting has several advantages. First it is simplicity and clarity, exchange rate targeting is easily understood by the public. Nominal anchor of exchange rate targeting fixes the inflation rate for international traded goods, and this directly contributes to keeping inflation under control. Third, if central bank is credible and their monetary regime e.i. exchange rate targeting is credible, than domestic inflation expectation is directly linked to the inflation rate in the anchor country to whose currency it is pegged. An exchange rate targeting provides an automatic rule for the conduct of monetary policy that avoids the time inconsistency problem. If there is tendency for the domestic currency to depreciate, than monetary authority starts tightening monetary policy or if there is tendency for domestic currency to appreciate, expansionary monetary policy takes place.

Thanks to all those advantages, exchange rate targeting was effectively used to control inflation in industrialized countries. In late 1980th both France and United Kingdom used exchange rate targeting to reduce inflation by tying their currency value to German mark. This monetary regime has also been used to lower inflation in a short time in developing countries. A good example has been Argentina, which in 1990 established a currency board arrangements, requiring the central bank to exchange U.S. dollar for new pesos at fixed

exchange rate of 1 to 1. From the first sight, Argentina's currency board was quite successful. Inflation at over one thousand present annual rate in 1989 fell under 5% by the end of 1994. But overall result of exchange rate targeting and Argentina's monetary policy was deep economic crisis.

(Obstfeld M., Rogoff K, 1995) Emphasized the second problem of exchange rate target, it leaves countries open to speculative attacks to their currency. In this circumstances it becomes harder for the country monetary authority to keep exchange rate fixed to the anchor countries currency. The model becomes extremely hard to remain in transition economics and Czech Republic is good example of this, which in 1997 moved from exchange rate target to inflation target.

The excess of capital inflows would expand the money supply if the central bank intervened to defend the exchange rate. And in exchange rate targeting they have obligation to defend the exchange rate. If the monetary effects of this interventions were sterilized (and this is common practice in these economies), the pressure of higher domestic interest rates would remained and encourages more capital inflows. Some countries tried to slow capital inflows with capital controls but this politics were of limited effectiveness. The inflows in the Czech Republic case were caused by the large interest rate differential and by the high credibility of maintaining the gap. In the end, for the purpose of domestic inflation pegged exchange rates were replaced with market rates and other nominal anchors. According to Mishkin (1999) the Czech Republic's exchange rate might have survived with a more appropriate fiscal and monetary policy mix. However he does not suggest neither solution, nor the time horizon, how long this policy could have worked, in case country could save it.

2.3 Monetary targeting

In many countries, exchange rate targeting is not an option because of the country's economy structure and size. Basically these countries are too large or have no obvious country whose currency can serve as the nominal anchor. For example, exchange rate targeting is not an

option for the United States, Japan or European Monetary Union. That is why these countries must look to other monetary policy regimes, one of which in monetary targeting[8].

The monetary targeting regime focuses on the growth rate of a chosen monetary aggregate. It is based on the finding, that in the long term, price growth is affected by money supply growth. A major advantage of monetary targeting is that it enables central bank to develop independent monetary policy with domestic considerations. It allows central bank to set inflation goals independent from other countries and it is more flexible than exchange rate targeting in response to domestic output fluctuation. Like exchange rate targeting, monetary targeting is clear and easily understanding regime for public, so information on whether the central bank is achieving its target is known almost immediately – announced figures and statistics about monetary aggregates are typically published or announced periodically with short time lags. Monetary aggregates also have the advantage of being able to promote almost immediate accountability for monetary policy to keep inflation low and so help constrain the monetary policymaker from falling into the time-inconsistency trap.

We have already mentioned that monetary target regime is based on the finding that in the long term, price growth is affected by money supply growth. A problem or disadvantage, however lies in the choice of an appropriate monetary aggregate to target. Success of the regime is strongly defined by reliable relationship between the goal variable (inflation or nominal income) and the targeted aggregate. If there is instability, so that relationship between targeted aggregate and monetary goal variable is weak, then monetary aggregate targeting will not work. The weak relationship implies that hitting the target will not produce the desired outcome on the goal variable and thus the monetary aggregate will no longer provide an adequate signal about the stance of monetary policy. Thus, monetary policy will not help to fix inflation expectations and be the good guide for assessing the accountability of the central bank.

In case central bank choose right aggregate, another problem is discovered. Targeted monetary aggregate must be very well controlled by the central bank. If not, the monetary aggregate may not provide as clear signals about their intentions of the policymakers and thereby make it harder to hold them accountable. Central banks have right mechanisms to

[8] Some authors describe this regime as money targeting.

control narrow monetary aggregates, but in term of stable, strong relationship, broader monetary aggregates like M2 or M3 are more suitable for the regime.

In the 1970s monetary targeting was adopted by several countries but its form was quite different from Milton Friedman's suggestion for a constant-growth-rate rule in which the chosen monetary aggregate is targeted to grow at a constant rate.

Monetary targeting in the United States, Canada and the United Kingdom did not prove to be successful in controlling inflation. Main reason is that growing instability of the relationship between monetary aggregates and goal variables such as inflation (or nominal income). By the early 1980s, it has been clear that the relationship between monetary aggregates and inflation (and nominal income) had broken down. But, there was effective implementation of monetary targeting in Germany and Switzerland, these two countries officially engaged in monetary targeting for more than 20 years starting at the end of 1974. The success of monetary policy in Germany and Switzerland in controlling inflation is the reason that monetary targeting still has strong advocates and is under consideration as the official policy regime for the European Central Bank. Otherwise, in 1993 chairmen of US Federal Reserve, Allan Greenspan told congress: "The historical relationships between money and income, and between money and the price level have largely broken down, depriving the aggregates of much of their usefulness as guides to policy." (Dolan J. C, Tatalovich R., Frendreis J, 2007)

The key elements of successful targeting regime are flexibility, transparency and accountability. They play key role inflation targeting regime as well. Thus, Germany and Switzerland might best be thought of as "hybrid" inflation targeting and monetary targeting. Inflation targeting regime is described in the next session.

2.4 Inflation targeting

New Zealand was the first country to formally adopt inflation targeting in 1990, with Canada following in 1991, The United Kingdom in 1992, Sweden and Finland in 1993, Austria and Spain in 1994. Many other countries have recently adopted inflation targeting as their monetary policy regime, majority of them emerging market or low-income economy.

Moreover, a number of central banks in more advanced economies for example, the United States Federal reserve, have adopted many of the main elements of inflation targeting.

In December 1997 Czech National Bank's bank board decided to change its monetary policy regime and switch it to inflation targeting. This decision did not involve any changes in goals and objectives of central banks, defined by law, just the way to meet those goals.

Table 3 Inflation targeting adoption and target rates

Country	Inflation targeting adoption date	Target inflation rate
New Zealand	1990	1%-3%
Canada	1991	2.00% +/-1.0%
United kingdom	1992	2%
Sweden	1993	2%
Australia	1993	2%-3%
Czech republic	1997	2.00% +/-1.0%
Israel	1997	1%-3%
Poland	1998	2% - 3%
Brazil	1999	4.50% +/-2.0%
Chile	1999	3.00% +/-1.0%
Colombia	1999	3.00% +/-1.0%
South Africa	2000	3.00% - 6.0%
Norway	2001	2.50%
Hungary	2001	3.00% +/-1.0%
Indonesia	2005	4.00% +/-1.0%
Romania	2005	2.5% +/-1.0%
Turkey	2006	5.00% +/-2%
Serbia	2006	4.00% +/-1.5%
Ghana	2007	8.00% +/-2.0%
Georgia	2009	5%

Source: http://www.centralbanknews.info/p/inflation-targets.html

Inflation targeting involves several elements (Mishkin S. F., 1999):

- Public announcement of medium-term numerical target for inflation, policy makers to graduate monetary policy in order not to surprise market agents by their changes.
- An institutional commitment to price stability as the primary, long-run goal of monetary policy through achievement of the inflation goal;
- Increased transparency of monetary policy strategy through communication with the public and the markets about the plans and objectives of the monetary policy;
- Increased accountability of the central bank for attaining its inflation objectives.

Inflation targeting has several important advantages. Inflation targeting enables monetary policy to focus on domestic considerations and to respond to shocks to the domestic economy.[9] This regime allows the monetary policymakers to use all available information for determining the best setting for monetary policy and they do not came out only from one variable, as for example money growth rate. Inflation targeting is readily understood by the public and is very transparent.

Because an explicit numeric target of inflation helps to increase in accountability of monetary authority, monetary targeting also has potential to avoid central bank's policy in time-inconsistency trap. But as time inconsistency is mostly developed from political pressure to central bankers to deploy expansionary policy, a key advantage of inflation targeting is that it can help focus the political debate on what a central bank can do in the long run – this is, control inflation – rather than what it cannot do – raise economic growth and employment rate permanently through expansionary monetary policy.

In the long run Central banks can only contribute to raising the growth potential of the economy by maintaining an environment of stable prices. Central bank cannot boost and maintain economic growth only by expanding money supply which is inconsistent with price stability and general economic situation on the country. Even though inflation targeting is based on so called gap models, where policy makers take into consideration product gap and public expectation on interest rates, monetary base and monetary aggregates do not play direct role in specifying of policy, it is still considered that ultimately, inflation is monetary phenomena and central banks have straight control on its development. Prolong periods of

[9] In contrast to exchange rate targeting, for instance.

high inflation is traditionally linked with high monetary growth. In inflation targeting regime, central banks' are primarily responsible to meet inflation target rate, which is considered to be under the direct control of central banks.

Despite the hypocrite approach to price stability, most countries choose to target inflation rate above zero. Inflation rate is calculated from consumer price indices. Decision to target inflation rate above zero reflects monetary authorities concern about negative effects of too low, or particularly low inflation on the real economy. Definitely, after 1930 s deflation is linked to deep recession. Targeting inflation rates above the zero makes periods of deflation less probable. Central banks have generally pursued a flexible form of inflation targeting. That means that rather than focusing on achieving the inflation target of all times, approach emphasizes achieving the target over the medium term – typically over 12-18 month horizon (Inflation targeting in the Czech republic, CNB). This allow policy to be flexible toward long term changes in the economy and the same time act smoothly over the short period.

Another element of flexibility in inflation-targeting regimes is that it allows policymakers to define more specifically, on what inflation targets are based and often offers possibility to exclude negative (and positive as well) "supply shocks" from calculation of inflation rate. Thus central bank target "core" inflation rates. For instance, the price index on which the official inflation targets are based may exclude some combination of commodity and energy prices, indirect tax changes etc. Many inflation targeting central banks has adopted the practice, that in some justified situations they except exceptions from the duty to meet the target rate. Fundamentally, this means to ignore external shock that have short term feature. It concerns negative and positive shocks as well.

Case of the Bank of Canada is good example of this. Shortly, after adopting inflation targeting as a country's monetary regime in 1991, the Bank of Canada was faces with a new goods and service tax (GST), an indirect tax similar to a value added tax, an adverse supply shock that in earlier periods might have led to an intensifying up in inflation. Instead, the tax increase led to only a one-time increase in the price level, it did not generate second and third round increase in wages and in prices that would led to a untiring rise of the inflation rate.

Inflation targeting regime also emphasize importance of policy transparency, policy that is clear, simple and comprehensible and also points out the importance of regular communication with the public.

Inflation targeting could be defined as forward looking policy. Every decision central banks takes today, has influence and consequences in the future. If monetary policymakers want their action has reasonable results and reach their goals, they need public belief in them. Success of inflation targeting regime is absolutely depend on how "well-anchored" public inflation expectations are and also it depends on the credibility of the monetary authorities. On its way, credibility is raised only after transparency and soundness of the institution. Central banks' officials take every opportunity to make public speeches and presentations about their monetary policy and explain what does inflation targeting mean. So, central banks are fully involved in distribution of the information, public needs to know, including distribution different publications such as Inflation report documents or brochures.

All above mentioned channels of communication are used by central bank to explain very important aspects of monetary regime to general public, financial market participants and politicians. Central banks try to inform about:

- The goals and limitations of monetary policy;
- The numeric values of the inflation and how they were determined;
- The economic situation and how the inflation target are to be achieved given the current conditions;
- The reasons from any potential or already given deviation from the target.

With all this advantages, we can clarify some disadvantages and criticism of inflation targeting. The privileged position of the inflation targeting, as a successful monetary regime was damaged during the global financial crisis in 2008, it was blamed for creating the foundation for crisis, because of the lack of soundness of the policy. Some of analytics saw inflation targeting regime as an unsustainable in the beginning of adoption. International monetary fund described policy as "a pragmatic response to the failure of other monetary policy, such as those that targeted the money supply or the value of the currency in relation to another, presumably stable, currency." (Jahan S., 2012)

One common concern about inflation targeting is that it leads to low growth in output and employment. The roots of this concern can be found in so called Philips curve theory, according to which there is tradeoff between Inflation and unemployment. Inflation reduction adversely effects economic growth and employment. Tradeoff, described by Philips curve, was itself declared as a wrong in 1970s. It was argued, that tradeoff exists only in short run. So, once the low inflation target rate is achieved output and employment bounce back to their potential, natural level that cannot be influenced by inflation and monetary effects.

Another topic that has raised important concern about inflation targeting is exclusive focus on inflation rate and ignoring other macroeconomics goals such as GDP or employment growth. In respond of this criticism, there were also proponents of flexible inflation targeting, who held that it was fine to put some weight and importance on GDP growth. This point was emphasized by (Svensson L., 2010) who makes distinction between strict rules of inflation targeting, which aims to meet only inflation rate with no regard of the stability of real economy and flexible inflation targeting with focus on inflation rate and stable economic development as well. But still, some felt that if the definition of inflation targeting was too wide and be stretched too far, it would lose its meaning. In practice, monetary policy is mostly flexible, with the monetary policymakers addressing their actions to meet inflation target and to take care of stabilization of real economy around the normal level. Nevertheless an important criticism of inflation targeting is that an exclusive focus on inflation target rate would lead to very poor economic outcomes and would destabilize the economy when large supply shock appears.

Besides the theoretical pros and cons of the inflation targeting regime, some weak pointes were indicated during hard times of global financial crisis. Jeffrey Frankel, Professor at Harvard University declared in 2012 that the monetary policy regime, known as inflation targeting, evidently passed away in September, 2008 when it became clear, that central banks had been relying on inflation targeting, that had not paying enough attention to asset price bubbles (Frankel J., 2012). This could be the strongest argument against inflation targeting. The burst of the subprime mortgage crisis made it clear that asset bubble had not been paid sufficient attention and that is due to choice of the consumer price index (CPI) as the operational target to measure inflation. The CPI captures only the price level of consumer

goods and services, and does not account for investment items such as real estate, insurance and financial instruments in general. I think, it is important to stress out, that Mishkin (1999) considers CPI approach to measure inflation targeting as an advantage of the regime. While the lack of response to asset bubbles was probably the biggest failing of inflation targeting, another major obstacle was inappropriate responses to supply shocks and terms-of-trade shocks.

Economy is strong and healthier, it monetary policy response to the external supply shocks in the appropriate way. It means, when the world price of its *exported* commodity increases, monetary policymakers should conduct contractionary monetary policy to cause the currency appreciation. But CPI targeting instead tells the central bank to tighten policy in respond to an increase in the world price of *imported* commodities – exactly the opposite than we described before. It is widely suspected that the reason of increasing interest rates in July 2008 by ECB, when the oil price heated almost its historical maximum, was CPI targeting. Oil price are given substantial weight in the CPI, so stabilizing the CPI when dollar-denominated oil prices go up requires euro appreciation vis-à-vis the dollar.

There is another, comparatively, new theory, why inflation targeting fails in modern world. Visabonga Ramangkura, chairman of the Bank of Thailand declared that "inflation targeting is no longer effective because inflation has been globalized." Small open economies are world price takers of local commodities and prices are not determined by policy of a particular country, the source of instability for emerging countries is foreign exchange rate instability and not inflation says Ramangkura in his speech in August, 2012.

An alternative monetary policy regime offered by Frankel (2012) is nominal GDP targeting, a monetary policy targeting a country's value of output for a given year as measured by the prices prevailing during that year. Advantage over inflation targeting is that it focus on volume and on price as well. Nevertheless, according to Mishkin, nominal GDP targeting regime is not transparent. Promote nominal GDP targeting and explain it to wide public is much more difficult that inflation targeting and threaten to credibility of monetary policymakers.

Despite the criticism and failure of the inflation targeting, the regime still has its supporters. Number of countries who adopt inflation targeting still increasing. According the Svensson

(2010), flexible inflation targeting, applied in the right way and using all the relevant information for the forecast of inflation, remains the best practice monetary policy before, during and after financial crisis. However, global financial crisis revealed some serious weaknesses of the regime, such as its lack of response to asset price bubble and inappropriate reaction to supply shocks. The operational target used to measure inflation has proved to be one of the major causes of the regime's failure.

However, our primary goal in not to find the best practice of monetary policy regime, nowadays reality is that, inflation targeting is becoming popular not only in emerging markets, but in advanced economies as well. Generally, the performance of inflation targeting is perceived as positive. Inflation targeting countries seem to have significantly reduced both the rate of inflation and inflation expectations.

In the next chapters, we will discuss, how inflation targeting works, what are the main instruments of central banks who adopted inflation targeting as their monetary regime. In the next sections we will try to find connections and links between inflation targeting and structure of central banks' balance sheet and how this regime contributes or influence to financial performance of central banks.

2.4.1 How does inflation targeting work?

Main aim of this chapter is, firstly to explain briefly how the regime works and then to find out links between inflation targeting and structure of central banks' balance sheet. We mentioned in the first chapter, that according to the balance sheet of central banks we can discuss about its monetary policy. In the second part of the chapter we will arise this question again and try to find out, how monetary policy regime influence of the structure of balance sheet and if inflation targeting creates „productive" base for loss-making balance sheet structure of central banks.

Inflation targeting is straightforward, at least in theory. That means, that monetary policymakers forecast the future development or path of inflation. The forecast is compared with the target inflation rate. The difference between the forecast and the target determines how much monetary policy need to be adjusted. Given the lags in monetary policy effect, an inflation targeting is forward looking policy. Actions must be taken before inflationary

pressure becomes instance. So, there is several very important technical points to make inflation targeting operations successful.

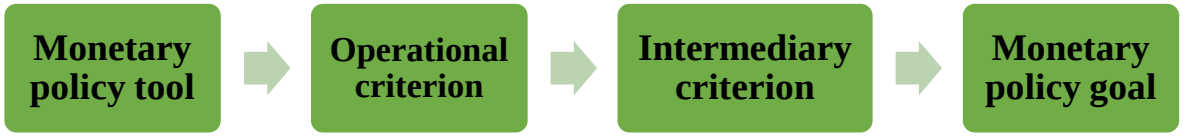
- Establishing quantitative targets;
- Creating quality model or methodology for inflation forecasting;
- Considering lags in monetary policy outcome.

The monetary authorities for successful implementation of any monetary policy regime should have the technical and institutional capacity for setting explicit quantitative inflation target, which will be communicated and explained to wide public and at the same time, monetary authorities should have enough capacity to model and forecast domestic inflation.

Inflation targeting requires strong technical capacity in the central bank to model the economy, understand the transmission mechanism and forecast inflation. Most inflation targeting central banks use a suite of models approach, including statistical and spreadsheet forecasts, structural, macroeconomic and dynamic stochastic general equilibrium models. Some models are based on theory, while others are more data driven. In fact, experience in most inflation targeting countries has shown that using the input from many different models tends to give monetary authorities the most useful information and effective model for inflation forecasting. [5] After establishing the most coherent model with strong theoretical background and data support, central banks must set up an operating procedures' framework, in which monetary policy instruments are properly adjusted to meet the chosen target.

Monetary transmission mechanism to achieve inflation target rate can vary in different countries. The monetary policy transmission mechanism in general is a proses, by which changes in monetary policy instruments lead to the desired changes in the inflation. Transmission mechanism can be described as strongly connected chain as shown on the figure below.

Figure 2 Basic model of monetary transmission mechanism



Source: Půlpanová S. komerční bankovnictví v České republice

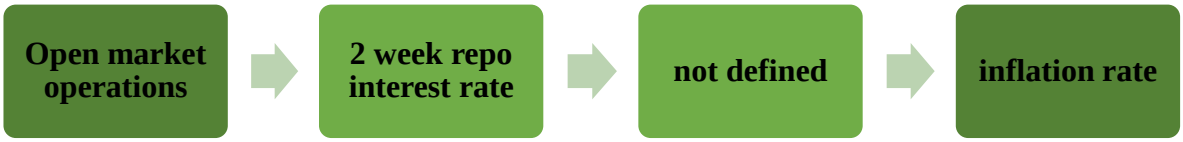
The main characteristic for inflation targeting is to set middle term inflation targeting rate and usage of inflation forecast to conduct right policy in order to meet the focus. For this aim, central banks use monetary policy instruments. By changing those instruments, monetary policymakers try to respond inflationary or deflationary pressures that deviate future inflation from the inflation target. Among the tools used by central banks to achieve their monetary policy objectives is the temporary edition or subtraction of liquidity (reserve balance) to commercial banks via repurchase or reserve repurchase agreements in the open market.

Repos are the most common form of temporary open market operations. Central banks use open markets operations for managing interest rates in economy. Steering interest rates in economy via transmission mechanism causes changes in inflation.

The repurchase agreement (repo) is short term deal between central bank and commercial banks, when central bank borrows money to commercial banks and in return it accepts eligible securities as a collateral. At the same time, the two parties agree to the reserve transaction, when the borrower pays loan back with interest rates and creditor returns the collateral back. For a long time, that was traditional form of repo operations.

In reserve repo Central banks borrows money from primary dealers. A reverse repurchase agreement is the transaction when central bank sells securities to the commercial banks with the deal to repurchase this securities with certain price in the future. Difference between prices is interest paid by central bank on the transaction. Length of the repo agreements varies in different countries according to the financial market needs and development. Thus, central banks set monetary policy interest rates in repo operations and by them, they try to influence short term interest rates in economy. Interest rate channel of transmission mechanism is widely used in inflation targeting.

Figure 3 transmission mechanism in inflation targeting



Source: Authors modeling from Půlpanová S. komerční bankovnictví v České republice

Generally, transmission mechanism process is not straight line and it acts through several channels in the same time. But the main logic, how interest rate channel operates is following: An increase/decrease in a monetary policy interest rate (specifically the repo rate in the Czech Republic) leads first to an increase/decrease in interest rates on the interbank market. This in turn causes banks to raise/lower their rates on credits and deposits. The result is a contraction/expansion of investment activity and aggregate demand and ultimately a weakening/strengthening of inflationary pressures. So, for example, when there are inflationary pressures in economy, central banks increase in monetary policy interest rates, that leads to a weakening of aggregate demand, which is turn causes inflation to fall.

3. Central banks financial strength and policy outcomes

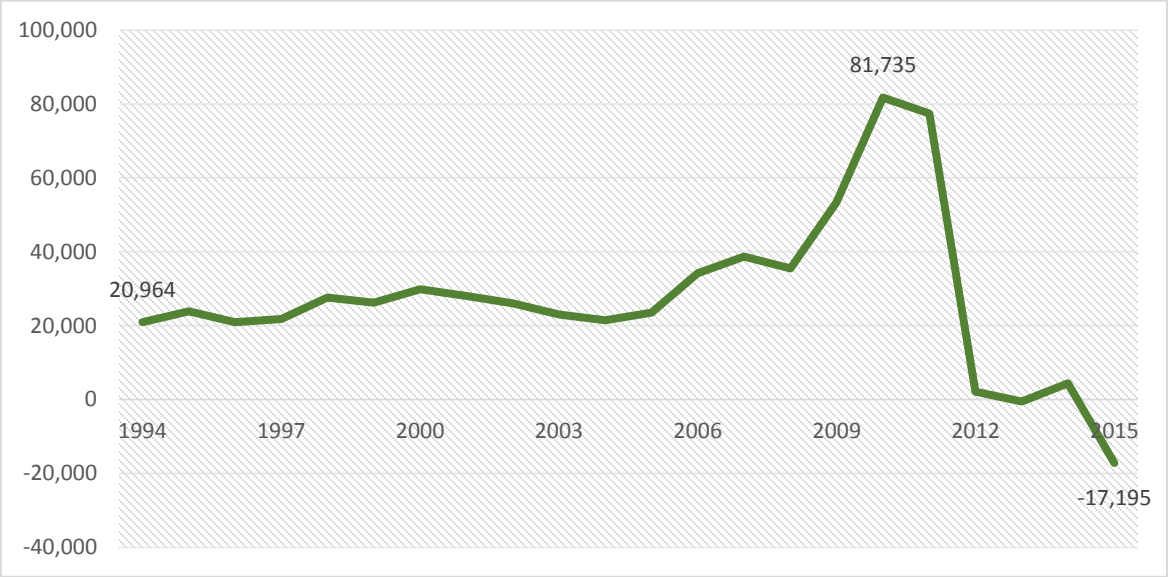
Central banks are very strong institutional entities and play very important role in the country's economic development. Their monetary policy outcomes have direct influence on the stability of economic growth and sustainable development of financial markets. No matter, what kind of monetary regime they deploy, the main objectives of monetary authorities is price stability. In some countries they are equipped with dual mandate, as for example in the United States, where central banks objectives are price stability and low unemployment. In the Czech Republic, for instance, central bank is explicitly responsible for the price stability but at the same time, it takes care on financial market stability. Thus, Central banks performance has long term consequences on the country development as a whole.

As we defined in the hypotheses of this thesis, main aim of the paper is to argue, why central banks strength is relevant for policy credibility. There are several reasons, why this issue was not clearly analyzed or why financial performance of central banks was considered as the less important in the past.

First, central banking is considered as a profitable sector. Many Central banks, including those of the Group of Seven (G-7) prior to the foundation of the ECB, had been highly profitable for a long period. Fed has made a significant profits ever since 1915 (Stella P., Lonnberg A., 2008).

Second, and the key reason is that central banks have an unlimited costless ability to create money to pay their financial obligations, thus they are not required financial strength, as for example commercial banks.

Table 4 FED's comprehensive income from 1994 to 2015 in millions



Source: FED, income statements

Those explanation appear as a strong reasons to ignore central banks financial performance. At the end of the day, public is more interested in CBs' ability to meet its goals. Nevertheless, if we ignore insignificant financial costs to issue money and focus on the result of this activity, we can conclude, that central banks cannot both achieve the monetary policy objectives and at the same time create an unlimited amount of money to cover its' financial obligations.

Another problem, that may appear is government participation in central banks financing, in order to cover the losses. In this situation, central bank might become financially dependent on the government. That could constrain operational independence of central bank and threaten its credibility among wide public. Credibility is essential in influencing expectations.

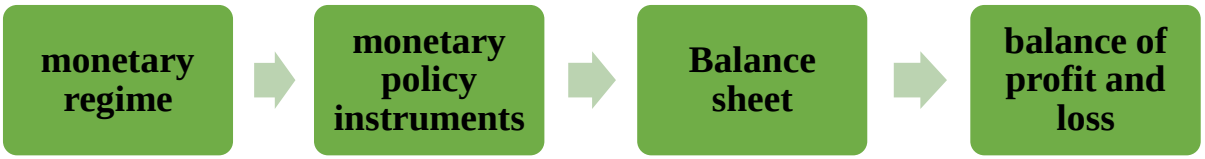
In this section, we will focus on two main questions, what are the sources of loss for central banks' i.e. how central banks can accumulate losses and the second question is, what are the consequences of unfavorable financial performance of central banks? Basically, why losses are problem and why central banks should pay attention on their financial results?

3.1 Sources of losses

Financial performance of central banks is determined by several internal or external effects, such as objectives of the monetary policy, instruments central banks use to reach their goals,

level of their operational independence and financial market development as well. Balance of profit and losses is directly influenced by the structure of balance sheet, which itself is determined by the monetary policy instruments and monetary policy regime. Actually, there is quite simple chain from monetary policy regime to the statement of loss and earnings, as showing picture below.

Figure 4 Communication channel between monetary regime and financial performance of CB



Source: Author

This chain analyses economic source of the central banks' losses, but it ignores potential fiscal or quasi fiscal reasons. In the ideal world, we could have ignored fiscal and quasi-fiscal operations (QFO) as a reasons of losses, but it is often case for transition economies and I consider, it is important to be also discussed along with economic reasons.

(Markiewicz M., 2001) Defines QFO as operations undertaken for public policy reasons by unites outside the definition of government. Those unites include central banks as well. As noted by (Stella P., Mackenzie A. G, 1996) central banks can affect the overall public sector balance without affecting the budget deficit.

The main categories of QFOs for monetary policy authorities are:

- Subsidized lending, loan guarantees
- Rescue operations

Subsidized lending is typically extended on the request of government or parliament and main feature is that interest rates of such credits are lower than market interest rates on the market. Basically, every case, when central banks give credits to certain entities, remunerated under the market interest rates, is classified as fiscal subsidize. Mostly, financed entities are governments. The practice to grant government with the cheaper credits, leads to decrease central banks profit, which itself undermine central banks independence. Buying

government bond in the primary market by Central bank or other ways of monetization debts are also considers as QFOs.

The scope of QFOs undertaken by central banks depends on the relationship between central bank and government. Typically, central banks plays the role of the fiscal agent of the government, but when the independence of central banks are low or financial market are not enough developed, then lending the government is widely used practice.

The most visible and expensive form of QFO is rescue operations. These can take the form of addition of capital to a troubled institutions, of an assumption of non-performing loans or even for example exchange rate guarantees. When those actions are taken by central banks, it is assumed that they have quasi-fiscal character. In this story, very important role plays rescue of banks. There are different opinions about central banks' intervention in banking system to save commercial bank from bankruptcy, but everyone agrees that central banks must not finance insolvent banks. To rescue an insolvent commercial bank can become source of huge losses and inflationary pressures as well. Nowadays, bank rescue operations are often linked to deposit insurance schemes. When deposit insurance is widely used and well developed scheme, then pressure to central bank to rescue commercial banks are a little bit less.

In the different references, QFOs are discussed as a historical form of sources of losses and nowadays, importance of economic sources is underlined. But financial crisis in 2008 arise question of QFOs taken my central banks again. Modern forms of QFOs are related to the supervision role of central banks and the lender of the last resort. For example ECB's activities in crisis. ECB normally did not buy bonds, but use it as a collateral in the repurchase facilities. But facing sovereign debt crisis, ECB changed its policy and started purchasing bonds, issued by weaken states of monetary union. Main objective was to strengthen portfolio of commercial institutions and banks, thus doing this assumes the risk of deterioration of balance sheet of ECB.

The Bundesbank explains, that considering all the rules and technical requirements, the outright purchase and sell of the securities on the market (outright monetary transactions-OMT) belongs to standardized open market operations within the Eurosystem's monetary policy framework. However, these transactions were launched as a respond to global

financial crisis to maintain sustainable position of structural liquidity of the financial systems. Within OMT programme, ECB purchased state bonds from Spain, Italy. Quality and rating of those bonds were controversial, that means, ECB took risk to worsen quality of its balance sheet and face financial losses in future. Thus quasi fiscal operations can be considered as a reality in the modern monetary policy.

(Markiewicz M., 2001) Summarize, that permanent losses of central banks' indicate the existence of QFOs. Otherwise central banks do not make large losses in the stable macroeconomic situation. QFOs played significant role in accumulated huge losses by central banks in Latin America countries in 1980s.

Ignoring fiscal reasons of the losses, we have already emphasized, that central banks should operate at profit. Nevertheless, number of central banks have faced large losses and accumulate negative capital over the years.

In this part we will analyze the economic and operational losses of central banks, which naturally raise the question, if central banks can successfully conduct their monetary policy.

Economy source of losses are strongly influences by monetary policy objectives, instruments and by balance sheet of central bank. In this part, we can use balance sheet approach for better understanding of losses or potential losses of central banks. Economic situation and financial market development are also determinant features of balance sheet structure and therefore for central banks profit or losses.

Our balance sheet model is quite general and can be applied in different countries, but still is suits the best to the open transition economics in convergence.

Recently, public attention has started to focus on the losses related to the high and growing foreign exchange reserves in many countries. If we decompose central banks' balance sheet into its local currency and foreign exchange parts, then it is clear, that net foreign exchange assets are covered or financed by liabilities, denominated into domestic currency and by own capital. From corporate point of view, central banks have huge open long position in foreign exchange and they face large currency risk. Nowadays central banks are more vulnerable to revaluation losses, volatility has risen as central banks have accumulated large volumes of

foreign exchange reserves, in absolute terms and as a proportion of their assets. Open long position can become serious source of losses as soon as domestic currency appreciates in **nominal terms** (Cincibuch, M., Holub, T. and Hurník J, 2009).

Own capital with the currency issued by central banks are considered as non-interest-bearing liabilities. Other liability unites of balance sheet, such as open market operations, commercial banks' current accounts or other remunerated claims carry some interest rates. Consequently, losses can arise once significant part of net foreign currency assets are covered by interest-bearing liabilities in a situation when a total yield on foreign exchange assets are lower than their financial cost.

Risk premium is another key parameter that can impact central banks statement of profit and loss. Risk premium can impact through two channels and its effect is ambiguous and is determined by the concrete structure and size of balance sheet entries. First, high risk premium increase domestic interest rates and contributes to increase earnings from seignoirage and from own capital. So, central banks financial performance improves. From the other hand it leads to losses on net foreign exchange assets, thus depressing profits.

To sum up, experiences from different countries have arisen questions about central banks losses and therefore about negative capital. Sources of losses are divided into two big group – quasi fiscal operations and their negative impact on statement of profit and loss and economical sources of losses. Therefore first one was considered as a historical experience and modern literature is focused on former one. Thus, global financial crisis once more emphasized the issue and problem of quasi fiscal operations taken by central banks.

Still, there is open question, why losses or negative capital is problem for central banks. We've mentioned several times, that financial performance of not primary objective of monetary authorities. Hence, we are interested, if negative capital and unfavorable financial performance can threaten monetary effectiveness and performance of central banks'? Analysis of financial losses are not particularly useful unless they have some correlation with central banks' policy performance. Next section of the thesis offers theoretical basic, about relations between losses and policy performance, why central banks' losses are problem and how they can threaten to achieve of monetary policy objectives.

3.2 Is central banks financial performance sensible concept?

"If credibility is important for the success of monetary policy, the central bank must be financially strong." (Zelmer M., Johnson G, 2007) In our definition, central bank is financially strong when it is relatively unconstrained by its financial performance in policy decisions.

While exploring deeply if financial performance of the central banks' impact their monetary policy achievements, it is worth mentioning that in some countries central banks are so big and financially so strong, it is hard to imagine that micro elements could become obstacles to successful policy. When the central banks losses do occasionally arise the main interest is not focused on the policy performance, because it is largely acknowledgment, losses cannot threaten central banks objectives, but rather on institution's financial insolvency. (Stella P, 2008) The latter one is very implausible. In many countries, by the law central banks cannot become insolvent.

Due to this reality, it is considered, that central banks' financial performance firstly, is not linked to its financial solvency and second it should not influence monetary policymaking. This approach is exemplified by the United States, Canada and the member states of European system of central banks.

Table 5 Consolidated financial indicators in billions of USA dollars

year	capital	Net income before paying to U.S. treasury	Transfers to USA treasury	Total assets
2001	14.69	28.03	27.09	614.43
2004	23.54	21.44	18.08	814.95
2006	30.65	34.19	29.05	873.36
2007	36.90	38.39	34.60	918.38
2008	42.15	38.66	31.69	2248.53
2010	53.05	81.73	79.27	2430.89
2013	55.01	79.14	79.63	4024.15

Source: FED, annual reports

Given the numbers in table above, it is clear that some kind of financial insolvency of FEDs in not real problem and generally this topic is not discussed widely among theoretic as well.

The same we can say about central banks of Canada. Out of total assets central bank of Canada holds more than 90% in securities issued or guaranteed by Canada AAA-rate sovereign, and its liabilities are largely non-interest bearing currency. This structure of central bank's balance sheet does not make any intentions of future losses, which cannot absorbed by Bank itself. From the financial indicators of the last decade is clear, that net worth of the Bank of Canada never been an issue. Its capital increased after financial crisis and net income decrease was immaterial.

Table 6 Financial indicators of Bank of Canada, millions of Canadian dollar

Years	Capital	Net income	Total assets
2000	30.0	1992.4	39548.1
2004	30.0	1701.0	46730.8
2006	30.0	1896.1	51625.5
2007	154.7	2024.4	53896.8
2008	212.9	1852.2	78583.5
2010	416.8	1162.5	61216.1
2013	435.2	1006.0	91305.7
2014	449.3	1126.8	94112.1

Source: Bank of Canada, annual reports

So, in the countries where central banks are strong institutes, with high level of independence and credibility, financial strengths may enhance only little to the central bank's ability to deliver successful monetary policy. Conversely, financial situation can contribute to central banks success in the countries, where its historical record, image, credibility was damaged, or general economic and financial situation in the country is poor. Only this conclusion, makes it harder to find out single answer if central banks financial performance matters.

In the countries, with small economy in transition, with less developed financial markets, central banks losses can influence decision making process about policy objectives and therefore limit policy outcomes. Central banks are vulnerable and at times of financial distress, policy outcomes do deteriorate, which is considerable problem. Precisely in those central bank financial strength is relevant.

Former president of the Bundesbank Axel Weber expressed that "the Bundesbank profit is residual issue for me and my colleagues" and later outlined that "maximizing profit is not a

goal of the Bundesbank, we are instead striving to carry out many tasks with the most efficient use of resources possible." (Stella P, 2008)

Vice Versa in 2005 Francisco de Paula Gutierrez, President of central bank of Costa Rica stated: "We, the central bank, have a negative net worth… and this remains our greatest challenges. "

To sum up here, approach to central banks financial performance varies according to the countries and basically depends on strength and historical value of the central banks. Losses of central banks are not noticed as a big problem is big economies, with large balance sheet of central banks, with strong financial markets, conversely it is problem for relatively small, open economies, in transition.

What are the real problems hidden behind central banks losses and its negative net worth?

Financial performance indicates how costly monetary policy is. When central banks accrue losses due to its decision to make expansive transactions (For example purchase of long term government bonds), arises question, is central banks committed to its policy. Even perception, among market players that central banks will not fully commit to its policy due to financial losses may ruin credibility of the central banks, which in turn has a serious macroeconomic consequences.

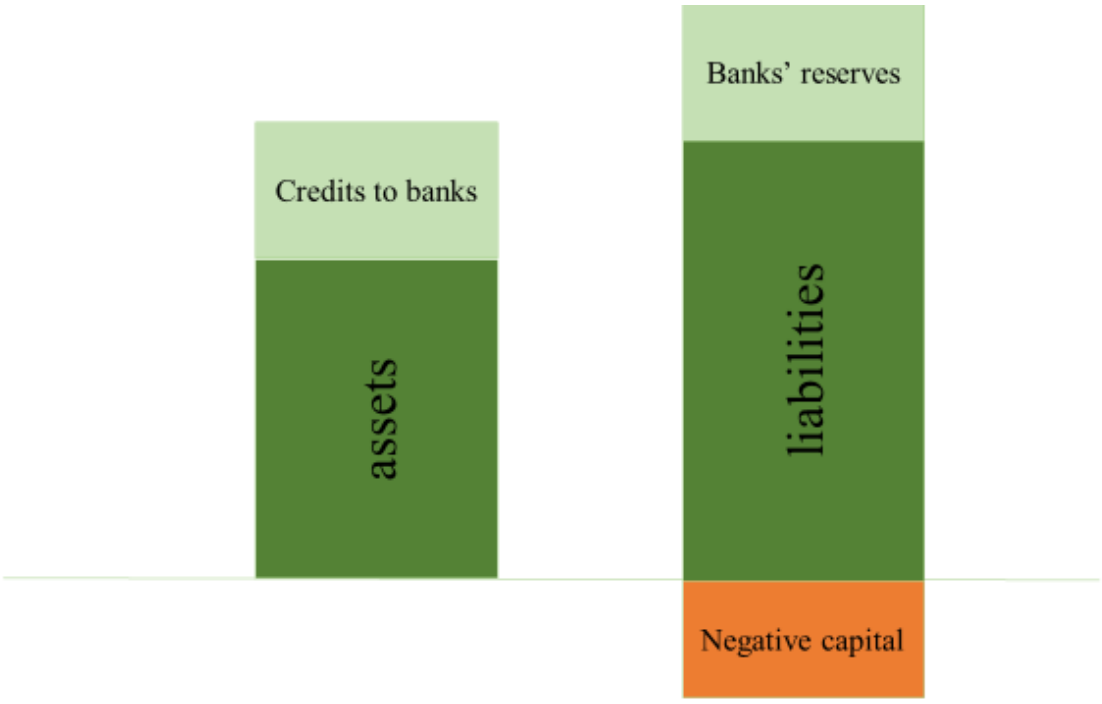
When central bank's policy is expansive and it already accumulated huge losses, the key question arise. How or who will cover the losses?

First suggestion to solve accumulated losses is that central bank can **issue the banknotes**. We have already mentioned several times, that financial solvency, as a disability for entity to pay its liabilities, is not a concern for central banks as additional banknotes could always be created by central banks. Thus, accordingly we can presume that technical insolvency caused by accumulated losses, may require changes in policy, for example by forced obligation to issue the currency, to pay its current expenses and costs. Indeed,

central banks' policy can be restricted by the need to create money in excess to finance their losses.

I think it is right place to visualize, how does this channel work. When imagine central bank's balance sheet with large accumulated losses, value of assets are less than liabilities.

Figure 5 Visualization of CB's balance sheet with accumulated losses



Source: Author

Negative capital means that value of assets are lower than value of liabilities. Central bank has ability to increase its assets by providing credits to commercial banks.[10] But at the same time, it will increase the value of liabilities, as the free reserves of commercial banks will increase. That action, taken by central banks to improve their financial position does not solve the problem of negative capital, as the negative difference between assets and liabilities stays unchanged. However, central bank can improve some relative measure, as for example ratio of assets to HDP or ratio of assets to currency into circulation.

[10] Assuming, banking system wants additional financial capital.

The side effect of this actions is issuance additional liquidity to the banking system that can cause unwilling inflationary pressure and threaten price stability on the market.

Second, Central banks can decide on **debt financing** of the losses by issuing their own obligations, in case central bank wants to avoid inflationary pressure by issuing money. As a first step, CB takes out financial resources from the market. Next step, CB uses new financial capital to cover its expenses, by this way, money gets back to economy. In contrast with the previous method, there is no new money created in the system and there is no direct threaten of inflationary pressure.

For the sake of objectivity, I consider important at this place to mention post-Keynesian approach to inflation and describe shortly, what they considered as an impulse of inflation. Post Keynesian main proposition on inflation is that for them inflation is not always and everywhere a monetary phenomenon. According to them wealth effect can itself contribute to inflationary pressure. When households and economic agencies hold central banks bonds and its price increase, that directly create inflationary pressure. My assumption, that via debt financing central bank can avoid inflationary pressure in the market can be not precisely correct in some theories of economy.

Nevertheless, decision to use debt financing can have its cons as well: first, like the previous channel, CB cannot fully solve the problem of accumulated losses and second, there is easy trap to further problems - to worsen balance sheet structure. (Frait J., 2006) For example at the end of 2002 central bank of Costa Rica had twice more interest bearing liabilities than interest bearing assets. So the central banks negative capital was over 6% of GDP. As a positive effect can be advantage in capitalization with marketable operations (marketable security offers). It creates rare opportunity to develop domestic security market. A lot of countries with central banks having financial problems undergo with undeveloped domestic financial market as well.

The third possibility to cover central banks losses or remediate from financial insolvency is central banks recapitalization by **government transfers** of cash and securities. According to Stella (2002) government have not historically come to the financial aid on the timely basis. And over, they are rarely in such a strong liquidity position to provide significant amount of cash to the central bank. By that time, central banks reputation is already damaged by poor financial performance. To cover central banks' losses from public finance, can limit independence of central banks. Financial independence is very important part of central banks operational independence and many authors prove that there is strong positive correlation between central banks independence and policy outcome. Even perception, that central banks is depend on government, or policy objectives are not set only according to the needs of economy can ruin central banks credibility and facility to meet their goals. Besides, the process of convergence of transition economies toward advanced economies is assessed on the basis of convergence criteria referred to as the Maastricht criteria. Among Maastricht criteria, big ascent is put on sustainability of the government position, specifically on government debt. The criteria on government debt means that the ration of government debt to GDP in nominal prices does not exceed 60%. In case, when countries fiscal policy precisely fulfills this criteria, additional expenses due to central banks losses can be problem and threaten to fill the criteria.

Nevertheless, to solve the problem shown on the figure 5, issuance government bonds and delivering them to CB can be the best way. Through this channel, central banks assets will increase, value of assets will equal to the value of liabilities and negative capital will be cleaned up from the balance sheet.

As a last, untraditional way to cover central bank's losses is **monetary crisis**. Losses accumulated by combination of large long open position in currency of CB and appreciation of domestic currency can be cleaned up by depreciation of it. This unconventional way is not in favor of economy neither for monetary policy, but it is worth mentioning as a method to decrease or annulled accumulated losses in central bank's balance sheet.

Our primary goal is not to find out the best possible way to cover the losses but to realize, that all the suggested methods above requires policy adaptation to the certain level, in case when central bank decide to solve unfavorable financial situation.

Actually, basic theoretical approach clearly emphasize that losses itself is not problem for Central banks, since it is perceived as a negative event by wide public and central bank is forced to solve it. Complications can be laid in the solutions, central bank choose to adapt. "We are not usually worried about the direct financial problem for the central bank, the losses, per se, but the impact this may have on the attainment of its policy objectives."

Central banks financial strength is positively associated with monetary policy goals. Financially weak central banks generates losses and net worth of capital, which threaten macroeconomic stability and credibility of the bank. At the base of empirical observation (Stella P, 2008) states, that in the counties with weak central banks, average inflation rate is higher than in countries, where central banks have strong financial position. As a weak banks are defined banks who accumulate losses for a several years in a row and trends to the negative capital, or already have it.

Table 7. Inflation performance and financial strength

	Weak Central banks	**Strong Central banks**
Mean inflation[11]	23.8%	11.2%
Number of observations	111	328

Source: Stella P., 2008

Matter of balance sheet of central banks, financial performance, measurement of financial performance, financing central banks losses is very complex problem and often it is very difficult to analyze this question generally without concrete focus. As this section shows, there is no need to discuss this problem deeply in United States, Canada, Germany and basically in the countries, where central banks historically have strong financial background and resilient position. Financial losses in those countries do not arise perception of inability

[11] The mean inflation rate were calculated using country observation in 1992, 1997, 2004

central banks to meet their goals. From the other hand, there are countries where central banks have become technically financial insolvent. In this case, we face several very important questions: what was the reasons of the losses? Loss making structure of balance sheet was necessity of monetary policy regime and objectives, or quasi fiscal operations contributed with the large scale? How to cover unfavorable result of financial performance and what are the result of central banks losses? Answers to all this questions are very individual in every country. Even when central banks authorities refuse importance of central banks financial results, some theoretical and empirical studies emphasize significance of the problem.

4. Czech National bank experience with negative capital and future predictions

The CNB is the central bank of the Czech Republic, the supervisor of the Czech financial market and the Czech monetary authority. It is established under the Constitution of the Czech Republic and carries out its activities in compliance with Act No. 6/1993 Coll., on the Czech National Bank, as amended and other regulations. CNB was established in January 1993, after the dissolution of Czechoslovakia.[12]

The development path of CNB may serve as a good example of central banks in convergence economy. Since 1993 Financial performance of Czech national bank was always variable with up and down in profits and losses years on year.

For the better understanding, I think it is reasonable to discuss central banks financial performance not for the whole period of its existence, but to divide this time into short periods.

4.1 Exchange rate targeting or before monetary crisis

First four years of Czech National Bank existence was very interesting from the financial performance point of view. During this period CNB managed to accumulate significant amount of losses[13], which was cleared up in 1997, because of monetary crisis.

The new established central bank followed the fixed exchange rate regime, which was introduced by the State bank of Czechoslovakia in 1990, as a nominal anchor for the economy at the beginning of its economy transition. Czech crown was linked to currency basket including 65% of DEM and 35% of US Dollar with fluctuation band + - 7.5%. Officially, the CNB also followed monetary aggregate targeting, publicly shown as a money growth rate. Exchange rate fluctuation band was rather narrow, at ±0.5%, but initially CNB did not have problems to sterilize capital inflow in order to meet both exchange rate and monetary targets.

[12] The history of central banking on the territory of Czechoslovakia starts in 1918, when first national bank was founded.

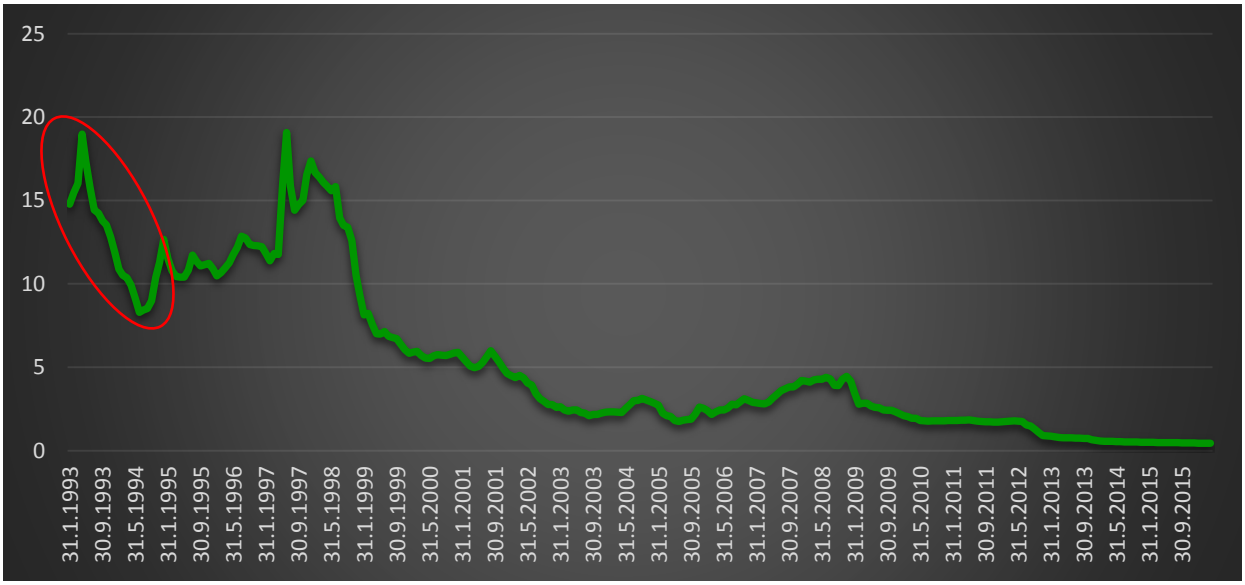
[13] In 1996 losses CNB was 8653.84 mln. CZK

Initial level of CNBs foreign exchange reserves was low, roughly 110 mln. CZK (3.87 mln USD) at the end of 1993. However there was a steady rise in foreign exchange reserves in following years. Increase in central banks foreign exchange reserves was mainly determined by inflows of foreign investments.

In 1990s more than a few factors determined upward trend of foreign capital inflows in large scales in the Czech Republic. Country implemented several political and economic reforms toward market liberalization. Limitation of currency trade was excluded for residents as well as for foreigners. Besides, general economic situation and monetary policy framework has been creating favorable conditions for foreign investments.

In 1993 - 1994 interest rates was very high in the Czech Republic and therefore high interest rate differential attracted foreigner investors. Nominal interbank interest rate of the Czech Republic in 1993 was around 19% p.a. and interest rate differential between Czech Republic and United states was roughly 11% in nominal terms, obviously Czech financial market was exciting for foreign investors. Also, by fixed exchange rate regime, low inflation environment was established at the beginning of 1990s.

Figure 6 Average Prague Interbank interest rate p.a from 1993 to 2015

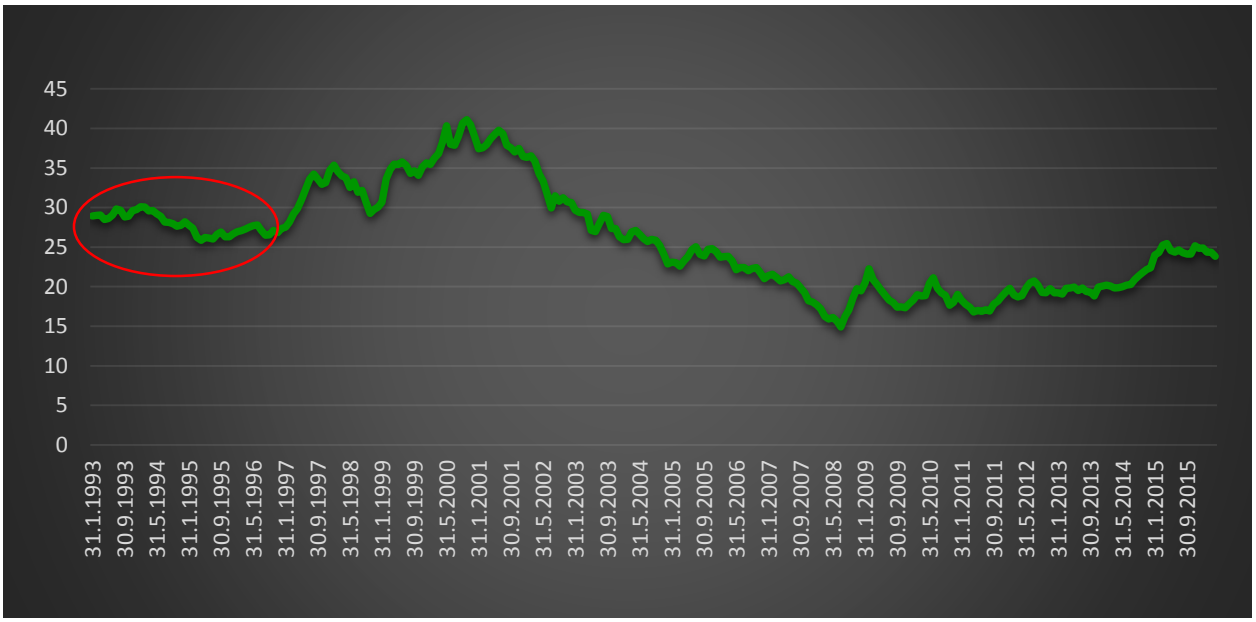


Source:1 ARAD – CNB's system of time series, author's modeling

According to Purchasing Power Parity (PPP) high level of interest rate differential should be absorbed by expectation of exchange rate devaluation (Mandel M., Tomšík V., 2008), but in

1993-1997 CNB carried an obligation of stable nominal exchange rate. Graph below clearly shows Czech crowns stability toward US dollar in 1993-1995. Thus interest rate differential was not absorbed by depreciation on Czech crown.

Figure 7 Nominal exchange rate CZK/USD from 1993 to 2015



Source:2 ARAD – CNB's system of time series, author's modeling

Important measurement for investors, except interest and exchange rates is general investment situation in the country, political, economic stability and development. All this criteria are collected in countries ratings, provided by globally well-known rating agencies. In 1993 Czech Republic had according to Standard & Poor's rating BBB[14], which is considered as an acceptable level for investment (Mandel M., Durčáková J., 2016).

So thanks to high interest rates, fixed exchange rate and high investment rating, Czech Republic was very attractive for foreign investors. Moreover, there was large wave of privatization programme. Inflow of foreign investments, including speculative capital in domestic market, created strong pressures on appreciation of Czech crown, Central bank was obliged to intervene into the market in order to ensure stability of exchange rate and avoid nominal appreciation of domestic currency. Czech national bank was buying foreign

[14] Moody's rating for Czech Republic was Baa3 in 1993.

currency in the market to neutralize its pressure on exchange rate. Intervention operations were reflected in the growth of foreign exchange reserves in central banks' balance sheet.

Table 8 Foreign reserves in CZK in millions and its ratio to currency in circulation and nominal GDP

	Foreign reserves in CZK	Ratio to currency	Ratio to nominal HDP		Foreign reserves in CZK	Ratio to currency	Ratio to nominal HDP
1993	65,462	1.17	-	**2004**	678,266	2.59	0.22
1994	147,858	1.74	-	**2005**	833,032	2.89	0.26
1995	269,092	2.54	0.17	**2006**	756,885	2.35	0.22
1996	352,217	2.75	0.19	**2007**	744,699	2.11	0.19
1997	393,235	2.83	0.20	**2008**	733,242	1.84	0.18
1998	429,535	2.94	0.20	**2009**	781,680	2.02	0.20
1999	547,210	2.97	0.24	**2010**	810,769	2.07	0.21
2000	550,200	2.79	0.23	**2011**	816,948	1.98	0.20
2001	570,879	2.75	0.22	**2012**	869,175	2.06	0.22
2002	743,390	3.31	0.28	**2013**	1,131,362	2.56	0.28
2003	717,184	2.90	0.26	**2014**	1,258,059	2.68	0.30

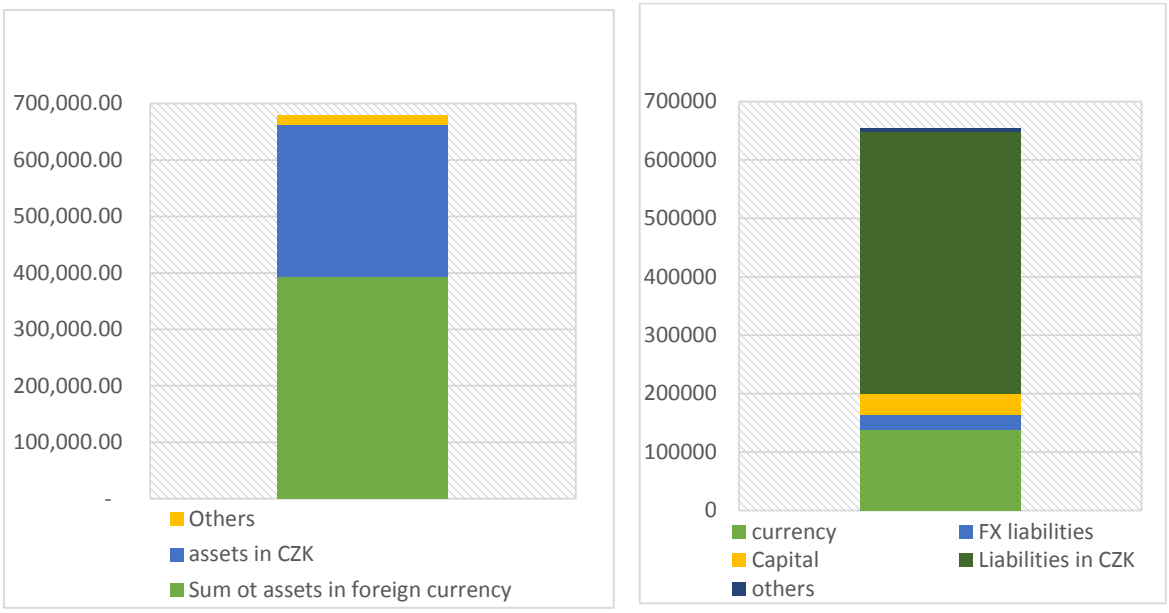
Source: CNB, annual reports

The result of national bank's intervention against appreciation of domestic currency was inflationary pressures in the economy. As we mentioned, in this period CNB was targeting exchange rate and at the same tame following monetary targeting, so money growth rate had under the control. According to the forecast and CNB's predictions, growth rate of M2 must have been around 10-12%, but actual growth rate hit to 20% (Mandel M., Tomšík V., 2008). In order to have it stable, central bank had to sterilize their interventions in the market. CNB decided to sterilize currency purchase operations by issuing their own bonds.

As a result, balance sheet of CNB was gradually affected by the situation.

As shown in the *figure 8*, the asset side was dominated by foreign exchange reserves, their volume was in 1997 2.83 times more than currency in circulation. On the liability side the main item besides currency in circulation was sterilization of excess liquidity, i.e. CZK-denominated interest bearing liabilities to the domestic banking sector, while the foreign currency liabilities were immaterial. Sterilization operations were costly, as interest rates paid by central bank on sterilization were higher than interest rates on foreign assets.

Figure 8 Assets and Liabilities structure of CNB in 1997



Source: Authors modeling from annual reports of CNB

Nevertheless, CNB cleared up all accumulated losses in May, 1997 when due to the expansionary monetary policy and deep deficit of currency account of balance sheet, country could not avoid monetary crisis. CNB board decided on change of monetary policy regime, abandoning the fluctuation band and introducing managed floating with German Mark as a reference currency. Czech crown depreciated almost by 23% annually from 1996 to 1997. Weakening of the Czech crown was the most important event that effected CNBs performance in 1997 with profit of 10 744 million CZK. The loss from 1996 was fully covered and rest was allocated to the bank's fund.

4.2 From monetary crisis to global financial crisis

Second, very interesting but unfavorable period in CNBs performance was decade, after adopting inflation targeting, from 1998 to 2008. During the decade, with few exceptions, central bank run losses. At the end of 2007 accumulated amount of losses was around 200 000 mln. CZK.

Figure 9 Profit/loss of CNB and accumulated financial results from 1996 to 2014 (in mln.CZK)

Source:3 CNB - Annual reports

Adoption inflation targeting did not somehow effected central bank's balance sheet structure. Central banks was still operating with long open position in foreign currency.

Czech Republic kept its path toward developed economies. Real exchange rate appreciation caused by convergence process has been processed mainly by appreciation of the nominal exchange rate, hitting the CNB's balance sheet sustainability. Thus, nominal appreciation of Czech koruna was the main reason of losses in CNB. In years 1999-2000 the negative effect of foreign reserves' valuation was partly offset by income from international reserves management. The rate of return on international investments were higher than in previous years, that enabled bank to cover its sterilization expenses, operational costs and partly its exchange rate losses. In 2001 significant change was that CNB board decide to remunerate the minimum reserves of commercial banks. Decision was made as a part of central bank to harmonies the reserve requirement system with European Central Bank rules. The remuneration rate in 2001 was the current rate for CNB's two week repos, which in November 2001 moved to 4.75%. Due to the reserve requirement rumination CNB's interest expenses rose by 645 million CZK only in 2001.

Banking sector consolidation programme had a marginal effect on CNB's financial performance. Most of the expenses in this area had been incurred in the previous period.

Large share of expenses were covered by a 22.5 billion CZK state guarantee issued in 1997 by the Czech government.

With income of CZK 56,877 million and expenses of CZK 36,920 million, the Czech National Bank made a profit of CZK 19,957 million first in the last five year in 2005. Foreign exchange differences had fundamental influence in CNB's financial performance for the past years, but it had only partial effect in 2005, as during the year, two main reserve currency (Euro and US Dollar) has been developing differently. Czech crown appreciated against the euro from CZK/EUR 30.465 to CZK/EUR 29.005, while against the dollar it depreciated from CZK/USD 22.365 to CZK/USD 24.588. Overall effect of exchange differences was positive, foreign exchange losses on euro assets were fully offset by the foreign exchange profit on dollar assets. The average sterilization volume felt by 5% and caused decrease in sterilization expenses. Still, CNB's sterilization expenses and operational costs were more than income from international reserve management. Remuneration costs dropped in 2005 as well, the decline in interest expenses on required reserves was associated with a fall in the repo rates, at which required reserves were remunerated by CNB.

Clearly, profit in 2005 could not offset total losses of CNB accumulated in the past years. Thus CNB continued operating with losses and its amount reached peak in 2007. At the end of the year CNB's accumulated losses stood at CZK 200 billion, which was equivalent to 57% of currency circulation in the economy and around 6.7% of nominal GDP. CNB was technically insolvent, it's negative own capital was only slightly lower then losses at CZK 176 billion.

The largest accumulated losses recorded in CNB's balance sheet was explained by several reasons by CNB in their annual report. First, there was historical resolution of consequences of the division of the state bank of Czechoslovakia's balance sheet and the CNB's involvement in the banking sector consolidation programme. Those two factors totally contributed to CNB's losses with about CZK 95 billion. Thus, the CNBs performance was mainly affected by foreign exchange losses, generated by large long open position of CNB (in 2007 95% of assets were denominated in foreign currency) and the long trend of Czech crowns appreciation. The gradual appreciation of the domestic currency is logical alongside process of real convergence of domestic economy toward the level of developed economies.

Open market operations, conducted in the form of repo operations, and remuneration of banks' minimum reserve holdings brought a loss of CZK 12,514 million. Their year on-year growth was due in part to higher interest rates. Thus, there was positive effect of down ward trend of excess liquidity, in the sense of a smaller year-on-year rise of expenses on repo operation to sterilize this excess liquidity.

Moreover, from 2006 CNB had new mandate of supervisor of financial market that caused increase in operational costs. Integration of financial market supervision and regulation into CNB generated a sizeable increase in personnel expenses. In turn, operational income totaled CZK 95 million with income related to financial market supervision.

Official position of CNB about accumulated losses was following: "The primary objective of the CNB is to maintain price stability. Monetary policymaking is fully subordinated to this. Monetary operations affect the bank's performance, hence the latter is not and cannot be an indicator of the true quality of performance, despite efforts to be efficient."(CNB, annual report 2007)

Assuming, Czech Republic's aspiration toward advanced economies, Asset to liability structure of CNB at the end of 2007 was loss making. CNB had huge long open position in foreign currency, which, as we have already mentioned several times, was main reason on losses, as per Czech Republic choose the convergence path via nominal appreciation of the domestic currency.

Despite the asset to liability relation, from the year 2007, CNB has shown decreasing trend in accumulated losses. Year to year Profitable financial performance of the bank, naturally had positive effect of total financial position of the central bank.

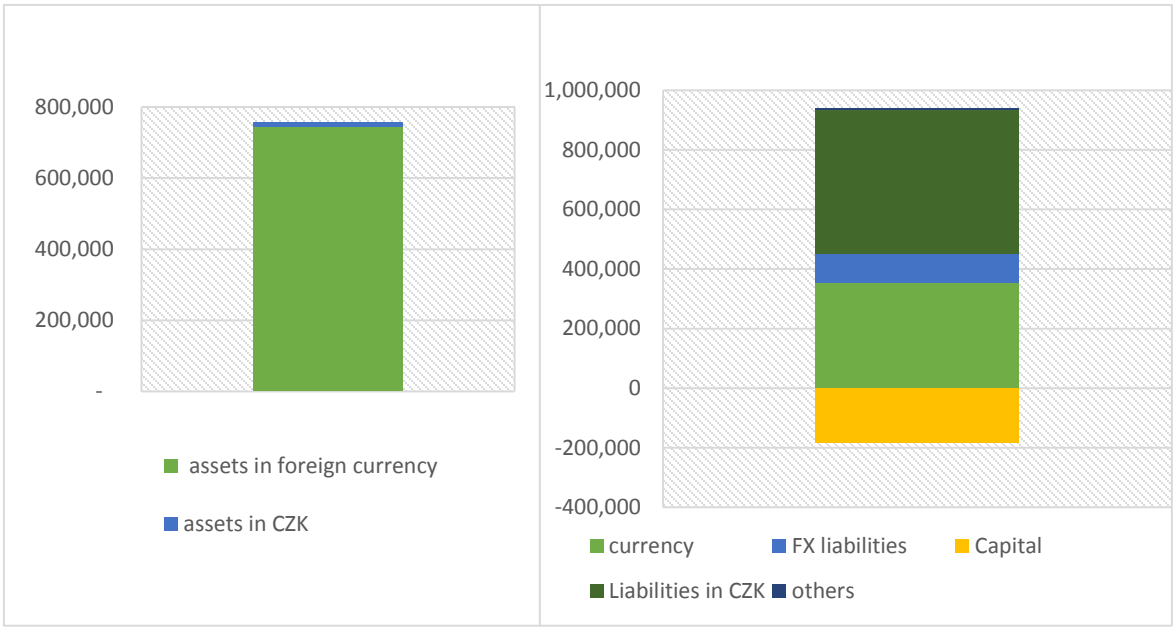
So, as a third period of central banks financial development can be considered from 2008 till 2014, when CNB managed to clear accumulated losses from its balance sheet.

4.4 From global financial crisis to present

The main reason of profitability of central bank was, that exchange rate losses due to crown appreciation were covered by international reserve management income. Profit was also positively affected by decrease in sterilization operations of excess liquidity in combination

with decrease in in the repo rate during 2009. CNB adjusted its main two week repo rate four times and it was declined from initial level of 2.25% to its historical minimum of 1%. Those changes had significant positive effect on central banks financial performance, as the cost of open market operations were reduced and also it caused decline in interest expenses on remunerated required reserves.

Figure 10 CNB's assets and liability structure in 2007



Source: CNB – annual reports

Czech national bank declared its position on this development, that the main objective of their policy is price stability and their monetary decisions are fully subordinated to their goals, regardless of the amount of expenses and income.

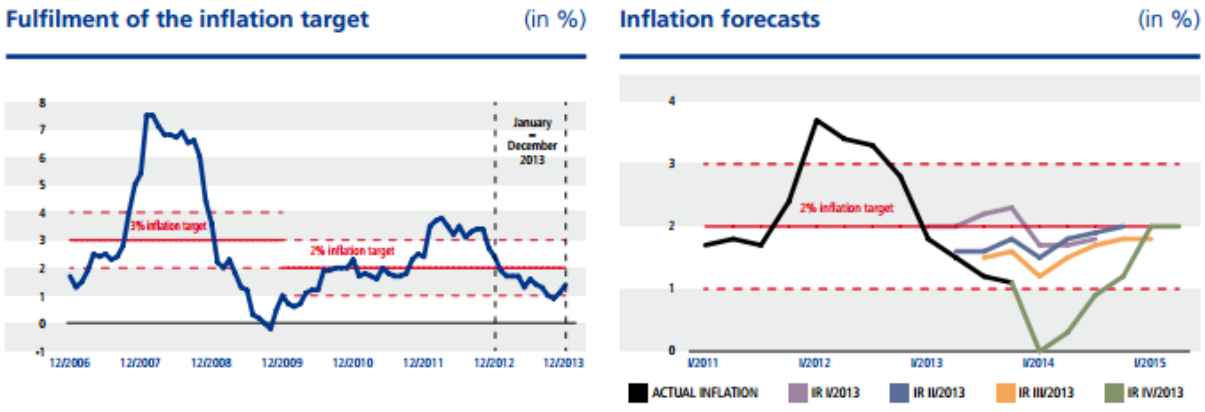
In respond on global financial crisis, CNB introduced extraordinary liquidity – providing repo operations with two weeks and three months maturities, aimed to support financial market and banking sector. By the time, need to sterilize excess liquidity from foreign capital inflows was decreasing and respectively, cost of sterilization operations went down.

Decrease in the key two week repo rate to 0.75% bring positive effect on financial results, as it caused decrease in sterilization expenses.

The next turning point in central bank's financial performance was in 2011, when due to the debt crisis in Eurozone, euro depreciated toward dollar. In turn, Czech crown depreciated against all reserve currencies in year-on-year terms. CNB recorded profit of CZK 35 425 million, in result of successful combination of international reserve management and nominal depreciation of Czech crown. Monetary policy instruments stayed unchanged in 2011, so there was not sharp changes in sterilization expenses as in the past year. Main events in 2012, effecting central bank's profitability was key two weeks repo rates adjustment, which reached its historical minimum at the end of the year and caused decrease in sterilization expenses. Foreign reserve management was successful in 2012, especially equity portfolio, which recorded a strong recovery following a loss a year earlier.

Year 2013 was very positive for CNBs financial performance, its result ended up in profit CZK 73 116 million. Unlike to the development of domestic economy. The Czech economy entered in 2013 in difficult situation. In the past years, economy growth was decreasing, unemployment had gone up, consumption and households' income, as well as investment and corporate profits all gone down. Monetary policy reaction to this unfavorable development was full use of its monetary policy instrument during 2012, when CNB board decide to lower it to its historical minimum to technical zero to 0.05%. Moreover, CNB took responsibility to keep key interest rate on this level, until inflation pressures increase enough, to meet the target.

Figure 11 Inflation targeting fulfillment from 2006-3008 and inflation forecast



Source: CNB- annual reports

CNB gradually announced that it was ready to use additional monetary policy instruments, in case further monetary easing become necessary. Alongside to this statement, it had been communicated from CNB that for open economy with excess liquidity in banking system, the most efficient additional tool was exchange rate.

CNB's fall forecast of poor economy development make it clear that monetary policy needed to be eased. Central bank had two tools to deploy monetary policy – first, reduce policy interest rates and second, use additional monetary policy, as exchange rate and intervene against nominal appreciation of Czech crown.

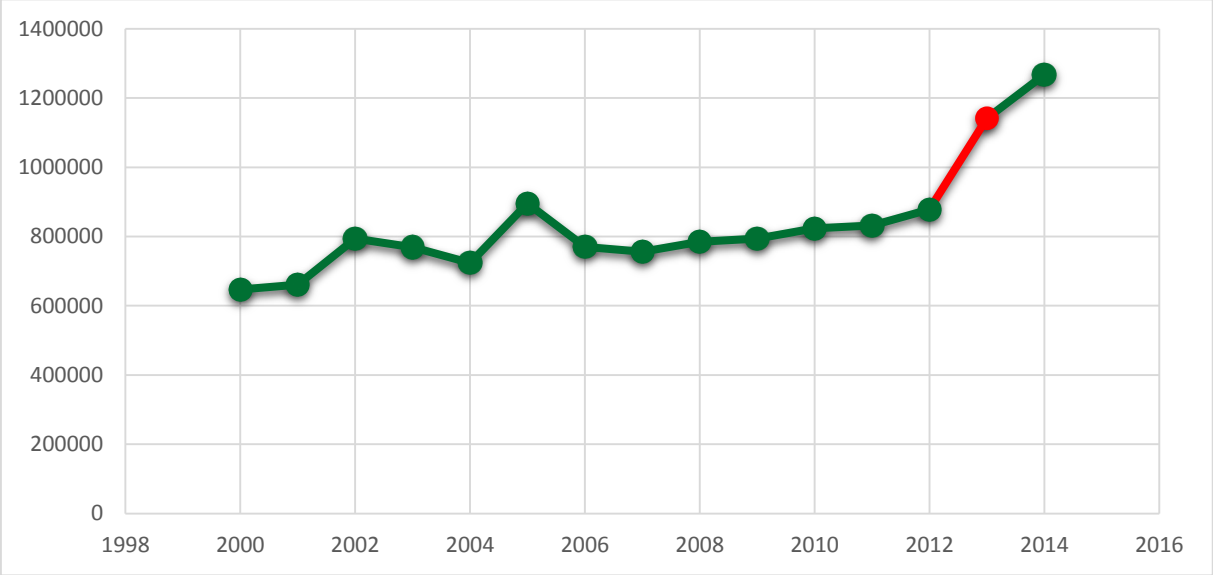
For delivering the necessary level of monetary easing, one percentage point reduction of policy interest rates into negative territory was needed. Thus, CNB choose alternative scenario to use exchange rate instrument. According to bank's forecast a weakening of the exchange rate to levels close to CZK 27 to the euro would deliver the necessary monetary policy easing, reduce the risk of deflation, accelerate the return of inflation towards the target and support a recovery in economic activity.

CNB used exchange rate as an additional monetary policy instrument in November 2013, when intervened against domestic currency appreciation first time during last 10 years by buying currency on the market. Czech crown depreciated around 5% to 27 CZK/EUR.

Change in value of Czech crown had positive effect on central banks financial performance. CNB managed to reduce its accumulated losses by 60% from CZK 121549 million to CZK 48433 million.

From the other hand, we need to discuss long term effects of this intervention. Despite the positive effect, we mentions above, it had influence on central bank's balance sheet. Balance sheet sum has increased by 23% year on year base from 2012 to 2013. 99% of assets are denominated in foreign currency. Long open speculative position of CNB alongside with Czech Republic's path toward advanced economies was the main reason of accumulated losses in central banks performance.

Figure 12 Balance sheet sum of CNB (in mln. CZK)



Source: CNB, Annual reports

Today, CNB cleared up all accumulates losses and operates in profit. But remains the main question, how will financial performance develop, if Czech Republic keeps movement toward developed economies? What is the threshold value of potential losses Czech National Bank can accumulate and will it be ready to manage its profitability/unprofitability on its own, without governments and public finance assistance.

To answer those questions we can describe two scenarios of development of economy. It is clear, Czech Republic wants to keep its course to advanced economies, question is in the pass country can choose: either keep real appreciation of currency via nominal appreciation of Czech crown, or via positive inflation differential between Czech Republic and developed world.

4.5 Convergence economy of Czech Republic

We analyze the sources of Czech national bank's losses, which had the economic substance. In a consistence framework we discussed what nominal exchange rate appreciation, risk premium and its decline trend, high interest rates and it's gradual decline mean for the central bank's balance sheet. All these events are tightly connected to convergence process in transition economy of Czech Republic.

There is several different definition of convergence process. Convergence could mean the reduction in dispersion per capita income or it could mean the catching up of relatively low-income countries with relatively high-income countries. (Bunyaratavej K., 2004)

According to ECB sustainable real convergence is the process when GDP per capita level in developing, low-income countries catch up with the level of developed, rich counties on a durable basis. (Borys Morgese M., Polgár Katalin E., Zlate A, 2008)

Nominal and real convergence process is widely discussed in euro area. First, it is a process of economic integration and second, there is still large gaps in terms of income per capita in member countries that causes disparities of policy and instability in the union. Eventually there is common aim to set up policy to close the economic gap. Convergence process was highly discussed question in 2010 as well, when European Union admitted 10 more member countries from Central and Eastern Europe, among them was Czech Republic, with prediction that one day these countries would be part of Euro area.

Concept of nominal or/and real convergence has many dimensions, thus there are different variables to measure of determine convergence process. Maastricht Treaty convergence criteria can be good measures for nominal convergence. In case of real convergence, we will focus on real appreciation of domestic currency that has 2 scopes: nominal appreciation of domestic currency or inflationary differential.

Maastricht convergence criteria includes:

- Criterion on price stability
- Criterion on government financial position
- Criterion of the convergence of interest rates
- Criterion on participation in the exchange rate mechanism

Our purpose in not to go deep in these criteria, but they play important role in definition of nominal convergence, we are interested in. So, brief evaluation of Czech Republic's position according to these criteria can give us good basis for future prediction of convergence process.

We will focus on our main objective to analyze influence of process on central bank's balance sheet and financial performance.

4.5.1 Criterion on price stability

"The price stability criterion assesses the rate of consumer inflation, which must not be more than 1.5 pp higher than the average of the three best performing countries in terms of price stability." (Assessment of the Fulfilment of the Maastricht Convergence Criteria and the Degree of Economic Alignment of the Czech Republic with the Euro Area, 2015)

The price stability criterion is linked to the rate of consumer inflation, which must not be more than 1.5 pp higher than the average of the three best performing countries in terms of price stability. According to the Assessment of fulfilment of the Maastricht convergence criteria, the Czech Republic has been compliant with the price stability criterion since 2013. The average inflation rate in 2014 was only 0.4%, despite the fact, that in 2013 CNB used the exchange rate as an additional monetary policy instrument to sustain price stability in line with its inflation target. However growing domestic demand and the effect of lower oil prices should push inflation rate toward the rate into upcoming years. Moreover, exit from the CNB's exchange rate commitment and subsequent rise in nominal interest rates are assumed. Consequently the criterion should thus be also filled in 2016-2018 by a sufficient margin.

4.5.2 Criterion on government financial position

"The criterion on the government financial position is satisfied only when both components of the fiscal criterion, i.e. a general government deficit of less than 3% of GDP and general government debt of less than 60% of GDP, are fulfilled in a sustainable manner."

Excessive deficit of Czech Republic's government since 2009 was successfully stopped in 2014. The ministry of finance expected a general government deficit of 1.9% of GDP for 2015. Predictions for the next years are more optimistic, current estimations of general government balance are to improve to --0.5% of GDP in 2018.

Initial level of general government level was low, so the Czech Republic has had no problem to fulfil the criterion. The debt has increased significantly in 2013 due to the global financial and economic crisis and reached to 45% of GDP. One of the main threaten to debt to GDP ratio is population aging, which needs some active steps to be taken to avoid the unfavorable

long term evolution of general government finance. Despite this fact, debt to GDP ratio should full further, reaching around 40% of GDP in next 3 years.

When discussing central banks losses, the debt to GDP ratio question arises. In case CB need to be recapitalized and government has to provide financial assistance, debt to GDP ratio can be worsen and fulfilment of criteria be threatened.

4.5.3 Criterion on the convergence of interest rates

"This criterion states that long-term interest rates (yields on bonds with a residual maturity of 10 years) must not be more than 2 pp higher than in the three best performing states in terms of price stability."

Long term interest rates sharply decreased in Czech Republic during last 3 years and currently they are below 1%. The Czech Republic constantly fulfils interest rate criteria and should have no in the future to meet criteria requirements.

4.5.4 Criterion on participation in the exchange rate mechanism

Becoming the member of euro area is conditioned by successful, at least two year successful stay of national, domestic currency in ERM II. Success is measured by ability of domestic currency to stay within +-15% band without devaluation of the central rate. Formal fulfilment of criterion would be possible only after the Czech Republic becomes member fo ERM II. Before, only analytical evaluation is possible. The latest simulation from CNB shown, that Czech crown could have fulfilled the criterion in 2 years period from 2013 to 2015, despite the fact that CNB started using exchange rate as an additional nominal instrument to ease monetary policy after the lower bound on interest rates had been reached.

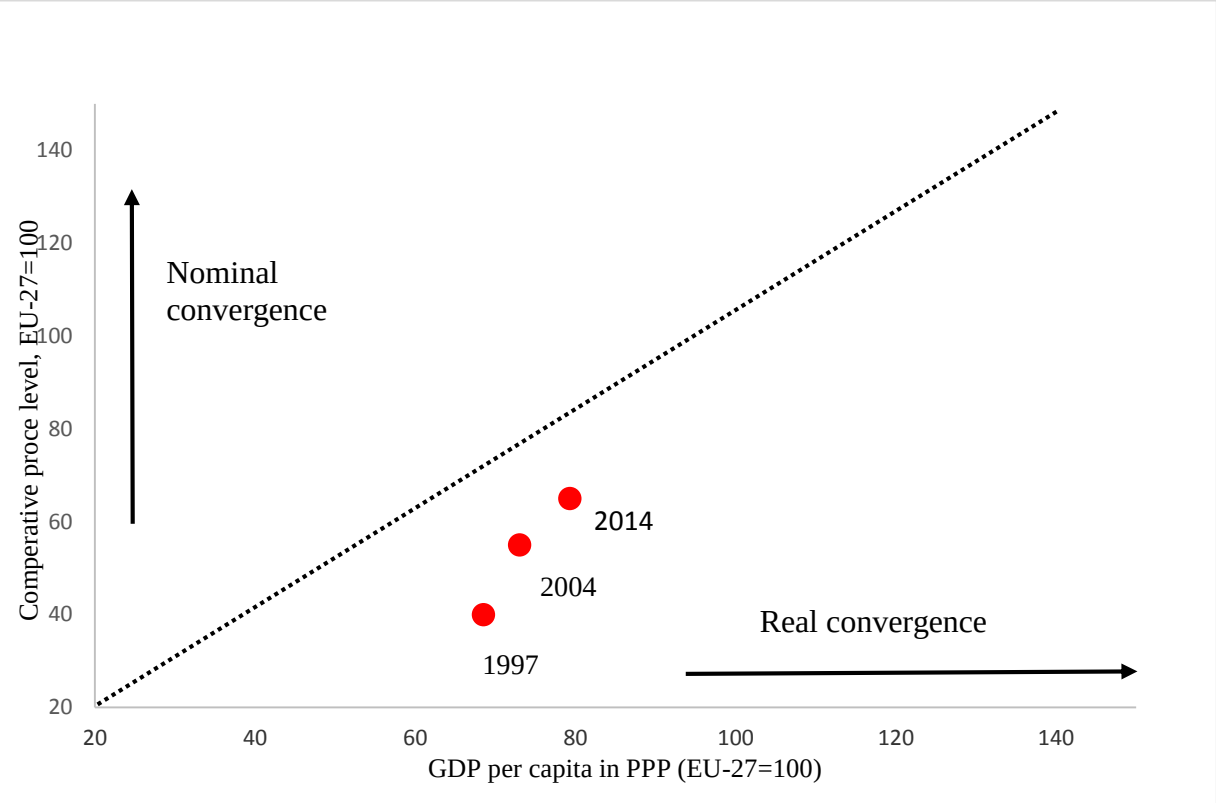
The minimum length of staying EU member countries in ERM II is 2 years, but it's is not obligatory and countries can choose longer period. The Czech Republic's euro area association documents declares the agreement between government and CNB to stay in the system for minimum requited period. This implies that The Czech Republic should only enter ERM II after it has achieved a high degree of economic alignment.

According to the "Assessment of the Fulfilment of the Maastricht Convergence Criteria and the Degree of Economic Alignment of the Czech Republic with the Euro Area" we can

assume that the institutional development and structural reforms, especially in fiscal policy, required for successful nominal convergence is fulfilled. Question is whether or not nominal convergence has had a significant and positive impact on real economic convergence.

From the table below we can see that level of economic development in 2014, calculated by GDP per capita in PPP was 78% of EU average, at the same time we can observe that, these result was accompanied with lower price level than average in countries of EU. To compare those results in 2006, it is clear that Czech Republic sustainably was approaching to EU.

Figure 13 Real and nominal convergence of Czech Republic



Source: OECD statistics, Authors modeling

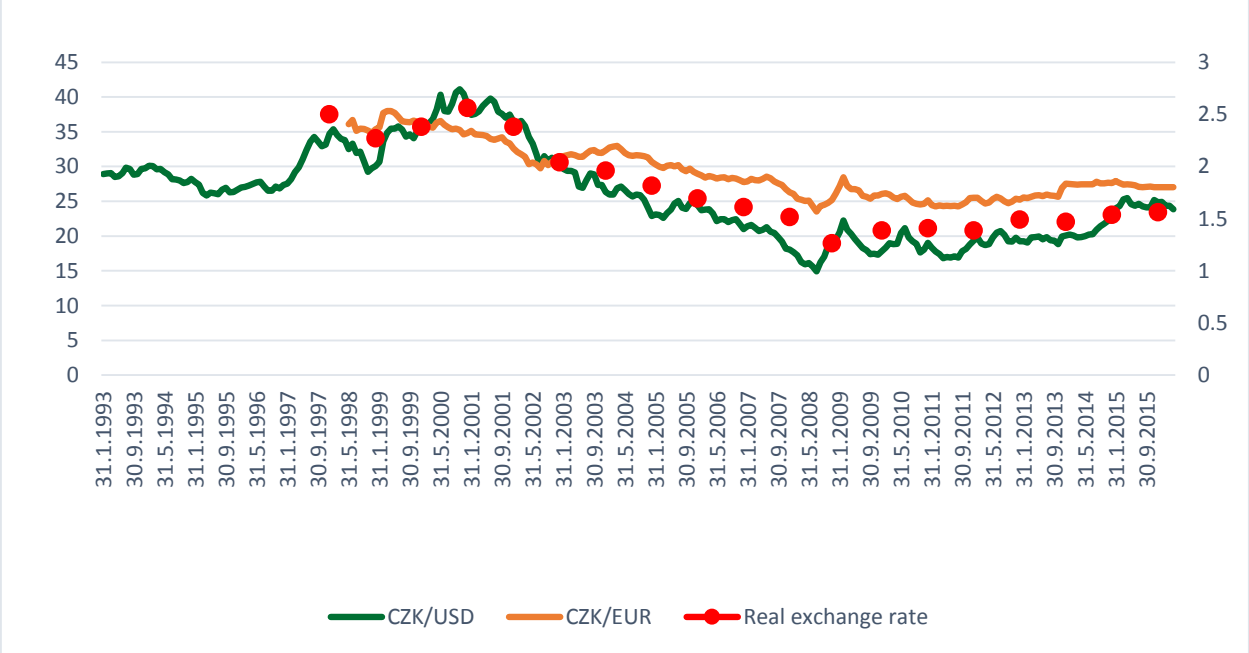
Differences in economic levels of the countries in transition, as for example Czech Republic, to the average can be reduced only permanently higher economic performance than the average result in the countries of Eurozone. In difference, narrowing price level difference between transition and advanced economies can be reached by real appreciation of domestic currency, this is possible by two channel (Mandel M., Tomšík V., 2008):

- Exchange rate channel, by appreciation of domestic currency
- Inflation channel, by having positive inflation difference toward advanced economies.
- Mix of exchange rate and inflation channel.

Choosing right channel is the main brainteaser for central banks, including Czech national bank.

The Czech Republic decided to choose exchange rate channel to reach real appreciation via nominal appreciation of CZK. Czech crown appreciated to EUR by 25% and to USD by 29% during almost 20 years period from 1997 to 2015.

Figure 14 Nominal (left axes) and real (right axes) exchange rates of CZK



Source: ARAD – CNB's time series system

4.6 Future scenario

We have constant the fact, that the nominal appreciation of CZK was exactly the main reason of large accumulated losses of CNB, obviously in combination with balance sheet structure.

Nowadays, as a result of CNB's interventions against currency appreciation, absolute amount of long open position in foreign currency of national bank is higher than 3 years ago. Foreign

reserves have been increased by 30% from CZK 869,175 million in 2012 to CZK 1,258,059 million in 2014. That means, that appreciation of nominal currency today by 1% will have bigger impact on central banks financial performance than several years ago.

We assume that the Czech Republic keeps moving toward advanced economies and affords to reach that sustainable level of economy, when adoption Euro and becoming euro area member will not create any complication and threaten to welfare of the country.

Taking into account central banks devotion to inflation targeting, forecast of inflation rate and afford to return to conventional monetary policy, I think, that convergence policy will continue via nominal appreciation of the Czech crown.

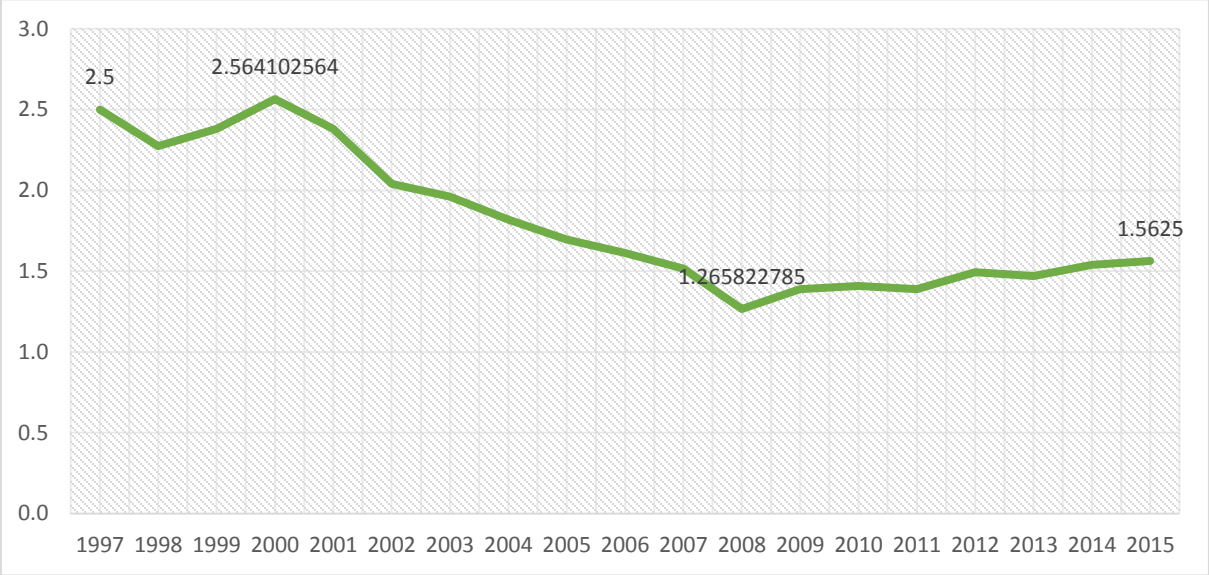
It is hard to find ideal measurement of convergence, or to define, when convergence process reached the peak point. For the transition economies, who tries to narrow and meanwhile, close the price level gap, between domestic advanced economies, real exchange rate of the currency can be fear pointer.

Purpose of real exchange rate is to compare the price levels in the two country (or to group of countries) after conversion to the common currency. Real exchange rate is greater than 1 means, that domestic price level is lower than foreign, thus internal purchase power of currency is higher than the outside.

When real exchange rate of Czech crown is 1 toward euro area countries that means, that price level gap is closed and convergence process is effective. Real CZK exchange rate (calculated as ERDI) in 2015 was 1.56, it has been gradually decreasing[15] during last 20 years from 2.5 to 1.56.

[15] Purchase power of CZK was increasing, which means **numerical** decrease of currency.

Figure 15 Real exchange rate of CZK (ERDI)



Source:4 OECD statistics, authors modeling

Real exchange rate of the Czech Republic to OECD countries with high income in 2015 was 1.52 that means, that nominal appreciation of CZK by 36% is required to reach real exchange rate equal 1, ceteris paribus. When calculating this number, I do assume, that inflation difference is constant.

Strengthen of CZK by 36% can cause very unfavorable financial performance of CNB and with actual balance sheet structure central bank can accumulate losses in larger scale in the future.

4.6.1 Threshold value of future losses

CNB hold its reserves in 6 currency, those are EUR, USD, CHF, JPY, GBP and AUD. (Mandel M., Durčáková J., 2016). According to financial report of CNB, in 2015 58% of foreign assets were in EUR.

However, information about structure and percentage composition of CNB foreign assets portfolio is not publicly available. Statistical reporting of overall amount of reserves are given in two currency – in EUR and USD that can be found in time series system of CNB – In ARAD. Amount of foreign reserves reported in CZK are available in the balance sheet of CNB.

I have decided to deploy two different methods to calculate future threshold value of losses on foreign reserves.

First with easy arithmetic operations to calculate future CZK value of foreign reserves in case CZK appreciates by the projected percentage.

Clearly not knowing exact structure of foreign reserves and rough projection of Czech koruna's development makes calculation result less reliable, but from the other hand, with basic calculations we can get basic future image of CNB's financial development.

I have chosen real exchange rate, calculated as ERDI for the basic information to estimate Czech koruna's future development. Nowadays, ERDI for CZK runs on 1.56. As I have mentioned in previous chapter, desirable level of ERDI for Czech koruna is 1. So we need real exchange rate to appreciate by 36%.

$$\frac{1 - 1.56}{1.56} = -0.36$$

Negative figure, in this case shows the appreciation trend. We assume, that Czech Republic goals to reach real exchange rate appreciation via nominal rate appreciation. If inflation differential stays constant between domestic and foreign economy, than Czech Koruna needs to appreciate by 36% in nominal term.

For 31.3.2015[16] foreign reserves of CNB reported in the Czech koruna were 1 341 536 mil CZK, its equivalent in euros was 59 238 mil EUR. When assuming that CZK will appreciate by 36%, it is exchange rate to EUR can reach 17.28 CZK/EUR. Recalculation foreign reserves in EUR by this new exchange rates gives us 1 023 632 mil EUR.

$$59\,238\ mil\ EUR\ \times 17.28 \frac{CZK}{EUR} = 1\,023\,632\ mil\ CZK$$

Decrease in the value of foreign reserves by 317 903 mil. CZK potentially means losses for central bank in the same amount. I assume this result as a threshold value of future

[16] Latest available information

revaluation losses of today's state of foreign reserves. The calculation is based only on the static state of foreign reserves and no changes are included in the model.

Another, more reasonable method in my opinion is to build regression model based on historical data and development of CNB's financial performance. For my model, as a dependent variable I choose central banks financial results from foreign reserve revaluation, relevant explanatory variables are nominal change in values of CZK/EUR, and nominal change in foreign reserves value in the balance sheet of CNB.

Regression model was built in statistical software for time series – Eviews.

Result is following[17]:

$$Y = -16178 + 16907 \times X + 6.24 \times Z$$

Where,

Y - CNB financial results from revaluation of foreign assets in mil.

X – Nominal change in the value of CZK/EUR

Z – Nominal change in values of reserves, reported in EUR in mil.

According to the regression model, appreciation of the Czech koruna by 1 CZK, which numerically means decrease in value, can run losses on the level of 16.9 bill. CZK. If koruna appreciates by 36%, and its value will be around 17 CZK/EUR, we can assume roughly 169 bill. CZK of losses in CNB's income statement.

As I have mentioned, currency structure of foreign reserves is not available. According to the financial report of CNB, international investments in EUR were 58% in 2015. My personal guess is that the second biggest share of international reserves are held in US dollar. I have run the same regression model to discover, how CZK/USD exchange rate can influence financial performance of CNB.

$$Y = -11497 + 9652 \times X + 2.82 \times Z$$

Where,

Y - CNB financial results from revaluation of foreign assets in mil CZK.

[17] See appendix 3 for software results.

X – Nominal change in the value of CZK/USD

Z – Nominal change in values of reserves, reported in USD in mil.

We read from the model that the historical sensitivity of CNB's financial performance on the change of CZK/USD exchange rate is lower than in case of CZK/EUR. Czech koruna appreciation by 1 CZK leads to increase financial losses by 9.6 in CZK billions.

5. National bank of Georgia and its financial performance

Including or not this part in my thesis was hard decision, as from the beginning I did not know, if it is relevant at all, if I can find enough information or even necessary statistics to analyze at least current financial situation of National bank of Georgia. As an emerging market, Georgia does not possess a well-developed infrastructure that would generally exist in a more mature market economy. Well-developed infrastructure includes some specific ways to communicate with wide public, including informational bulletins, inflationary reports, publishing statistical data on the regular basis. After short hesitation and small research, I have decided that with all available information, it is possible to work on this part without some serious obstacles.

Besides, during the working on this paper, I have seen, that the case of developing country, at the start of convergence way can be precisely relevant to the main objective of my thesis, unlikely with the developed economies – analyzing central banks financial performance influence of the monetary policy effectiveness.

5.1 General overview

The National Bank of Georgia (NBG) is the central bank of Georgia. Its status is defined by the Constitution of Georgia. The rights and obligations of the National Bank of Georgia as the central bank of the country, the principles of its activity and the guarantee of its independence are defined in the Organic Law of Georgia on the National Bank of Georgia. Georgia's first central bank was established in 1919. In its current form the National Bank of Georgia exists since 1991.

The main objective of NBG is to maintain price stability, furthermore NBG supports financial system stability and provides supervision for banking system.

The monetary policy regime, to support NBG’s main objectives is inflation targeting with 3% inflation rate as a long term target. Developing countries generally are characterized by high inflation, according to the present situation of economy in Georgian, the inflation target is set for the medium term 5% for 2016 and 4% for 2017. NBG predicts to decrease its inflation target to the long term level – 3% for year 2018.

The main monetary policy instrument of NBG is the one week refinancing loans that are supplied to the commercial banks on the auction basis every Thursday. Besides, NBG uses minimal required reserves, open market operation and overnight loans and overnight deposit facilities as its monetary policy instruments. NBG plays role of lander of the last resorts and provides guaranteed refinancing loans.

After independence of Georgia and rehabilitation of existence of central bank, NBG's operations and development was not smooth, similarly as development of the whole country. Political instability had direct influence of economic development and NBG's operations as well. Thus monetary policy in early 1990s was strongly influenced by politics and central bank's activities were in dissonance with general accepted principals of monetary authorities. Alongside with operational independence there was issues in personnel independence as well, from 1991 to 1995 central banks of Georgia had 5 heads of board (Tuchiashvili E., 2016).

Georgian Lari (GEL) as a national currency was adopted in 1995. Before, main currency in the country was Coupon. Coupons were temporary means of payment, not national currency. Coupons rate experienced strong fluctuations in 1993 and was sharply depreciated to US dollar. At the same period, central bank used to provide large amount of loans[18] to non-banking institutes and companies, that were managed by politicians or related persons. Clearly decisions to credit them were forced by political powers. As a consequence of these actions, in 1993 strong inflationary pressures appeared on the market and at the end of the year inflation rate was 50-60%. 1994 was the year of hyperinflation. In the fall of 2014, 1 US dollar was approximately 2.4 million Coupon. Even 1 000 000 nominal banknotes were issued.

From 1995 Georgian Lari was issued in circulation and rate toward Coupon was 1 GEL = 1million Coupon. Exchange rate to US Dollar was fixed on the level of 1.3 GEL and it was kept with small fluctuations till 1998.

This period was hard for the whole history of Georgia, with civil war and unstable political movements, indeed it had influence on the central banks activities, which were aambiguous.

[18] Exact numbers and creditors are still unknown to the wide public, estimated amount of credits are hundreds of billions of Coupons.

Considering all the facts, I have described, central banks financial performance was absolutely irrelevant for monetary policy development in 1990s. Moreover, from this period, not a lot of academic papers or researches are done, statistical data is not available, and even if I personally consider, that this period was very interesting and important, with all positive and negative sides of central banking development, for the purpose of my thesis, I decided to skip it and analyze central banks financial performance from early 2000s.

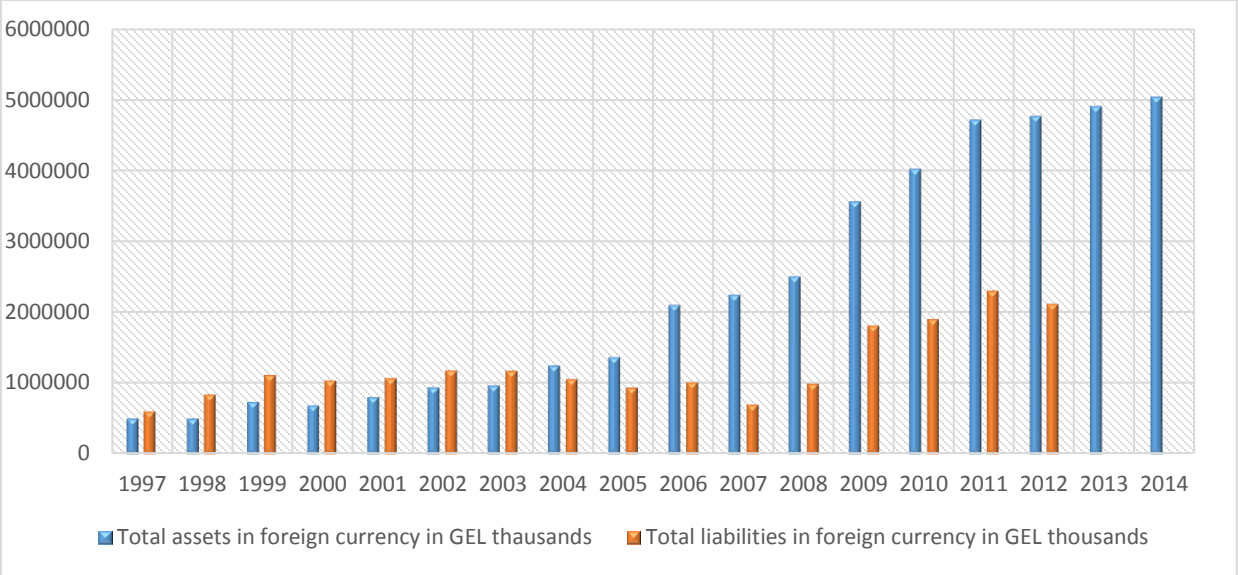
5.2 NBG's financial performance

Main objective of NBG is to ensure the price stability in the market. From the year 2009, NBG tries to meet its objectives via inflation targeting, before this monetary regime of NBG was monetary targeting.

In the transition economy, under the conditions of undeveloped financial markets, high levels of dollarization, corruption and budgetary crisis ensuring price stability via monetary instruments was rather complicated task. Policy implementation and efficiency of monetary instruments were largely influenced by overall macroeconomic environment. Undeveloped and illiquid financial markets restricted utilization of market-based mechanisms of monetary regulation. As a result, for the purpose of liquidity management the NBG mostly used direct crediting of the government and reserve requirements, as well as one-sided foreign currency interventions (purchase of foreign exchange only).

Balance sheet structure of NBG in reviewed period was different than in the Czech National bank. Foreign currency assets reached 50% percent and liabilities in foreign currency were exceeding assets (61%). NBG was operating till 2004 with short open position facing the exchange rate risk from depreciation of domestic currency.

Figure 16 Foreign assets and liabilities in NBG's balance sheet, thousands in GEL



Source: NBG, annual reports

Different structure had, clearly, different effects on financial development of NBG. Significant part of interest bearing liabilities were in foreign currency. As inflation rate was higher in Georgia[19] than in developed countries, interest payment on foreign liabilities were lower than on the liabilities denominated in domestic currency. In turn, larger part of domestic assets generated higher interest incomes for national bank, as assets denominated in national currency were bearing higher interest than assets in US Dollar.

[19] For main macroeconomic data, see appendix 2.

Table 9 Ratio of foreign assets and liabilities to balance sheet sum

	Ratio of assets in foreign currency to total assets	Ratio of liabilities in foreign currency to total assets		Ratio of assets in foreign currency to total assets	Ratio of liabilities in foreign currency to total assets
1997	50.6%	60.7%	**2006**	70.7%	34.0%
1998	42.3%	70.4%	**2007**	71.5%	22.2%
1999	48.1%	72.9%	**2008**	70.9%	28.1%
2000	44.6%	67.2%	**2009**	80.9%	41.1%
2001	50.1%	66.2%	**2010**	81.0%	38.3%
2002	53.4%	66.6%	**2011**	85.8%	41.9%
2003	52.5%	63.6%	**2012**	82.5%	36.6%
2004	58.4%	49.3%	**2013**	83.1%	41.3%
2005	60.8%	41.7%	**2014**	79.4%	31.3%

Source: NBG, annual reports

Despite the NBGs tough historical experience, its financial performance has never been question of wide discussions. Annual reports and general information about NBG is available only from 1997 and in contrast with Czech National Bank, central bank of Georgia has never had large amount of losses that could have caused negative worth of capital or some technical problems of insolvency.

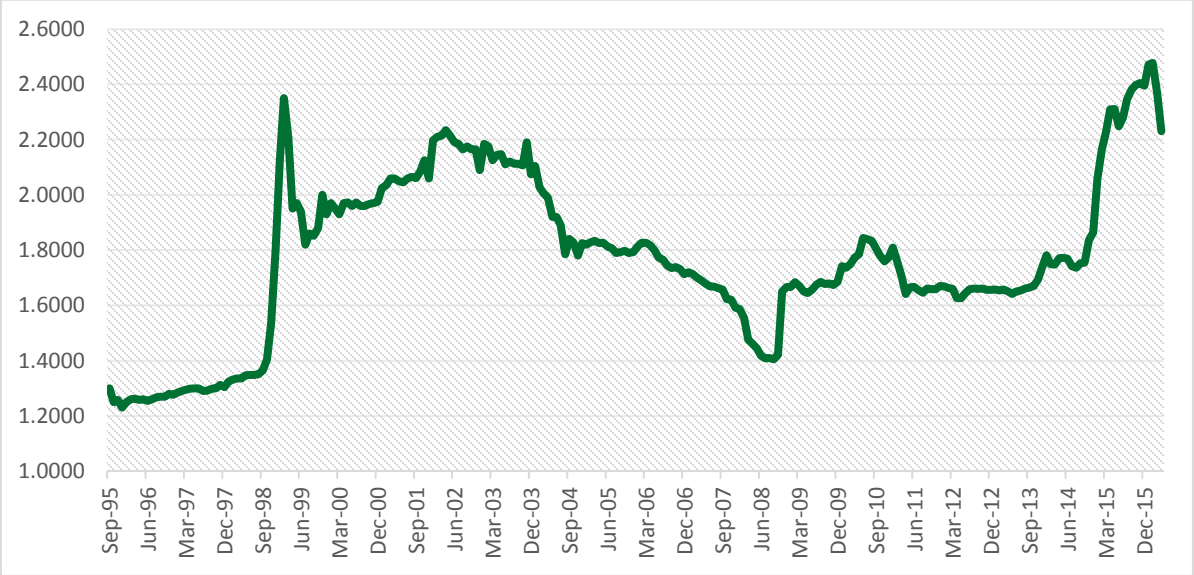
Figure 17 Financial results (left axes) and accumulated results (right axes) of NBG, in thousand GEL

Source: NBG, annual reports

First large amount of losses has been reported in 1998, when main source of this unfavorable financial results were due to the depreciation of the value of the Lari by some 38% against the USD during the year, the NBG has incurred a loss of Lari 128.8 million.

It is worth mentioning, that in accordance with the law on NBG, gains and losses from foreign exchange rate and gold are not included in profit and loss and remain in the gold and foreign exchange assets revaluation reserve. Net gains will be used to cover any net future losses to the extent that they are available. Besides, In accordance with Article 23 of the Law on the NBG, whenever the value of the NBG's assets fall below the sum of its liabilities and its unimpaired capital and reserve Notes to the Annual Financial Statements 48 National Bank of Georgia 1998 Annual Report fund, the Ministry of Finance shall deliver government securities as necessary to remedy the deficit. However, in 1996 NBG adopted accounting principles in accordance with International Accounting Standards (IAS). Thus, under IAS revaluation losses in 1998 were recorded in the profit and loss account. Nowadays, central bank of Georgia follows IFRS standards.

Figure 18 GEL/USD exchange rate on monthly basis



Source: NBG statistics

So combination of balance sheet structure on the figure 17 and exchange rate development on figure 18 created losses in 1998 but in long term, NBG accumulated big amount of profit, which was used to cover past losses, create reserves against revaluation losses and remaining was distributed to treasury.

From 1998, more than decade NBG was running with positive financial results. (See figure XX) Even there were fluctuations in financial performance, during 12 years, NBG accumulated large amount of profits. Significant share of it was distributed to the treasury.

The main sources of profits were interest incomes, mostly offset by revaluation losses from the foreign investments. Thus, present situation slightly differs from the historical one, as the structure of balance sheet changed during the time and from 2014 GEL depreciates.

From the beginning of new millennia the main purpose of NBG's activities was creation of conditions for ensuring economic growth, containment of inflationary growth and stability of the foreign exchange rate. As it was mentioned, due to the undeveloped financial and banking system, NBG was limited in usage of monetary policy instruments. The main channel to supply money into the market was direct crediting of the government and some strategically important segments of economy, such for example energy sector. The credits in 1999 were issued at an annual interest rate at 12% and mostly were used for servicing foreign debt of the country. That mechanism of debt management ensured non-inflationary nature of government crediting. Through at the same time, it led to the reduction of official foreign exchange reserves. However, government crediting was contributing largely to the profitability of NBG due to interest incomes. Net interest income ratio to the net total income in 2000 and in 2001 was 1.13 and 1.28 accordingly[20].

Credits to commercial banks were provided by the national bank of Georgia through interbank credit auctions and only to the banks in financial difficulties. NBG performed its function of a lender of last resort. Credit auctions were held only in Georgian Lari, so it represented an important regulator of liquidity in national currency. Due to the fact, that Georgian financial market at this time was illiquid, undeveloped and non-integrated, even small mismatch between demand and supply on the market could lead to high fluctuation in interest rates. Thus NBG often intervened in auctions to smooth interest rates fluctuates.

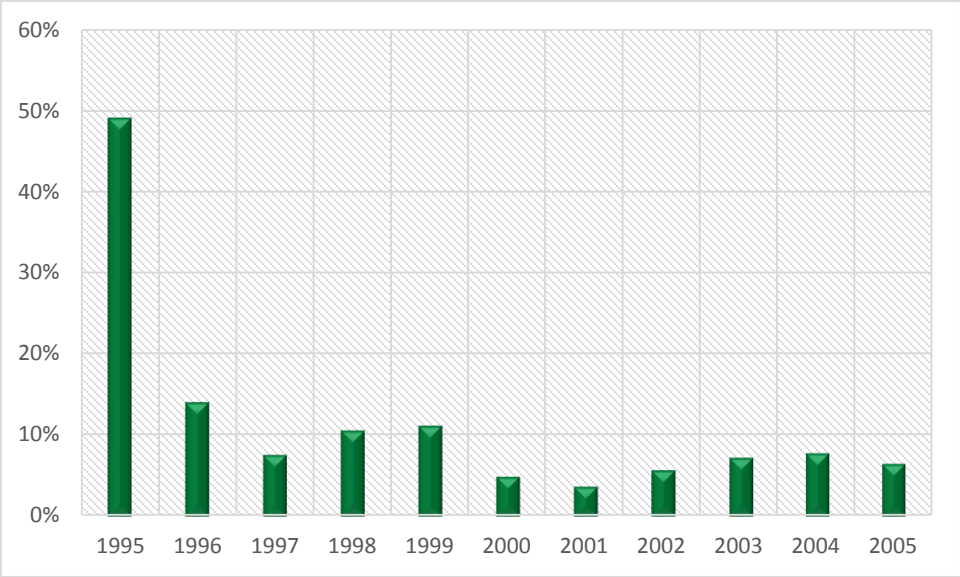
Minimum reserve requirements were set on 16%, but in order to promote banking activities, it was gradually by 1 p.p. decreased to the 14%. To avoid commercial banks losses due to inflation and exchange rate changes required reserves were remunerated by 8%, (projected

[20] Ration of net interest income to the net total income, excluding foreign reserve revaluation losses.

inflation rate). Taking into the account, that during first three quarters price level increased only by 0.4% and inflation projection were revised to 5-6%, reserve rumination was stopped from the October in 2000. Total interest expenses paid on required reserved during the year was 2 million Lari.

Main macroeconomic trend from new millennia was decreasing in inflation rate and nominal appreciation of national currency, consequently real exchange rate of GEL was appreciating. Exchange rate development, clearly had positive effect for the whole economy. Strengthen of domestic currency supported development of export and at the same time limited export as a relative prices of imported goods rose against those of domestic goods.

Figure 19 Inflation rates in Georgia from 1995 - 2005



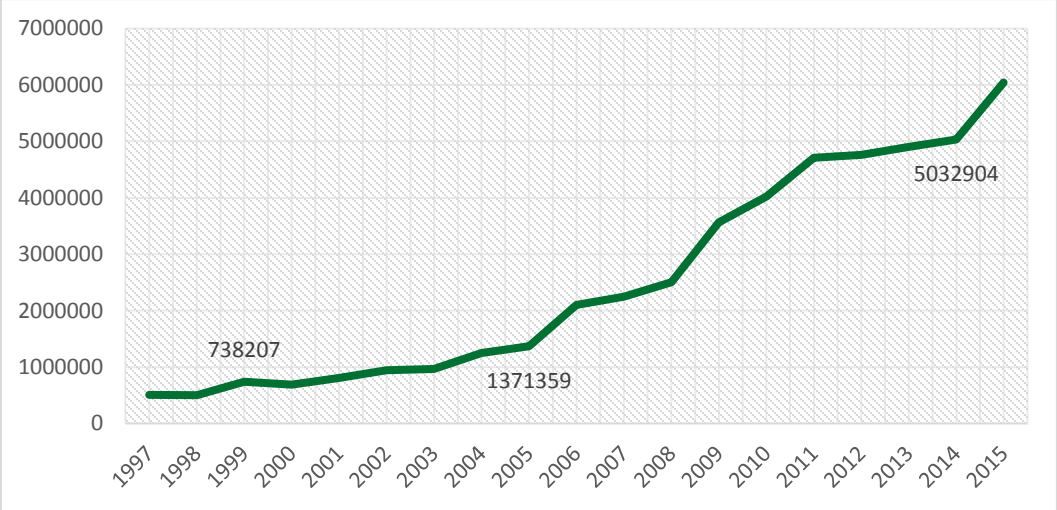
Source: NBG, annual reports

Back up trend of national currency appreciation was rise in foreign investment inflows. Foreign exchange policy of the National Bank of Georgia was still focused on maintaining stable nominal exchange rate of lari under the floating exchange rate regime and ensuring real exchange rate dynamics favorable for international competitiveness of the country.

The stability of the nominal exchange rate of lari was particularly important due to its influence on the price level. Stable exchange rate decreased the level of risk for owners of assets denominated in national currency and created favorable preconditions for development of financial markets in Georgia.

One of the main objectives of exchange rate policy, besides having stable exchange rate, was accumulation of foreign reserves, which is essential for external debt servicing and for central bank's image. High level of foreign reserves serve as a positive psychological background as a guarantee of financial stability.

Figure 20 Foreign reserves accumulation from 1997 to 2015in GEL thousands



Source: NBG, annual reports

Financial performance of NBG was consistent with its monetary policy and instruments, positive balance of interest incomes and expenses was decreased by losses from exchange reserve revaluation.

2003 was marked with some important innovations and development in monetary policy instruments. Overnight deposits and credit mechanisms were introduced, inter-banking credit auctions moved to daily base and rules on minimum required reserves became more liberal. Interventions in inter banking credit auctions and lending to the ministry of finance were kept as an instruments for short term liquidity management. Unsterilized interventions in foreign exchange market was used to supply liquidity in the market as well.

International capital inflow has being rising, that created additional misbalance on the domestic exchange balance, which was adjusted by floating exchange rate of GEL. So basically national currency was strengthening. However, NBG was actively intervening on the market to avoid unjustified appreciation of lari, which jeopardize the competitiveness of Georgian export goods. In that period, there was no defined exchange rate level that NBG was attempting to get, just to stabilize appreciation level. Foreign exchange policy was

oriented towards the competitiveness of countries economy by the monitoring of the real effective exchange rate.

One of the top priorities of foreign exchange policy to accumulate international reserves was remained. Year 2003 was the last year, when NBG had short position in foreign reserves, meaning that value of assets denominated in foreign currency was less than liabilities. From 2004 present NBG's foreign reserve balance is positive *(figure 16).*

Similar to the previous years, significant part of the profit was generated by interest incomes. Net interest income was fully enough to cover foreign reserve losses due to the changes in the national currency and to cover operational expenses, which were higher than the previous years. Main reason was increase in personnel expenses. Implementing new monetary policy instruments required new expertise and number of employees was increased.

Next several years after 2003 was full of reforms and political changes in the country. New government tried to create favorable conditions for business development, international investments, and fight against corrupts, in turn the policy had positive impact on capital inflows to the country. National currency was appreciating and during 3 years it has been strengthened from 2.1885 GEL/USD to 1.7242 GEL/USD. Central bank was actively participating in foreign exchange market and intervening against sharp appreciation of Geogian Lari. Foreign reserves increased and net position in foreign currency was positive. Thus, due to the domestic currency appreciation in nominal terms had negative impact on financial performance of NBG, as revaluation results were negative. Revaluation losses was fully offset by interest incomes during those years.

The main instrument of foreign exchange policy before 2006 was unsterilized interventions on the market. In 2006, international investments in Georgia hit its maximum, in order to protect Lari against unexpected and sharp appreciation, NBG had to intervene actively in large scales. Due to the high amount of interventions, money supply was higher than demand on the market and in order to avoid inflationary pressures, NBG started to sterilize market interventions. For this aim, NBG issued short term securities – NBG's deposit certificates with 3 and 6 month of maturity. Behind the main goal, issuance of short tern financial instruments aimed to support financial market expansion and development. Issuance of new securities was connected to additional expenses, for example organizational expenses as well as income expenses. So in 2007, net profit of NBG was almost half of the results from 2006.

The main events influencing central banks activities in 2008 was global financial crisis and military operations in Georgia. National bank of Georgia was forced to use all the instruments and tools to ensure financial stability in the country.

From 2009 Georgia moved to the new monetary regime – inflation targeting. NBG set as a target inflation rate 9% of CPI with +/- 2% deviation band. As a main monetary policy instrument was defined one week refinancing interest rate. Due to undeveloped money market in Georgia and high dollarization of the economy, interest rate transmition mechanism was not effective. Thus, NBG continued to actively use policy instruments for quantitative regulation of the monetary aggregates. Reserve money was used as an operational target and M2 represented an intermediate target.

It is clear, that actual inflation rate was considerably lower than inflation target at the end of 2009, determined at least by 2 factors. First, price decrease in the post war period was caused by demand contraction in the larger scale than expected, and secondly, impact of the global financial crisis and world economic collapse on the domestic market was solid. Thus monetary policy in this period was oriented towards economic stimulation.

Exchange rate policy remained to be important direction in the context of maintaining price stability. NBG was actively intervening in the exchange rate market, with the goal to avoid sharp movements of exchange rate rather than to change the exchange rate trend.

Year 2011 was exceptionally unsuccessful for NBGs financial results, it end up with losses in GEL -125,343 thousands. This result was mainly driven by revaluation of foreign reserves due to the changes in exchange rate. Main objective of exchange rate policy of NBG, started from 2010, wat to adopt gradually free floating exchange rate by reduction in FX intervention. In 2010-2011 the volume of the NBG's purchases/sales of foreign currency is approximately 4 times less than in 2008. The main goal is to enhance the exchange rate determination through market principles. As a result of the reforms exchange rate flexibility increased and the exchange rate gained the shock-absorbing function.

In the reporting period Lari showed strong appreciation trend. There were several factors determining those tendencies. Foreign currency loans were increasing at a faster rate than

Lari denominated loans in the first 2 month of the year, but NBG considered this process as temporary, followed by Lari depreciation, when loans' repayment, and used foreign currency perchance to avoid excessive short term appreciation of the exchange rate. The situation changed fundamentally during the next months. The 2011 was characterized with an increase in private capital inflows, as capital inflows through foreign direct investments rose 19%, tourism revenues recorded a considerable growth, increasing 42% in annual term, and also there was the rise in non-residents deposits, consequently Lari appreciated during the year by 6%.

Appreciation of nominal currency had negative effect of the value of foreign assets, thus revaluation losses reached GEL -132,332 thousands.

Moreover, in 2011 the NBG continued to issue the certificates of deposit, first in purpose to sterilize FX intervention and then to increase money market liquidity and support its development. In 2011 along with 3-month CDs, the NBG introduced CDs with 6-month maturity. The CDs were considered by the banking sector to be the most attractive short-term instrument. Throughout 2011 the annualized interest rate oscillated between 6.95% and 9.82%. Issuance of debt securities caused drastic increase in interest expenses, which 3 times more in 2011 than in past year. Thus total interest income was significantly decreased and could not absorb losses from foreign assets revaluation.

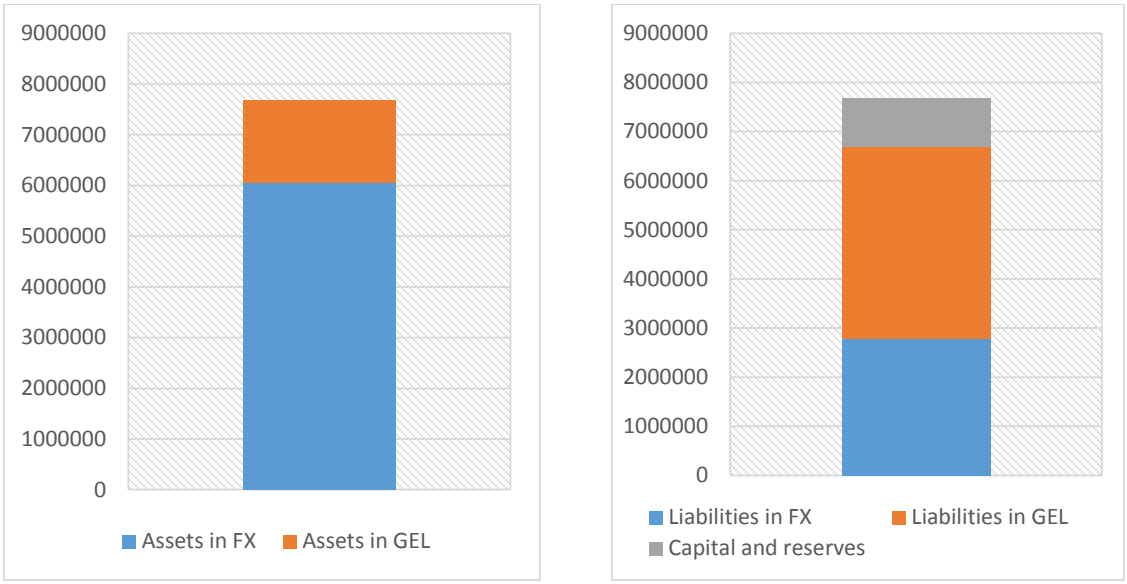
Despite the large financial losses in central banks income statement, monetary and exchange rate policy was evaluated very positively during 2011.

Next years were not somehow significant in terms of central banks financial performance. Combination of nominal exchange rate devaluation due to the external shocks and global appreciation of US dollar and increasing international reserves, created favorable bases for positive revaluation effects on NBG's financial results. Ratio of net interest incomes on overall result has been decreasing in favor of increasing share of revaluation gains. For the sake of objectivity must be said, that positive financial results of NBG was not positively correlated with monetary policy results, as due to the unexpected and sharp depreciation of national currency had large negative effect on economy and residents welfare. Credit dollarization is still high in the country, so for residents with incomes in national currency and liabilities in US Dollar Lari depreciation was strong financial burdens.

2015 was extremely positive for NBG's financial performance, thanks to large positive revaluation of foreign assets. Net income reached its historical maximum and run at GEL 724,506 thousands. Net interest income was positive but its contribution to financial result was insignificant.

Present structure of balance sheet of NBG is following:

Figure 21 Balance sheet structure of NBG, in 2015, in GEL thousands



Source: NBG, annual reports

Ratio of assets in foreign currency is higher than in the period, we started analyzing, and based on the experience of the Czech republic, it is justified to say, that actual structure of NBG's balance sheet is loss making. It creates potential for future losses, in case domestic currency will appreciate.

In case of Georgia, we apply the same method to calculate sensibility of NBG revaluation results as in section *4.6.1 threshold value of future losses.*

Calculate directly revaluation value of foreign reserves according to the actual structure is not possible due to the unavailable data. NBG does not report value of foreign reserves neither in EUR nor in USD.

Due to the same reason, mentioned in the previous paragraph, regression model cannot be constructed similar as in case of Czech national bank. Depended variable is NBG's

gain/losses from foreign currency, but we have only one independent variable in this case – exchange rate of Georgian lari.

$$Y = 12539 + 218047 \times X$$

Where,

Y - NBG financial results from revaluation of foreign assets in thousands lari.

X – Nominal change in the value of GEL/USD

Interpretation of the coefficient is the same as in case of CNB, appreciation of Georgian lari by 1 Gel toward USD can lead to the revaluation losses for NBG in value of 218 047 thousands lari.

Sensitivity of financial results of NBG to GEL/EUR exchange rate changes is lower than to GEL/USD, in difference with the case of NBG. Thus, GEL appreciation by 1 lari toward EUR can cause losses only in value of 94 243 thousands lari, according to the model bellow.

$$Y = 4989 + 94243 \times X$$

Where,

Y - NBG financial results from revaluation of foreign assets in thousands lari.

X – Nominal change in the value of GEL/USD

For the sake of objectivity, should be mentioned, that in case of opposite development of domestic currency i.e. depreciation of CZK or GEL can run the financial results in profit at the same amount.

Clearly, regression models, presented in this thesis are very simplified by assumptions and mainly due to the lack of available information. Moreover, time series, used to build model are very short to get quality results[21]. However, results are in line with rational judgement, of future face of central banks income statements depended on the exchange rate changes. Nevertheless, I consider, that these simple models provide good base for further analyses of the relationship of central banks' balance sheet structure and financial performance.

[21] For detailed review of regression models, see appendix 3

Conclusion

Central banks financial position and its corporate financial structure has received little attention while analyzing central banks abilities to meet monetary policy objectives. Only during last two decades central banks financial strength became more discussed question with greater focus on the central banks' balance sheet structure as a determinant of central banks financial performance.

We have discovered several reasons abstracting from any discussions about central bank's balance sheet and ignoring central bank's financial situation. First, financial performance is not relevant measurement of central bank's policy performance. Second, central banks finance (balance sheet size, profits or losses) play insignificant role within the consolidated public sector accounts and third, central banks legally cannot be announced as an insolvent institutes. As an empirical justification of not paying enough attention to central banks corporate finance structure can be fact, that leading, large central banks, for example FED, Bank of Canada, Bank of England or ECB, have never had financial straggles. Historically, those institutions are considered as a strong, independent institutions, with power to finance their losses, in case of need.

The primary goal of the thesis was to find out, how financial performance of central bank, precisely its profitability and net capital worth effects on the ability to deliver desired monetary policy results. First step of study is to find out, what does effect financial performance itself.

We came to conclusion, that Balance sheet structure directly affects central banks financial performance. By analyzing central banks' balance sheet, it becomes clear what risks does central bank face. Quality of securities in central banks' balance sheet, open positions in different currency and the way, how central bank finance its property have direct effect on financial results. From the other hand, balance sheet structure is designed by monetary policy goal and by the decision of central bank, what monetary policy tools to be used to achieve the objectives. Thus, from the central bank's point of view, its balance sheet structure is exogenous, determined by monetary policy goal. Central banks, primarily do not decide about balance sheet structure and take it as a given.

Basically, there is two main source of losses. Losses raised from quasi fiscal operations and losses from economic activities of CB. Losses from economic activities can be divided into two groups: first revaluation losses, which is described as an accounting loss, seen in Central banks accounting book and material losses, when for example, return on central bank assets are less than it pays on its liabilities. Usually losses are not the problem, until central bank equity becomes highly negative. Then, there is pressure on the CB to strengthen its capital. Solving negative capital problem may have impact on the attainment of central bank's policy objectives. I have found two main factors that could be negatively influenced, when CB tries to cover its losses. First is inflation and second institutional independence of Central banks.

Inflation channel works following: In modern banking system, where central bank and commercial banks face each other, there we can assume, with some objections, that losses in CB's balance sheet means profit for other commercial institutions. High profit and wealth in economic agencies create impulse to higher demand and subsequently create inflationary pressures. From the other hand, central banks cannot simultaneously cover its losses by issuing "new money" and meet its price stability objectives.

Legal acts about central banks precisely describes profit distribution rules for central banks, but rules for coverage of losses are ignored in most countries. When central banks losses give rise to negative capital, IMF recommended practice is to recapitalize the bank by injection of government securities. Financial assistance of government creates concerns about financial and thus operational **independence of central** banks and threatens its credibility. Independence is crucially important issue and basic condition for successful monetary policy.

As an aside negative effects of accumulated losses in central bank's balance sheet could be harm on public finance, damage of international image, losing trust in their devotion to follow their expansive monetary policy, as it generates negative financial results.

Empirical illustrations of central banks financial performance with simple regression models are provided on the example of the Czech Republic and Georgia. Given their balance sheet structure central banks financial results are sensible on foreign exchange rate changes and they potentially face future losses, when domestic currency appreciates. This conclusion is valid for both of the country, even if the historical development of their financial performance is radically different. To be more specific, numerical decrease of CZK/EUR exchange rate

by 1 CZK, which means appreciation of Czech crown, can generate 16.9 billion CZK losses on foreign reserves, when appreciation of GEL – 94243 thousands lari. Besides, balance sheets asset structure changes play role in case of Georgia.

Greater contribution of the thesis, for me, as for the author, is better understanding of the problem, having better overview and wide picture on the problem and mainly, deeper interest in learning more about central banking as a central institution of monetary economy and irreplaceable field of banking system. This thesis gives several possibilities, how the topic can be expanded and supplemented. For me, it is good inspiration for future possibility to study in more details and quantify relationship between independence and financial strength of central banks.

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Content of figures and tables

Abbreviation

AUD Australian Dollar

CB Central Bank

CHF Swiss Franc

CNB Czech National Bank

CZK Czech Koruna

ECB European Central Bank

ERDI exchange rate deviation index

EUR Euro

FED Federal Reserve System

GBP British Pound

GDP Gross domestic product

GEL Georgian Lari

JPY Japanese Yen

NBG National Bank of Georgia

OECD Organization for Economic Co-operation and Development

USD United States Dollar

Appendix 1 Structure of income statement of Czech national bank

1. **Interest income and similar income**
   1.1 Interest from fixed income securities
   1.2 Other
2. **Interest expense and similar expense**
3. **Income from shares and other interests**
4. **Fee and commission income**
5. **Fee and commission expense**
6. **Gains less losses from financial operations**
   6.1 Net foreign exchange gains / losses and foreign exchange spread
   6.2 Other
7. **Other operating income**
   7.1 Income from money issue
   7.2 . Other
8. **Other operating expense**
   8.1 Expenses for production of notes and coins
   8.2 Other
9. **Administration expense**
   9.1 Personnel expenses
      9.1.1 Wages and salaries
      9.1.2 Social and health security
      9.1.3 Training and employee benefits
   9.2 Other administration expenses
10. **Depreciation and amortisation of fixed assets**
11. **Reversal of provisions for receivables and guarantees, income from receivables already written off**
12. **Write offs, additions and utilisation of provisions for receivables and guarantees**
13. **Net loss / profit for the period**

Appendix 2 Basic macroeconomic data about Georgia

Nominal GDP

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
GDP (at current prices, mil. GEL)	3,868.5	4,554.9	5,022.1	5,668.7	6,043.1	6,674.0	7,456.0	8,564.1	9,824.3	11,620.9
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015***
GDP (at current prices, mil. GEL)	13,789.9	16,993.8	19,074.9	17,986.0	20,743.4	24,344.0	26,167.3	26,847.4	29,150.5	31,691.6

Balance of Payments of Georgia

(Million of USD)

	2000	2001	2002	2003	2004	2005	2006	2007
A. Current Account	-248.5	-242.0	-243.2	-394.2	-432.6	-771.7	-1256.9	-2122.3
B. Capital Account	12.4	13.5	18.6	19.9	40.7	58.6	169.0	127.9
C. Financial Account	97.1	72.6	105.5	385.6	545.5	742.7	1586.1	2324.2
D. Net Errors and Omissions	5.5	11.1	12.6	-3.4	15.3	26.5	-59.5	-36.0
Total, Groups A Through D	-133.5	-144.8	-106.5	7.8	168.9	56.2	438.7	293.9
E. Reserves and Related Items	133.5	144.8	106.5	-7.8	-168.9	-56.2	-438.7	-293.9
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
A. Current Account	-3135.4	-1243.9	-1326.6	-1962.2	-1918.3	-1016.5	-1833.7	-1745.8
B. Capital Account	114.3	182.9	206.4	153.2	133.5	134.1	109.7	63.5
C. Financial Account	2206.4	1149.8	991.1	2201.1	2011.0	1148.6	1774.9	1435.4
D. Net Errors and Omissions	-59.9	28.2	-33.0	15.0	-53.4	-41.7	-73.7	-85.8
Total, Groups A Through D	-874.7	117.0	-162.0	407.1	172.8	224.5	-22.9	-332.7
E. Reserves and Related Items	874.7	-117.0	162.0	-407.1	-172.8	-224.5	22.9	332.7

date	Annual Inflation (CPI Percentage Change over Corresponding Month of Previous Year),%	Inflation, Annual Average (12 months average), %
January-96	42.9	127.6
July-96	51.8	51.0
January-97	11.8	36.3
July-97	5.1	14.2
January-98	6.7	6.7
July-98	1.3	5.1
January-99	13.2	4.1
July-99	21.2	12.3
January-00	8.5	18.6
July-00	4.3	9.0
January-01	4.9	3.8
July-01	5.7	5.9
January-02	4.7	4.7
July-02	5.1	4.6
January-03	5.5	5.6
July-03	5.0	4.4
January-04	5.2	4.8
July-04	5.5	5.7
January-05	9.3	6.0
July-05	6.0	7.7
January-06	5.2	7.9
July-06	14.5	7.8
January-07	10.4	9.6
July-07	6.6	9.4
January-10	2.7	1.6
July-10	7.0	3.4
January-11	12.3	7.9
July-11	8.5	11.4
January-12	0.5	7.5
July-12	0.6	0.7
January-13	-1.6	-1.1
July-13	-0.2	-0.8
January-14	2.9	-0.1
July-14	2.8	1.8
January-15	1.4	2.9
July-15	4.9	3.1
January-16	5.6	4.4

date	monetary policy interest rate, %	1-day Loans Interest Rates TIBR1
29-Feb-08	11.00	8.63
30-Jun-08	12.00	12.95
31-Dec-08	8.00	8.01
30-Jun-09	6.00	3.88
31-Dec-09	5.00	3.96
30-Jun-10	6.25	5.86
31-Dec-10	7.50	7.52
30-Jun-11	8.00	7.82
30-Dec-11	6.75	6.27
31-Jul-12	5.75	5.25
31-Dec-12	5.25	4.5
28-Jun-13	4.00	3.73
31-Dec-13	3.75	3.5
30-Jun-14	4.00	3.98
31-Dec-14	4.00	4.04
31-Jul-15	5.50	6.13
31-Dec-15	8.00	8.72
29-Feb-16	8.00	8.74
28-Apr-16	7.50	7.17

Appendix 3 Regression model

Czech Republic

Dependent Variable: CNBFXLOSS
Method: Least Squares
Date: 05/31/16 Time: 22:56
Sample: 1998 2014
Included observations: 17

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-16178.46	8981.314	-1.801346	0.0932
CHANGES_IN_CZKEUR_FX	16906.24	5406.628	3.126947	0.0074
CHANGES_IN_RESERVE	6.242958	2.664823	2.342729	0.0344

R-squared	0.569437	Mean dependent var	-11084.59
Adjusted R-squared	0.507928	S.D. dependent var	35610.09
S.E. of regression	24979.71	Akaike info criterion	23.24830
Sum squared resid	8.74E+09	Schwarz criterion	23.39534
Log likelihood	-194.6106	Hannan-Quinn criter.	23.26292
F-statistic	9.257782	Durbin-Watson stat	2.166571
Prob(F-statistic)	0.002743		

Dependent Variable: CNBFXLOSS
Method: Least Squares
Date: 06/02/16 Time: 01:16
Sample: 1998 2014
Included observations: 17

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-11497.05	7167.715	-1.604006	0.1310
CHANGES_IN_CZKUSD_FX	9652.791	1990.308	4.849898	0.0003
CHANGES_IN_USD_RESERVES	2.818284	1.826643	1.542876	0.1452

R-squared	0.628475	Mean dependent var	-11084.59
Adjusted R-squared	0.575400	S.D. dependent var	35610.09
S.E. of regression	23204.00	Akaike info criterion	23.10082
Sum squared resid	7.54E+09	Schwarz criterion	23.24786
Log likelihood	-193.3570	Hannan-Quinn criter.	23.11544
F-statistic	11.84128	Durbin-Watson stat	2.120649
Prob(F-statistic)	0.000977		

Georgia

Dependent Variable: NBGFXLOSS
Method: Least Squares
Date: 06/02/16 Time: 01:47
Sample: 2002 2014
Included observations: 13

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4989.235	22881.19	0.218050	0.8314
GELERU_NOM_CHANGE	94243.40	109473.0	0.860883	0.4077

R-squared	0.063122	Mean dependent var	8228.308
Adjusted R-squared	-0.022049	S.D. dependent var	80493.72
S.E. of regression	81376.29	Akaike info criterion	25.59219
Sum squared resid	7.28E+10	Schwarz criterion	25.67911
Log likelihood	-164.3493	Hannan-Quinn criter.	25.57433
F-statistic	0.741119	Durbin-Watson stat	2.343268
Prob(F-statistic)	0.407676		

Dependent Variable: NBGFXLOSS
Method: Least Squares
Date: 06/02/16 Time: 01:46
Sample: 1999 2014
Included observations: 16

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12539.20	18801.50	0.666925	0.5157
GELUSD_NOM_CHANGE	218047.2	188740.6	1.155275	0.2673

R-squared	0.087035	Mean dependent var	13405.94
Adjusted R-squared	0.021824	S.D. dependent var	75979.76
S.E. of regression	75146.11	Akaike info criterion	25.40872
Sum squared resid	7.91E+10	Schwarz criterion	25.50530
Log likelihood	-201.2698	Hannan-Quinn criter.	25.41367
F-statistic	1.334659	Durbin-Watson stat	2.311686
Prob(F-statistic)	0.267315		