

Charles University in Prague

Faculty of Social Sciences
Institute of Economic Studies



MASTER'S THESIS

**Central Bank's Financial Strength and
Monetary Policy**

Author: [Bc. Jan Kadlec](#)

Supervisor: [doc. Mgr. Tomáš Holub Ph.D.](#)

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Declaration of Authorship

The author hereby declares that he compiled this thesis independently, using only the listed resources and literature, and the thesis has not been used to obtain a different or the same degree.

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Prague, May 14, 2015

Signature

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Abstract

The objective of this thesis is to see how effectively can central banks can conduct monetary policy under specific circumstances. Four hypothesis are being examined on the case study of five central banks - the Czech National Bank, the Central Bank of Chile, the Bank of Jamaica, the Central Bank of Argentina and the Swiss National Bank. Firstly this work confirms that solid monetary policy can be applied even if CB is dealing with loss based on inflation targeting success rate of central banks. Secondly, in the case of Czech National Bank using VAR, was concluded that inflation expectations can influence the outcome of CB's monetary policy. In the second part of this hypothesis the expectations from the government side in SNB case were examined. On the case of Argentina the negative effect of adjusting monetary policy was demonstrated. The last part elaborates on the topic of determining optimal capitalisation of central bank.

JEL Classification [E27, E42, E5](#)

Keywords central bank, monetary policy, financial strength, Czech National Bank, Central Bank of Chile, Bank of Jamaica, Central Bank of Argentina, Swiss National Bank

Author's e-mail jan.kadlec@foxtron.cz

Supervisor's e-mail Tomas.Holub@cnb.cz

Abstrakt

Cílem této diplomové práce je zjistit, jak efektivně mohou centrální banky vykonávat jejich monetární politiku za určitých podmínek. Byly zkoumány čtyři hypotézy na případové studii pěti centrálních bank - České Národní Bance, Centrální Bance v Chile, Jamaiské Bance, Centrální Bance Argentiny a Švýcarské Národní Bance. Nejdříve se potvrdilo, že se dá vykonávat úspěšná monetární politika přesto, že je centrální banka ve ztrátě pomocí úspěšnosti v cíování inflace centrálních bank. Zadruhé se na případu České Národní Banky potvrdilo pomocí VAR modelu, že inflační očekávání mohou ovlivnit výsledek monetární politiky centrální banky. Ve druhé části této hypotézy pak byla zkoumána očekávání ze strany vlády v případě Švýcarské Národní Banky. Na případu Argentiny jsme si pak ukázali negativní efekt přizpůsobování monetární politiky. Poslední část rozebírá faktory určující optimální kapitalizaci centrální banky.

JEL Klasifikace

[E27, E42, E5](#)

Klíčová slova

centrální banka, monetární politika, finanční síla, Česká Národní Banka, Centrální Banka v Chile, Jamaiská Banka, Centrální Banka Argentiny, Švýcarská Národní Banka

E-mail autora

jan.kadlec@foxtron.cz

E-mail vedoucího práce

Tomas.Holub@cnb.cz

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Acronyms

ARS	Argentine Peso
BCB	Central Bank of Brazil
BIS	Bank for International Settlements
BoJ	Bank of Jamaica
CB	Central bank
CBoA	Central Bank of Argentina
CBoC	Central Bank of Chile
CNB	Czech National Bank
CPI	Consumer price Index
CPIad	Administrative CPI
CPIen	Energy CPI
CPIfo	Food CPI
CPIfork	CPI forecast
CZK	Czech Crown
exrate	Exchange rate
FX	Foreign exchange
GDP	Gross domestic product
GOJ	Government of Jamaica
HNB	Hungarian National Bank
CHF	Swiss Franc
IMF	International Monetary Fund
inrate	Interest rate
ITS	Inflation Targeting Success rate
LFI	Local financial institution
LIBOR	London Interbank Offered Rate
MP	Monetary policy
NB	Norway Bank
NBP	National Bank of Poland
REPO	Repurchase agreement
SDR	Special drawing rights
SNB	Swiss National Bank
SWIFT	Society for Worldwide Interbank Financial Telecommunication
VAR	Vector auto regression
VAT	Value added tax

Master's Thesis Proposal

Institute of Economic Studies
Faculty of Social Sciences
Charles University in Prague



Author:	Bc. Jan Kadlec	Supervisor:	Doc. Mgr. Tomáš Holub Ph.D.
E-mail:	kenny0518@seznam.cz	E-mail:	Tomas.Holub@cnb.cz
Phone:	777933397	Phone:	
Specialization:	C (Evropská ekonomická integrace) Defense Planned: January 2015		

Proposed Topic:

Central Banks Financial Strength and Monetary policy – case studies

Topic Characteristics:

CB are different from other private financial institutions. They can drive their accounting equity negative and still continue to function successfully. In this master thesis I will describe five different central banks – their behavior, monetary policy and most importantly the level of successful operating with negative equity and/or accounting losses. Those five countries will be divided into 2 groups and one special case. First group will be countries (Chile and Czech Republic) which are able to handle deficit better than the second group (Jamaica and Argentina). Special case will be Switzerland which is not operating with deficit, but it got into accounting losses in some years, which have led to political-economy problems because of government expectations. Apart of brief description of those central banks this work will show how the shift in the level of available CBs finances will change the opportunity to execute its policy successfully. There are a lot more factors that contribute to performing desired policy such as expectation and pressure from government, different financial buffers in various times, adjusting various factors according to current and future situation, etc.

Hypotheses:

1. Hypothesis #1: Solid monetary policy can be applied even if CB is dealing with loss.
2. Hypothesis #2: Expectations can strongly influence the outcome of CB monetary policy
3. Hypothesis #3: Financial strength of central banks can be obtained by adjusting monetary policy, but this is typically not the preferred solution, as it may be in conflict with the price stability objective.
4. Hypothesis #4: There is no optimal capital level which will guarantee the proper function of every CB.

Methodology:

Since this work will be in a form of case study I will firstly elaborate each central bank separately. I will describe the history and developments of monetary policy and central bank finances and their implications. In the second part there will be comparison between those policies and outcomes. In first four steps I will compare losses of central banks, inflation in given country, seigniorage and exchange rate development. The used data will be since 1990s till 2012. Finally I will Compare observance of planned monetary policy and if previously mentioned data do affect it.

Outline:

1. Description of each Central banks
 - (a) Bank of Jamaica
 - (b) Central bank of Argentina
 - (c) Central bank of Chile
 - (d) Czech national bank
 - (e) Swiss national bank
2. Comparison of the data
 - (a) Losses of Central banks
 - (b) Inflation measurement
 - (c) Money seigniorage
 - (d) Exchange rate development
 - (e) Observance of planned monetary policy based on mentioned factors
3. Conclusion

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Author

Supervisor

1 Introduction

Nearly every state has its own central bank. The main purpose of these banks is to take care of financial well-being of its citizens, which means that central banking influences all of us. This may not be obvious and many common people are not interested in the behavior of their central bank. This could be mistake and there should be more concern from the side of the public. This work will provide information about five central banks and about how successful they are in pursuing their goals in the form of case study. The selected banks are the Czech National Bank, the Central Bank of Chile, the Bank of Jamaica, the Central Bank of Argentina and the Swiss National Bank. These banks were selected based on several criteria. First three of central banks experienced losses in this century and they are forced to operate with a deficit. CBoA exhibits surplus, but they experienced huge financial instability. The Swiss national bank was chosen as a special case. The SNB operates with profit, but it also experienced some economical turbulences even though it is not performing poorly. Four of the selected central banks are inflation targeting, but they all have slightly different approaches.

Four hypothesis have been presented whose aim is to examine financial strength and monetary policy success rate of central banks. The first hypothesis, Solid monetary policy, which can be applied even if central bank is dealing with loss, elaborates the possibility for central bank to experience consistent losses and negative equity and still be able to deliver monetary policy target as promised. We will see whether the central banks are dealing with constant deficit and we will calculate the success rate of their monetary policy efforts. Since tfour of the selected central banks target inflation, we will use inflation targeting as the measurement of meeting the given objectives. Special Inflation Targeting Success rate index was developed for this work to prove or disprove this hypothesis. The second hypothesis, Expectations can strongly influence the outcome of the CB monetary policy, will be examined from two points of view. Firstly, as inflation expectations which will be supported by empirical evidence. Using vector auto regression the effect of shocks in expectations to several inflation variables will be examined. The second part will deal with the expectations from the government side using the case study of SNB. The third hypothesis, Financial strength of CB can be obtained by adjusting MP, which is

typically not the preferred solution as it may be in conflict with the price stability objective, will research whether there is a correlation between seigniorage and inflation and provides possible reasons for excessive seigniorage. Since Argentina has had issues with inflation for the past several decades, this part will focus mainly on this country. In this part we will use Pearson's Correlation. The last hypothesis, There is no optimal capital level which will guarantee the proper function of every CB, will examine the level of capitalization which is needed for the optimal function of the central bank.

The thesis is structured as follows. In the first part this work will provide the literature review of relevant sources related to our topic. In the second part we will have a look on individual central banks and see their monetary policy development and current monetary policy. This is important in order to understand the behavior of central banks. In each case a balance sheet decomposition will be provided to see how the assets and liabilities are divided and which risks the central banks are facing. The first half of this thesis will be more descriptive than the second half in order to provide the reader with insight. The second half will focus solely on the proposed hypotheses and examine them one by one. The methodology will be explained with each hypothesis. The conclusion is provided at the end.

2 Literature Review

The composition of following literature review will trace the thesis structure. First of all we will take a look on the sources directly related to each central bank. In the second part the sources related to each hypothesis will be reviewed separately.

First of all, we have to look directly at the websites of each central bank. These websites contain the necessary data for research in this thesis. We can divide the first part into two major areas: Monetary policy of each CB (including MP history) and annual reports. Monetary policy and its goals are described on all of the websites. Most extensive information are provided by CNB, CBoC, BOJ and SNB. On the other hand, the CBoA has insufficient information which are hard to find because of the instability of its website. Other sources related to monetary policy are laws e.g. Law nr. 6/1993 Sb., about CNB. As the only bank, CNB has all objectives and history completely accessible online. The other banks offer pdf pamphlets all of which have a similar structure. The SNB's one is called "The Swiss national Bank in Brief", the Chilean is called "Central Bank of Chile: Monetary Policy in an Inflation Targeting Framework", the Jamaica's one was written by Lattie, C. (2000) and has the title "Monetary Policy Management in Jamaica" and the Argentina's is called "Central Bank of Argentina - Targets and programs for the development of monetary, financial, credit and exchange policies". They all contain monetary policy framework and its implementation. Chile also has its macroeconomic environment, transparency and communication described in its pamphlet. Argentina also has an addition in the form of macroeconomic environment background. There are some unofficial sources which describe the history of given monetary policies. Two of the best publications related to this topic are Caputo R., D. Saravia (2014): "The Fiscal and Monetary History of Chile 1960-2010" and Buera, F., J. P. Nicolini (2011): "The Fiscal and Monetary History of Argentina 1960-2007". It is also worth mentioning older papers written by Lim, G. L. (1991): "Jamaica's financial system: It's Historical Development".

Each CB publishes annual reports with vital information related to this work. Some of the CBs also publish reports with higher frequency but most comprehensive are the annual ones. The CNB starts its report with balance sheet and income statement followed by the structure of the CNB. In the second part, the accounting

policies are explained and closely examined. At the end of the report, independent auditor's report is attached. The CBoA has the similar structure of the annual report: Financial statements at the beginning followed by explanation of financial items. Unlike the CNB, in the independent auditor's opinion is missing in the Argentina's report. Two of the most extensive annual reports are Jamaica's and Chile's. CBoC starts with an economic overview with brief balance sheet. In the second part it describes institutional management and the governance of the bank. Full financial statement is nearly at the end of the report followed only by the auditor's report. There are also some appendices included which are mainly composed of press releases. Jamaica publishes a very detailed report. In the first part, the role and function of this central bank is described followed by the economy and monetary policy review. This review focused apart from domestic situation also on the markets abroad. The next part examines the financial market operations used by the central bank. This report also includes the part related to the payment system oversight, banking and depository services. In the second half of this annual report administration and governance of CBoJ is being described and the future objectives are stated. At the end of this pamphlet the auditor's report and full financial statements are included. The SNB has the most brief and simple annual report. It contains only financial statements and explanation of its items. The auditor's report is included at the end as is the case with other banks.

In the following part literature related to each hypothesis will be reviewed. The data to support the hypotheses were partially used from annual reports described previously. Let us start with hypothesis 1. - Solid monetary policy can be applied even if CB is dealing with loss. There are several papers which examine the relationship between outcome of monetary policy and the financial strength of central banks. The most active author in this area is Peter Stella who wrote several papers related to this topic. One of the Stella (2008) conclusions is that measures of private enterprises' financial strength, profitability and capital can be very misleading and cannot be applied in the same way to the central banks. However, there is lack of the econometric evidence to support this hypothesis. In the next paper written by Klüh and Stella (2008) the authors provide empirical analysis between central banks' financial strength and policy performance, in this case inflation. They found negative relationship between those measures, but they also conclude that it would have to be huge worsening in CB's balance sheet to decrease inflation significantly. In the paper of Frait (2005), the author examines whether there is a problem with negative central

bank capital. This article concludes that it strongly depends on the source of underlying losses and the negative capital does not mean potential illiquidity nor insolvency unless the values are extremely high. Also the loss cannot undermine the credibility of the central bank's monetary policy. Another paper by Dalton & Dziobek (2005) is in the form of case study. It discusses the impact of losses on central banks in six particular cases. It concludes that losses should be reflected immediately in the financial accounts as they appear and suggests several accounting methods of losses. The next IMF working paper written by Stella (1997) examines whether the central bank needs capital. This paper points out that the CB can operate with negative worth, but large deficit can compromise central bank's independence and therefore jeopardize its monetary policy objectives. Reis (2012) also examines whether central banks are able to cope with losses and he draws a conclusion that losses must be met with seigniorage which can lead to higher inflation (but not necessarily).

Hypothesis 2. states that expectations can strongly influence the outcome of the CB monetary policy. The most substantial paper for the first part of this hypothesis is the one of Holub & Hurník (2008). This paper examines the effects of inflationary shocks on inflation expectations using the structural VAR model. It focuses on the first ten years of inflation targeting regime in the Czech Republic. From this example, the authors conclude that inflation targeting regime has successfully anchored the inflation. There are relatively low magnitudes of inflation expectation responses compared to the actual inflationary effect of shocks. Much of the paper deals directly with central bank transparency as it might be closely related to the inflation expectations and especially to anchoring them. Dincer & Eichengreen (2009) examined a pool of 100 central banks. Their main idea was to see the consequences of monetary policy transparency. They draw several conclusions from their econometric research. The central banks are far more transparent than they used to be and they tend to be transparent more in democratic countries with strong and stable political situations. More transparent monetary policy is also correlated with higher inflation stability. Another important paper related to this topic is Neuenkirch's (2010). The author examines the influence of central banks transparency on the expectations on the money market. Similar conclusions as Neuenkirch (2010) were found. The transparency of CB reduces the bias on the money market expectations and lowers their variation. Davis, Mack & Wynne wrote a short paper where they found out that there is statistical correlation between the level of policy transparency and anchoring the inflation expectations. The following papers both focus on the role

of expectations. Dermittis (2006) concludes that explicit quantitative targets are important in the implementation of monetary policy. Audzei (2012) used the DSGE model to simulate the exceptional shock adjusted by the values observed in the financial crisis. The conclusion of this paper is that exceptional shocks themselves could generate a recession comparable with recent crisis. Eusepi & Preston (2007) analyze the level of central bank's communication in the implementation of monetary policy. The major discovery of this paper is that announcing inflation target is not enough to stabilize expectations and CB should also announce the way how the target will be achieved.

In the second half of this part the most relevant sources are those which focus on the dividends of SNB and the reason why they stopped being paid. The first paper was presented as a speech by Studer (2014) on the SNB shareholders meeting. He announced that there will be no dividends and also explained the reason. Two major factors contributed to this unpopular move, the decrease of the gold price and the shift in exchange rate. Three following articles examine the impact of reduction of transfers to cantons. Allen (2011) states that the amount which cantons receive from SNB is small, but substantial for its budget. Hirst (2015) reveals the effort of SNB to restore the dividends payment by abandoning the currency peg. The outcome of this step was different than expected and SNB found itself in larger deficit. Hurst & Rühl (2015) point out that the financial situation of cantons has worsen since the dividends payment stopped.

Hypothesis 3. Financial strength of CB can be obtained by adjusting MP, presents a solution which is typically not preferred as it may be in conflict with the price stability objective. Three major areas of papers are related to this topic. Firstly, it is the monetary history of Argentina; secondly, financial strength of central banks and lastly seigniorage and its possible results. Buera & Nicolini (2011) use budget constraint of the government as the framework to explain the macroeconomic history of Argentina. This work argues that the contingent debt played a substantial role in economic problems and the financial position of the government. Basco & D'Amato (2006) examine the relationship between money growth and inflation in Argentina. They found out that money velocity correlates with inflation in the long run. Regarding the financial strength of the central bank Benecká, Holub, Kadlčáková & Kubicová (2012) examine whether there is a link between financial strength and inflation. They conclude that there is a link between those two variables, but it is rather weak and not significant. As mentioned before, Peter Stella wrote several

papers related to this topic. There have been written many studies concerning the seigniorage topic. Aisen & Veiga (2007) examined 100 countries and their political and institutional determinants of seigniorage. Estimation shows that there is higher seigniorage in political instable and developing countries. Fielding & Mizen (2000) concluded that if there is any value attached to the seigniorage revenue then there will be an inevitable collapse some day.

Hypothesis 4. There is no optimal capital level which will guarantee the proper function of every CB. Archer & Moser-Boehm (2013) elaborate central bank finances. They draw several conclusions. Central banks strive for national welfare and not for profits, so financial results should not be a measurement of their success. It is difficult to determine the level of capital backing which a given central bank needs in the present and it is even more difficult to predict it in the future. Finally, the level of capital which CB needs can be lowered by transparency and openness to the stakeholders and observers. Adler, Castro & Tovar (2012) examine whether the amount of capital of the central bank affects monetary policy. Findings of this paper suggest that weak central bank balance sheet can influence the ability to conduct monetary policy properly. Large deviations from the MP goal are correlated with weak balance sheets.

3 Descriptive Part

At the beginning of this thesis we must define the term financial strength in this work. It is the level of constraint caused by the financial situation which the CB is facing when conducting its goals and policies. The financially stronger the CB is, the less constraints it is facing. If the bank is financially weak it often leads to macroeconomically unstable environment caused by losses generated by the central bank. Another remark relates to the accounting principles of central banks. There is no unified accounting standard which allows an individual central bank to modify its balance sheet and therefore misrepresent its results. In this thesis balance sheets presented officially by individual central banks are taken in account.

3.1 Czech Republic

3.1.1 Monetary Policy History

After the Velvet revolution in 1989 the transformation from central planning economy to the market economy was commenced in Czechoslovakia. Standard market mechanisms started to be applied. The liberalization of prices caused a steep increase in inflation. The main goal of the State bank of Czechoslovakia was to maintain the stability of domestic prices and the exchange rate. This goal was achieved by targeting the amount of money in economy and maintaining a fixed exchange rate. When Czechoslovakia split, two independent national banks were established. On January 1st 1993 the Czech national bank (CNB) started to operate and has maintained its formal structure to the present day. Nevertheless, soon after it was established it found out that the existing monetary approach was unsustainable. Due to speculative attacks on the Czech crown, Czech national bank was forced to leave the fixed exchange rate regime in 1997. Inflation targeting regime was implemented in 1998 and has been in effect until today (2014). It has led to a successful decrease of inflation. CNB improved the inflation targeting over time thanks to better analytical and forecasting tools. In 2004 Czech Republic joined the European union and committed to adopt Euro in the future.

3.1.2 Current monetary policy

The Constitution of Czech Republic and the Act on the Czech National Bank states that main goal of CNB is to maintain price stability¹. The secondary goal is to support general economic policy of the government (if it is not contradictory with the main goal). The main goal is achieved by adjusting monetary conditions by using their tools – especially basic interest rates. Decisions of the CNB board are based on current macroeconomic forecasts. In the following section, this work will describe the role of monetary policy and the definition of price stability.

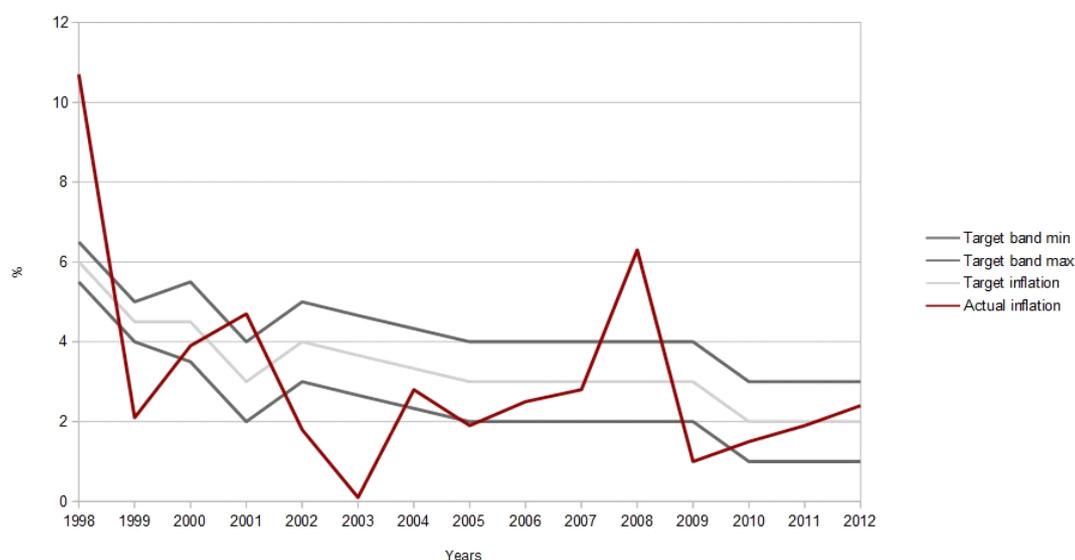
National banks in most democratic countries with market economy have the same main goal as CNB. Price stability is the key element for maintaining stable financial environment and for the development of entrepreneurial activities. It is the sign of responsibility of the national bank and its commitment to sustainable economic development. To fulfill the goal there are four basic monetary policy regimes that national banks can utilize: the mode with an implicit nominal anchor, money targeting, exchange rate targeting and inflation targeting. In December 1997, the CNB board decided to use the inflation targeting regime. High and unstable inflation has negative consequences on economic growth. Higher inflation reduces real incomes and savings. It is also responsible for higher nominal interest rates and higher variation of inflation in general. When there is persistently higher inflation economic subjects usually adapt to inflation and depreciation expectations. Due to higher variability of inflation, investors focus more on short-term financial investments – speculative activity and hedging against inflation and they neglect investments with long term returns. There are also other negative effects which higher inflation causes. It redistributes income from creditors to debtors, causes distortion of the tax system and it represents a hidden burden to those who save and are not able to secure the purchasing power of their savings and investments. Also high interest rates occur which stimulate the inflow of short-term risk capital. The most significant features of inflation targeting are the medium-term strategy, the use of inflation forecasts and public announcement of inflation targets. CNB is adjusting monetary policy tools in order to fluently regulate excessive inflation or disinflationary pressures that keep pushing the inflation away from inflation target tolerance band.

In the first period of inflation targeting, the CNB used net inflation as a

¹ Law nr. 6/1993 sb., “About Czech National Bank”

primary indicator.² The first announcement of inflation target was made in December 1997. It was made for the year 1998 and also for the end of the year 2000. The inflation band was set up to 5.5% – 6.5% for 1998 and 3.5% – 5.5% for 2000. At the end of the year 1998 the short term target band was set to 4% – 5% for the year 1999. In April 1999 long term target band was announced. The inflation should be 1- 3% by the end of the year 2005. One year later the goal for the year 2001 was set to 2 – 4%. In April 2001 a decision was made and net inflation was replaced by headline inflation. The 3-year interval target band was announced and it was stated that inflation should be measured at 3% – 5% at the beginning of the year 2002 and 2% – 4% by the end of the 2005. After the year 2005 inflation target was announced to be 3% with possible deviation of 1% in each direction (there is the same one percentage tolerance band till those days – 2014). In March 2007 a new inflation target of 2% was announced. It was in effect since the beginning of 2010. All the data including actual inflation can be seen in the Figure 3.1.1. CNB should follow the inflation targeting, but there are some exceptions in which the deviation from the target band is possible. Those are the cases of huge one time shocks caused by exogenous factors. Persistence in meeting the inflation target can lead to severe damages on GDP and employment.

Figure 3.1.1: Target inflation/Target band and actual inflation between years 1998 - 2012



Source: CNB, Czech Statistical Office

² CNB (2014): "What is inflation?" https://www.cnb.cz/en/faq/what_is_inflation.html

The theory about inflation targeting and its observance is attractive, yet the main question is how to achieve the desired inflation. There are several monetary policy instruments which CNB uses to meet the objectives.

The oldest one is the requirement from the banks to keep minimum reserves. It is one of the basic monetary instruments and it serves to regulate the amount of liquidity in the banking system. However, the Czech Republic banking system does not suffer from liquidity issues and therefore it rather serves the purpose of keeping transactions between banks smooth than the previous purpose. That is why CNB requires from each domestic bank, foreign bank that possesses a Czech banking license and every credit union to keep on their CNB account only 2% in liquid funds. Those 2% are computed from the reserve base. Until 1997 it used to be 11,5% without interest bearing. In four steps it has been gradually reduced to the final 2%. From July 2001 on, this base is formed by the volume of primary liabilities of the banks to non-banks subjects which have lower maturity than 2 years. Then each month the average is made from total funds on the account and it should not be less than the required 2% from the reserve base. Those 2% are interest-bearing at the two week Repo rate (by the CNB).

Although the instrument of keeping minimum reserves is an important tool, there are more active instruments used by the CNB to affect Czech economy. One of the active monetary policy instruments are open market operations. Their main form are Repo operations which serve the purpose of adjusting the interest rates. The CNB decides how high the interest rates should be and it is represented by a two-week Repo rate. In Repo operations, the central bank sells securities to banks and agrees to buy them back in certain amount of time for a higher price (profit for bank). The rate at which the loan is provided is called the Repo rate and the Bank Board votes on this rate. Thanks to those Repo operations, the amount of money circulating in economy and liquidity is regulated. Czech economy usually experiences a liquidity surplus so the CNB works on sterilizing it. To decide which bank will provide the loan, the CNB runs a tender in the form of an American auction. The maximum rate is the agreed Repo rate (two-week Repo rate). Then banks send their offers which include the amount they are willing to loan and the interest rate. CNB firstly satisfies those with the lowest interest rate up to the volume of money which CNB planned to pull off from the market. Repo tenders usually take place three times per week and the minimal loan is 300 million Czech crowns (around 11 Million Euro in 2014).

The next instrument is automatic facilities. They are used by banks to deposit their money (liquidity) overnight. There are two types of automatic facilities – the deposit facility and the marginal lending facility. The deposit facility is not collateralized and the amount is multiplied by the discount rate. The minimum volume is 10 million CZK. The marginal lending facility is used by banks with a general Repo agreement with the CNB. They use it to gain liquidity from the CNB in the form of Repos. It is multiplied by the Lombard rate and the minimum volume is the same as for the deposit facility. Nevertheless, this instrument is not used by banks very frequently.

FX interventions are another useful monetary policy tool. It is basically an operation in which the purchasing or selling foreign currency with CZK takes place in order to increase or decrease the value of CZK and to make Czech producers more or less competitive with the foreign ones. It is not usually used in the inflation targeting regime, but it could be observed a few times in recent history. The CNB weakened the rate of CZK to Euro in 2013 by intervention. Before the intervention 1 Euro equaled to around 25 CZK and after it was 27 CZK.

3.1.3 Balance Sheet Structure

Since this is first balance sheet structure decomposition, it would be proper to compare the size of the balance sheet of all chosen banks. From the Table 3.1.1 we can see that the largest balance sheets are held by SNB, second is CBoA, third CNB, fourth CBoC and smallest CBoJ.

Table 3.1.1: Assets/Liabilities of central banks in 2013 in billions of USD

	USD billions
CNB	58,39
SNB	527,29
CBoC	47,56
CBoJ	3,52
CBoA	126,61

sources: CNB, CBoC, CBoA, BoJ, SNB (2013): “Financial Statements”

The CNB accounting method varied over time hence the structure of the balance sheet varied too. There are nine basic items on the asset side and thirteen on the liability side which CNB used from 1993 until 2013. Some of those items are composed of subitems. The most significant asset item for monetary policy is

Receivables from abroad. With this instrument, the CNB maintains foreign currency reserves administration according to the monetary policy.

The first item on the asset side is Gold and other precious metals (mostly in the form of gold bullion, minted gold coins and other unlimited gold stock). Those metals are valued at their historical cost and interests from the gold deposits are accrued in the income statement. From the Figure 3.1.2 we can see the historical development of relative gold holdings. The gold reserves were reduced in both relative and absolute terms. Since 1998 the amount of gold holdings was around 0,1% which is a low value compared to the percentage rates of other balance sheet items.

Since the Czech Republic is the member of IMF the CNB got receivables from this organization. They consist of reserve position, membership deposit, bank funds at SDR, and loan provided to IMF. The majority of receivables are in domestic currency. Between the years 2001 and 2005 there was sharp increase in foreign currency receivables compared to the domestic ones.

The most significant share of total assets represents Receivables from abroad. This item consists of Total deposits at foreign banks and financial institutions, securities and Other receivables from abroad. Securities represent the biggest part, which can be divided into Treasury bills and other discounted securities, Bonds and other coupon securities and Shares. In 2013, Treasury bills were equal to 230,8 billion CZK, Bonds to 617,6 billion CZK and Shares to 107,9 billion CZK. From the data we can see that Bonds themselves represent a very significant part of the total assets which can lead to the interest rate risk exposure.

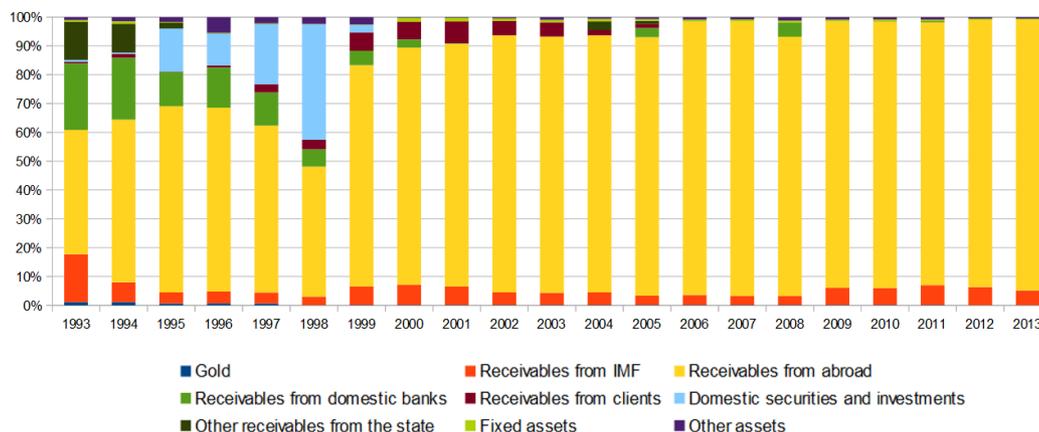
Receivables from domestic banks are represented by reverse REPO transactions. After 2000 there are nearly no loans provided to domestic banks (with two exceptions in 2006 and 2008 and few negligible ones). This was caused by long-term redistribution loans which were provided in 1990 and 1991 and which matured at the end of 2000.

Domestic securities and interests - This instrument had been used only until the year 2000, when the CNB sold its investment to “Konsolidační banka”. The most significant values were in 1995 (15%), in 1996 (11%), in 1997 (21%) and in 1998 (40%). In other years it was lower than 1%. Other receivables from the state - This item was significant only in 1993 and 1994 (13% and 10%). In 1995 and 2004 it was 2% and 3%. In other years it was zero, or close to zero. Another asset side item are Fixed assets. Fixed assets are divided into tangible and intangible assets. Both of them are depreciated in the specific period except for land, art and collections. As we

can see from Figure 3.1.2 over most of the period the fixed assets were beneath 1%.

Other assets are the last item on the asset side. This item is mainly composed of CNB shares in European Central Bank, the Banks for International Settlement, SWIFT and shares of former banks acquired by the CNB during the consolidation of banking sector. BIS and SWIFT shares are non-tradable and they serve as a requirement of being members of those institutions.

Figure 3.1.2: CNB’s assets 1993 - 2013



Source: CNB (1993 - 2013): “Financial Statements”, Author’s own calculations

As for the liabilities side, the first item is Currency in circulation. It represents a substantial part of CNB’s liabilities and its share has doubled over the past two decades. Currency can be considered as zero-coupon debt securities. This value can be affected by minimum reserves. The side of Liabilities to the International Monetary Fund closely resembles the asset side. Therefore, if we compare assets and liabilities to IMF we can see that in the case of Czech Republic most of the time the value of assets is very similar to the liabilities. However, they are not necessarily balanced out. Liabilities to IMF mostly consist of IMF deposits in the CNB. Those deposits are covered by long-term liabilities, interest-free bill of exchange of the bank and SDR allocations.

Liabilities abroad are mainly represented by REPO transactions with foreign banks. Liabilities abroad can be in both domestic and foreign currency. The majority of those liabilities are in foreign currency; however, there has been sharp reduction in this item after 2008. In the same way as liabilities abroad, liabilities to domestic banks are mostly in the form of REPO. Liabilities to domestic banks are mainly

collateralized by the Bank's treasury bills. REPO transactions in the form of securities switch are reported in the off balance sheet. As we can see from Figure 3.1.3 liabilities to domestic banks make up around half of the total liabilities after 2000.

Client deposits - Client deposits include certificates of deposit, deposit bill of exchange and other bonds. Client deposits had been fluctuating between 2% and 12%. Those deposits have been 0% since 2008.

Domestic securities issued – They mostly concern bonds and similar bills. This item had an increasing tendency until 1999 (nearly 40% of all liabilities). In that year this instrument stopped being used.

The CNB also has liabilities to the state and other public institutions. This item consists of several sub-items. First group of sub-items is called Total CZK funds and contains State funds accounts, state financial assets denominated in CZK including Single Treasury Account, Off-budget funds deposits and other deposits in CZK. The second group is called Total foreign currency funds and it consists of Single treasury account in EUR and other deposits in foreign currencies. Since January 2013 there have been extensive changes related to the state accounts held by CNB. Many of the state funds (such as grants for universities, scientific research, state-budget organizations, etc.) were transferred under the Single Treasury Account into EUR. From Figure 3.1.3 we can see the development of the liabilities to the state budget.

Another liabilities item of the CNB are Provisions (also called Reserves). They appear when the central bank has an obligation which results from past events (loans, guarantees). The shift in provisions can be caused by exchange rate movement when the provisions are held in foreign currency. As we can see from Figure 3.1.3 the reserves in the past decade are nearly negligible.

The item Capital and funds is sometimes stated as two separate items - Share Capital and funds. CBN's only fund is called the general reserve fund. Its value must be approved by the CNB's Board. This fund is based on profit and its purpose is mainly to cover losses or increase share capital. As we can see from Figure 3.1.3, most of the time the capital and funds remain on a similar level.

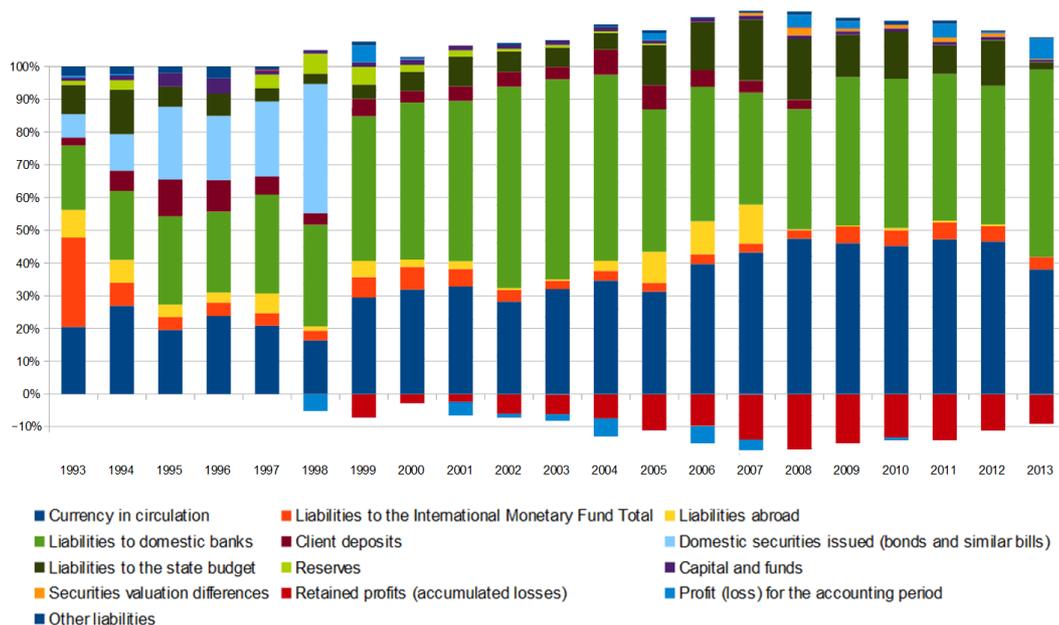
The revaluation reserve (also called Securities valuation differences) states the difference in the real value of securities, interest and shares until its actual sale. Thanks to the fact, the difference can oscillate in both directions as the values can become positive but also negative. This indicator has been implemented into the

CNB's balance sheet after 2005 and it was negative only in the first year.

The CNB's balance sheet ends with the summary of profits/losses. First of all there are profits/losses for the current accounting period. This is simply the result of the bank in a given year. There are also retained losses from previous periods. Both those variables can be either positive (profit) or negative (losses). As we can see from Figure 3.1.3, the CNB's annual results vary in time. As for the accumulated losses, there has been a 15% improvement after 2008 - Figure 3.1.3. The accumulated losses should be covered by future profits.

The very last item on the liabilities side are Other liabilities. It consists of Negative fair value of foreign currency forward and interest rate swaps, advance received in relation to the State Guarantee, Liabilities to the European union, Employee accounts and other liabilities. The biggest share of total Other liabilities are represented by Liabilities to the EU and Employee accounts. Lately the value has been oscillating between 0,5% and 1%.

Figure 3.1.3: CNB's liabilities 1993 - 2013



Source: CNB (1993 - 2013): "Financial Statements", Author's own calculations

3.2 Chile

3.2.1 Monetary Policy History

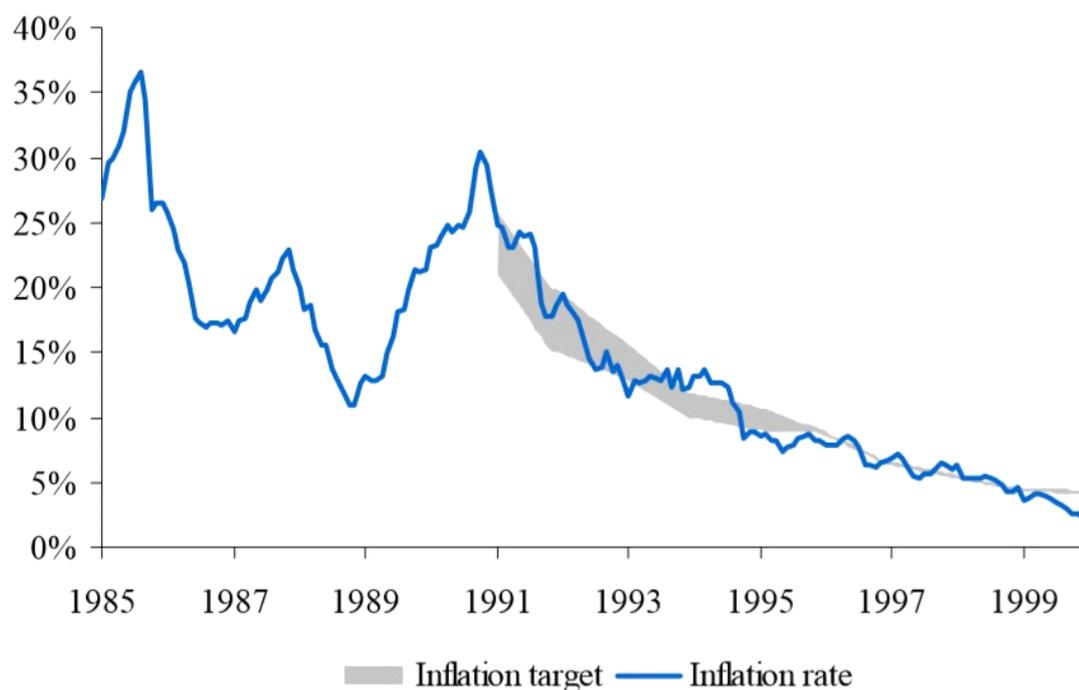
The Central Bank of Chile (El Banco Central de Chile) was founded on 22nd August 1925 and the board of directors was established. The key aspect of this board was that it could decide anonymously and independently from the government. There was, however, some supervision guaranteed by the law. The first objective of the CBoC was to maintain currency stability (it was under the golden standard regime) and the second objective was to regulate the currency according to the market needs. Thanks to these two objectives, CBoC was established as the only institution with the seigniorage privilege. In 1940s in Latin America it was usual to start the industrialization process. Chile was one of those countries. This period was marked by the wide use of import subsidies. The main goal was the promotion of domestic industrial sector. The promotion of domestic sector can be done by import tariffs and quotas. It is difficult to apply this strategy for a longer time period. Thanks to this factor, excessive money seigniorage and poor monetary policy lead to the inflation of approximately 30% between 1950 and 1960. Around in the year 1958 a stabilization process started which should contain inflation and suppress public spending. This process lasted until 1964 and caused an improvement of inflation which reached single-digit figures. However, after this period the inflation came back to its previous level. Between years 1964 – 1970 there were a few attempts of monetary reforms. In 1960 the central bank's third basic constitutional law came into effect. The objectives remained the same, but there were some structural changes in CBoC. Also the bank's powers were extended in terms of credit control and reserves requirement adjustments. In 1973 there was a military revolution which resulted in very high inflation around 1970s³. 1974 saw a hyperinflation with a culmination point at 586%. There was an urgent need of suppressing that kind of inflation. CBoC implemented rescue programs which should prevent bankruptcies and rescue the banking system. The Central Bank paid liabilities for several private banks which were eliminated. The Central Bank also bought some risk assets from commercial banks and financial institutions. Also some subsidies to financial institutions were made. All those measures were taken to prevent financial institutions and banks from going bankrupt.

3 INFLATION.eu (2014): "Worldwide Inflation Data" <http://www.inflation.eu/inflation-rates/chile/historic-inflation/cpi-inflation-chile.aspx>

Not surprisingly, the Central Bank had experienced a great loss. In order to deal with that problem, the main objectives of the monetary policy were to control the interest rate and to deal with that loss using different means than printing more money. For the next ten years the interest rate was set by the CboC. An important step to achieve the reduction was the implementation of the law in 1989 that greatly supported the independence of the Central Bank. We can see the improvement from Figure 3.2.1 Only then was the bank really independent and there were no connections to the ministry of finance. This was the origin of Chilean stable economic situation.

The final amendment was made in 1979. The main feature of this amendment was a provision which stated that under no circumstances can the Central Bank gain any kind of discount from the credit granted by the state and it also cannot provide loans to the private institutions with the exception of financial institutions.

Figure 3.2.1: Inflation rate and Inflation target (target) band in Chile 1985 - 1999



source: CENTRAL BANK OF CHILE (2007): “Monetary Policy in an Inflation Targeting Framework”

3.2.2 Current Monetary Policy

After those radical steps were made and CBoC became an independent entity, the monetary policy regime started to focus on inflation targeting and floating exchange rate. In 2001 a fiscal rule was introduced. This fiscal policy was based on an annual surplus of 1% in the GDP. The main idea was to make public expenditures stable over the business cycle (save money in times of prosperity which is paid in the times of recession). Inflation targeting primary focused on price stability. The main parameters of Chilean inflation targeting are: the price index that defines the target, the midpoint of the target range, the target range, the policy horizon and the operational instrument. The price index that defines the target is an annual change in the Consumer price index. Using CPI has the advantage in representation and credibility, but also disadvantage in volatility. The midpoint of the target range is 3% annually. The target range is set to the 1% above or below the desired 3% inflation target. The policy horizon is set to about 1 – 2 years. That is a short to mid-term horizon. The operational instrument is understood as a monetary policy tool. CBoC utilizes open market operations as the main instrument. Due to the floating exchange rate, the Central Bank has to approach foreign exchange interventions. At the beginning of the 21st century there were two announcements of Central Bank's intentions to intervene. The first time in August 2001 the bank announced that it may intervene anytime until the end of the year. It actually intervened and bought 800 million USD for peso. The second intervention took time in October 2002 with the opposite pattern. Another two interventions were held in 2008 and 2011. Their goal was to strengthen the international reserves position of the bank. The next important tool is represented by the monetary policy path and forecasts. Since May 2000, CBoC has published its quarterly monetary policy report. This report has three main targets. The first is to inform the public, government and the senate about the recent and expected inflation and issues resulting from this inflation. The second target is to explain to the public the medium term framework used by the board of CBoC to create the monetary policy. The third target is to inform about matters which will help agents to decide and adjust their strategy regarding future inflation and output development. When this report started to be published, the standard practice of fixing monetary policy for 12-24 months was created. This resulted in several issues. Fixed rate assumption means that monetary policy has to anchor the inflation in the future. Another issue was that

this kind of monetary policy should be very persistent and powerful.

3.2.3 Balance Sheet Structure

As with the other examined subjects, the accounting method of CBoC varies slightly in time. The basic variables, however, remain the same. There are 3 major groups on the asset side and 4 major groups on the liabilities side. As for the asset side there are foreign assets, domestic assets, and other assets. Similarly to the liabilities side there are foreign liabilities, domestic liabilities, other liabilities, capital and reserves.

Foreign Assets

The most important asset side item for monetary policy is Deposits and securities in foreign currencies. This instrument is used for the regulation of exchange rate if needed.

Gold - With an exception in the period 1997 - 1999 the CBoC held less than one tenth of the percent from assets in gold reserves. Since this is a negligible amount compared with the other variables, the development was not as significant as for the other assets. In 2013 the monetary gold (7940 fine gold troy ounces) was valued for 5050 million Chilean pesos (US\$9,6 million). This amount equals to 0,02% from assets.

Investments in foreign currency (Deposits and securities) - This is the most significant value on the Chilean balance sheet asset side. Until 2009 it was called Deposits and securities. As we can see from Figure 3.2.2 this variable rose steadily from 51% in 1997 to 87% in 2013. The deposits and securities were held in foreign currencies - mostly in US dollar (50%) and Euro (19%) in 2013. Investments in foreign currency are composed from Instruments at fair value with effect on net income and Held-to-maturity securities. The first group makes up around 90% of Deposits and securities in foreign currency.

Special Drawing rights (SDR) - International monetary fund assigned reserve assets (in foreign currencies) proportionally to all members according to the payment in Chilean pesos as a parity in IMF. Until 2001 there were no SDR. From 2001 - 2009

the value remained around 0.2%. Since 2009 the value has been constantly around 2-3%.

Mutual loan agreements - This item represents the amount payable to the Central Bank of Chile from other central banks as agreed (Reciprocal Payments and Credits for the exports performed). This payment is considered as non-derivative held-to-maturity securities, valued at the amortized cost at effective rate.⁴ However, this item has been equal to zero in the first half of the period and also lower than 0,50% in the rest of the years.

Loans - this item has been part of the asset side until the year 2000. Non-indexed loans receivable at original value.

IMF subscription - Also called reserve position IMF. At the beginning of our period it was between 2.5% - 4%. In the new millennium, this value decreased to about 2%. It contains 4 items: subscription installment (contribution), loan, new arrangement to borrow and deposits. Deposits is the only item which is subtracted from the others so in theory it can reach a negative value.

Shares and contribution to the Inter-American Development bank - IDB is an organization in Latin America and Caribbean which helps to improve health and education. The assets in this organization remain on a similar level from 0.4% - 0.8% over the whole period.

Domestic assets

Loans to state-owned companies - This item was constantly decreasing from 1997 (0,3%) and it has been 0% after 2009.

Loans to Banco del Estado de Chile - It is the National Bank of Chile which conducts all financial activities for the state of Chile. The highest loans were 1.1% in 2003 and 2.5% in 2004. Otherwise, it was insignificant and after 2006 there were no loans to BancoEstado (short name for this national bank).

Loans to commercial banks - In Chile loans to commercial banks had shown an

4 CBoC (2013): "Financial Statement of the Central bank of Chile"

increasing trend, however after reaching the peak of 18% in 2009 there was a decrease to 0,01% next year and in 2013 the value was zero.

Loans to other institutions - similarly as for the other loans the CBoC tends to reduce loans to other institutions. There was a constant increase until 2007. The two following years showed a decrease and after 2009 there were zero loans to other institutions.

Treasury transfers - Those transfers are a result of the differences produced in the recovery by granting discounts to shareholders (through future taxes). They started as nearly a quarter of all assets in 2007 and remained on the same level until 2003 when a sharp decrease started and lasted until 2008 when it settled on the level of around 1.3%.

Financial Institution subordinated obligations - This item represents subordinated liability of Banco de Chile with CBoC. This arrangement started in 1996. This payment takes place in two steps. Firstly, the Banco de Chile transfers the liability to Sociedad Administradora de la Obligación Subordinada and then this institution pays the CBoC. The values fluctuated from 5% to 9%. After 2007 there was a decrease to less than 3% in 2013.

Sinap liquidation law – The Central bank of Chile granted to refinance credit lines to Sinap (National Savings and Loan System) to comply with Law 18,900. This is the result of liquidation of two national institutions, Central savings association and Loan and saving association, which ceased to exist and CBoC is responsible for all their obligations. Those obligations appeared in last five years and form around 4% of all assets.

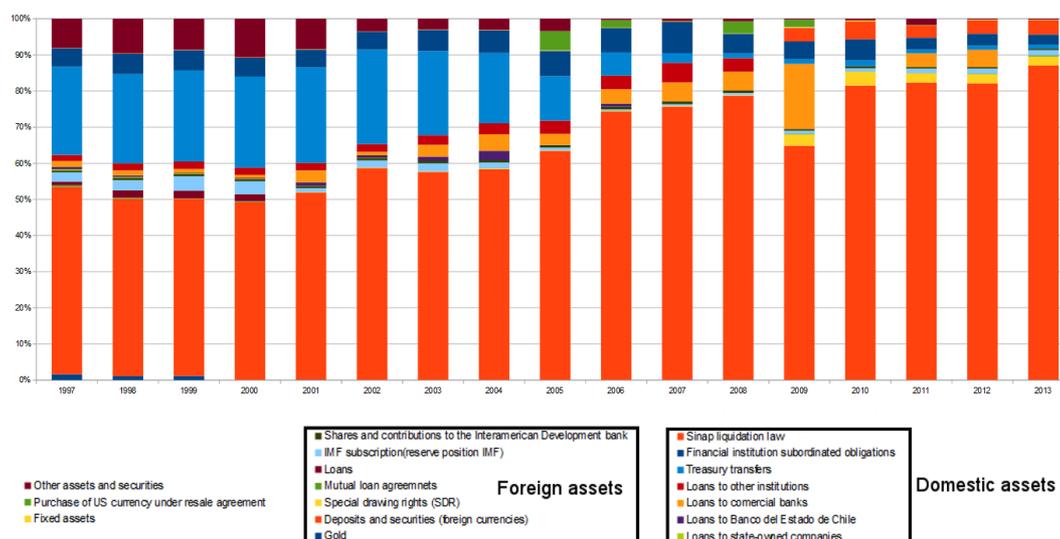
Other assets

Fixed assets - CBoC has very little fixed assets compared to the other items on the asset side. There is a slightly growing tendency, but the spread is from 0.09% to 0.15% (with two exceptions).

The purchase of US currency under a resale agreement - This purchase was conducted only 4 times in our examined period and formed twice 2%, once 3.3% and once 5.4% of assets.

Other assets and securities - In this group there are assets and securities, which could not be classified in any other group. There has been a decreasing trend and it has been usually under 1% over the past 8 years.

Figure 3.2.2: Assets of central bank of Chile as shares; 1997 - 2013



Source: CBoC (1997 - 2013): "Financial Statements of the Central bank of Chile", author's own calculations

Liabilities

Foreign liabilities

Reserve liabilities - this category consists of two sub-items. Mutual loan agreements and FMI deposits. FMI deposits appear only in the first four years and form a majority of reserve liabilities. After 2000 the reserve liabilities have been negligible (less than 0.05%).

Other overseas liabilities - There are four sub-items in other overseas liabilities. Loans, Accounts with other international organizations, allocation of special drawing rights and interest payable. Two most significant sub-items are accounts with other international organizations and allocation of special drawing rights. Accounts with other international organizations are being held in local currency and they do not bear interests. Other overseas liabilities form around 3% of the total liabilities.

Domestic liabilities

Currency issuance and deposits (monetary base) – The most significant part of the monetary base is sub-item called Banknotes and coins in circulation which itself forms about one third of all liabilities. Banknotes and coins are recorded at their face value. Monetary base is growing in time relatively to the total liabilities. It started on 9% in 1997 and it was 37% in 2013.

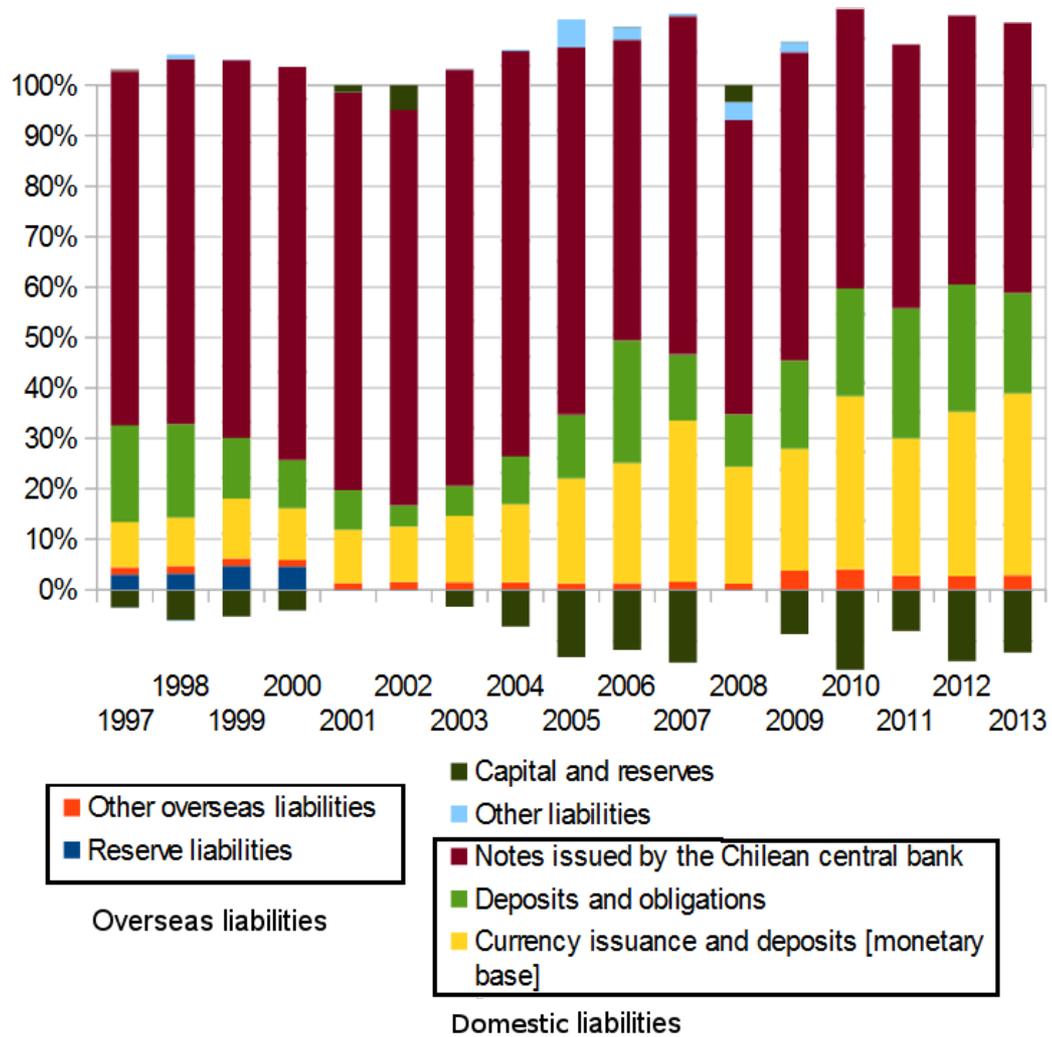
Deposits and obligations - This item reflects movements in local currency between financial institutions and CBoC. From 1997 to 2002 there has been steady decrease from 19.3% to 4.2%. Afterwards, the trend was opposite and at the end of 2013 it was over 20%.

Notes issued by the Chilean central bank - There are 20 sub-items in this part. Those are mainly coupons, bonds, promissory notes and securities issued in various currencies. This is the main item on the liabilities side. Despite the fact that there is declining trend, it has never fallen under 50%.

Other liabilities - There are four sub-item provisions, temporary liabilities, US currency purchases under resale agreement and other securities. The value of this item varies in time. The highest values were recorded in four years during which there were US currency purchases under the resale agreement (same as for the asset side). At other times the values were less than 1%.

Capital and reserves - This item consists of two subitems: capital and deficit/surplus during the given period. Both those items can have positive or negative values. This item was, with an exception of three years, always negative and also the negative shares are in absolute value higher than the positive ones. Over the last few years the average value has been around -15%.

Figure 3.2.3: Liabilities of central bank of Chile as shares; 1997 - 2013



Source: CBoC (1997 - 2013): "Financial Statements of the Central bank of Chile"

3.3 Argentina

3.3.1 Monetary Policy History

The Central bank of Argentina (Banco Central de la República Argentina) was created in May 1935 as a result of a banking and monetary reform. This meant the end of the Currency Board which had been in place before. The main goal in the beginning was to overcome the crisis in 1930. Monetary policy history of CBoA can be divided into five periods. The first period started in 1961 and lasted for 15 years. At the beginning of this period, the government debt was relatively small (7,5%) and the economy was closed to foreign borrowings so the deficit was financed from domestic funds or seigniorage. At the end of this period in 1976 there was a hyperinflation caused by the effort to cover the debt using seigniorage. The debt to the GDP ratio jumped from 12% in 1975 to 20% by the end of 1976.⁵ The second period lasted until the year 1982. In this period there was a reduction in tariffs and also involvement of the economy in the international capital market. Two major monetary policy changes are significant for this period. First, the deregulation of the financial sector took place. The deregulation consisted of free entry to the market and the determination of the interest rates by the market. The deposit insurance guaranteed by the government was also implemented. This means that in the case of banking crisis the debt of financial sector becomes the debt of CBoA. The second was an attempt to stabilize the economy. It started in 1978 and part of that attempt was an announcement of government guaranteed crawling peg. The deposit insurance guaranteed by the CBoA lead to its default in 1982. It forced the government out of the international market for nearly a decade. Again the debt had to be covered by domestic sources or the seigniorage. The third period was unsurprisingly a sign of hyperinflation and payment crisis. CBoA could not honor some of its contracts and due to excessive seigniorage a hyperinflation of over 200% occurred in 1989. Later that year the stabilization attempt started. It was called the Bonex plan. Short term bank deposits were replaced with long term bonds. After the Bonex plan came the Brady plan in 1992. This strategy started the fourth period. This finally brought some success. The currency board was implemented in the monetary strategy and Argentina joined international markets again. The fifth and last period started in 2000 and it has

⁵ BUERA, F., J. P. NICOLINI (2011): “The Fiscal and Monetary History of Argentina 1960-2007”

lasted until today. At the beginning of the new millennium some doubts appeared regarding the currency board. Those doubts were proved as justified after the start of the crisis in December 2001. The default, devaluation and depression were very severe for Argentina. The improvement in the shape of GDP growth and stable inflation (regarding Argentina) came after the year 2003.

3.3.2 Current Monetary Policy

In 2003 the CBoA adopted four financial measures which should support financial stability. Firstly, the minimal cash requirements were adjusted to make the provisions from loans more beneficial and to bring the minimal requirements closer to standards used in other countries. This is commonly known as Basel II. and III. Secondly, the rules for risk management related to economic capital assessment were modified. Thirdly, financial institutions have to share more information about the regulatory capital, management and risk which they are facing with public today. Lastly, the set of rules regarding the rights and duties of all parts relate to the financial markets.

Argentina has also adopted a managed float exchange rate policy which has been supported by foreign exchange and capital flow regulation. The basic purpose of this act was to lower the variability between assets and liabilities in foreign currency.

3.3.3 Balance Sheet Structure

The official resources of Central bank of Argentina provide multiple balance sheets. Those balance sheets vary not only in their composition, but also in particular numbers including the total assets and liabilities. In this work the most consistent data over the period are chosen. The most significant items on the asset side are Gold and foreign exchange, Government advances and Bonds in foreign currency. If we compare Bonds in foreign currency with holdings of foreign assets of other banks we can see that CBoA holds much less of those assets. Unfortunately Argentina's balance sheet aggregates Gold and foreign exchange together so we cannot find out what portion of these values are represented by foreign currencies holdings.

Assets

Gold and foreign exchange – As the only examined bank, The Central bank of

Argentina mixes together gold and foreign currencies as one item in the balance sheet. In 2013 nearly twice as much was held in gold than in foreign currencies. This item sharply increased to 81% in 1996 (after 37.5% in 1995). Values around 80% remained until 2001 when there was sudden decrease to 53%. Nowadays the values are under 30% (28.5% in 2013).

Contribution to financial agencies - This item is mainly on behalf of the Government of Argentina. Those agencies are IMF, IADB, IBRD and IDA. It has been between 2% - 3% in the last 7 years.

SDR assignment - As the only examined bank, CBoA recognizes negative a value in the SDR asset item. Since the beginning, when it started on around -2% it had been steadily decreasing up to 2008 (-0.7%). After 2008 the values have been between 3% - 4,5%.

International agencies obligations - Until 2005 the values had been recognized in dozens of negative percent (e.g. -72% in 2002). After 2005 it settled around -1%.

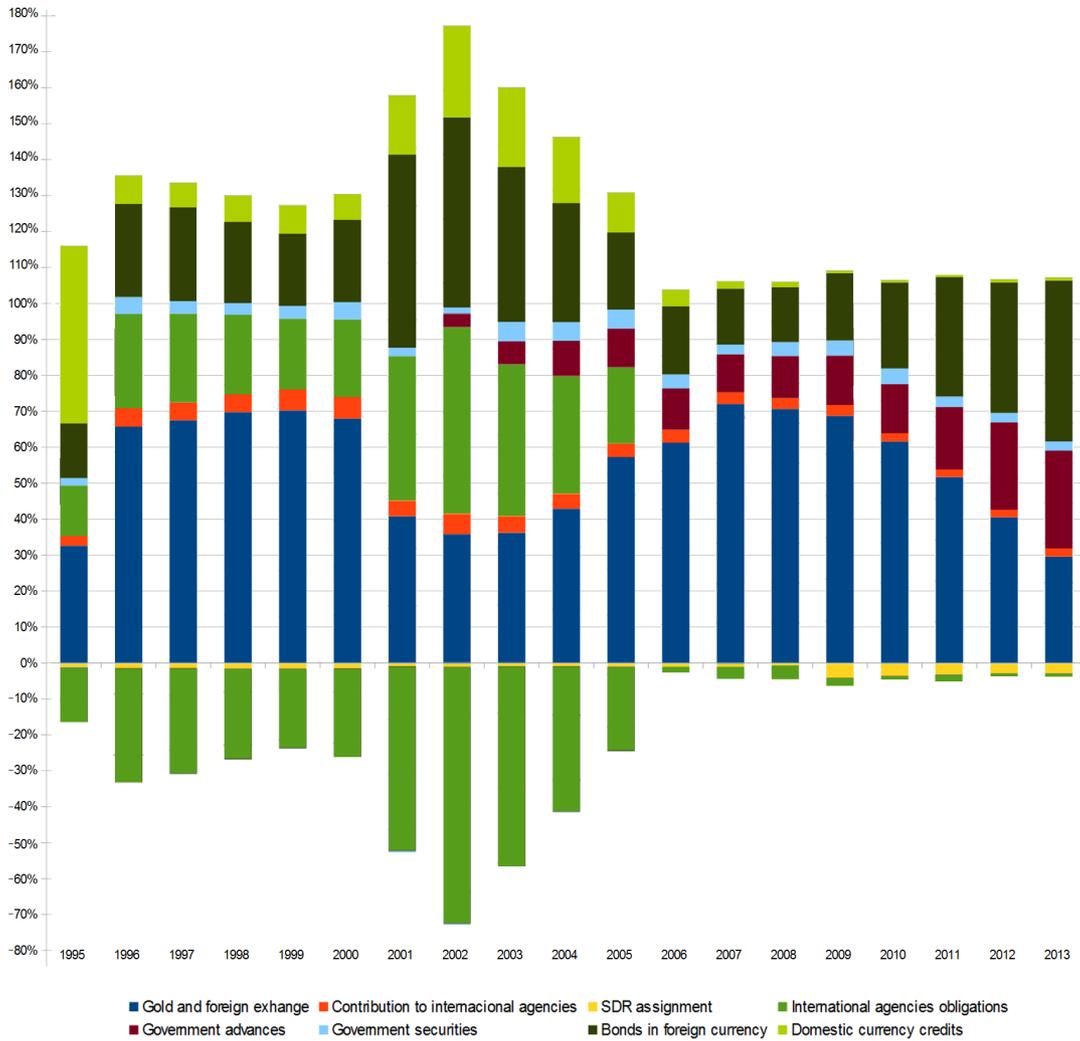
Government advances – Based on the law the Central bank can make advances to government for one year. This instrument started in 2002 and has been rising ever since. In 2013 it reached the value of 26%.

Government securities - This item recognizes high variance over the years. It has no obvious tendency and it has a fluctuation range between 2.5% and 7%. It has been at the bottom boundary for the last 3 years.

Bonds in foreign currency - We can see exceptional growth in this item in the years 2001 - 2003. In this period it ranged between 58% - 73%. It was 15% - 40% in the rest of the years.

Domestic currency credits - In 1995 this item reached the value of 57%, but the very next year the value was 10%. Around 10% persisted until 2001 when there was an increase to 21% which sustained for the next 4 years. It was under 1% for the past 5 years.

Figure 3.3.1: Assets of CBoA as shares; 1995 - 2013



Source: CBoA (1995 - 2013): "Financial Statements of the Central bank of Argentina", author's own calculation

Liabilities

National government deposits – The Government held deposits by CBoA only after the year 2005 and the values were fluctuating between 0.3% and 2.5%.

Official deposits - Held for the state of Argentina in foreign currency. Before 2002, the values had been fluctuating between 4% - 15%. After 2001 the values were under 1%.

Sundry deposits - The value of various deposits is converging in time to zero (0.02% in 2013).

Foreign currency deposits - From the beginning until 2001 this item was negligible. In 2001 the new sub-item was included in Foreign currency deposits - Bank liquidity fund which is accounted in foreign or local currency. Thanks to this change it rose up to 21% in 2001. Over the last 6 years the values have been around 10% with a slightly growing tendency. This item appeared after 2001 because of very tight foreign exchange controls in Argentina. Those controls were deregulated and gradually loosened up the CBoA.⁶

Securities issued by BCRA - This item started in 2002 on 4.5% and sharply increased to 27% in 2005. Since then it has been slightly decreasing and stopped on 16% in 2013.

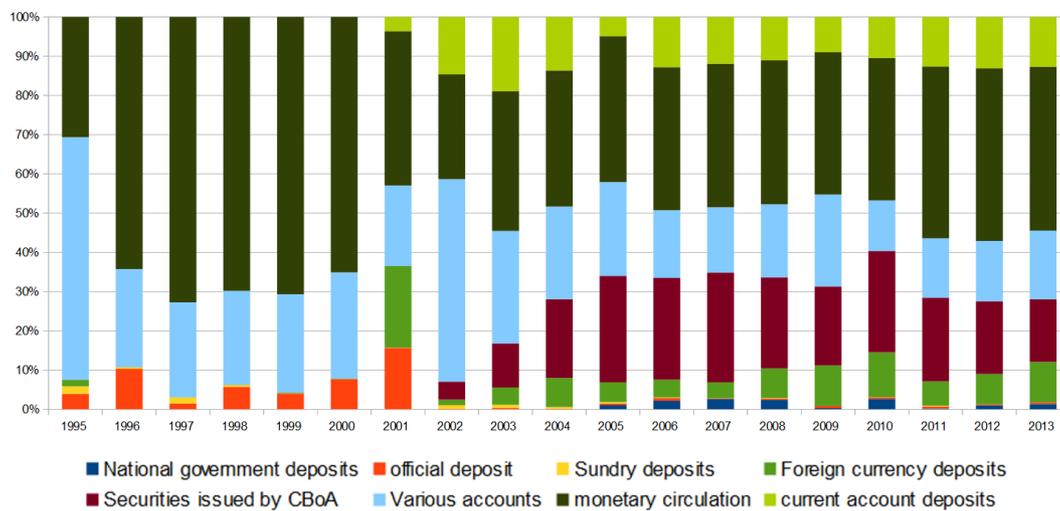
Various accounts - This item has been on a similar level 15% - 25% over the whole period with the exception of 1995 (62%) and 2002 (52%).

Monetary circulation - Banknotes and coins in circulation have represented 35% - 45% of all liabilities since 2001. Before that year, monetary circulation had been around 60% - 70%.

Current account deposits – Together with Monetary circulation, it forms the monetary base. Current account deposits started in 2001 and for most of the period the values were 10% - 14%.

⁶ ABRAMOVICH, F. L., J. I. MAYORA (2012): “Foreign exchange controls in Argentina”
International Financial Law Review

Figure 3.3.2: Liabilities of CBoA as shares; 1995 - 2013



Source: CBoA (1995 - 2013): "Financial Statements of the Central bank of Argentina", author's own calculation

3.4 Jamaica

3.4.1 Monetary Policy History

The Bank of Jamaica started to function in May 1961 by the introduction of the Bank of Jamaica law (sometimes also the Bank of Jamaica Act). Since 1939 there has been a Currency board system in Jamaica. Because of the credit boom in the country at the time the prior goal was to limit the credit expansion. Any subject, which wanted to run a banking business had to receive a license from the Minister of Finance. In the first three years the BoJ tried to maintain the external equilibrium of the currency (with the U.K.). In 1963 it went wrong and there was an 18 million JD outflow of the foreign reserves which even worsened next year. In 1965 the BoJ had to adopt a series of measures against the continuing outflow. By 1969 the expansion of credit was growing at a very high rate and the BoJ ordered the commercial banks to restrict total credit. *"In 1971, the suspension of automatic US dollar convertibility signaled the impending collapse of the Bretton Woods system of fixed exchange rate. By March 1973, the system finally collapsed with the generalised floating exchange rates. The international financial system was further shaken by the OPEC oil crisis, which placed severe pressure on Jamaica's external reserves."*⁷ In 1973 the BoJ adopted a

⁷ LIM, G. L. (2008): "Jamaica's financial system: It's Historical development" *Bank of Jamaica*

series of monetary policy changes which included devaluation of JD and comparison of JD with USD instead of GBP, wider control over the non-bank institutions, liquidity increase, increase in bank and savings rate and the tightening of exchange control regulations. At the beginning of the 80s most of the problems from 1970s were present. The CB continues to seek the ways how to protect value of the currency and increase reserves. Finally with contribution of aggressive interest rate policy, new deposit scheme for payments and expansion in rediscounting facilities there was an improvement of reserves in 1984 and 1986. The Financial Sector Reform Program was introduced in 1986 and its primary goal was to support central bank's ability to affect money and credit variables. After the year 1990 there was a necessity to let the free market forces to affect the financial environment. The deregulation of the financial market was introduced and it liberalized the exchange system. This brought exchange rate and price stability and BoJ focused on the liquidity management. With all those deregulations the existing legislation was insufficient to provide the best development of the market. The authorities therefore reformed the current financial legislations and more or less created new ones. The burst of the bubble in the stock and real estate market lead to the galloping inflation between the years 1990 until 1996 with the culmination in 1991 (80,2%).⁸ At the end of the 1990s the new legislation was introduced and the Deposit insurance was implemented. In 1999 the BoJ managed to keep the inflation under 10%, but the exchange rate was still unstable. Maintaining the inflation was also the basic goal in the new millennium. Also exchange rate became more stable thanks to higher interest rates artificially increased by BoJ. In 2003 the BoJ started to supervise more the financial institutions. Stable macroeconomic environment allowed BoJ to loosen its monetary policy during the 2004. This trend continued also in the first half of 2005. After 2006 the loosening of monetary policy continued - the Special Deposit requirement was canceled (in effect since 2003). The BoJ kept the conservative monetary policy throughout the crisis in 2008 and returned the inflation into the values around 10% after the year 2008.

8 LIM, G. L. (2008): "Jamaica's financial system: It's Historical development" *Bank of Jamaica*

3.4.2 Current Monetary Policy

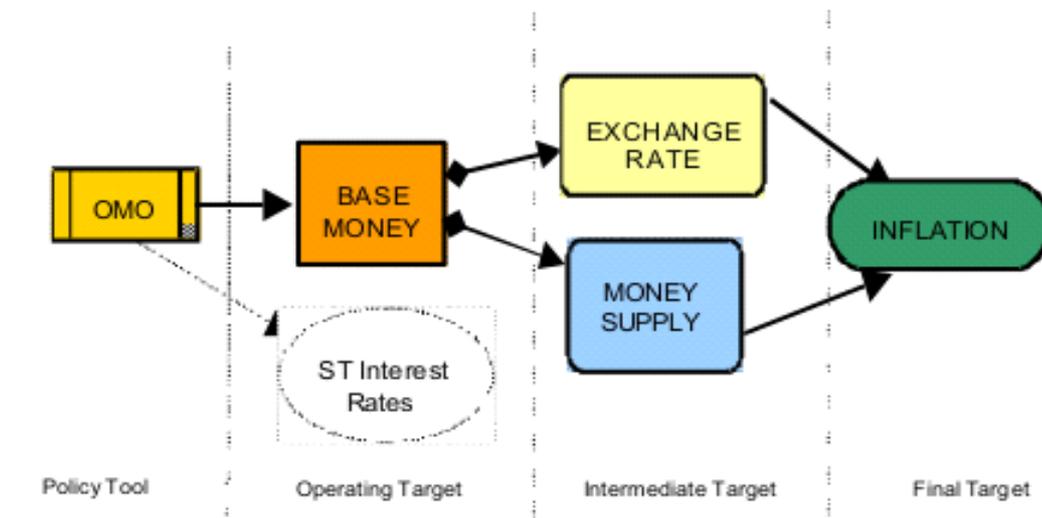
As was partially stated earlier the Bank of Jamaica law stated that the monetary policy should be aimed at regulating the growth of money and credit relatively to the resources expected to finance economic activity. Also, higher employment rate with no negative price stability consequences is required. According to the BoJ the price stability goal is the best contribution of monetary policy and it should lead to the economic and financial welfare of Jamaicans. Price stability in this case is defined as inflation being so low that it has no material effect on each inhabitant's economic decision. The second criterion for inflation is to have similar inflation with Jamaica's most significant trading partners. Jamaica uses CPI to measure inflation.

The BoJ monetary policy framework consists of several monetary targets by which it aims to achieve price stability. Those goals are:

- The definition of the objective of monetary policy (price stability)
- Setting operating targets (monetary base and interest rates)
- Setting intermediate targets (Exchange rates and money supply)
- Manipulation of monetary policy instruments (open market operations)

In Figure 3.4.1 we can see the schematic flow of the transmission of monetary policy in Jamaica. At the beginning of this process stands any monetary policy instrument (in this case open market operations). At first the monetary base is affected. The shift in the monetary base will project itself into Jamaican prices. This will happen through one of two possibilities (change in money supply or in exchange rate). From this model it is obvious that in order to manage inflation it is necessary to manage the monetary base with proper monetary policy tools.

Figure 3.4.1: Schematic flow of the transmission of Monetary Policy in Jamaica



source: LATTIE, C. (2006): “Monetary Policy Management in Jamaica” *Bank of Jamaica*: p.5

The inflation target is approved by Minister of Finance and it is incorporated in the balance sheet made by the Central bank. Each day the committee meets and discusses monetary policy operations and development in the past 24 hours. The main discussion topic is related to monetary base movement. Then the decision about future open market operations is made. The desired final state of each day is to leave commercial bank's free reserves at the minimum possible level. The main tools to affect the monetary base are indirect and direct. Open market operations are identified as the indirect ones and the minimum reserves requirement as the direct ones. The BoJ uses several ways how to conduct open market operations. Mostly as the interest rate in those cases, the BoJ uses the reverse repurchase rate. Firstly it is done by using Government of Jamaica securities. Those securities are being sold or used as a collateral for short term loans (30 – 180 days) to Primary Dealer. Another open market operation used by BoJ is direct purchase or the sale of Government of Jamaica securities on the market. This is however used mainly to manage liquidity. The third type of open market operations are conducted without the Government of Jamaica securities. The BoJ offers a deposit which is guaranteed by the Central bank to be repaid at given time of maturity. The last indirect tool used by the BoJ are the Repurchase agreements. It is the opposite of reverse repurchase. It is used by the banking institution to overcome the liquidity shortage at a given time. Those agreements have a very short temporal nature (often no longer than one day).

There is only one direct tool of monetary policy which the BoJ uses. This tool

is minimal reserve requirements. This is a percentage share of deposits that the financial institution has to keep as a deposit at the BoJ. Two types of deposits are required, cash deposits and non-cash deposits. The cash rate for commercial banks is 15 percent and 1 percent for building societies. As for the non-cash requirements, banks have to hold 18 percent of deposit liabilities as risk-free liquid assets as the Government of Jamaica securities. For building societies it is 4 percent.

3.4.3 Balance Sheet Structure

The most significant items on the asset side are Time deposits and other cash deposits (foreign assets) and Holdings of GOJ securities. Time deposits and other cash deposits are being used as monetary policy instrument similarly with other central banks - to regulate the exchange rate if necessary. Holdings of GOJ securities are used as OMO operations as described in the previous part of current monetary policy.

The central bank of Jamaica divides its assets into two main groups: Foreign and local assets.

Foreign assets

Foreign assets had experienced transformation in the accounting method. In 1999 and 2000 there were two items - Foreign Balances (which form a vast share of foreign assets) and Foreign securities. After the year 2001 it was split into two items: Bonds and other long term securities and Time Deposits and other cash resources to improve the informative value of the balance sheet.

Bonds and other long term securities - This item is inconsistent in time. At the beginning of the examined period, it was 22%, next year 38% and another year 16.5%. This is caused by a different time of maturity. From this sample we can see that no tendencies can be drawn from this variable. After 2008, the values of this item stabilized and it formed between 12% - 17% of all assets.

Time deposits and other cash resources - This item forms mostly between 30% - 45% of foreign assets and started in 2001. As mentioned before it is caused by a different

accounting method.

IMF holding of SDR - The same item as seen on other central banks. The BoJ started to hold IMF's SDR in 2009 and it is steadily around 8%.

Local assets

Holdings of GOJ securities - Government of Jamaica stores several types of securities in BoJ - Treasury bills, investment debentures, other marketable securities and non-marketable LRS. This is the most significant part in local assets and it usually forms between 25% - 35% of all assets.

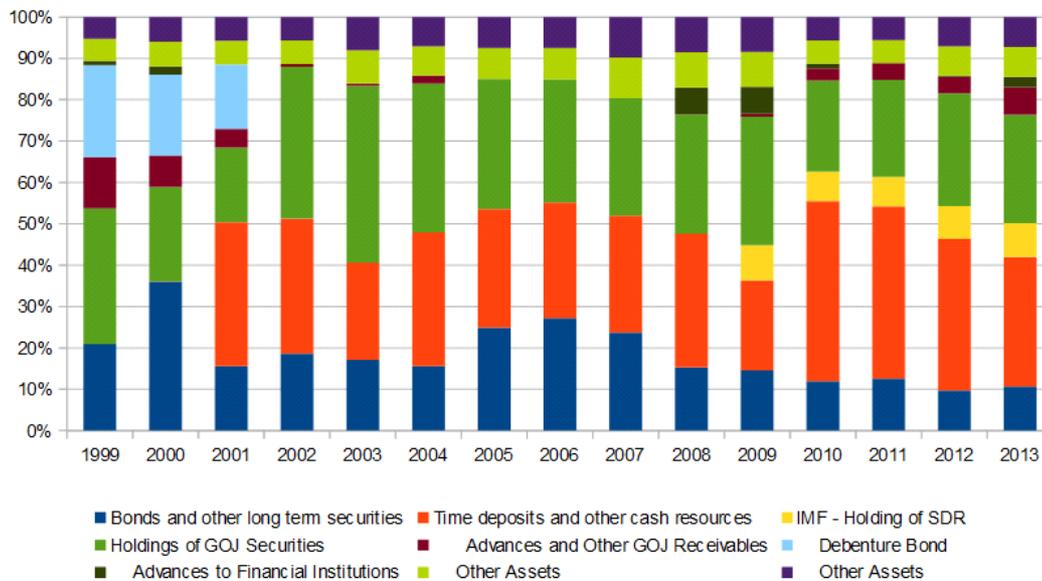
Advances and other GOJ receivables - This instrument is used only occasionally. From Figure 3.4.2 we can see that in the years 2002 - 2010 there were almost no uses of GOJ advances.

Debenture bond - BoJ accounted debenture bonds only 3 times at the beginning of the examined period. After that period it started to be recorded under Holdings of other marketable securities which are included in the Holdings of GOJ securities. Those were not secured debt securities for the Government of Jamaica. In 1999 it was 23%, in 2000 21% and in 2001 16.5%.

Advances to financial institutions - this instrument was used in 1999, 2000, 2008, 2009, 2010, 2012 and 2013. The most significant years were 2008 and 2009 (7%).

Other assets - The BoJ does not vary the composition of other assets over time. This results in stable values in the whole period. Other assets sub-items are staff loans, ex-staff loans, inventory of unissued notes and coins, items in process of collection, accrued interest receivable other than GOJ securities and other.

Figure 3.4.2: Bank of Jamaica assets composition (1999 - 2013)



Source: BOJ (1999 - 2013): "Financial Statements of the Bank of Jamaica", author's own calculation

Liabilities

Notes and coins in circulation - this item relatively steadily fluctuates between 15% - 20% of all liabilities.

Public sector deposits - BoJ allows public sector to store funds with the central bank. At the beginning it formed about 13% - 18%. In 2012 it was 2% and in 2013 7%.

IMF deposits - IMF requires some kind of standby deposits which had been less than 0.1% until 2010. Starting in 2010 it has been around 20%.

Commercial banks and other LFI's deposits - First two years this item formed about quarter of all liabilities. In 2001 there was a sharp decrease to 12%. In 2008 it came back to 20% and in 2013 it was at similar level.

Other deposits - The rest of the deposits formed between 0.5% - 1% with an exception of first two years when they were 2.5% and 5%.

Allocation of SDR - SDR requirement given by IMF. It had been under 2% until 2009, but nowadays it is around 20%.

Foreign liabilities - Relatively negligible compared with other items. It has been always less than 0.5%.

Open market instruments - A tool used by BoJ to control liquidity. Usage of this instrument rose in time with the culmination point in 2005 (60% of all liabilities) and then it steadily decreased to 17%.

Amounts due to government of Jamaica - Irregular item which appeared 7 times in the balance sheet and reached the values between 0.3% and 4.5%.

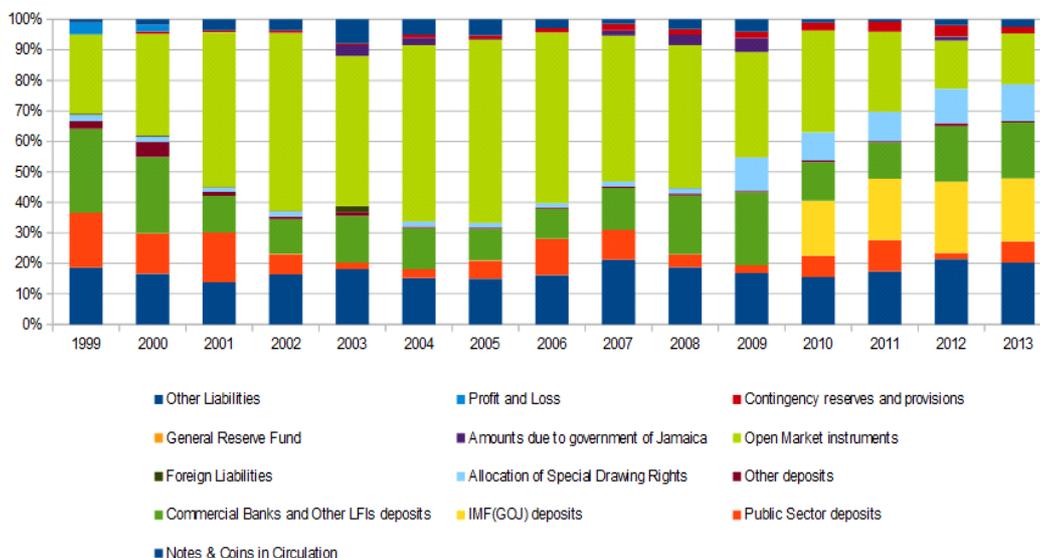
General reserve fund - At the end of the year profit is transferred or loss is subtracted from this reserve fund. It has always been the same value of 0.01%.

Contingency reserves and provisions - Another reserve fund. Since the beginning of the period it has had a growing tendency (0% in 2000 and 3.6% in 2012), however last year there was a drop to 2,1%.

Profit and loss - Profit and loss is accounted only in 1999 and 2000. In other years this item was completely passed over and accounted to another items.

Other liabilities - Usually between 1% and 4%. Only in 2003 - 2005 it was 5% - 8%.

Figure 3.4.3: Bank of Jamaica liabilities composition (1999 - 2013)



Source: BOJ (1999 - 2013): "Financial Statements of the Bank of Jamaica", author's own calculations

3.5 Switzerland

3.5.1 Monetary Policy History

The Swiss national bank was established in 1907 by the provision of the Swiss constitution. It resembles in form a public institution and it is owned by shareholders. After the breakdown of the Bretton Woods system in 1973 the SNB experienced a turn in the monetary policy. This event provided an opportunity for SNB to pursue independent policy of inflation control which had been impossible before. The Swiss national bank was one of two national banks⁹ which successfully employed inflation targeting. Inflation in Switzerland went from 10% in 1974 to 2% in 1976.¹⁰ After 1978 the SNB aimed at price level stability. After the year 1980 the SNB aimed at the annual target of monetary base instead of M1 and also employed the observation of exchange rate development into its monetary policy. Until 1987 the inflation in

⁹ The other one was Deutsche Bundesbank

¹⁰ ABEGG, W., E. BALTENSBERGER (2007): "The Swiss National Bank, 1907 - 2007" *Swiss National Bank*, ISBN: 978-3-03823-282-7

Switzerland had been around 2-3% which was satisfactory. There were three main factors which led to higher inflation after 1987. Firstly, it was the crash of the stock market, secondly the introduction of Swiss Interbank Clearing and the third was a change in the bank's reserves requirements. This resulted in inflation of 6.6 in 1991 and the implementation of new monetary restrictions was necessary. The first step was a change from the annual goals to medium-term objectives (three to five years). Besides that the SNB focused more on other indicators such as interest rates and business cycles. By 1994 the Swiss economy started to improve slowly. Since the goals were met and the monetary base was within the limit, the basic procedure would be to implement a more expansionary policy and lower the interest rates. SNB did not do this readjustment because of fear from inflation induced by expected cyclical recovery and new VAT. It turned out that those concerns were pointless and the monetary policy could be less restrictive. The SNB tried to fix this misjudgment in 1995 by an interest rate decrease. Unfortunately, this step led only to a dramatic increase in unemployment rate in Switzerland. The SNB had been under heavy pressure from the public in those times. Slow unemployment improvement started in 1996, but it was fully restored only at the end of the century. Given previous experiences the SNB decided to abandon medium-term base money targeting and focused on inflation predictions. Those forecasts are being published on a regular basis. The main objective continues to be price stability which is now defined as inflation under 2%. Also the operational level was fixed on the three month LIBOR in CHF. This concept is valid until today and will be described in more detail further.

3.5.2 Current Monetary Policy

The SNB aims at price stability as most of the other examined banks. SNB's monetary policy strategy consists of three basic elements. Firstly, it is the definition of price stability, secondly, inflation forecast for future periods and thirdly, a target range for the reference interest rate (three month CHF LIBOR).

SNB's definition of price stability is to achieve a national CPI growth of less than 2% per year. Deflation is also unacceptable and it violates the price stability. Inflation forecast is published quarterly and it covers a three-year period. It serves two purposes. Firstly, it is the main indicator for the interest rate decision and secondly, the general public can see the development of the SNB's monetary policy.

This forecast takes into account not only Swiss economy, but also global economy (since Switzerland is deeply involved in international trade). As for the target range for the reference interest rate, it is three-month CHF LIBOR on a quarterly basis. Since 2011 it has been 0 – 0.25%.¹¹

Implementing monetary policy is done by managing liquidity on the finance market and by this affecting the interest rate level. If there is not enough liquidity, the SNB usually provides the liquidity through short-term money market operations. If there is a need for absorbing liquidity the SNB conduct it through money market transactions, REPO operations and standing facilities. Another tool for implementing monetary policy is the minimum reserve requirement. Today the minimum reserve amount is 2.5% of short-term liabilities plus 20% of liabilities towards customers (in the form of investments and savings). Since 2011 the SNB has also focused on preserving the minimal exchange rate of 1.20 CHF per Euro. This has been maintained by foreign exchange swaps and foreign exchange transactions.

3.5.3 Balance Sheet Structure

Assets

Gold - Same as the other national banks SNB holds gold reserves (also other precious metals). Unlike the other banks, however, the SNB holds a relatively large quantity of gold compared to its total assets. About 30% of gold is being held abroad. This gold can be used in the times of crisis. From Figure 3.5.1 we can see that there was significant decrease in gold stock after the year 2008. Lately it has represented about 10% of assets.

Foreign currency investment - This item forms the majority of the asset side and is therefore with Gold holdings one of the major monetary policy instruments. Those instruments are affected by the exchange rate risk and they are often the biggest source of income for the SNB (together with Gold deposits). Among the foreign currency investments are included sight deposits, call money, time deposits, money market instruments, bonds and equities. Securities lending transactions are also included in foreign currency investments. All securities lent from SNB's own

¹¹ SECRETARIAT GENERAL (2014): “The Swiss National Bank in Brief”: *Swiss National Bank*

portfolio are secured by collateral. Since 1995 there has been a constant decrease of this variable with trough in 2008. Since then there has been a sharp increase and in 2013 the foreign currency investment formed over 90% of SNB's asset side.

Reserve position in the IMF - The same item as for other members in IMF. IMF's sight balances at SNB, new and general arrangements to borrow are subtracted from Swiss quota. Values are also in a similar range. Until 2004, the range had been between 2% - 4% and after 2004 it was under 1%.

International payment instruments - This item basically consists of sight deposits in SDRs. These deposits arise from purchase and sale of SDRs with IMF. Usually international payment instruments form less than 1%.

Balance of payment aid - This is a part of the IMF program where bilateral monetary assistance is provided to the countries with financial problems. It forms less than 0.5% of the asset side.

Repo transactions - This is one of the principal instrument of monetary policy. Repo transactions are usually carried out in Swiss francs to ensure money market liquidity or to withdraw liquidity from the market. SNB conducted those operations only in those years when it was needed. On the other hand, when they use repo transactions, it forms about a quarter of all assets, with two exceptions in 2008 - when it was almost half and in 2011 when it was only 5%.

Domestic claims - Domestic subjects in Switzerland provide local cash redistribution for SNB. This redistribution has had a declining tendency since the beginning and after 2002 it has been zero or almost zero.

Domestic securities - This item comprises only of negotiable bonds. They are accounted in market value subtracted from accrued interest. It has maintained a stable value of around 5%, but since 2006 there has been a stable decrease resulting in the value of 0.75% in 2013.

Stabilization fund investment - In autumn 2008 a series of measures were introduced. Those measures were aiming at financial system strength of Switzerland. It lasted

only for five years and forms between 2% - 10% (higher at the beginning and lower at the end).

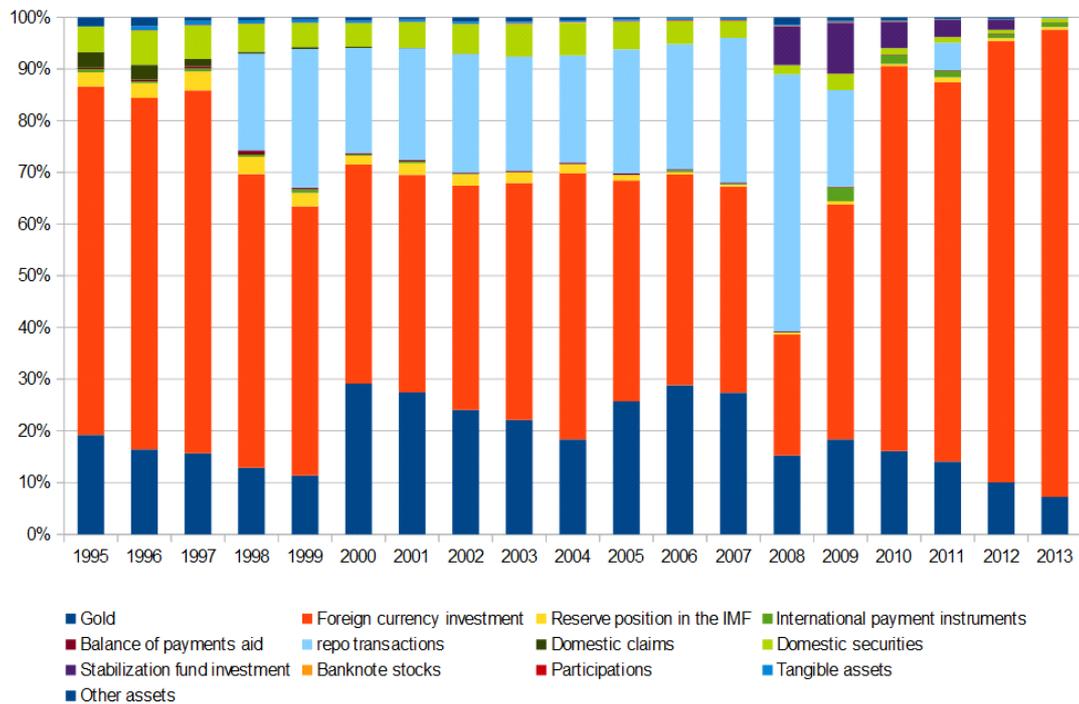
Banknote stocks - Newly printed banknotes which have not been released yet. Values are around 0.1%.

Participations - SNB's participations in various businesses. They forms less than 0.1%

Tangible assets - Same as for the other - buildings, lands, software, etc. The absolute values are quite similar, but relative values are decreasing because of higher quantities of other assets. At the beginning they formed about 0.75% and in 2013 0.09%.

Other assets - Under other assets are stated sundry assets including Foreign notes, Non paid-up capital, Coupons, Postal giro accounts and others. They usually form less than 1%.

Figure 3.5.1: SNB assets 1995 - 2013



Source: SNB (1995 - 2013): "Financial Statements of the Swiss National Bank", author's own calculation

Liabilities

Banknote circulation - In spite of the growing total nominal value of banknotes, the relative number has decreased from 50% in 1995 to 13% in 2013. It is caused by growth of other liabilities items (especially sight deposits of domestic banks).

Sight deposits of domestic banks - This is one of the key elements for SNB monetary policy. As we can see from Figure 3.5.2 until 2007 the percentage share remains within the band of 5% - 9%. After 2007 there was sharp increase and in 2013 it was almost 65%.

Liabilities towards confederation - SNB holds sight deposit account for the Swiss confederation. Also Switzerland may place time deposits at the SNB. Both bear interest. It has usually been between 2% - 5% with the exceptions of 1998 and 1999 when it was 16%.

Sight deposits of foreign bank and institutions - Foreign banks and institutions have sight deposits at SNB in Swiss francs. They do not bear interest. These deposits have growing tendencies and in 2013 they comprised almost 2.5%.

Other sight liabilities - Sight deposits accounts of non-banks entities, accounts of active and retired staff members and pension funds. Most of the time the values were negligible (0.1% - 0.3%), but in 2011, 2012 and 2013 it grew up to 8%, 13% respectively 5%.

Repo transactions - SNB uses this instrument to operate with liquidity, however it is not a widely used instrument. One year marked the repo transactions value of 5%. In the rest of the period it was 0 or close to 0.

SNB debt certificates - SNB issues time to time interest bearing debt certificates. It has only one purpose - to absorb liquidity from the market. Since this is not a regular tool we can observe that SNB used it only in four consecutive years. In 2008 it was 11%, in 2009 13%, in 2010 39% and in 2011 4%.

Foreign currency liabilities - Sight liabilities, short-term liabilities and foreign currency repo transactions. Those repo transactions are used to increase the balance

sheet. This item was lower than 1% for most of the period, only in 2001 it was slightly over 1% and in 2013 it was 1.6%.

Counterpart of SDR's allocated by the IMF - this item meets the liability definition given by the IMF. This item has been included in the balance sheet only over the last five years and its relative values are between 1% and 2.5%.

Other term liabilities - Additional liabilities stated in Swiss francs. Other term liabilities were significant only in two years. In 2007 when they represented 3.6% and in 2008 when they reached an amount of 13.7%.

Provisions - This item is one of the most time varying liabilities in SNB's balance sheet. There were 5 kinds of provisions in the examined period. Provision for assignment of free assets - this provision appeared in balance sheet only for 3 years (2001 - 2003) and it formed 16% - 17%. The provisions for market and liquidity risk on gold also appeared in the 3 consecutive years (2000 - 2002) and they formed 5% - 6%. Another type is provision for market and liquidity risk. This type appeared in the first 9 years and formed 32% - 42%. The provisions for currency reserves on the other hand figured in the balance sheet in 2001 and after 2002. At the beginning, it formed about 30% of liabilities, but it decreased fluently to 10%. The last provisions were for operating risks. Compared to the other provisions this was not substantial. It formed usually less than 1% and after 2002 it decreased almost to zero.

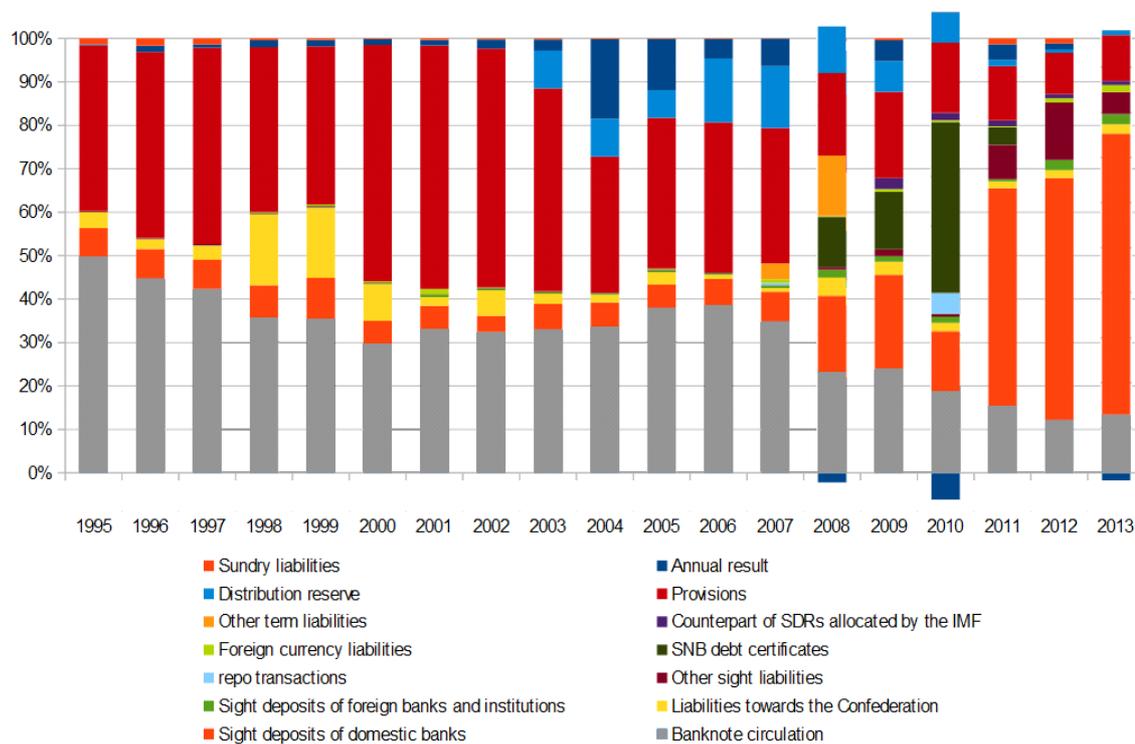
Distribution reserve - The SNB cumulates profits which have not been redistributed yet. It is compensated with losses so it can become a negative value (only in 2011). This reserve has been implemented into MP because of the threat of lowering profit (experiencing loss) and therefore the danger of the ability to pay the dividend to its shareholders and governmental units. Eventually, this distribution reserve was depleted and the SNB stopped the dividend payment after 100 years.¹²

Annual result - The SNB has almost always ended in profit. Only in 2008, 2012 and 2013 SNB ended in loss. Two most outstanding results were in 2004 - 18% and in 2005 - 12%.

¹² HIRST, T. (2015): "Here Are The Behind-The-Scenes Politics In The Decision To Let The Swiss Franc Cause Market Chaos" *Business insider*

Sundry liabilities - various liabilities which are negligible on their own (usually less than 0,1%). Together, they form between 0% to 1.4%.

Figure 3.5.2: SNB's liabilities 1995 - 2013



Source: SNB (1995 - 2013): "Financial Statements of the Swiss National Bank", author's own calculations

4 Comparative Part

4.1 Hypothesis nr. 1 – Solid monetary policy can be applied even if the CB is dealing with a loss.

Good policy performance is considered to be positively correlated with central banks financial strength¹³. In this case it can raise the questions about pertinence of the central bank's monetary policies. It is misleading to measure the financial strength of CBs in the same way as in the case of private subjects on capital market. We have to take different aspects into account. The financial strength is very important factor which influences the final policy outcomes. Well capitalized banks are far more resistant to the changes in its finances than banks with lower capitalization. The financial strength is not equally important for all of the central banks. The less finances and more ambitious policy plans the CB has the less financial strength it has. In other words, the financial strength must be in balance with the monetary policy, capitalization and possible risks.

*"The primary metric of private enterprise performance is profitability. A second metric, enterprise book value, or capital, is a direct reflection of accumulated past earnings. Another metric, market capitalization, is a straightforward function of the present discounted value of expected future earnings adjusted by the expected volatility of earnings as well as the correlation of those earnings with the overall market. Hence, enterprises with a large market capitalization have either been successful at generating earnings in the past and/or are expected to be profitable in the future."*¹⁴ Central Bank does is not primarily concerned with profitability or market capitalization. Its main task is to meet the goals which were given to it. Those goals usually aim to create conditions in which price stability, financial stability and economic growth in a given economy is achieved. The second goal is to minimize the

13 KLÚH U., P. STELLA (2008): "Central Bank Financial Strength and Policy Performance: An Econometric Evaluation" *IMF working paper 08*: pp. 7-12

14 STELLA, P. (2008): "Central Bank Financial Strength, Policy Constraints and Inflation" *IMF Working Paper*: p5.

costs of achieving those conditions. So it is easily imaginable that the CB fulfills perfectly its goals and is dealing with loss at the same time since it is not a profit-generating institution. However, it is very hard to determine how to efficiently achieve the determined goals. There are usually several goals (price stability, inflation target band, sustainable exchange rate, etc.). It is also hard to figure out if and in what range the CB policy has an impact on the given goal since the CB is not the only policy maker. Another obstacle arose in the form of non-transparent balance sheet. Not all of the CBs have a transparent balance sheet and even if they do, there are several important items which are not taken into account on both the asset and liabilities side. For example, on the asset side it can be the present discounted value of all future seigniorage and tax revenues. On the liability side it is the potential cost of bankrupt institution which will need to be bailed. This similar case happened in Argentina in 1988. In their balance sheet they showed positive capital despite their disastrous financial situation. This unfortunate move prevented them from containing high inflation.

Since most of the central banks (all except Argentina) described in this paper are “maintaining inflation on certain level” as the primary goal (or one of the primary goals), this paper has chosen this attribute to be the main indicator to test this hypothesis. Firstly, let us see the development of balance sheets of the central banks.

Table 4.1.1: Current account of central banks in billions of USD 2000 - 2013

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
CNB	-0,41181	-1,16877	-1,65087	-2,55243	-4,89179	-4,41545	-7,17707	-9,83933	-9,99414	-7,98319	-8,47753	-7,14932	-6,31902	-2,57801
CBoC	-0,00133	0,00039	0,00127	-0,00079	-0,00204	-0,00433	-0,00404	-0,00417	0,00118	-0,00350	-0,00676	-0,00487	-0,00920	-0,00771
CBoA	4,22000	3,14000	6,08323	4,54949	5,49898	7,27568	7,70945	9,70994	9,63006	13,29142	9,78721	9,02978	13,57187	19,69744
BoJ	-0,36700	-0,75730	-1,07400	-0,76140	-0,50900	-1,07100	-1,18200	-2,03800	-2,79300	-1,12700	-0,93000	-2,10900	-1,90400	-1,41300
SNB	31,47929	19,94083	23,20513	43,35821	48,79032	54,16000	58,32000	38,83333	11,66667	56,14679	92,21154	58,98876	70,53191	84,30108

Source: CNB, CBoC, CBoA, BoJ, SNB (2000 - 2013): “Financial Statements”, OANDA (2014): "Average Exchange Rate" www.oanda.com/currency/average, author’s own calculations

As we can clearly see from the table 4.1.1, most of the central banks have negative deficit of current account balance (red highlighted amounts). For a better view on each central bank and its net profit see Table 4.1.2.

Table 4.1.2: Net profits/losses of central banks in billions of USD 2000 - 2013

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
CNB	0,06535	-0,75066	-0,29043	-0,64562	-2,09097	0,83328	-2,49602	-1,84855	1,70639	0,96922	-0,50990	2,00368	0,14550	3,73995
CBoC	0,00033	0,00155	0,00090	-0,00207	-0,00112	-0,00203	0,01509	-0,00054	0,00489	-0,00492	-0,00292	0,00226	-0,00436	0,00133
CBoA	0,96500	-0,12900	3,85161	0,28855	1,19456	1,73904	1,21042	2,49263	1,45127	6,31260	2,27519	1,86973	7,07275	14,33601
BoJ	-0,35000	-0,43780	-0,60500	-0,57140	-0,58000	-0,67500	-0,61500	-0,66200	-0,56800	-0,66800	-0,49400	-0,51800	-0,43000	2,40400
SNB	0,91071	2,39882	1,44487	3,02761	0,32258	10,24000	3,32560	6,03750	-5,31111	6,33028	-20,00000	14,66517	6,65957	-7,33333

Source: CNB, CBoC, CBoA, BoJ, SNB (2013): "Financial Statements", OANDA (2014): "Average Exchange Rate" www.oanda.com/currency/average, author's own calculations

From these two tables we can conclude that the majority of central banks described in this study are dealing with a loss. To determine how efficiently those central banks conduct their monetary policy, this paper examines their inflation targets (table 4.1.3) and compares them with actual inflation in the given country (table 4.1.4). There will be two outcomes of this comparison. Firstly, we will see how many times the central bank succeeded in fitting the inflation in the target band. Secondly, we can see the use of the ITS index (inflation targeting success rate) specifically developed for this work. If the inflation is in the tolerance band π the 0 for the given year is added.

$$ITS = \frac{\sum_{i=1}^n |tib_t - \pi_t|}{n} \quad (1)$$

Where tib_t is the target inflation band (range) in time t , π_t is inflation for given country in the time t (computed as annual average) and n is the number of observances. This index represents the average deviation from the inflation target goal. The lower to zero the better. Values around 1 and lower can be considered a relative success in conducting solid monetary policy. Values above 1 can indicate unstable monetary policy or at least the struggle with meeting given criteria.

Table 4.1.3: Inflation targets of central banks 2000 – 2013¹⁵

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
CNB	3,5% - 5,5%	2% - 4%	3% - 5%	2,6% - 4,6	2,3% - 4,3%	2% - 4%	2% - 4%	2% - 4%	2% - 4%	2% - 4%	1% - 3%	1% - 3%	1% - 3%	1% - 3%
CBoC	2,5% - 4,5%	2% - 4%	2% - 4%	2% - 4%	2% - 4%	2% - 4%	2% - 4%	2% - 4%	2% - 4%	2% - 4%	2% - 4%	2% - 4%	2% - 4%	2% - 4%
CBoA	no target	no target	no target	no target	no target	no target	no target	no target	no target	no target	no target	no target	no target	no target
BoJ	4% - 6%	4 - 6%	4% - 6%	6% - 7%	9% - 10%	9% - 10%	9% - 10%	9% - 10%	9% - 10%	7,5% - 9,5%	7,5% - 9,5%	6% - 8%	6% - 8%	8,5% - 10,5%
SNB	≤2%	≤2%	≤2%	≤2%	≤2%	≤2%	≤2%	≤2%	≤2%	≤2%	≤2%	≤2%	≤2%	≤2%

Source: CNB, CBoC, CBoA, BoJ, SNB (2000 - 2013): “Inflation Targets”

As for the inflation targets, most of the banks use the target inflation and target band. The target band is usually 1 percentage point above and below the target inflation. In the year 2007 the bank of Jamaica did not choose the band, but only desired the inflation of 10%. To provide more accurate results the band was created according to the year 2006 and 2008 where the same goal was set with the target band of 1 percentage point below. Since the Central bank of Argentina does not use inflation targeting as one of the monetary policy goals, it was not included in the testing of hypothesis number 1. The Czech national bank set the inflation target at 4.5% for the year 2000 and 3% for the year 2001 with the target band of 1 percentage point above and below for both years. From 2002 – 2005 there was an inflation target which aimed to reduce the target band from 3% - 5% in the year 2002 fluently to the target band 2% - 4% in the year 2005. For better results the gradual shift of the target band was proportionally divided into each year in this period. The band 2% - 4% was held until the year 2009. Since 2010 (until 2013 in this work) the target band has been 1% - 3%. The Central bank of Chile has the same target band 2% - 4% over the whole period with an exception for the year 2000 when the whole band was shifted upward by a half percentage point. The Bank of Jamaica generally has higher inflation targets than the rest of the banks in this paper. At the beginning of the millennium the target was set to 5% with one percentage point above and below the tolerance band. Increasing inflation (Table 4.1.4) forced the BoJ to adjust the inflation target to be more realistic and achievable. After the year 2003 when the inflation target band was 6% - 7%, the BoJ set the target band between 9% - 10%. It stuck to this goal for the next five years. The target inflation in 2009 and 2010 was 8.5% with an inflation band of 1% above and below. After these two years the BoJ targeted the inflation of 7% with the same tolerance band. In 2013 the inflation target band was 8.5% - 10.5%. The SNB has the same inflation targeting goal during the whole period of 2000 – 2013. Its only goal is to have the maximum inflation 2% (while defying

¹⁵ SNB does not want to be in deflation so in our calculations the target band 0% - 2% is used

deflation).

Table 4.1.4: Actual inflation (Czech Republic, Chile, Argentina, Jamaica and Switzerland) 2000 - 2013

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
CNB	3,9%	4,7%	1,8%	0,1%	2,8%	1,9%	2,5%	2,8%	6,3%	1,0%	1,5%	1,9%	3,3%	1,4%
CBoC	3,8%	3,6%	2,5%	2,8%	1,1%	3,1%	3,4%	4,4%	8,7%	0,5%	1,4%	3,3%	3,0%	1,8%
CBoA	-0,9%	-1,1%	25,9%	13,4%	4,4%	9,6%	10,9%	8,8%	8,6%	6,3%	10,5%	9,8%	10,0%	10,6%
BoJ	8,8%	6,9%	7,0%	10,3%	12,4%	15,3%	5,8%	9,5%	22,0%	9,6%	13,0%	7,5%	8,0%	9,7%
SNB	1,6%	1,0%	0,6%	0,6%	0,8%	1,2%	1,1%	0,7%	2,4%	-0,5%	0,7%	0,2%	-0,7%	-0,2%

Source: CNB, CBoC, CBoA, BoJ, SNB (2000 - 2013): “Financial Statements”

In Table 4.1.4 are actual inflation data for in each country respectively for each central bank. As we can see from Table 4.1.4, the SNB is the best in meeting its criteria of inflation targeting. Only in the year 2008, it exceeded the maximum limit. However in 2009, 2012 and 2013 there was deflation. Year 2008 was specific for other countries. It was the only year when all of the central banks did not manage to sustain inflation in the tolerance band. This was caused by the global economic crisis in the 2008 and the growth of world oil prices before recession.¹⁶ Let us see the results for the central banks working with a deficit. The Czech national bank did not achieve the target inflation in exactly half of the period. However, it did achieve inflation intentions seven times in the fourteen years. Moreover, in the year 2005 it did not reach the limit by only one tenth of a percentage point, in the year 2012 it was just three tenths of the percentage point and in the year 2001 it was also a lower than 1% deviation. From this point of view, the CNB was successful most of the time, although it is dealing with a loss. The CBoC met its criteria nine times in the fourteen years. Five times it did not meet the given inflation requirements. We must add that from those five times, only two times the failure was higher than 1 percentage point. From this perspective we can conclude that the CBoC is also successful in its application of monetary policy when dealing with a loss. The testing of this hypothesis does not include the Central bank of Argentina, nevertheless we can compare its inflation with inflation in the rest of the countries. If we take other countries inflation targets and compare them with Argentina's inflation we can see that Argentina would fail in most years for all target bands. The inflation rate in Argentina is very unstable and very often reaches double digits. Maybe the CBoA should consider focusing on inflation management and implement the inflation targeting in its monetary policy. Although the BoJ tried to adjust the inflation target

¹⁶ IMF (2008): “World Economic Outlook UPDATE” *International Monetary Fund*

band according to the development of the real inflation in Jamaica it was not as successful as the CNB or the CBoC. From the selected fourteen years it managed to accomplish its goal only four times. Moreover, during the crisis in 2008 the inflation was over 22% which is an alarming value and signs galloping inflation. Jamaica experienced double digit inflation in five years of the examined period.

When applying the numbers in the ITS formula we get results in Table 4.1.5.

Table 4.1.5: ITS results for CNB, CBoC, BoJ and SNB

	ITS
CNB	0,58
CBoC	0,53
BoJ	1,75
SNB	0,13

Source: author's own calculations

As was stated above, if the result is below 1 it can be considered a successful conduction of the monetary policy. From these results we can conclude what was indicated above. The SNB is by far the best in its application of monetary policy tools (however, it has a surplus). The SNB's ITS is only 0.13 which is simply caused by the fact that it meets its inflation targets. The CNB and the CBoC have quite similar results around 0.5. The results would be even better if it was not for the financial crisis in 2008. The CBoC as well as the CNB experienced the worst deviations from inflation targets in this year. Yet, all in all those two central banks achieved great results. On the other hand, BoJ was not successful at all. Most of the time it was not capable of constraining the inflation in the desired target band and it lead to the result of ITS closer to 2 than to 1. With the result of 1.75 BoJ should adjust its monetary policy.

To support our results we need to compare them with results of countries with profitable central banks. Our selected control group of central banks in this case are also inflation targeting. We have selected the National Bank of Poland (NBP), the Central Bank of Norway (Norges Bank - NB), the Hungarian National Bank (HNB) and the Central Bank of Brazil (Banco Central do Brazil - BCB). We can see from the Table 4.1.6. that all of those selected central banks have overall profit in the examined period (2000 - 2013) and also ended in profit at least in half of the period.

Table 4.1.6: Net profits/losses of central banks (control group) in millions of USD

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
NBP	1152,76	647,04	1305,99	1110,2	1798,67	377,89	834,88	-4597,99	-5187,84	1333,12	2154,57	2936,58	1717,71	0
NB	1,51	-0,52	-3,12	2,91	0,17	3,41	0,88	-2,99	0,59	-1,22	2,14	1,71	-0,09	9,1
HNB	0,05	0,01	-0,02	0,35	-0,21	-0,17	0,07	-0,09	-0,03	0,33	-0,2	0,07	-0,18	0,12
BCB	-2262	3307	302	8496	2244	4319	30569	87484	2969	46651	49101	58637	18900	-5926

2000 - 2013

source: NBP, NB, HNB, BCB (2000 - 2013): "Financial Statements", OZFOREX (2014): "Historic Rate Tools" <http://www.ozforex.com.au/forex-tools/historical-rate-tools/yearly-average-rates>, own calculations

As stated before, all of those central banks use inflation targeting as one of monetary policy tools. Norway and Hungary started to target inflation in the year 2001 so in the computation, ITS data from the period 2001 - 2013 are being used. As we can see from the table 4.1.7, Poland had the inflation target 6.1 with the tolerance band of +/- 0.7% at the beginning. In 2001 the inflation target shifted to 7% with the tolerance band +/-1% (this tolerance band remains the same afterwards). In 2002 and 2003 the inflation target was 3% and from 2004 to 2013 it was 2.5%. Norway, on the other hand still has the same 2.5% inflation target since the inflation targeting was implemented into Norwegian monetary policy in 2001. Hungary started to use inflation targeting in the same year and set the inflation target to 7% with the tolerance band +/-1% (which has been applied since then). In 2002 the inflation target was 4.5%, in 2003 and 2004 3.5%, in 2005 4% and 2006 3.5%. From 2007 to 2013 the inflation target remained the same - 3%. Brazil is slightly different from the other countries in our control group. It has a wider tolerance band. In 2000 it was 8% +/-2%, in 2001 6% +/-2%, in 2002 4% +/-2%, in 2003 3.5% +/-2%, in 2004 5.5% +/-2,5% and in 2005 4.5% +/-2.5%. Since 2006 it has been the same 4.5% +/-2%.

Table 4.1.7: Inflation target bands for control group 2000 - 2013

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Poland	5,4% - 6,8%	6% - 8%	2% - 4%	2% - 4%	1,5% - 3,5%	1,5% - 3,5%	1,5% - 3,5%	1,5% - 3,5%	1,5% - 3,5%	1,5% - 3,5%	1,5% - 3,5%	1,5% - 3,5%	1,5% - 3,5%	1,5% - 3,5%
Norway	not set	1,5% - 3,5%	1,5% - 3,5%	1,5% - 3,5%	1,5% - 3,5%	1,5% - 3,5%	1,5% - 3,5%	1,5% - 3,5%	1,5% - 3,5%	1,5% - 3,5%	1,5% - 3,5%	1,5% - 3,5%	1,5% - 3,5%	1,5% - 3,5%
Hungary	not set	6% - 8%	3,5% - 5,5%	2,5% - 4,5%	2,5% - 4,5%	3% - 5%	2,5% - 4,5%	2% - 4%	2% - 4%	2% - 4%	2% - 4%	2% - 4%	2% - 4%	2% - 4%
Brazil	6% - 10%	4% - 8%	2% - 6%	1,5% - 5,5%	3% - 8%	2% - 7%	2,5% - 6,5%	2,5% - 6,5%	2,5% - 6,5%	2,5% - 6,5%	2,5% - 6,5%	2,5% - 6,5%	2,5% - 6,5%	2,5% - 6,5%

Source: NBP, NB, HNB, BCB (2000 - 2013): "Financial Statements", LYZIAK T. (2013): "Building transparency and credibility of the central bank - The case of Polish inflation targeting"

In Table 4.1.8 we can see the actual inflation for our control group of countries. Form

those data we can conclude that Poland failed to fit in the tolerance band 10 times from 14 observed years, Norway 6 times, Hungary 9 times and Brazil 3 times. Brazil's inflation targeting might appear as well performing, but it has to be said, that Brazil has by far the widest tolerance band. Also, there were two out of three cases when inflation in Brazil did not fit in the tolerance band and was significantly higher than the upper limit of the band.

Table 4.1.8: Actual inflation of the control group 2000 - 2013

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Poland	9,90%	5,40%	1,90%	0,70%	3,40%	2,20%	1,30%	2,40%	4,20%	3,80%	2,60%	4,20%	3,60%	1,00%
Norway	3,10%	3,00%	1,30%	2,50%	0,50%	1,50%	2,30%	0,70%	3,80%	2,20%	2,40%	1,30%	0,70%	2,10%
Hungary	9,80%	9,20%	5,30%	4,70%	6,80%	3,60%	3,90%	8,00%	6,10%	4,20%	4,90%	3,90%	5,70%	1,70%
Brazil	7,10%	6,80%	8,40%	14,80%	6,60%	6,90%	4,20%	3,60%	5,70%	4,90%	5,04%	6,63%	5,40%	6,20%

Source: INFLATION.eu (2014): “Worldwide Inflation Data”

<http://www.inflation.eu/inflation-rates>

From those data the ITS index has been computed (table 4.1.9) in the same way as for our originally examined countries.

Table 4.1.9: ITS results for NBP, NB, HNB and BCB

	ITS
NBP	0,46
NB	0,29
HNB	0,98
BCB	1,46

Source: Author's own calculations

If we compare the ITS results for the control group and for the originally examined group we can see that two of the central banks dealing with deficit (CNB and CBoC) are more successful in targeting inflation than two central banks which reports profit (HNB and BCB). Also BCB is the second worst performing central bank regarding inflation targeting even though its inflation targets were higher than others' inflation targets and they have a twice wider tolerance band. On the other hand, Poland and Norway are targeting inflation more successfully than all of our examined countries except for Switzerland (which can be also considered as a profitable central bank). However, the difference between NBP and CNB/CBoC is around 0.1 which is not that distant. From those results we can conclude that inflation targeting can be

successfully performed no matter if the central bank is in profit or is dealing with a loss. Equally, profit does not guarantee inflation is kept within the target band.

4.2 Hypothesis nr. 2 - Expectations can strongly influence the outcome of the CB monetary policy.

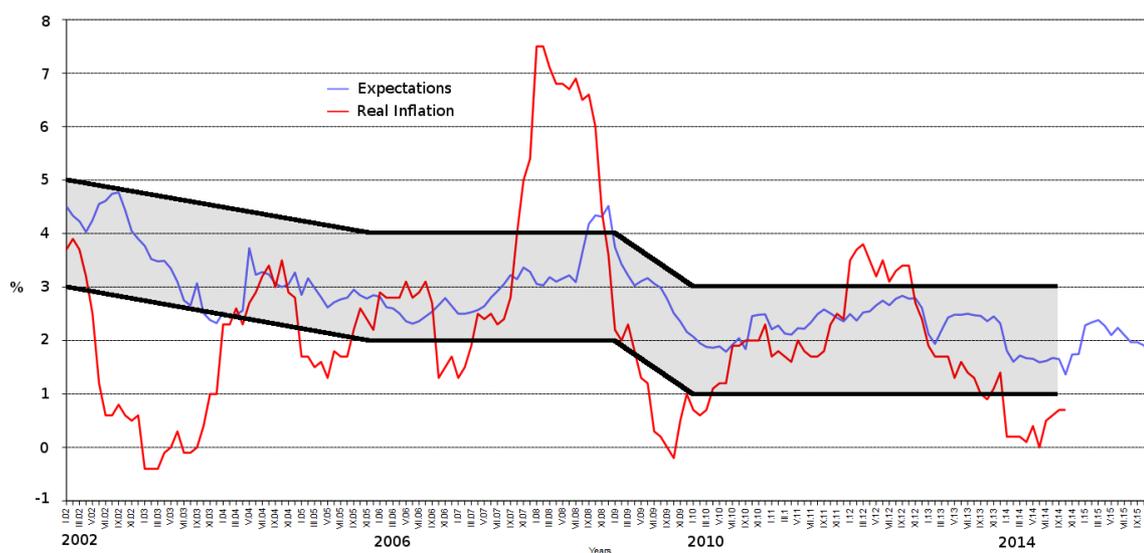
In this part we will see whether expectations can affect a central bank's outcome or not. There are two types of expectation that this work will analyze - inflation expectations from public sector and expectation of dividend payment from the government side. First, we will look at the expectations from the public sector side. In the recent two decades the central banking experienced transition from private and secret nature towards a more transparent and lucid monetary policy. Goals and objectives are being clearly specified, interest rates are immediately explained after announcement, economic forecasts are being published and many other steps are made in order to achieve greater transparency and therefore to influence the public and government expectations. If the expectations are as the CB desired, people support those CBs' policy objectives with their behavior.

4.2.1 Inflation Expectations

There are many different expectations from the private sector side, but since four of the five central banks chosen for this case study have adopted inflation targeting as one of their primary monetary policy objective we will focus on inflation expectations in the first part of this hypothesis. *“The measuring of financial market inflation expectations, a standard analytical approach of central banks, occupies a particularly important place in the inflation-targeting monetary policy scheme. The central bank’s monetary policy decision-making is based on an analysis of current and predicted future developments in the economy and the factors affecting them. The forecasts for inflation and economic growth are therefore key variables affecting the*

future monetary policy settings." ¹⁷ As we can see, inflation expectations are a very important factor for the central bank to determine the level of future inflation. Inflation can become a self-fulfilling prophecy. If employees expect future inflation, they would like their wages to get increased because they expect their costs to grow up. If they succeed the employer would have to increase prices and the inflation spiral successfully begins. Therefore, the goal of the central bank should be (besides other goals) to provide information to the public and government so that they can see the long-term objective and do not change their expectations when the outcome (in our case inflation) slightly deflects from its target path. This can be demonstrated on the case of the Czech National Bank and its anchoring inflation expectations. The CNB has been chosen because it publishes as the only bank from our sample monthly data about inflation expectations. In Figure 4.2.1. we can see inflation expectations (blue line) in the Czech republic between the years 2002 - 2015. Data for those expectations were gathered by CNB and they were collected monthly with a 1 year forecast. The respondent group has consisted of economic analysts from major banks and broker companies. We can also see the real inflation development (red line) and the inflation target band (gray area with black borders).

Figure 4.2.1: CNB - inflation expectations compared to the real inflation and inflation target 2002 - 2015



Source: CNB (2014): "Inflation Targeting in the Czech Republic", TRADING ECONOMICS (2014): "Czech Republic Inflation Rate"

<http://www.tradingeconomics.com/czech-republic/inflation-cpi>

¹⁷ CNB (2014): "Financial market inflation expectations"
https://www.cnb.cz/en/financial_markets/inflation_expectations_ft/

There are several interesting findings that we can draw from Figure 4.2.1. What is most important for our purpose is the finding that inflation expectations are almost always within the target band¹⁸. If we look at the actual inflation we can see that there were several swings and not rarely the inflation was higher or lower than target. Question is why the expectations did not trace the actual inflation (or at least not their extreme values). To answer that we have to look at the transparency of the Czech National Bank. The objectives of the central bank are clear, but which tools and how will use them is the responsibility of each CB to explain. It is difficult to measure transparency since it cannot be quantified. The quality of information provided is much more important. Czech national bank is considered one of the most transparent bank in the world¹⁹. Therefore, we can conclude that inflation expectations in the Czech Republic did not deviate from the inflation target because people simply believe that the CNB is able to deliver the promised monetary policy targets. Hypothesis 1. showed that the CNB handles inflation targeting quite well and part of the successful policy outcome is that the expectations correspond with the monetary target set out by the CNB.

To support our this hypothesis empirically we will use structural vector auto regression (VAR) to see whether there exists a correlation between the forecast of CPI and energy CPI (CPIen), food CPI (CPIfo), administrative CPI (CPIad - other than energy and food), exchange rate (Exrate - CZK/USD), CPI (to see overall impact) and short term interest rate (inrate). The VAR model has been chosen because it is appropriate for measuring the impact of shocks. It is estimated for inflation expectations using monthly data from CNB's questionnaires²⁰ between 1st Jan 2003 and 1st Dec 2013. Those data are an expected development of annual inflation in the horizon of 1 year (average of analysts, firms and households). One-year-ahead expectations can be considered more suitable for this case than three-year-ahead expectations.²¹ VAR including constant has been selected and lag of one and 90%

18 The most significant deviation from inflation target was at the end of the year 2008. It was caused by the global economic crisis which also affected the Czech Republic. However the expectations were just 0.5% above the target band and were significantly lower than the actual inflation that year.

19 DINCER, N., B. EICHENGREEN (2009): "Central Bank Transparency: Causes, Consequences and Updates" *The National Bureau of Economic Research*
This paper examines 100 countries and their monetary policy transparency. It showed that central banks generally tend to become more transparent and the Czech National Bank was declared as one of the seven most transparent banks in the world.

20 CNB (2014): "Financial market inflation expectations"
https://www.cnb.cz/en/financial_markets/inflation_expectations_ft/

21 HOLUB, T., J. HURNÍK (2008): "Ten Years of Czech Inflation Targeting: Missed Targets and Anchored Expectations" *Emerging Markets Finance & Trade*

confidence band is selected.

The estimation of VAR has the following representation (2):

$$Y_t = AY_{t-1} + v_t \quad (2)$$

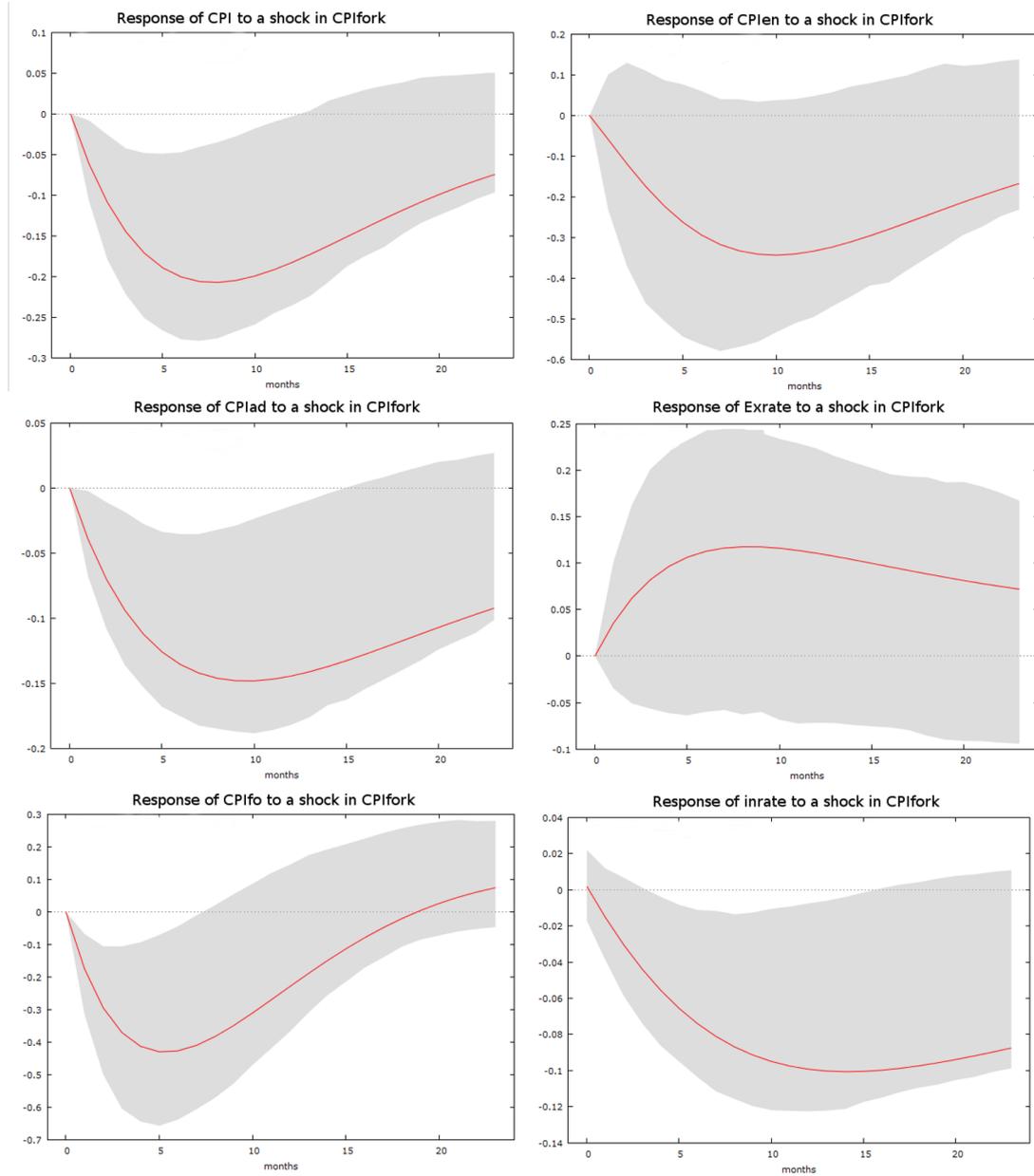
Y_t stands for the vector of endogenous variables in the time t , A is the matrix of coefficients describing the reduced-form relations among the endogenous variables and v_t is the vector of residuals. The variables described earlier are in this following vector.

$$Y = [\pi_{en}, \pi_{fo}, \pi_{ad}, \Delta s, \pi_{fork}, \pi, i] \quad (3)$$

The order of those endogenous variables is given by Cholesky factorization (as stated in formula 3). If examining shock and responses the identification is crucial. This part follows Holub & Hurnik (2008), who suggest that individuals take into account shocks and overall inflation observing inflation expectations. We should say that individuals observe only the monetary policy decisions. By observing shocks, individuals take into account previous experience. By doing so, they evaluate reactions of monetary policy. On the other hand, authorities, which provide monetary policy, observe inflation expectations when they are formed. Moreover, it is assumed that monetary policy actions do not have a contemporaneous effect on inflation (Holub & Hurnik, 2008).

In Table 4.2.1 we can see the variance decomposition of our variables. We have specifically focused on how CPIfork affects them. The expectations on administrative CPI, interest rate and overall CPI have the biggest impact at around 20% - 25%, CPIfo is around 12% and, as the smallest on exchange rate, CPIen is around just 4%.

Figure 4.2.2: The Response of endogenous variables to inflation expectations shocks



Source: Author's own calculations

Table 4.2.1: Variance decomposition of each variable for CPIfork - include a constant

period	CPIen	CPIfo	CPIad	Exrate	CPI	Inrate
1	0	0	0	0	0	0,0233
2	0,0864	1,2432	0,9982	0,1556	1,1237	0,7157
3	0,3137	3,1881	3,0229	0,4416	3,2596	2,2593
4	0,687	5,2198	5,6903	0,7973	5,873	4,2612
5	1,1902	7,052	8,6062	1,1817	8,548	6,4198
6	1,7948	8,5818	11,4424	1,5676	11,0307	8,5381
7	2,4678	9,7978	13,9817	1,9383	13,2024	10,5054
8	3,1771	10,7282	16,1199	2,284	15,0328	12,2703
9	3,8947	11,4153	17,8396	2,5999	16,5395	13,8186
10	4,5982	11,9035	19,1754	2,8841	17,7612	15,1571
11	5,2707	12,2337	20,1858	3,1371	18,7426	16,3029
12	5,9007	12,4417	20,934	3,3603	19,5264	17,2773
13	6,4807	12,5579	21,4784	3,5561	20,1503	18,1024
14	7,0073	12,6074	21,8684	3,7272	20,6462	18,7991
15	7,4794	12,611	22,1436	3,8762	21,0402	19,3864
16	7,8981	12,5852	22,3347	4,0058	21,3536	19,8809
17	8,2661	12,5432	22,4652	4,1185	21,6032	20,2971
18	8,5867	12,4949	22,5525	4,2167	21,8024	20,6473
19	8,864	12,4475	22,6093	4,3024	21,962	20,9419
20	9,1022	12,406	22,645	4,3775	22,0901	21,1896
21	9,3057	12,3735	22,6664	4,4435	22,1935	21,398
22	9,4786	12,3514	22,6782	4,502	22,2772	21,5731
23	9,6248	12,3401	22,6837	4,5541	22,3453	21,7202
24	9,748	12,339	22,6851	4,6008	22,4009	21,8437

Source: Author's own calculations

Our results indicate that inflation expectations have a significant statistically negative impact on the inflation rate of food, inflation rate of administration, overall inflation and interest rate. The 1% increase of inflation expectations decreases food inflation by 0.82%, administrative inflation by 0.19% as well as general inflation by 0.29% and decreases the interest rate by 0.08% respectively. The results for administrative inflation and interest rate are significant at the level of 5% of error correction term. The results for food inflation and general inflation are significant at the level of 1% correction term.

Table 4.2.2: Impact of inflation expectations on CPIfork - include a constant

	Coefficient	Std. error	t-ratio	p-value
CPIen	-0.279746	0.385449	-0.7258	0.4694
CPIfo	-0.821061	0.287679	-2.854	0.0051 ***
CPIad	-0.185540	0.0760333	-2.440	0.0161 **
Exrate	0.164787	0.166876	0.9875	0.3253
CPI	-0.287766	0.109110	-2.637	0.0094 ***
inrate	-0.0799930	0.0325718	-2.456	0.0155 **

Source: Author's own calculations

It may seem somewhat surprising that shocks in inflation expectations negatively affect inflation. One of the possible explanations can be found in Juster & Wachtel (1972). Although this is an older reference, it was verified by the University of Michigan. This paper examines the behavior of consumers and their response to higher inflation expectations. One of its findings is that “*the appropriate reaction to inflationary expectations would be to curtail spending in an attempt to guard against declining real income, thus, as corollary, raising the saving rate.*”²² They support this hypothesis with empirical evidence which was later confirmed by the University of Michigan²³ as mentioned earlier. The less the people spend the lower the actual inflation is. Another explanation can be that if CNB observes higher inflation expectations it adjusts the setting of monetary policy instruments to prevent the self-fulfilling forecast²⁴ and the result can have great impact on the final inflation.

4.2.2 Expectations From the Government Side

If the central bank registers a profit in a certain year, it has multiple possibilities how to handle that profit. One of those possibilities (also often given by a law) is to pay the dividends to a state. In this part, we will see how expectations of the dividends can lead to problems when the regular dividends suddenly stop. The Swiss National Bank is known as a privately owned company. At the end of 2013 nearly 53% of the SNB's shares were held by cantons²⁵. According to the Federal Act of the Swiss National Bank Art. 30 and Art. 31 „ *The National Bank shall set up provisions permitting it to maintain the currency reserves at a level necessary for monetary policy. In so doing, it shall take into account the development of the Swiss economy. The remaining earnings are deemed to be distributable profit. Distribution of profits: A dividend not exceeding six percent of the share capital shall be paid from the net profit. One third of any net profit remaining after the distribution of a dividend shall accrue to the Confederation and two-thirds to the cantons...*”²⁶ This profit distribution means small, yet important income for cantons. On average, it forms 2%

22 JUSTER, T., P. WACHTEL (1972): "Inflation and the Consumer" *National Bureau of Economic Research*: p.87

23 KATONA, G. (1972): "A Communication: Inflation and the Consumer" *Brookings Papers on Economic Activity*: pp.788 - 790

24 CNB (2014): "Inflation targeting in the Czech Republic"
https://www.cnb.cz/en/monetary_policy/inflation_targeting.html

25 HIRST, T. (2015): "Here Are The Behind-The-Scenes Politics In The Decision To Let The Swiss Franc Cause Market Chaos" *Business insider*

26 SNB (2003): "Federal Act of the Swiss National Bank"

of canton's expenditure and 4.6% income from direct taxes.²⁷

From Table 4.2.3 we can see that annual results were several times negative in the second half of our examined period. It is obvious that in those times the distributable profit equals zero. If the occasion is unique, the dividends are being paid from the distributional reserve. This reserve is generated in the times of prosperity and help co cover losses in more dire times. We can see that from 2004 - 2008 the reserve grows, but after the deficit in 2008 and 2010 it shrunk to zero (respective to negative figures).

Table 4.2.3: Profit and dividends of SNB 2004 - 2013 (bil. of CHF)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
annual result	21,6	12,8	5	8	-4,7	10	-20,8	13	6	-9
distributable profit	20,7	12	4,2	7,2	0	6,9	0	0	2,4	0
distributional reserve	6,9	16,5	18,1	22,8	22,9	14,6	19	-5	3,9	5,3
dividend to Cantons	2,5	2,5	2,5	2,5	2,5	2,5	1,5	1,5	1	0

Source: SNB (2004 - 2013): "Annual Results of the Swiss National Bank"

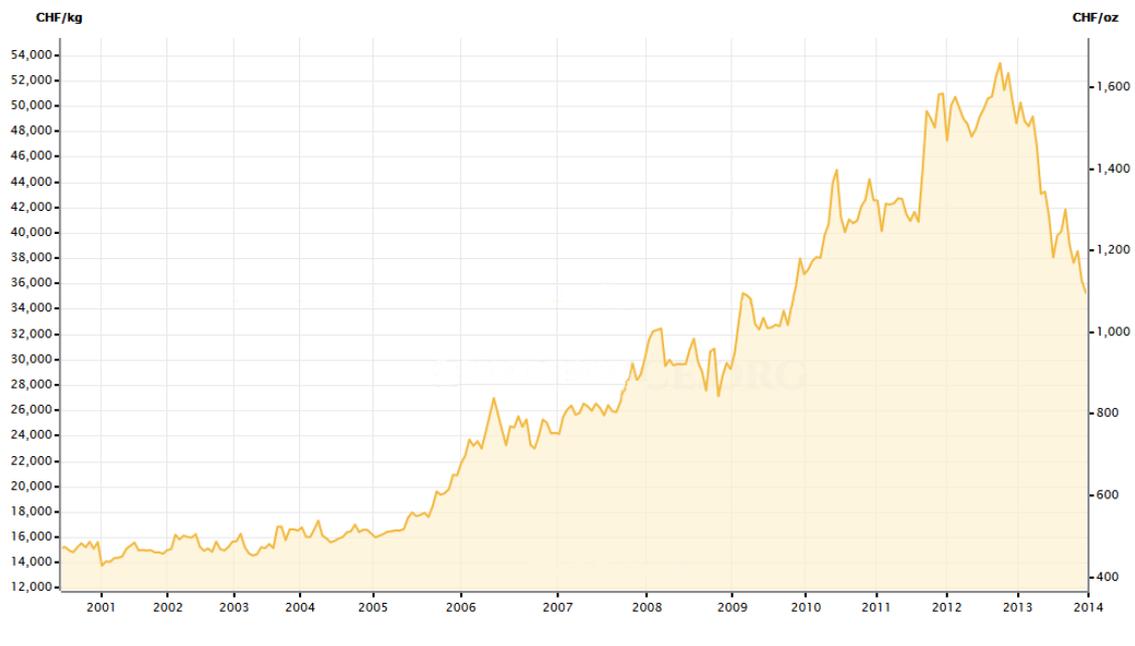
There were several factors which caused negative annual results and therefore stopped the dividend payment after 100 years.²⁸ As stated in the SNB's balance sheet decomposition in the first part of this work, two major asset side items are represented by Foreign currency investments and Gold holdings. This implies that the two of the most significant risks are the foreign exchange risk and risk related to the price of gold. As we can see from Figure 4.2.3 there was a sharp decrease in the price of gold in the year 2013 (more than 1/3). This resulted in the valuation loss of 15 billion CHF in SNB's holdings.²⁹

27 ALLEN, M. (2011): "Cantons count cost of reduced SNB handouts" *Swiss info*

28 STUDER, J. (2014): "A year without dividends and profit distributions - what are the reasons" *SNB*

29 STUDER, J. (2014): "A year without dividends and profit distributions - what are the reasons" *SNB*

Figure 4.2.3: Gold price 2001 - 2014



Source: GOLDPRICE (2014): "Where the World Checks the Gold Price"
www.goldprice.org

The appreciation of Swiss franc against other currencies also caused great losses. For instance, only in the period between 2008 and 2012 SNB experienced a loss in foreign currency investment every year. Most severe losses were in 2010 - 32.7 billion CHF and in 2012 - 10.6 billion CHF.³⁰ Those circumstances resulted in several steps by the SNB. At first, the SNB published warnings that it will not be able to pay out the same dividends as it used to pay if the trend continues in the following years. In 2010 and 2011 transfers to the cantons were reduced from original CHF 2.5 billion to CHF 1.5 billion. In the next year the payment was only 1 billion CHF and finally in 2013 there were no dividends from the SNB. For many of the cantons this cut in the financial flow posed a problem.³¹ Many cantons expected dividends to come normally and did not cover for them from different sources. This led to financial problems in several regions in Switzerland. From the Figure 4.2.4 we can see that many canton's budgets showed a deficit. After the decrease in dividends in 2010, the first cantons started to operate with negative financial results. Two years later 15 out of 26 cantons showed deficits in their accounts. When the financial problems appeared, the cantons started to pressure the central bank to return the dividend.³² At the very beginning of 2015 the SNB abandoned its currency peg. This

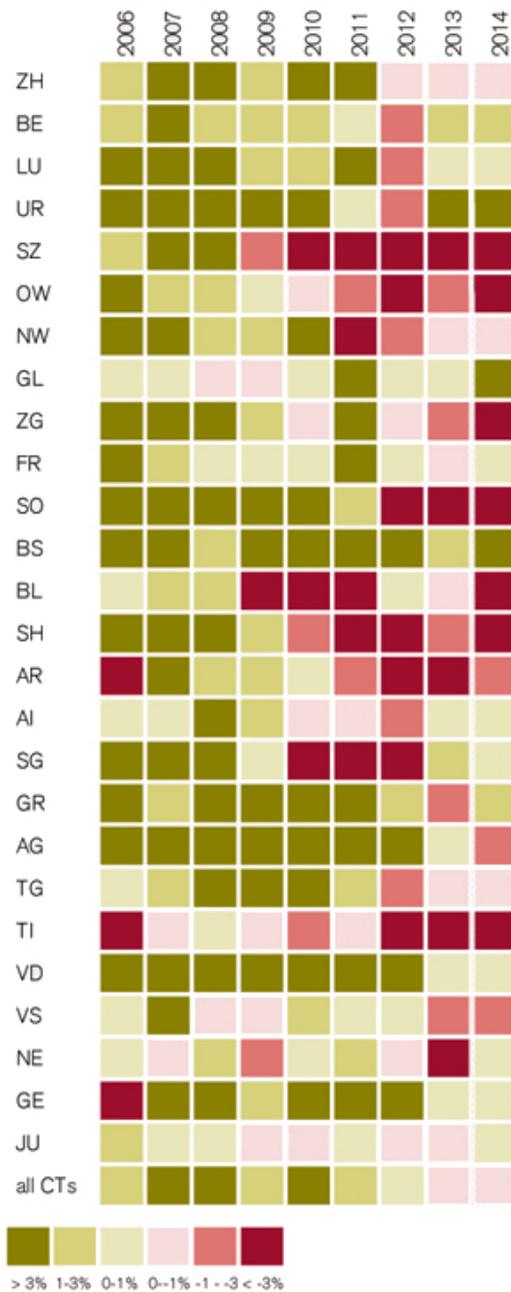
30 SNB (2008 - 2012): "Annual Results of the Swiss National Bank"

31 ALLEN, M. (2011): "Cantons count cost of reduced SNB handouts" *Swiss info*

32 HIRST, T. (2015): "Here Are The Behind-The-Scenes Politics In The Decision To Let The Swiss Franc Cause Market Chaos" *Business insider*

move enabled the franc to appreciate against the Euro. This resulted in the SNB's loss of around 75 billion CHF.³³

Figure 4.2.4: Financial results of Swiss cantons 2006 - 2014



Source: HURST, S., T. RÜHL (2015): “Half of Swiss Cantons in the RED” *Credit Suisse*

The question is whether this act is related to restoration of the dividends when the result is exactly the opposite. According the SNB president Thomas Jordan the Swiss franc was “greatly overvalued” when it was in currency peg regime. One of the

³³ HIRST, T. (2015): “Here Are The Behind-The-Scenes Politics In The Decision To Let The Swiss Franc Cause Market Chaos” *Business insider*

possible motives³⁴ was to depreciate the franc and therefore earn higher profit from foreign exchange investments. The reason why it did not work was wrong timing. Mr. Jordan thought that Swiss Franc would fall against the Euro when the peg was abandoned. In any case, we can conclude that after the SNB made changes in dividend payment, there was pressure on it from the government (cantons) to restore it again. The SNB tried to satisfy them by adjusting the monetary policy.

4.3 Hypothesis nr. 3 - Financial strength of the CB can be obtained by adjusting MP, but this is typically not the preferred solution as it may be in conflict with the price stability objective.

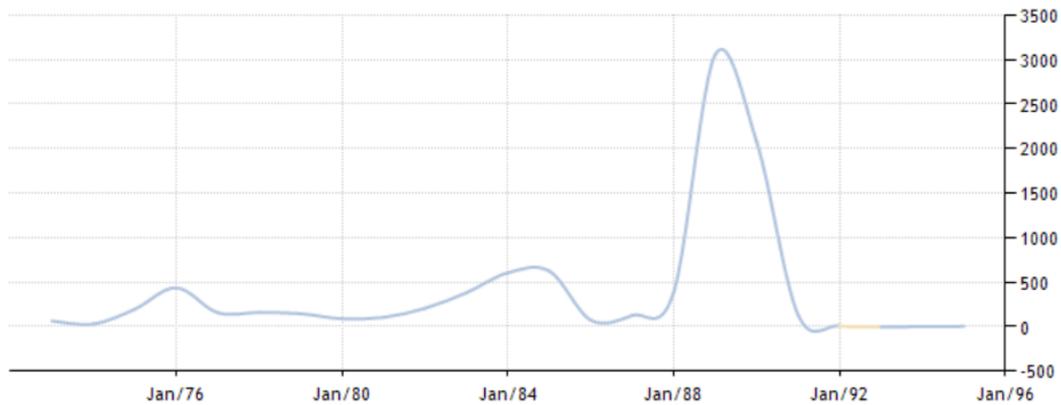
Since the central banks are not evaluated in terms of profitability, but rather in terms of their ability to fulfill the given goals there are several ways how to improve the ability to meet its objectives without necessarily increasing the profit. One of them is adjusting the monetary policy. As Benecká, Holub, Kadlčáková, Kubicová (2012) claim: *“In particular, higher inflation may increase central banks' financial strength via higher seigniorage.”*³⁵ There are several examples of this practice in the history. The question is if those steps did not undermine the macroeconomic stability. In this part of the work, we will elaborate on this phenomenon in the case of Argentina. Argentina is suitable as a case study for this part of the work due to the fact that it has experienced severe economic turbulences in the past several decades which resulted in very unstable macroeconomic environment. Those turbulences were caused by many different factors, but adjusting monetary policy to gain financial strength was most definitely one of them. Argentina is known as the country with fluctuating inflation - Figure 4.3.1. There have been periods with a relatively low inflation and

34 HIRST, T. (2015): “Here Are The Behind-The-Scenes Politics In The Decision To Let The Swiss Franc Cause Market Chaos” *Business insider*

35 BENECKÁ, S., HOLUB, T., KADLČÁKOVÁ, N. L., I. KUBICOVÁ (2012): "Does Central Bank Financial Strength Matter for Inflation? An Empirical Analysis" *CNB working paper series 3*: p. 17

periods with hyperinflation. From 1920 to 1939 this range was a few points above or below 0. On the other hand between 1970 to 1990 there was an inflation in hundreds and later that period even in thousands of percentages.³⁶

Figure 4.3.1: Inflation in Argentina 1973 - 1995



Source: TRADING ECONOMICS (2014): “Inflation - GDP deflator in Argentina”
<http://www.tradingeconomics.com/argentina/inflation-gdp-deflator-annual-percent-wb-data.html>

As is typical for countries with chronic-inflation economies and as was stated in the first part of this work (Argentina - History and Monetary policy history), every galloping inflation or hyperinflation cycle was followed by an attempt at stabilization. The more important question for our purpose is what preceded these inflationary cycles. To answer that question, we have to look back in the monetary history of Argentina and we can see that a frequently used tool to balance the government debt was seigniorage. In the following part this work will examine whether there is a correlation between money issued by the CBoA and the inflation rate. There are several approaches how to measure the seigniorage. The most simple is based on the premise that change in the monetary base equals seigniorage³⁷

$$S_t = \Delta M_t = M_t - M_{t-1} \quad (4)$$

36 PARKER (2010): "Case of the Day: Money and Inflation in Argentina" *Reed College*

37 BUITER, W. H. (2007): "Seigniorage" *Economics: The Open-Access, Open-Assessment E-Journal*, 1 (2007-10): pp. 4 - 5

Another measure is based on the interest earned by investing resources obtained by the previous issuance of base money in assets which bear interest.

$$S_t = i_t M_{t-1} \quad (5)$$

However, it is always better to measure seigniorage as a share of GDP^{38 39} which will also be used in this work.

$$S = \frac{M0_t - M0_{t-1}}{GDP_t} \quad (6)$$

Where S is seigniorage, ΔM is equal $M_t - M_{t-1}$ is the change in the monetary base, GDP_t is the gross domestic product in the time t. As the representative sample, the period between the years 1992 and 2012 was chosen. In Table 4.3.1 we can see seigniorage computed as a ratio of change in the monetary base to GDP. There are also inflation rates in the period that we used.

38 KIGUEL, A., Miguel & A. P. Neumeyer (1989): "Inflation and Seigniorage in Argentina"

39 BUITER, W. H. (2007): "Seigniorage" *Economics: The Open-Access, Open-Assessment E-Journal*, 1 (2007-10): pp. 4 - 5

Table 4.3.1: Seigniorage and inflation in Argentina between the years 1992 and 2012

	Seigniorage (S)	inflation (i)
1992	1,39	24,90
1993	1,68	10,61
1994	0,42	4,18
1995	-1,17	3,38
1996	0,36	0,16
1997	0,66	0,53
1998	0,14	0,92
1999	0,04	-1,17
2000	-0,51	-0,94
2001	-1,14	-1,07
2002	16,72	25,87
2003	13,30	13,44
2004	3,97	4,42
2005	1,22	9,64
2006	11,84	10,90
2007	7,37	8,83
2008	3,11	8,6
2009	4,20	6,3
2010	10,32	10,5
2011	14,02	9,8
2012	17,78	10

Source: IMF (2014): "International Monetary Fund" and author's own calculations

From these data the correlation was computed using Pearson's Correlation. The value will be within the range of -1 to 1. According to the literature⁴⁰ the strength of the correlation is divided into seven categories of positive correlation (we do not expect those values to be negatively correlated). Below is the formula specific for this case:

$$r_{si} = \frac{\sum_{t=1}^n (s_t - \bar{s})(i_t - \bar{i})}{\sqrt{\sum_{t=1}^n (s_t - \bar{s})^2 \sum_{t=1}^n (i_t - \bar{i})^2}} \quad (7)$$

40 UNIVERSITY OF STRATHCLYDE (2014): "Correlations: Direction and Strength"
<http://www.strath.ac.uk/aer/materials/4dataanalysisineducationalresearch/unit4/correlationsdirectionandstrength/>

We have simply plugged all the data into the equation and we received the correlation coefficient of $r = 0.592$. According to the classification chosen⁴¹ it is within the interval of 0.5 - 0.8 which can be referred to as a strong correlation. However, it is not a very strong (0.8 - 0.9) nor perfect (1) correlation. This can be caused by several factors. The most probable cause is that there are many more factors which affect the inflation rate of which seigniorage is merely one. Even if the results suggest a correlation, it would be premature to draw conclusions because the correlation between high and volatile inflation and seigniorage can be anticipated. What is more interesting is that the Mean of seigniorage in Argentina between years 1992 - 2012 was 5,03%. For comparison in the same period in Switzerland the mean of seigniorage was 1,1%⁴². We can observe the galloping inflation in our tested sample. It is not as severe as the hyperinflation around the year 1989 which culminated at 3080 %⁴³, but it is still high enough to compromise price stability. In the times of galloping inflation and hyperinflation prices changed so fast that people tended to hold assets in foreign currency or in commodities. The basic purpose of seigniorage in the time of debt reduction is to obtain financial strength to pay the debt. This may cover for the debt, but it is bound with financial instability and negative effects for domestic currency holders. Inflation causes the depreciation effect on domestic currency which lowers money's purchasing power. In other words, the central bank covers its debt or the government's debt with the wealth of domestic currency holders. The value of money drops and the bank eventually changes the currency as we have seen many times in the history of Argentina⁴⁴. According to Webber (2011) printing money in Argentina is a form of interest-free financing for government expenditures. It seems as if the government was satisfied with double digit inflation. The reason for this behavior is that growing expenditures can be financed by the inflation tax. From the Figure 4.3.2 we can see that government expenditures are steadily growing. Webber provides the numbers: *Argentina raised \$6bn, or 1.6 per cent of GDP, through inflation tax last year (2010) – a gain of \$7bn, or 1.9 per cent of GDP, if seigniorage is taken into consideration.*⁴⁵ We can see that the government

41 UNIVERSITY OF STRATHCLYDE (2014): "Correlations: Direction and Strength"
<http://www.strath.ac.uk/aer/materials/4dataanalysisineducationalresearch/unit4/correlationsdirectionandstrength/>

42 IMF and author's own calculations

43 FEDERAL RESERVE BANK OF ST. LOUIS (2014): "Inflation, consumer prices for Argentina"
Economic Research: <http://research.stlouisfed.org/fred2/series/FPCPITOTLZGARG#>

44 Last four changes were in 1970, 1983, 1985 and 1992.

45 WEBBER, J. (2011): "Argentina: inflation as a money sniper" *beyondbricks*

needs that money and forces central bank to issue more money. It may be profitable for the government, but it drives the inflation.

Figure 4.3.2: Government spending in Argentina 2004 - 2014 (mil ARS)



Source: TRADINGECONOMICS (2014): "Argentina Government Spending"
www.tradingeconomics.com/argentina/government-spending

The change in monetary policy should not therefore be applied in order to achieve the financial strength. From this case study we can conclude that CB's money growth is inferior to keeping inflation in a sustainable band. The CBoA is the only central bank which does not target the inflation and it has far worst results in achieving economic stability in Argentina. Change in the monetary policy should be applied with respect to economy stabilization and not just the financial strength of the central bank.

4.4 Hypothesis nr. 4 – There is no optimal capital level which will guarantee the proper operation of every CB.

To confirm or disprove this hypothesis we first need to understand some of the mechanisms of central banks. Most of the central banks are owned by general public nowadays. Some of them were private at the beginning, but were nationalized later. There are still few which still have private shareholders. Those shareholders would

tend to focus on profit which could jeopardize the independence and monetary policy of the CB. In those rare cases there are laws passed by the government which prevent those situations from occurring by significant limitation of shareholders' authorities. Dividends are limited to certain levels (usually 5% - 6% of the CB's face value), the shareholders have nearly no impact on the strategy of the CB, etc. We can conclude that central banks have the only motive to act in the public's best interest. Also as stated earlier in this work, the central bank nearly cannot go bankrupt. It can slip into balance sheet insolvency and still operate successfully and conduct solid monetary policy. To determine whether there is universal capital level that ensures the proper operation of every CB we need to see the mechanism of the CB's handling of finances and therefore affecting its financial position. CB's gains and losses belong to residents of the given state. If we take this into account, it is logical that in the times of negative equity the CB can face the public pressure as well as political pressure. The policy of the CB can be questioned whether it can deliver the promised targets. These insecurities are not beneficial for anybody. On the other hand, if the CB is in surplus (or at least shows an increasing trend), politicians as well as the public will support the CB's actions which will leave CB's decisions more independent and therefore more focused on the observance of monetary policy targets. The central bank's finances can therefore support its credibility and ability to execute its policy successfully. There are also different developments of the balance sheet which will satisfy the government and public at different times. The public and government react differently to the negative equity in the time of crisis. In crisis the CB has different financial demands than in times of prosperity. Therefore, the bank should cumulate financial reserves in the period of well being to use them later at a worse time in order to retain its continuous ability to perform its monetary policy and to maintain its independence. To determine what capital level the central bank needs we have to take into account all of those factors and several more aspects.⁴⁶ We can sum them up into four general areas - economic exposures, financial risk management, accounting policies and financial weaknesses. Economic exposures may vary a lot across the central banks. One of the most significant differences can be identified in currency exposure - foreign exchange exposure to be specific. This is an exposure of the CB to the potential impact of the movement in foreign exchange rates. There are several reasons for the CB to hold the foreign currency assets. Some of the CBs conduct their

⁴⁶ In fact there are so many other factors and aspects that it is nearly impossible to cover them all. To cover all this topic this would be subject of, at least, dissertation thesis. There are however few comprehensive papers such as Archer and Moser-Boehm (2013) which the author of this thesis recommends to read if interested in this topic.

stability objective using a fixed exchange rate or managed floating exchange rate which required foreign currency reserves to intervene if necessary. As an example, let us take three countries from our group - CNB, CBoA and SNB. CNB uses FX interventions to weaken the Czech crown⁴⁷. The main purpose is to keep the inflation around 2% and to prevent deflation. FX interventions were implemented by CNB in 2013 as one of its monetary policy tools and it also should keep exchange rate close to 27 CZK/EUR. The CBoA has adopted a floating exchange rate after the pressures from IMF⁴⁸. This had some depreciation effects on peso so they also adopted FX regulations. FX regulations strictly regulate all entities involved in FX transactions. For example, the residents of Argentina can purchase foreign currency only if they are involved in foreign trade or *“Argentina residents that provide services to non-Argentine residents are also obligated to bring into Argentina and sell in the foreign exchange market that amount in foreign currency collected for consideration of the services.”*⁴⁹ SNB aims to preserve the exchange rate on the minimum rate 1.2 CHF/EUR which is achieved through foreign exchange swaps and transactions. We can see the usage of those instruments in the recent history.

Some of the central banks acquire the foreign currency when they intervene to support domestic exporters as can be seen in 2013 by the CNB (beside the goal to prevent deflation and to keep inflation around 2%). Another economic exposure is the interest rate exposure. This exposure is dependent on the balance sheet structure of a given central bank. A great illustration of this occurrence can be found in Argentina between the years 2001 and 2003. The interest rate has been fluctuating enormously from 80% to 0% and back to over 90% in the short period. After the year 2004, the interest rate situation became more balanced - Figure 4.4.1.⁵⁰

47 CNB (2014): "The Exchange Rate as a Monetary Policy Tool"

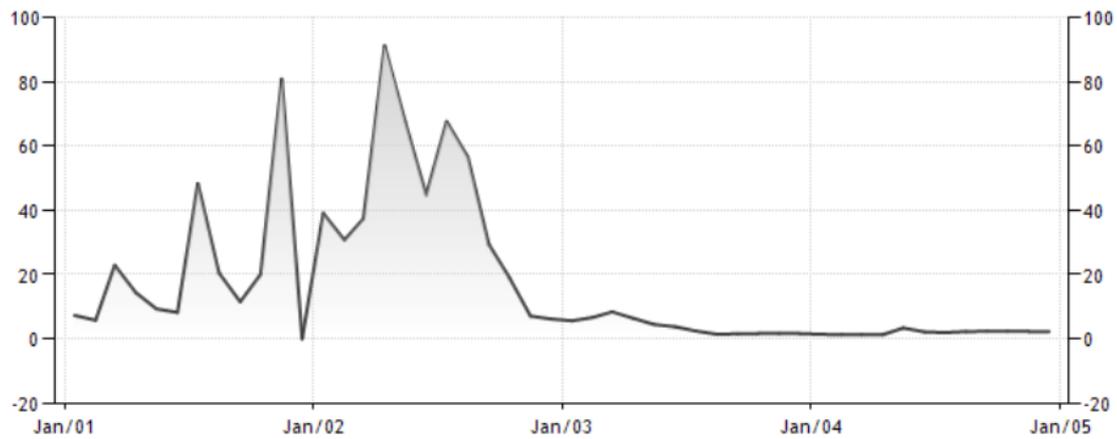
https://www.cnb.cz/en/faq/the_exchange_rate_as_monetary_policy_instrument.html

48 FRANKEL, R., M. RAPETTI (2007): "Argentina's Monetary and Exchange Rate Policies After the Convertibility Regime Collapse"

49 ABRAMOVICH, F. L., J. I. MAYORA (2012): "Foreign exchange controls in Argentina"
International Financial Law Review

50 TRADINGECONOMICS (2014): "Argentina Money Market Rate"
<http://www.tradingeconomics.com/argentina/interest-rate>

Figure 4.4.1: Interest rate in Argentina 2001 - 2004



Source: TRADINGECONOMICS (2014): "Argentina Money Market Rate"
<http://www.tradingeconomics.com/argentina/interest-rate>

To cover those exposures in normal times it is essential to figure out which level of financial resources is needed. The difficulties appear in special occasions. Firstly, there can be massive financial exposure linked to the fact that the CB serves as the last-resort backup. The financial requirement in the last-resort situation can be enormous. Experience for the past two decades suggested that crisis amplifies the economic exposure. Those situations must be taken into account. We can see that different central banks face different financial exposures in different times. As for the Financial risk management, the central bank has very similar financial risk management tools as the commercial banks such as setting credit and market risk limits, reducing exposures as their riskiness increases and reducing riskiness by accepting a collateral. Unfortunately, none of the central banks use those tools to cover the entire balance sheet. *“Even where risk management systems are in active use, they are almost always focused on assessing and controlling the smaller contributor to financial risk: active risk-taking (usually assessed relative to the structurally and policy-determined strategic benchmarks in which one finds the dominant exposures).”*⁵¹ Briefly, this means that central banks prefer monetary policy objectives over financial objectives. There are several examples which can be observed in the CB behavior. In the financial crisis the existing collateral requirements are loosened up. In case the credit risk increases, the CB does not enforce the credit limits as it usually does. Another example is in the situation of FX interventions. After influencing the exchange rate, an exchange rate risk can appear

⁵¹ BORIO, C., GALATI, G. & A. HEATH (2008): "FX reserve management: trend and challenges"
Bank for International Settlements

which is not immediately hedged. Another topic is different accounting policies. As mentioned earlier in this thesis each CB has slightly different approach to accounting. Although it can be considered as purely formal matter, it can affect the economic development. Accounting serves (among other purposes) the purpose of informing the subjects involved in the market about the condition of the CB and help them to adjust their future market behavior. There are, however, some actions taken by CB which can be hidden from the balance sheet and can therefore distort the impression from the balance sheet. The central bank can transfer welfare from one group to the other by undertaking some of the actions. For example in case of intervention which would depreciate domestic currency, the welfare shifts from domestic consumers to the exporters and foreign consumers. Another fact can distort the judgment from the balance sheet. Central banks usually aim for long-term goals so the decrease in some of the balance sheet items does not automatically mean wrong development of monetary policy. Financial markets can therefore receive undesired messages from CB's balance sheet and behave differently from CB's intentions. This would make it harder for the CB to pursue its policies correctly. There is, however, always the possibility to provide comprehensive explanatory material. As was stated earlier, the financial strength (or weakness) does not guarantee good (bad) performance. Yet, the central banks tend to declare negative stances to the financial weakness. That can be explained again by the misinterpretation of the balance sheet variables. Politicians and other subject in the market still tend to usually explain weak finances as the signal of corrupted CB's policy. This could lead into self-fulfilling prophecies. It is necessary to say that it may actually be the signal of the corrupted CB's policy and it is not an easy task to distinguish between those two cases. To assess the proper capital level for each central bank we have to take all those aspects into account. From that we can get an outline of the framework which can be used to compute the optimal level for the given central bank at the given time. Each of those four basic areas (economic exposures, financial risk management, accounting policies and financial weakness) influences the capitalization level which is suitable for the specific bank. There can be huge differences between two central banks with similar results arising from misunderstanding or misinterpretation of the CB's financial results. Misunderstanding appears when the market subjects apply the same measures to the CB as to the commercial banks or other financial institutions. Misinterpretation appears when taking (or not taking) into account signals which should not be (should be) taken into account. This could lead into self-fulfilling prophecies. What is most

significant is therefore not the capital level itself, but the lucidity of the CB's messages and its ability to explain them to the general public as well as to the politicians. From this case study as well as from the other papers (*“Four cases of policy success despite long periods of negative equity were discussed – the central banks of Chile, the Czech Republic, Israel and Mexico. These central banks all have good recent track records with respect to macroeconomic and financial stability...”*)⁵² it is clear that CNB and CBoC have different capital level than central banks with positive equity and they are still successfully conducting monetary policy. From all the above we can conclude that there is no optimal capital level which will guarantee the proper operation of every CB.

52 ARCHER D. & P. MOSER-BOEHM (2013): "Central bank finances" *Bank for International Settlements*

5 Conclusion

This work analyzed five central banks and examined their ability to successfully execute monetary policy. This case study examined the Czech National Bank, the Central Bank of Chile, the Central Bank of Argentina, the Bank of Jamaica and the Swiss National Bank. This paper is divided into two parts. The first part is descriptive and provides the reader with the awareness about each central bank, its monetary policy and balance sheet composition. To sum up this part, we can conclude that all of the selected central banks are inflation targeting except for the CBoA. Argentina has adopted a managed float exchange rate. If we look at central banks' balance sheets we can conclude that the most significant asset side item always represent the holdings of securities in foreign currencies. This implies that the banks are most prone to exchange rate risk.

Four hypotheses are examined in the second part.

H1.: Solid monetary policy can be applied even if CB is dealing with a loss.

This paper tests the hypothesis on four central banks with inflation targeting regime - CNB, CBoC, BOJ and SNB. At the beginning we showed that three of those four banks were operating with a deficit and they also experienced a loss most of the years. The period from 2000 - 2013 was chosen. To determine whether they are successful in conducting monetary policy we chose the measure that is the same for all of them - inflation targeting. The Inflation Targeting Success rate index was developed specifically for this work and its purpose was to examine average deviation of actual inflation from the inflation target band of each central bank.

$$ITS = \frac{\sum_{i=1}^n |tib_t - \pi_t|}{n}$$

The more closer this index is to 0 the better the CB is in targeting inflation and therefore in conducting monetary policy successfully. Our results revealed that the SNB has the best ITS index with only 0.13 and the worst is held by the CBoJ with 1.75. What is interesting is that the Bank of Jamaica has the highest inflation target of all and the Swiss National Bank the lowest. The CNB and the CBoC have a similar index around 0.5 which means relatively successful monetary policy. We have also chosen a control group of central banks which are also under inflation targeting regime and do not suffer from budgetary issues. We have selected the National Bank

of Poland, the Central Bank of Norway, the Hungarian National Bank and the Central Bank of Brazil. We have used the same figures as we used with our original banks. The best performing CB is the Central Bank of Norway with ITS 0.29, the second is the National Bank of Poland with ITS 0.46, the third is the Hungarian National Bank with ITS 0.98 and the worst is Central Bank of Brazil with ITS 1.46. Even though Brazil has the most volatile inflation target band (some years even +/- 2.5%) it still was not able to fit in this target band and according to this index it is the second worst central bank from all eight examined banks. When we compare the overall results we can conclude that even if a bank is in deficit, it can still be able to pursue its goals effectively and, on the other hand, positive balance sheet does not ensure proper observance of monetary policy goals. We can conclude that in fact solid monetary policy can be conducted even with deficit of the central bank.

H2.: Expectations can strongly influence the outcome of the CB monetary policy.

This hypothesis was tested from two points of view. Firstly as inflation expectations from the public sector and expectations of dividend payment from the government side. Inflation expectations are a very important factor for CB to determine the level of future inflation. The case of CNB has been chosen to see how shocks in inflation expectations affect the actual inflation. To empirically support this hypothesis we have chosen the VAR model. We examined the relation between forecast of CPI and energy CPI, food CPI, administrative CPI, exchange rate, CPI and short term interest rate. The estimation of VAR is represented by

$$Y_t = AY_{t-1} + v_t$$

and Cholesky factorization was chosen according to Holub & Hurnik (2008):

$$Y = [\pi_{en}, \pi_{fo}, \pi_{ad}, \Delta S, \pi_{fork}, \pi, i]$$

The results suggested that inflation expectations have a negative statistically significant impact on inflation rate of food, inflation rate of administration, overall inflation and interest rate. This correlation may seem unintuitive. This paper provides two possible explanations. The first one is based on the ideas of Juster & Wachtel (1972) which were later confirmed by the University of Michigan. They claim that in the times of higher inflation expectations people tended to limit their spendings in

order to guard against declining real income. This would potentially lead to the decrease in inflation. Another possible explanation is that CNB observes inflation expectations and in the case of excessive expectations it takes actions to prevent the prophecy fulfillment.

The second part of this hypothesis examines expectations from the government side on the case study of Switzerland. The SNB used to pay the dividends over 100 years from its profit. The drop in the price of gold and the strengthening of the Swiss Franc forced this central bank to restrict the dividends in 2010 and eventually stop paying the dividends in 2013. This resulted in a noticeable worsening of the balance sheet of Swiss cantons. Many of them found themselves in financial trouble and started to force SNB to return dividends back. There are speculations that this pressure lead to the of the withdrawal of the currency peg.

We can conclude that expectations can influence the outcome of CB even if the influencing can be unexpected.

H3.: The financial strength of CB can be obtained by adjusting MP - this is typically not a preferred solution as it may be in conflict with the price stability objective.

The financial strength is crucial for the proper execution of monetary policy. Financially strong banks are facing less restrictions than financially weak banks. We showed on the case of Argentina that seigniorage can be a source of financial strength for the central bank or government. In the past several decades Argentina experienced unstable macroeconomic environment often leading to excessive inflation. In this part we examined the correlation between seigniorage and inflation and the possible causes for seigniorage. For seigniorage measurment we chose the change in the monetary base according to GDP. We used the Pearson's Correlation to see the dependence between those two variables. The suitable formula for our case was therefore:

$$r_{si} = \frac{\sum_{t=1}^n (s_t - \bar{s})(i_t - \bar{i})}{\sqrt{\sum_{t=1}^n (s_t - \bar{s})^2 \sum_{t=1}^n (i_t - \bar{i})^2}}$$

The results suggest that there is strong correlation between seigniorage and inflation. However this result could be anticipated since the inflation in Argentina was high and volatile. Remarkable is the reason of excessive seigniorage. The government

spendings are increasing constantly and there is the need to cover for those spendings. Through inflation, Argentina raised \$7 billion in 2010. That is quite a substantial amount and not surprisingly, the government is forcing the CBoA to issue more money. Unfortunately, this lead to high inflation and therefore it disrupts price stability.

H4.: There is no optimal capital level which will guarantee the proper function of every CB.

When central bank is facing difficult times and the determined monetary policy objectives are hard to achieve there was pressure from the public and government side. On the other hand in the times of prosperity the central bank is fully supported and can operate without being pressured. In the times of prosperity, the CB should accumulate reserves which will be used in worse times. There are many aspects which need to be taken into an account when determining the level of capital which each CB needs. We can sum them up into four general areas which are economic exposures, financial risk management, accounting policies and financial weakness. Economic exposure is specific for each CB and the most significant exposure is foreign exchange rate exposure. There are several factors that force central banks to hold foreign currency or securities. From the balance sheet decomposition at the beginning of this work we can see that holdings in foreign currency vary among the banks. Financial risk management is similar to commercial banks. There is slight difference in the preferences of central banks. They prioritize monetary policy objectives before financial objectives. Accounting policies can affect the economic development. They can affect market behavior and shift welfare from one group to another. It is important for a central bank to behave as lucidly as possible and provide sufficient explanatory material. Financial weakness is often hard to detect. In the first hypothesis we showed that even with a loss it is possible for the CB to be financially strong. Unfortunately, losses are often misinterpreted as financial weakness. Those misinterpretations can lead into self-fulfilling prophecies. If we want to determine the optimal capital level for each central bank we have to take into account all of these factors. From this work, it is clear that CNB and CBoC have different capital level than the other central banks which are still perfectly capable to deliver their promises.

This work reveals several factors which are vital for the proper operation of a central bank. They can be summed up in three general principles. Firstly, the key for

achieving support from public and government is transparency. The CB should explain its moves in the most detailed way possible. The second principle is to behave as independently as the environment allows. Pressures and demands from the government only make it harder to follow the delineated monetary policy. The last principle is to explain to the public that central banks can be perfectly capable of operating even with a loss.

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