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Faculty of Economics and Management



Bachelor Thesis

**The Monetary policy and the Central Bank Intervention,
the case of the Czech Republic**

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Declaration

I declare that I have worked on my thesis called “The Monetary policy and the Central Bank Intervention, the case of the Czech Republic” on my own and I have used only the scientific literature and other information resources that are mentioned in the references at the end of the thesis.

Prague, the 15th April 2009

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**The Monetary policy and the Central Bank
Intervention, the case of the Czech
Republic**

**Monetární politika a zásahy centrálních
bank, případ České Republiky**

Summary

This bachelor thesis consists of a theoretical and practical part. The theoretical part describes basics of monetary policy with a focus on the role of central banks. Firstly, the principles under which the monetary policy functions are explained, including its fundamental division and the two major approaches to it. The practical part concerns the Czech National Bank, especially in the period from 1998 to 2007 (the first ten years of the inflation targeting system).

Key words

- bank regulation, central bank, Czech National Bank, inflation, inflation targeting system, money, monetary policy, money supply, price stability

Souhrn

Tato bakalářská práce se skládá z teoretické a praktické části. Teoretická část popisuje základy monetární politiky se zaměřením na roli, kterou zde hrají centrální banky. Nejdříve jsou vysvětleny principy fungování monetární politiky, její základní rozdělení a dva hlavní přístupy k monetární politice. Praktická část se zabývá monetární politikou České Národní Banky v letech 1998 až 2007 (období prvních deseti let systému cílování inflace).

Klíčová slova

- bankovní regulace, centrální banka, Česká Národní Banka, inflace, systém cílování inflace, peníze, monetární politika, nabídka peněz, cenová stabilita

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1. Introduction

The origins of central banking system along with the monetary policy lie in the 17th century when the first central banks were established (namely it was the Swedish Riksbank which was founded in 1664 and the Bank of England which was set up in 1694). Their purpose then was to aid to the national treasure of the emerging states by purchasing and publicizing government debt. Another important role of the earlier central banks was the issuing of a uniform currency (that is in terms of its colour, size, value and market good will) which brought reliability to paper currency and strengthened its financial and economic aspects. Nevertheless, establishing of central banks in large scale is predominantly a phenomenon of the 20th century. The following facts may serve as an example: around 1900 there were only 18 central banks; this number was gradually increasing to the extent that by the end of the century there were 161 central banks (Cappie F., 1997). This expansion is explained by the growth of the activist monetary policy along with the market need for the security of deposits which single commercial banks were not able to provide – therefore the central banks' function of the lender of last resort (providing collapsing banks with certain amount of money in order to prevent the whole banking system from bankruptcy) has been set up.

In the Czech Republic, the role of a central bank is carried out by the Czech National Bank. For layers, its performance may not be very visible but it is crucial for the state's economy. It executes monetary policy – regulates money reserves, interest rates and currency exchange rates. This enables the Czech National Bank to significantly influence the price level, price stability, employment, balance of payments, economic growth and stability on the financial and exchange rate markets. It also operates as a bank of state (it administrates the state budget) and as a bank of banks (it serves as theirs creditor, regulates the commercial banks' activities and it checks legitimacy of

their transactions). By executing all these tasks the Czech National Bank provides security and stability of the whole Czech banking system. It also has the exclusive right to issue currency. The problem of monetary policy and central banks' interventions is very extensive and hundreds of pages would be needed for its full explanation. This thesis thus aims to outline its key principles.

2. Aim and methodology

The aim of this thesis is to provide a general overview of the monetary policy and central banks responsibilities. The main focus is laid on the Czech National Bank in the period from 1998 to 2007 – this period covers the first ten years of the inflation targeting system. I was examining whether the implementation of the inflation targeting system was successful.

The methodology consists of working with data on three main levels. Firstly, it is data gathering and literature study – predominantly scientific publications and my own study materials were used. Then, data sorting follows. It comprises of separating the relevant data from the unrelated ones and verifying their credibility. All the data resources are listed in the end of my thesis as references. Collected knowledge was put together to form an overview of my topic.

The thesis begins with presenting money – its functions, features, brief history and the process of its creation. Then the focus is shifted to the monetary policy. Its basic division on restrictive or expansionary type is explained, along with its objectives, effects and means of controlling the monetary conditions. When the theoretical part of monetary policy is covered, practical example of the Czech National Bank is used. At the end, 10 years of the inflation targeting system is presented together with focusing on the Czech National Bank's fulfilment of defined targets.

3. Literature overview

3.1. Money

Money can be defined as a certain kind of asset which is acceptable for sellers. All money has certain common functions, features and comparable motives for its holding. Further division could be perceived (in compliance with Maitah M., 2009, page 80 - 82):

Functions of money

- 1) *medium of exchange* - we use it to make transactions (it must be widely accepted for payment and portable)
- 2) *unit of account* – we compare the value of different types of goods with it
- 3) *store of value* - it is possible to transfer its purchasing power from the present to the future
- 4) *standard of deferred payment* - it means that debt is repaid by money, we must distinguish between money (it is what we use to pay with) and credit (available savings that we lent to borrowers)

Features of money

Its features are portability (*“easy to transport and transfer to the seller”*), divide-ability (*“measurable in both small and large units”*) and durability (*“able to retain value over time”*).

Motives for holding money

Motives for holding it are subsequent: transaction motive ("*since money is a medium of exchange, it is required for conducting transaction*"), precaution motive (selling of goods when it is expected that the price will go down) and speculative motive (buying of currencies at the right time).

3.1.1. History of money

The origin of money cannot be certainly dated; it always depends on various points of view of economists, historians, numismatists and anthropologists. In the West, an opinion that the first coins appeared in ancient Lydia in the 8th century BC prevails while others believes that its foundations lies in China. There are several types of money, listed by historical order we distinguish between (according to Maitah M., 2009, page 81 - 82):

- *barter money* - direct exchange of one goods for another without using money, it is harder to find out somebody for the exchange
- *commodity money* - there are determined commodities/items with internal value and the exchange is done with them, it can be for example olive oil, animals, wine, cigarettes, huge wheels of curve stone, shells and others
- *metal money* – it is made from copper, iron, gold, silver and diamonds and it has its own internal value (government does not have to guarantee it)
- *paper money* – here the fact what we can buy for it is more important than its origin
- *bank money* - money that are transferred into one's account at a financial institution, it is represented by deposits

- *plastic money* - corresponds to credit cards

3.1.2. Money creation

The majority of what we consider as money is created by the process of banks' lending to households and firms (credit creation). Direct money creation therefore consists of cash (banknotes and coins) and bank reserves which the commercial banks have at the central bank. These two items together are known as a monetary base. The central bank is issuing currency (it has the exclusive right for doing so) and creating bank's reserves. Also indirect control over money creation process is possessed by the central bank (it limits the possible volume of reserves)¹.

The role of commercial banks in money creation process

Although the central bank holds the key position in the process of money creation we should not omit the role of commercial banks. They act as financial intermediates, perform payment-clearing role (between their own clients and those of other banks) and supply money to the market. The point is that the majority of money supplied is in the form of bank deposits and not in the form of currency. As the only ones from all intermediates, commercial banks can legally lend more than they have received in deposit and hence create money².

There are two aspects of holding reserves. Firstly, the reserves pay little or no interest, so commercial banks would either keep them at minimum. This minimum is

¹ We can differentiate two types of values:

a) Nominal value: the value of certain thing expressed in the money value of that day – considering inflationary effects, it is not suitable for comparing different periods.

b) Real value: the value we get from the nominal one by adjusting, it reflects the real purchasing power of money (how much you can actually buy for it).

² By issuing loan, they increase the volume of their assets (they need to have enough bank reserves on their asset side). On the other way round, liability side is increased by the amount of loan credited.

determined by two necessities: *“having enough currency for the case of customer’s possible large withdrawal (usage of vault cash or deposits in central bank which is convertible to cash immediately) and settling payments among themselves (central bank transfers money from one account to another)”* (Burda M., Wyplosz Ch., 2005, page 205). Secondly, it is their duty to meet the reserve requirements given by the central bank.

This relationship between liabilities of commercial banks (current deposits of customers) and bank reserves (assets of the commercial bank and simultaneously liabilities of the central bank) creates the basis for the central bank control over the money supply. This connection could be described by money multiplier (it relates monetary base to wider monetary aggregates).

Monetary aggregates

Monetary aggregates mean: *“various definitions of the money stock, differing largely by their degree of liquidity”* (Burda M., Wyplosz Ch., 2005, page 552). We can distinguish between following majors ones (as indicated by Maitah M., 2009, page 82):

M₀: money in circulation, things could be bought immediately for it

M₁: includes M₀ plus sight deposits (it can be withdraw immediately), there is lower interest rate

- it is the widest and most liquid part of money supply, it comprises of currency, travellers’ checks, demand deposits (checking accounts) and other checkable deposits (interest bearing checking)

M₂: M₁ plus terminated deposits (you need certain time to withdraw it), there is higher interest rate

M₃: M₂ plus certain types of securities (issued for maximum period of 2 years)

3.2. Monetary policy

By monetary policy we understand “*actions taken by central banks to affect monetary and financial conditions in an economy*” (Burda M., Wyplosz Ch., 2005, page 552). It is a part of the state’s economic stabilization policy – therefore whilst conducting monetary policy, coordination with other instruments of economic policy is vital. Effectiveness of monetary policy depends on a range of variables such as economic structure, degree of development in money and capital market (sufficient level of the degree is crucial – when it is unsatisfactory, monetary policy is removed from one of its major tool that is the instrument of open market operations) and prevailing economic conditions.

3.2.1. Basic types of monetary policy

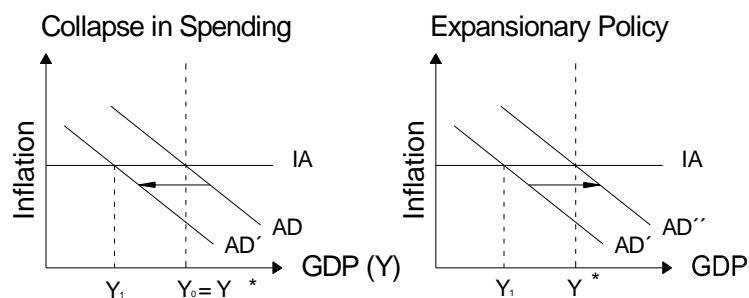
Monetary policy can be either expansionary or restrictive. These policies are rooted in the fact that the central bank can control the interest rate by the processes of purchasing and selling bonds. In order to not disrupting the long-run equilibrium in the market, timing of these policies is very important (using it inadequately may result in recession or even in economic depression).

Expansionary monetary policy

During expansionary monetary policy, bank raises money supply. This can be done by lowering reserve requirements, reducing discount rate or by buying bonds (conducts open market purchases). When there is an excess in money supply, demand for bonds rises along with their price. The higher is the price of bond; the lower is the interest rate.

Hence, augmentation of money supply induces lowering of interest rate which provokes increasing of the rate of investment and therefore growth of the aggregate demand (as well as of the real GDP)³ and decreasing the rate of unemployment. It is being used e.g. during the collapse in spending to limit the depth and length of the recession period.

The equation is: Open market purchases → Money supply rises → Interest rate falls down → Level of investments increases → Multiplier effect → Real GDP grows (Maitah M., 2009, page 147)



Here Y is level of output, AD stands for aggregate demand and IA signifies inflation average.

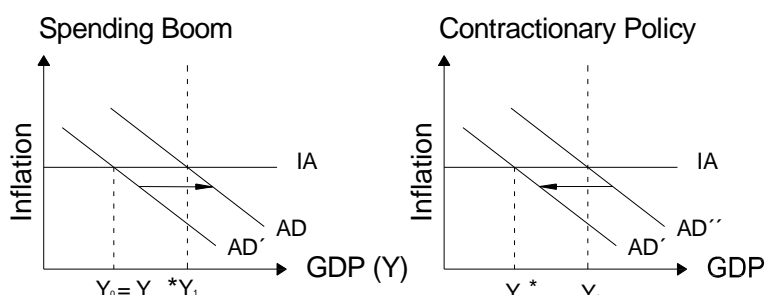
Restrictive monetary policy

Restrictive monetary policy works in the opposite way to expansionary policy – the central bank raises the interest rate by conducting open market sales in order to slow down the overall growth of economy.

³ Multiplier effect: the amplified change in real GDP that follows an increase in autonomous expenditures (Maitah M., 2009)

This operation can be expressed by following equation: Open market sales → Money supply falls down → Interest rate raises → Level of investments decreases → Multiplier effect → Real GDP drops

It is applied e.g. in case of exceeding inflation target (Maitah M., 2009, page 148).



Here, the shortcuts of Y, AD and IA signify the same things as on the graph above.

3.2.2. Different points of view on monetary policy

There exist two major points of view on monetary policy based on the approach to it – Classical and Keynesian. They differ mainly in the opinion of the state of employment in an economy and on the amount of influence that monetary policy can have over real GDP.

Classical view of monetary policy

The Classical point of view is described by the quantity theory of money, which is given by the following formula: $M \cdot V = P \cdot Y$, where M is a measure of money stock, V stands for velocity of money (indicates the average number of how many times one banknote changes its owner per year for purchases of final goods and services), P stands for price level and Y stands for real domestic product. For classical economists V and Y

remain fixed. Using words, it can be rewritten as: current market value of all final goods and services is equal to the supply of money multiplied by the velocity of banknotes. Therefore we got to the logical conclusion that an increase (decrease) in the quantity of money leads to a proportional increase (decrease) in the price level. Because of this, an expansionary (restrictive) monetary policy (increasing / decreasing of money supply) would lead only to proportional increase (decrease) in price level causing inflation (deflation) of the price level.

Another statement is that economy can be always found at the state (or near) full employment.

Keynesian view of monetary policy

“Keynesianism is the view that government demand management policy should play a key role in macroeconomist policy: Keynesians holds that markets suffer from imperfections – for example show clearing of labour and product market – which are responsible for the occasional underutilization of resources.” (Burda M., Wyplosz Ch., 2005, page 550)

The Keynesians deny both statements of the classical point of view (quantity theory of money and the situation of full employment in any economy). They admit that monetary policy can indirectly affect real GDP (by increasing of money supply causing decrease in interest level and so increase in the real GDP and vice versa). But they are sceptical about its efficiency because of two reasons:

- 1) Increasing bank reserves does not have to necessarily lead to an increase in money supply because banks may want to just hold the reserves.
- 2) Lowering interest rates does not have to imply an increase in aggregate demand (firms' and households' investment do not have to be that sensitive to the level of interest rates).

Because of the reasons stated above, Keynesians prefer fiscal policy to monetary policy (considering its effectiveness).

3.2.3. Monetary policy – its objectives, targets and instruments

As it has been mentioned earlier, monetary policy concerns the supply side of money provided by commercial banks (supply the majority of money) or by the central bank (supplies money and controls the processes in order to obtain/maintain price stability).

The central bank has three main objectives. They can be divided into two groups by their importance:

- 1) **Primary objective:** price stability⁴ - heavily depends on low and stable inflation
→ necessity of low rate money growth in the long-run (over 3 years)
- 2) **Secondary objectives:** short-term economic growth and exchange rate stability

The formula for achieving these objectives is: Instruments → Targets → Objectives.

Instruments which can be controlled by the central bank with high precision are:

- Bank Refinancing rates (repo and discount rate)

Repo: *“Agreements in which one party sells a security to another party and agrees to buy it back on a specified date for a specified price. Central banks deal in short-term repos to provide liquidity to the financial system, buying securities from banks with cash on the condition that the banks will repurchase them a few weeks later”* (Bishop M., 2004, page 202).

⁴ This objective has been existed since 1980s (due to the increase in inflation rates in the late 1970s and early 1980s). Before, the main goals were economic growth and low rate of unemployment. (Burda M., Wyplosz Ch., 2005)

Discount rate: The rate of interest which the central bank charges to other financial institution in case of lending.

- Monetary base control using open market operations (purchases and sales)

Open market operations: The process of central bank's selling and buying securities (such as government bonds, treasury bills) in the open market.

- Require Reserve ratio: *"the fraction of deposits that a bank is required to hold as reserves and not lend out"*. (Maitah M., 2009, page 171)

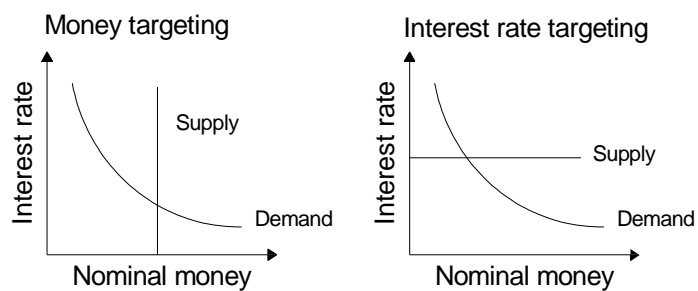
By these instruments, the central bank indirectly affects its targets such as:

- **Inflation rate:** *"the rate of change of the level of prices, measured by some price index of deflator"* (Burda M., Wyplosz Ch., 2005, page 549)
- **Exchange Rate:** *"the price of one currency in terms of another"*. (Maitah M., 2009, page 166)
- **Long-term market interest rates:** *"the amount of interest that would be paid during a year divided by the amount of money loaned/ in case of central bank it is the price that charges to banks for borrowing money overnight, expressed as an annual rate."* (Bishop M., 2004, page 143)
- **Rate of growth of monetary aggregates** (M_1 , M_2 , M_3 , etc.): the proportion by which the monetary aggregates are enlarged

Given the price level, the real demand is downward sloping (presenting the preferences and tastes of non public sector – the higher interest rate, the lower quantity of money demanded). As the central bank is on the supply side, it cannot affect public preferences. The point of the central bank policy is its positioning on this

graph setting either interest rate target (horizontal supply line, used by most of the CBs) or the amount of quantity supplied (vertical supply line).

Nominal demand for money as a function of the interest rate is graphically shown below (Burda M., Wyplosz Ch., 2005, page 202).

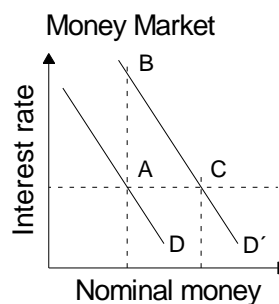


This graph is expressed by formula $M^d = PL(Y, i, c)$, where M^d is money demand, P is price level and L is real money demand (depends on Y – income, i – interest rate)

3.2.4. Controlling of monetary conditions

Money market

“Money market enables to trade reserves among all its participants (as some commercial banks keep an excess while the others have shortage).” (Burda M., Wyplosz Ch., 2005, page 210)



Participants of this market are commercial banks, financial institutions (possibly also non – financial institutions) and the central bank which is the sole producer of money base and therefore has a dominant influence on the market. Commodities are deposits at the central bank. Interest rate is the primary indicator of monetary conditions. It determines how much banks charge their own customers for lending (it is called money market interest rate).

Monetary conditions on money market are controlled by open market operations, reserve requirements and various monetary policies.

Open market operations

The main feature of open market operations is that they are short – term (less than two years), thus enables the central bank to control the money market conditions with a great precision (by deciding whether to renewing or not the maturing loans). The procedure, under which this system is functioning, is called rolling over. Commercial banks are taking loans from the central bank which induces increased in M0. Thereafter commercial banks rise the lending to customer that evokes M1 and the wider monetary aggregates to expand. Decreasing liquidity and diminishing of the monetary base is done the other way round. The same effect can be achieved by outright purchases and sales of assets (e.g. foreign exchange and government securities).

Reserve Requirements

Change in reserve requirements causes changes in possible commercial bank's lending. Increase in reserve requirements implies contraction of deposits of commercial banks and consequently they may stop be able to lend or even they may be forced to demand immediate repayments – “call in”. This principle works also in the contradictory way. But since these interventions may be very disruptive and costly

they are used only in emergency situations and the changes are done only by small increments.

Monetary policies

Monetary targeting

Monetary targeting is based on the presumption that as long as the public's demand for monetary aggregates is stable, money growth determines the level of inflation. This link was working relatively well⁵ until the widespread financial deregulation in the mid-1980s, when (also in connection with information revolution's impact on the banking and financial markets in 1990s) it becomes untrustworthy and therefore a shift to a direct inflation targeting has been done.

Inflation targeting

As inflation target is a simple and verifiable goal, it facilitates the central bank's communication about monetary policy actions to the public. It is also very good understood because of its clearness and transparency. The inflation target is settled on the base of the central bank forecast of inflation over a medium run (2 – 3 years ahead). Comparing this target with the forecast serves as a guideline for actual monetary policy. When the forecast is higher than the target, restrictive monetary policy takes place and vice versa.

Exchange rate targeting

Exchange rate targeting can be flexible or complete, depending on the relationship between local and foreign currency.

⁵ During 1980s almost all banks in OECD (Organisation for Economic Cooperation and Development) used monetary targeting system, with the outcome that interest rates were quite unpredictable. [2]

- 1) **Flexible exchange rate targeting:** link domestic currency to the foreign one (“currency board”).
- 2) **Complete exchange rate targeting:** there is a possibility of complete adoption of a foreign currency which had happened e.g. in Argentina, Bosnia, Bulgaria and Estonia. Elimination of domestic monetary policy occurs as a result of this (e.g.: dollarization – in case that adopted currency is dollar or euroization when adopted currency is euro).

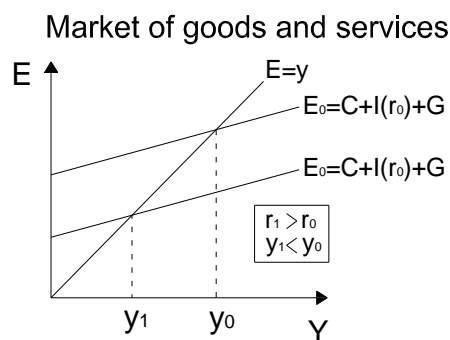
3.2.5. Effects of monetary policy

Market of goods and services

It is the market where goods and services are exchanged. There is an inverse relationship between interest rate (which is mainly determined by the monetary policy) and income. It determines the output (Y) (which is equal to the income) and it is expressed by the formula:

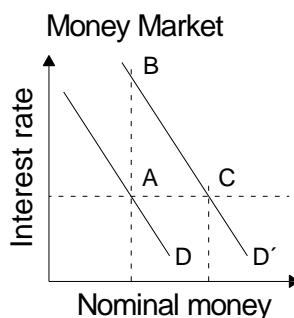
$$Y = C(Y - T) + I(Y, i) + G$$

- where C is consumption, T are taxes, I are investments, i is interest rate and G are government expenditures (Maitah M., 2009, page 53)



Money (financial) market

Money market is described in more details in chapter 3.2.4. For illustrating the effects of monetary policy, reminding of following graph is important (Burda M., Wyplosz Ch., 2005, page 210).



There is a positive relationship between interest rate and income.

Both markets are interconnected in a way that:

- $Y = C(Y - T) + I(Y, i) + G$, (determines Y), I depends on r
- Money demand = money supply, (determines r), Money demand depends on Y

IS-LM model

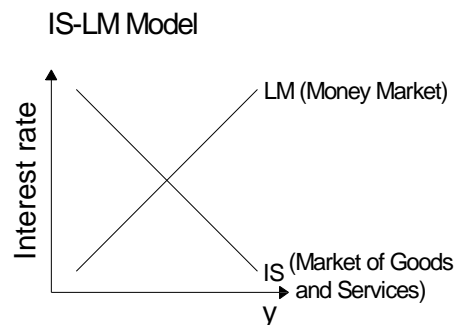
Effects of monetary policy could be demonstrated graphically using IS-LM model which shows the relationship between the output and the interest rate in the two markets (market of goods and services and money market).

This model was introduced by John R. Hicks, Roy Harrod and James Meade in September 1936. Its purpose then was to elucidate the relationship between Keynes's General Theory and General equilibrium.

We get it by putting the graph of market of goods and services and money market into single one. The intersection of IS and LM curve represents an equilibrium between

those two markets (in words it means that the supply of goods and services is equal to the demand of goods and services and the supply of money is equal to the demand of money).

Graphically, it looks subsequently (Maitah M., 2009, page 118).



The central bank and its monetary policy influences LM curve. By expansionary monetary policy the central bank shifts the curve down while output is increasing and interest rate is declining. Restrictive monetary policy works in the other way round.⁶

3.3. Bank Regulation and Monetary Control

Central bank supervision

Lending money is much more risky than it seems at the first sight. There are two major reasons for this:

1. **Information asymmetry:** appears when a customer does not provide completely true data about his current financial situation in order to get a loan (especially in case that giving all data correctly would lead to a refusal of credit)

⁶ Shifting of IS curve can be done fiscal policy, e.g. to the right by decreasing taxes and increasing governmental expenditures and vice versa.

2. **Systemic risk:** arises because of the fact that in banks' system, all commercial banks and financial institutes keeps large amounts of each other's assets. Hence when one of these institutions bankrupts, its liabilities (others bank assets) becomes worthless and a chain reaction takes place. A specific feature of the systemic risk is that it is not bounded by one country but spread through a whole system on the world level (as it has happens in autumn 2008).

As a prevention of this collapse, bank regulations (such as "*supervision of bank accounts and operations, limits on competitions perceived dangerous to the stability of banks, restrictions on asset ownership and banking activities*") and international agreements are being set up (Burda M., Wyplosz Ch., 2005, page 220). Possible protection against this failure is for example compulsory bank insurance (depositors are protected against loss up to certain limit) or a specific function of the central bank known as a lender of last resort. Briefly it means that the central bank provides collapsing banks with such amount of money that prevents the whole banking system from an immediate bankruptcy and calm down depositors. On the other hand, some commercial banks could feel extremely safe due to this and thus operate in a hazardous manner.

Another mean of depositors protection is capital adequacy (it is "*minimum net worth that banks are required to have as a fraction of total risky assets*") which ensures that "shock absorber" for the banks sheet will be the property of bank's owners (owner's capital/equity or so called net worth) (Burda M., Wyplosz Ch., 2005, page 222).

3.4. Independence of the central bank

Independence of the central bank is crucial because it enables the central bank to execute transparent policy-making decisions. Nowadays, this independence is

generally given by law (e.g. in case of Euro-area it is covered by Maastricht Treaty - it stated there that lending directly to public authorities is forbidden and it is explicitly required to maintain low and stable inflation rates). Beside this legal independence, there exist also a goal independence (the right to determine own policy goals such as inflation targeting, maintaining a fixed exchange rate, money supply control), an operational independence (the right to determine the instruments for achieving its goals and their timing) and a management independence (right to own appointment of staff and setting budgets).

Monetary financing of the government

Relationship between government (“cash-hungry institution”) and the central bank (“exclusive producer of cash”) is always full of a temptation (based on the fact that the central bank could serve as a possible source of money and because of the seigniorage⁷ and the inflation tax⁸). The problem is that the benefits (e.g. from actions stated before) can be observed immediately whereas the costs (in form of the inflation) afterwards.

One of the examples of this phenomenon can be monetization of public debt. It is the case when the central bank lends to government by crediting its account (creation of monetary base M0) and government purchase goods and services with this money. It enters the commercial banking system and multiplier effect arise (the same goes for governmental issuing Treasury bills for borrowing from commercial banks). This monetization of public debt along with/ or direct financing of budget deficit is a most common source of past cases of inflation/hyperinflation.

⁷ Seigniorage: “exploitation by the government of the monopoly power of the central bank to create money as a means of raising real resources.” (Burda M., Wyplosz Ch., 2005, page 557)

⁸ Inflation tax: “real revenue that government obtains by inflation. Inflation erodes the real value of nominal assets and therefore may improve financial condition of the government, reducing the value of its nominal liabilities.” (Burda M., Wyplosz Ch., 2005, page 549)

Seigniorage is the main source of profit for the central bank. As the central bank is a public institution, it is obliged to return most of its profits to the government. Therefore it can represent substantial source of government revenue in time of high inflation but it is not much used nowadays. It should not be confused with inflation tax.

4. Monetary Policy of the Czech National Bank

The Czech National Bank (further on the abbreviation CNB is used) belongs to the group of the most open banks in the world. Its decisions are disclosed with minimal delay. This fact enables CNB's monetary policy to be considered as transparent, comprehensible, predictable, reliable and therefore credible as it is possible.

Main goal of the CNB is to maintain price stability⁹ by setting interest rates at such level that will ensure low and stable level of the inflation. Beside this, the CNB supports general economic policies of the government (usually in form of stable economic growth), if these policies are not in conflict with the CNB's main goal. Decisions are made based on macroeconomic forecasts, concerning the period about 12 – 18 months in advance ("the so called monetary policy horizon"). This occurs due to the time lag between an implementation of monetary policy and arising of its impact on inflation. During computing with variety of possible future models, it is required to consider following variables: *"developments in the external environment (such as changes in inflation or economic growth in other countries and world prices of raw materials), price-related administrative decisions made by Czech state and local authorities, and, in particular, changes to the CNB's rates, pass through into various areas of the economy and ultimately into inflation."* (CNB, Monetary Policy of the Czech National Bank, 2008, page 2). Usually, quarterly prediction model is utilized.

After joining the euro area by the Czech Republic, the CNB will give up its own monetary policy on behalf of European Central Bank.

⁹ Price stability does not mean their changelessness but moderate and stable growth, which is described by inflation target.

(Article 98 of the Constitution of the Czech Republic and in Article 2 of Act No. 6/1993 Coll., on the Czech National Bank)

4.1. Monetary policy instruments

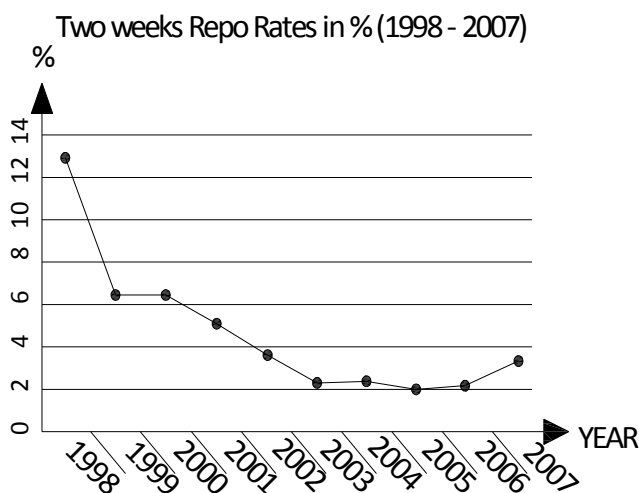
The CNB applies selected monetary policy instruments to reach its objectives. The instruments used are open market operations, automatic facilities and required minimum reserves. Utilization of a variety of instruments instead of a single one is appreciated – their coordination is essential to the appliance of a rational monetary policy.

1. Open market operations

The aim of open market operations is to regulate the interest rate trend in economy. They are usually implemented in form of repo transactions. According to their objective and regularity, we can distinguish between 3 categories.

- a. **Main monetary policy instrument** is a repo tender, especially the two weeks repo rate: *“Banks have the option of depositing their excess liquidity at the CNB for a two-week period on the basis of repurchase agreements (“repos”) at a rate not exceeding the two-week repo rate. By changing the repo rate, the CNB influences short-term interest rates on the interbank market. This signal then spreads to interest rates throughout the economy, to economic activity and ultimately to inflation.”* (CNB, Monetary Policy of the Czech National Bank, 2008, page 4). The repo tender is accomplished 3 times a week. The minimal acceptable amount of money is 300 million CZK and further on the multiples of 100 million CZK.

The chart of the average 2 weeks repo rates is shown below (CNB websites, History of the Repo Rates).



- b. **Supplementary monetary policy instrument** is for example the three months repo tender which works on the same principle as the two weeks repo tender. It is not being used now – the last three months tender was in January 2001.
- c. **Fine tuning instruments** (foreign exchange operations, securities operations) are utilized by the CNB for the occasion of short term fluctuation in market liquidity when the interest rate stability is endangered. These instruments are also applied very rarely.

From the autumn 2008, the CNB conducts also reverse repo operations for supplying the liquidity to the market. Their due dates are either 14 days or 3 months.

2. Automatic facilities

Automatic facilities serve for providing and depositing liquidity overnight. From the banks' point of view it means permanent possibility of borrowing or depositing money. Hence the interest rates used in automatic facilities creates corridor where the short term money market rates (along with the two weeks repo rates) can be found.

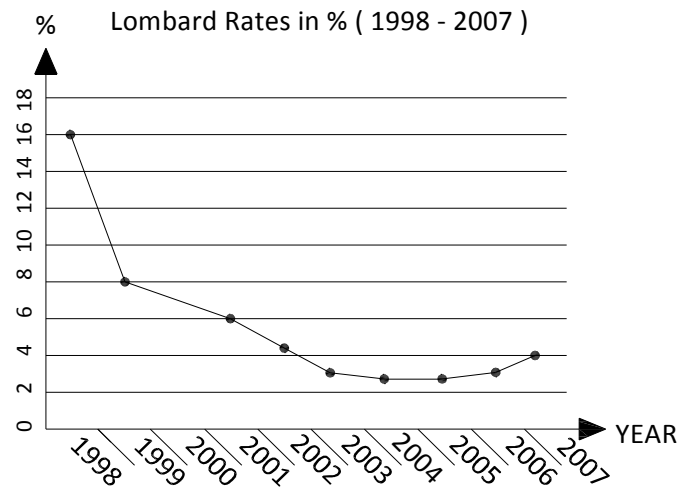
- a. **Deposit facility** gives an opportunity to banks to deposit surplus liquidity in the CNB just for 1 night (without any collateral). The interest rate charged to deposits is in the amount of the discount rate therefore the discount rate generally represents the bottom limit for short-term interest rate movement on the market. The minimal acceptable amount is 10 million CZK.

The discount rates development through time can be seen on the graph below (CNB websites, History of the Discount Rates).



- b. **Marginal lending facility** provides banks (which have repo agreement with the CNB) with the opportunity to borrow liquidity overnight in the form of repo operation. This facility is charged by interest rate called the Lombard rate. It generally forms the upper limit for short-term interest rate movement on the market. By banks, it is used mainly at the end of each cycle of required minimum reserves. The minimal acceptable amount is 10 million CZK as it is in the case of deposit facility.

Below is shown the graph with the Lombard rates (CNB websites, History of the Lombard Rates).



3. Required minimum reserves

“This instrument requires banks to hold a specified percentage of the deposits they accept on zero-notice accounts at the central bank.” (CNB, Monetary Policy of the Czech National Bank, 2008, page 4). It implies to all banks on the market including foreign banks that have a business licence in the Czech Republic. If we take 2%¹⁰ of the base from which we calculate the minimum reserves, we get the reserve requirements. Over the maintenance period (approximately one month – starting on the first Thursday in actual month and ending on the Wednesday before the next first Thursday of the following month), each bank has to sustain the end-of-day balance in such way that the average of these balances is equal to (or greater than) the settled amount of the required minimum reserves.

¹⁰ This percentage rate is settled by the CNB, after the consultation with the European Central Bank for banks in Economic and Monetary Union (EMU) – the Czech Republic is not yet a member of the EMU.

The function of the required minimum reserves as a monetary instrument is of a little importance nowadays. But still they have their role during the CNB Clearing (they ensure the smoothness of system of payment).

4.2. Financial stability

Financial stability is defined by the CNB as *“a situation where the financial system operates with no serious failures or undesirable impacts on the present and future development of the economy as a whole, while showing a high degree of resilience to shocks”* (CNB websites, Financial Stability). Maintaining the financial stability along with its analysis belongs to the key tasks not only for the CNB but also for many other national and international institutions. Presumptions for successful fulfilling of this objective are price stability (get by monetary policy instruments) and health development of financial institutions (achieved by financial sector supervision). On the other side, it can be endangered by the external environment, domestic macroeconomic developments, position of the main debtors and creditors of financial institutions, economic policies or changes in the institutional environment.

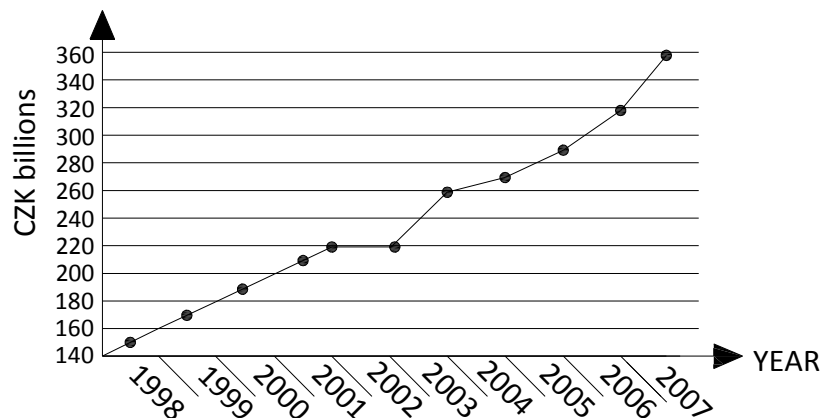
4.3. Financial market supervision

The CNB’s financial market supervision is given by Act No. 6/1993 Coll., on CNB. This supervision covers following areas: the banking sector, capital market, insurance and pension scheme industry and credit unions together with the foreign exchange supervision and the supervision of electronic money institutions. The CNB states the rules for protecting the banking sector stability, capital market, pension scheme industry and insurance industry. It regulates, controls, analyzes and when necessary penalises for non-respecting settled rules.

4.4. Banknotes and coins

The CNB has the exclusive right to issue banknotes and coins, based on Act No.6/1993 Coll., on the CNB. The CNB takes care of the effectiveness of the money circulation (it copes with the banknotes and coin stocks, it withdraws and damages the banknotes and coins which are used up and it exchanges invalid and old banknotes and coins for new ones). It ensures artistic and technical preparation of means of payments, their production and supply. It participates on legal and technical protection of money against falsification (it files those retained within the borders of the Czech Republic). It examines the validity of money. On the chart below can be seen the volume of currency in circulation in the Czech Republic since 1998 (CNB websites, Banknotes and coins).

Currency in circulation in the Czech Republic (1998 - 2007)



5. Case study of the CNB interventions: The inflation targeting system (1998 – 2007)

5.1. Inflation

Importance of the low inflation

The necessity of maintaining the low inflation (1 – 3 %) is based on an international experience proving that a high and instable inflation causes damages to the economy by generating uncertainty in the money market and devaluing all macroeconomic forecasts.

Inflation causes so called redistribution effects which represents the transfer of a part of wealth from certain groups on behalf of the others. This leads to non-effective allocation of resources and non-optimal behaviour (mainly of risk averse economical subjects) which probably decreases the overall welfare of the economy. (Revenda Z., 2001).

The low inflation is also one of the conditions which Czech Republic must fulfil for entering the euro area and for the adoption of the euro. Inflation in the Czech Republic is demonstrated in an attachment number 1 where, in the years of 2002 - 2003, deflation can be observed. Deflation is considered as: *“a continued fall in the price level and an increase in the value of a currency”* (Maitah M., 2009, page 165). It is not to be confused with a decline in prices in one economic sector or with a fall in the inflation rate (which is known as disinflation).

5.1.1. Impacts of inflation

Impacts of inflation can be either negative or positive. Between the main negatives ones are (in compliance with Reverenda Z., 2001):

- **Influence on wages and salaries** – in case that nominal wages do not augment along with the inflation level, real wages and their purchasing power decreases
- **Influence on fixed pension** – nominal rate of fixed pension is stable therefore its real purchasing power falls
- **Social influence** – it is connected with the influence on social benefits (purchasing power is lower in connection with higher inflation rates as well) upon which some people are heavily dependent

Positive effect of inflation can be observed in following examples (in compliance with Reverenda Z., 2001):

- **Real estate** – their price rises together with the level of inflation
- **Loans and deposits** – their absolute value decrease, theoretically it is beneficial to get into debt because the increase in price level will make the paying off more easy

Measuring of inflation

Inflation level is get from the formula:

$$\text{Inflation level [\%]} = \frac{\text{Price level in year } t - \text{price level in } (t-1)}{\text{price level in } (t - 1)}$$

Price level is then calculated by price indexes such as

- **Consumer Price Index:** $\text{CPI} = \frac{\sum P_1 \cdot Q_0}{\sum P_0 \cdot Q_0}$

- P_0 are prices in base year, P_1 are prices in current year and Q_0 is consumption basket (it is based on selective investigation of households consumption, it is created by 729 items divided into 12 categories by CZ – COICOP¹¹)

- **GDP deflator:** $\text{def}_{\text{gdp}} = (\text{Nominal GDP} / \text{Real GDP}) \cdot 100 = \frac{\sum P_1 \cdot Q_1}{\sum P_0 \cdot Q_1}$

- P_0 is prices in base year, P_1 are prices in current year and Q_1 is final production produced in given year

5.2. The inflation targeting system

5.2.1. Theoretical principle of the inflation targeting system

The inflation targeting strategy comprises of the following steps: the central bank announces a target for the inflation rate that aims to reach within 2-3 years, it publishes its inflation forecast and it adjusts its policy in reaction to the difference between the target and the forecast (Burda M., Wyplosz Ch., 2005). For example, when the CNB assumes that in the future appear inflation pressures provoking the inflation to rise above the corridor; it is a signal for making the monetary policy more restrictive. In other words, repo rate should be higher and hence also others market rates would grow (mortgages ...).

Theoretical principle of the inflation targeting system is expressed by two formulas (Mandel M., Tomšík V., 2003):

1) **Inflation prognosis:** $P_1(p_{t+1}) = f_2(x_1 \dots x_n)$

- where $P_1(p_{t+1})$ is inflation prognosis in time $t+1$, $x_1 \dots x_n$ are explaining variables in inflation prognosis

¹¹ COICOP stands for Classification of Individual Consumption According to Purpose

2) **The Central bank reaction function:** $repo_t = f_1 [(P_1(p_{t+1}) - p^t_{t+1})]$

- where p^t_{t+1} is the central bank inflation target in t+1 and $repo_t$ is change in repo rate in time t

Sometimes it can happen that current inflation moves out from its limits unexpectedly. This appears mainly because of the high level of uncertainty in prediction models¹² and therefore their possible failure. Other possibility is the situation where domestic economy is affected by an external shock. In both cases, there occur first round effects (when the economic and price system is just adjusting to the changes) and second round effects (unwanted results of the first round effects, the CNB concentrates on holding back mainly these ones). In order not to harm the economy more than it is inevitable, the CNB can also use the so called “exemptions from the obligation to fulfil inflation target”. In the history of the inflation targeting, this had happen just one time, in April 2003 (in connection with changes in indirect taxes).

Another specific feature of inflation targeting is the stress that is put on the openness of monetary policy. Making the inflation targets freely accessible to public provides economic subjects with important knowledge – what level of inflation they can expect in the future. Degree up to which is the target consider credible, serves as a measure of success.

Final, but not less important, precondition of inflation targeting well-doing is the independence of the CNB. It is ensured by the way how the senior officers are elected and dismissed, by the independence of the CNB on public budget, etc.

¹² Prediction models represent the most probable development of inflation and other key indicators, e.g. production, unemployment, interest rates and exchange rate.

5.2.2. History of the inflation targeting system in the Czech Republic

In the beginning of its existence, the CNB had been focusing on synchronised monetary targeting and fixed exchange rate. After leaving of fixed exchange rate in 1997, it sustained only monetary targeting system. And in January 1998, altering on inflation targeting has been done (on the base of the exchange rate crisis in May 1997). Between the main reasons for doing so can be listed (according to Mandel M., Tomšík V., 2003):

- the central bank cannot follow more than one target (as for the number of its effective instruments covered by open market operations) which is price stability
- inflation targeting is a transparent system for the market, it can efficiently influence inflation expectations and stabilise interest rates
- low inflation enables the GDP growth maximization in the long-run
- need to fulfil the Maastricht's inflation criterion in order to be able to join the Euro zone by the Czech Republic

Then, the CNB became the first post – communist country with the inflation targeting system. In that time, the monetary policy had been losing on effectiveness due to the liberalisation of capital flows and financial market and it was not able to reduce the growing domestic demand and to hold to its previous primary objective – monetary stability.

The firsts used targets (from December 1998 up to March 2001) were set in so called net inflation¹³. Following data are cited based on the CNB fact sheet (CNB, Ten years of inflation targeting, 2008). In the year of 1998, target was set to 5,5 – 6,5 % while real net inflation was 1,7 %. In 1999, target decreased to 4,0 – 5,0 % and real net inflation 1,5 %. In 2000, target was 3,5 – 5,5 % and the real net inflation raised to 3,0 %. In 2001, the target was lowered to 2,0 – 4,0 % and real net inflation increased to 2,4 %.

From the results above it is obvious that this system could not be considered suitable for the Czech Republic. Based on this malfunctioning, changes had been done. From April 2001, objects were set in terms of the consumer inflation¹⁴ and were decided for a longer time horizon in form of interval (this range starts on 3 – 5 % in January 2002, ends on 2 – 4% in December 2005). And finally, point target has been used from January 2006 (in general with tolerance of plus/minus 1 percentage point). Inflation targets from their beginning and their fulfilment can be seen graphically in attachment number 2.

5.3. The CNB's fulfilment of defined targets

Comparing real inflation with defined targets tells us that inflation were significantly more often below the targets. The largest differences can be observed in the two disinflationary periods¹⁵ in 1998 – 1999 and 2002 – 2003. Looking back nowadays, we can say that the “undershooting” of inflation targets in the period from 1998 – 2007

¹³ *Net inflation is a subset of headline consumer inflation adjusted for administrative measures (regulated prices and the first-round impacts of changes to indirect taxes). It was targeted mainly because of the uncertainty prevailing at the time about the rate and scale of price deregulation, and partly because of the low ability of monetary policy to affect this part of the consumer basket.* (CNB, Ten years of inflation targeting, 2008, page 2)

¹⁴ The Consumer inflation is expressed as an annual increment of Consumer Price Index – it describes the overall development of prices more complexly, it is more comprehensible for layer and hence it has a higher potential to influence the inflation expectations

were caused by the non-fulfilment of the forecast due to a combination of anti-inflationary shocks (external – weak external demand, internal – rapid appreciation of Czech currency, overproduction of agricultural commodities, slow deregulation, less easy fiscal policy) and due to the imperfections in forecasting system. For achieving the defined targets, the lower interest rates were required (CNB, Ten years of inflation targeting 1998 – 2007, 2008).

5.3.1. Proposals and recommendations

In my opinion, as the anti-inflationary shocks could not be controlled by the CNB, main focus should be placed on a maximal possible improvement of the forecasting system. Every model is just a simplified interception of a very complex real world. Therefore it is necessary to continuously work on creating more and more developed systems. But as the computers are only computers and economy is a social science, they could never involve the irrational acts of human beings in their calculations. Hence, it is required not to forget to ask also experts and scientists on their points of view (because they can much better evaluate recent economic development as well as the future one considering illogical aspects of it).

6. Conclusion

Since 1998, the Czech National bank has been executing monetary policy in form of the inflation targeting system. In the first years, the CNB's inflation targeting could not be considered very successful due to the fact that undershooting of defined target appeared in a majority of the examined periods.

This impreciseness could be explained by two main reasons. Firstly, it was the insufficient forecasting system of that time. Since 1998, prognosis technique has changed three times and even nowadays, the CNB is working on its continuous amelioration. Secondly, it is the fact that in the Czech Republic is just a small open economy. As a consequence, it is highly influenced from abroad. This limits the efficiency of the CNB's monetary policy and therefore the non-fulfilling of the preset inflation targets do not have to be solely the CNB's fault. Other possible causes of the difficulties with attaining the desired goals can be traced in its history, more specifically the legislative, administrative and political changes connected to the split of the Czechoslovakia in 1993 and the related implementation of new currency and the subsequent reorientation from the Eastern market to the Western one. All these influences worsen the CNB's position by contributing to the relatively high inflation rate right at the beginning of the inflation targeting system launching (in 1998, inflation level was around 10 % while in other countries the average inflation level during the introduction of this system was approximately 3 % - Mandel M., Tomšík V., 2003).

Nonetheless, the situation has been ameliorating throughout the whole epoch. I believe that in spite of all these inconveniences, the CNB's decision to commence with the inflation targeting system was a correct and donating step for the overall state's economy.

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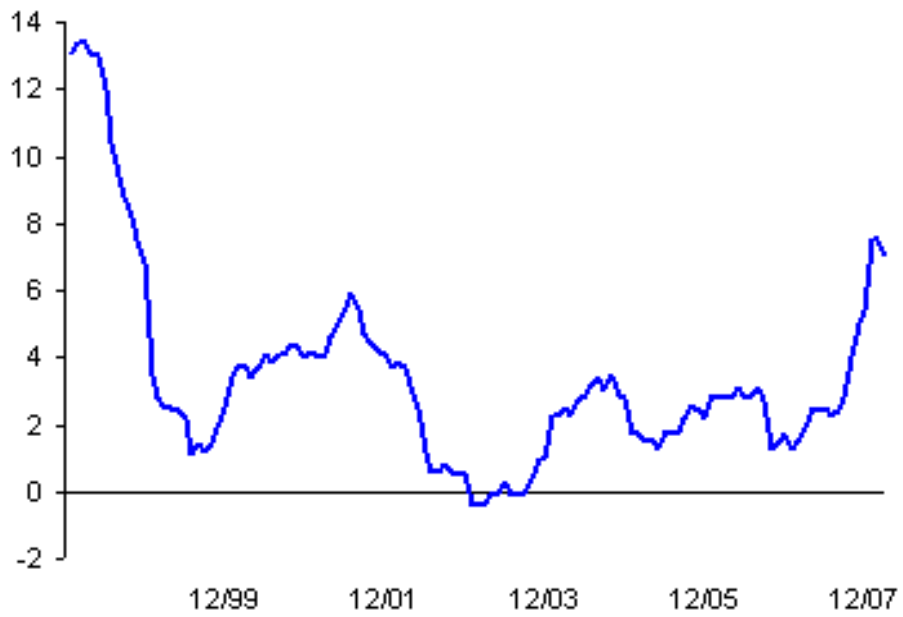
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8. Attachments

Attachment number 1

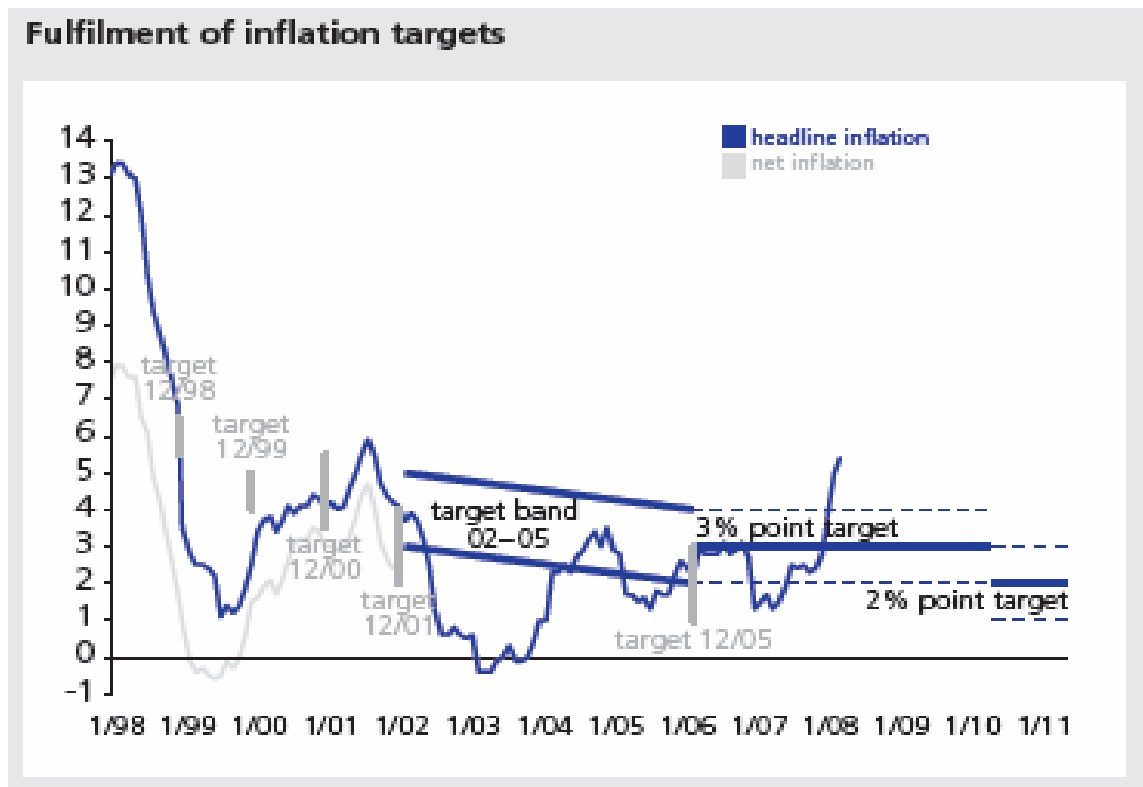
Inflation in the Czech Republic (annual growth in consumer prices in %)



Source: CNB, Monetary Policy of the Czech National Bank, 2008

Attachment number 2

Inflation targets from their beginning and their fulfilment



Source: CNB, Ten years of inflation targeting, 2008