Czech University of Life Sciences Prague

Faculty of Economics and Management

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Diploma Thesis

Czech National Bank´s Foreign Exchange Interventions and Their Impact on Czech Republic´s Economy

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DIPLOMA THESIS ASSIGNMENT

Bc. Dominik Pechr

Economics and Management

Thesis title

Czech National Bank´s foreign exchange interventions and their impact on Czech Republic´s economy.

Objectives of thesis

The aim of the thesis is to assess and analyze the development of exchange rate in the Czech Republic and its impacts.

Methodology

In theorethical part I will be focusing on describing major concepts needed for understanding the topic. Practical part will contain selfmade graphs and other figures describing the development of exchange rates and their impact on the economy of Czech Republic.

The proposed extent of the thesis

60-70 pages

Keywords

Exchange rate, monetary policy, CZK/EUR, economic development, deflation

Recommended information sources

HOLMAN, R. *Ekonomie.* Praha: C.H. Beck, 2002. ISBN 80-7179-681-6.
JÍLEK, J. *Finance v globální ekonomice. I, Peníze a platební styk.* Praha: Grada, 2013. ISBN 978-80-247-3893-2.
REVENDA, Z. *Centrální bankovnictví.* Praha: Management Press, 2001. ISBN 80-7261-051-1.
TEPLÝ, P. – ČERNOHORSKÝ, J. *Základy financí.* Praha: Grada, 2011. ISBN 978-80-247-3669-3.

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Declaration

I declare that I have worked on my diploma thesis titled " Czech National Bank´s Foreign Exchange Interventions and Their Impact on Czech Republic´s Economy" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the diploma thesis, I declare that the thesis does not break copyrights of any third person.

In Prague on 30.3.2016 _____

Dominik Pechr

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Intervence české národní banky a jejich dopady na ekonomiku České Republiky.

Czech National Bank´s Foreign Exchange Interventions and Their Impact on Czech Republic´s Economy

Souhrn

Tato diplomová práce je zaměřena na roli České národní banky a na monetární politiku a kroky, které v ní Česká národní banka podniká, aby dostála svým závazkům a cílům především z oblasti cenové stability a také podpory růstu ekonomiky. Pozornost je věnována především intervencím, které podnikla Česká národní banka na devizovém trhu v listopadu 2013, a které měly být hlavním nástrojem k potlačení zvyšujících se deflačních tlaků, kterým Česká Republika čelila v průběhu roku 2013. Cílem této práce je analyticky posoudit správnost rozhodnutí České národní banky.

Tato diplomová práce je rozdělena do dvou částí. Teoretická část tvoří zhruba polovinu této práce a je zaměřena na roli České národní banky, na její monetární politiky a nástroje a mechanismy, které s ní souvisí a dále pojmy jako inflace a deflace, které vedly Českou národní banku k podniknutí intervencí na devizovém trhu.

Druhá část této práce je zaměřena na vyhodnocení reálných dopadů, které měly kroky České národní banky na devizovém trhu na české hospodářství, jeho růst a vývoj. Tato analýza je podniknuta za pomoci vyhodnocení základních makroekonomických ukazatelů.

Summary

This diploma thesis focuses on the role of the Czech National Bank and on monetary policy and the steps taken by the Czech National Bank in order to meet its obligations and objectives, especially in the area of price stability and also in support of the growth of the economy. Attention, in this thesis, is paid mainly to interventions

taken by the Czech National Bank in the foreign exchange market in November 2013, which were supposed to be the main tool for suppressing the increasing deflationary pressures faced by the Czech Republic in the course of 2013. The aim of this work is to analytically vindicate the correctness of the decision of the Czech National banks.

This diploma thesis is divided into two parts. The theoretical part accounts for roughly half of this work and focuses on the role of the Czech National Bank, its monetary policies and the instruments and mechanisms related to it, as well as concepts such as inflation and deflation, which led the Czech National Bank to intervene in the foreign exchange market.

The second part of this work focuses on the evaluation of the real effects of the Czech National Bank's actions on the foreign exchange market on the Czech economy, its growth and development. This analysis is undertaken with the help of basic macroeconomic indicators.

Klíčová slova: Měnový kurz, Česká národní banka, Monetární politika, Inflace, HDP, Export, Zahraniční obchod, CZK/EUR, Ekonomický vývoj, Deflace

Keywords: Exchange rate, Czech National Bank, Monetary policy, Inflation, GDP, Export, Balance of payments, CZK/EUR, Economic development, Deflation

Contents

1. Introduction

In November 2013, the Czech National Bank was forced to take steps to reduce the deflationary pressures faced by the Czech Republic as economy face them since the beginning of the same year. For this objective, it chose not a very common instrument in the form of interventions in the foreign exchange market since other traditional instruments were no longer enough to face the pressures. These steps face very critical and questionable comment from the professional public and, in general, these steps did not get adequate support.

This work focuses mainly on the steps of the Czech National Bank, which it took on the foreign exchange market in order to alleviate deflationary pressures and thus to prevent deflation in order to fully manifest itself. This was absolutely necessary to fulfill the main tasks of the Czech National Bank of price stability as well as GDP growth or healthy economic development.

The theme of this work was to focus on the analysis of these steps in the foreign exchange market and their evaluation. The work is therefore divided into several parts and, above all, two major parts. Theoretical, which contains chapters describing the role of the Czech National Bank, the tools available to the Czech National Bank and the mechanisms by which these steps can be applied assuming certain effects on the economy. Other chapters in the theoretical part deal with delays in these mechanisms as well as inflation and deflation, their measurement and risks, which have led to the introduction of such a specific monetary policy - foreign exchange interventions.

The practical part of this thesis deals with the evaluation of these interventions against the natural development of the exchange rates, which were undertaken by the Czech National Bank. Major macroeconomic indicators were monitored before, during, and after the interventions taken, on which an overall analysis was then performed. The analysis also includes future forecasting of individual indicators and opinions of the professional public towards CNB interventions.

The work was concluded with the final chapter, where the monitored indicators were combined and evaluated as a whole, so that the overall development could be assessed.

1.1. Objectives

The main aim of this diploma thesis is to evaluate the impact of interventions, introduced by the Czech National Bank in the foreign exchange market at the end of 2013, on the main macroeconomic indicators and on the economy as a whole.

As first, the analysis of the role of the Czech National Bank, its monetary policy, instruments and mechanisms that are used to manage monetary policy was conducted. The theoretical parts describe the mechanisms and their possible impacts on the economy of the Czech Republic. Also, in the theoretical part, the thesis focuses on inflation and deflation and analyzes possible causes, effects and consequences.

The second, the practical part of this thesis, is focused on the analysis and its evaluation in terms of five major macroeconomic indicators in the economy of the Czech Republic. These indicators are: inflation, gross domestic product, foreign trade, employment and exchange rate. The analysis focuses on the individual contributors to those indicators and the indicators' individual contribution to the economic development, and the possible causes or consequences are also analyzed.

The primary hypothesis of this work is the assumption that the interventions introduced at the end of 2013 by the Czech National Bank have had a generally positive effect on the overall development of the economy and have met their main objective of reducing deflationary pressures on price development.

1.2. Methodology

Methodology and processing of this thesis is based on secondary research. Firstly, an analysis of individual sources, literature, but also sources online were used. An analysis of statistical data relevant to the topic was carried out as a follow-up part of the thesis. Data from the websites of the Czech National Bank and the European Central Bank, as well as the Czech Statistical Office and the Ministry of Labor and Social Affairs were used for this work.

On the basis of a quantitative and qualitative analysis of these data, a final evaluation and interpretation of the results could be made. The final result of this thesis is based on the descriptive and comparative method of analyzing the data.

2. Czech National Bank and Its Role in Economy

Headquartered in Prague, the Czech National Bank, as many other national banks of democratic countries, oversees and ensures the price stability which is crucial for healthy economic development and safe banking culture. Each national bank has certain, rather high, level of independence to perform, carry out and practice it´s monetary policies as well as supervising other commercial banks and ensuring the safe and sound operations on the financial market.

The Czech National Bank was established in 1993 concurrently to the Czech Republic itself by the law of Czech National Bank in the provision in Article 98, in the Czech Constitution.

"*The Czech National Bank is established under the Constitution of the Czech Republic and carries out its activities in compliance with Act No. 6/1993 Coll., on the Czech National Bank and other regulations*."[1]

Besides the main objective of price stability, there are other tasks for the Czech National Bank to perform:

"*a) set monetary policy;*

b) issue banknotes and coins;

c) manage the circulation of currency, administer payments and clearing between banks, foreign

banks carrying on banking activities in the Czech Republic through a branch (hereinafter "foreign

bank branch") and credit unions, promote smooth and efficient operation thereof, and contribute

to the safety, soundness and efficiency of payment and settlement systems and to the development thereof;

d) supervise the activities of entities operating on the financial market (Article 44(1);

e) set macro prudential policy by identifying, monitoring and assessing risks jeopardizing the

stability of the financial system and, to prevent or mitigate these risks, contribute by

[1] https://www.cnb.cz/en/about_cnb/

means of its powers to the resilience of the financial system and the maintenance of financial
stability; where necessary, it shall cooperate with the relevant state authorities in setting
macro prudential policy;
f) carry on other activities pursuant to this Act and pursuant to other legal rules."[2]

The Czech National Bank tasks and performances can be divided into two sections; macroeconomic and microeconomic. From the macroeconomic point, the Czech National Bank is the only emitter of Czech crowns, coins and bills, monetary policies and finally the foreign exchange policies and activities foreign exchange market. As microeconomic agenda we can state the regulations and supervision of commercial banks and their market as a whole, the Czech National Bank acts and performs tasks as "Bank of the Banks" and bank of the country and also represents the Czech Republic in some foreign monetary meetings and negotiations. (Revenda, 2001)

Czech National Bank has the exclusive privilege and at the same time obligation of issuing coins and notes of the national currency of the Czech crowns (CZK). National banks have not always had this role until 1817 in Austria, respectively 1844 when the emitting monopoly in UK was given to the Bank of England, followed by other countries such as France (1848), Sweden (1904) and American Federal Reserve System in 1904.

The Central Bank focuses on the stability of consumer prices. The objective is to have stability in growth of consumer prices rather than the stability of the prices themselves. To ensure the growth and the stability of consumer prices the central bank uses inflation targeting, a mechanism to control general rise in the price level. Inflation targeting can be described as "*a monetary policy strategy used by central banks for maintaining prices at a certain level or within a specific range. Using methods such as interest rate changes, this could help guide inflation to a targeted level or range*."[3]

[2] Act No. 6/1993 Coll., on the Czech National Bank and other regulations https://www.cnb.cz/en/legislation/acts/download/act_on_cnb.pdf
[3] http://lexicon.ft.com/Term?term=inflation-targeting&mhq5j=e7 – Financial Times

3. Monetary Policy

The central bank uses set of actions to reach its objective of ensuring the price stability in the country´s economy. These mechanisms of central banks are only possible in countries with market economy. "*Monetary policy means influencing inflation and other national economic variables. It is essential that the change in monetary policy instruments does not directly affect the final objectives but through several intermediate stages. The way the central bank works for the ultimate goal is called the transmission mechanism of monetary policy*" (Černohorský & Teplý, 2011). The bankers of the Czech National Bank usually have multiple objective simultaneously which need to be tackled while the conditions are constantly changing in the economy. Central bankers need to undertake difficult decisions based on future predictions, current state of the economy and assessments of the risk so the processes and decision that are eventually taken don't deviate from the required state of the economy and objectives.

3.1. Aims of Monetary Policy

The main goal of monetary policy is to maintain the purchasing power of the currency. Economists distinguish between the domestic and the external price stability. The external price stability focuses on stable exchange rates. The domestic price stability aims for the low and steady rise of prices of products and services. According to Holman (Holman, 2008) the price stability is the only objective of monetary policy that can be influenced in the long term while other inferior objectives are influenceable only for shorter periods of time. The monetary policy alone may "*not be able to achieve all of its ultimate goals at the same time such as reducing inflation, reducing unemployment and improving the balance of goods and services*"[4] and in this case the exchange rate targeting comes as a very effective tool to cope with and support those objectives.

[4] https://www.cnb.cz/cs/menova_politika/uloha.html

Among significant objectives of monetary policy, the following can be listed:

- internal stability of the currency, the fight against inflation;
- supporting economic growth
- fighting unemployment
- balance of payments equilibrium
- interest rate stability
- exchange rate stability
- security and stability of financial markets

3.1.1. Instruments of Monetary Policy

The Czech National Bank can achieve its aims of ensuring price stability by aiming for low and sustainable growth of the inflation rate in the economy, and or other targets, by a set of monetary instruments. Jílek defines them as "*techniques of stably complying with the operational objective of monetary policy, i.e. short-term interest rates. In other words, once a certain short-term interest rate has been approved at some point in time, it must be ensured that from that moment on it is stably accomplished and reached."* (Jílek, 2013) These instruments are divided according to the nature of how they are addressed.

- Direct
- Direct and Indirect
- Indirect

3.1.2. Direct Instruments of Monetary Policy

Direct monetary policy instruments can be defined as those with an administrative or directive character and are used by the central banks rather rarely.

(Rejnuš, 2014) Commercial banks are directly restricted or in any way influenced by these non-market operations of the central banks and the decisions carried out by them. Out of the many direct monetary policy instruments, these following are the most commonly used.

- Liquidity rule
- Limits on bank loans
- Interest rate limits
- Required obligatory deposits

Direct instruments of monetary policy, as said earlier are used very rarely, and only in cases where indirect monetary policy instruments fail to accomplish and reflect desired results by the bankers of the national bank.

3.1.3. Direct and Indirect Instruments of Monetary Policy

There are two main instruments in this category that are most commonly used. One of the being the compulsory minimum reserves and the other group is a set of recommendations, appeals and agreements from the Czech National Bank.

"In general, the minimum reserves are generally one of the main monetary policy instruments through which the central bank can influence the amount of liquidity (free funds) in the banking system. In the Czech environment of a substantial liquidity surplus, however, this role is declining and the minimum reserves serve mainly as a cushion for the smooth functioning of the interbank payment system.

The application of the reserve requirement in practice involves several areas (obliged entities, the reserve requirement rate, maintenance periods, the reserve base, fulfilment of the reserve requirement, remuneration, the reserve requirement where statements are not submitted, etc.) whose individual parameters can change flexibly, reflecting the need to react to changes in trend in the banking system."[5]

[5] https://www.cnb.cz/en/monetary_policy/instruments/index.html

As to the recommendations, appeals and agreements "*these are mainly the verbal or written amendments to some monetary policy instruments by which the central bank concretizes its intentions for the next development in the monetary area and the banking system. This tool can be implemented in form*"[6]

- Recommendation – generally formulated wishes of central bank
- Appeals – have concrete and firm character
- Agreements - in the form of gentlemen's agreements, agreement is binding

3.1.4. Indirect Monetary Policy Instruments

Indirect monetary policy instruments can be defined as "*measures and procedures that facilitate the business of all commercial banks.* " (Rejnuš, 2014)

- Open market operations
- Discount rates
- Foreign exchange interventions

3.1.4.1. Open Market Operations

The purpose of one the most commonly used tools - open market operation – is to streamline the short-term interest rates. Open market operations are transaction between the central bank and commercial banks. The subject of the transaction are usually securities – governmental bonds – or even securities of the central bank. These transactions are cashless and the purpose is to change the commercial banks' reserves in a way it is currently desirable. Open market operations can also be used in order to *"to compensate other operations and actions that contribute to changes in liquidity."* (Jílek, 2013) "*Open market operations are used for steering interest rates in the economy and*

[6] https://is.mendelu.cz/eknihovna/opory/zobraz_cast.pl?cast=4508

are mostly executed in the form of repo operations."[7] In these repo tenders the Czech National Bank receives the payments in the amount of the surplus liquidity of the commercial banks and furnishes the collateral – securities. The typical duration of this exchange process is two weeks (two-week repo rate) and thus the open market operations allow the Czech National Bank to react flexibly and quickly and have the key importance in terms of monetary policy. It is agreed that after the expiration of the repo rate period, the borrower (Czech National Bank) will repay the principal along with the interest to the lander (commercial bank) and the lender will return the collateral. "*The CNB conducts variable rate tenders, which means that the declared repo rate serves as the maximum limit rate at which banks' bids can be satisfied in the tender. The bids are ranked using the American auction procedure, i.e. those with the lowest interest rate are satisfied as having priority and those with successively higher rates are accepted until the total predicted liquidity surplus for the day is exhausted. Exceptionally, the repo operations with shorter maturity are executed as well as supplementary monetary instrument in form of three-month repo tender.*"[8] The last time the three-month repo tender was used was in 2001.

3.1.4.2. Discount Rates

"*The discount rate is the interest rate charged to commercial banks and other depository institutions for loans received from the national banks discount window*."[9] The discount rates as a tool of monetary policy have been widely used by many commercial banks worldwide for decades. The discount rates also serve as a tool to control the amount of liquidity on the market. The lower the rate the more likely the commercial banks will use the borrowings and the money supply rises.

[7] https://www.cnb.cz/en/monetary_policy/instruments/index.html
[8] https://www.cnb.cz/cs/menova_politika/mp_nastroje/
[9] https://www.investopedia.com/terms/d/discountrate.asp

3.1.4.3. Foreign Exchange Interventions

Foreign exchange interventions can be defined as "*purchases or sales of foreign currencies against the Czech koruna on the foreign exchange market*."[10] This monetary tools of the national bank is used quite rarely in comparison to other inflation targeting tools such as adjustments in interest rates. In case, in an economy, the interest rate reaches so-called technical zero, rate of only 0,05% where further decrease would make commercial banks to hold their cash rather than deposit it, further monetary policy easing can be achieved by weakening the exchange rate. "*The CNB faced this situation between autumn 2013 and spring 2017, when it used an exchange rate commitment to intervene on the foreign exchange market if necessary to weaken the koruna so as to maintain the exchange rate close to CZK 27 to the euro*."[11] These deflation fighting and export supporting activities on the foreign exchange market and their impact on the Czech economy will be the core subject of this thesis. The main target of foreign exchange interventions is to influence the development of the currency exchange rate. Beside the main target, the interventions also influence or have impact on the other economic indicator – minimum reserves amount and interest rates. The side effects might be partial aims, however most of the times the they are just a co-product of the exchange rate streamlining.

3.1.4.4. Exchange Monetary Regimes

There are several exchange monetary regimes. All of the monetary regimes are however connected to the exchange rate among currencies. Exchange rate is a rate under with a currency can be traded or exchanged for another currency. People can buy currencies for the value of the exchange rate of another currency. Exchange rate can be compared to a price of an asset, let's say a house, and represents the price of foreign currency in a value of domestic currency.

[10] https://www.cnb.cz/en/monetary_policy/instruments/index.html
[11] https://www.cnb.cz/en/monetary_policy/instruments/index.html

3.1.4.4.1. Golden Standard (Pegged) Exchange Monetary Regime

"*The gold standard is a monetary system where a country's currency or paper money has a value directly linked to gold. With the gold standard, countries agreed to convert paper money into a fixed amount of gold. A country that uses the gold standard sets a fixed price for gold and buys and sells gold at that price. That fixed price is used to determine the value of the currency. For example, if the U.S. sets the price of gold at $500 an ounce, the value of the dollar would be 1/500th of an ounce of gold*."[12] The golden standard is not in use anymore. The US used it in limited way up until 1971 but the pure golden standard was abandoned in 1933 – 2 years after the UK abolished the system. After all major economies abolished the golden standard, they transitioned to fiat money. Fiat money is any currency declared by a government as a legal tender.[13]

3.1.4.4.2. Fixed (Pegged) Exchange Monetary Regime

In case of fixed exchange rate the central bank ensures the level of the exchange rate and can also adjust the official exchange rate. Usually, a set price is determined against one of the major currencies such as USD, EUR or YEN or even a basket of currencies. The central banks keep the exchange rate stable through purchases and sales of other currencies, usually the ones the local currency is pegged to. These trades on foreign exchange market are greatly demanding on the reserves the central bank needs to have available in form of foreign currency (pegged currency). Fixed exchange rate helps to lower transactional costs and makes future economical predictions easier. This might be helpful in terms of foreign trade and foreign investments.[14]

3.1.4.4.3. Floating Exchange Monetary Regime

The floating exchange rate is driven by the supply and demand for local currency. The floating exchange rate is then determined by the so-called "self-correcting" mechanism as any inequality on the supply or demand will become

[12] https://www.investopedia.com/ask/answers/09/gold-standard.asp#ixzz56XBnWDNU
[13] https://www.investopedia.com/terms/f/fiatmoney.asp
[14] https://www.cnb.cz/cs/faq/jaky_je_rozdil_mezi_pevnym_a_plovoucim_menovym_kurzem.html

automatically corrected and will reflect in the exchange rate. The changes on the supply and demand have also direct impacts on the economy itself, and more then on all other, on the balance of payments. If there is low demand for local currency, it's value decreases. This situation might help in export focused economy such as the one of Czech Republic to boost demand for local goods and services since they become cheaper for abroad consumers. Imported goods and services, however, get more expensive for domestic consumers. Such a situation would bring higher investments and thus create jobs. These two factors will very likely lead to an auto correction on the money market. One of the biggest advantages of floating monetary system is the possibility of erasing high fluctuations in the economic cycle.[15]

3.1.4.4.4. Managed (Dirty Float) Floating Monetary Regime

As well as there is no pure fixed monetary regime as the market pressures push on official adjustment of exchange rates and the central bank must revalue or devalue local currency due to formation of so-called black market and its more effective and quicker responses, there is also hardly any pure floating monetary regime. In managed floating monetary regime the central bank intervenes in case of some external shock or as a part of monetary policy instrument when no further lowering of discount rates is possible. In some rare cases the dirty float can prevent greater harms when a country faces hedge fund or other speculator attack.[16]

In the Czech Republic, the exchange rate was fixed up until the beginning of 1996 against a basket of currencies. Later on it was released by a significant widening of the fluctuation range and now the Czech economy is under the so-called managed floating rate.

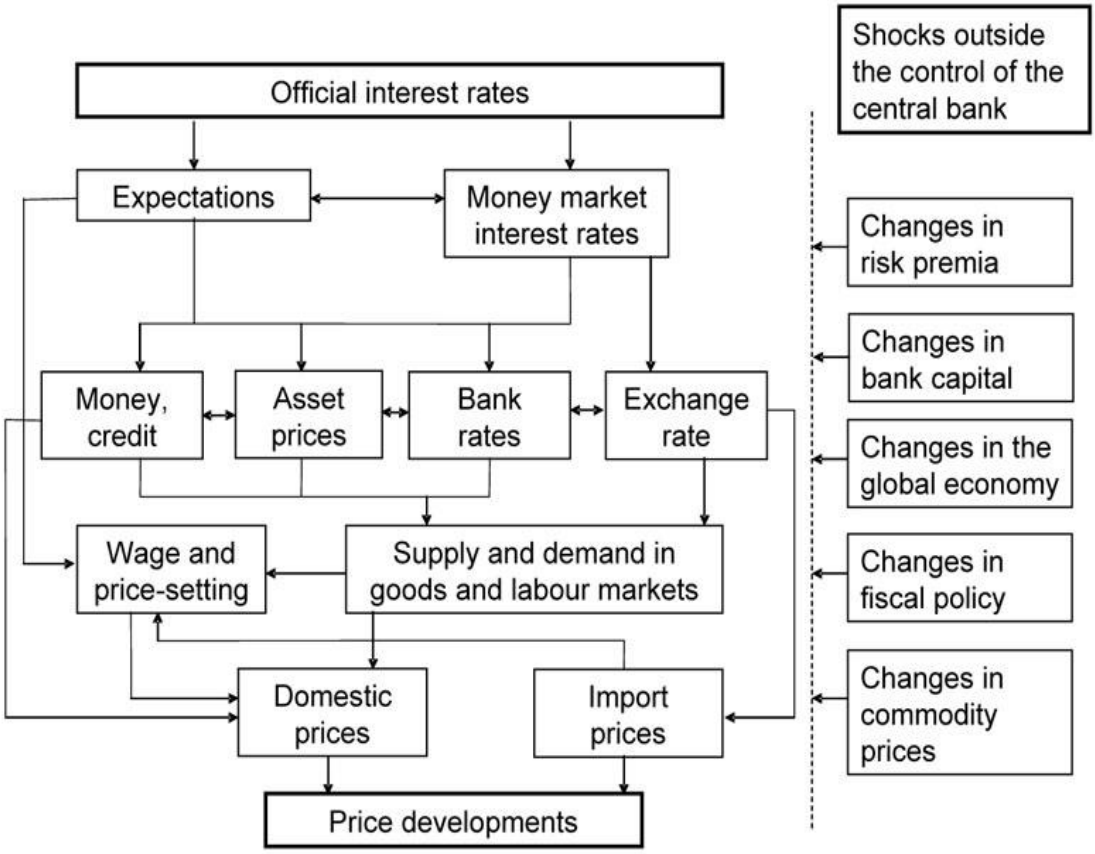
[15] https://www.cnb.cz/cs/faq/jaky_je_rozdil_mezi_pevnym_a_plovoucim_menovym_kurzem.html
[16] https://www.investopedia.com/terms/d/dirtyfloat.asp

3.2. Transmission Mechanism of Monetary Policy

The basic monetary policy instrument is the monetary-policy interest rates set-up, where their settings are implemented into the economy by several routes known as transmission mechanisms. Most economist agreed on certain level of influence of monetary policy on the economic activity through various channels – mechanisms. They usually differ only in degree of importance or show the specifics and factors that cause and explain different impacts. But as Loayza and Schmidt-Hebbel state: "*in a fully flexible economy, currency shock is fully reflected in equitable and immediate growth in all nominal aggregates (including money and loans), asset prices, exchange rates, producer prices and goods. Aggregate demand is growing, but aggregate supply remains unchanged*," and as a logical outcome they add: "*under these conditions, it makes no sense to identify separate transmission mechanisms and even less to measure their relative importance*." (Loayza & Schmidt-Hebbel, 2002) This theory is however valid for the fully flexible economy. In real imperfect and not fully flexible economy as the of Czech Republic the observation, understanding and analysis of each individual transmission mechanism is vital and helps to understand their importance, intensity and responsiveness and thus better controlling of an economy. The Czech National Bank defines the transmission mechanism as follow: "*a chain of economic ties that allows for changes in the setting of monetary policy instruments to lead to the desired changes in inflation.*"[17]

[17] https://www.cnb.cz/cs/obecne/slovnik/index.html

Scheme 1: Transmission mechanism of monetary policy



Source: ECB.eu[18]

3.2.1. Monetary Transmission Mechanism

One of the monitored points must undoubtedly be the surrounding monetary policy system, for example, as factors seemingly unrelated to monetary policy as well as factors outside the domestic economy but with the influence to the domestic economy. Low average inflation rate, the primary objective, is achieved by adjusting the money supply in the economy using the available tools (for instance the minimal reserves requirements for commercial banks) which then further influence inflation rate. Money supply then serves as an intermediary criterion. (Revenda, 2011)

[18] https://www.ecb.europa.eu/mopo/intro/transmission/html/index.en.html

3.2.2. Interest Rate Transmission Mechanism

The main objective of interest rate transmission mechanism is, as the name indicates, to manage the inflation rate through the short term interest rate. It is up to the bankers to decide the instrument and, through economic relationships, the intermediary market is influenced and the market itself is then forced to change its patterns in its behavior.

To set an example, to decrease the inflation pressures in the economy the central bank needs to cool down the overheating economy (most likely the case). This means for the central bank to lower salaries and their growth, lowering employment and GDP growth. All these can be reached by raising the interest rate. This forces commercial banks to "sell" their money for higher prices. As commercial banks increase theirs interest rate, they lower the demand for money, because there are stricter criteria for clients to draw loans, and limit the spendings of households and decrease the overall consumption. Similar implies for the companies as they cut short their investments. Similarly, it works in opposite case, where the economy is crawling from difficulties or recession and needs to be boosted. The interest rate is lowered to minimum, money becomes cheaper, household and companies spend more and GDP rises. (Revenda, 2011)

3.2.3. Exchange Rate Transmission Mechanism

Exchange rate transmission mechanism, also a series of economic relationships, also set the main objective of manipulating the inflation level by foreign exchange interventions by the domestic central bank. There are two ways, channels, this goal can be achieved by.

In the first case the national bank intervenes (purchases or sales foreign currency against domestic currency) on the foreign exchange market. This operation immediately influences the price level in the short term in the same direction as the numerical expression of the exchange rate development. The inflation level is then expected to move in the same direction as the price level itself.

The interest rate lowering is the main tool in the second exchange rate transmission mechanism channel. In case the central bank increases the interest rates, followed by the commercial banks, the domestic currency tends to appreciate. The process of currency appreciation involves lower exports, cheaper imports and overall slowing of the economy and GDP. As in the case of interest rate transmission mechanism channel, this step slows down the salary growth and investments and therefore slows down or turns the development of raising inflation rate. (Revenda, 2011)

3.3. Monetary Policy Regimes

The implementation of monetary policy is completed via one of the monetary policy regimes. The monetary regimes give the monetary policy certain structure that facilitates decision-making itself but above all it interprets the decisions to the public.[19]

Among the basic monetary policy regimes are:

- Regime with and implicit nominal anchor
- Regime of exchange rate targeting
- Regime of Monetary Targeting
- Inflation targeting regime

3.4. Regime With and Implicit Nominal Anchor

A regime with an implicit nominal anchor involves targeting a particular nominal variable adopted only internally within the central bank without it being announced explicitly. A prerequisite for successful functioning of this regime is high credibility of the central bank, which enables the desired changes in inflation or inflation expectations to be achieved without explicit targets.[20]

[19] https://www.cnb.cz/cs/faq/jake_jsou_rezimy_menove_politiky.html
[20] https://www.cnb.cz/en/faq/what_are_the_regimes_of_monetary_policy.html

3.5. Regime of Exchange Rate Targeting

Under the exchange rate targeting regime, the central bank tries to ensure nominal exchange rate stability vis-à-vis the currency of a so-called anchor country via interest rate changes and direct foreign exchange interventions, thereby "importing" price stability from the country. Maintaining the exchange rate requires an appropriate economic policy mix ensuring a low inflation differential vis-à-vis the anchor country, a sufficient level of international reserves, and the maintaining of the country's competitiveness and overall credibility, including its institutional and legislative framework and political stability. The goal is to achieve price stability as in the foreign country to which the country is being anchored.[21] Loss of monetary policy autonomy appears to be a major drawback to this regime. (Černohorský & Teplý, 2011)

3.6. Money Targeting Regime

The money targeting regime focuses on the growth rate of a chosen monetary aggregate. It is based on the finding that in the long term, price growth is affected by money supply growth. A problem, however, lies in the choice of an appropriate monetary aggregate to target. In an environment of financial innovation, market computerization and globalization, the relationship between monetary aggregates and the price level is becoming ever weaker. The central bank may also fail to manage the selected monetary aggregate with sufficient precision.[22]

3.7. Inflation Targeting

Under inflation targeting, the central bank publicly pre-announces an inflation target (or a succession of targets) that it is determined to achieve. This involves active and direct shaping of inflation expectations. This regime's decision-making scheme involves the use of much more information than merely the exchange rate or monetary

[21] https://www.cnb.cz/en/faq/what_are_the_regimes_of_monetary_policy.html
[22] https://www.cnb.cz/en/faq/what_are_the_regimes_of_monetary_policy.html

aggregates, covering the labor market, import prices, producer prices, the output gap, nominal and real interest rates, the nominal and real exchange rate, public budgets, etc.[23]

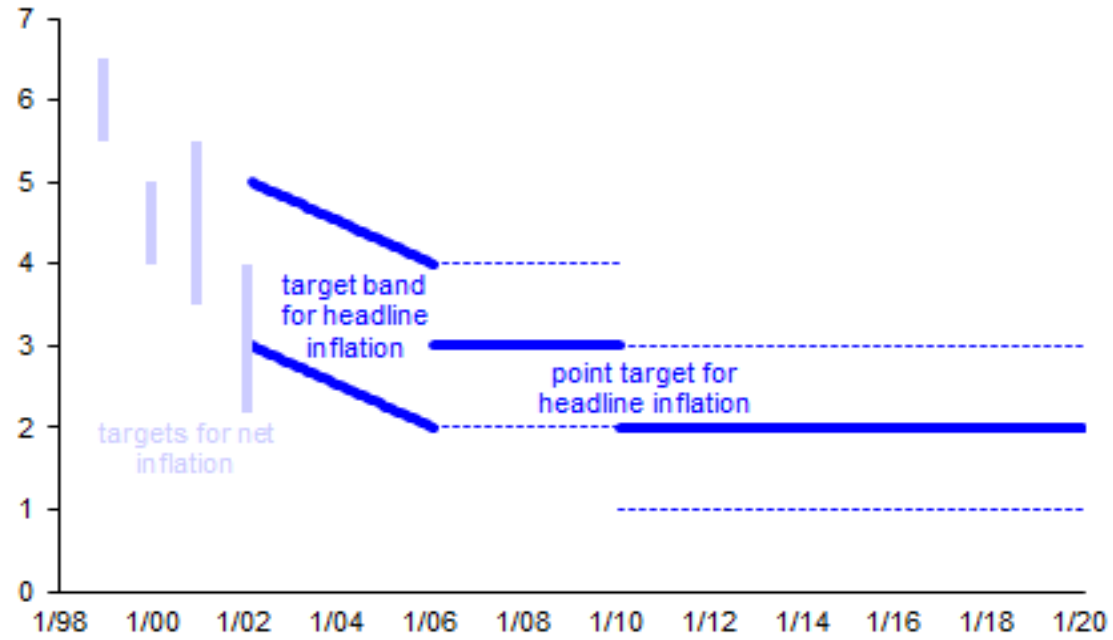
In 1998 the Czech National Bank made a decision of to target the inflation. This transmission did not mean any changes in the objectives but only changes in ways of achieving the objectives. The medium term of this strategy can be considered as one of the basic features of this strategy. Other important features include, for example, the use of the inflation forecast, the succession of targets, or the public explicit declaration of the inflation target. The Czech National Bank Board of Governors, in its monetary policy decision-making, assesses the central bank's latest forecast and evaluates the risks of non-fulfillment of this forecast. Based on these considerations, the Board votes on whether and how monetary policy instruments should be changed. By changing these instruments, the central bank seeks to offset or differentiate excessive inflationary, disinflationary pressures that deflect future inflation outside the inflation target or they violate a tolerance band around this target. For example, an increase in the repo rate is usually driven by a so-called transmission mechanism to weaken aggregate demand, which results in a weakening in price growth. Lowering the repo rate usually has the opposite effect on inflation.[24] In case the central bank faces any signs of excessive inflationary pressures over or below the inflation target the policy of the central bank is than expected to lean towards more restrictive policy, the repo rate should be higher. Inflationary development, respectively the expected development in inflation may be the result of extraordinary shocks, usually on the supply side, disinflationary manifestations will disappear over a period of time, so the effort to eliminate these manifestations completely by changing the setting of monetary policy instruments would unnecessarily distort the economy for a short time.

The inflation target set in terms of headline inflation of 2% with effect from January 2010 until the Czech Republic's entry to the euro area. As before, the CNB will strive to ensure that actual inflation does not differ from the target by more than one

[23] https://www.cnb.cz/en/faq/what_are_the_regimes_of_monetary_policy.html
[24] https://www.cnb.cz/cs/menova_politika/cilovani.html

percentage point in either direction.[25] The development of inflation targeting is graphically shown in scheme no. 2.

Scheme 2: Inflation targeting development



Source: cnb.cz[26]

[25] https://www.cnb.cz/en/monetary_policy/inflation_targeting.html
[26] https://www.cnb.cz/en/monetary_policy/inflation_targeting.html

4. Time Lags

In terms of economy of any country the predictions play a key role. The economist and bankers need to predict the future development of the economy performance and the key macroeconomic indicators such as employment, interest rates, GDP growth etc. Based on the predictions the members of CNB board need to decide on the actions to take today, in terms of monetary policy, in order to prevent great fluctuations in the economy tomorrow. The experts predict in the period of 12-18 months from now. This period is in terms of economy called the horizon of monetary policy. To picture above better, let's imagine a tanker on the sea. When the helmsman moves the helm, it takes a long time for the tanker to turn to the desired direction. The helmsman must therefore observe the sea at a considerable distance ahead of him in such a way as to avoid possible obstacles in time. The geographic distances in the case of the tanker are analogous to the time lag in the case of monetary policy impacts on the development of the economy.[27]

4.1. Recognition Lag

The recognition lag can be recognized as a period of time between the shift in the direction of the economy performance, usually in form of economic shock, boom or bust, and the point in time it is recognized by the government, economists and bankers. The recognition lag can last for days up to many months depending on the nature of the shift or the severity of the shock. Economic shock can be generally described as an event happening outside the economy with an impact inside the economy.[28]

4.2. Implementation Lag

The implementation lag recognizes the period from the shift or shock or any kind of adverse action in the economy and to the point of the monetary policy or other corrective action is put into place. In terms of duration of implementation lag it could

[27] https://www.cnb.cz/cs/menova_politika/vzdelavani/mp_clanky/kapitoly/mp_06.html
[28] https://www.investopedia.com/terms/r/recognition_lag.asp

also be, similarly as in case of the recognition lags, matter of days, weeks or months. One of the key factors as to the duration being long or short, depends on whether policy makers have a definite course of action or must debate and seek consensus on the right action to take in order to correct the unwanted shifts. [29]

4.3. Response Lag

Response lag is measured as the period between the monetary policy making real recognizable difference or correction back to the time it was initially implemented. The corrective actions taken by government, central bank or other authorities can be either disposed once as an immediate implementation or it can multiple steps or incrementally action. Therefore, the same as for the recognition and implementation lag applies – the generalization of the duration as rather impossible. [30]

[29] https://www.investopedia.com/terms/i/implementation_lag.asp
[30] https://www.investopedia.com/terms/r/response_lag.asp

5. Inflation and Deflation

Chapters about inflation and deflation are included in the thesis as the topics are very interconnected with the main topic of the thesis, the interventions of the Czech National Bank. The interventions were initiated, among other reasons, to fight inflation/deflation and keep it in the inflation targeted range.

For inflation targeting, it is also advisable to know how the central bank measures inflation in order to set inflation targets and forecasts. Therefore, in the following chapters, the types of inflation measurement and their advantages or disadvantages will be introduced. In addition, inflationary consequences, costs and also effects on some other economic variables. Also, the issue of deflation, its circumstances and the costs associated with its presence in the economy will be presented.

5.1. Inflation

Revenda, in general consensus with other economists, describes inflations as "*longer-term, uninterrupted rise in price levels that is associated with excessive money issuance and which leads to a decline in the purchasing power of money*." (Revenda, 2011) Therefore, inflation does not mean the rise of prices independently but rather the price level throughout the economy as a whole. In addition, any price level increase does not necessarily mean inflation is taking place. The growth of price level must be long-term in order to be considered as inflation. With certain level of certainty, we can speak about inflation when the price level has been unceasingly raising for at least two quarters.

It is good to take into consideration that the growth of inflation does not have to mean more poverty for economic entities than in the previous period as the rise in price level also means an increase in the prices of factors of production, corporate costs and increase of wages. This principle confirms that economic participants do not become poorer in comparison to the previous period and it also explains the reduction in the amount of goods that economic entities are able to buy as a monetary unit. (Holman, 2002)

Inflation is usually divided and named by the main initiator as described in the following list.

- Demand inflation – caused by excessive purchase demand
- Supply inflation – caused by aggregate supply in the economy
- Cost inflation – caused by higher costs of raw materials or services
- Profit inflation - profit surpluses of monopolies to production and service prices
- Wages inflation – increase in wages

Inflation can be also broken down according to the severity of it. Generally speaking, if inflation is up to two percent on an annual basis, it can be considered as price stability. Positive on it can be that the moderate inflation may be that it increases the effectiveness of counter-cyclical monetary policy. This moderate inflation may be used to some extent to influence the short-term interest rate if its real level approaches zero or even negative. (Revenda, 2011)

As much more complicated for the economy is the double-digit inflation. As the name itself implies, we can talk about double-digit inflation as the price level annually rises from 10% to 99%. Hyperinflation is considered as a 3 digit and more precentral rise in the price level in the economy. When hyperinflation takes place, usually, the market collapses and economic connection and ties and habits seize to exist.

5.2. Measuring Inflation

As the central bank aims for the price stability, it is vital for it to use standardized measurements of the inflation. Those can be divided in two major categories – deflator of GDP and price index, mostly index of consumer prices.

5.2.1. Deflator

For calculating the inflation using the deflator, we shall use the following formula for calculating the deflator first:

Formula 1: Deflator GDP formula

$$DEFLATOR\ GDP_t = \frac{\text{NOMINAL GDP}}{REAL\ GDP_t}$$

Source: author's presentation

in which the real GDP_t is the gross domestic product, expressed in terms of constant prices in the selected base period. This method is, however, considered as very inoperative as it takes longer to collect the data and for this reason it is mostly measured only on the quarterly basis. In the other though, it takes the whole complex picture of the economy. The inflation using the deflator can be measured as the following formula implies:

Formula 2: Inflation formula

$$INFLATION_t = \frac{\text{DEFLATOR GDP}_t - DEFLATOR\ GDP_{t-1}}{DEFLATOR\ GDP_{t-1}}$$

Source: author's presentation

5.2.2. Consumer Price Index

The consumer price index is a statistical figure, an estimate, based on prices of items from the so-called consumer basket. It represents the year to year increase of prices measured by 700 goods and services most commonly used by average households. The CPI is used to assess the price level development and to help the Czech National Bank more precisely target the inflation. The consumer price index's advantages are that the number of items remains the same and therefore, it is significantly easier to do the calculations on monthly basis or separate the data for desired regions. In most economies the CPI is among the most closely watched economic indicators.

The Czech Statistical Office works with two kinds of data in the consumer basket – the price data and the weighting data. The price data are collected based on sample of sales and locations and times and then averaged. The weighting data are

indexes representing the share of budget a household spends on such an item on yearly basis. These data are usually collected or obtained from surveys distributed to randomly chosen representative sample of households or may be estimated from composition of consumption expenditures. Many time the purposive sampling serves as a calculating method but mostly the probabilistic sampling prevails.

The composition of goods and services in the consumer basked is based on most consumer representative and the inclusion of different specific groups of products and services. Almost ¼ of all the goods in the basket is imported goods, volatile (petrol, butter, eggs,..) and stable items in terms of price (insurance, electricity, raw materials,..), daily bought items as well as cars. To list some examples:[31]

- Insurance and medical care
- Apparel
- Education
- Food
- Recreation
- Housing
- Transportation

The formula for computation of CPI is as follows:

Formula 3: CPI formula

$$CONSUMER\ PRICE\ INDEX = \frac{COST\ OF\ MARKET\ BASKET_T}{COST\ OF\ MARKET\ BASKET_B} \times 100$$

Source: author's presentation

The CPI index can be also used in order to calculate the inflation. The following formula would be used.

[31] https://quickonomics.com/calculating-consumer-price-index-cpi/

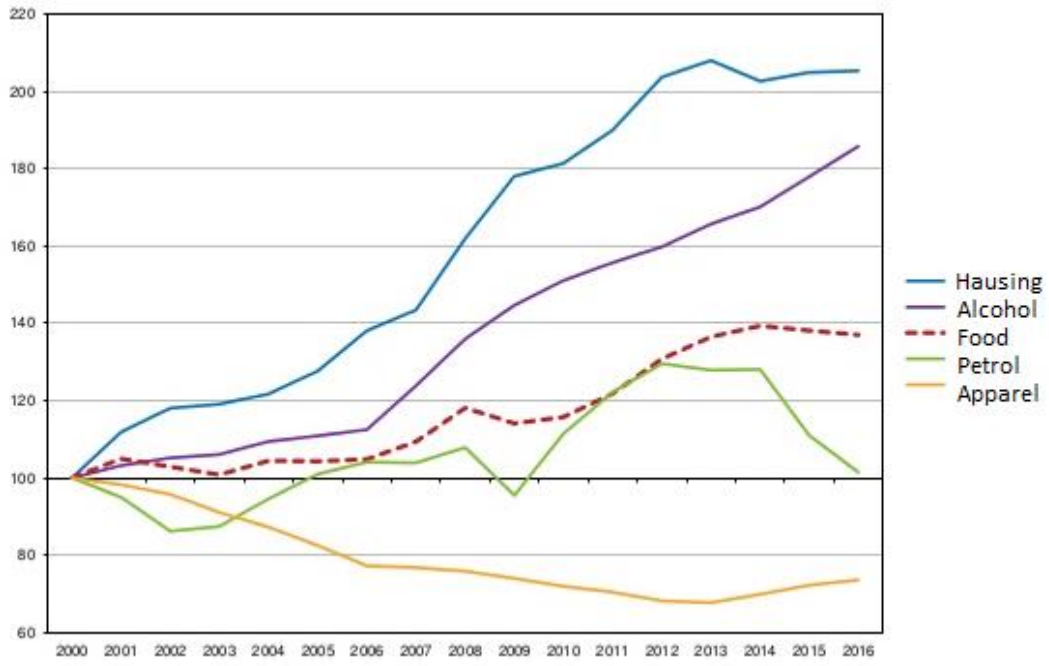
Formula 4: Inflation rate formula

$$INFLATION\ RATE\ IN\ YEAR\ 2 = \frac{CPI_2 - CPI_1}{\mathrm{CPI}_1} \times 100$$

Source: author's presentation

The European Union and the European Central Banks uses the Harmonized Index of Consumer Prices (HICP). This index which is compiled according to a methodology that has been harmonized across EU countries by standardizing the items in the basket. On the scheme below we can observe the development of HICP in the Czech Republic.

Figure 1: HICP development in Czech Republic; %xYrs



Source: Jiří Mrázek, ČSÚ, slideshare.net[32]

[32] https://www.slideshare.net/statistickyurad/s-inflace-a-ceny-nemovitost-2017

5.3. Costs and Consequences of Inflation

Among the primary and most important consequences to the economy in term of inflation can be listed the lowering of purchasing power of the monetary unit. Creditors are also negatively affected by the unexpected inflation as they are not fully capable of making the correct predictions on incorporation future price increases into higher interest rates. This phenomenon can then lead to unpredicted and unintended redistribution of wealth among creditors and borrowers as it pays off for the borrowers to postpone their instalments and general decline in their willingness to pay.

5.4. Deflation

The definition of deflation highly corresponds with the definition of inflation. Deflation can be defined as a sustained decline in an aggregate measure of prices such as the consumer price index or the GDP deflator or as continuous long-term decline of price level. As in case of inflation, the assumption is that it must be continuous, lasting at least 6 months or longer otherwise it must not be deflation as such and the thread might be none or minimal.

Deflation can be also divided into several categories. The principal division is based on the initial shock which in case of supply shock is considered to be good, beneficial and generally positive and then the negative shock caused by the demand shock.

5.4.1. Positive Deflation

"*Good deflation is generally caused by a positive supply shock (i.e. an outward shift of the supply curve) that leads to the production of higher quantities sold at lower prices. In most cases, this type of deflation can be attributed to technological progress. New technologies allow companies to improve their production processes and reduce costs. As a result, the price level falls and (relatively speaking) money becomes more*

valuable."[33] Among other reasons we can list trade liberalization, fiscal policy changes or decrease in input prices. (Rogoff, 2003)

"*An example of good deflation is the development of flat screen televisions. When they were introduced a few years ago, not many people could afford to buy one, because they were quite expensive ($3'000 – $4'000). However due to technological progress and improved production processes a flat screen television only costs about $600 – $1'000 these days*."[34]

This basically leaves both parties (consumer vs. producers) better off. Consumer become wealthier even though not in the real sense and producers and suppliers, even though the prices fell, the cost are reduced the same direction and at the same pace.

5.4.2. Negative Deflation

"*Bad deflation is caused by a negative demand shock (i.e. an inward shift of the demand curve) that leads to the consumption of lower quantities at lower prices. In other words, sellers have to reduce prices, because there is a lack of demand and they cannot sell their goods at the original price anymore*."[35] The negative demand shock can be caused by several aspects. For instance, the bubble on the market might burst, shift in preferences of consumers, relatively normal economic decline as the cycle changes towards downward sloping, restrictive fiscal or monetary policy connected to the economic cycle changing, lowered investments due to uncertainty on the markets or/and currency appreciation. (Rogoff, 2003)

Simple correlation among major economic indicators can be found. Deflation, good and bad, can be highly linked to the development of GDP, productivity of the economy and interest rates. In case of so-called good deflation, the GDP and productivity are rising while the interest rates are kept minimal or declining. In case of so-called bad inflation, the interest rate is also minimal or declining, but the GDP and productivity also tend to be lower as the household are losing their purchasing power due to the deflation.

[33] https://quickonomics.com/good-deflation-vs-bad-deflation/
[34] https://quickonomics.com/good-deflation-vs-bad-deflation/
[35] https://quickonomics.com/good-deflation-vs-bad-deflation/

So even though, the deflation might at the first sight seem as a beneficial phenomenon as the consumers can allow to purchase more for the same amount of money, the opposite is true. Although, the price level drops and purchasing power rises, in long-term the deflation pushes the prices of already bought assets, and other as stocks and wages, down. Which in terms of absolute wealth makes the consumers within the economy worse off.

5.4.3. Deflationary Spiral

"*A deflationary spiral is when a period of decreasing prices (deflation) leads to a situation whereby the economy cannot recover, which compounds over time leading to even lower prices in a vicious cycle*."[36] As well as deflation the deflationary spiral usually camos along with the recession or depression (extreme recession) in the economy. This forces the producers to further lower their prices of products and services in pursuit of convincing consumers to consume (spend) more. However, people, in tough time, tend to postpone their expenditures and creating a cushion of liquid money and assets and therefore they nourish the deflationary spiral even more. Another reason for hoarding money might by explained very easily. Why to spend money today if the assumption is that one can buy more staff for it tomorrow. This behavior spins the spiral and the aggregate demand lowers or turns the growth of GDP.

One of the assumptions of the national bank is to reduce interest rates through the tools available to it which described in the previous chapters. The central bank should also prevent the risks associated with the possibility of bankruptcy. Because the value of money decreases, the value of the debts of the creditors who subsequently face this risk of bankruptcy increases. Failure to repay their commitments would continue to exacerbate the deflationary crisis. Here, there may be situations where it is no longer possible to reduce interest rates and traditional monetary policy instruments are no longer effective and can no longer influence aggregate demand and GDP growth. And in this case, the national bank has to resort to less traditional instruments and

[36] https://www.investopedia.com/terms/d/deflationary-spiral.asp#ixzz57N637ImW

transmission mechanisms such as, for example, interventions on the foreign exchange market. (Holman, 2010)

5.4.4. Economic Consequences of Deflation

During deflation, a hardly predictable chain of causes and consequences arises. The effect of deflation can be partly eliminated by monetary policy in case the deflation is recognized in time. However, if the monetary policy is implemented inappropriately it can also contribute or deepen the deflation. In the general assumption that prices of real estate, value of securities or portfolios will fall, commercial banks will try to sell as much as needed in order to secure their profits. As banks get rid of their assets, it causes even further decline in the prices of those assets. In this case, it pays to keep this information confidential, because as soon as this information reaches the public, it can further deepen the deflationary crisis, from which the economy will only get with even greater difficulties. Real wages and real debt repayments are on the rise, which is unfavorable for companies that have to pay wages and for the borrowers in general. Consumers in a situation of lower prices paradoxically postpone purchases of goods, services and real estate in the hope that in the future these prices will be even lower. This consumer thinking is a disaster for businesses because for them the declining demand means higher real repayment of their debts towards commercial banks and their real cost connected to the wages. Companies are forced to reduce their staff and their production costs, which further exacerbates the deflation process. In the long run, real wages growth is impossible, resulting in an absolute fall in nominal wages over time. For this reason, consumers will reduce the demand for company production even further, and companies are forced to take on further redundancies and lower prices for their products. The price level falls further down and down, which is the result of this deflation spiral. The economy is in a situation where there is a great lack of public confidence in the banking system, companies are going bankrupt in a large quantity, already high unemployment rate is growing and there is a general lack of liquidity. Tax revenues of the government fall tremendously as the collection of direct and indirect

taxes lowers due to lower prices and wages. The economy must regain credibility and trust of investors using reforms and monetary policies.

5.4.5. Wealth Redistribution due to Deflation

"*Arbitrary redistribution of wealth from borrowers to lenders. Given that the experience of many countries in the recent past has been that of steadily rising prices, many long-term contracts are written with the expectation of continuing inflation. Thus, when unanticipated deflation occurs, these contracts need to be adjusted. It is reasonable to expect that these adjustments will not be instantaneous, since many contracts cover an extended period of time. Without adjustments, unexpected deflation will lead to arbitrary redistribution of wealth from borrowers to lenders (the opposite of the case of unanticipated inflation).*"[37]

5.4.6. Deflation Effecting Interest Rates and Monetary Policy

Inflation and pressures associated with it are like many others closely linked to other tools and indicators. Inflation is adjusted by the development of interest rates. Assuming deflation can be expected, the interest rate gradually decreases to the extent that it reaches technical zero and no further reduction is possible. Reducing the interest rate to negative numbers is not technically possible, since the most liquid asset - money - has a zero interest rate. This suggests that deflation virtually increases the cost of borrowed money and thus reduces the willingness to borrow money. Therefore, it can be assumed that all business activities financed from outer financial sources and by borrowed money are basically limited.

The interest rate cut is also strongly linked to the monetary policy used and executed by the central bank, as one of the most important and effective monetary policy instruments is the change in interest rates. In the case of interest rates reaching technical zero, the central bank loses the ability to influence demand in this way and has

[37] https://www.frbsf.org/education/publications/doctor-econ/2006/february/deflation-costs/

to resort to other monetary policy instruments with lower efficiency and less certain outputs. These may be money market interventions or bond purchases.

5.4.7. Deflation Effecting Wages, Employment and Profits

In times of deflation, the company faces a strange and yet logically very easy to explain phenomenon. If companies experience financial recessions and deflation, real wages are actually rising. Nominal wages are declining but in general, the pace of this decline is not sufficient and symmetrical with the depth of deflation and the crisis itself. Assuming that real wages rise, that means that businesses are increasing their marginal costs. In order to maintain their competitiveness, manufacturers have to continue to discount their products, thereby further increasing the marginal cost. Another possible way to reduce costs, as soon as nominal wages are reduced, is to lay off workers and reduce production and further reduce the profitability of companies. This simply explains why in the severe economic times of deflation and crisis the unemployment rate is so substantial.

6. Practical Analyses

6.1. Interventions of Czech National Bank on Foreign Exchange Market

As early as 2012, the Czech National Bank has announced possible interventions in the foreign exchange market. The original and ultimately fulfilled intent was to intervene against the major European currency - the euro. Since the instruments of the central bank include verbal instruments in the form of public statements, this can be considered as the initial steps of interventions. The interventions themselves were officially announced on November 7, 2013, and despite the previous statements, they were still surprising for many. Even though many world central banks have this monetary tool of foreign exchange interventions, some economists and politicians have taken this step as a step towards a fixed exchange rate. (KLAUS, 2013)

As mentioned above, the main goal of the interventions was to face the risk of deflation, which would most likely occur, as the main policy instrument of the Czech National Bank, the 2W Repo rate, could no longer serve its purpose as its value reached the minimum level.

However, three scenarios were considered by the CNB board:

"*1. The base scenario with negative interest rates - a hypothetical scenario that shows what would happen if market interest rates were negative.*

2. Passive Monetary Policy Scenario - a scenario showing what would happen if the CNB did not start foreign exchange intervention; the scenario implies strengthening the course.

3. Alternative scenario of using the exchange rate - a scenario showing what is likely to happen after the CNB has initiated foreign exchange interventions."[38]

While the scenario with negative interest rates is possible in some countries (for example, the banks of Sweden, Denmark, Switzerland or Japan and the ECB have used

38 https://www.cnb.cz/miranda2/export/sites/www.cnb.cz/cs/verejnost/pro_media/konference_projevy/vystoupeni_projevy/download/singer_20131120_olomouc.pdf

or been using negative rates)[39], we do not have this option in the Czech Republic. The specific assumption for successful achievement of the anti-deflation intention would be a rate of negative 0.85%, which would mean a decrease of 9 per mile from the value of technical zero rate. The second scenario, in reality, was not even considered, and so the exchange interventions took place.[40]

Foreign FX interventions of CNB had a number of critics among economists and politicians in particular. Among the loudest critics were former Czech President Vaclav Klaus or former Prime Minister Jiří Paroubek.

For illustration, we can show the statement of Jiří Paroubek. Paroubek said that the CNB paid, and therefore taxpayers, for the weak crown, in July 30 billion crowns, in August 100 billion crowns and in September 63 billion crowns. Consequently, in the third quarter, the CNB spent nearly CZK 200 billion on the weakening of the Czech koruna. Since the start of interventions in November 2013 for the weakening of the Czech koruna, the Czech National Bank has already earmarked 390 billion crowns, and it is really expensive. This statement is very inaccurate and chaotic and the question arises whether it is only a political statement or only gross ignorance of the mechanisms and the whole monetary policy functioning. The Czech National Bank, of course, does not spend the money from public budgets and therefore the taxpayers' money, but only creates (digitally prints) new crowns for which it then buys foreign currencies and, in this case, the euro in particular.

Concerns were mainly related to the rise in prices of imported consumer goods, the rise in inflation, the slowdown in economic growth, the depreciation of savings and the rise in strategic commodities such as oil or, for example, pig meat prices, and considerably more expensive imports of live pigs. Imports of live pigs actually fell from about 10 percentage points in the first two years due to the weakened exchange rate of the koruna, but exports of pigs grew roughly by 70% over the first two years of interventions. Totally legitimate concerns were in terms of depreciation of savings. Taking the total amount of savings in the domestic currency at the end of 2013 and re-calculating them by 27 CZK/EUR according to the announced exchange rate, there

[39] https://www.usatoday.com/story/money/business/2016/01/28/japan-negative-interest/79499096/

[40] https://www.cnb.cz/miranda2/export/sites/www.cnb.cz/cs/verejnost/pro_media/konference_projevy/vystoupeni_projevy/download/singer_20131120_olomouc.pdf

would actually be a decrease of CZK 76 billion in reserves. These losses would, however, only occur if all savings were to be collected in total amount and immediately, however this scenario was not practically possible. There was no general reason for a sudden transfer to foreign currency, and the overwhelming majority of the population spends money in the domestic currency. Other criticisms such as slowing GDP growth or high inflation rates will be reversed in the following chapters.[41]

[41] http://ceskapozice.lidovky.cz/kritika-devizovych-intervenci-cnb-byla-a-je-neopodstatnena-po9-/tema.aspx?c=A151126_170324_pozice-tema_lube

6.2. Development and Amount of Interventions

The Czech National Bank altogether spent up to 6 April 2017 the amount of CZK 2,048.64 billion (EUR 75.9 billion) for the purchases of a foreign currency euro. The first step of the interventions, and for a relatively long time it was the only step, was the purchase of the euro at the amount of 200 billion crowns. As a result, the Czech National Bank achieved its target rate of 27 CZK/EUR by supplying large amounts of domestic currency to the domestic market, thus slightly exceeding demand, which led to a decrease in the koruna's exchange rate against the euro. The policy of the Czech National Bank was that if the 27 CZK/EUR borderline was at stake, it would continue to intervene so that this border would not be reached or broken. Otherwise, if the exchange rate should continue to show the depreciation of the Czech koruna the CNB would not interfere and would allow the exchange rate to be driven by the market mechanisms. The Czech National Bank had to make another purchase of euro in March 2015, where the purchase amount was about one tenth of the initial purchase. The weakening rate, however, already but remotely threatened the 27 CZK/EUR target and it was therefore the only correct choice in order to fulfill the objectives. During this period of 17 months, from November 2013 to March 2015, the exchange rate against the euro was relatively volatile, but still relatively high above the 27 CZK/EUR threshold. When the exchange rate eventually reached the value of 27.3 CZK/EUR in March 2015, it forced the CNB to execute further financial operations on the foreign exchange market. Since then, the central bank has intervened, with only two exceptions in October 2015 and March 2016, on a monthly basis. In July 2015, the koruna against the euro rate broke the 27 CZK/EUR threshold but only thousandths of units. The central bank was still forced to intervene, but at the same time the koruna's exchange rate against the euro stabilized just above (with few short-term exceptions) the 27 CZK/EUR basically until the end of the intervention period. The development is graphically displayed on the graph bellow.

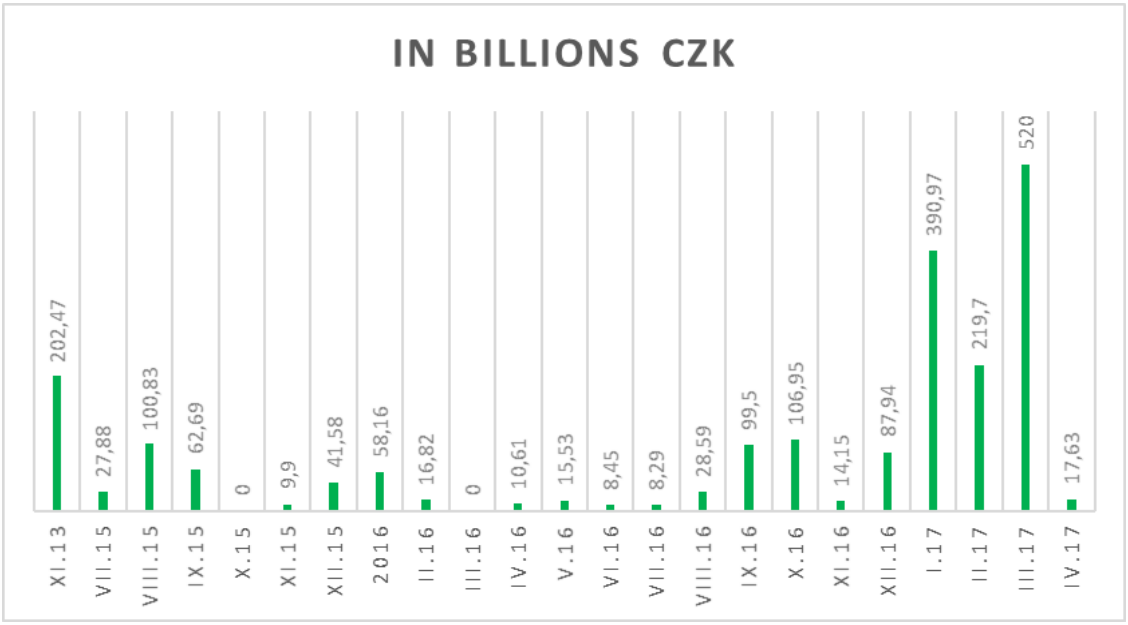
Figure 2: CZK/EUR exchange rate

Source: xe.com[42]

On the figure no. 3 bellow this paragraph we can see the time series of the amounts of interventions over time. The data are in billions of CZK and it is clearly seen that the highest amounts had to be exchanged at the very beginning and toward the end of interventions.

[42] http://www.xe.com/currencycharts/?from=EUR&to=CZK&view=5Y

Figure 3: Monetary amount of interventions



Source: cnb.cz, author's presentation

6.3. Czech Economy's Performance Indicators Evaluation from 2012 to 2017

The Czech National Bank had started its activities on the foreign exchange market in November 2013. "*However, it should be noted that as early as November 2012, the CNB advised that it would not oppose interventions for the weaker crown if the economic situation deteriorated and deflation would be a thread. The main reasons why the CNB justified the beginning of the interventions were the fear of deflation and the intended support for exports. The interventions were not welcomed, but the exporters welcomed them. For example, former CNB governor Miroslav Singer said that if he knew how the economic situation would evolve in Europe, he would intervene earlier and much more significantly*."[43]

For the purpose of the practical part and the possibility of evaluating foreign exchange interventions, five basic indicators of economic development were selected. The values of these indicators were at the same time the reason why the central bank even started to intervene. Data on these indicators is included in the central bank's annual inflation reports regularly issued each quarter.

The Inflation Report contains information from 6 basic categories:

- Supply and demand
    - GDP
        - Household consumption
        - Government consumption
        - Capital formation
        - Import and export
    - Coincidence indicators
        - Industrial production
        - Building production
        - Others
- Prices
    - Inflation rate
    - Consumer prices
        - Regulated prices
        - Net inflation

[43] https://www.finance.cz/489618-intervence-cnb/

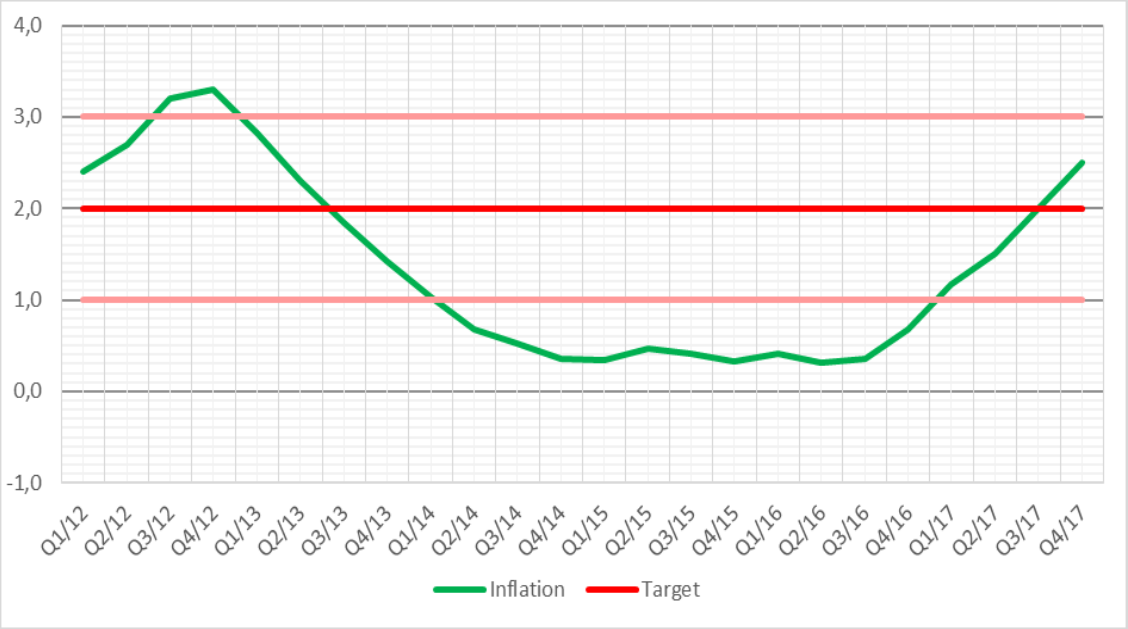
        - Fuels
        - Others
    - Monetary policy inflation
    - Deflator
    - Partial price indices
- Labor market
    - Average monthly wage
        - Nominal, realistic
    - Wage costs
    - Labor productivity
    - Unemployment rate
    - Share of unemployed
    - Public finance
        - Deficit (GDP / in %)
        - Public debt (GDP / in %)
- External relations
    - Trade balance
    - Balance of services
    - Balance of payments
    - Direct investment
    - Courses
- Money and interest rates
    - M2
    - 2T Repo rate
    - 3M PRIBOR

As one of the main tasks of the Czech National Bank is the price stability, price stability and, above all, deflationary concerns were the main reasons for the initiation of interventions by the Czech National Bank on the foreign exchange market. The secondary objective was also to support the economy slowed down by the economic crisis in 2012, where the growth of the economy slowed down, and even the decline of GDP over previous periods.

6.4. Development and Assessment of Inflation Rate

For the purpose of visual representation of development of inflation rate in Czech Republic was created the following graph. The graph compares the development inflation rate expressed in consumer price index in time. The data series starts in Q1 of 2012.

Graph 1: Inflation rate development



Source: cnb.cz, author‘s presentation

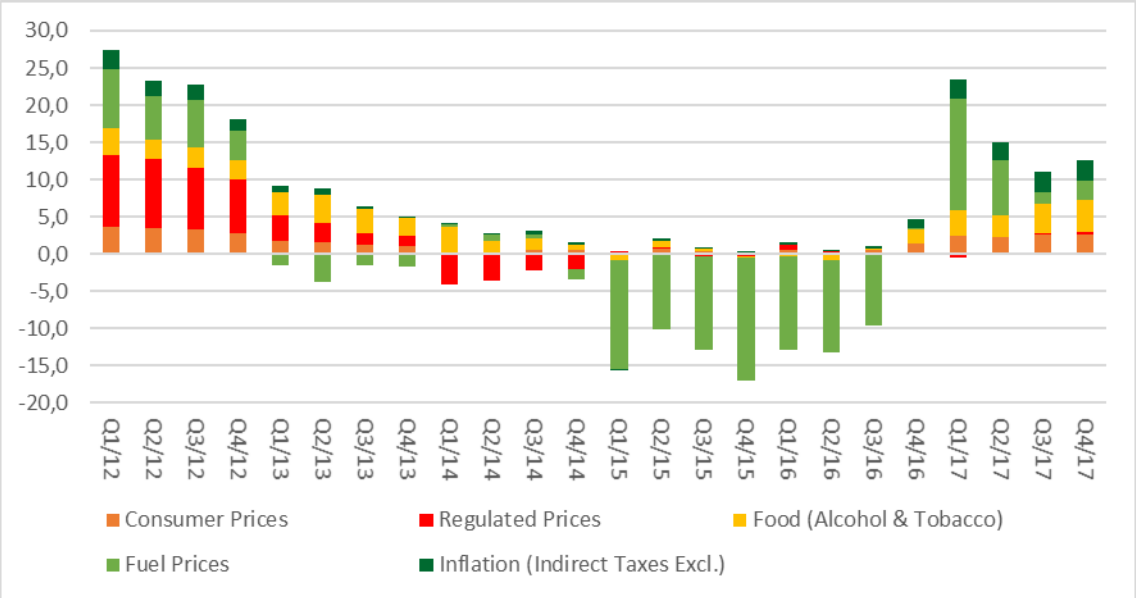
The data time series is represented on the horizontal axis. All together 24 periods from Q1/2012 to Q4/2017 is tracked. The left hand side data on the vertical axis represent the percentage difference in inflation using the CPI – compared to $N_{t\text{-}1year}$. The green line pictures the development if inflation itself. The inflation targeted value of 2% is marked by the red line and the tolerance range of 1% either way is lightly reddened.

By the end of 2012 Czech Republic faced slightly higher inflation rate of 3,2%, respectively 3,3%. These values didn’t mean real thread to the economy compared to the values of the following period of 2013, when deflationary pressures began to fully

threaten the economy and inflation rate and where the Czech National Bank in the last quarter intervened in the foreign exchange market.

In the chart below, we can monitor individual items of the consumer price index and their individual increases or decreases compared to the previous year, expressed as a percentage. From this table, it is easy to deduce the main contributors to inflation or deflation. Consumer prices reflect the change in the price of consumer goods outside of food, fuel and other individually monitored indicators. Regulated prices are the prices of all types of products and services for which the price is regulated by the government. Here, for example, medicines or electricity.

Graph 2: Inflation contributors



Source: cnb.cz, author's presentation

In 2012, we can observe most of the items contributing to rising inflation, but with a more cautious view, it is clear that the impact of these items is gradually decreasing. Primarily, prices of regulated products and services contribute to inflation and also falling oil prices are also largely contributing to this trend. Regulated prices in 2012 grew by 8.6% on average. However, the trend for regulated products was declining - 9.7% in the first quarter and only 7.1% in the fourth quarter. Although oil

prices per barrel did not change on year to year basis, prices for end customers continued to decline.

At the beginning of 2013, the inflation rate began strongly to descent. The inflation rate returned to the targeted range, but the downward trend continued to move further in the coming quarters. Based on the scheme, we can conclude that the steep decline was mainly due to food prices and especially imported food, which increased the purchasing and importing costs due to the koruna's exchange rate and also reflected prices for final consumers. One of the main factors behind the fall in inflation this year was the declining oil prices.

The trend of declining oil prices was also a major contributor to deflation pressures in the upcoming years, but this trend was slightly mitigated by the fact that this commodity is purchased in USD. The USD exchange rate copied the trend of the EUR exchange rate against the Czech koruna, thus avoiding far greater impacts on the overall price level in the Czech Republic.

The decline in inflation continued in the first quarter of 2014 and was gradually slowing down with the end of the year coming. The biggest contributor to the drop in price level were mainly prices of regulated products which, as a group, faced a year-to-year decline in prices. This trend did not get turned even by a typical pro-inflationary group of consumer goods, especially food products, including alcoholic products and tobacco. The declining inflation rate was further strengthened by the reduction of indirect taxes and, above all, the VAT. In the last quarter there was a large contribution to the declining by fuel prices, which dropped by 1.2%, which can be considered a very good result due to the drop in oil prices by 29.5% for the barrel only in the last quarter of 2014.

If it wasn’t for the never-ending decline of fuel prices in 2015, the inflation might have turned up a little sooner. The fuel prices dropped again for almost 13% in 2015 but the prices of raw oil dropped by mesmerizing 46%. If it wasn’t for the fact of weakened exchange rate this would have had much greater impact on the decline of inflation in 2015. The trend held on up until the fourth quarter of 2016 when prices of oil finally began to rise up again.

In 2016 the monetary policy of CNB finally started to show results in regards to the inflation rate. The price of imported goods started rising, followed by food, tobacco and alcoholic products.

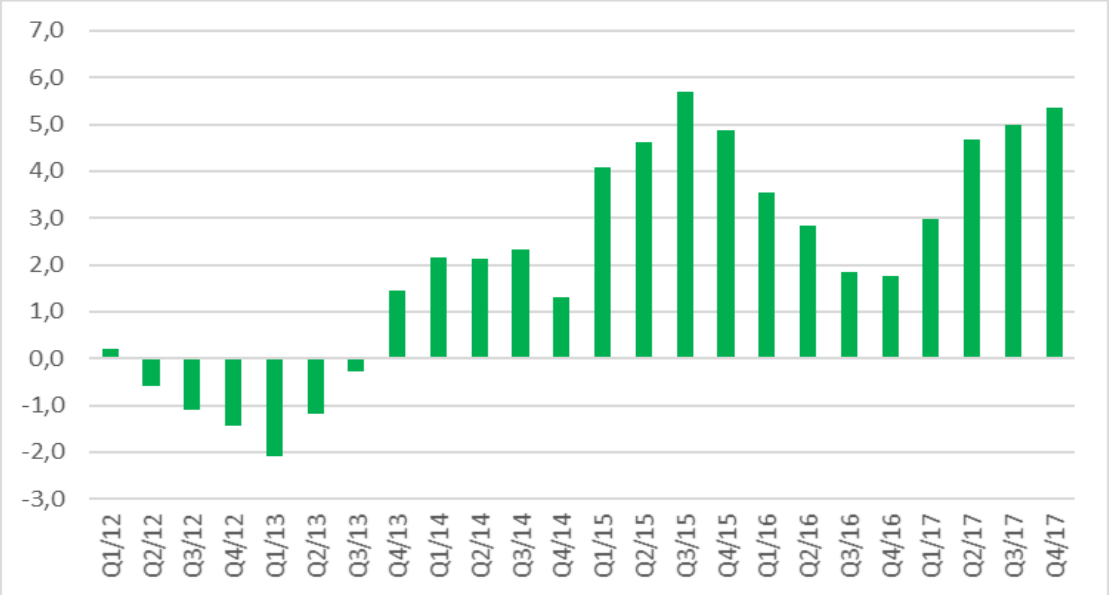
In conclusion to this chapter we can state that among the main factors we can select the dramatically falling prices of crude oil. It is very much certain that without the exchange rate being quite significantly lowered to 27 CZK/EUR, which in certain way mirrored into the exchange rate of CZK/USD being around 24 to 25 throughout the interventions years, Czech Republic would have most likely face deflation in 2015, respectively 2016. It is clearly visible from the graph number 2 that after the Czech National Bank relieved its obligation to keep the exchange rate close or above 27 CZK/EUR, the individual groups of investigated factors had been limited on their influential abilities.

The Czech National Bank expresses the future development of inflation as follows: “Inflation will remain above 2% this year (2018), returning to the level of 2% at the beginning monetary policy horizon. The rise in prices is mainly due to core inflation and food prices. The gradual slowdown in inflation in 2018 will reflect, in particular, the anti-inflationary effect of import prices as a result of the appreciation of the koruna as well as the damping of one-off effects. Domestic inflationary pressures on the labor market, on the other hand, will remain strong. Contribution to regulated price growth will increase this year, but will again drop slightly in 2019, which will lead to inflation slightly below the target in 2019. Monetary-policy inflation, inflation adjusted for the primary impact of changes in indirect taxes, will be almost identical to overall inflation.

6.5. GDP Growth Development Assessment

On the graph bellow we can observe the GDP growth development from the first quarter of 2012 up to the last quarter of 2017. Horizontal axes represent the time over which the values were noted and the vertical axes shows the rise or decline in percentage.

Graph 3: GDP growth in %



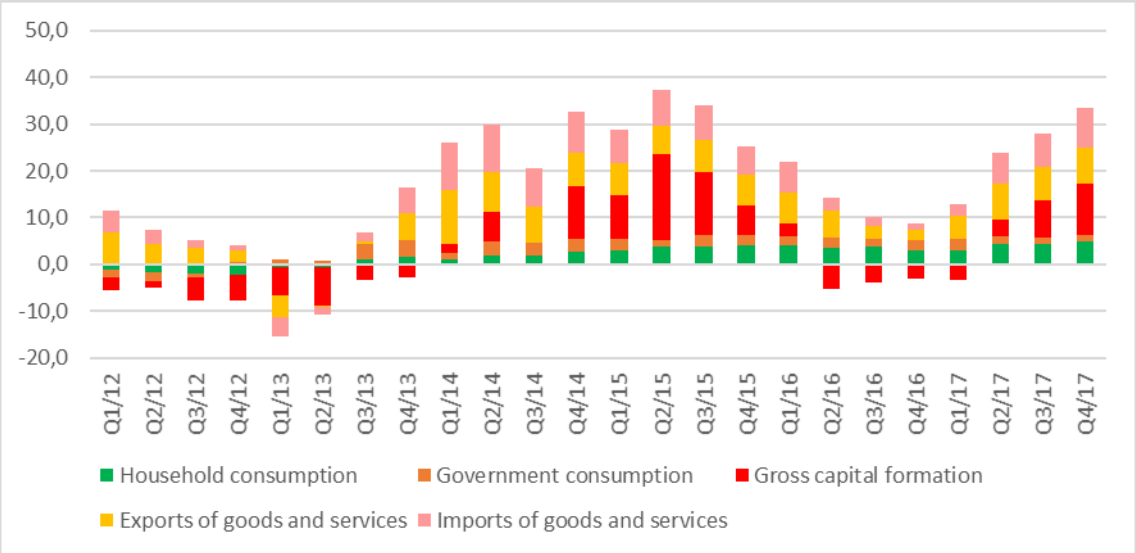
Source: cnb.cz, author's presentation

By the end of 2012 Czech Republic and many other economies faced the peak of minor economic crisis and the overall GDP was steadily declining. Year of 2013 indicated that better times are ahead for the Czech economy. Even though, the first quarter of 2013 might have indicated that the recession could continue the following two quarter showed exactly the opposite trend and by the end of the year the GDP reaches levels of it had before the crisis on the beginning of 2012 – 1,003 trillion CZK per quarter. Since the fourth quarter of 2014, there has been a clear upward trend until the third quarter of 2015, where growth peaked at 5.4% in the period under review. There was only one slowdown there in 2014, specifically in Q4. Here, mainly, gross capital formation fell. Since the beginning of 2015, the trend has been reversed and

GDP growth has gradually slowed down below a year-to-year growth threshold of two percent. This decline was, however, moderate and above all temporary, as with the start of 2017, when CNB interventions were terminated during the first quarter, the growth of gross domestic product again rose and reached close to the five percent growth levels.

In the scheme below we can see individual partial contributors to GDP development in the Czech Republic. Among the researched groups of contributors are household consumption representing all consumption of goods and services by all households; government consumption, which is investment in building government programs and public services, as well as the cost of running the government itself. Another monitored group is capital formation, including the value of free transfers of assets and the acquisition of property by government, corporations and households. Another monitored groups are representing the exports and imports of goods and services.

Graph 4: GDP growth contributors' development in %



Source: cnb.cz, author's presentation

From the beginning of 2012, we can observe a moderate decline in GDP growth with the marginal contribution of the decline in export and import growth. The main causes, however, were year-to-year declines in government investments, total household consumption and, above all, gross capital formation. At the peak of the crisis in 2013,

more precisely in the first quarter, all tracked groups reported a year-to-year decline, excluding government investments. On the contrary, they changed in growth in 2013, but the growth was only very minimal.

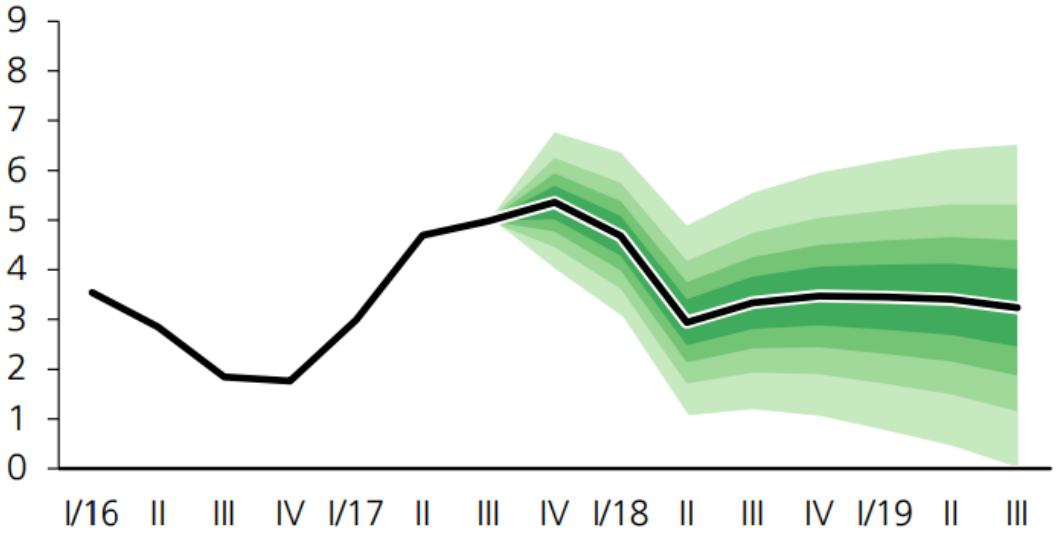
From the end of 2013 and for the whole of 2014 and 2015 we can observe the growth of all monitored groups influencing GDP growth. This marked rise in growth rates can be attributed to monetary policies and can be combined with low interest rates and a weakening of the koruna's exchange rate. It can be observed that fears of falling import value have not been met. Imports in 2014 and 2015 even grew at an average rate of 9%, surpassing average export growth averaging 7.4% over the two years. Export and import were the main factors behind the significant GDP growth. This fact was further supported by a very solid growth through the accumulation of gross capital.

In 2016 we observed a slowdown in GDP growth. The main causes were the end of government-funded EU programs and also the decline in exports. As in previous years, gross capital formation was one of the major contributors to the decline in growth. On the contrary, growth has traditionally been supported mainly by household consumption, government and foreign trade.

In 2017, it is clear that all of the groups of factors under review have already pushed GDP growth upwards, and although the rate of growth did not exceed the 2015 figures, it is a very economically successful period.

If we were to summarize GDP growth during the interventions of the Czech National Bank, we could say that the interventions served as a sort of wake-up call for the growth of the economy or as a starter motor that moved the whole colossus forward. Since the third quarter of 2013, significant GDP growth has been observed, particularly in sub-areas such as exports, consumption and growth in government investment.

Graph 5: GDP growth prediction



Source: cnb.cz[44]

On the graph above from the 2018 inflation report, the green colored spectrum outlines the next possible evolution of GDP growth in 2018 and 2019. Again, the horizontal axis describes the time on quarterly basis and the vertical axis records the percentage increase over the previous year-to-year period.

Further future GDP growth will be driven mainly by a significant increase in household consumption. This may be due to strong wage growth due to good past economic results. At the same time, increased government investment may be expected as a result of withdrawing European subsidies. However, the positive contribution of net exports to GDP growth is due to accelerate import-demanding domestic demand and strengthen the koruna's exchange rate. Monetary conditions will be tightened in both its exchange rate and interest rate components, and will thus counter the overheating of the domestic economy.[45]

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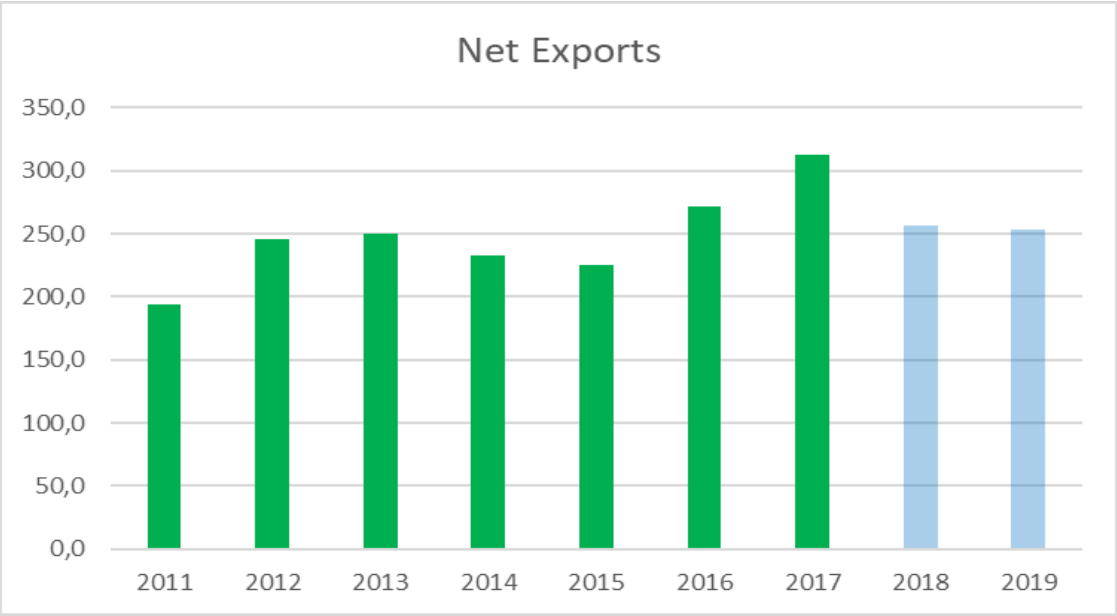
44 https://www.cnb.cz/miranda2/export/sites/www.cnb.cz/cs/menova_politika/zpravy_o_inflaci/2018/2018_I/download/zoi_I_2018.pdf

45 https://www.cnb.cz/miranda2/export/sites/www.cnb.cz/cs/menova_politika/zpravy_o_inflaci/2018/2018_I/download/zoi_I_2018.pdf

The diagram below shows the Czech National Bank's assumption regarding the foreign trade balance for years 18 and 19 in billions of CZK. It can be said that the general assumption was a significant increase and support for exports at the beginning of the intervention regime, assuming that the Czech koruna would be artificially weakened. Export growth rose only slightly more than half a percentage point than the growth for imports of goods and services over the period under review. However, in absolute terms, as it is already traditional for the Czech Republic, export has prevailed quite significantly. After the end of the Czech National Bank's interventions on the foreign exchange market, it is logically expected a slight decline in absolute figures expressed in money, in this example in CZK. Foreign trade will be more thoroughly discussed in the next chapter of this thesis.

Graph 6: Net export development and prediction

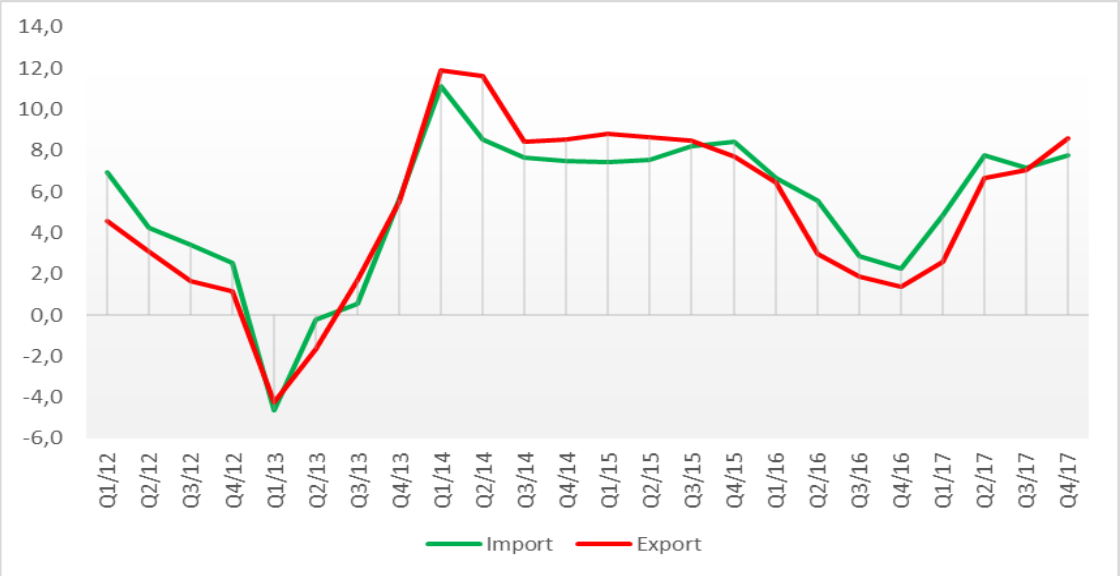


Source: cnb.cz, author's presentation

6.6. Foreign Trade Development

The chart below describes a year-to-year increase or decrease in exports and imports of goods and services between years 2012 and the end of 2017. The time series is broken down quarterly and is represented by the horizontal axis, while the vertical axis indicates the percentage increase or decrease of the values monitored. It is clear from the chart, and the following commentary by the Czech National Bank confirms that foreign that, that trade and its growth rates were mainly the result of the weakened exchange rate of the koruna against the euro and thus fulfilled one of the primary objectives of the foreign exchange market interventions. The web page of the Czech National bank states the following: "The weakening of the exchange rate has contributed significantly to the economic recovery that took place in 2014. In addition to the relaxed monetary policy, the recovery in domestic economic development also contributed to the recovery of foreign demand."[46]

Graph 7: Import vs. export development in %



Source: cnb.cz, author's presentation

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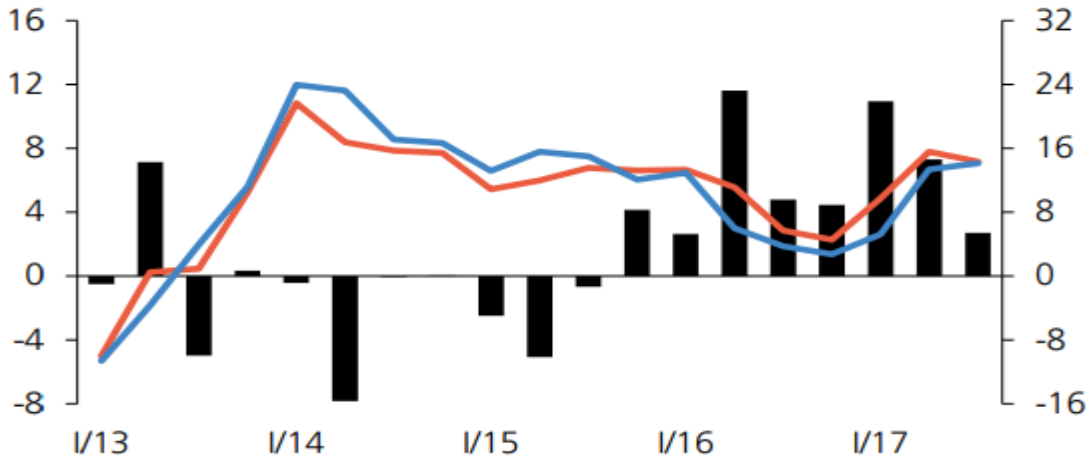
https://www.cnb.cz/cs/menova_politika/zpravy_o_inflaci/2017/2017_II/boxy_a_prilohy/zoi_2017_II_box_1.html

From graph no. 6 at the end of the previous chapter, it is quite clear that although the overall development of net exports in absolute terms decreased in 2014 and 2015, this was mainly due to a higher rate of increase in imports than a rather predicted reduction in exports. Net exports can simply be explained as the simple difference between export and import. Therefore, it is necessary to bear in mind that although the development of import and export is somewhat similar in percentage terms, and the trends of both factors are to some extent replicated, that exports are still very prevalent in the monetary values of the export-oriented Czech economy.

The aim of the Czech National Bank prior to the introduction of the interventions was to support Czech exporters. This was to be ensured by the depreciation of the Czech crown and thus by lowering the price of domestic products for purchasers or consumers paying in a different currency and, above all, the euro, as the EU is the biggest market for Czech products. Although many experts have feared a drop in imports and a rise in prices of imported goods, it is quite easy to find out the causes of the parallel increase in import growth. It is logical to assume that many domestic exporters have foreign suppliers and with increased foreign demand, Czech exporters have to import more raw materials at the same time, and then export the finished product or semi-finished product with the value-added to it abroad again.

Between 2016 and 2017, a faster growth in export performance is seen, which is also reflected in the net exports of a country with record values of more than 272 and 313 billion crowns in these two years.

Graph 8: Dynamics of net export in % and billions of CZK



Source: cnb.cz[47]

Using the chart from the 2018 inflation report, we can see quarterly growth and movements in net exports and its dynamics, as well as the growth of exports and imports. The left vertical axis represents the percentage increase and the right vertical axis is the value in billions of crowns, and at the same time the contribution to GDP growth.

The Czech National Bank commented on this graph as follows: "While exports slowed, the dynamics of imports increased and the positive contribution of net exports to GDP growth has decreased. The slowdown in year-to-year growth in exports followed a slightly faster rise in foreign economic activity. Compared with the first half of last year, export dynamics was lower especially in the automotive industry. A slower rate of export growth in the third quarter may be affected irregularities in production during the summer months. The growing demand for investment assets including inventories has also led to an acceleration in the pace of imports. The contribution of net exports to GDP growth has significantly decreased as a result."[48]

47 https://www.cnb.cz/miranda2/export/sites/www.cnb.cz/cs/menova_politika/zpravy_o_inflaci/2018/2018_I/download/zoi_I_2018.pdf

48 https://www.cnb.cz/miranda2/export/sites/www.cnb.cz/cs/menova_politika/zpravy_o_inflaci/2018/2018_I/download/zoi_I_2018.pdf

Therefore, if we were to summarize foreign trade, we could say that the demand for Czech products abroad grew at a significant rate as well as an increase in total net exports, and the CNB's goal was met in this regard, and the satisfaction of the Bank Board quantified results.

As for the Czech National Bank's forecast for foreign trade, its analysts predict that after the end of the Czech National Bank's interventions there will be faster growth on the import side and although the export growth could be around averaged 7.3% in 2019 and 2020, the total value of net exports will again reach the levels of CZK 250 billion in both years.

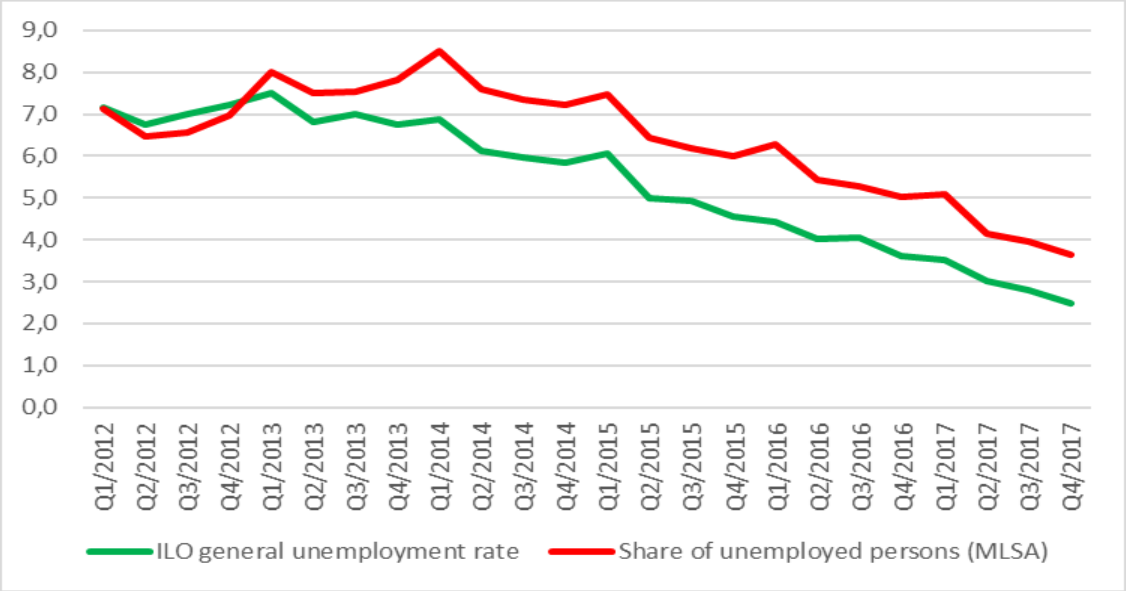
6.7. Labor Market and Employment Figures Development

Another reviewed group of indicators will be labor market indicators and the chapter will focus, above all, on the rate of the unemployed and on wage growth. Both of these factors are very closely linked to the inflation rate and the interest rates the CNB has to predict and modify based on development of this data.

The chart below shows two types of unemployment rate. One value is referred to as the ILO unemployment rate, and the second unemployment rate is counted by the MLSA. The International Labor Organization (ILO) calculates unemployment or the rate of unemployment: "by expressing the number of unemployed people as a percentage of the total number of people in the labor force. The labor force (formerly known as the economically active population) is the sum of the number of persons employed and the number of persons unemployed. Thus, the measurement of the employment rate requires the measurement of both employment and unemployment."[49] While the Ministry of Labor and Social Affairs (MLSA) calculates the proportion of unemployed persons as follows: "The share of unemployed persons represents the share of achievable job seekers aged 15-64 from all the population of the same age."[50]

[49] http://www.ilo.org/ilostat-files/Documents/description_UR_EN.pdf
[50] https://portal.mpsv.cz/sz/stat/nz/zmena_metodiky

Graph 9: Unemployment rates development in %



Source: cnb.cz, author's presentation

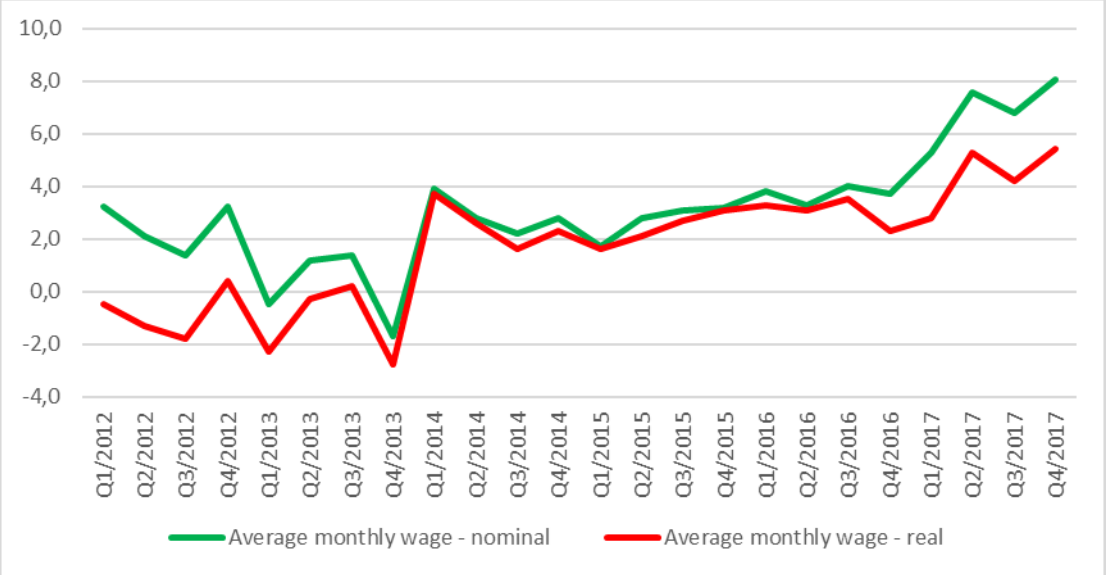
Again, we can see on the horizontal axis the time period between years 2012-2017 and the vertical axis is the percentage of both types of measured unemployment rates. The following comments on the unemployment rate will not distinguish the specific measured rate of unemployment. In both trends, it is clear that they are inaccurately copying each other. And although at some points of observed development these values are different by up to more than 1.5%, for the purposes of this assessment, a more accurate factor is the general development and especially the ascending or descending trend. It is clear from the chart that the global economic crisis in 2012 also increased slightly, respectively stagnated, the level of unemployment. Even though the economy, in terms of GDP, was by the end of 2013 already in the black numbers and rising, it can be observed that this trend was not followed up until late 2014, where it also turned up the have improving trend. The new year's peak, repeating every year, is caused by the termination of a large number of fixed-term job contracts for the calendar year and is for our purposed irrelevant.

The value of the unemployment rate cannot be directly linked to interventions by the Czech National Bank and its monetary policy. It is, however, very feasible through various macroeconomic links, especially with export growth, GDP growth, low interest

rates, wage growth and other factors. At the beginning of 2014, the Czech Republic's economy was already re-established, exporters started to grow and GDP grew significantly. Undoubtedly, the growth was partially caused be the intervention on the FX market. These two factors, coupled with low interest rates, and led the companies operating on the market in the Czech Republic to have higher sales, to invest more and to expand their businesses, and thus to attract more people into employment. As described in the chapters above on GDP and foreign trade, the intervention of the Czech National Bank in the foreign exchange market was mainly influenced by exports by the increase in the demand for domestic goods, which resulted in higher profits and larger investments.

Unemployment rates and their leveling out in 2014 and then an almost consistent decline of around 1% per year, continued until the end of the 2017 reference period. This was mainly due to the fact that the factors that affect the unemployment rate described in the paragraph above were valid and true for the remainder of the reference period. By the end of 2017, unemployment was down to 3.6% (MLSA) and 2.5% (ILO), respectively.

Graph 10: Wages growth in %



Source: cnb.cz, author's presentation

The wage growth factor is inseparably linked to the fall in unemployment rates. The above chart describes the development of nominal and real wages over the projection period. It is interesting to note the link between wage growth and declining unemployment rates. With the dwindling labor force on the market and the unrequited demand for workers, pressure is put on employers who then have to compensate, in wage terms, their demanding potential employees to suppress their competitors. It is, of course, possible to attract potential employees or workers with various benefits. However, the highest pressure is exerted on wage growth, and this pressure is further exacerbated by the wage policy of the government. It can, on the one hand, increase salaries to civil servants in times of economic growth, and on the other hand it can change the laws on minimum wages and, for example, the valorization of pensions. Extensive pressure on wage growth is also being developed by labor unions. Major companies with labor unions are forced to step down for more or less legitimate wage demands because of the company's growing profits - and everyone, understandably, wants their piece of that cake. The growth of wages in large corporations must then also be reflected in smaller competitors, otherwise they would no longer be competitive demanding for workers.

Other interesting thing is the scissors between nominal wage growth and real wage growth. Real wage growth is refined from inflation. Looking at the wage chart and the inflation trend chart, it is easy to see the notional scissors that were closed between 2014 and 3Q/2016 as the inflation rate was almost zero. Until the last quarter of 2016, scissors, along with rising inflation, began to open again. This is a direct link between CNB interventions and growth in real wages, as one of the main objectives of interventions was to face deflationary pressures. Wages would also not grow at such a significant rate if the economy as a whole was not performing well and from the previous chapters it proves that the activities of the Czech National Bank in the foreign exchange market had a crucial share in the monitored years.

6.8. Development of Exchange Rate

In the scheme below, we can see the evolution of the US dollar and the euro compared to the Czech crown. The monitored period marked on the horizontal axis is again from 2012 until the end of 2017. The vertical axis indicates the amount in CZK that is needed to buy one unit denoted by the foreign currency.

In 2012, one euro was worth about 25 crowns (according to CNB's low-volatile quarterly data) and in the course of 2013, or after the Czech National Bank publicly expressed its intentions to intervene in the foreign exchange market, the exchange rate continued to fall towards 26 CZK/EUR. However, spoken intervention on the foreign exchange market was not the only factor.

Immediately after the start of interventions, the koruna's exchange rate against the euro rose above the 27 CZK/EUR threshold. Generally speaking, the exchange rate ranged around 27.5 CZK/EUR until Q1/2015. In this period, the exchange rate was attacking levels as high as 28 CZK/EUR and once, in Q3/2014, this level was even broken and the exchange rate was around 28.3111 CZK/EUR.

Since the breaking of the limit of 28 CZK/EUR, followed a relatively consistent increase in the koruna's value, in July 2015, the 27 CZK/EUR border was broken and the Czech National Bank was again forced to intervene. The further course of the exchange rate was abnormally stable in terms of volatility in the foreign exchange market. However, this can be clearly attributed to the interventions made and the CNB's statements that this commitment would not change in the future.

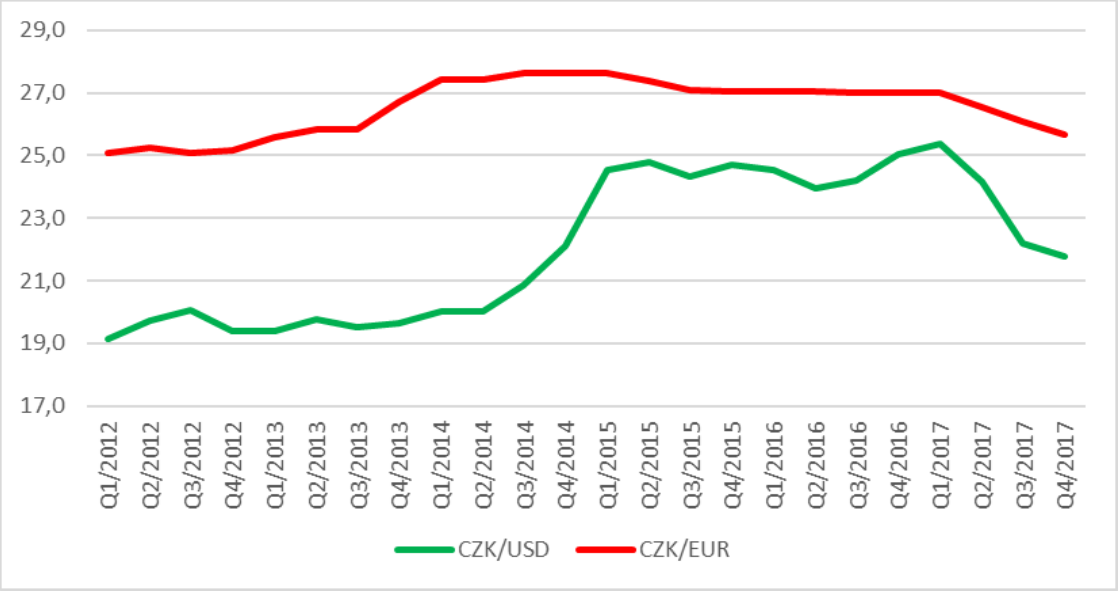
Figure 4: CZK/EUR exchange rate development

Source: xe.com[51]

It is also interesting to follow the development of the Czech crown against the US dollar. In the case of USD, there was no immediate copying of the EUR/CZK currency pair trend, instead the US dollar remained relatively stable for another almost three quarters.

[51] http://www.xe.com/currencycharts/?from=EUR&to=USD&view=5Y

Graph 11: CZK/USD & CZK/EUR exchange rate development



Source: cnb.cz, author's presentation

Then there was a break and the US dollar began to appreciate against the Czech crown. This was both a natural consequence and a side effect of the depreciation of the koruna against the euro and, on the other hand, a visible decline in the EUR/USD pair, which can be seen in the following graph. While the koruna's exchange rate against the euro fell by roughly 8% on average (over 13% when the exchange rate reached 28.3 CZK/EUR) during the interventions, this decrease, in case of CZK/USD was almost 25% against the dollar. Such a decrease was already very dramatic, and Czech importers buying in the US felt this drop in the CZK/USD exchange rate significantly.

Figure 5: EUR/USD exchange rate development

Source: xe.com[52]

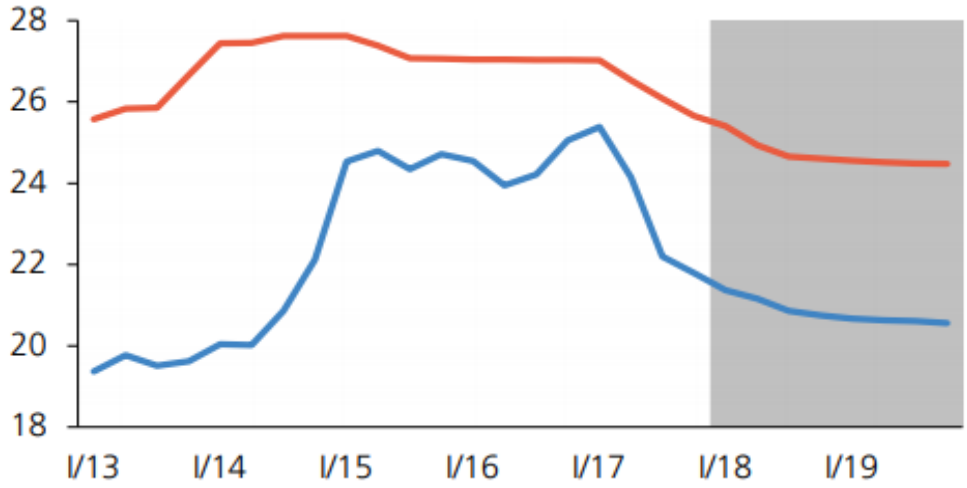
As for the forecasts for the future, the Czech National Bank comments on future developments as follows: "The koruna's exchange rate will be further strengthened by the forecast. The forecast for the first quarter of 2018 expects its further moderate consolidation to average 25.4 CZK/EUR. The projected appreciation of the exchange rate in the course of this year (2018) will be reflected in particular by an increase in the interest rate differential with the euro area and by the ECB's continued purchases of assets by September 2018. In the same direction will continue the real convergence of the Czech economy with the Eurozone countries associated with rising labor productivity. In the next year, the course will strengthen only moderately to around 24.5 CZK/EUR. Also, given this comment, it is obvious that the CZK/USD development will be slightly more pronounced and mainly due to the ECB's monetary policy."[53]

[52] http://www.xe.com/currencycharts/?from=EUR&to=USD&view=10Y

[53] https://www.cnb.cz/miranda2/export/sites/www.cnb.cz/cs/menova_politika/zpravy_o_inflaci/2018/2018_I/download/zoi_I_2018.pdf

Therefore, the US dollar exchange rate against the Czech crown cannot be expected to reach the pre-intervention threshold, as is likely to be the case for a pair of CZK/EUR.

Graph 12: CZK/EUR (red) & CZK/USD (blue) exchange rate prediction



Source:cnb.cz[54]

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https://www.cnb.cz/miranda2/export/sites/www.cnb.cz/cs/menova_politika/zpravy_o_inflaci/2018/2018_I/download/zoi_I_2018.pdf

7. Overall Assessment of Interventions' Influence on Economic Indicators

The evaluation of the main monitored indicators is generally positive. If we take it as a of sequence how the individual indicators have been evaluated separately, inflation can be seen returning to the inflation zone and even overcoming the level of 2%. The prerequisite for the Czech National Bank is that inflation will not leave the inflation target zone in the future and its values will in the future remain more stagnant. In its inflation report, the CNB comments on it: "Inflation will remain above 2% this year (2018), returning to the monetary policy required levels at the beginning of the monetary policy horizon. The rise in prices is mainly due to core inflation and food prices. The gradual slowdown in inflation in 2018 will reflect in particular the anti-inflationary effect of import prices as a result of the appreciation of the koruna. Domestic inflationary pressures on the labor market, on the other hand, will remain strong. Contribution to regulated price growth will increase this year, but it will drop again slightly in 2019, which will lead to inflation falling slightly below the target in 2019."[55] This claim can be considered a very good and positive estimate for future years.

In terms of GDP, the intervention period was also very successful. GDP grew at a fast but still healthy pace. The main contributors were mainly gross capital formation as well as export, but above all increased households' consumption. Future growth is most likely between 2% and 3% per year for the duration of the 2-year prediction as predicted in the inflation report of Q1/2018.

Although foreign trade was more likely to have a more dynamic development on the export side, import did not lag anyway. The values of the trend have not differed fundamentally, yet net exports have reached an average of around 250 billion crowns per year. However, this figure will logically decrease with the return of the CZK/EUR exchange rate to the market rate. However, the objective was not to continuously increase net export values, but only to support exporters in the short term by artificially

55 https://www.cnb.cz/miranda2/export/sites/www.cnb.cz/cs/menova_politika/zpravy_o_inflaci/2018/2018_I/download/zoi_I_2018.pdf

lowering the prices of their products, thereby supporting economic development and growth, and this objective was achieved on the basis of the indicators under review.

Also, we have witnessed improvements in the labor market. Unemployment has fallen at a steady pace since the beginning of 2014 and is now on the brink of its potential. Many experts argue that further reduction of unemployment is not possible or even undesirable from the point of view of the health of the labor market. Wages also grew at a very significant pace, and in mid-2016 their growth slowed down due to rising inflation. Despite this fact, real wages rose at a pace close to 4,5% in recent years 2016 and 2017.

Exchange rate development was more a tool than a cause but as to future development, it is assumed that the CZK/EUR exchange rate returns over the course of two years to the 24.5 CZK/EUR threshold which is close to the market exchange rate before the interventions begin. This will also make imported goods and services cheaper in the upcoming months.

Further evidence of the achievement of the objectives of the interventions could be the appreciation of Central Bank Governor Jiri Rusnok, who was awarded by the GlobalMarkets Magazine (Official Journal of the Annual Meeting of the International Monetary Fund and the World Bank) as the best governor for Central and Eastern Europe for the smooth ending of interventions in 2017 also by The Banker magazine as Best Governor of the National Bank for Europe in 2018.

8. Conclusion

The main aim of this work was to analyze the development, consequences and impacts of the monetary policy of the Czech National Bank, especially in terms of interventions in the foreign exchange market. As a means of their evaluation, the basic macroeconomic indicators were selected, which were subsequently analyzed and evaluated and their interconnectedness and continuity were explained.

The introduction of this paper, its initial chapters, were devoted to the role of the Czech National Bank, its purpose and objectives. It was stated that the main objective of the Czech National Bank is above all the price stability and also the support of economic growth through the described tools of the Czech National Bank. Support for economic growth is only a secondary, but no less important, goal that the CNB can do only if it does not conflict with the primary objective of price stability. A prerequisite, as for most institutions in democratic countries, is the independence of the bank from the government, its representatives, and resilience from any influence of the private sphere or from abroad.

The role of the Czech National Bank was followed by instruments that are used to implement monetary policy. These tools were divided into three groups - direct, mixed and indirect. For the purpose of this work, the last group of instruments, which also includes interventions on the foreign exchange market, was particularly important.

The transmission mechanisms have been described in the following chapter. This theme deals primarily with the interconnection of monetary instruments and their subsequent effect on the economy. All the processes that occur between these two concepts are referred to as transmission mechanisms. We have named three basic types of transmission mechanisms - monetary, interest rate mechanism and exchange rate mechanism. This is key to the topic of this work and describes how the desired goal can be achieved, particularly in terms of inflation and deflation, through influencing the koruna's exchange rate against foreign currencies, either directly or indirectly.

The theoretical part also deals with monetary policy regimes. The monetary policy regimes basically describe the processes and objectives that are crucial to the Czech National Bank. Since 1998, it has been the inflation targeting monetary policy

regime. The main objective of this regime is to influence the rate of inflation around the required or tolerated levels. The current targeting point is 2% with a tolerance band of 1% in both directions. This zone is generally and globally considered the healthiest set of values. The basic prerequisite for the proper implementation of monetary policy is the correct prediction of the development of individual macroeconomic indicators as well as of the world events outside the Czech Republic. The CNB also regularly issues inflation reports for the purposes of more detailed evaluation and for public informative purposes. These quarterly reports contain a large amount of data with related issues and also contain future bank board predictions and may therefore indicate the future monetary policy of the bank.

As the work touches on the theme of the future development prediction, there has to be a mention of the time lag in the different phases of the recognition and application of monetary policy. Three types of delays were described in the thesis, and also the important term of the so-called monetary policy horizon was explained.

A large part of the theoretical part of the thesis took up chapters devoted to inflation and deflation. First, the concept of inflation itself was explained and the subchapters devoted to the different types of inflation calculations as well as to the subsequent costs and potential impacts on the economy and the population. Deflation has also been described in connection with this topic. This topic was given a disproportionate amount of space in the theoretical part, mainly because deflationary pressures were the main reason for the Czech National Bank to start interventions in the FX market in November 2013. This chapter, among other things, analyzed and distinguished between deflation types - the positive and the negative, described in depth the deflationary spiral, which is a very unwanted, long-lasting and costly phenomenon for all participants in the economy. It is quite obvious that deflation has many consequences, especially in terms of monetary policy and, above all, interest rates. The last sentences of the previous conjecture may be equally well placed on the contrary. Interest rates and monetary policy have a fundamental effect on deflation or inflation. This chapter also dealt with specific theoretical impacts on factors such as wages, the unemployment problem or the real profits of companies and firms.

The situation of the Czech economy was not in good shape before the interventions of the Czech National Bank. At the end of 2012 and the beginning of

2013, the economic crisis culminated, and the Czech National Bank tried to stimulate the economy by reducing interest rates to technical zero. However, this was not enough and less common tools were needed. The CNB chose the interventions on the FX market and launched its first purchases on November 7, 2013. By April 6, 2017, the Czech National Bank spent a total of 2,049 billion crowns for the purchase of euros. It was already clear during the interventions that this tool would be functional and most of the concerns were proved to be unjustified.

Interventions can be considered successful in all monitored sectors of the economy, with the help of evaluation of selected macroeconomic indicators. Inflation was finally rising at the end of 2016, but the CNB's projections spoke of inflation growth in the earlier period. This, of course, was caused only by the unpredictable development of fuel prices. After the arrival of 2017, it turned out that this trend was not short-termed or isolated, so CNB abandonment this tool of monetary policy and intervention had ended.

It is also clear that intervention, the depreciation of the crown, helped to trigger the economy’s growth of through favoring exporters and supporting domestic demand which was at long-term low at that time. Although the dynamics of foreign trade did not reach the intensity as expected, however, there was a significant growth in both export and imports. Although total foreign exports reached record values, it is expected to decline in 2018 due to a return to the koruna's market exchange rate against the euro.

Higher domestic and foreign demand has led to larger domestic sales of companies and therefore they have been able to further invest in expanding production and have begun to demand more labor, more workers. This trend has also been positively reflected in the labor market, where unemployment has fallen sharply to current levels where there is only the very low potential for further decline.

The CNB also raised interest rates in the third quarter of 2017 to avoid overheating the economy and, on the contrary, to curb inflationary pressures. The initial increase was 0.25% and then 0.5% in the fourth quarter.

This assessment confirms the original idea and the main hypothesis of this work and that the Czech National Bank's intervention in the foreign exchange market has had a positive influence on the development and growth of the economy in the Czech Republic.

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