Charles University in Prague

Faculty of Social Sciences
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MASTER'S THESIS

Deflation and the Czechoslovak experience

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Declaration of Authorship

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

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Prague, July 28, 2016

Signature

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Abstract

This thesis focuses on the term deflation, i.e., a decline in the price level in the economy, from a theoretical point of view, as well as empirically by an analysis of two deflationary periods in interwar Czechoslovakia. The first part focuses on theoretical concepts concerning the decline in price level. Deflation, currently a frequently discussed topic, can be distinguished as deflation caused by a negative demand shock and by a positive supply shock. Based on this distinction, a group of contemporary economists distinguishes between "good" and "bad" deflation. In contrast to this concept, the other group of economists consider deflation only as a negative phenomenon, even though deflation is caused by a positive shock.

The second part of this thesis analyzes two deflationary eras in the 1920's and 1930's in Czechoslovakia. The first deflation was induced by interventions on the foreign exchange market in order to reduce the price level and stabilize the currency. In contrast, the second deflationary period was associated with the Great Depression, i.e., with an external factor. The third part analyzes Czechoslovak interwar time series using Spearman's and Pearson's correlation.

Keywords deflation, inflation, Czechoslovakia, interwar period

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Abstrakt

Tato práce se soustředí na problematiku deflace, tedy na pokles cenové hladiny v ekonomice, a to jak z teoretického hlediska, tak na příkladu dvou deflačních období v meziválečném Československu. První část práce se soustředí na teoretické pojetí poklesu cenové hladiny. Deflace, v současné době velmi diskutované téma, se rozděluje na deflaci vyvolanou negativním poptávkovým šokem a deflaci vyvolanou pozitivním nabídkovým šokem. Na základě tohoto rozdělení část současných ekonomů rozlišuje "dobrou" a "špatnou" deflaci. Oproti tomu se vymezuje druhá skupina ekonomů, kteří považují deflaci za negativní jev a to i v případě deflace vyvolané pozitivním šokem.

Druhá část práce pojednává o dvou deflačních obdobích ve 20. a 30. letech 20. století v Československu. První deflace vyvolaná intervencemi na devi-

zovém trhu si kladla za úkol snížit cenovou hladinu a stabilizovat měnu. Oproti tomu druhé deflační období bylo spojeno s Velkou hospodářskou krizí, tedy s externím faktorem. Třetí část analyzuje časové řady proměnných z meziválečného Československa a to pomocí Spearmanova a Pearsonova korelačních koeficientů.

Klíčováová slova deflace, inflace, Československo, meziválečné období

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Acronyms

AD	Aggregate demand
AS	Aggregate supply
BoJ	Bank of Japan
CNB	Czech National Bank
CPI	Consumer Price Index
ECB	European Central Bank
FED	Federal Reserve System
Frs	Swiss franc
HICP	Harmonised Index of Consumer Prices
IMF	International Monetary Fund
IS	Investment-saving
LM	Liquidity preference-money supply
ZLB	Zero lower bound

Master's Thesis Proposal

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Proposed topic	Deflation and the Czechoslovak experience

Motivation

Deflation is traditionally viewed as very dangerous and unpleasant economic feature. Currently, this topic is discussed not even in connection with Japanese economy but also with strong economies as Germany. Extensive discussion about deflation also did not avoid the euro area, including Germany and the Czech Republic.

Economic situation in the Czech Republic after 2012 exhibited disinflation and the analysis of the Czech National Bank indicated that in early 2014 inflation would turn into negative numbers. The Czech National Bank used the exchange rate as an unconventional monetary policy instrument to avoid with this adverse scenario.

To investigate potential costs of deflation in the Czech Republic, this thesis will use historical episodes which may be seen as similar to current situation: Czechoslovakia in 1930-1936 i.e. years after the Great Depression, in times of disinflation and when government decided to devalue Czech national currency.

Expected contribution of this thesis will be explaining the deflation in general, what are the problems, benefits, costs and consequences. Also this thesis will investigate the costs of deflation in 1930's and reaction of the market on deflation of Koruna in 1934.

Hypotheses Hypothesis #1: There is a significant impact of devaluation of Koruna in 1930's in Czechoslovakia on price growth

Hypothesis #2: There is a strong correlation between output growth development and goods and services prices development

Methodology

This thesis has two interconnected motivations. First, thesis is will shed light on the problems connected to deflation and state the reason why national banks in general target low but positive inflation usually at the 2% level. Second, thesis should investigate costs of deflation in the context of the Czechoslovakia during the Great Depression.

Thus the second, empirical section, will mainly use data from (printed) statistical yearbooks for examined years (listed in the section Core Bibliography) to investigate connection of price growth with main economic indicators. The study will be focused on time series in the case of Czechoslovak data and on panel data in the case of comparison of Czechoslovak data with data of selected countries.

Expected Contribution

Expected contribution of this thesis will be explaining the deflation in general, what are the problems, benefits, costs and consequences. Also this thesis will investigate the costs of deflation in 1930's and reaction of the market on deflation of Koruna in 1934.

Outline

1. Theory
   - **(a)** Traditional approach to deflation
   - **(b)** Current debate about costs of deflation
2. Case study: Czechoslovak deflation and devaluation of Koruna
   - **(a)** Historical background
   - **(b)** Data description
   - **(c)** Comparison with other historical episodes
   - **(d)** Cost of Deflation model
   - **(e)** Evaluation of results
3. Conclusion

Core bibliography

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Chapter 1

Introduction

Deflation, the opposite of inflation, is a term generally associated with economic crisis and unemployment. Currently perceived as one of the reasons for slow economic growth in recent years, the threat of deflation is present in developed economies including the United States, Germany, Japan and the Czech Republic. Excluding Japan, which has been experiencing deflation since the 1990's, the occurrence of deflation has been very limited over the last fifty years.

Despite the fact that deflation has been a much discussed phenomenon in recent years, there is little theoretical background available in mainstream economics. In order to uncover the causes and consequences, one has to go back to at least the interwar period (or earlier) when countries regularly faced decreasing price levels.

This thesis has two main objectives. The first one is to theoretically describe deflation in the context of available historical data since the 19^{th} century and to further elaborate on the perception of contemporary mainstream economic theory.

The second objective is to describe the deflationary era in Czechoslovakia during the 1920's and 1930's. This time period was chosen due to the similarities when compared to the current economic situation in the Czech Republic. Since the Czech economy is recovering from the most recent worldwide economic crisis, there might be a resemblance seen between Czechoslovakia during the interwar period and the current status of the Czech economy. Therefore, the main objective of this thesis is to firstly describe the deflation in general and consequently to thoroughly analyze the deflationary pressures in Czechoslovakia.

By all means, there are indeed differences in the economic environment in

the Czech Republic of today and the situation from almost a hundred years ago in Czechoslovakia. However, some analogies may be seen between the two such as unfavorable external factors and similar monetary tools used to influence price levels. These similarities could help us better understand current deflationary pressure. The historical record provides data on how to study the behavior of Czechoslovak economy in the presence of falling price level.

The rest of this thesis has the following structure: Chapter 2 introduces theory regarding deflation, historical occurrence of deflation and two main contemporary theoretical approaches with respect to deflation; Chapter 3 provides a brief history of interwar Czechoslovakia with special attention paid to the monetary situation. In detail, it focuses on deflation during the discussed time period and how it affected industrial and agricultural production, international trade and the social situation; Chapter 4 is devoted to correlation analysis of selected time series; and Chapter 5 offers a conclusion.

Chapter 2

Deflation: Theoretical Background

The attention of policymakers and economic agents in general has been traditionally paid to inflation, i.e., a rise in general price level. In contrast to that, deflation has been defined simply as negation of inflation and the attention paid to this phenomenon has been very limited. The reason for this is simple, deflation is relatively rare in modern history (see timeline of deflations since 1870 in Figure 2.1).

The purpose of this chapter is to theoretically describe deflation in three different ways. Section 2.1 concerns the definition and consequences of deflation; Section 2.2 briefly describes occurrences of deflation and how the real economy reacted to a change in price level; and Section 2.3 summarizes the two main contemporary theoretical approaches for dealing with deflation.

2.1 Definition, Consequences and Measurement

Definition

The study of price changes includes three main terms: Inflation, Disinflation, and Deflation. Mankiw (2003) defines them as follows:

- The inflation rate is a measure of the percentage change in the average level of prices from the year before. Inflation as such is a situation when the inflation rate is above zero, and therefore, prices are rising.
- Deflation occurs when the growth rate is below zero, and thus, prices are falling.

- If the inflation rate declines but remains positive, causing prices to rise but at a slower rate, the situation is called disinflation.

Some definitions also include a time horizon for how long prices have to decline in order to constitute deflation. Kumar *et al.* (2003) specifies a period of at least two quarters, International Monetary Fund (1999) identifies deflation only if price level decreases for at least two consecutive years[1].

The importance of price level analysis is based on the belief that the economy performs best under low inflation[2]. This idea is reflected in the main objectives of the monetary policies of today's advanced economies. As a review, the main objectives of the Federal Reserve System (FED) and the European Central Bank (ECB) will be described, as well as the objectives of the Czech National Bank (CNB), due to the fact that the second part of this thesis describes the Czech, resp. Czechoslovakian economy.

The FED, representing the economy of the United States, operates under a dual mandate[3]: it focuses on full employment, price stability, and moderate long-term interest rates. These goals were prescribed in a 1977 amendment to the Federal Reserve Act. For the ECB, representing the economies of the European Union, the primary goal is to maintain price stability[4]. The monetary policy of the ECB clearly states that deflation is not in accordance with price stability "...not only inflation above 2% but also deflation, i.e. a self-sustaining fall in the broad price index, is inconsistent with price stability" (European Central Bank 2001). In addition, the Czech National Bank (CNB) has operated within an inflation targeting regime since 1998. The inflation target is set at 2%, effective since 2010.

[1]Definition in International Monetary Fund (1999) is from a study of data on price and output growth between the years 1882-1939.

[2]Most advanced economies currently target inflation of 2% or 2% within a narrow range of ±1% (Lavigne *et al.* 2012). The target is set on the level of 2% in order to account for approximately 1 percentage point of measurement bias (for more information see Section 2.1) and 1 percentage point in order to decrease the risk of the inflation rate reaching zero and risking deflation (Holub 2016). More, an inflation target of 2% has gained credibility and is perceived as a stable and achievable objective (Kryvtsov *et al.* 2015). For example European Central Bank (2016a) states the following benefits of price stability defined as a year-on-year increase in HICP of below but close to 2%: it makes the monetary policy more transparent; provides a clear and measurable yardstick against which European citizens can hold the ECB accountable; and provides guidance to the public for forming expectations of future price developments.

[3]For more information see, for instance, Steelman *et al.* (2011).

[4]See for example European Central Bank (2001), European Central Bank (2016c) website.

As stated above, low inflation brings benefits. There is a general belief that an economy with a high inflation rate or in deflation performs sub-optimally. Deflation is also generally considered to be costly, moreover when is unforeseen. As this thesis concerns deflation, the following section details the costs associated with occurrences of deflation.

According to Bordo & Filardo (2005), deflation reduces the efficiency of monetary policy in three ways. First, central banks are not used to operating under deflation. This means that central banks have difficulties with interpretating economic developments and monetary transmission mechanisms in comparison to low inflation environments. Communication with the public about monetary policy and future intentions is more challenging as inflation expectations may directly affect the ability to form expectations about future economic development. Second, the zero lower bound on interest rates disables central banks from adjusting short term interest rates to pursue their inflation and output goals. Finally, Bordo & Filardo (2005) states that central banks may have problems with conducting countercyclical monetary policy. Deflation and expectations could form a liquidity trap where the central bank would be left without any policy for stimulating the aggregate demand.

Price level stability or Zero inflation

The risk of deflation raises the concerns of policymakers and economic agents in general for several reasons. The reasoning is divided into three main arguments: arguments in favor of price level stability or zero inflation, arguments against deflation and arguments against prolonged deflation.

Bagus (2015) provides five basic arguments of economists who promote price level stability or zero inflation. First, when price level changes are unanticipated, an economy might suffer from (unjust) redistribution of wealth. Second, price level volatility has a negative impact on companies and entrepreneurs. Third, price level stability would minimize "menu costs". Fourth, price level stability reduces uncertainty for economic agents. And, Bagus (2015), last argument points out the danger of monetary misconception. Overall, price level stability economists emphasize the possibility of "money illusion" when prices are volatile and economic agents tend to think in nominal rather than real terms[5].

[5]For more information about money illusion, see Shafir *et al.* (1997).

Arguments against deflation

Anther theory held by groups of economists points out the risks associated with deflation. The modern theory of deflation begins with Irving Fisher and John Maynard Keynes. Fisher (1933) discussed deflation and its consequences in his famous work *The Debt-Deflation Theory of Great Depressions*. He states that "... two economic maladies, the debt disease [over-indebtedness] and the price-level disease [deflation], are, in the great booms and depressions, more important causes than all others put together". According to this belief, over-indebtedness will tend to liquidation and will lead to a chain of nine following consequences:

1. Debt liquidation → Distress selling
2. Contraction of deposit currency
3. A fall in the level of prices
4. A still greater fall in the net worths of business
5. A fall in profits
6. A reduction in output, trade and in employment
7. Pessimism and loss of confidence
8. Hoarding and slowing down still more the velocity of circulation
9. Complicated disturbances in the rates of interest

(Fisher 1933).

To summarize Fisher's main idea, debt-financed innovations create a boom which is followed by a recession that can turn into a depression through an unstable interaction between excessive real debt burdens and deflation. Fisher's work concerns the propagation mechanism and how the initial shock is transmitted through the economy (King 1994).

The second influential economist concerning deflation in the first half of the 20^{th} century was John Maynard Keynes who collected argumentation concerning deflation and, later on, stated the liquidity trap argument. The arguments against deflation are, therefore, based on his work. Keynes (as cited in Bagus (2015)), repeats the argument of price level stability economists, the wealth

redistribution argument. He regards the injustice of redistribution during deflation as a transfer of wealth to the rentier class, a transfer from "active" borrowers such as traders, farmers, and manufacturers to "inactive" lenders who only collect interest. Due to that, an economy in deflation is gets less active or less productive. Moreover, Keynes is highly aware that deflation is disadvantageous to a highly indebted government or to big companies with influence on a country's politics. This might be another reason why deflation occurs less frequently.

Based on Keynes' writings, an expectation of deflation restricts production in two ways. Firstly, deflation increases the real interest rate and the debt must be repaid with money with higher purchasing power. The other argument points out the consequence of the length of production because inputs are bought at higher prices and products sold at new, lower prices. Thus, even though the deflation is anticipated, production would be hampered (Bagus 2015).

Keynes (1931) in *Essays in persuasion* argues that "... a decline in money values so severe as that which we are now experiencing threatens the solidity of the whole financial structure."

Keynes' argument that constitutes the liquidity trap is based on the situation where monetary policy faces falling prices and can not stimulate the economy by pumping money into the system. Economic agents do not sufficiently respond to the nominal interest rate close to zero by borrowing more money, but instead hoard money and do not invest it into production (Bagus 2015).

Arguments against prolonged deflation

In addition to arguments against deflation, Svensson (2003) in his influential work *Escaping from a liquidity trap and deflation: The foolproof way and others* states the negative consequences of deflation when the monetary policy reaches the zero lower bound for interest rates. He describes the *liquidity trap* situation where the economy is saturated with liquidity and further provision of liquidity has no effect on the price level of production (for more information about the liquidity trap see Section 2.4).

Svenson states the following negative consequences of prolonged deflation combined with a liquidity trap. First, the real value of nominal debt rises which

may cause bankruptcies of companies and households. The second consequence is the fall in asset prices which causes financial instability due to a decrease in the value of the collateral. And the last, a rise in unemployment due to downward wage rigidity. During deflation, real wages do not fall but increase instead and thus putting pressure on employers.

All the consequences stated above might further contribute to a fall in aggregate demand, leading to a further fall in the price level, a further increase in the real interest rate and thus turn an economy into a deflationary spiral. Based on this argumentation, Svensson (2003) call a prolonged recession or a deflationary spiral as a *"central banker's nightmare"*.

Measurement bias

When analyzing the inflation rate, one has to take into account the measurement bias. Inflation is usually measured by the Consumer Price Index (CPI) or GDP deflator. Both indices do not perfectly anticipate changes in the price level. There are four main sources of measurement bias. The first source of bias is based on the type of index: almost all countries use "Laspeyres"[6] type of index which does not allow for changes in prices of goods and services to affect the quantity purchased, i.e., does not allow for substitution in the two periods. Therefore, this type of index overstates the inflation level. The second source of bias is the inadequately reflected impact of sales and discount outlets. The third one refers to new products, which were not included in the previous period. The last type is quality change bias that, unlike other biases, might be negative (Kumar *et al.* 2003), (Rossiter 2005).

The resulting measurement bias overstates the inflation rate by 0.5% to 1% (Kumar *et al.* 2003), (Rossiter 2005)[7]. Therefore, there is a wider range, where we can find "real" inflation, respectively deflation. The measurement bias is one of the reasons why inflation targeting central banks do not target zero in-

[6]Laspeyres index is "base-weighted" as the price increases are weighted by the quantities in the base period: $L_t = \frac{\sum_{i=1}^{n} p_{it} q_{i0}}{\sum_{i=1}^{n} p_{i0} q_{i0}}$ where p and q stands for price and quantity, $i0$ refers to the base year value for goods, and i and t refer to current year.

[7]Rossiter (2005) estimated that the Canadian CPI bias has a mean of 0.58% per year, with the upper limit of 0.75%. Kryvtsov (2013) recently computed the quality bias in Canadian CPI close to zero. Kryvtsov (2013) considered quality bias as the most important source of bias and therefore concluded that total measurement bias in Canadian CPI is close to zero. Lebow & Rudd (2003) estimated the bias of the US CPI by 0.9%.

flation[8]. Therefore, an inflation rate of 1% or less may reflect declining prices (Kumar *et al.* 2003).

2.2 History of Deflation

When analyzing the causes and consequences of deflation in the second half of the 20^{th} and the first years of the 21^{st} century, one is left only with a very limited historical record. Besides the deflationary era in Japan since the mid-1990's, there has been only a few sustained eras of falling price level. Thus, it is necessary to consider deflationary eras even before World War II and deflationary eras in the 19^{th} century.

19^{th} century

In comparison to the 20^{th} century, deflation was not uncommon in the 19^{th} century (see Table 2.1 and Figure 2.1). Periods of inflation and deflation changed frequently due to shocks including military conflicts, years of poor harvest or constraints imposed by the classical gold standard. The gold standard as commodity based monetary regime in comparison to fiat money combined both advantages and disadvantages. Gold, as a rare commodity, had (and still has) a limited supply, thus not being able to flexibly respond to changes in demand or supply. Moreover, gold discoveries abruptly changed the amount of gold in circulation and thus caused significant external shocks to economies. On the other hand, the gold standard provided a credible nominal anchor in shaping the private sector expectations about price level. Given the global nature of the gold standard, prices in different countries were tied together which provided a self-correcting system for deviations in one country's price level. Thus, the uncertainty about future price level was low (Kumar *et al.* 2003), (Bordo & Filardo 2005).

The first deflationary era described in Bordo & Filardo (2005) took place between the years 1837 and 1843. Bordo & Filardo (2005) refers this episode as "bad"[9] since it was associated with financial crisis in London, the United States and continental Europe during 1837. On the other hand, the episode from 1873 to 1896 Bordo & Filardo (2005) interprets as "good deflation". The

[8]See for example European Central Bank (2001).

[9]For a distinction between "good" and "bad" deflation, see Section 2.3.

fall in price level by about 2% was accompanied by economic growth of about 2-3%. Deflation was driven by a productivity growth connected to the "second industrial revolution" dated between 1870 and 1914. Even though this deflation is considered to be good, by its nature it caused redistribution of income, a fall in real income, a rise in the debt burden as well as an increased number of bankruptcies and financial crises. This led to social and political unrest followed by the creation of labor unions and labor political parties (Kumar *et al.* 2003), (Bordo & Filardo 2005).

When analyzing deflationary eras in the 19^{th} century, the GDP growth was, on average, positive, but still lower than during inflationary eras. In comparison to deflationary eras in the 20^{th} and 21^{st} centuries, the financial intermediation was not as important and the nominal rigidities were less entrenched (Kumar *et al.* 2003). In addition to studying deflation in this time period, one needs to have in mind that data from the 19^{th} and the beginning of the 20^{th} centuries on price level may be subject to some questions about their accuracy.

Table 2.1: Goods and services price deflations: an overview

	Full sample	Classical gold standard	Interwar			Great Depression	Postwar
	1870 - 2013	1870 - 1913	1920 - 1938	1920 - 1929	1929 - 1938	1930 - 1933	1947 - 2013
Number of years							
Inflation	3024	368	282	130	152	16	2374
Deflation	663	294	240	100	140	99	129
All deflations							
Average duration (years)	2.2	2.1	2.9	2.2	3	3	1.5
Average rate (%)	-3.9	-3.8	-5.0	-5.8	-4.5	-5.4	-1.9
Persistent deflations[1]							
Number	66	33	29	22	26	26	4
Average duration (years)	7.4	6.8	8.5	5.7	4.8	3.3	4.7
Average rate (%)	-3.0	-2.5	-4.0	-3.8	-4.1	-5.1	-0.6
Countries in sample	38	20	32	29	32	32	38

The sample consist of 38 economies, for years 1870-2013, annual data.
[1] Persistent deflations identified as periods following price peaks associated with a turning point in the five-year moving average and peak levels exceeding price index levels in the preceding and subsequent five years. Troughs identified as lowest price index readings after the peak.

Source: Borio *et al.* (2015)

Figure 2.1: Timeline of deflations

[1] Persistent deflations identified as periods following price peaks associated with a turning point in the five-year moving average and peak levels exceeding price index levels in the preceding and subsequent five years. Troughs identified as lowest price index readings after the peak.

Source: Borio *et al.* (2015)

Interwar deflation

After World War I, most of the advanced economies (eg. the United States, Great Britain, Sweden) faced strong inflationary pressure. Central banks and/or governments wanted to increase purchase power to prewar levels and return to the gold standard. In order to do that they used tight monetary policy. In line with this tendency was Rašín's deflationary policy in Czechoslovakia as discussed in Chapter 3. The deflationary pressures corresponded to global contraction in economic activity[10] lasting from 1919 to 1921 (Kumar *et al.* 2003), (Koderová 2014).

The following period from 1921 to 1929 was associated with mild deflation

[10] Annual GDP fell by 18% in the United States, by 29% in the United Kingdom and by 20% in Germany (Kumar *et al.* 2003).

of 1-2% but, in contrast to the first years after World War I, it was an era of post-war prosperity, productivity growth and emergence of new technologies. Therefore, Bordo & Filardo (2005) considers this deflation as a "good" one.

The Great Depression

The term "Deflation" is mostly associated with the era of the Great Depression. The economic contraction between the years 1929 and 1933 was connected both to decline in real output and decline in price level. Contemporary consensus states that the crash on the stock exchange only contributed to the crisis but was not the root cause. The Great Depression is attributed to monetary policy failures. Restrictive monetary policy and unwillingness to leave the gold standard deepened and prolonged the crisis. The crisis ended for the United States in 1933 when the gold standard was abandoned and the United States switched to expansionary monetary policies. Countries in the gold block (France, Belgium, the Netherlands, Switzerland, Italy, Poland, Czechoslovakia) suffered until 1935–1936 when they left the gold standard principle as well (Kumar *et al.* 2003), (Bordo & Filardo 2005) (see Figure 2.2).

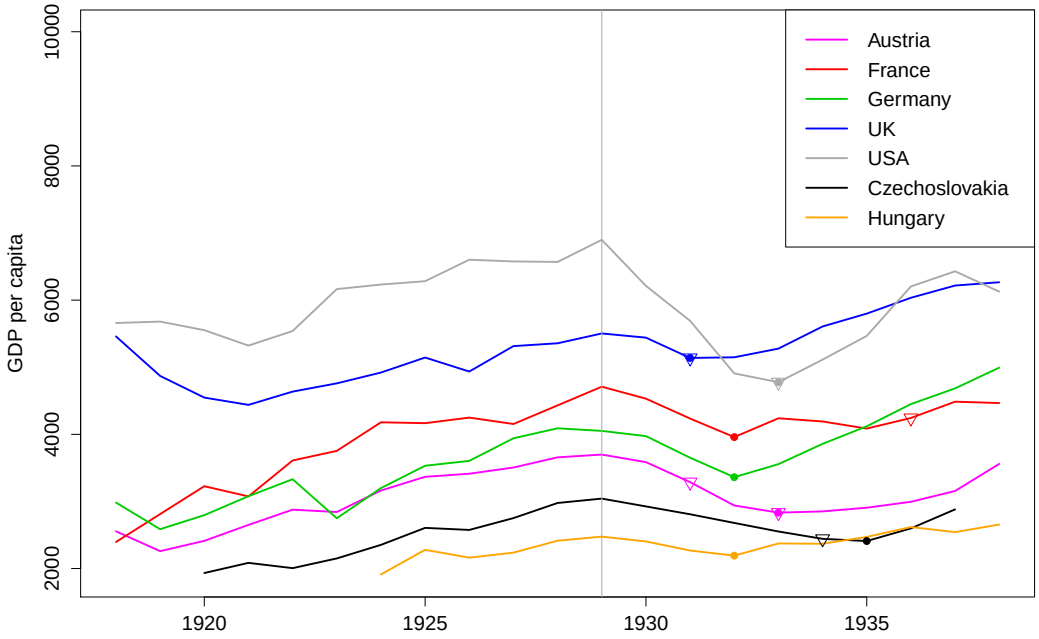
In these times influential economists like Knut Wicksell (1851 - 1926), Irving Fisher (1867 - 1947) and John Maynard Keynes (1883 - 1946) (in some texts) promoted price stability as the essential part of macroeconomic stability. Keynes also stated the liquidity trap argument[11] [12] (Bagus 2015).

The Great inflation and the Great Moderation

The perception of price growth and price stability in the United States was mainly defined in the era called the Great Inflation. The two decades-long period from 1965 to 1984 can be defined by the collapse of the Bretton Woods monetary system, two oil crises and high and volatile inflation[13] (see the middle shaded section in Figure 2.3 with inflation rate reaching 11% in 1974 and 13.5% in 1980). Some economists like Orphanides (2002) or Bryan (2013) consider the Great Inflation to be the most dramatic failure of American macroeconomic policy. The macroeconomic policy had to go through a transformation and to understand the importance of price stability. In these times deflation was

[11] See Section 2.4.
[12] For history of the concept of liquidity trap, see Boianovsky (2005).
[13] See, for instance, Bryan (2013), Meltzer *et al.* (2005).

Figure 2.2: Abandonment of Gold Standard



Source: GDP data: The Maddison-Project (2013), Abandonment of Gold Standard: Bernanke & James (1991), Author's computation; the idea based on O'Neil (2009)

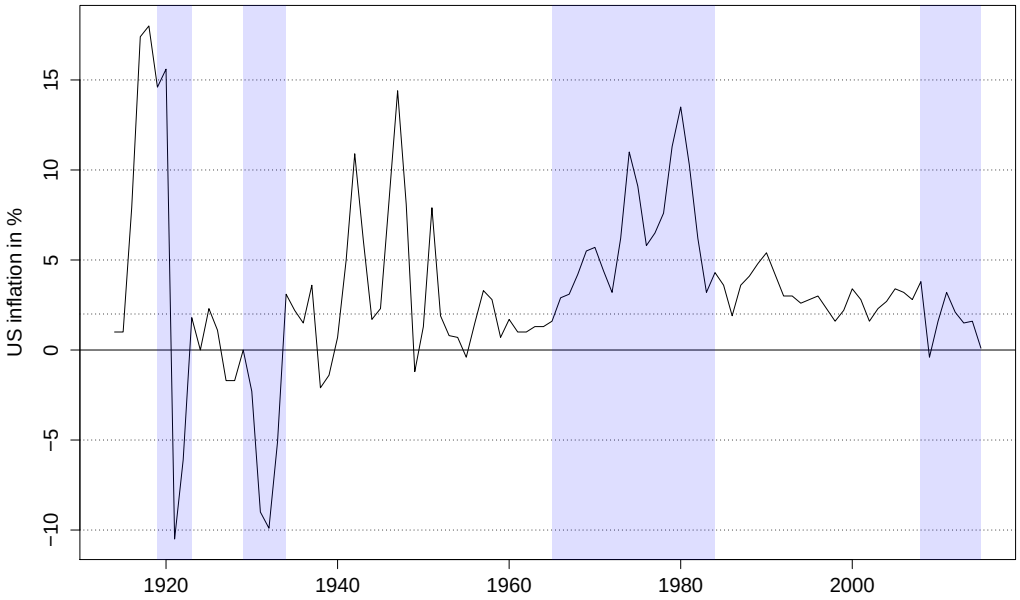
Dots denote the minimum GDP per capita for given country in post-1929 period. Triangles depict the devaluation or abandonment of the gold standard. Austria have two triangles due to devaluation of currency in September 1931 and suspension of gold standard in April 1933.

something very theoretical and seen only as a topic covered in textbooks and only very briefly.

The situation severely changed in the mid-1980's. The Great Moderation in the United States started the trend towards lower inflation. Economies experienced low and relatively stable inflation accompanied with long economic expansion[14] and central banks went through institutional reforms to ensure greater independence with greater emphasis on inflation objectives (Borio & Filardo 2004).

[14]See Hakkio (2013).

Figure 2.3: The United States Inflation Rate, 1914–2015



Source: Autor's analysis based on US Inflation Calculator (2016) data

The inflation rate in the United States of America covering the recent 101 years. There are four highlighted periods: 1919-1923 (Post-war deflation), 1929-1934 (the Great Depression), 1965-1984 (the Great Inflation), 2008-2015 (the Global Financial Crisis). Following lines are drawn: -10%, -5%, 0%, 2%, 5%, 10%, 15%.

Japan's Two Lost Decades

In the early 1990's, when the United States experienced the Great Moderation with relatively low, stable inflation rates and a prospering economy, Japan went through an entirely different situation (see Figure 2.4). After a burst of an asset price bubble in the early 1990's, Japan faced a general fall in price level along with economic slowdown. In the mid-1990's when the economy seemed to recover, the Asian (1997) and Russian (1998) crises worsened the situation again. The period of deflation or near-deflation in Japan resulted in the long-lasting stagnation of the economy sometimes called "Japan's (Two) Lost Decades". The Japanese central bank, Bank of Japan (BoJ), tried to intervene in the financial markets, but the desired result did not come. The situation changed after 2008 when BoJ started to act more aggressively.

As a result, together with the deflation associated with the Great Depression, the two lost decades in Japan are examples of devastating deflation (Be-

necká & Komárek 2014). The analysis of what were the causes and what were the consequences of deflation in Japan differs among economists. For example, according to Benecká & Komárek (2014), deflation in Japan was the main factor for economic slowdown. Bordo & Filardo (2005), on the other hand, identifies the banking system to be the main cause of deflation. Cargill (2001) states that deflation in Japan was a consequence of multiple factors: inflation expectations, long-lasting negative output gap, a decline in import prices, a higher exchange rate and other sources.

Figure 2.4: Japan and the US Inflation Rate, 1985–2014

Source: Autor's analysis based on The World Bank (2016) data

21^{st} century

The attention paid to deflation in the 21^{st} century was triggered by a steady decline of price level in Japan in the 1990's and by "deflation scares" in the United States and Europe around the years 2003 and 2004. The rising concern regarding deflation was reflected, for example, by the International Monetary Fund (IMF), who in May 2003, organized the Economic Forum "Should We Be Worried About 'Deflation'?" relating to IMF publication *Deflation: determi-*

nants, risks, and policy options [15]. Also, other economists like Michael Bordo with his colleagues published the study *Good versus Bad Deflation: Lessons from the Gold Standard Era* [16].

Economists' concerns about deflation were nevertheless overwhelmed in 2007 by the worldwide Global Financial Crisis. Since 2009 the United States and states in the European Union have been reaching zero lower bound on interest rates. As a result, they have been losing the ability to directly stimulate the economy or price level growth by cutting the interest rate. The discussion about deflation has been taking place again since 2013 when HICP in the Euro zone as well as the US inflation rate fell below the target of 2%. From 2013–2016 the inflation rate fell below 1% or even turned into negative territory, thus causing deflation[17]. The data on inflation rate in the first half of 2016 indicates that the Euro zone will remain below 1% inflation rate as energy prices continue to remain very low (Czech National Bank 2016a).

The Czech Republic

In 2013 the CNB decided to use the exchange rate as an unconventional monetary policy instrument to maintain price stability. This move was made based on the CNB's short-term outlook indicating a risk of deflation. Predictions showed ongoing decline in prices of consumer goods and the CNB justified their interventions by the dangerous possibility that households and companies would take the decreasing price level for granted and incorporate them into their expectations and setting of wages. The CNB considered the consequences of deflation as unpleasant for the Czech economy and decided to use the koruna exchange rate as an additional instrument for easing the monetary conditions. In order to prevent excessive appreciation of the koruna, CNB stated the one-sided commitment to keep the exchange rate close to 27.0 CZK/EUR (Franta *et al.* 2014), (Czech National Bank 2014).

[15] See Kumar *et al.* (2003).

[16] See Bordo *et al.* (2004).

[17] The inflation rate in the United States using CPI was, in 2015, on average 0.1% when, for three months (January, March and April), the inflation rate turned negative (US Inflation Calculator 2016). The inflation rate in the European Union (28 countries) using HICP, was in 2015 on average 0.0% when, for four months (January, February, March and September), the inflation rate turned negative (EUROSTAT 2016).

2.3 Good versus Bad Deflation

Contemporary mainstream economic theory analyzing deflation is divided into two main groups: Liquidity trap theorist and Good-Versus-Bad deflation theorist (Bagus 2015). The first group is inspired by Keynes and its main protagonists are Ben Bernanke, Lars E. O. Svensson and Paul Krugman. This group of economists do not see any positives when deflation occurs and try to avoid consecutive liquidity trap. They see deflation only as obstruction and as a sign of a malfunctioning economy. The other group is inspired by the Chicago School and is represented by Claudio Borio, Andrew Filardo, Michael Bordo and Angela Redish. This group distinguishes three broad categories of deflation based on their historical analysis: "the good, the bad and the ugly"[18].

Economists inspired by the Chicago School suggest that deflation comes in three types based on the shock that cause it and the consequent impact on an economy.

Bad Deflation

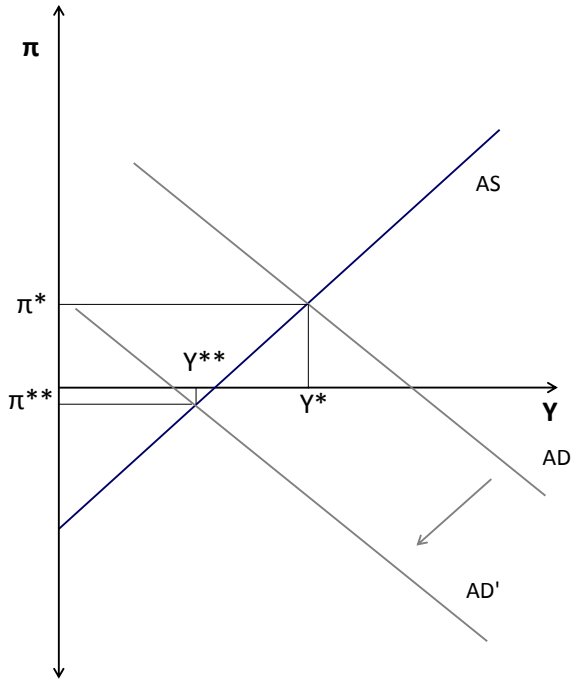
Bad deflation is associated with recession, economic contraction and, thus, a negative demand shock. From the 1960's to mid 1990's economic weakness was associated with disinflation Bordo & Filardo (2005). Bad deflation is mainly caused by nominal rigidities, burst of asset price bubbles, lower confidence in government policies or corrections in expectations. The deflationary pressure might be amplified through distortions in confidence of the general public in future economic development and expectations of steadily declining prices (Kumar *et al.* 2003), (Bagus 2015).

To demonstrate negative demand shock, consider an economy which is initially in the equilibrium (π^*, Y^*)[19] at the intersection of Aggregate supply (AS) and Aggregate demand (AD). Negative demand shock pushes demand to the left from AD to AD' (see Figure 2.5) to the point (π^{**}, Y^{**}). At that point price level and the output is lower compared to the initial equilibrium.

[18]Some authors distinguish only the good and bad deflation.

[19]Point (π^*, Y^*) represents an economy at full-employment, where π^* represents price level and Y^* output.

Figure 2.5: AS-AD model: Negative demand shock



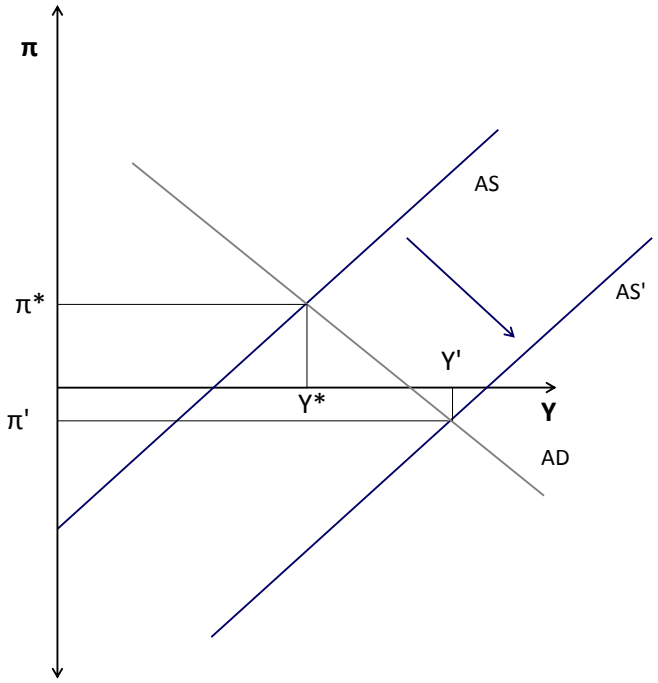
Source: Kumar *et al.* (2003)

Good Deflation

Good deflation or, according to White (2006), "Benign deflation" is driven by a positive supply shock. This type of deflation might be associated with increasing productivity, rising real wages and asset prices, lower price products and stronger financial sector performance (Bordo & Filardo 2005), (Kumar *et al.* 2003). Also, "good deflations" may by those reflecting normal cyclical downturns in an economy with a low-inflation (Borio & Filardo 2004).

As in the previous case, an economy is initially in an equilibrium (π^*, Y^*). But in this case there is positive supply shock which pushes AS to the right to AS' (see Figure 2.6) to the point ($\pi^{'}$, $Y^{'}$). In the new equilibrium, there will be a downward pressure on prices and, if the initial inflation is low enough, deflation might arise. In contrast to the case of Bad deflation, the output is higher than in the initial state.

Figure 2.6: AS-AD model: Positive supply shock



Source: Kumar *et al.* (2003)

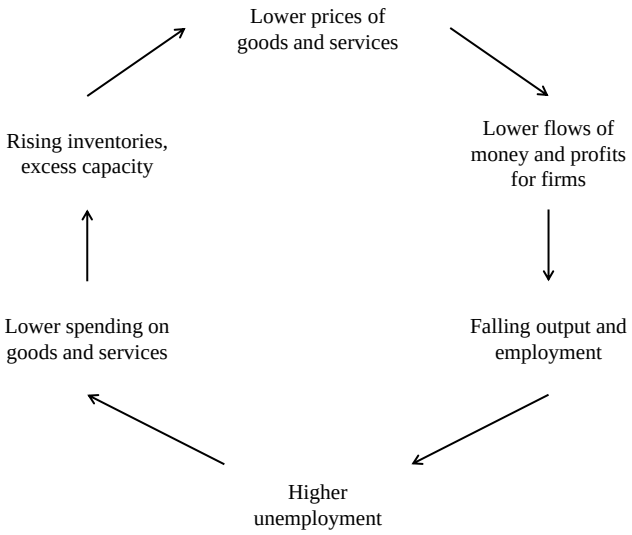
Ugly Deflation

The last type of deflation refers to situations like the Great Depression in the 1930's. White (2006) names three rigidities which causes ugly deflation: nominal wage rigidity, zero lower bound for nominal interest rates and debts denominated in nominal terms. The rigidities cause lower employment and lower investment which is associated with further reduction in demand and further reduction in the price level. Borio & Filardo (2004) describes ugly deflation as one which distorts the economy and turns it into a self-enforcing deflationary spiral (see Figure 2.7).

2.4 Liquidity trap theory

The group of economists inspired by John Maynard Keynes study deflation mainly in connection to the liquidity trap. These authors do not see deflation positively. They see adverse effects of deflation on the economy even when arising from positive supply shock (i.e. increasing productivity, rise in real

Figure 2.7: Deflationary spiral



Source: Benecká & Komárek (2014)

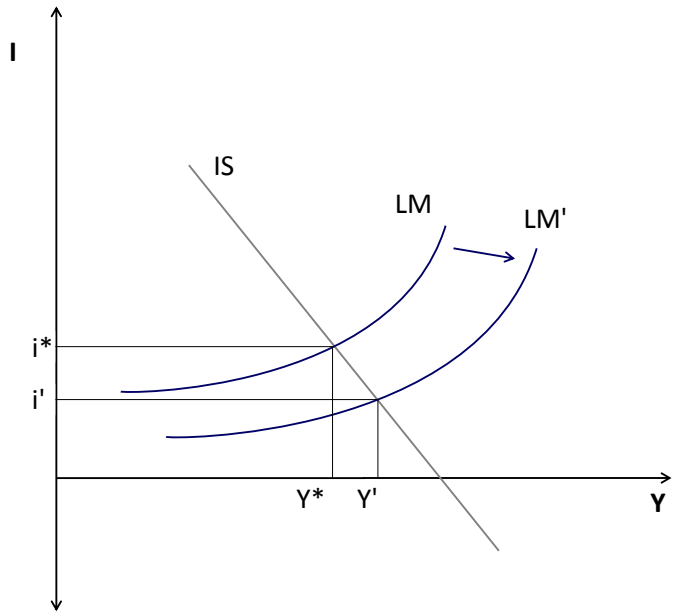
wages, etc.) They state that unanticipated shock may lead to recession and deflation.

The liquidity trap is a situation where the interest rate reaches zero lower bound and thus monetary policy cannot stimulate aggregate spending. The situation can be described by the IS-LM model with the investment-saving (IS) curve and liquidity preference-money supply (LM) curve. By increasing the money supply (shifting LM to LM' in Figure 2.8) economic agents should consume and/or invest more as the interest rate decreases from i^* to i'. However, in the case of the liquidity trap, agents only hold the money and do not spend/invest. This might be caused by uncertainty over future development and by the lack of positive expectations about the economy.

The situation of the liquidity trap is depicted in Figure 2.9. The shift of the LM curve to the right to LM' shows an increase in money supply. In an economy facing a situation what is shown in Figure 2.9, the easing of monetary policy does not affect the interest rate. The intersection of the IS curve with the LM / LM' curve remains the same. Therefore, the monetary policy becomes ineffective, as neither output nor interest rate moves.

Liquidity trap becomes a major problem in the deflationary environment

Figure 2.8: IS-LM model: Standard situation



Source: Mankiw (2003)

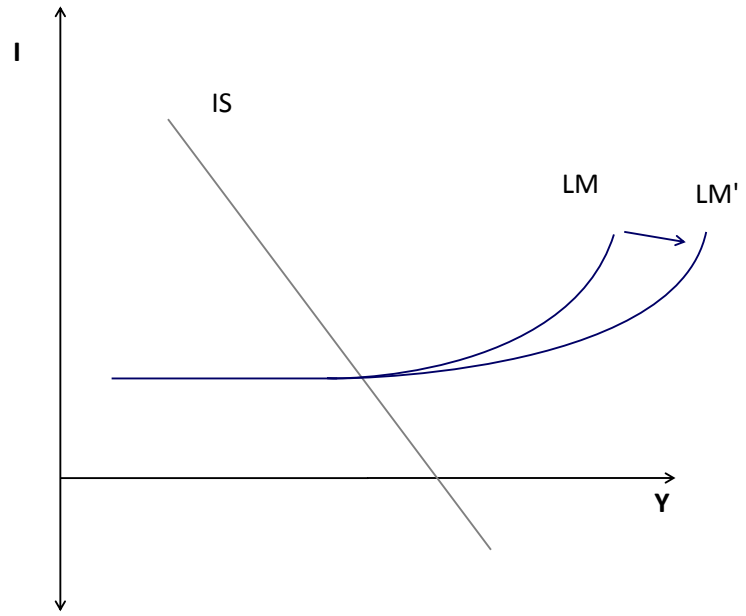
as the central bank can not achieve its inflation goal by lowering the interest rate. Credibility of the institution and its perceived ability to achieve its goals thus might be eroded.

Historical experience provides us with only two examples of liquidity trap. The first one is connected to the Great Depression in the United States when the nominal interest rate fell below 1% in the second half of the 1930's. The other example is Japan since 1999 when the BoJ lowered interest rate to virtually zero (Mankiw 2003), (Ito & Mishkin 2006). In addition to the historical experience of liquidity trap, the Euro zone has kept interest rates well below 1% since 2012[20]. The United States has kept the Fed funds rate below 1% even since 2009. Thus, both leading economies are not far from zero lower bound.

Economic literature concerning zero lower bound is inspired by economic development in Japan (Krugman *et al.* 1998), (McCallum 2000), "deflation scares" in the US in 2003–2004 (Eggertsson *et al.* 2003) and the recent eco-

[20]On 16^{th} March 2016, ECB decreased its benchmark refinancing rate by 5 basis points to 0.00% and the interest rate on deposit facility decreased by 10 basis points to -0.40% (European Central Bank 2016b).

Figure 2.9: IS-LM model: Liquidity trap



Source: Kumar *et al.* (2003)

nomic situation after the Global Financial Crisis (Franta *et al.* 2014), (Hamilton & Wu 2012). In addition to the problems associated with falling prices, theory does not state any means for how to escape from the liquidity trap by any conventional policy. Svensson (2003) published a paper *Escaping from a liquidity trap and deflation: the foolproof way and others* where he presents the *foolproof* way for escape by unconventional policies and more importantly, how to return back to conventional ones when the economy recovers. However, the presented "ways how to escape" are unconventional monetary policies which are not fully proven empirically or by historical experience.

Chapter 3

Deflation in interwar Czechoslovakia

The second part of this thesis is primarily focused on two deflationary episodes in Czechoslovakia between World War I and World War II. The first episode is tied-up with attempting to overcome inflationary pressure after World War I and attempts to increase the purchasing power of the currency. The other deflationary episode is connected to the Great Depression.

The second part of this thesis is structured as follows: Section 3.1 describes the historical background in Czechoslovakia between the years 1918 and 1936 and the problems connected to newly gained independence: Section 3.2 describes used data in presented analyses; Section 3.3 describes development of price level in Czechoslovakia; and sections Section 3.4, Section 3.5 and Section 3.6 describe development of industrial and agricultural production, international trade and unemployment and wages in connection to changes in inflation rate.

3.1 Historical Background

Půlpán (1993) divides the inter-war era as follows:

1. 1918-1923: Stabilization of monetary system and structural changes in industry, recession in 1922-1923
2. 1924-1929: Inter-war boom
3. 1930-1934: Great Depression

4. 1934-1938: Recovery from the Great Depression and preparation for World War II

Establishment in difficult times

Czechoslovakia was officially founded in October, 1918 as one of the successors of the Austro-Hungarian empire after World War I, when both internal and external conditions were not stable. The new state was composed of four parts: Bohemia, Moravia (together hereinafter referred to as "Czech Lands"), Slovakia and Subcarpathian Ruthenia[1] (in Czech: Podkarpatská Rus) (see composition of inhabitants in Table 3.1). Development of these territories was very uneven. While Czech Lands inherited 70-75% of industrial production of the Austrian part of the former empire, Slovakia was more focused on agriculture and was thus significantly less developed in terms of industrial production or, for example, in terms of education. In addition to uneven development, Czechoslovakia was a multi ethnic state with a very important German minority, amounting to 22.8% of the total population in Czechoslovakia (see Table 3.2).

The international environment at the end of World War I was not stable as Europe had to recover from the war times and faced high inflationary pressures caused by war expenditures.

Table 3.1: Composition of inhabitants in Czechoslovakia in 1921

Territory	Population	Share
Bohemia	6.7 mil.	49.3%
Moravia	3.3 mil.	24.3%
Slovakia	3.0 mil.	22.0%
Subcarpathian Ruthenia	0.6 mil.	4.4%

Source: Vencovský (2003)

Table 3.2: Composition of ethnicities in Czechoslovakia in 1921

Ethnicity	Population	Share
Germans	3.1 mil.	22.8%
Hungarians	0.7 mil.	5.1%
Ruthenians	0.5 mil.	3.7%

Source: Vencovský (2003)

[1]Subcarpathian Ruthenia was attached to Czechoslovakia in 1919.

Rašín's deflationary policy

After the declaration of independence in 1918, Czechoslovakia took over the currency of the former empire, Austro-Hungarian korona, which was under strong inflationary pressure. The amount of money in circulation increased during the war by 1 340% and the amount of money sharply increased even after the end of war (see Table 3.3).

Table 3.3: Money in circulation in Austro-Hungarian Empire, 1914–1919

Date	Money in circulation
23.6.1914	2 130 mil. K
26.10.1918	30 680 mil. K
28.2.1919	37 570 mil. K

Source: Vencovský (2003)

In order to stabilize monetary policy, the Czechoslovakian government had to establish a new monetary system with a new currency. The author of the monetary reform and also the first Minister of Finance, Alois Rašín, had a clear and strict vision about the new monetary system. He wanted to achieve a strong and credible currency both on the domestic market and in the international environment. His monetary reform was based on the following steps:

- Separate currency from former Austro-Hungarian monetary system and create a new currency - Czechoslovak koruna (in Czech: Koruna československá) denoted as Kč;
- Increase purchasing power of currency;
- Stabilize currency with higher purchasing power.

Source: Vencovský (2003)

The first phase of the reform combined the first two steps. It combined separation from the Austro-Hungarian monetary system along with the desired restriction of up to 80% of currency from circulation. This phase was executed in March, 1919 when the new Czechoslovak currency, koruna, was created by stamping Austro-Hungarian banknotes and decreasing their nominal value to 1% of the original value (see Figure 3.1). Also, only one half of collected banknotes were returned to circulation. The other half were exchanged for government bonds with a 1% interest rate. Even though Alois Rašín wanted to

Figure 3.1: Stamped 10 korona banknote

Stamped Austro-Hungarian 10 korona banknote. The stamp in the top left corner shows the nominal value - 10 haléřů (0.1 Kč).

Source: Czech National Bank (2016b)

restrict up to 80% of money from circulation, in reality only 30.4% was actually restricted (Vencovský 2003).

The first phase of monetary reform did not fulfill all the government's and Alois Rašín's expectations. The reform was successful in terms of avoiding hyperinflation and separation from the old currency went surprisingly well. However, the restriction of money was not sufficient as price level increased by 77% between 1919 and 1920. Böhm *et al.* (2012) explains the reason for unfavorable development of price level by an increase in indirect taxes and loose monetary policy. Vencovský (2003) explains it by high government budget deficit, a highly volatile exchange rate and the expensive defense of Slovakia during the Hungarian invasion in 1919.

The second attempt to lower the price level was done in 1921. The strategy was to achieve lower price level by appreciation of the koruna on foreign exchange markets, namely by foreign currency borrowing (Böhm *et al.* 2012). The aim was to decrease domestic price level through a stronger exchange rate, which would make exported goods more expensive. The second phase of deflationary policy turned out to be effective. The koruna significantly appreciated and price level decreased. Appreciation of the koruna on foreign exchange markets resulted in independence from German and Austrian currency as they both went through hyperinflation and their exchange rate dropped to almost zero (Vencovský 2003).

The koruna appreciated from 6.5 Swiss Francs per 100 Kč at the start of intervention in December 1921 to a stabilized level of approximately 16.0 Swiss

Francs per 100 Kč in December 1922. The development of the koruna to the US dollar was analogical. The exchange rate changed from 1.3 USD per 100 Kč in December 1921 to ca. 3.1 USD per 100 Kč in December 1922 (see Figure 3.2).

Figure 3.2: Exchange rate of the Czechoslovak koruna (Swiss franc and US dolar per 100 Kč), December 1921 – December 1927

Source: Author's computation, Statistical yearbooks

The price level responded to appreciation of the koruna quickly, the annual average wholesale price level decreased by 7% in the first year and by an additional 34% in the second year of interventions. The impacts of deflation on the real economy was rather severe. The first to be affected by the appreciated exchange rate was export. Protectionism (also frequently used by other countries) prevented the flooding of the Czechoslovakian market by relatively cheap import, thus the balance of trade remained positive. Industrial production decreased significantly, agricultural production was not affected only due to the shortage of basic food after the war (Böhm *et al.* 2012). Along with decreased industrial production increased unemployment (see Table 3.4).

Deflationary pressures especially pushed down wages. The most affected were companies with loans as the interest was fixed. Later on, banks got into

Table 3.4: Development of Czechoslovak economy, 1921–1924

Year	Wholesale Price Index*	Export, billions Kč	Unemployment, thousands
1920	1 542	28.5	148.0
1921	1 453	29.5	71.5
1922	1 348	19.6	127.2
1923	891	13.9	207.3
1924	878	17.0	96.5

Source: Statistical yearbooks

* Wholesale price index is in nominal values, created by Prof. Dr. Mildschuh, 1914=100

problems and the state budget also ended up in deficit as incomes decreased due to lower production while expenses remained fixed. Interventions in 1921 and 1922 had adverse effects on the real economy, but in the long-run perspective, it stabilized economic conditions and made the Czechoslovak koruna credible currency (Böhm *et al.* 2012). The koruna was freely convertible and led to the introduction of the gold standard.

Deflationary monetary policy was not supported by all domestic economists. The main opponents of Rašín's approach were Karel Engliš and Josef Macek. They pointed out that deflation has adverse effects on the real economy. They saw problems such as increased pressure on companies, as deflation decreases profits while liabilities such as wages, loans, rents etc., are fixed. It causes a decrease in production, higher unemployment and, as a result potential social unrest. They argued that even if companies are not primarily affected by deflation, the effect of deflation will affect them in the long run through the banking sector as banks will ultimately refuse to provide loans. As a result, both banks and companies get into a bad economic condition (Vencovský 2003).

Gold era and adoption of gold standard

Since 1923 the monetary policy has gradually moved to stabilization of the exchange rate, rather than increasing purchasing power (see stabilized exchange rate after 1923 in Figure 3.2). Since 1925 the koruna has been pegged to the US dollar and the exchange rate has remained stable.

In terms of real economy, production recovered quickly after the downturn in 1922–1923 and grew on average by 8% (except for year 1926) (Böhm *et al.* 2012).

Economic recovery was based on a boom of industrial production. Agricultural production also increased.

After the separation from the Austrian korona, Czechoslovakian currency was paper money "backed only by the full faith and credit of the Czechoslovakian government and industry" (Půlpán 1997). In the second half of the 1920's the Czechoslovakian economy experienced growth, stable price level, and increased gold reserves, which had increased steadily since independence, and thus a large majority of economists as well as general public tended towards adoption of the gold standard. This monetary system was perceived as the best way how to store value and prevent hyperinflation while also being the monetary system used in all the leading developed countries at the same time (e.g. the United States, the United Kingdom and France). Adoption of the gold standard was seen as the last step of monetary policy stabilization.

Adoption of the gold standard had several critics. The main ones were Karel Engliš, Vilibald Mildschuh and Josef Pazourek. Engliš did not support the change of the monetary system because he believed that the price of gold would increase and create deflation. For example, Rašín did not consider the gold standard as necessary for a well-functioning economy, but he saw important psychological reasons in favor of adoption of the gold standard (Vencovský 2003).

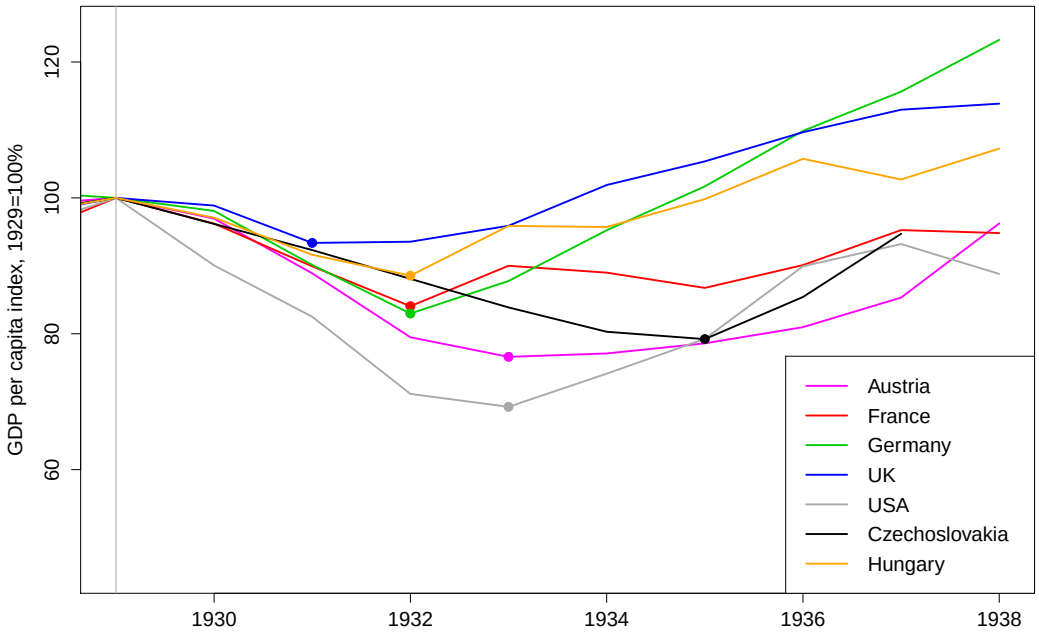
In normal times, when the internal and external conditions (economy, political situation etc.) would remain stable, there would be no difference in having the koruna pegged to the US dollar or having the gold standard (Půlpán 1997). However, at basically the worst time such a change could occur, 7^{th} November 1929, the Czechoslovak koruna became a part of the gold standard monetary system. 1 Kč was denominated as 44.58 mg of gold. In hindsight, this decision was very unfortunate.

The Great Depression

The beginning of the Great Depression is usually attributed to "Black Tuesday," 29^{th} October 1929. This devastating collapse of US Stock market prices led all industrialized countries into depression. The "real" and significant consequences of the Great Depression came to Czechoslovakia after the bankruptcy of Vienna Bank in 1930, which was followed by withdrawals of deposits from banks and overall withdrawal of capital from less developed countries (including Czechoslovakia). As can be seen in Figure 3.3 which describes the development

of GDP in Czechoslovakia and in developed countries, Czechoslovakia was hit by the crisis slightly later than other countries. As a result the economy hit its the bottom later than other countries.

Figure 3.3: Development of GDP per capita during the Great Depression



Source: GDP data: The Maddison-Project (2013), Author's computation

The graph shows the development of GDP per capita as index where 1929=100%.
Dots denote the minimum GDP per capita for given country in post-1929 period.

Problems associated with the lack of demand resulted in a dramatic decrease in export, a subsequent decrease of industrial production and a sharp increase in unemployment. Agriculture has been affected earlier, in 1928, by an agricultural crisis and by low prices for agricultural products in the following years. To stimulate the economy, countries gradually abandoned the gold standard. The first nation who abandoned the gold standard was Great Britain in September 1931. This move was followed by Japan and the Scandinavian countries in the same year. The United States remained on the gold standard two more years, until March 1933 (Bernanke & James 1991).

The economic situation got worse after the United Stated abandoned the

gold standard. Unfortunately, France, Czechoslovakia's main ally, remained tied to gold. On 17^{th} February 1934, after many countries had already escaped the crisis (see the minimum GDP per capita after 1929 in Figure 3.3), Czechoslovakia devaluated the koruna by 16.67% (1 Kč was denominated as 37.15 mg of gold).

The devaluation of the koruna was tied with panic by the general public due to a sudden rise of prices. Therefore, when the first devaluation came into force, the government released regulations against unjustified increases of prices (Půlpán 1997). This is in direct contradiction to the modern economic theory of inflation which presents increased inflation expectations as a way how to escape deflation (Svensson 2003).

Devaluation did not significantly change the price level (even with government regulations) nor did it increase the volume of export. The support of export was not successful due the devaluation of currencies in other countries and due to prohibitive tariffs. Půlpán (1997) cites Jaroslav Nebesář who states that Czechoslovak banknotes were traded abroad with a 15% discount and the devaluation only helped to equilibrate this difference.

In 1936 the Czechoslovak koruna was devalued for a second time as a reaction to the devaluation of the French franc and Swiss franc. On 9^{th} October 1936 the amount of gold in 1 Kč decreased to 31.21 mg, i.e., by additional an 15.99%. In total, the koruna had been devalued by 29.99%, by the equal share as countries like France, the Netherlands, Switzerland and Italy.

Půlpán (1997) draws attention to the unfortunate set of the denomination of the koruna. In the case of the first devaluation, the denomination was set as a "hard" number, for the second one, the amount of gold was set by a narrow interval of 2 mg of gold. This setting disabled the ability to move flexibly with the exchange rate and adjust to the current situation.

The economic situation in the fall of 1936 tended to stabilize, the press predicted a recovery and the start of an economic boom. The situation after the second devaluation will not be discussed in this thesis because of the adverse political situation, the bias of industry towards the military production and war expectations.

Conclusion of historical background

The Czechoslovak economy and monetary policy was tightly connected to the international environment mainly due to its openness, strategical location and

size of economy. The monetary and fiscal solution used in the era 1918 - 1938 was very conservative and concentrated more on social impact. Exchange rate and its stability should be the supplementary tool to achieve a well functioning economy. The exchange rate should not be the the ultimate goal of the monetary policy or the economy as a whole.

3.2 Data description

Data covering interwar Czechoslovakia were hand-collected mainly from the following Statistical Yearbooks:

- Statistical Yearbook of Czechoslovakia, 1925 [Statistická ročenka republiky Československé, 1925] (Státní úřad statistický 1925)
- Statistical Yearbook of Czechoslovakia, 1928 [Statistická ročenka republiky Československé, 1928] (Státní úřad statistický 1928)
- Statistical Handbook of Czechoslovakia, 1932 [Statistická příručka republiky Československé, 1932] (Státní úřad statistický 1932)
- Statistical Yearbook of Czechoslovakia, 1934 [Statistická ročenka republiky Československé, 1934] (Státní úřad statistický 1934)
- Statistical Yearbook of Czechoslovakia, 1936 [Statistická ročenka republiky Československé, 1936] (Státní úřad statistický 1936)
- Historical statistical Yearbook of Czechoslovak Socialist Republic [Historická statistická ročenka ČSSR] (Federální statistický úřad 1985)

Dataset collected from statistical yearbooks are hereinafter referred to as "Statistical yearbooks". Due to the age of publications, faded entries, errors in the printings and unreadable entries, these data are subject to questions regarding their accuracy and reliability.

Dataset includes:

- Monthly data:
  - Unemployment, January 1921 – June 1935
  - Vacancies, January 1921 – June 1935

  - Wholesale price index, nominal, January 1922 – December 1926
  - Wholesale price index, in gold, January 1922 – June 1935
  - Wholesale price index by Prof. Dr. Mildschuh, January 1921 – December 1926
  - Exchange rate of Czechoslovak koruna, Austrian korona and German mark in Zürich, 1919 – 1923
  - Exchange rate of Czechoslovak koruna in Zürich and in New York, December 1921 – December 1927
  - Consumer price index, Group I, January 1921 – December 1927
  - Consumer price index, Group II, January 1921 – January 1925

- Annual data:
  - Consumer price index in Prague (official index and black market index), 1913–1921
  - Industrial production index, 1919 – 1937
  - Agricultural production index (total, crop production, livestock production),
  - Wholesale price index, Industrial prices, 1926 – 1935
  - Wholesale price index, Food prices, 1926 – 1935
  - Wholesale price of agricultural commodities (wheat, potatoes, beef), 1913, 1918 – 1936
  - Wholesale price index of agricultural production, 1925 – 1936
  - Cost of agricultural production, 1925 – 1936
  - Export, nominal, 1920 – 1937
  - Import, nominal, 1920 – 1937
  - Daily wage index, nominal, real
  - Index of annual real wages, 1919 – 1937
  - Living cost index (total, food & nutrition, fuel & light, rent, clothing, others), 1919 – 1937

The data from dataset will be discussed in the next four sections to document the development of price index and the reaction of the Czechoslovak economy to changes in price level.

3.3 Inflation

The following section is primarily based on data from the Czechoslovak Statistical Office (in original: Státní úřad Statistický). The Czechoslovak Statistical Office started recording statistical data regarding prices and their changes in January 1921 in the case of a consumer price index and in January 1922 in the case of a wholesale price index. The base year for both indices was set as July 1914, the last month before the start of World War I. Both price indices were recorded in nominal prices and as an index denominated in gold.

To describe price development before 1922, two sources of indices will be used. The first one, presented in Olšovský (1961), shows an unweighted consumer price index of a selected 38 kinds of goods in Prague, both on the official and black markets. Data covers the period between the years 1913 and 1921 (see Table 3.5). The second source is a nominal wholesale price index created by Prof. Dr. Mildschuh with monthly data since January 1921 (see Table 3.6 and Figure 3.5).

First deflationary period

To analyze the inflation rate in the first years of independent Czechoslovakia, one has to bear in mind price development before that period, during World War I. The first year of the war, 1914, was accompanied with a relatively modest price level change of 12% in year over year comparison. However in the following years prices accelerated sharply. Price increase peaked in 1918 with a 70% change in year over year comparison. In comparison to pre-war levels, in 1918 prices nominally increased by 560%. Prices on the black market, which might better capture the real development of prices during the war, increased sharply from the first year of the war and changed even faster than the official ones. Black market price level index increased by 2 273% within five years of war (see Table 3.5).

The reason for the steep increase in prices was the need for the Austro-Hungarian empire to finance war expenditures. Like all other belligerent nations, the Austro-Hungarian government started to finance military expenditures through printing money. At the end of June 1914, currency in circulation totaled to 2.3 billion Austro-Hungarian koronas, by the end of 1918 the amount expanded to 30.7 billion koronas and continued to rise (see Table 3.3). This means that the amount of money in circulation in the Austro-Hungarian empire expanded by 1 340% during the war.

Table 3.5: Consumer price index in Prague, 1913–1921

	Official Index*	Δ in %	Cumulative Δ in %	Black market Index**	Δ in %	Cumulative Δ in %
1913	100			100		
1914	112	12%	12%	194	94%	94%
1915	192	71%	92%	425	119%	325%
1916	248	29%	148%	796	87%	696%
1917	389	57%	289%	1 495	88%	1 395%
1918	660	70%	560%	2 373	59%	2 273%
1919	990	50%	890%	-	-	-
1920	1 750	77%	1 650%	-	-	-
1921	1 914	9%	1 814%	-	-	-

Source: Olšovský (1961), Author's computation

*Official index represents unweighted index of official prices based on selected 38 kinds of goods in Prague.

**Black market index represents unweighted index of prices on a black market based on selected 24 kinds of goods

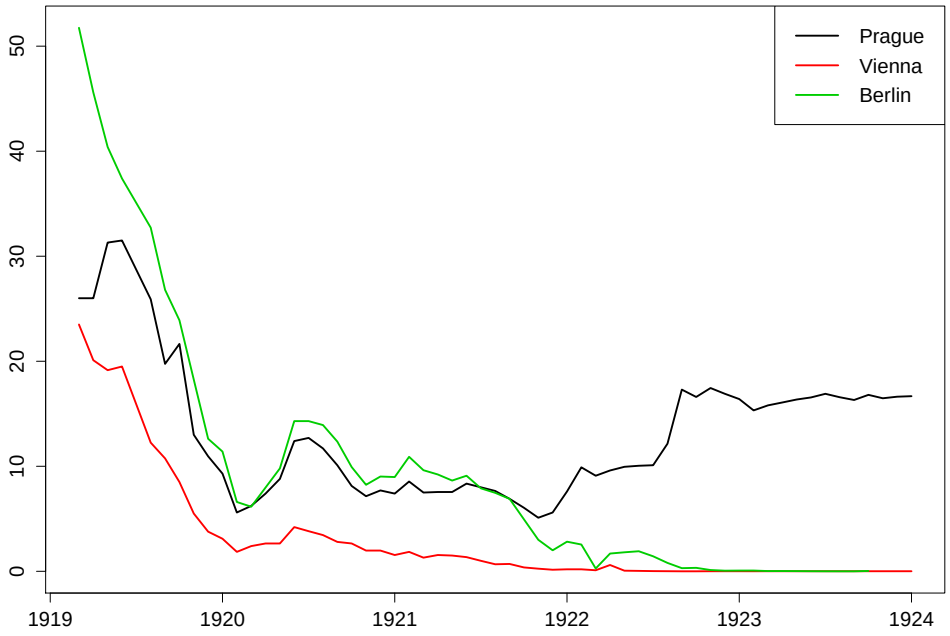
The first Czechoslovak Minister of Finance, Alois Rašín, was aware of the problems associated with increasing the amount of money in circulation and increasing price level. Even before Czechoslovakia's declaration of independence he started to prepare monetary reform (Vencovský 2003). Immediately after the end of the war he set a very conservative monetary policy. His goal was to achieve a stable currency and to at least partially restore the pre-war price level. In 1918 Czechoslovakia took over the Austro-Hungarian currency with increasing amount of money in circulation. Therefore, in order to create a stable monetary environment, Rašín decided to create a new Czechoslovakian currency by separating from the Austro-Hungarian monetary system accompanied with a restriction on the amount of money in circulation. The separation was executed in 1919 and worked well, but the attempt to decrease price level was not successful. The year over year change in price level between the years 1919 and 1920 amounted to 77%, i.e. to the highest increase since 1914 (see Table 3.5).

The Rašín's attempts to decrease price level were not abandoned. Economic conditions and (worldwide) post-war recession in 1921 made deflationary policy possible. At the end of 1921, Czechoslovakia started to intervene on the foreign exchange market, especially in Zürich, in order to appreciate the koruna. The aim was to put downward price pressure on Czechoslovakian exports using a

stronger exchange rate and thus affect the general price level.

The interventions started at the end of 1921 with the exchange rate slightly above 5 Swiss francs per 100 Kč. The exchange rate reached its maximum in October 1922 with a rate of 19.2 Swiss francs per 100 Kč. It means that within 11 months Czechoslovak currency appreciated in comparison to Swiss franc by 284%. After the peak, the exchange rate started to fall again in the end of 1922. During 1923 the rate stabilized at a level around 16.5 Swiss francs per 100 Kč (see Figure 3.4).

Figure 3.4: Exchange rate of the Czechoslovak koruna, Austrian korona and German mark in Zürich, 1919–1923



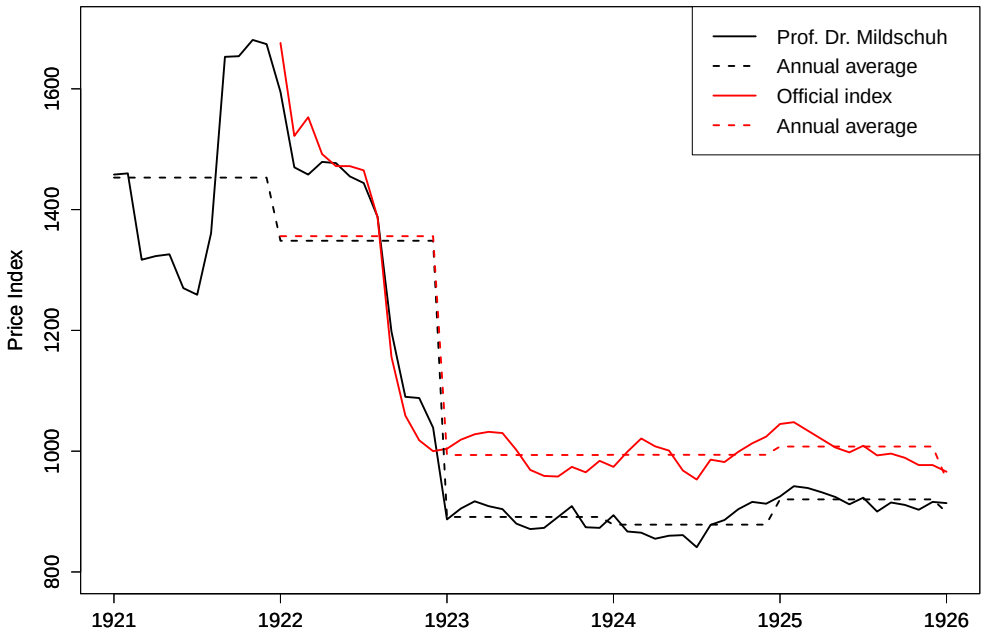
Source: Author's computation, Statistical yearbooks

Through export prices, purchasing power increased during the deflationary crisis by 30-40% (Průcha 2004). In order to make interventions on the monetary market, Czechoslovakia had to borrow from Britain and the United States with very unfavorable conditions at a rate of 8% (Olšovský 1961). According to Průcha (2004), the appreciation was also supported by speculators who believed that the Czechoslovak koruna was a more credible store of value than other currencies. As described in Sargent (1982), Czechoslovakia was surrounded by countries (Austria, Hungary, Poland, Germany) facing hyperinflation, but was

able to maintain a stable currency. As depicted in Figure 3.4, the exchange rates of Austria and Germany in comparison to the Swiss franc hit virtually zero.

The appreciation of the koruna had the desired effect. The nominal index of wholesale prices dropped significantly and the development of price level structurally changed (see Figure 3.5). The index[2] peaked at 1 681 in November 1921 just before prices turned downward. The subsequent decline was sharp, the index dropped within 12 months to 1 088, i.e., by 35%. The decline continued even in the next year, in 1923, when at the end of that year the index amounted to 874, i.e., a decrease of an additional 20% in year over year comparison. In total, nominal wholesale prices dropped between November 1921 and November 1923 by 48% (the changes are summarized in Table 3.6).

Figure 3.5: Wholesale Price Index in Czechoslovakia, nominal, 1921–1926, 1914=100



Source: Author's computation, Statistical yearbooks

A comparison of the development of the wholesale price index in nominal values and denominated in gold is shown in Figure 3.7. Due to interventions in

[2]Only in this section is the wholesale price index created by Prof. Dr. Mildschuh used due to the availability of the wholesale price index from the State statistical office since January 1921.

Table 3.6: Wholesale price index by Prof. Dr. Mildschuh

Year	Month	Index	Δ in %	Cumulative Δ in %
1921	11	1 681		
1922	11	1 088	-35%	
1923	11	874	-20%	-48%

Source: Author's computation, Statistical yearbooks

the foreign exchange market and, thus, appreciation of the koruna, the index denominated in gold followed a different path than the nominal one. In year over year comparison of annual averages between the years 1922 and 1923, the gold index of wholesale prices decreased by only 3% while the nominal by 27%. In the next years both indices moved very similarly.

Consumer prices have been recorded by the Czechoslovak Statistical Office since 1921, hence one year before the wholesale one. Between the years 1921 and 1924 the nominal consumer price index was divided into two groups; Group I showed prices of food, fuel, kerosene and soap, Group II showed prices of clothing and footwear. Since 1925, only one Group I consumer index has been published and was transformed into the food weighted index.

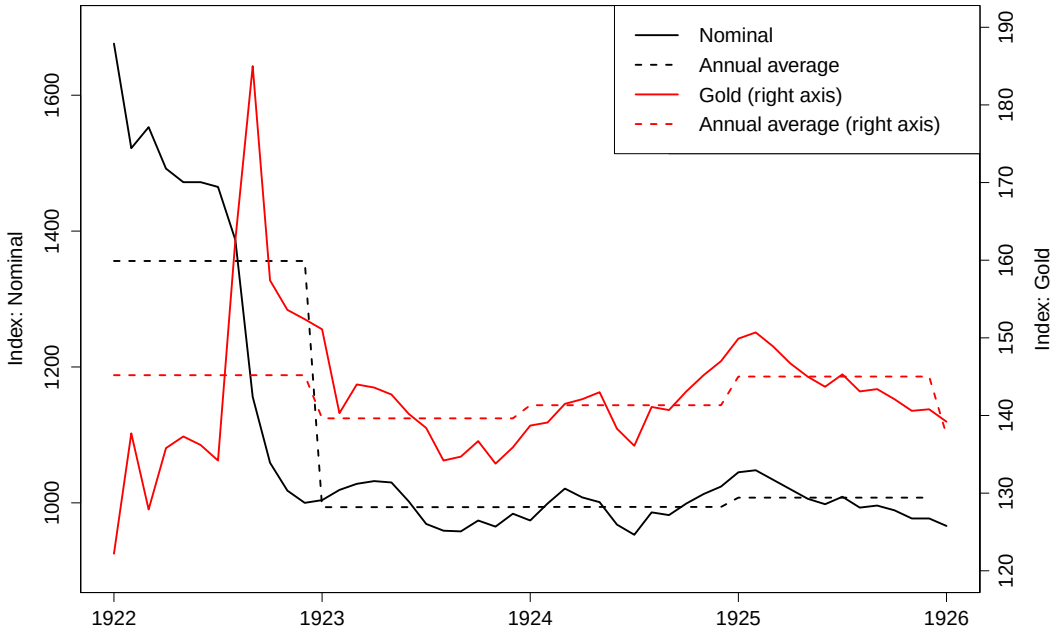
After the start of the interventions in 1921, consumer prices in comparison to wholesale prices dropped more steeply. Prices in Group I and II decreased by 37% and 48%, respectively, between November 1921 and November 1922. However, in the subsequent 12 months, indices decreased less, by 9% and 12%, respectively. The overall decrease of consumer price level amounted to 43% in the case of Group I and 55% in the second one (the changes are summarized in Table 3.7).

Table 3.7: Retail price index, 1921–1923, 1914=100

		Group I			Group II		
Year	Month	Index	Δ in %	Cumulative Δ in %	Index	Δ in %	Cumulative Δ in %
1921	11	1 569			2 243		
1922	11	984	-37%		1 156	-48%	
1923	11	898	-9%	-43%	1 017	-12%	-55%

Source: Author's computation, Statistical yearbooks

Figure 3.6: Wholesale price index in Czechoslovakia, nominal and in gold, 1922–1926, 1914=100



Source: Author's computation, Statistical yearbooks

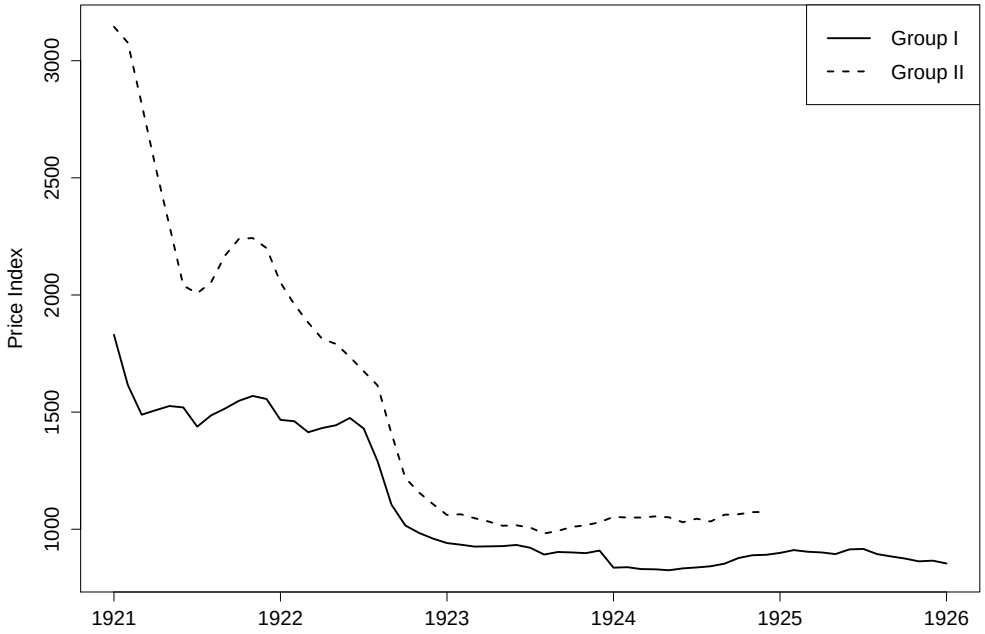
Comparison of monthly indices denominated in nominal prices (solid black line) and in gold (solid red line) with annual averages of those indices (dashed lines).

The Czechoslovak koruna, due to the interventions and a conservative monetary policy, lost its dependency on the German mark and Austrian krone (schilling) and became stable and credible currency (Olšovský 1961).

Monetary policy after 1923 gradually changed from intervention on the foreign exchange market to stabilization of the economy. Since 1925, the Ministry of Finance's Banking Authority has targeted the exchange rate of the US dollar. The target was set at the level of the exchange rate of the last two years, meaning, within a range between 2.90 and 3.03 US dollars per 100 Kč. Since 1925, therefore, the koruna has been indirectly pegged to the gold standard (Vencovský 2003). Wholesale prices rose annually on average by 1.4% (denominated in gold by 1.6%) between 1923 and 1928 with the only exception being 1926 when prices fell by 5.3% (denominated in gold by 4.8%)(see Table 3.8).

Stable price level and a booming economy led the National Bank of Czechoslo-

Figure 3.7: Consumer price index, 1921–1926, 1914=100



Source: Author's computation, Statistical yearbooks

Group I contains prices of food, fuel, kerosene and soap. Group II contains prices of clothing and footwear. Since 1925, Czechoslovak Statistical Office published only one index as weighted food index.

vakia[3] to the decision that the Czechoslovakian economy was finally able to adopt the gold standard. This move had many critics, especially Karel Engliš, Vilibald Mildschuh and Josef Pazourek, who pointed out the risks bound to the volatile price of gold (Vencovský 2003). Regardless of the criticism, the gold standard was adopted on 7^{th} November 1929.

Second deflationary period

The subsequent Great Depression, combined with other influences, had dramatic consequences on price level in Czechoslovakia. Price level started to fall one year before the crash on the US Stock exchange, between the years 1928 and 1929. A world-wide agricultural crisis in 1928 sharply decreased the prices of grain crop and Czechoslovakia was not an exception (Lacina 1984).The wholesale price index reached its local maximum in August 1928, when the nominal

[3]The National Bank of Czechoslovakia was officially established in 1926, it took over the responsibilities of the Ministry of Finance's Banking Authority as independent central bank.

price index amounted to 989 and the gold one to 144.2. Then prices started to fall, a change of nominal price level between the years 1928 and 1929 amounted to -6% and the decline continued in the following years by -11%, -9%, -8% and -3% between 1932 and 1933. From 1933, nominal prices slightly started to rise. In total, the nominal wholesale price index decreased by 32% between the years 1928 and 1933. The deflation, however, had a significantly different character than the previous one. Deflation during the Great Depression was long-lasting and, before the deflation, the price development could be characterized as low, stable and predictable inflation.

Consumer prices, in comparison to wholesale prices, declined less. More over consumer prices declined less than the corresponding index of life expenditures. This meant that the lower prices did not affect consumers' buying power nor increase demand. Nominal consumer prices started to slightly fall one year earlier, between the years 1927 and 1928, when the index decreased by 1%. The decline in prices continued for the next six years, until 1935. On average, price level decreased by 4% between 1927 and 1934. The cumulative change in the consumer price index amounted to -27% in the same period.

Decrease of the price level was supported by both external and internal factors. From the external factors the most important one was the abandonment of the gold standard in England in September 1931 and by the US in April 1933. On the other hand, countries in the Gold Block (France, Switzerland, the Netherlands, Italy and Czechoslovakia) stubbornly stuck with the gold standard.

Figure 3.8: Wholesale price index denominated in Gold in Czechoslovakia, 1925–1936

Source: Author's computation, Statistical yearbooks

Inflation: Summary

The price level in Czechoslovakia between the years 1918 and 1934 was very volatile. In the first years of independence, the inflation rate amounted up to 77% due to inflationary pressures caused by war and military expenditures. The situation changed in 1921 with the start of interventions on the foreign exchange market. The subsequent deflation significantly decreased price level and structurally changed its development. The years 1924 – 1928 were accompanied by stable price level with the only exception being in 1926.

The deflation connected to the Great Depression had a different character than the previous deflationary period. Decrease in price level was long and deep, wholesale price level cumulatively decreased by 32% while the retail price index by 27%. Deflation was supported by abandonment of the gold standard by majority of leading nations (except the Gold Block).

Table 3.8: Wholesale price index, 1922–1937

	Nominal index	Δ in %	Index in Gold	Δ in %
1922	1322		145	
1923	967	-27%	140	-3%
1924	986	2%	141	1%
1925	997	1%	145	3%
1926	944	-5%	138	-5%
1927	968	3%	142	3%
1928	969	0%	142	0%
1929	913	-6%	134	-6%
1930	811	-11%	119	-11%
1931	736	-9%	108	-9%
1932	680	-8%	100	-7%
1933	659	-3%	96	-4%
1934	676	3%	85	-11%
1935	705	4%	86	1%
1936	707	0%	86	0%
1937	749	6%	77	-10%

Source: Author's computation, Lacina (1984)

Table 3.9: Retail price index, 1924–1937

	Nominal index	Δ in %	Index in Gold	Δ in %
1924	850			
1925	894	5%		
1926	866	-3%		
1927	922	6%		
1928	917	-1%	134	
1929	898	-2%	131	-2%
1930	860	-4%	126	-4%
1931	782	-9%	114	-10%
1932	730	-7%	107	-6%
1933	702	-4%	103	-4%
1934	670	-5%	84	-18%
1935	697	4%	85	1%
1936	712	2%	87	2%
1937	709	0%	73	-16%

Source: Author's computation, Lacina (1984)

3.4 Industrial and Agricultural production

In this section the reactions of the industrial and agricultural sectors to the previously described changes in price level will be analyzed. After the declaration of independence, Czechoslovakia had to face several problems in connection to industry and agriculture. Industry had to change into an export oriented industry and transformed from military to civil production. Agriculture, on the other hand, benefited from a shortage of basic food during World War I and the years following the end of military conflict. Both sectors were, however, unevenly distributed in the Czech Lands and Slovakia and were also on different levels of development, which ultimately caused social tensions (Lacina & Pátek 1995).

While the share of people employed in the industrial sector in the Czech Lands remained stable at around 40%, the share employed in agriculture fell below 30% in 1930. At the same time, in Slovakia, the share of people in industry increased from 17.4% in 1921 to only 19.1% in 1930 while the share of people employed in agriculture remained well above 50% even into the 1930's (see Table 3.10). Also, the technology used in both territories was at on different levels of development. The methods of cultivation in agriculture were very intensive in Bohemia and Moravia while the methods used in many parts of Slovakia and in Ruthenia were relatively primitive (Teichová 1988).

Table 3.10: Employment in Industry and in Agriculture in % according to territories in Czechoslovakia

	Bohemia		Moravia		Slovakia		S. Ruthenia	
	Ind.	Agri.	Ind.	Agri.	Ind.	Agri.	Ind.	Agri.
1910	40.7%	32.3%	37.2%	38.6%	18.4%	62.6%	10.3%	71.3%
1921	40.6%	29.7%	37.8%	35.3%	17.4%	60.6%	10.4%	67.6%
1930	41.8%	24.1%	40.8%	28.6%	19.1%	56.8%	11.9%	66.3%

Source: Olšovský (1961)

Industrial production

Industrial production was an essential source of living in Czechoslovakia. As depicted in Table 3.10, this sector directly employed a great portion of the population. After the end of war, the industrial sector had to go through structural changes. Czechoslovakia inherited 60-70% of industrial production from the Austro-Hungarian empire, mostly located in Bohemia and Moravia, but the new domestic market was not wide enough to absorb this production.

Therefore, Czechoslovakia naturally became an export oriented country with traditional trade relations with Austria and Germany. Hence, a large portion of trade changed from trade within the empire into international trade, facing tariffs and import barriers[4]. The other structural change was the transformation from military to civil production.

Industrial production in 1919 was well below the pre-war levels. Industrial production amounted to only 77% of production in 1913. The above mentioned structural changes caused a temporary decrease in industrial production as the index dropped to 75. In 1921 production significantly recovered as the index increased to 86 (see Table 3.11). World-wide production was booming after the war such that the sudden overproduction in 1921–1922 caused an economic slow down. It created a suitable environment for the Czechoslovak monetary policy to intervene on the foreign exchange market and appreciate the koruna. Both factors, the economic slowdown and decreased export, caused a drop in industrial production in 1922.

The appreciation of Czechoslovak currency had different effects on light (consumer) industry and heavy industry. Heavy industry sold its products mainly within Czechoslovakia and imported raw material from abroad. Thus, representatives of this sectors supported high tariffs and a stronger exchange rate for the koruna. High tariffs protected the domestic market from the import of products they made and the stronger exchange rate enabled producers to buy raw materials abroad at lower prices. On the other hand, light industry was primarily oriented on luxury goods such as musical instruments, glass, porcelain and toys, i.e., on export goods. The strong exchange rate, therefore, made their products less competitive on the international market. Representatives of light industry supported lower tariffs in order to generally decrease the level of import customs in other countries (Olšovský 1961). The interventions on the foreign exchange market thus affected light and heavy industry in the opposite directions. As a result, light industry in the interwar period did not reach pre-war levels of production again (Olšovský 1961).

The economic slow down ended in the beginning of 1923. Industrial production recovered surprisingly quickly and Czechoslovakia experienced an industrial boom. In 1924 industrial production was, for the first time, above pre-war levels of production (the index amounted to 107 with the base year

[4]All the successors of Austro-Hungarian empire after the World War I adopted high import customs to protect their domestic market which made international trade even more difficult.

Table 3.11: Industrial production in Czechoslovakia 1919–1937, with base years 1913, 1929 and 1937

	1913=100	1929=100	1937=100
1919	77	54	57
1920	75	53	55
1921	86	60	63
1922	78	55	57
1923	82	58	60
1924	107	76	79
1925	112	79	82
1926	108	77	80
1927	126	89	92
1928	135	96	99
1929	141	100	104
1930	126	89	93
1931	114	81	84
1932	90	64	66
1933	85	60	63
1934	94	67	69
1935	99	70	73
1936	113	80	83
1937	136	96	100

Source: Statistical yearbooks

in 1913). Production reached its inter-war peak in 1929 when the index of industrial production in Czechoslovakia was 41% above the level in 1913.

In contrast to the first crisis in 1922–1923 described above, the Great Depression had a more severe impact on industrial production. The Great Depression started in autumn 1929, and can be characterized as very long and very deep. The crisis in Czechoslovakia had a few specific circumstances: First, the crisis effectively started one year later in 1930, second, industrial production bottomed out in 1933 which was one year later than was the average of other industrialized countries, and finally, the decline in industrial production was deeper than was the world or European average[5] (Lacina 1984), (Olšovský 1961).

As depicted in Figure 3.9 and in Table 3.11, industrial production reached its maximum in 1929 and then fell until 1933 when it fell well below level of

[5]Industrial production in Czechoslovakia declined during the Great Depression by 40% while the world average of decline was 37% and the European average was 28% (Lacina 1984).

production in 1913. The index in 1933 amounted to 85 (where 1913=100) while the index reached 141 in 1929. The reason for decreasing production was decreasing demand on domestic and international markets. Companies reacted to lower demand firstly by a partial restriction of production and by a reduction of employees. Later on, they reacted by closures of factories and bankruptcies. As a result, Czechoslovakia was affected by chronic redundancy of production capacity and unemployment.

Figure 3.9: Index of industrial and agricultural production, 1920–1937, 1929=100

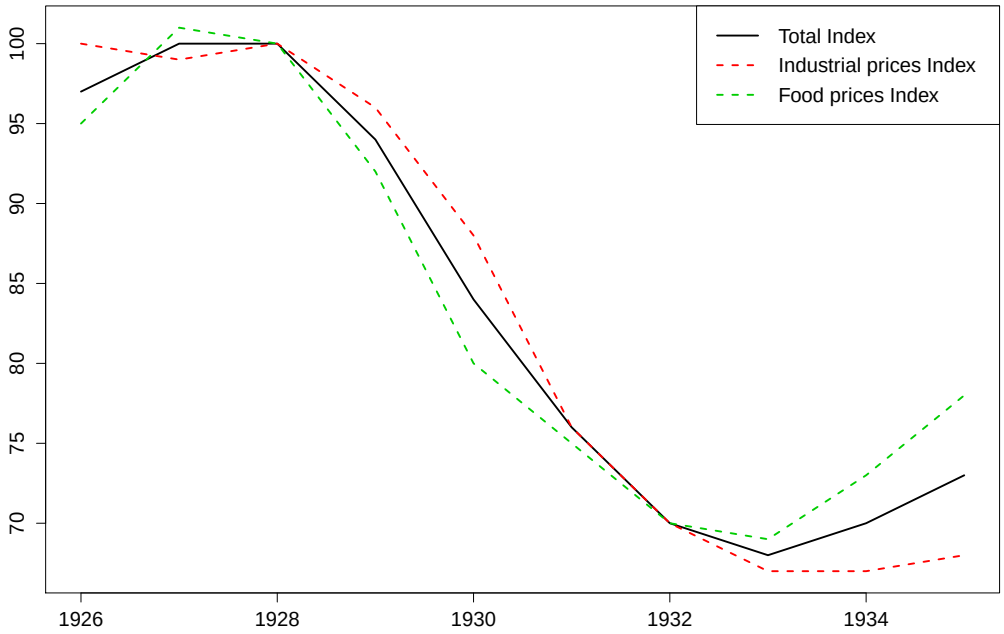
Source: Author's computation, Statistical yearbooks

As shown in Figure 3.10 wholesale prices of industrial products during the Great Depression fell less than the total index and food index in the first years of the crisis. According to Lacina (1984) the price level of industrial products did not fall so drastically due to widespread monopolization and the creation of cartels and syndicates of the most important products. These companies with market power used its dominance to keep prices high despite decreased demand. As a result, these companies were profitable even during the crisis despite people not being generally able to afford their products.

Companies who did not enjoy price agreements had to decrease the prices of products, increase productivity and cut all costs. Higher productivity and

efficiency, however, did not compensate for lack of demand and a decrease in non-monopolized prices often led to bankruptcies. The bad economic situation within industry led to the inability to repay investment and operating loans. Banks postponed payments, but refused to provide additional credit while demanding regular controlling, austerity measures and decrease of wages. Hence, companies were unable to finance their operations and often sold their production capacity to bigger firms. Thus, this process led to greater and greater market concentration (Olšovský 1961).

Figure 3.10: Wholesale price index, index of industrial and food prices, nominal, 1926–1935, 1928=100



Source: Author's computation, Statistical yearbooks

Agricultural production

Agricultural production after World War I benefited from a shortage of basic food. Wholesale prices, therefore, reacted to high demand by a sharp increase which was even sharper than the increase of the total wholesale index. The boom of production slowed down with the world-wide (agricultural) crisis in the second half of 1921. Prices of agricultural products in Czechoslovakia reacted in 1922 only by a slight decrease and only for some commodities, but decreased sharply in 1923. For example, in total, the wholesale price of wheat decreased

by 41% between 1921 and 1923 and by 48% in the case of barley. In the following years, prices at least partially recovered and agricultural production increased. The deflationary price development and Rašín's deflationary policy in general was not very harmful for agriculture due to the post-war shortage and significant increases of prices before the crisis (Olšovský 1961), (Böhm *et al.* 2012).

The second agricultural crisis in Czechoslovakia began even before the Great Depression. World-wide agricultural overproduction caused the prices of commodities to fall in 1928. In Czechoslovakia, the wholesale price index of agricultural commodities decreased by 4% in 1928 (see Table 3.13). In comparison to peak agricultural prices in 1928 and 1934 when prices hit bottom, the index decreased by 42%. The prices of agricultural products therefore decreased by 10% more than the nominal wholesale price index in the same time period.

Table 3.12: Wholesale prices of selected agricultural commodities in Prague, average price in Kč per 100 kg, 1913 & 1918–1936

	Wheat	Δ in %	Potatoes	Δ in %	Beef	Δ in %
1913 -	21.3		7.8		134.9	
1918	52.7	148%	27.9	256%	979.2	626%
1919	65.4	24%	32.1	15%	716.5	-27%
1920	119.8	83%	33.0	3%	1 612.5	125%
1921	281.1	135%	75.5	129%	1 272.9	-21%
1922	258.8	-8%	75.2	0%	1 296.0	2%
1923	166.8	-36%	31.1	-59%	1 174.8	-9%
1924	192.3	15%	64.3	107%	1 270.8	8%
1925	227.3	18%	53.0	-18%	1 139.0	-10%
1926	220.1	-3%	62.2	17%	975.1	-14%
1927	239.4	9%	54.8	-12%	956.4	-2%
1928	213.7	-11%	42.3	-23%	916.0	-4%
1929	177.2	-17%	41.8	-1%	1 050.0	15%
1930	163.1	-8%	39.4	-6%	1 047.4	0%
1931	152.5	-6%	39.1	-1%	793.2	-24%
1932	153.5	1%	35.7	-9%	718.2	-9%
1933	153.3	0%	34.4	-4%	675.6	-6%
1934	160.7	5%	39.8	16%	616.5	-9%
1935	177.0	10%	49.8	25%	760.2	23%
1936	173.9	-2%	44.5	-11%	943.5	24%

Source: Author's computation, Statistical yearbooks

In contrast to industrial production, farmers were not able to decrease pro-

duction as prices decreased due to the nature of agriculture. Farmers tried to compensate the adverse price development by increasing production and by producing of more profitable crops. Unfavorable price development was also deepened by decreasing demand due to rising unemployment. More over, the costs of agricultural production decreased less than the prices for agricultural products. While prices decreased by 42% between the years 1928 and 1934, the cost of production decreased by only 15% in the same time period. The relationship between these two indices was alarming, especially in the years 1932 and 1933 (see Table 3.13).

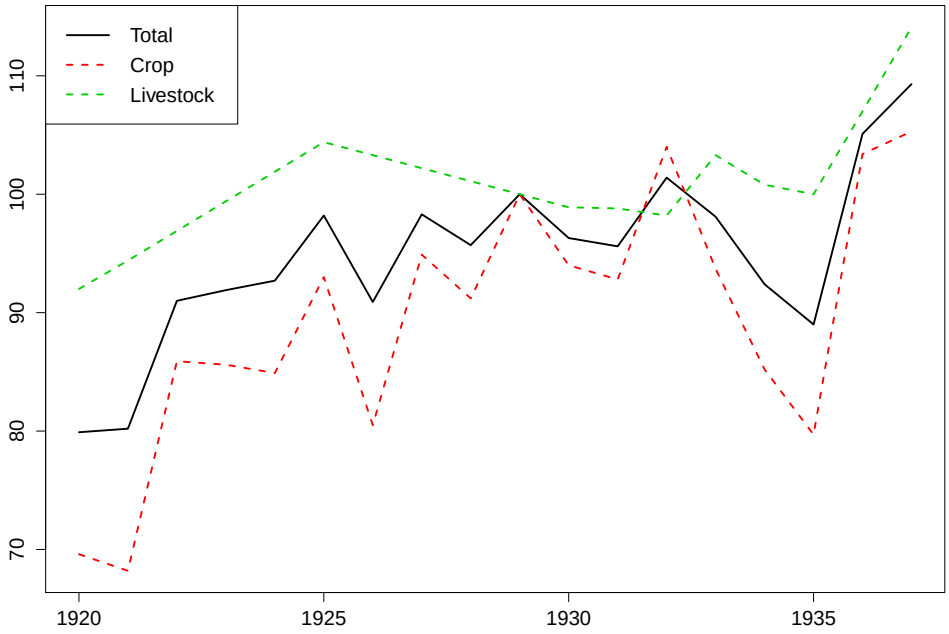
In contrast to the first agricultural crisis, the crisis in the 1930's was deep, long and caused impoverishment of farmers.

Table 3.13: Agricultural wholesale prices and cost of agricultural production, 1925–1936, 1913/1914=100

	Wholesale price		Cost of production		Disparity
	Index	Δ in %	Index	Δ in %	in prices and costs
1925	889		897		1.01
1926	781	-12%	903	1%	1.16
1927	853	9%	934	3%	1.09
1928	815	-4%	949	2%	1.16
1929	766	-6%	944	-1%	1.23
1930	658	-14%	903	-4%	1.37
1931	589	-10%	857	-5%	1.46
1932	509	-14%	829	-3%	1.63
1933	495	-3%	785	-5%	1.59
1934	511	3%	762	-3%	1.49
1935	580	14%	778	2%	1.34
1936	589	2%	780	0%	1.32

Source: Author's computation, Statistical yearbooks

Figure 3.11: Index of agricultural production, index of crop and livestock production, 1920–1937, 1929=100



Source: Author's computation, Statistical yearbooks

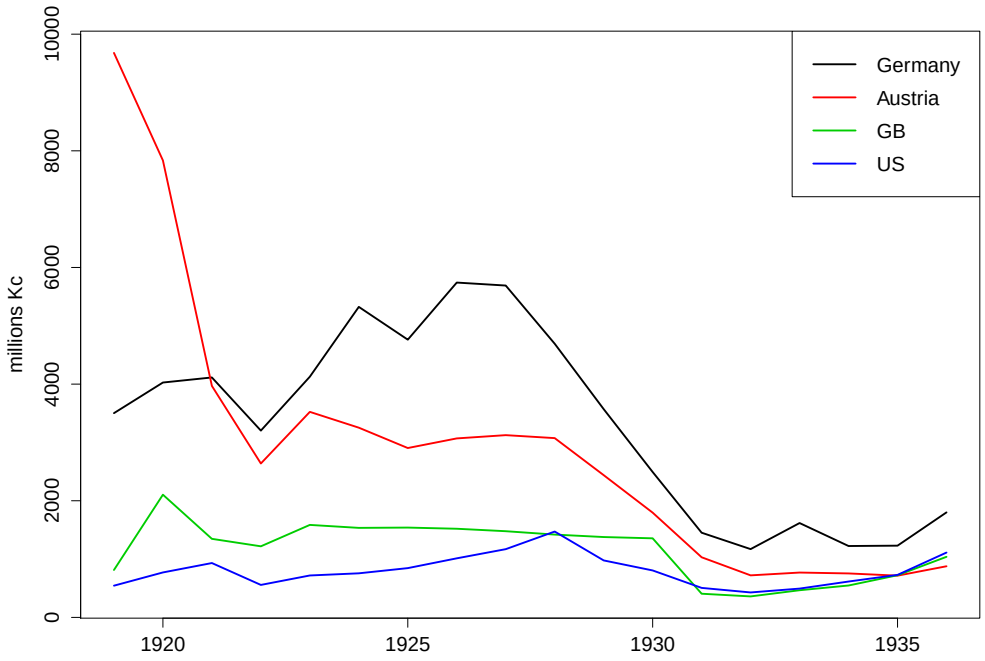
Industrial and agricultural production: Summary

The first deflationary era especially influenced light industry which was export oriented. Heavy industry, on the other hand, supported the interventions. Agricultural production was not much affected, but this was only due to the shortage of food after the end of war. The Great Depression, on the other hand, significantly affected both sectors. Industrial production rapidly decreased as companies went bankrupt. Agriculture was not able to flexibly adjust its production, thus, farmers concentrated on more profitable products. Increased disparity between production costs and prices of products caused deeper impoverishment of farmers.

3.5 International Trade

International trade in the inter-war period was strongly connected to industrial production. As discussed in Section 3.4, Czechoslovakian industrial production exceeded the sales opportunities of the domestic market and naturally became an export-oriented country. The traditional trading partners were the successors of the Austro-Hungarian empire, especially Austria (see Figure 3.12). But the importance of Austria in international trade fell significantly after 1919. The main trading partner, thereafter, in both import and export become Germany. The realties of Czechoslovak foreign policy, however, did not correspond to trade relations. The main political allies were France, Romania and Yugoslavia, who were only minor trading partners.

Figure 3.12: The main trading partners: Export, in millions Kč, 1920–1936, 1929=100



Source: Author's computation, Statistical yearbooks

In the first years of independence, international trade in nominal values was highest during the inter-war era. The high volume was supported by low price level in comparison to trading partners and after-war inflation. Strong appreciation of the koruna in 1922 and 1923 thus significantly decreased the volume of export as it fell in 1922 by 33% in year over year comparison and in the next year by an additional 29%. In total, the nominal value of export fell by

53% between the years 1921 and 1923. Import followed almost the same path as it, in total, decreased by 54% during the same time period (see Table 3.14 and Figure 3.13).

Table 3.14: International trade, nominal values, in mil. Kč, 1920–1937

	Export	Δ in %	Import	Δ in %	Balance	Δ in %
1920	28 515		23 912		4 603	
1921	29 458	3%	23 685	-1%	5 773	25%
1922	19 633	-33%	13 478	-43%	6 155	7%
1923	13 903	-29%	10 821	-20%	3 082	-50%
1924	17 035	23%	15 855	47%	1 180	-62%
1925	18 821	10%	17 618	11%	1 203	2%
1926	17 857	-5%	15 277	-13%	2 580	114%
1927	20 135	13%	17 962	18%	2 173	-16%
1928	21 224	5%	19 208	7%	2 016	-7%
1929	20 499	-3%	19 988	4%	511	-75%
1930	17 474	-15%	15 715	-21%	1 759	244%
1931	13 149	-25%	11 801	-25%	1 348	-23%
1932	7 392	-44%	8 158	-31%	-766	-157%
1933	5 923	-20%	6 125	-25%	-202	-74%
1934	7 288	23%	6 392	4%	896	-544%
1935	7 947	9%	6 743	5%	1 204	34%
1936	8 036	1%	7 915	17%	121	-90%
1937	11 972	49%	10 980	39%	992	720%

Source: Author's computation, Statistical yearbooks

The decrease of export can easily be explained by the strong appreciation of the koruna's exchange rate. However, Průcha (2004) states that reduction in the turnover of international trade was caused rather by the appreciation of the koruna instead of the lower amount of exchanged goods. On the other hand, appreciation of the exchange rate should promote import, but in the case of this deflationary episode, the government adopted such protectionist measures that the import actually decreased in the same proportion as export. Home production was heavily protected by import taxes (Lacina & Pátek 1995). Even though both export and import decreased, the balance of trade remained positive.

International trade between 1924 and 1929 experienced a significant boom with a positive trade balance. However, international trade lagged behind industrial production, which suggests lower competitiveness on the international

Figure 3.13: International Trade: Export, Import, nominal values, in mil. Kč, 1919–1935

Source: Author's computation, Statistical yearbooks

market (Olšovský 1961). After a short crisis in 1926 Czechoslovakian export started to benefit from an economic boom in Europe. The level of international trade in nominal values nevertheless remained below the levels of 1920 and 1921.

The second deflationary era, during the Great Depression, affected international trade even more. The magnitude of decline in export and import was greater as well as the length of decline. Export in nominal values fell by 72% after its peak in 1928 to the bottom in 1933. Import decreased slightly less - by 69% between 1929 and 1933. The trade balance, unlike in the first deflationary era, fell into negative numbers in two consecutive years, 1932 and 1933 (see Figure 3.14). The decline was caused mainly by a lack of demand on international markets, and a relatively high price level while the impact was magnified by the orientation of Czechoslovak industry on luxury products.

International trade: Summary

International trade went through a structural change in the first half of the 1920's as the Czechoslovakia became an export-oriented country. The

Figure 3.14: International Trade: Trade Balance, nominal values, in mil. Kč, 1919–1935

Source: Author's computation, Statistical yearbooks

exchange-rate pass-through was used in 1921–1923 as a way to decrease domestic price level. The reaction of both import and export was significant, as both decreased in nominal values by more than 50%. A boom between the years 1924 and 1929 increased the volume of trade, but it lagged behind industrial production which suggest lower competitiveness on international markets.

The impact of the Great Depression on international trade was particularly negative. Export decreased by 72% and the trade balance fell for the first time into negative.

3.6 Unemployment, Wages and Living Expenses

The social situation after World War I was alarming due to various reasons. One of them was the poor supply of food and basic living needs. The supply of food was worsened in 1918 by crop failure. The situation was partially solved in 1919 by the import of flour from the United States, but at a price three-times higher than was standard on the domestic market. It led to additional impulse to high level of inflation rate which amounted to 50% in 1919 (Olšovský 1961). The increase in inflation was not, however, compensated by proportional increase in wages. As depicted in Table 3.15, between the years 1913 and 1919, consumer prices increased nine times while in the same time period wages increased approximately 3.5 times. It means that real wages decreased during the war by 70% in the case of annual wages and by 67% in the case of daily wage metric. When we compare the price index on the black market with the index of nominal wages, the disparity is significantly greater. Real wages bottomed out in 1918 and afterwards increased, but still lacked behind pre-war levels.

Table 3.15: Retail price index in Prague, Daily nominal and real wages, Annual nominal and real wages index, 1913–1921

	Official price index*	Black market price index**	Daily wage index Nominal	Daily wage index Real	Annual wage index Nominal	Annual wage index Real
1913	100	100	100.0	100.0	100.0	100.0
1914	112	194	104.6	93.4	94.2	84.1
1915	192	425	111.2	57.9	104.0	54.2
1916	248	796	124.0	50.0	122.8	49.5
1917	389	1 495	161.2	41.4	154.9	39.8
1918	660	2 373	218.4	33.1	199.2	30.2
1919	990		370.7	37.4	342.0	34.5
1920	1 750		634.5	36.2	601.1	34.3
1921	1 914		1 018.8	53.2	950.9	49.7

Source: Olšovský (1961)

*Official index represents unweighted index of official prices based on selected 38 kinds of goods in Prague.

**Black market index represents unweighted index of prices on a black market based on selected 24 kinds of goods

In the years 1919 and 1920 the return of soldiers from the warfront also temporarily increased the unemployment level caused (see Figure 3.15). Due to a booming economy, unemployment steadily decreased in the next two years to approximately 20% of the level in 1919. During the crisis in 1922–1923, the

number of unemployed rose again. The study of unemployment, however, has its limitations because unemployment statistics are based on the number of people registered as unemployed in the labor office. Hence, this statistic generally understates the reality. Given the analyzed time period, there were two reasons for measurement bias. The first reason is that not everyone registered at the labor office and second is that especially in eastern parts of Czechoslovakia, there were an insufficiently low density of labor offices available (Olšovský 1961). For example, Janko (1926) estimates that official statistics in 1926 captured only 75% of all unemployed.

Figure 3.15: Labor Market: Unemployment in Czechoslovakia, in thousands, 1919–1935

Source: Author's computation, Statistical yearbooks, Teichová (1988)

Monthly data (available from January 1921) reveals a strong seasonality pattern during the crisis in 1922–1923 and the Great Depression.

The social situation worsened again in 1921 with the deflation and economic crisis. As mentioned above, the economic crisis caused sharp increase in unemployment. Even though Table 3.16 shows an increase in real wages, Olšovský (1961) states that a decrease of wages preceded a decrease of price level. This contradiction can be explained by the fact that official statistics were based on the wages of fully employed workers. Crises are, however, accompanied by

Figure 3.16: Labor Market: Vacancies in Czechoslovakia, in thousands, 1921–1935

Source: Author's computation, Statistical yearbooks

overtime work and partial employment. Therefore, the statistics do not fully describe the actual real wage of the average worker.

Unemployment rose due to the crisis in 1922–1923 from its minimum in October 1921 to its peak in January 1923 five times[6]. A decrease of nominal wages led to higher work intensity and was followed by labor strikes. Průcha (2004) points out that strikes were more frequent at this time than during the Great Depression. Strikes aimed both for an increase in wages as well as against a decrease in wage (see Table 3.17) and their structure changed as the crisis deepened. While only 9.2% of strikes in 1921 aimed against wage decrease, the share of this type of strike increased to 50% in the next year.

In addition to unemployment, in certain parts of Czechoslovakia, people faced agrarian overpopulation. This led to a migration to cities, seasonal employment in neighboring countries and permanent emigration, primarily to the United States, Germany or France (Olšovský 1961).

The situation during the Great Depression was different. Nominal wages decreased dramatically. The decreases, however, were different in different

[6]Průcha (2004) states unemployment increased seven times.

Table 3.16: Indexes of annual wages and living costs, 1929=100, 1919–1937

	Index of annual real wages	Living cost index
1919	51.0	75.3
1920	69.2	128.8
1921	85.5	137.0
1922	89.8	116.0
1923	93.6	90.0
1924	92.1	93.2
1925	89.0	97.0
1926	91.0	96.0
1927	91.1	100.1
1928	96.2	100.3
1929	100.0	100.0
1930	94.4	97.8
1931	91.5	93.6
1932	88.8	91.8
1933	85.0	90.8
1934	84.0	89.7
1935	81.0	92.3
1936	86.0	93.2
1937	90.4	94.4

Source: Teichová (1988), Statistical yearbooks

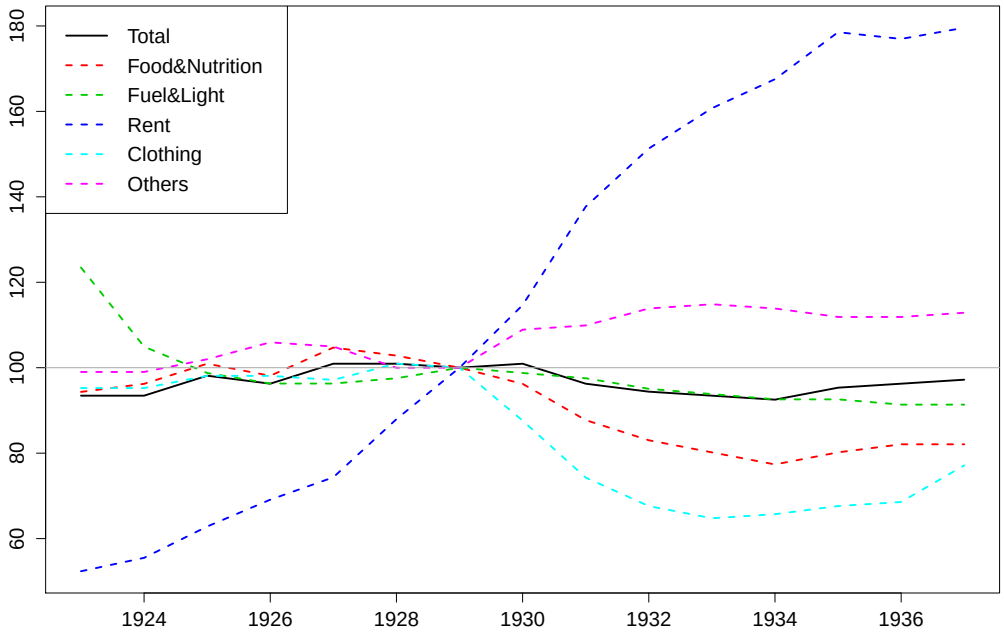
sectors and territories. The worst situation was in agriculture, where wages decreased between 1929 and 1935 by 33% in Moravia, 42% in Bohemia, 36% in Slovakia and 47% in Subcarpathian Ruthenia (Olšovský 1961). Real wages decreased for five subsequent years after 1930. The social situation worsened again as the total Living cost index decreased between 1929 and 1934 by 10.3% while the real wages fell by 16% in the same time period and declined even in 1935, when the living cost index increased (see Table 3.16). A relatively small decrease in living costs can be explained by a steady increase in rental costs regardless of the crisis (see Figure 3.17). Other components of the living cost index were food, clothes, fuel and services.

Table 3.17: Structure of strikes, 1921–1923

	Strike wage increase, in %	Strike against wage decrease, in %
1921	42.0	9.2
1922	17.5	50.0
1923	33.0	33.8

Source: Olšovský (1961)

Figure 3.17: Living cost index, Worker's family, 1923–1937, 1929=100



Source: Author's computation, Statistical yearbooks

The labor market significantly changed between the years 1929 and 1935. In 1928 the Czechoslovak economy was booming and the number of unemployed amounted to only 39 thousand people in a country a population of almost 14 million. As described specifically in Section 3.4, during the Great Depression the economy faced worsening demand conditions and, notably, industrial production significantly decreased. As a result, the average number of unemployed increased to 738 thousand people in 1933, i.e., by almost 1 800% in comparison to the annual average in 1929.

Unemployment, Wages and Living Expenses: Summary

The social situation after World War I was alarming. The population suffered from a poor food supply and the increase of price level which had occurred during the war was not compensated by a corresponding increase in nominal wages. The first deflationary era was accompanied by strikes and increased unemployment, but the index of the average wage fell only between the years 1923 and 1924.

The situation was dramatically different during the Great Depression when real wages decreased significantly in six subsequent years. The social situation worsened due to decreasing wages, rising and long-lasting unemployment and also by an insufficient decrease of living costs. This index was especially driven up by a steady increase in rental costs.

Chapter 4

Correlation Analysis

4.1 Methodology

The data available for Czechoslovakia between the years 1919 and 1935 includes annual data for most variables while only having data available for a few variables on a monthly basis. The analysis is divided into two sections. The first one analyzes the relationship between the exchange rate and price indices during Rašín's deflationary era. The second section focusses on the relationship between the wholesale price index and the consumer price index, the living expenses index, export and the index of industrial production.

The data analysis is based on two types of correlation[1]: Pearson's product-moment correlation and Spearman's rank-order correlation.

Pearson's r is calculated as follows:

$$r = \frac{\sum_i^n z_{Xi} z_{Yi}}{n} \tag{4.1}$$

where

$$z_{Xi} = \frac{X_i - \bar{X}}{s_X} \tag{4.2}$$

$$z_{Yi} = \frac{Y_i - \bar{Y}}{s_Y} \tag{4.3}$$

where $\bar{X}$ and $\bar{Y}$ are the means of variables X and Y, n is number of observations,

[1]Classical regression analysis or VAR model can not be used due to small sample size.

standard deviation of X:

$$s_X = \sqrt{\frac{\sum_i^n (X_i - \bar{X})^2}{n}} \tag{4.4}$$

standard deviation of Y:

$$s_Y = \sqrt{\frac{\sum_i^n (Y_i - \bar{Y})^2}{n}}. \tag{4.5}$$

Person's r explain a linear interdependence between variables X and Y. The larger the coefficient (in absolute value), the more interdependence. Pearson's r ranges from -1.00 to +1.00. A value +1.00 represents a perfect positive correlation, -1.00 a perfect negative correlation. The mathematical property of Pearson's correlation coefficient treats both variables symmetrically and the coefficient in absolute value is not affected by any linear transformation. However, Pearson's r is not an appropriate index when the relationship between variables is not linear (Connelly 2012).

Spearman's ρ is calculated as follows:

$$\rho = 1 - \frac{6 \sum_i^n (X_i - Y_i)^2}{n} \tag{4.6}$$

where $(X_i - Y_i)$ represents the difference between the ranks on variables X and Y and n is the number of observations.

Spearman's ρ is a non-parametric measure of rank correlation, i.e. Pearson's r for ranked data. Spearman's rank correlation is a nonparametric statistic and, as Pearson's coefficient, measures a strength of association between two variables. The advantage of Spearman's correlation is that it does not require the linearity assumption between variables and the correlation coefficient is not affected by outliers (Hauke & Kossowski 2011).

The analysis uses the t test to test the null hypothesis of no correlation for both types of coefficients. The null hypothesis $H_0 : r = 0$ is tested using the test statistic:

$$t = r \sqrt{\frac{N-2}{1-r^2}} \tag{4.7}$$

with $N - 2$ *df* (Myers *et al.* 2010), (Lomax & Hahs-Vaughn 2013).

Table 4.1: Correlation coefficient interpretation

Absolute value of the correlation coefficient	Interpretation
0.90 to 1.00	Very high correlation
0.70 to 0.90	High correlation
0.50 to 0.70	Moderate correlation
0.30 to 0.50	Low correlation
0.00 to 0.30	Negligible correlation

Source: Hinkle *et al.* (2003)

4.2 Foreign exchange intervention

The first correlation analysis concentrates on the relationship between the exchange rate of the Czechoslovak koruna to the Swiss franc and the price index during and after the interventions in 1921–1922. The analyzed data covers the monthly data on the exchange rate of the Czechoslovak koruna, the wholesale price index[2] and the consumer price index[3] for the period between January 1921 and December 1925 (60 observations). The dataset is divided into two sets of observations, due to the assumption of structural change in 1923. Period 1 one covers a period with volatile variables, i.e., the period between January 1921 and December 1922 (24 observations). Period 2 covers a period with stabilized variables, i.e. period between January 1923 and December 1925 (36 observations).

To estimate the correlation coefficient, the time series is first differenced to render them stationary. The correlation is computed for zero to three leads, meaning the correlation is computed by exchange rate in time t and the price index in time $t + n$, where n=0,1,2,3. In this section Pearson's correlation coefficient was used.

The null hypothesis is that exchange rate and price indices are correlated.

Results

As depicted in Table 4.2 and Table 4.3 Pearson's correlation coefficients suggest low positive correlation between exchange rate and price indices. The correlation coefficient between the exchange rate and the wholesale price index is the strongest and statistically significant at 5% level with one lead in the

[2]Price index created by Prof. Dr. Mildschuh, official index created by the state statistical office covers period after January 1921.

[3]Consumer price index, Group I.

case of Period 1 and with two leads in Period 2. The reverse situation exists in the case of consumer price index. The correlation coefficient is statistically different from zero with two leads in Period 1 and one lead in Period 2.

As we can not assume the causal relationship[4] between exchange rate and price indices, we can interpret the results described above as follows. In Period 1, there is a linear relationship between exchange rate and wholesale price index when we compare both variables in time t, but the relationship is stronger when we compare the exchange rate with the price index delayed by one month. In Period 2, the relationship is statistically significant only if we compare the exchange rate with the price index two months later, i.e. the co-movement of variables is delayed by one more month.

The results of the correlation between exchange rate and consumer price index show the opposite pattern. While in Period 1 the correlation coefficient was statistically significant with two months delay, in Period 2 the coefficient was significant with one month delay.

We can say that there is a statistically significant positive linear relationship between the exchange rate of the Swiss franc and the wholesale and consumer price indexes with one to two leads. The coefficients suggests low positive correlation between variables.

Table 4.2: Pearson's correlation coefficient r: Exchange rate of Swiss franc and Wholesale price index

	Period 1		Period 2	
Variable (lead)	Correlation coefficient	p-value	Correlation coefficient	p-value
Wholesale price index (0)	0.35*	0.0986	0.12	0.4765
Wholesale price index (1)	0.45**	0.0307	0.16	0.3678
Wholesale price index (2)	0.34	0.1219	0.40**	0.0217
Wholesale price index (3)	0.02	0.9477	-0.03	0.8890

Note: n=24 (Period 1), n=36 (Period 2); numbers in parentheses indicates number of leads; p-value corresponds to t-test of no correlation (***=1%, ** = 5%, *=10% levels of significance).

[4]Causal relationship cannot be analyzed using correlation analysis.

Table 4.3: Pearson's correlation coefficient r: Exchange rate of Swiss franc and Consumer price index

	Period 1		Period 2	
Variable (lead)	Correlation coefficient	p-value	Correlation coefficient	p-value
Consumer price index (0)	0.17	0.4248	-0.09	0.5973
Consumer price index (1)	0.33	0.1196	0.37**	0.0298
Consumer price index (2)	0.41*	0.0557	0.15	0.4004
Consumer price index (3)	-0.06	0.8112	0.10	0.5779

Note: n=24 (Period 1), n=36 (Period 2); numbers in parentheses indicates number of leads; p-value corresponds to t-test of no correlation (***=1%, ** = 5%, *=10% levels of significance).

Figure 4.1: Exchange rate of Czechoslovakian koruna to Swiss franc and wholesale price index, nominal, 1921–1925

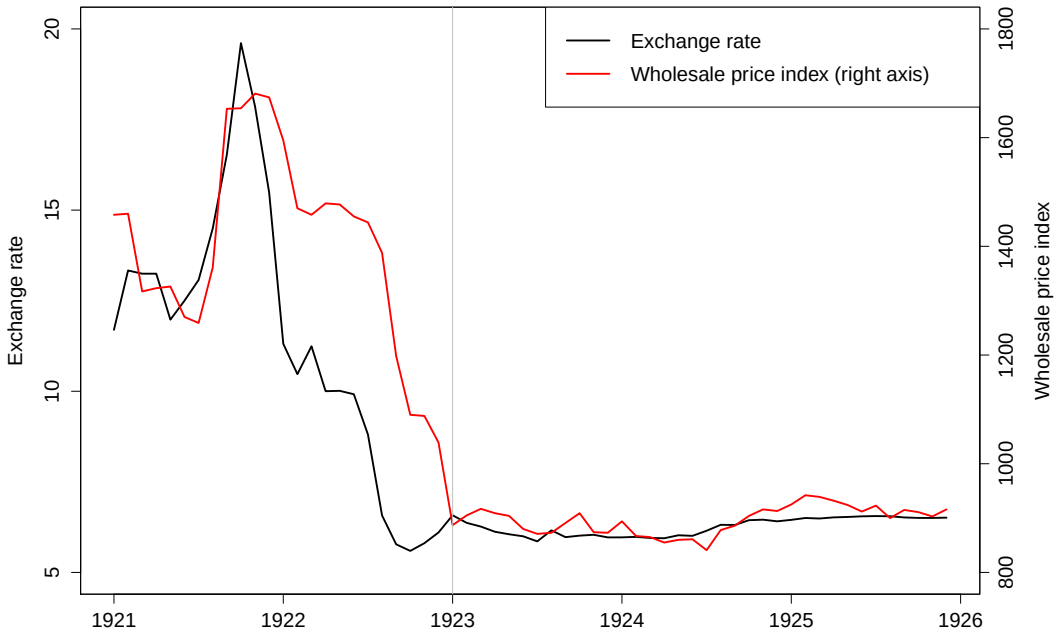
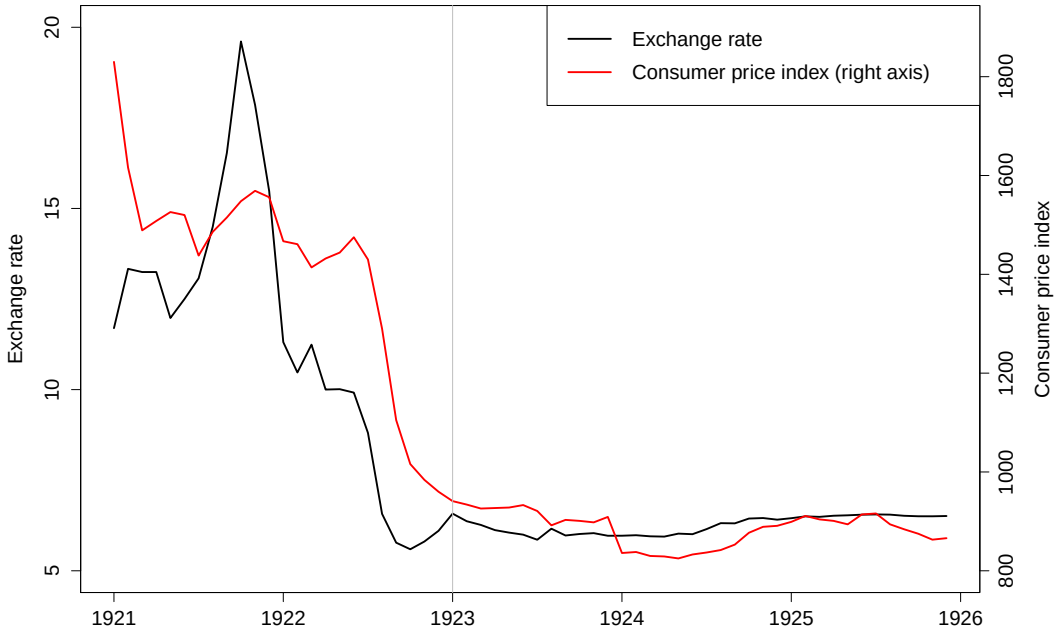


Figure 4.2: Exchange rate of Czechoslovakian koruna to Swiss franc and consumer price index, nominal, 1921–1925



4.3 Annual data

The second section of correlation analysis is based on annual data covering the wholesale price index (1920–1935), the consumer price index (1921–1935), the living expenses index (1924–1935), the export in nominal values (1920–1935) and the index of industrial production (1920–1935). The analysis is based on the delayed relationship between variables as in the previous section. The studied relationship is the correlation between the wholesale price index and all the variables mentioned above with zero to two leads (two years).

The correlation analysis is based on Spearman's rank-order correlation. This type of correlation is non-parametric and more robust to outliers, hence, it was selected as a more appropriate methodology.

Results

Based on the correlation coefficients presented in Table 4.4, all the analyzed variables, except for the index of industrial production, are correlated with the wholesale price index at least at 5% significance level.

The resulting correlation between the wholesale price index and the consumer price index suggests a very high positive Spearman correlation between those variables. The correlation is strongest with one lead and coefficient amounts to 0.88. As depicted in Figure 4.3, both indices follow the same path except for minor differences, e.g. in 1924 the wholesale price index increased while the consumer index decreased.

The index of living expenses has the strongest correlation with the wholesale price index with a one year lead as the consumer price index. The correlation coefficient of 0.61 is statistically significant at 1% and suggest moderate positive correlation. The less stronger correlation between variables might be affected by an increase of rental expenses during the whole time period[5] despite long-lasting deflation.

Export is highly correlated with the wholesale price level without any lead. As depicted in Figure 4.5, both variables move similarly. The correlation coefficient amounts to 0.84 and is significant at 1% level.

In the case of rank-order correlation between the wholesale price index and the industrial production index, there is no evidence against the null hypothesis of no correlation. As depicted in Figure 4.6 the index of industrial production developed differently than the wholesale price index. Data do not reject the hypothesis of structural break in 1923, but due to a small sample (n=15) we can not make an inference based on this analysis.

[5]See decomposition of index of living expenses in Figure 3.17

Table 4.4: Spearman's correlation coefficient ρ: Wholesale price index and selected variables

Variable (lead)	Correlation coefficient	p-value
Consumer price index (0)	0.84***	$9.14e^{-05}$
Consumer price index (1)	0.88***	$1.36e^{-05}$
Consumer price index (2)	0.82***	0.000379
Living expenses index (0)	0.60**	0.038588
Living expenses index (1)	0.61**	0.035806
Living expenses index (2)	0.48	0.112409
Export (0)	0.84***	$4.44e^{-05}$
Export (1)	0.75***	0.001391
Export (2)	0.56**	0.035330
Industrial production index (0)	-0.19	0.477503
Industrial production index (1)	-0.15	0.597421
Industrial production index (2)	-0.04	0.887164

Note: n=16 (Wholesale price index, Export, Index of industrial production), n=15 (Consumer price index), n=12 (Living expenses index); numbers in parentheses indicates number of leads; p-value corresponds to t-test of no correlation (***=1%, ** = 5%, *=10% levels of significance).

Figure 4.3: Wholesale price index and consumer price index, nominal, 1920–1935

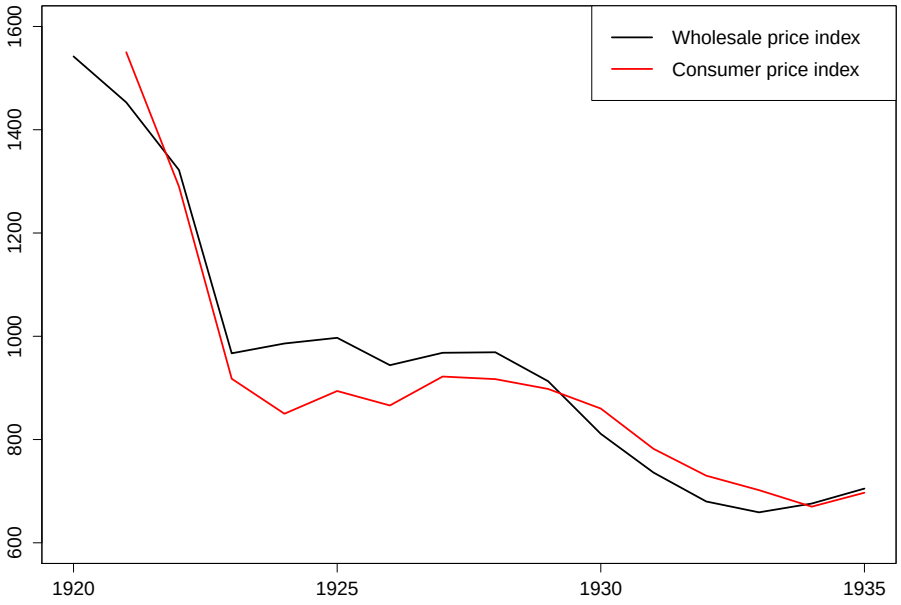


Figure 4.4: Wholesale price index, nominal, and index of living expenses, 1920–1935

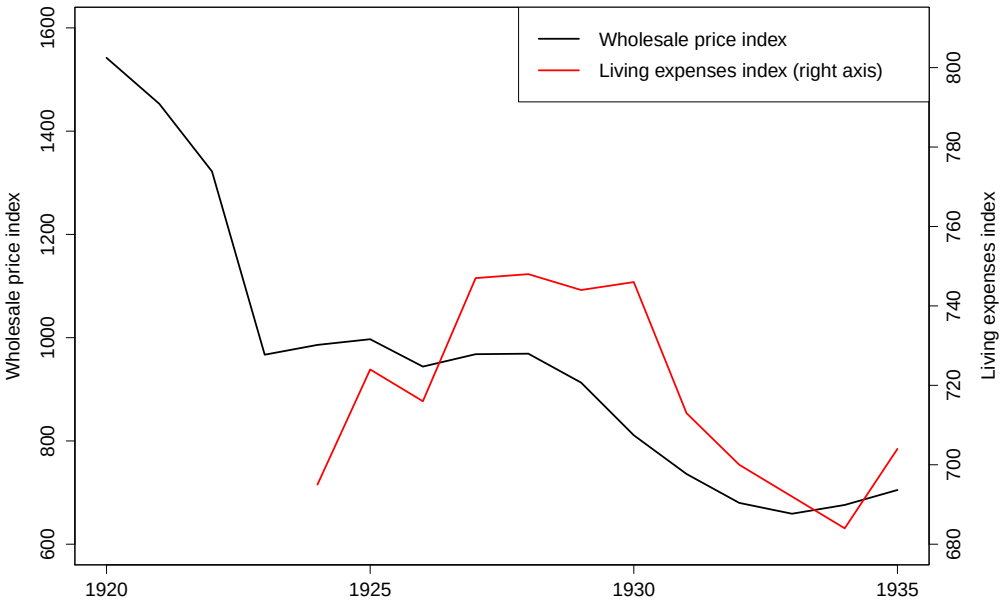


Figure 4.5: Wholesale price index, nominal, and Export in mil. Kč, 1920–1935

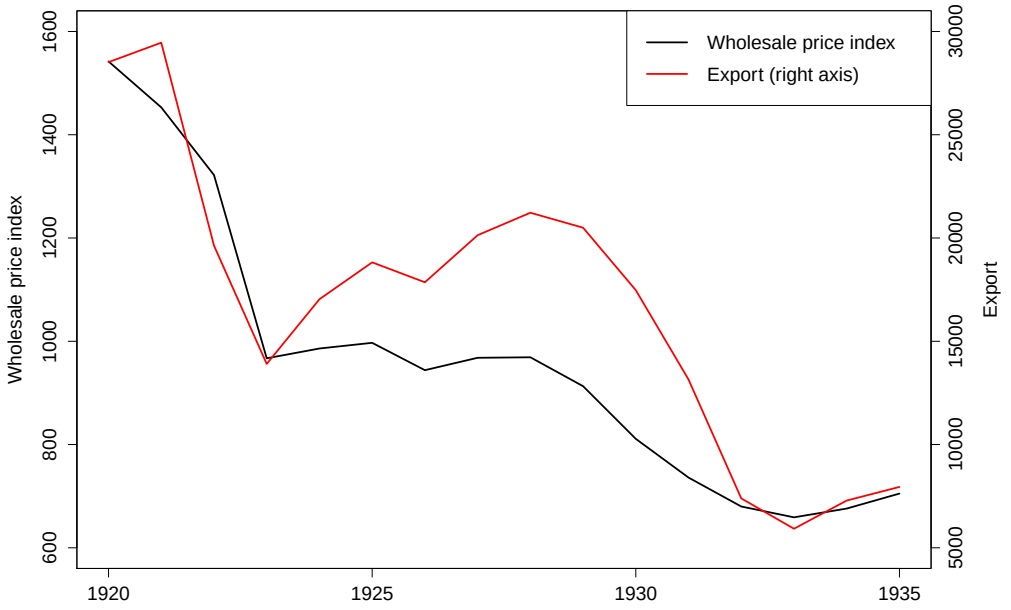
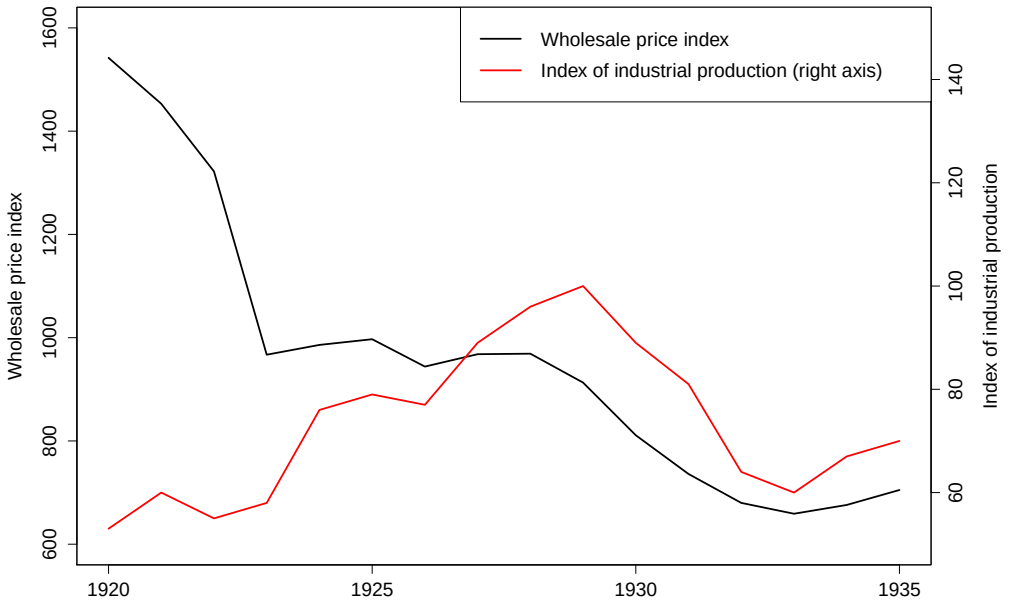


Figure 4.6: Wholesale price index, nominal, and Index of industrial production, 1920–1935



Chapter 5

Conclusion

This thesis focused on deflation, i.e., a decline in general price level. Even though this phenomenon is currently frequently discussed, there have only been a few eras of deflation in the last fifty years. However, historical data indicates, that deflation was common in the second half of the 19^{th} century and in the beginning of the 20^{th} century. After World War II the occurrence of deflation dramatically decreased. The only exception is Japan which has been suffering from deflation since the mid-1990's. The attention to deflation was renewed, in the first wave, around the years 2003 and 2004 due to deflationary scares in the US and Europe. The second wave of attention has been raised recently due to problems of zero lower bound on interest rates and the falling price of commodities, especially oil.

Theory distinguishes two types of deflation; the first is deflation caused by negative demand shock, i.e., by nominal rigidities, burst of asset price bubbles, lower confidence in government policies or corrections in expectations. The second is deflation caused by positive demand shock, i.e., by increasing productivity, rising real wages and asset prices, lower price products and stronger financial sector performance. Contemporary mainstream economic theory regarding deflation is divided into two main groups: Liquidity trap theorists and Good-Versus-Bad deflation theorists. While Good-Versus-Bad deflation theorists see some positives for a real economy in deflation, Liquidity trap theorists seldom see deflation as benign, even thought deflation is caused by positive supply shock.

The second part of this thesis analyzed two deflationary eras during the 1920's and 1930's in Czechoslovakia, each of them with different characteristics. While the Rašín's deflation was self-imposed by interventions on the foreign

exchange market and as a tool to partially restore prewar price level after years with inflation rates above 70%, the deflation during the Great Depression was imposed by external factors.

Both deflationary eras in Czechoslovakia were significantly affected by the historical context. The purpose of the first, self-imposed deflation under Rašín in 1921–1922 was to partially restore prewar price level and to structurally change the development of the price level because the inflation rate amounted up to 77% in year-over-year comparison to the previous years. Deflation caused by foreign exchange interventions brought significant costs, especially to the export industry, raised unemployment and worsened the social situation. On the other hand, it was very beneficial in terms of price stability and international credibility. Rašín's deflationary policy and strict monetary policy was in direct contradiction to the development of Austria, Hungary, Germany and Poland, i.e., states which experienced a dramatic hyperinflation.

On the other hand, deflation during the Great Depression was caused by lack of demand and was mainly tied up with the gold standard, which left nations without the ability to flexibly adjust their exchange rates. During the second deflationary era, the Czechoslovak economy fell for four consecutive years, i.e., long-lasting problems in all spheres of an economy. However, the worst situation was most likely in agriculture as farmers faced wide disparity between prices of products and production costs. The social situation dramatically worsened as unemployment grew manifold, real wages decreased in six subsequent years and living costs did not decrease sufficiently.

The last part analyses correlation between the price index with selected variables. The first analysis, based on monthly data, focuses on the relationship between the exchange rate of the Czechoslovak koruna to the Swiss franc and the price index during the interventions in 1921–1922. Results indicate that price indexes follow the exchange rate with one to two periods lag and variables are low positively correlated. The second analysis, based on annual data, focuses on the correlation between the wholesale price index and the consumer price index, the living expenses index, export and the index of industrial production. Results show positive correlation, except for the index of industrial production.

The last, analytic, section is strongly influenced by the lack of available data. The consumer price index started in January 1921, therefore one cannot precisely analyze the sufficiently long period before the interventions to clearly describe the possible structural changes caused by interventions. Also,

most variables were available only with the annual frequency, hence with few observations.

Further analysis of deflation in Czechoslovakia could be focused on the comparison of price level development in the neighboring countries. In the case of the first deflationary period, analysis could describe the effect of Alois Rašín's tight monetary policy and self-imposed deflation in contrast to countries with hyperinflation. In the case of the Great Depression, panel data could show the effect of the gold standard and other aspects of monetary policy on the real economy during the crisis.

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