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Why Did Norway Encounter Pronounced Levels of Inflation After the Pandemic?

A Study of Inflation Dynamics

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Abstract

This master thesis conducts a comprehensive analysis of inflation dynamics, trying to gain a better understanding of why inflation increased to such pronounced levels in the years after the COVID-19 pandemic. The pandemic caused the world economy several serious problems, with high inflation being the major problem in the aftermath of the pandemic. We analyzed this problem by employing a time series analysis to identify and evaluate key determinants, as well as a case study, comparing inflationary trends in Norway and Switzerland.

Through detrending CPI and nine different economic variables, we carried out a multiple regression analysis to investigate whether the economic variables could explain the rise in inflation. In our empirical investigation, we ascertain that money supply, credit volume, the Harmonized Index of Consumer Prices (HICP), and unemployment emerge as the most significant factors influencing inflation. Our findings support existing literature on inflationary processes, which provides policymakers and economists with nuanced perspectives for informed decision-making.

In addition to the time series analysis, a comparative case study between Norway and Switzerland is undertaken to further assess how a country´s macroeconomic landscape influences inflation. The study reveals a notable disparity in inflation rates, with Switzerland exhibiting lower inflation levels attributed to the resilience of its currency. This underscores the vital role of exchange rate dynamics in shaping inflation outcomes and advocates for a holistic approach to economic policy formulation.

In conclusion, this master thesis contributes to the ongoing discussion on inflation, presenting a nuanced analysis that deepens our comprehension of the multifaceted forces driving inflationary trends. Through a combination of empirical evidence and case study insights, our research strives to inform strategic policy decisions aimed at fostering economic stability and resilience in an era of continual change.

Preface

This thesis is written as a concluding part of the master's study in business administration at the Norwegian School of Economics, where we are majoring in financial economics.

The topic of the thesis is the post-pandemic inflation in Norway from a Western perspective – a topic for which we share a strong common interest. A thesis on inflation is well in line with our desire to study something highly topical, as it affects nearly every aspect of the economy. Ever since the inflation rate began rising in 2022, it has reshaped the news picture and debate environment in Norway, shifting it inwards from focusing on global events to more domestic challenges.

The process of working on this subject has been challenging yet rewarding, deepening our appreciation for comprehensive studies. Despite the high demands, the process has been highly educational, thus broadening our knowledge and pushing our analytical abilities to new heights.

We would like to extend our gratitude to our supervisor, Ola Honningdal Grytten, for his very professional and valuable guidance and feedback during this process. Furthermore, we extend our gratitude for the wonderful collaboration this fall. Despite our frequent work over the past four years, this period has provided a unique opportunity to delve deeply into an intriguing topic, hence bringing us immense joy and satisfaction.

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1. Introduction

"Inflation is as violent as a mugger, as frightening as an armed robber and as deadly as a hit man" – Ronald Reagan [1].

In the aftermath of the global upheaval brought forth by the COVID-19 pandemic, the economic currents have taken on a complex and often unpredictable course. In the heart of this economic turbulence lies the surge of inflation in post-pandemic Norway. Our thesis is a voyage into the intricate web of factors that contributed to this distinctive inflationary trend, seeking to unravel the forces at play.

The pandemic's impact on Norway was profound, with economic indicators reflecting a shifting landscape. As the gross domestic product contracted and unemployment soared, private debt witnessed a notable surge, signaling a fascinating interplay of economic dynamics [2] [3] [4].Yet, amidst these fluctuations, the weakened Norwegian currency emerged as a noteworthy protagonist, influencing the trajectory of inflation [5].

Our study is not merely a dissection of economic phenomena; it is a quest to understand the essence of Norway's post-pandemic inflation. Beyond the data and theories lies a pursuit to uncover the lessons embedded in the numbers, offering insights that resonate in the broader context of western economies.

1.1 Research Question

In response to the unprecedented challenges posed by the global pandemic, Norwegian authorities undertook extensive measures to mitigate economic repercussions, deploying both expansive monetary and fiscal policies. Key interest rates were adjusted, and a substantial infusion of liquidity was implemented. The motivation for our research inquiry stems from the remarkable surge in inflation rates experienced by Norway in the aftermath of the pandemic. This inflationary surge is particularly intriguing when viewed through a western perspective, considering the broader economic dynamics in the region. Against this backdrop, our study seeks to unravel the factors contributing to Norway's distinctive post-pandemic inflationary trends. By delving into the intricate interplay of monetary and fiscal policies, examining the

economic landscape, and considering external factors, we aim to address the core research question:

"*Why Did Norway Encounter Pronounced Levels of Inflation After the Pandemic?*

1.2 Delimitations

While our exploration seeks to shed light on the intricacies of post-pandemic inflation in Norway, it's imperative to delineate the boundaries within which our study unfolds. First and foremost, the scope of this thesis is confined to the post-COVID-19 period, neglecting potential longer-term trends that may manifest in the wake of the pandemic. Additionally, the focus remains primarily on macroeconomic factors, limiting the depth of our analysis into microeconomic influences on inflation. The geographical scope narrows our lens to Norway, precluding a broader comparative analysis with a more extensive set of western economies. Furthermore, our study operates within the constraints of available data, acknowledging the potential limitations posed by data gaps or delays in official releases. These delimitations underscore the specificity and depth of our inquiry, providing a clear framework for the interpretation of our findings.

1.3 Structure

In chapter 2, we present theories, models, and other terms and concepts that are adopted further on and throughout the thesis. We introduce three types of inflation and two types of price indices, before presenting the Quantity Theory of Money, the Expectations-Augmented Phillips Curve, and New Keynesian models.

Chapter 3 consists of a literature review, where we introduce the most prominent macroeconomic factors that tend to affect inflation in Norway. To put recent developments into context, the chapter is completed with historical developments of Norwegian inflation.

The methodology is presented in chapter 4, including an assessment of validity and reliability. Data analysis techniques such as the Hodrick Prescott-filter, Multiple Linear Regression, and the Variance Inflation factor is also discussed in this chapter, before concluding the chapter with our findings.

Chapter 5 explores the analysis of the Consumer Price Index (CPI) in Norway using methods introduced in Chapter 4. The HP filter is initially applied to examine the CPI trend and identify any deviations. The chapter then investigates the CPI in connection with potential influential factors to understand if variations can be attributed to these factors or if other elements are contributing.

In chapter 6, we introduce a case study that we conducted on inflation differentials in Norway and Switzerland. After an overview of government measures introduced during and after the pandemic in both countries, we analyze developments in several inflationary parameters in Norway and Switzerland. The chapter is completed with an assessment of the Swiss franc and other factors that is likely to have dampened the inflationary pressures in Switzerland, before concluding on the learnings from Switzerland.

Lastly, chapter 7 of the thesis gives a comprehensive summary of the findings from the empirical time series analysis on inflation along with the conclusion.

2. Theories and Models

In this chapter, we delve into the theoretical foundations and models that underpin our understanding of inflation. From classical views emphasizing the role of money supply to contemporary insights integrating behavioral factors, we explore the diverse frameworks that economists have developed to understand the complexities of inflation. By evaluating some of the models, we aim to provide a concise yet comprehensive overview, laying the groundwork for a nuanced analysis of inflationary pressure.

2.1 Definition and Types of Inflation

We start by diving into the aspects of inflation and understanding its forms and expressions. It is imperative to have this knowledge because it will help us delve deeper into the causes of inflation in today's world. We will explore different types of inflation, as well as different metrics of measuring inflation.

Inflation is the rate of increase in prices over a given period of time, which can be translated as the decline of purchasing power over time [6]. The average price increase of a selection of products and services over time can serve as an estimate for the inflation rate. The rise in prices, usually expressed as percentage, means that a unit of currency effectively buys less compared to prior periods. Deflation, which occurs when prices decline and purchasing power increases, can be contrasted with inflation [7].

Measuring price changes of products and services over time is straightforward, but the needs of humans go beyond just a few items. Individuals require a wide range of products and services to live comfortably. This includes necessities like food, metal, fuel, utilities like electricity and transportation, and services like healthcare and labor. The purpose of measuring inflation is to assess the overall price changes across a variety of goods and services. It provides a single value that represents the increase in the price level of goods and services over a period of time [7].

As prices rise, one unit of money buys less goods and services. This decrease in purchasing power impacts the cost of living for the public which eventually leads to a deceleration in economic growth. Economists generally agree that sustained inflation occurs when an economy's money supply grows faster than the economic growth. To battle this issue, the

monetary authority takes the necessary measures to regulate the money supply and credit to maintain inflation within acceptable limits and ensure the economy is running smoothly [7].

There are three primary types of inflation: Demand-pull inflation, Cost-push inflation and Built-in inflation.

2.1.1 Demand-Pull Inflation

Demand-pull inflation causes prices to rise due to an increase in aggregate demand, where demand outpaces the available supply of consumer goods, a condition which economists often describe as “too many dollars chasing too few goods” [8].

Demand-pull inflation can occur when there is a strong demand from consumers for a certain product or service. When there is a high demand for various goods in an economy, prices tend to go up. While short term imbalances of supply and demand may not be a concern, sustained high demand can echo in the economy and raise costs for other goods, thus we get demand-pull inflation [9].

When unemployment is low and wages are increasing, consumer confidence tends to be high, which leads to higher spending. The growth of the economy directly influences consumer spending levels, which can drive up the demand for products and services. As the demand for a product or service rises, the available supply decreases. When there are fewer items available, consumers are often willing to pay more to obtain them based on the economic principle of supply and demand. As a result, we get demand-pull inflation with an increase in prices [9].

Companies also play a critical role in inflation, particularly if they produce popular products. A company can raise prices because consumers are willing to pay more for them. Additionally, corporations may freely increase prices when they sell items that people need for their everyday life, such as food, oil and gas. However, it is the purchasing power of consumers that enables corporations to increase their prices [9] [10].

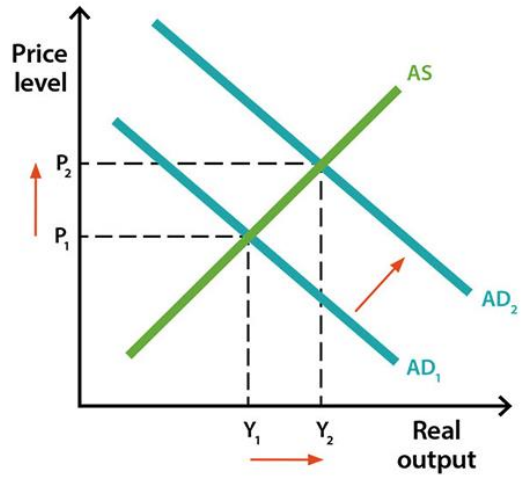

Figure 1: Aggregate demand increases, leading to a higher price level [10]

Figure 1 illustrates how an increase in aggregate demand results in a new equilibrium, with a higher price level and higher output. This is an illustration of how Demand-pull inflation occurs [10].

2.1.2 Cost-Push Inflation

Cost-push inflation occurs when prices increase due to a rise in production costs, like materials and wages. This happens when the supply of goods decreases while the demand remains unchanged. Consequently, consumers end up paying higher prices for finished goods because of the increased production costs [9].

One indication that cost-push inflation may be occurring is the trend in commodity prices, such as oil and metals since they are key inputs in production. For instance, if the price of oil goes up, businesses that utilize oil in their products might raise their prices. If the demand for these products is not influenced, companies will pass on the costs of raw materials to consumers. This leads to increased consumer prices without any change in product demand [9].

Wages also impact production costs and are usually a significant expense for businesses. During good economic periods, where we have low unemployment rates, labor shortages can arise. In response, companies raise wages to attract qualified candidates, which ultimately drives up their production costs. When companies increase prices due to increased employee wages, cost-push inflation occurs. Natural disasters or pandemics can also cause an increase

in prices. For instance, when a hurricane devastates crops of corn, prices tend to increase throughout the economy as corn is an essential ingredient in numerous products [9].

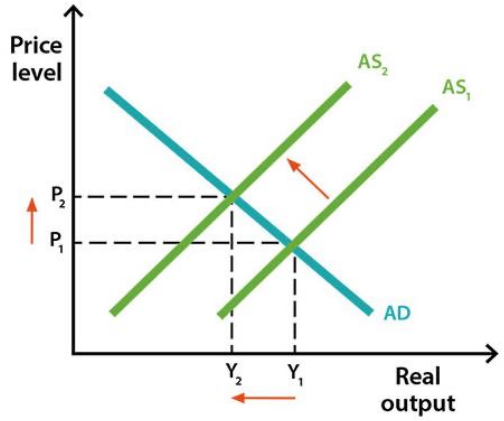

Figure 2: Supply decreases while demand remains the same, leading to lower output and higher price level [10]

Figure 2 illustrates how a decrease in supply, for example through higher production costs, results in a new equilibrium, with a higher price level and lower output [10].

2.1.3 Built-In Inflation

When there is a belief that inflation will persist in the future, it leads to built-in inflation. As the cost of goods and services goes up, people tend to expect increases at similar rates in the future. Because of these shared expectations, workers may ask for higher wages in order to keep up with the price increases and maintain their living standard. This rise in wages would result in increased costs for businesses, which again may pass those costs on to consumers. Moreover, higher wages also boost consumers disposable income, leading to an increased demand for goods that can further push prices upward. This interplay between wages and prices can set off a wage-price spiral, as both factors influence each other continuously [9].

2.2 Types of Price Indices

Multiple types of baskets of goods and services are calculated and tracked to be used as price indices. The Consumer Price Index (CPI) and the Producer Price Index (PPI) are two of the most widely used price indices [7].

A Consumer Price Index (CPI) is a measure that looks at the weighted average of prices of goods and services that people commonly need, such as transportation, food and medical care. The CPI was adopted by Statistics Norway in 1959, with the inclusion of consumption costs for all households, rather than just the working class, which was the case in the cost of living index prior to 1959 [11]. To calculate the CPI, we analyze how the prices of each item in a predetermined basket of goods change over time. We then average these price changes based on their relative weight of each item in the basket. The prices considered are retail prices, which are the ones that consumers pay when purchasing these items. The changes in CPI are used to reflect the changes associated with the cost of living, making it one of the most used statistics for measuring inflation [7].

A Producer Price Index (PPI), which tracks price changes that have an impact on domestic producers, is another indicator of inflation. A PPI tracks the cost of metals, chemicals, agricultural items and fuel, and will be affected if the price increases influencing PPI are passed on to consumers. While the CPI assess the customer perspective, it is the average selling price that producers receive for their output over time that determines PPI inflation, thus reflecting the producer perspective of inflation [9].

Norges Bank uses CPI (KPI) to measure inflation. Some prices included in the CPI tend to vary widely from one period to another. This applies, among other things, to energy prices, which can rise a lot in one period and then fall in the next. Such price changes can create noise in the picture of the underlying trend in price development. Norges Bank uses a variety of underlying inflation measures to help filter out temporary swings in inflation. The CPI-ATE (KPI-JAE), which is the CPI adjusted for tax increases and excludes energy products, is the most crucial indicator for underlying inflation in Norges Bank's analyses [12]. Core inflation, which excludes energy and food prices, is also a commonly used measure among many countries to exempt the volatility in food and energy prices. The European Central Bank refers to this core inflation as Harmonized Index of Consumer Prices (HICP) [13].

2.2.1 Quantity Theory of Money

Monetary economics is a branch of economics that studies different theories of money. The Quantity theory of money (QTM) is one of the main topics of study for this field of economics. The general level of prices for goods and services in an economy is proportional with the money supply, according to this theory. Although the Polish mathematician Nicolaus

Copernicus first proposed this hypothesis in 1517, economists Milton Friedman and Anna Schwartz later popularized it after the release of their book, "A Monetary History of the United States, 1867-1960," in 1963 [14].

The quantity theory of money states that when money doubles in an economy, prices will also double, all other things being equal. This implies that for the same number of products and services, the consumer will spend twice as much, which results in inflation. As with any commodity, the same forces of supply and demand also influences money; An increase in supply decreases the marginal value of money, which means that the buying capacity of one unit currency decreases. The prices of goods and services increase to compensate for this decline in the marginal value of money, which raises the inflation rate. Additionally, QTM assumes that the quantity of money has a significant influence on economic activity. This means that a change in money supply either changes price levels or the supply of goods and services, or both [14].

To better understand the Quantity Theory of Money, we can use the exchange equation, developed by Irving Fisher. In its simplest form, as expressed below:

$$(M) * (V) = (P) * (T)$$

Equation 1: Quantity Theory of Money

Where:

$$M = Money\ Supply$$

$$V = Velocity\ of\ circulation$$

$$P = Average\ price\ level$$

$$T = Volume\ of\ transactions$$

Holding V and T constant, we can see that increases in the money supply will cause average price levels to increase, thus causing inflation. The assumption that V and T are constant holds in the long run, as these factors cannot be influenced by changes in the economy's money supply [15].

The growth of monetarism during the 1970s and 1980s made the quantity theory of money more relevant. In monetarism, restricting the quantity of money is the main method of

establishing economic stability. Governments should undertake policies that affect the money supply as a strategy to promote economic growth, since in monetary theory, changes in money supply are the primary causes underlying all economic activity [14].

Monetarists contend that a significant increase in the money supply can lead to a surge in inflation. This is because when money growth exceeds the growth of economic output, relatively smaller levels of production are backed up by too much money. To avoid a surge in inflation, it is imperative to ensure that the growth of the money supply remains slower than the growth in economic output [14].

2.2.2 Expectations-Augmented Phillips Curve

In 1958, A.W. Phillips wrote the paper "The Relationship Between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1861-1957", where he analyzed data on wages and unemployment rates in the UK. With his results, Phillips was able to depict a curve showing the negative relationship between these factors. The Phillips curve was developed in response to other empirical investigations and is today a widely known economic model [16].

In his studies, Phillips illustrated the relationship between the unemployment rate (U) and the rate of change of money wage rates, expressed as a percentage change annually (w), illustrated in Figure 3.

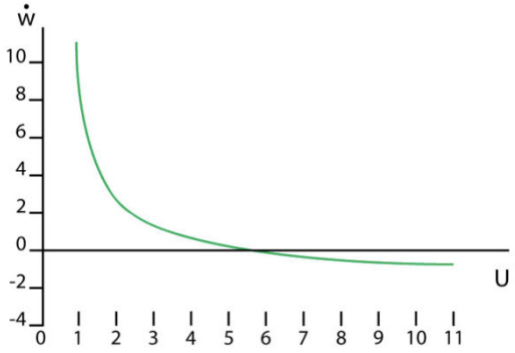

Figure 3:Unemployment (U) and wage (w) [17]

The point where the curve crosses the abscissa, and the fact that the coordinate appears to function as an asymptote, are both significant points to be taken into consideration. Since this rate of unemployment represents what an economy will experience for a zero percent growth in money wages, it is important to emphasize the significance of the point of crossover, which

is about 5.5 percent. In later modifications of the Phillips curve, this point will be referred to as the Natural Rate of Unemployment and Non-Accelerating Inflation Rate of Unemployment (NAIRU). Regarding the asymptote, as the author noted, there was no data of either lower unemployment rates or higher levels of change in money wages. We can conclude that there is a limit to how low unemployment can be. [17].

Paul A. Samuelson and Robert M. Solow examined a similar relationship in their 1960 paper "Analytical Aspects of Anti-Inflation Policy," using American data. They reached identical conclusions despite using inflation (π), as opposed to the rate of change in money earnings. The unemployment rate at price stability is the same at 5.5 percent as at money wage stability, and it appears that there is no way to reduce unemployment below a level around one percent, as illustrated in Figure 4.

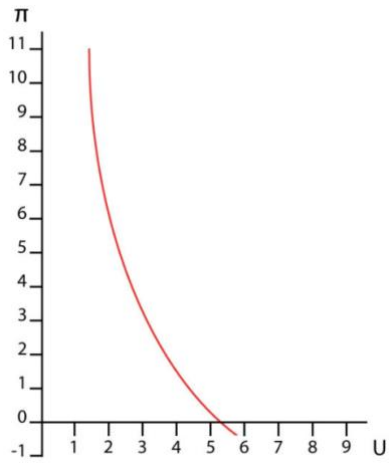

Figure 4: Unemployment (U) and inflation (π) [17]

The Phillips curve was for the first time considered a “menu of choice” in this article. In terms of policy, this meant that governments would have the option of choosing between a low unemployment rate with high inflation, and a higher unemployment rate with lower inflation. However, as the authors noted, this menu could only be utilized in the short-term because certain economic or policy developments could alter the curve's form in the long-term [17].

In the late 1960s, the adaptive expectations hypothesis became popular through the work of Phillip Cagan and Milton Friedman [17]. The validity of the Phillips Curve was also questioned when stagflation was rising in the 1970s. This scenario of stagnant economic growth, high unemployment, and high inflation directly contradicts the theory behind the Phillips curve. The stagflation phenomenon and the breakdown of the Phillips curve prompted

economists to examine the contribution of expectations to the relationship between unemployment and inflation in greater detail. The inverse relationship between inflation and unemployment could only persist over a short period because consumers and employees can adjust their expectations about future inflation rates based on current rates of inflation and unemployment [18].

These adaptive expectations were later introduced into the Phillips curve by monetarists, like Milton Friedman. It would therefore be reasonable to say that the expectations-augmented Phillips curve was originally used to explain the monetarists' view of the Phillips curve [19].

The expectations-augmented Phillips curve can be expressed as:

$$\pi_t = \pi_t^e + \alpha(u_t - u_t^*) + \epsilon_t, \quad a < 0,$$

Equation 2: Expectations-augmented Phillips curve [19]

Where:

$$\pi = Inflation$$

$$\pi^e = Expected\ inflation$$

$$u = Unemployment$$

$$u^* = Natural\ unemployment\ rate$$

$$\epsilon = Error\ term$$

From the expression, it is clear that the inflation rate today depends on expected inflation and the deviations of unemployment from its natural rate. Adaptive expectations fundamentally changed the perception of a government's ability to act. Monetarism embraced the theory, stating that people would stumble once or twice on the same stone, but not a third time. Based on the Phillips curve, if the government implements an expansionary monetary policy, inflation will increase and unemployment will decrease. However, after a second or third time, people will quickly associate increasing inflation to higher earnings, and change their behavior in accordance with their previous experiences. They would believe that monetary policy would not have the intended impact, given their expectations of inflation to reduce their purchasing power proportionally [19]. We depict this graphically in Figure 5.

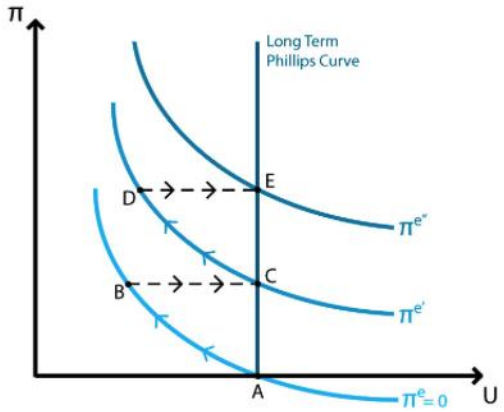

Figure 5: Expectations-augmented Phillips curve [20]

At first, unemployment and inflation are at point A. As a result of the government's decision to pursue an expansionary monetary policy, the markets are flooded with cheap credit, which encourages consumption. Along the Phillips curve, expectations shift to point B, where unemployment is reduced with a trade-off with a higher inflation rate. After a short period, agents start to link expansionary policy to inflation, which will be considered as a drain on their resources, and they will fight for higher salaries. As a result, the consumption boost will end and hiring incentives will be reduced. The agents' expectation curves will eventually move to point C. This process will continue in case of more expansionary policy, where point D will be achieved, eventually leading to point E. Because of this, inflation's long-term impact on unemployment, and vice versa, is minimal. Expansionary monetary policy will inevitably result in inflation with no long-term impact on unemployment.

To summarize, the Phillips curve will hold up in the short term, but not in the long term, according to monetarism. According to Friedman in his 1968 article “The role of Monetary Policy”, the Phillips curve is entirely vertical and predicts the natural rate of unemployment in the long run [19].

2.2.3 New Keynesian Models

Many Keynesian economists are critical to the fundamental concepts of the quantity theory of money and monetarism, and they contest the idea that attempting to control the money supply through economic policies is the best method to address economic growth [14].

New Keynesian economics is a branch of modern macroeconomics that is developed from the theories of John Maynard Keynes. Keynes was a British economist who first and foremost

tried to understand the causes of the Great Depression, and developed his theories in the 1930s based on this research. Keynes argued for a government response to the global crisis that involved raising government expenditure and decreasing taxes to stimulate demand [14]. His influence was great among academics and policymakers for several decades, but in the 1970s, new classical economists like Robert Lucas and Thomas Sargent questioned many of the theories developed during the Keynesian revolution. The term “New Keynesian” refers to those economists, who in the 1980s, modified the original Keynesian principles in response to this new classical critique [21].

How quickly wages and prices adjust is the main point of disagreement between new classical and new Keynesian economists. New classical economists assume wages and prices are flexible, and build their theories based on that assumption. They contend that quick price adjustments "clear" markets by balancing supply and demand. However, according to New Keynesian economists, market-clearing models are unable to account for short-term volatility in the economy, which is why they choose models with "sticky" wages and prices. This stickiness of wages and prices is a key component of the New Keynesian theories, which is used to explain why involuntary unemployment persists and how it can contribute to inflationary or deflationary pressure [21].

Costly price adjustments are one reason why markets do not clear out immediately. A company may need to send out a new catalog to clients, give new price lists to its sales personnel, or print new menus to update its prices. Firms modify prices sporadically rather than continually in consequence of these "menu costs", i.e., the costs associated with price changes.

Regarding short-term economic swings, economists are divided on the topic of menu costs. Skeptics claim that recessions, which are extremely expensive for society, are not likely to be explained by these insignificant expenses. The response from supporters is that "small" does not equate to "inconsequential". Even though menu expenses are minimal for a given business, they could have significant impacts on the economy as a whole [21].

According to New Keynesian economists, the phenomenon of sticky prices can be explained through the concept of staggering price adjustments, i.e., all firms cannot change their prices simultaneously. Adjustments occur over time, which introduces a complexity to businesses as they are concerned about their prices relative to those of other firms. This results in slow adjustments in the overall price level, even when individual prices change frequently. For

example, if some firms adjust prices on the first of the month and others on the fifteenth, a price increase by one firm may lead to customer losses, causing reluctance to raise prices substantially. This staggered approach results in a gradual rise in the price level as firms aim to avoid being the first to post significant price increases [21].

New Keynesian economists argue that recessions can result from coordination failures in wage and price setting. These failures occur because participants must anticipate the actions of others. For instance, when two firms must decide whether to cut prices after a monetary shock, each firm's choice depends on the other firm's decision. Coordination difficulties can lead to suboptimal outcomes, exemplified by a hypothetical scenario in which both firms prefer to lower prices but might not do so due to expectations of the other's actions [21].

The New Keynesian Phillips Curve (NKPC) combines staggered price-setting by imperfectly competitive firms and the use of rational expectations by private sector agents. The model is derived from the Calvo model (1983) and assumes that each period, a proportion of randomly chosen firms can reset their prices. As in the standard Phillips curve, the model depends on the current gap between actual output and equilibrium output, but on expected future inflation rather than on past inflation. The NKPC can be expressed as:

$$\pi_t = \frac{\alpha\delta}{1-\delta} x_t + \theta E_t \pi_{t+1}$$

Equation 3: New Keynesian Phillips Curve [22]

Where:

$$\theta = Discount\ factor\ (\theta < 1)$$

$$E_t\pi_{t+1} = Expected\ value\ of\ inflation\ in\ t+1$$

$$\delta = Proportion\ of\ firms\ that\ can\ reset\ prices$$

The NKPC equation's most crucial point is that current inflation is solely dependent on the current output gap x_t, and on the future inflation, represented by $E_t\pi_{t+1}$. The term $\frac{\delta}{1-\delta}$ indicates how important current excess demand is as a determination of inflation; the larger the percentage of firms that can set their price in the current period, the more significant it is. If all companies set prices each period, $\delta = 1$, and the curve is vertical. This is the case with rational expectations with full price flexibility [22].

Developing new theories of unemployment has also been an important part of New Keynesian economics. These theories typically assume that an oversupply of labor should naturally lead to lower wages, which, in turn, would decrease unemployment as demand for labor increases. New Keynesian economists introduce efficiency wage theories to explain why this market-clearing mechanism may fail. These theories suggest that higher wages can enhance worker productivity, thereby preventing firms from reducing wages despite labor surpluses. Efficiency wage theories propose that high wages reduce labor turnover, attract higher quality workers, and motivate employees to exert more effort, ultimately contributing to improved productivity and challenging the idea that wage reductions are always the solution to unemployment [21].

3. Literature Review

Inflation has been a topic of interest for economists, policymakers, and the public for decades. The tendency of prices to increase over time is not a concern, however, its dynamics, causes and consequences are constantly changing. This section aims to examine existing literature to gain insight into the causes and prevalence of inflation in today's economic environment. This review of existing literature provides the foundation, which helps us develop a comprehensive understanding of its current resurgence. Our objective is to contextualize the surge in high inflation by exploring various perspectives and insights.

3.1 Monetary Policy and Government Spending

Monetary policy revolves around how the policy rate influences a broad range of variables, such as inflation and economic growth. In every economy, money is essential. As participants in an economy, we use money to buy goods and services, we save money, and money serves as a measure of value in society. For money to fulfill the mentioned functions, we have to be able to trust that the value of money remains stable over time. The Norwegian Parliament and Government have charged Norges Bank with the duty of keeping the currency, Norwegian krone, stable through low inflation. Monetary policy involves all measures implemented by the central bank to achieve the goal of low and stable inflation [23].

The most important target in the monetary policy is low and stable inflation because this indicates that money can be exchanged for a predictable amount of goods and services in the future. Because we are able to plan our finances when we know that the inflation will be low and stable in the future, it is easier to make rational and sensible economic choices. Like many western countries, Norway operates with an inflation target. The Norwegian Government has defined low and stable inflation as the annual consumer price inflation of close to two percent over time [23].

At the same time, we need flexibility in the Norwegian monetary policy. Thus, economic stability is regarded as another important target. A flexible monetary policy is important because it facilitates Norges Bank with the possibility to contribute towards high and stable output and employment rates, as well as restraining build-ups of financial imbalances. This implies that Norges Bank sometimes may allow inflation to deviate from the two percent

inflation target. However, this should only be considered in certain periods when it is justified by abnormalities in these other important components [23].

The most prominent monetary policy tool is the interest rates on banks' loans and deposits in Norges Bank, and the policy rate is the most important among these. The Monetary Policy and Financial Stability Committee sets the policy rate at its monetary policy meetings, which are usually held eight times a year [23].

Market operations is another monetary policy tool that Norges Bank possesses. The central bank uses market operations to steer bank reserves towards the desired level. In order to do so, Norges Bank primarily operates with F-deposits and F-loans [24]. While F-loans are applied to supply liquidity to the banking system, F-deposits are used when Norges Bank's desire is to reduce the quantity of reserves in the banking system. Market operations is one of Norges Bank's policy tools used to expand or contract the money supply and boost or slow the economic activity. Quantitative easing is another tool that the central bank uses for monetary policy purposes. Essentially, quantitative easing involves purchasing large amounts of securities to spur or steady the economy [25]. Quantitative easing is usually employed after other monetary policy tools have been used but something more is required to boost or slow economic activity and lending.

Foreign exchange swaps and foreign currency loans are the last tools we are going to introduce at this stage. Norges Bank can use foreign exchange swaps when it wants to supply krone liquidity to Norwegian, as well as foreign banks. This type of swap can be practiced in addition to F-loans, and it can also be used to supply liquidity in foreign currency to Norwegian banks. Contrary to F-loans and F-deposits, banks that do not have access to Norges Bank's standing facilities are able to participate in foreign exchange swap agreements.

The central bank is also able to provide loans in foreign currency against collateral. Unlike foreign exchange swaps, loans in foreign currency provide the banks with liquidity, without affecting the amount of krone liquidity in the interbank market.

3.1.1 Monetary Policy and Inflation

Interest rates tends to move in the same direction as inflation, because the interest rate is the central banks' primary monetary policy instrument when managing inflation [26]. In this part,

we are going to apply the transmission mechanism to explain how changes in monetary policy affect inflation rates.

The transmission mechanism of monetary policy is the process in which monetary policy decisions affect the price level and the general economy [27]. It is characterized by long, variable, and uncertain time lags, which implies why it is so challenging to predict the exact effect that monetary policy and central bank action have on the price level and the economy. Figure 6 illustrates the main transmission channels of monetary policy decisions.

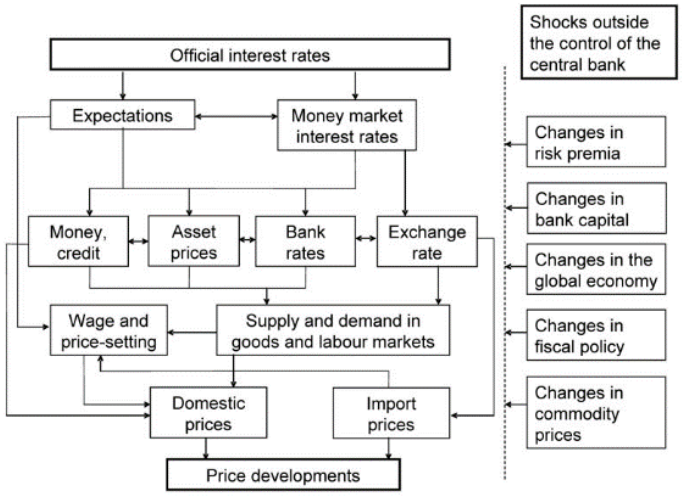

Figure 6: The Transmission Mechanism [27]

Change in official interest rates

The central bank provides money to the banking system and charges interest on the loans. The monopoly power that the central bank possesses on issuing money implies that it can fully and independently determine this interest rate.

Banks and money-market interest rates

The change in official interest rates from the central bank has a direct impact on money-market interest rates, and an indirect impact on deposit rates and lending, which are determined by commercial banks towards their customers.

Expectations

A change in the interest rate is the central bank's way of conveying forward guidance to the public, steering their expectations towards a desired state. These expectations of how the official interest rates will develop in the future affect medium to long-term interest rates. The long-term interest rates are influenced in part by the market's expectations regarding the future trajectory of short-term interest rates.

Central bank actions can also guide the expectations of future inflation among economic agents, and thus influence price developments. When a central bank possesses a high degree of credibility, the expectations of price stability anchors in the economy and economic agents do not have to raise their prices in fear of higher inflation or lower their prices in fear of deflation [27].

Asset prices

The impact that central bank actions have on financing conditions and market expectations in an economy may lead to adjustments in asset prices and the exchange rate. When imported goods are directly used in consumption, changes in the exchange rate can have a direct impact on inflation. However, they may also have an impact through other channels.

Saving and investment decisions

Changes in interest rates will probably influence saving and investment decisions in both firms and households. Ceteris paribus, higher interest rates will make it less attractive to loan money to finance investment or consumption. Conversely, lower interest rates will make it more attractive to loan money to finance investment or consumption. Additionally, investment and consumption are factors that are also affected by movements in asset prices. These effects arise from changes in wealth and value of collateral, e.g., if equity prices increase, shareholding households become wealthier and can increase their consumption. Asset prices can also affect aggregate demand via the value of collateral that allows borrowers to loan or to reduce the risk premium demanded by the banks [27].

The supply of credit

Higher interest rates will increase the risk of defaulted loans, and the banks may gain interest in cutting the amount of funds they lend to firms and households. A cutback in lending may result in reduced investment and consumption among firms and households.

Aggregate demand and prices

An increase or a decrease in investment and consumption will have an impact on the level of domestic demand for goods and services, relative to domestic supply. In the case of demand exceeding supply, an upward price pressure is imminent. Additionally, changes in aggregate demand may yield tighter or looser conditions in intermediate product markets and labor in general, which can have an impact on prices and wage-setting in the respective market.

Supply of bank loans

A change in the policy rate can also have an impact on banks' marginal cost for obtaining different external finance, depending on the level of a bank's banking capital. This channel is especially significant in financial crises or bad times, when capital becomes a scarcity and banks struggle with raising capital.

The traditional bank lending channel focuses almost solely on the quantity of loans supplied, but an additional risk-taking channel may occur when the banks' incentive to bear risk related to loan provision is being affected. This risk-taking channel operates through two main mechanisms. Firstly, lower interest rates will boost assets and collateral values, which, in combination with the belief that the increase in assets and collateral values is sustainable, leads banks and borrowers to accept higher risks. Secondly, lower interest rates become more attractive, because agents search for increased yields. The two effects normally translate into demulcent credit standards, which can increase the loan supply [27].

3.2 Fiscal Policy and Government Spending

Fiscal policy is denoted as the use of tax policies and government spending to influence economic conditions in general, but especially macroeconomic conditions. Among the macroeconomic conditions, we find factors such as economic growth, employment, aggregate demand, and inflation [28].

During periods with high inflation, the government may raise the tax rates or reduce spending in order to curb demand and reduce economic activity. In an opposite scenario, during a recession, the government may lower the tax rates or increase spending to encourage demand and higher economic activity.

The fiscal policy in most western countries is heavily influenced by the ideas of the British economist John Maynard Keynes. Keynes argued that the government was able to stabilize the business circle and regulate the output in the economy by adjusting tax policies and spending. He believed that this would make up for the shortcomings in the private sector. Aggregate demand is the driver for performance and economic growth in Keynes' framework, and is made up of net exports, consumer spending, business investment spending, and net government spending [28].

Keynesian economists argue that the private sector components of aggregate demand are too variable and underlines the fact that these components are depending on psychological and emotional factors to maintain sustained economic growth. Uncertainty, pessimism, and fear among both businesses and consumers can lead to recessions, and excessive public sector exuberance during good times can result in an overheated economy with subsequent inflation.

However, Keynesian economists firmly believe that, when managed in a rational manner, government spending and taxation can be applied to counteract the deficiencies and excesses caused by the private sector consumption and investment spending to stabilize the economy [28].

3.2.1 Corrective Government Fiscal Action

In Fiscal Policy, certain types of policies always follow a certain economic state, e.g., a significant decrease in private sector spending forces the government to either spend more or lower the taxes, or a combination of both measures [28]. On the other hand, an overly optimistic private sector that spends too much, too fast, forces the government to raise the taxes and/or reduce spending. This way, the government contributes towards either increasing or decreasing the aggregate demand. Thus, to help stabilize the economy, the government should consider a contractionary fiscal policy, defined as running large budget surpluses, when the economy is growing, and expansionary policy, defined as running large budget deficits, during economic downturns.

3.2.2 Fiscal Policy Tools – Expansionary Policy

Consider an economy in recession. Aiming at increasing aggregate demand and fueling economic growth, the government can issue tax stimulus rebates. The logic behind this is that lower taxes give people more money to spend or invest, which contributes towards increasing aggregate demand. An increase in the aggregate demand will decrease the unemployment rate, as firms would like to hire more workers. This causes an upturn in the labor competition, which leaves the consumers with more money to spend and invest, as the wage level is increasing along with competition. This phenomenon is considered a virtuous cycle, or a positive feedback loop [28].

Rather than lowering the tax level, the government may use an alternative approach in order to increase economic activity, i.e., by increasing spending, without increasing the tax level correspondingly. For example, if the government decides to upgrade the infrastructure, e.g., by building or upgrading railways or highways, this could increase employment, which in turn helps boost demand and growth.

Deficit spending is key when talking about expansionary fiscal policy, which occurs when the government expenditures exceed tax income and other sources of income that the government may have [28]. Usually, the government introduces a combination of both tax cuts and increased spending when applying expansionary fiscal policy.

3.2.3 Fiscal Policy Tools – Contractionary Policy

When faced with high levels of inflation or other symptoms of unsustainable expansion, the government may introduce contractionary fiscal policy, perhaps even to the extent of inducing a brief recession to restore the economic stability. The government has three main measures of achieving reduced economic activity, i.e., reducing public spending, cutting public sector wages or jobs, and increasing taxes [28].

Contractionary fiscal policy usually involves budget surpluses, which may come from all the three main approaches mentioned above. However, a contractionary fiscal policy is rarely applied by the government, as it is regarded as massively unpopular politically. Therefore, the policymakers face differing incentives regarding whether or not to engage in contractionary

fiscal policy. Hence, rather than using contractionary fiscal measures, the preferred tool when interfering with mounting inflation is usually contractionary monetary policy.

3.2.4 The Downside of Expansionary Fiscal Policy

Among the complaints made against expansionary fiscal policy is that one may end up with a piling mount of deficits. A flood of government red ink can tear on growth and eventually create the need for unhealthy austerity.

Many economists even question the effectiveness of expansionary fiscal policies, as they argue that increasing government spending can crowd out private sector investment.

Because it is so popular by the inhabitants in a society, expansionary fiscal policy can become extremely challenging to reverse [28]. Most voters are big supporters of low taxes and government spending, even if it may not have the desired macroeconomic effects. The different political incentives that policymakers face, facilitates consistent bias towards engaging in constant deficit spending that in some way can be rationalized as the right measure for any economy.

Persistent economic expansion will eventually get out of hand. When the wages increase, inflation and asset bubbles tend to form. High inflation and the risk of boundless defaults in case of debt bubbles bursting can severely damage the economy. It is precisely this risk that leads governments, and/or central banks when monetary measures are required, to reverse course and rather attempt to contract the economy.

3.2.5 Fiscal Policy and Inflation

The Euro Area, along with other advanced economies, has been facing challenges caused by the strong and rapid increase in inflation [29]. Since the end of 2021, inflation in all corners of the western world has increased at a rate that sparks glimmers to the conditions in the 1980s.

When addressing the impact of fiscal policy on inflation, a main issue is the conditions under which fiscal policy considerations influence the process of price determination. According to the early monetarist view, inflation, in the sense of sustained price level increases, is single-handedly determined by money growth, and fiscal policy does not play a role in this, unless it is money-financed. In his Quantitative Theory of Money, Milton Friedman stated that

"inflation is always and everywhere a monetary phenomenon", implying exactly that expansionary fiscal policy is not a driver for inflation.

In widely applied modern macroeconomic models such as new Keynesian models, fiscal policy, in combination with monetary policy, is an effective macroeconomic stabilization tool, at least in the short run. However, this is only applicable when the monetary policy is limited at the lower bound or in deep recessions, where discretionary fiscal policy can contribute towards preventing deflationary situations [29].

Another view is the so-called Fiscal theory of the price level (FTPL). This theory states that unbacked expansionary fiscal policy, i.e., an increase in public debt that is not matched by expectations of higher primary surpluses in the future, will make economic agents believe that their real wealth has increased, resulting in a boost of consumption and investment and ultimately the price level. In a general matter, if the present value (PV) of expected primary surpluses in the future is less than the amount of outstanding nominal debt, the price level equilibrium has to increase, thus reducing the real value of debt, in order to satisfy fiscal solvency if an explicit sovereign default is excluded.

Furthermore, the Fiscal theory of the price level is sorted into two different approaches, namely the strong and the weak form FTPL.

In the weak form FTPL, the fiscal dominance, derived from the link between monetary policy and fiscal policy through seigniorage, is reflected upon. Seigniorage is a governmental revenue from printing money, and therefore fiscal policies and monetary policies are determined concurrently by the fiscal budget constraint in the long run [30]. The weak form FTPL assumes that the government will decide the primary budget deficit or surplus and then, through monetary authorities, create seigniorage to maintain governmental solvency. By refusing to create this seigniorage, authorities risk that the debt to GDP ratio increases to an unsustainable level, which would facilitate increased real interest rates and government debt. As this process cannot continue, one of the policy authorities must adjust. Because we assume that the central bank will respond by creating seigniorage to avoid default, money supply becomes the main cause of the fiscal authorities in this theory. This means that fiscal policy is exogenous, while the movement of money supply itself is endogenous.

In its strong form, the FTPL posits that both monetary and fiscal policies are exogenous, with prices adjusting to uphold governmental solvency.

The Fiscal theory of the price level derives from an understanding of the government budget constraint and the velocity of money. The velocity of money in period t (V_t) is expressed as the ratio of nominal output of nominal money balances. In the equation below, the price level is proportional to the money supply.

$$V_t = P_t * \frac{Y_t}{M_t}$$

Equation 4: Velocity of money

The price level is determined by accounting for the balance in the economic trajectory. The balance can be defined by two conditions, namely the equilibrium of the money market and the governmental financial balance.

The equilibrium of the money market is where the real money supply equals the demand for real money:

$$\frac{M_0}{P_0} = f(R)$$

Equation 5: Equilibrium of the money market

M_0 is the nominal money stock at the very start of the period and P_0 is the prevailing price level. The real money demand is a function of the nominal interest rate $R = r + \pi$), where π is the inflation rate. The real money demand has to be a function of inflation as the real interest rate and output is assumed constant.

The financial balance of the government is expressed as:

$$D + S(\pi) = \frac{B_0}{P_0}, \qquad S'(\pi) > 0$$

Equation 6: Financial balance of the government

Where $S(\pi)$ represents the PV of seigniorage and D represents the PV of the future primary budget. When D takes a negative value, the PV of the future primary budget is negative.

The accumulated value of total real governmental debt maturing in the beginning of the period is denoted as $\frac{B_0}{P_0}$, and must equal the PV of the future primary budget surplus or deficit, added to the seigniorage revenues. Under conditions where the Ricardian Equivalence cannot be

satisfied, i.e., when the central bank operates completely independently, the imbalances in the intertemporal budget constraint must be adjusted to price level movements. More generally, if the perceived level of the primary budget surplus or deficit cannot ensure fiscal solvency, and the central bank decides not to create seigniorage, the balance will be obtained through the price level.

Studies conducted with the intent of explaining how fiscal policy affects inflation is usually carried out by investigating the relationship between fiscal policy and monetary policy, and then find its impact on inflation. Macroeconomic fiscal and monetary measures tend to impact inflation through changes in aggregate demand and supply side factors. So, the interesting thing here is more a question of under which conditions fiscal policies can affect monetary policy and inflation further. One of the conditions revolves around the independence of the central bank. If the government can further back up their fiscal policy through influencing and indirectly conducting central bank actions, the central bank is no longer independent. For example, to finance a primary budget deficit, the government can make the central bank support their fiscal policy by keeping interest rates low in order for their interest payments to be held at low levels.

Among other things, fiscal discretion may have an impact on the inflation volatility in an economy. According to Rother [31], fiscal effects on inflation may appear from the spillover of public wages to the private sector, impact of taxes on marginal costs and private consumption, and through influencing aggregate demand. Additionally, inflation can also be affected by the public's expectations of the government's ability to pay debt.

Using a data panel of 15 industrialized countries, Rother concluded that the volatility of fiscal policy has a significant effect on inflation volatility. Furthermore, this implies that changes in the fiscal policy in the current period (t) and the previous period $(t-1)$, will increase the inflation volatility in the current period (t). An increase in the volatility of discretionary fiscal by 1 standard deviation yields an increase in unconditional inflation volatility by 10 percent and conditional inflation volatility by 17 percent. From a policy perspective, Rother's findings indicate that fiscal discretion leads to de-stabilization, rather than stabilization of the macroeconomy.

3.3 Supply Chain Disruptions

We can define supply chain disruptions as a business' inability to receive, produce, ship, and sell their products [32]. In its natural form, supply chain disruptions are high-dimensional, but of which two dimensions especially stand out, namely increased transportation costs and disruptions in manufacturing production. The Federal Reserve Bank of New York has developed a new indicator, the Global Supply Chain Pressure Index (GSCPI), which captures both dimensions mentioned above. The index can capture these dimensions through combining global manufacturing data and several cross-border transportation cost indicators. The index suggests that the supply chain disruptions from 2021 and 2022 were more than 3 standard deviations above the historical average.

To some extent, supply chain disruptions resemble traditional global commodity supply shocks. Particularly for advanced economies, the standard policy advice when faced with such shocks is to accommodate the direct first-round impact of global supply shocks on the consumer price index, but not the second-round indirect impact on other consumer price index components. However, because they directly affect manufactured imported goods, disruptions to global supply chains differ thoroughly from commodity supply shocks. Rapid and strong increases in commodity prices have a direct impact primarily on food and energy inflation, which in turn have an impact on core inflation through second-round effects. On the contrary, global supply chain disruptions have a direct impact on the prices of other tradable goods, accountable for a large portion of the countries' core consumption basket. Second-round effects are materialized through non-tradable goods and services.

3.3.1 Recent Supply Chain Disruptions

During the pandemic, which saw global supply chains come to a grinding halt, other supply shocks also took place. Although the scope of Russia's invasion of Ukraine and the Suez Canal crisis is not really comparable, both events have had a major impact on global supply chains. The occurrence of these events shows that supply chain disruptions come in all shapes and forms, and while the Suez Canal crisis only lasted for about six days, the macroeconomic effects were devastating.

The Suez Canal is vital to international shipping, as it is the fastest way from Asia to Europe for container vessels. The canal is considered the busiest shipping channel for oil and refined

fuels, grain, as well as other trade linking the East to the West. When one of the world's largest container ships ended up blocking the canal for almost a week starting at the end of March 2021, around 300 vessels had their voyages delayed, resulting in a standstill for a major portion of the world's seaborne trade and thus a massive international supply chain disruption. The blockage was holding up trade valued at more than $9 billion per day, i.e., $54 billion over the 6 days [33]. However, this figure is only based on the cargo shipments that were delayed due to the blockage. The actual economic damage is assumed to be much higher, as oil and gas prices rose due to uncertainty of the scale. German insurer Allianz stated that the blockage could shun annual global trade growth by as much as 0.4 per cent. When costs such as increased commodity prices, additional chipping operation charges, and shipping delays are factored in, the extent of economic loss is likely to be even higher.

Russia's invasion of Ukraine has a significant impact on global supply chains [34]. In a virtual symposium, organized by the MIT Center for Transportation and Logistics, experts on the topic claimed that the invasion obstructs transportation of goods, causes product shortages, and drives up costs. Due to the catastrophic circumstances, the UN issued a warning, stating that we are one step away from a global food crisis. In addition to this, commodities other than food are also being obstructed, e.g., energy and other vital supplies. As a result, consumers will have to wait longer and pay more for their products, which causes a pandemonium for companies depending on their quick delivery systems.

3.3.2 Supply Chain Disruptions and Inflation

When fast-rising inflation returned as a concern in 2021, a large portion of it was driven by pent-up demand following the economic shutdown brought on by the pandemic. Consumers' resurrection to the marketplace resulted in a supply-demand imbalance, as the global economy faced a commodity shortage, which forced up the prices [35]. National investment strategist at U.S Bank, Tom Hainlin, stated that the increasing level of inflation was much due to a strong demand for goods where the supply was limited. Energy and food products were leading drivers of inflation, and Russia's invasion of Ukraine saw these challenges exacerbate. For a relatively long period, the invasion interrupted shipments of agricultural commodities and energy from both Ukraine and Russia. Besides, China's lockdown policies, which lasted until late 2022, also meant that the manufacturing and shipment of goods from Chinese companies were limited.

According to Liu & Nguyen [36], supply chain disruptions can affect inflation through several channels. The first channel is asserted through inflation expectations. Global supply chain disruptions tend to be associated with surges in commodity prices. Studies show that particularly short-term inflation expectations are sensitive to fluctuations in commodity prices. Liu and Nguyen [36] examined the responses of one-year-ahead inflation expectations from Philadelphia Fed's Survey of Professional Forecasters (SPF), following changes in the Global Supply Chain Pressure Index (GSCPI). They found that a shock that raises the GSCPI one standard deviation above its mean, increases short-term inflation expectations by as much as 0.1 percentage points. Thus, according to these observations, a shock that raises the GSCPI by four standard deviations, which was the observed increase between late 2020 and late 2021, would increase inflation expectations by as much as 0.4 percentage points. This increase would equate to roughly 40 percent of the actual increase in short-term inflation expectations between late 2020/2021 and 2021/2022, i.e., from 2.1 percent in the beginning of 2021 to 3.0 percent in the beginning of 2022. The effects of a surprise change in GSCPI on long-term SPF inflation expectations, however, are somewhat more muted.

The second channel is asserted through import prices. When supply chain constraints are tightening, the prices on imported goods tend to rise. The increase in prices on imported goods is then passed down to consumer prices. An increase of one standard deviation to the GSCPI, yields an increase of 0.9 percentage points on the inflation for imported goods. However, the spillover effects from the prices on imported goods to consumer price inflation is probably limited since the share of imported goods only makes up about five percent of total personal consumption expenditures price index (PCE).

The third channel is asserted through the costs of intermediate inputs. When faced with disruptions in their supply chains, businesses often respond by passing increases in intermediate input costs through to consumer prices. When examining the quantitative importance of this channel, Liu and Nguyen [36] found that an increase of one standard deviation on GSCPI raises the short-term changes in the producer price index (PPI) of crude materials by as much as 10 percentage points. Thus, input prices are increased significantly when there is a GSCPI shock. However, as costs move further along the production chain, i.e., from initial inputs to intermediate goods, a GSCPI shock has less impact on PPI inflation.

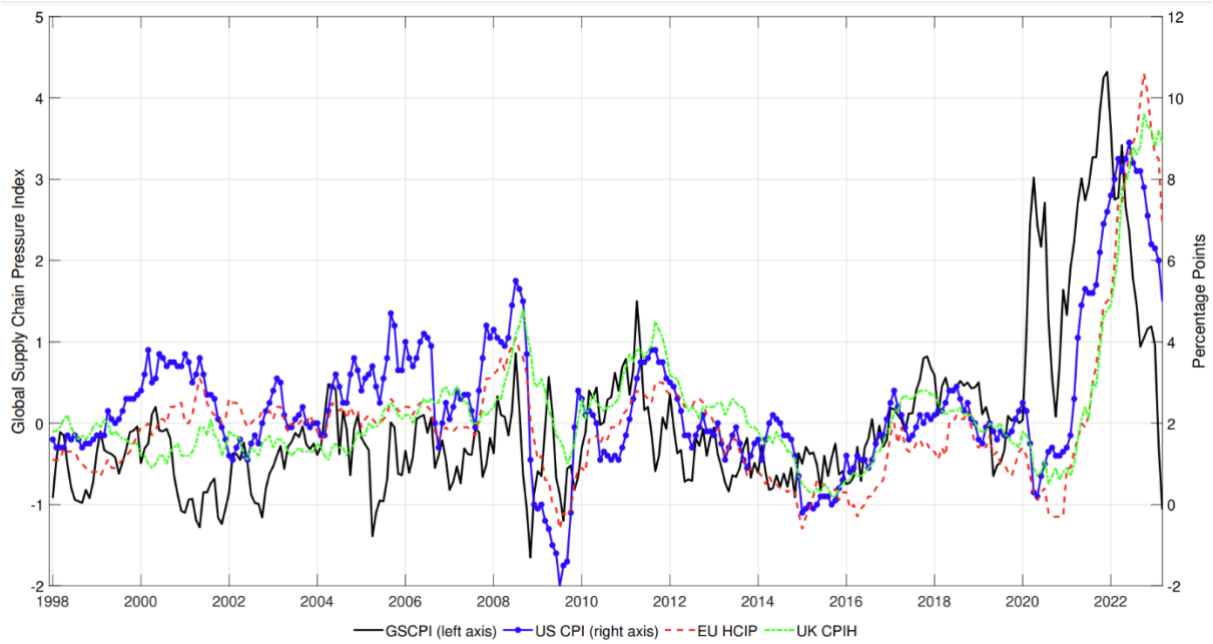

Figure 7: Global Supply Chain Pressure Index and Inflation [36].

Along with the GSCPI over the last decades, the figure above shows the development of consumer price inflation in the Euro Area, the US, and the United Kingdom. The figure displays extraordinary peaks of supply chain pressure during the COVID-19 pandemic [37]. Other notable peaks in recent times are during the US-China tariff dispute in 2018, the Great Japan Earthquake and the flooding in Thailand in 2011, and the Great Recession of 2008/2009. Furthermore, the figure suggests a close relationship between annual inflation rates in all the applicable areas and the level of supply chain disruptions. During periods of high pressure in the supply chains, the inflation level was high as well. Conversely, during periods of low pressure in the supply chains, inflation remained sober, e.g., in 2015.

Like Liu and Nguyen, Laumer (2023) finds positive connections between shocks in the supply chains and consumer price inflation, even before the pandemic. Laumer states that the positive impact on inflation varies across countries and varies over time. While the response in the Euro Area and the United States intensifies over time, the response in the United Kingdom peaks during the pandemic and the Great Recession. Although the response of inflation is consistently significantly positive in all three entities, the inflation response is somewhat larger in the Euro Area and United States, than it is in the United Kingdom. In his research, Laumer established global supply chain disruptions as an important driver of inflation, and that, over a three-year horizon, global shocks in supply chains concludes with between 15 and 30 percent of consumer price inflation.

3.4 Exchange Rates

The exchange rate is the rate at which one currency will be exchanged for another currency. Exchange rates impact trade and transactions of money between countries and are affected by both the value of foreign currency, as well as the value of domestic currency [38].

Exchange rates between countries are usually determined by a composition of different conditions, such as market interest rates, economic activity, the unemployment rate in each of the countries, and gross domestic product. The market exchange rates are determined in the global financial marketplace, where banks and other financial institutions trade currencies based on the mentioned conditions. Throughout the day or week, the exchange rates change by small margins or large incremental shifts, depending on the development of these macroeconomic conditions in the applicable countries. Regarding the exchange rate of the Norwegian krone, there seems to be a perception among market participants that changes in the oil price have an impact on the exchange rate. According to economic theory, a rise in oil prices, as experienced by an oil-exporting nation like Norway, is expected to result in more advantageous terms of trade with the global community. In isolation, this indicates a strengthening of the exchange rate [39].

Exchange rates can either be fixed or floating. While a floating exchange rate is strengthened or weakened due to changes in the foreign exchange rate market, a fixed exchange rate is pegged to the value of another currency and is only indirectly floating through that currency's performance in the market. For example, the Hong Kong dollar is pegged to the U.S dollar. Furthermore, it is pegged in the range of 7.75 to 7.85, which means that the value of the Hong Kong dollar towards the U.S dollar will remain somewhere in between.

The spot rate is the current market value of a currency's exchange rate. The forward value of a currency's exchange rate is based on the market's expectations for the currency to strengthen or weaken versus its spot price. These forward rates may fluctuate due to how market participants view the probability of macroeconomic conditions changing in certain directions in the future for one country versus another. For example, if traders speculate that the Euro Area is going to tighten the monetary policy versus the United States, they may choose to buy euro rather than U.S dollar, which yields a weakening of the dollar.

When the government determines the exchange rates in a country, the currency is restricted. Exchange rates can differ within a country, and a restricted currency limits the exchange to

within the borders of the country. In this case, it is normal that the applicable country applies two different rates, namely an onshore rate and an offshore rate, with the onshore rate often being the most favorable. China uses this rate structure, where the government determines a midpoint value for the currency from day to day, restricting the currency to trade in a span of 2% from the midpoint.

3.4.1 Exchange Rates and Inflation

While a depreciation of a country's currency is likely to cause inflation to increase, an appreciation of a country's currency is likely to cause inflation to decrease [40]. The central argument behind this logic is relatively intuitive and builds upon the fact that when your own currency weakens against the rest of the world, importing becomes more expensive. Contrarily, when a country's currency strengthens against the rest of the world, it becomes cheaper to import.

A depreciation of the Norwegian krone means that the krone now buys you less foreign currency than before, i.e., the purchasing power abroad is weakened. When the krone's exchange rate weakens against foreign countries, import becomes more expensive, while export becomes cheaper. As a result, the competition from foreign markets will increase the demand for domestic products, increasing domestic price and output. Conversely, when the krone appreciates, the krone now buys you more foreign currency than before, strengthening the purchasing power abroad. Because import now becomes cheaper and export becomes more expensive, the competition from foreign markets will decrease the demand for domestic products, and thus decrease domestic prices and output [41].

Imported inflation is a common result of a depreciation, as the price of imported goods rises when it becomes more expensive to trade with foreign countries. When the krone depreciates, Norway's export goods become cheaper for the countries abroad, meaning that demand increases for Norwegian exports. When imported goods become more expensive, the demand for imported goods decreases, shifting consumption to domestic goods. The result of these effects is an increase in domestic aggregate demand, which may lead to demand-pull inflation. A depreciation of the Norwegian krone also implies less incentives to cut costs, as the exporting manufacturers experience improved terms of competition, without needing to try. Some argue that this may result in long term inflation, as the incentives for cutting costs are

reduced. Hence, a depreciation can cause both demand-pull inflation, as well as cost-push inflation.

In this instance, we are looking at the scenario where a depreciation of a given currency is causing aggregate demand to rise. When domestic aggregate demand increases too strongly and rapidly for the supply to keep up, the cost of living eventually increases.

An important aspect in this context is that the aggregate demand must remain constant during the period in which changes to the production costs are occurring. Hence, a currency depreciation cannot affect both demand-pull inflation and cost-push inflation simultaneously. Only one of the phenomena can occur at a time, depending on the macroeconomic conditions in place.

We have established clear dynamics between exchange rates and inflation. While a currency appreciation contributes to decreased inflation, a currency depreciation contributes to increased inflation. We will further discuss some of the most central factors that are influencing the exchange rates between countries and illustrate how these factors have an indirect impact on inflation.

3.4.2 Interest Rates

Earlier in this chapter, we introduced monetary policy as a main factor contributing to inflation. Differentials in interest rates can also affect inflation through exchange rates. By adjusting interest rates, central banks impact currency values. An increase in interest rates offers a higher return in the applicable country, relative to the expected return in other countries. Thus, an increase in interest rates attracts foreign capital, which in turn causes an increase in the exchange rate. However, the effects of increased interest rates are mitigated if the inflation level or other factors in the country implies a weakening of the exchange rate. Contrarily, decreasing interest rates tend to weaken the exchange rate, unless there are other conditions in place indicating a strengthening of the currency [42].

3.4.3 Current Account Deficits

The current account reflects all payments between countries and is therefore considered the trade balance between a country and its trading partners. When a country displays a deficit over its current account, it implies that the country is spending more than it is earning on

foreign trade, and that the country is borrowing foreign capital to make up the deficit. This means that the country receives less foreign currency through export than it requires, and that it supplies more of its own currency than what is demanded by foreigners. Furthermore, the excess demand of foreign currency decreases the country's exchange rate, until domestic goods are cheap enough for foreigners, and foreign assets are too expensive to generate sales domestically [42].

3.4.4 Public Debt

To pay for governmental funding and public sector projects, countries take on large-scale deficit financing. As we have discussed earlier, such activities stimulate the economy domestically. The downside of having high debt levels and large public deficits, in this setting, is that these countries are less attractive for foreign investors. This is mainly because large debt levels encourage inflation, so that the debt is ultimately paid off with a cheaper currency in the future.

When a country has issues with servicing its debt, it may choose to print money. But this short-term solution is unfavorable in the long term, as increasing the money supply inevitably leads to inflation. Therefore, if the government cannot service its debt through selling domestic bonds and increasing the money supply, it must increase the sale of securities to foreign investors, often done by reducing the prices on these securities. Large debt levels may also seem worrying for foreign investors if they believe that the country risks defaulting on their own obligations. When the risk of default increases, foreign investors are less willing to own securities denominated in that currency. Therefore, a country's debt rating is crucial in determining its exchange rate.

3.4.5 Terms of Trade

Terms of trade is a ratio comparing import prices and export prices and is thus related to current accounts and trade balances. If a country's import prices increase faster or greater than its export prices, the country's terms of trade will have weakened. A weakening of the terms of trade implies a reduced demand for the country's exports, which leads to a reduction in export revenues and a decrease in demand for the country's currency, ultimately resulting in a weakening of the country's exchange rate.

3.4.6 Strong Economic Performance

Stable countries that deliver consistently strong economic performances are inevitably attractive to foreign investors. Such countries often draw investment funds away from countries where there is more economic and political risk involved.

3.4.7 Differentials in Inflation

Countries with consistently low inflation rates are often associated with a strong and stable currency value, as their purchasing power is greater than other countries, where inflation is more unstable. You could therefore argue that through changes in the exchange rates and the impact that depreciation has on inflation, inflation is actually an indirect driver of inflation. The United States, Canada, Japan, Germany, and Switzerland are examples of countries with relatively low and stable inflation.

3.5 Demand-Pull Factors and Consumer Behavior

As stated previously, demand-pull inflation is caused either by an increase in aggregate demand or by supply shortages. Because consumer behavior is another key theme in this section, the natural focus area will be demand-pull inflation caused by an increase in aggregate demand for goods and services. Demand-pull inflation occurs in periods where aggregate demand increases rapidly and is strong enough to exceed the economy's productive capacity. As businesses want to exploit this sudden change in demand, they increase the prices. There are various factors influencing demand-pull inflation, and these are the most central ones [43]:

- *Population growth:* A sudden and significant rise in a country's population, e.g., if a refugee crisis occurs and a country offers asylum to a lot of new people at the same time, can lead to demand-pull inflation through an increased demand for goods and services.
- *Government spending*: By increasing spending, a government can also play a vital role in causing demand-pull inflation. By increasing spending, the government increases the amount of money in circulation, causing an upward pressure on prices. When the public sector spends more money on the acquisition of goods and provision of services such as healthcare, social services, education and defense services, the

government creates a circle of economic activity where employment increases along with demand.

- *Money supply*: If the central bank chooses to lower its interest rate, it will directly increase the money supply as people are left with more money to spend, resulting in an increase in both consumer spending and aggregate demand. With access to more money, people become willing to pay more than before for goods and services, which can lead to demand-pull inflation.
- *Inflation expectations*: Consumers' and investors' general perception of how the inflation will develop in the future can also contribute to demand-pull inflation. If they expect prices to continue increasing in the future, they will most likely be receptive to investing or making their purchases now, to remain competitive in the future. Contrarily, if they expect prices to level out in the future, they will most likely hold back consumption and investments.
- *Commodity demand*: When the demand for commodities increases, i.e., fuels and metals in particular, inflationary pressures can arise, due to the fact that it costs businesses more money to produce items where such commodities are vital input factors. The supply of such commodities is often scarce, making it costly for businesses to cover the rise on the back of increased demand. To maintain production when costs increase, they raise their own prices to make the consumers finance the increase in the prices of raw materials.
- *Innovations***:** To satisfy the demand when new technological innovations are developed and introduced, businesses often need more resources to produce these items. More resources often mean more costs, as labor structures change, and production facilities need renovation and upgrading. When it costs more to produce items with minor upgrades compared to its predecessor, the price of the item increases, resulting in demand-pull inflation.

Consumer behavior is the study of individuals and processes applied when selecting, evaluating, and in many instances disposing, goods, and services, in order to satisfy consumer needs and those choices' impact on the entire society [44]. To adapt to their customers, almost every producer needs to acquire insight into consumer behavior. When producers acquire more insight regarding their customer base, their suitability to be more targeted with their own marketing communications increases. Therefore, everything from packaging and pricing to advertising and distribution must be adapted to each individual customer group [45].

At the very beginning of the pandemic in 2020, trend analyst Ole Petter Nyhaug predicted 7 changes to Norwegian consumer behavior, based on changes that typically occur in economic crises [46].

1. *From acting out to "cocooning" – short to medium duration*

In 1981, the American trend researcher Faith Popcorn introduced the term "cocooning" to describe people's reaction to crises and the feeling of insecurity. Many people tend to build a safe shell around themselves and their loved ones, as they prioritize comfort and seek the warm embrace of their home. Previous crises have yielded a rise to interiors and renovations, along with other things that provide extra comfort at home, e.g., food and beverage, and home entertainment.

2. *From curiosity to security seeking – medium duration*

As in previous crises, consumers become less willing to explore new products, take on risk, seek new adventures and experiences, or readjust their habits. Well-established brands with long traditions can expect an increase in the demand for their products, as people tend to search for what they are familiar with and can help them retain security and anchoring in turbulent times.

3. *From idealism to materialism – medium duration*

In good times, people tend to care about the world and their surroundings. But in more uncertain times, the focus shifts towards securing health and economy, and prioritizing those closest to us and their interests. People become more concerned with securing assets, financial means and comfort. National, rather than international, perspectives are becoming more important. Thus, issues such as climate and environment, open borders, and globalization, receive less attention and recognition in globally challenging times.

4. *From analog to digital behavior – long duration*

Quarantine, isolation, and social distancing mean that new user groups will have to experience online grocery shopping, meet in online videoconferences, and follow courses, training sessions or even concerts on the web. The technical solutions that make this possible are far simpler and more accessible today than they were just a few years ago. Many people will therefore receive revelations with the potential for permanently changed behavior.

5. *From global to local community – long duration*

Global events yield concrete local effects. The response to and the consequences of a crisis, varies widely from country to country. For many, crises can serve as reminders of the importance of local preparedness, national self-rescue, local businesses, and the feeling of community and solidarity with those around you. Therefore, such a crisis can lead to a period of increased support to the local and national, whether it is shops, brand, products, or experiences.

6. *From skepticism to trust – long duration*

In recent years, people's trust in authorities and experts has gradually weakened. There are several factors contributing to this, but the main issue is that many prefer to trust themselves and sources that support their own views. Both knowledge and truth have been individualized to a greater extent. Polarization is cultivated in the media as well as in the social media, but in situations of crisis, we rally around these authorities and experts, even though they openly admit that they lack a waterproof solution.

7. *From consumption to saving – uncertain duration*

Those who lose, or fear losing their jobs and income, will naturally spend less money on consumption. Many Norwegians are heavily indebted and are therefore now experiencing the importance of having a financial buffer in uncertain times.

3.5.1 Impact of Demand-Pull Factors and Consumer Behavior on Inflation

The aggregate demand in an economy equals the sum of all individual demand curves of the economy. Typically, aggregate demand is defined by four different components:

$$Aggregate\ Demand = G + C + I + (X - M)$$

Equation 7: Aggregate Demand

Government spending (G) is the government's total expenditure on defense and military equipment, healthcare services, investments, public sector facilities, government employees, and infrastructure [47]. Transfer payments, e.g., pension plans, aid to needy countries, and subsidies are typical spendings excluded from the component.

Consumption spending (C) refers to individuals' and household's total spendings on goods and services in an economy and is the largest component of aggregate demand. The component depends on several factors, such as interest rates, debt, disposable income, expectations of future economic conditions, and per capita income. Spending on residential structures is accounted for in the investment component of aggregate demand and is naturally not included as a factor in consumption spending [47].

Investment spending (I) involves the total expenditure on new capital goods and services, such as equipment, inventory changes, machinery, and investments in both residential and nonresidential structures. Because interest rates imply the cost of borrowing, it is a central factor influencing the component. Future expectations of economic development is another central factor influencing spending, along with government incentives, e.g., tax benefits or subsidies for investing in renewable energy.

Net exports (X-M) is the last determinant of aggregate demand and is a measure of exports minus imports in an economy. Because aggregate demand is the total demand for domestically produced goods and services, exports are added, and imports are subtracted [47].

In accordance with the Law of Demand, the aggregate demand curve is downward sloping, as higher price levels correspond to lower demand for goods and services. According to Pigou's Wealth Effect, assuming that wages are held constant, consumers are wealthier at lower price levels. Increased disposable income allows consumers to spend more on goods and services, resulting in increased demand. Furthermore, the Exchange Rate Effect states that a devaluation of a country's currency yields relatively cheaper domestic goods, and relatively more expensive imported goods. When domestic goods become cheaper relative to imported goods, the demand for exported goods increases, which results in an increase in aggregate demand.

A significant increase in any of the aggregate demand components, i.e., consumption, investment, government spending, and net exports, will shift the aggregate demand curve to the right. Contrarily, a significant decrease in any of the components will shift the aggregate demand curve to the left, representing a reduction in aggregate demand.

Demand shocks are caused by critical changes somewhere in the economy that have influence on spending decisions and will often result in sudden and unexpected shifts in the aggregate demand curve [48]. Some demand shocks are caused by technological innovation, as technological advancements often increase businesses' return on capital when labor becomes

more productive. A reduction of costs leaves more room for consumers to buy additional goods and services, invest, or save. Thus, the aggregate demand for goods and services increase, while prices decrease. Geopolitical occurrences, such as wars, disasters, and diseases can also cause aggregate demand shocks. In the short term, these types of events typically contribute towards reducing aggregate demand, especially if they limit earnings and cause consumers to buy less goods and services. However, the effects can be totally opposite in the long term, depending on the authorities' response to these events.

In order to untangle the threads in this section, we have to conclude on the mechanism between consumer behavior and inflation. Changes to consumers' expectations, spending patterns, and preferences can significantly affect the inflation rate in an economy.

As we have already established, changes in spending patterns can drive inflation, particularly when accompanied by increased demand. A significant increase in consumer spending can outpace the supply capacity in an economy, ultimately causing an upward pressure on prices. This is most likely to occur in situations where the consumer preferences shift towards a specific product or sector, leading to imbalances between supply and demand.

Correspondingly, changes to consumer preferences can also contribute to higher levels of inflation, as demand for certain goods and services increases. For example, a sudden increase in the demand for luxury goods will cause the prices of these exact goods to increase, which would also have an impact on the overall inflationary pressures in the economy.

Equivalently, consumer expectations and spending behavior can lead to increased inflation [48]. If the consumers expect an increase in future prices, they may accelerate on present purchasing decisions, causing increased current demand. This way, the increased demand, driven by changes in expectations of future prices, can influence the inflationary pressures. Contrarily, expectations of lower future price levels might result in reduced current spending, decreasing demand and inflationary pressures.

Changes in income levels are another factor that influence consumer behavior and inflation, as such changes have implications on spending patterns and preferences. An increase in income levels might lead to increased consumer spending, driving overall demand and potentially inflation. On the other hand, a reduction in the income levels might result in reduced spending and demand, ultimately resulting in deflationary pressures [48].

Consumer sentiment and confidence also play a significant role in shaping consumer spending patterns. While positive consumer sentiment often tends to increase spending and drive demand and inflation, negative consumer sentiment often tends to reduce spending, decreasing demand and contributing towards deflationary pressures.

Cultural and social changes conclude these inflationary factors. Changes in cultural preferences and societal trends can affect consumer behavior, and subsequently inflation levels. Significant shifts in consumer preferences, driven by social or cultural factors, can cause increased demand and contribute to inflationary pressures if consumers change from a specific product or service to another [48].

3.6 Historical Trends in Inflation Rates

To grasp the significance of current high inflation, it is crucial to compare it against historical trends. Looking at history allows us to assess the cyclical nature of inflation, how it might be connected to economic events, and when it has spiked or receded. Additionally, examining the past provides insights into how policymakers have responded, and whether their actions have been successful in managing inflation.

From history, we know many examples of inflation both in the form of short-term, violent "price explosions", called hyperinflation, and as moderate rises in the price level over a long period of time. Almost every period of hyperinflation can be linked to the printing of money or financing of war [49].

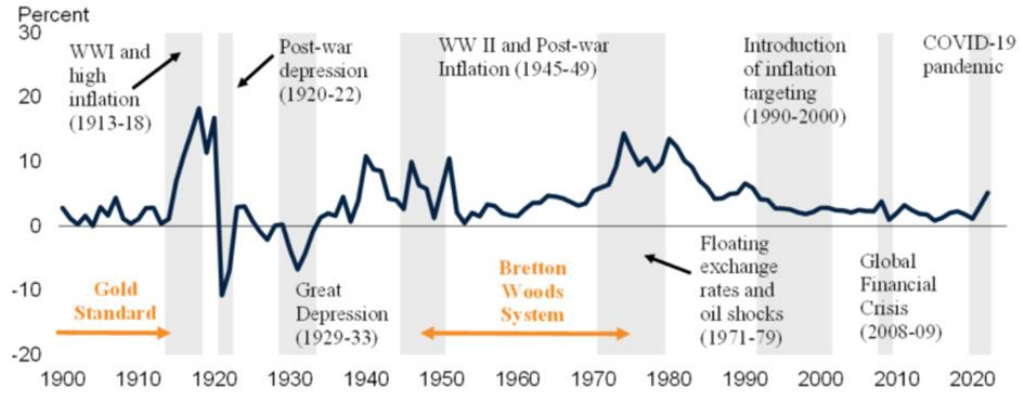

Figure 8: Global inflation 1900-2022 [49]

During the First World War, many countries experienced significant inflation, prompting authorities in the 1920s to seek to lower the price level, with the objective of fully or partially

restoring the old monetary value. The implementation of this deflationary policy created increased unemployment rates and a decrease in economic growth [50].

One of the most famous examples of hyperinflation is the mark-inflation in Germany in 1923. The increasing cost of goods, combined with a dramatic increase in the money supply, created perfect conditions for inflation. Million-mark notes, and later billion-mark notes had to be printed by the government in order to pay for the war expenses. Prior to World War I, the exchange rate was just over four marks to the U.S. dollar. By November 1923, one US dollar was worth 1,000 billion marks, which meant a newspaper would cost more than a wheelbarrow of cash [51].

During the Second World War, the money supply in most countries was also increased because of war financing. The effects this normally had on the price level were however held back by price regulation and rationing. In many places, there was therefore an abnormal relationship between the amount of money and the value of production. The situation was termed suppressed inflation. This situation was ended by confiscation of money or by the price level being allowed to rise. After a more normal relationship between the money supply and the value of production had been restored, the price level nevertheless continued to rise everywhere in the industrialized world [50].

After a decade with somewhat low and stable inflation, inflation began ratcheting upward in the mid-1960s, and the industrialized world entered a period with substantial inflation, referred to as “The Great Inflation”. The Great Inflation, alongside the Great Depression, stands out as one of the most serious failures in monetary policy during the 20th century. Apart from countries like Germany and Switzerland, most OECD members experienced inflation rates exceeding ten percent in the 1970s, where the peaks for France, Italy, and Spain were 15.2, 25.2 and 28.5 percent respectively [52].

Despite the occurrence of several dramatic instances of severe inflation and hyperinflation in the past, these instances have always been associated with wars, civil wars, or revolutions, necessitating the use of seigniorage by governments to cover their large budget deficits. As emphasized by Bradford De Long, The Great Inflation stands out as the only historical instance of a major, prolonged, and persistent inflationary episode during peacetime in the United States [53].

While the traditional explanation for the Great Inflation is the oil price shocks of 1973 and 1979, more recent economists believes that the misguided monetary policies during the period is a more plausible explanation.

The Great Inflation holds multiple important lessons for monetary policymaking, as it emphasizes the significance of a solid and reliable nominal anchor in constraining inflation expectations. Germany's success in the 1970s was significantly attributed to its quick adoption of monetary targeting as a new nominal anchor following the breakdown of Bretton Woods.

Another crucial lesson is that the stability of inflation expectations should never be taken for granted. The US saw inflation expectations drift progressively upward in reaction to actual inflation, which shows that just a few years of higher inflation can rapidly increase inflation expectations. This also implies why the reputations and credibility of the central bank is of great importance of [53].

The experience of the Great Inflation, where higher inflation was systematically linked to poor macroeconomic performance on the real side of the economy, put an end to the idea that inflation and real activity could be exploited as a trade-off. This significantly strengthened the classical pre-Phillips position that inflation, by distorting price signals, weakens the operation of market economies and ultimately overall macroeconomic performance. This view, which was eloquently articulated at the time of the Great Inflation by Friedrich Von Hayek, the 1974 Nobel Prize winner in Economics, is now one of the cornerstones of monetary policy and serves as another important lesson from the Great Inflation [53]. The lessons learned during the Great Inflation have had a significant impact on policymaking, and it continues to be one of the episodes in economic history that receives the most research [52].

After a period of high and fluctuating inflation, it was gradually recognized that maintaining low and stable inflation is the most crucial responsibility of monetary policy. Throughout the 1980s, monetary policy was oriented towards reducing inflation [54].

Along with several other nations, a fixed exchange rate was chosen by Norway as their monetary policy objective was to provide the economy with a nominal anchor. In Norway, this was a breach from past strategies where the monetary- and currency policy had been focused on strengthening the internationally exposed sector. Devaluations would no longer be able to restore competitiveness that declined because of rapid wage increases.

As the mobility of capital increased, it became progressively more challenging to maintain a fixed exchange rate. Even small variations in interest rates could lead to capital flows making monetary policy susceptible to becoming pro cyclical. Speculation on currency could become a self-fulfilling prophecy as raising interest rates to defend the exchange rate could potentially trigger such a decline in activity that confidence in the fixed exchange rate was destroyed.

The fixed exchange rate system was abolished in Norway in December 1992. Ongoing instability and extensive speculation in the European foreign exchange markets meant that the abandonment of the fixed exchange rate was inevitable in most European countries.

In Norway, the target exchange rate was made more flexible. Without establishing a central exchange rate with fluctuation margins, monetary policy was focused on maintaining a stable exchange rate relative to European currencies. Fiscal policy also aimed to stabilize the domestic economy, which meant that the policymakers had to be increasingly oriented towards maintaining low and stable inflation when determining the interest rate. Inflation targeting became a desirable choice throughout the 1990s [55]. This regime of monetary policy was developed using knowledge learned in the 1960s, 1970s, and 1980s. As a result of inflation-targeting frameworks, most advanced economies enjoyed a period of relatively low and stable inflation in the 1990s and early 2000s.

In addition to causing a period of economic turmoil, the global financial crisis of 2007-2008 also contributed to some economies experiencing a brief period of deflationary pressures [56]. Central banks responded with unconventional monetary policies, e.g., quantitative easing, to combat deflation. In most advanced economies, inflation remained relatively low in the aftermath of the global financial crisis. Low inflation rates have been sustained by elements including technological advancements, international competitiveness, and moderate economic growth.

However, low and stable inflation came to an end in the aftermath of the COVID-19 pandemic, where inflation increased to levels not seen for decades [57]. This period will be analyzed in more detail later in the thesis.

4. Methodology

4.1 Data Collection and Sources

In this chapter, we will present the data used in our analysis. All data is from Q1 1999 to Q2 2023. The reason for this is that quarterly coverage is not available for all series before 1999. As monthly data can be more volatile and subject to noise, especially for short-term fluctuations, we chose to use quarterly data to smooth out some of this noise and focus on longer-term trends and patterns. Some of the data were, however, only available in monthly measurements. By taking the average of every month in each quarter, we transformed the monthly data into quarterly data.

4.1.1 CPI

As a measure of general inflation, we chose to use CPI, as this is the most used metric of inflation in Norway and is easily available. Historical data for CPI is downloaded from Statistics Norway (SSB), table 03013 [58].

4.1.2 Credit Indicator K2

As a measure of credit volume, we chose the K2 indicator. K2 shows the sum of the public's debt to Norwegian lenders. The public includes the institutional sectors, municipal administration, non-financial enterprises, and households. Historical data for K2 is downloaded from SSB, table 11599 [59].

4.1.3 Savings Rate

As a measure of savings rate, we chose to use the household's savings rate estimated by SSB. This is defined as the savings' share of disposable income after interest expenses and tax [60]. Historical data for household savings rates are downloaded from SSB, table 11020 [61].

4.1.4 Money Supply M2

For money supply, we chose to use the indicator M2. M2 is defined as M1, which is the sum of currency in circulation and overnight deposits, plus deposits with an agreed maturity of up to two years and deposits redeemable at notice of up to three months [62]. Historical data for M2 is collected from SSB, table 08253 and 10945 [63] [64].

The first dataset only includes data to 2015, so we had to merge it with a newer data set. As the definition of M2 has changed during this period, the data from 1999-2007 use the old definition and data from 2008 use the new definition [65]. We chose to use the newest definition for the longest period possible, which was back to 2008. The reason for this is that we are focusing on the post-COVID-19 period, so we did not want the change of definition to disrupt the newer data. The change in definition means that the data are somewhat incorrect, but the time series still gives a representative picture of the development in money supply.

4.1.5 Gross Domestic Product

Gross Domestic Product (GDP) measures the monetary value of final goods and services produced in a country in a given period of time [66]. Historical data for GDP are collected from SSB, table 09190 [67]. As we are using GDP as a variable to explain inflation, we used nominal values.

4.1.6 Exchange Rate NOK/EUR

Historical exchange rates between NOK and EUR are collected from the central bank [68]. We chose to use data for NOK/EUR as the Euro Area is the most important trading partner for Norway, making NOK/EUR the most important exchange rate [69].

4.1.7 Policy Rate

Historical data for policy rates are collected from Norges Bank [70]. This data is the monthly average, which we transformed to the quarterly average.

4.1.8 Global Supply Chain Pressure Index (GSCPI)

GSCPI is a measure of global supply chain pressure developed by the Federal Reserve Bank of New York. The GSCPI combines several commonly used metrics to provide a comprehensive summary of potential supply chain disruptions. Historical data are collected from the Federal Reserve Bank of New York [71].

4.1.9 Unemployment Rate

Data for unemployment rate is collected from SSB, table 07458 [72]. These data are the numbers of unemployed as a percentage of the workforce between 15 and 74 years.

4.1.10 HICP

As a measure of inflation in the Euro Area, we are using the Harmonized Index of Consumer Prices (HICP). HICP measures the development in consumer prices within members of EU, EA, and EEA [73]. The index is "harmonized" since all countries in the European Union follow the same methodology. This makes the data from one country comparable with data from another. Historical data of HICP is downloaded from the European Central Bank [74].

4.2 Validity and Reliability

Validity is the extent to which the results really measure what they are supposed to measure. If the validity is low, then you are measuring something other than what you intended [75]. We can share the concept into external and internal validity. External validity is the extent to which results from a study can be generalized to other measures, settings, or groups. Internal validity is the degree to which you can be confident that a cause-and-effect relationship established cannot be explained by other factors [76].

Reliability refers to the extent to which the results can be reproduced when the research is repeated under the same conditions [75]. This implies that a reliable measurement is not always valid, as results can be reproducible, but not necessarily measure what they are intended to in the thesis.

The data material used in the study is a collection of various time series and indices. All the collected data is publicly available, as well as published by reliable sources. Statistics Norway, Norges Bank, and the Federal Reserve Bank of New York are reputable institutions known for providing accurate and reliable economic data. These institutions follow rigorous methodologies and standards in collecting and reporting data. For these reasons, the data is considered both reliable and valid. The fact that public reports are based on this data also strengthens the reliability and validity. One weakness of the dataset is the change in definitions for money supply M2. This margin of error is, however, small, and the dataset is still considered reliable and well suited for our analysis.

4.3 Data Analysis Techniques

We will now present the tools we use to analyze which factors drive inflation. The chapter will provide a theoretical presentation of the tools adopted to give an insight into the area of use, advantages, and disadvantages.

4.3.1 Hodrick Prescott-Filter

Most economic variables move around a trend, which can be estimated based on historical data. By analyzing deviations from the long-term trend, we can uncover how deviations in various factors affect inflation. A method that is widely used to find the underlying trend is the Hodrick Prescott-filter (HP-filter). By starting from a structural time series model, one can decompose an observed time series x_t into a trend component g_t, a cyclical component c_t, a seasonal component s_t, and an irregular component i_t where t is the current period [77].

The observed time series can be derived as a function of:

$$x_t = f(g_t, c_t, s_t, i_t)$$

Equation 8

Using an arithmetic approach, equation 8 can be derived as follows:

$$x_t = g_t + c_t + s_t + i_t$$

Equation 9

Next, it is normal to consider the irregular component as the equation residual. This gives us the following equation:

$$i_t = x_t - (g_t + c_t + s_t)$$

Equation 10

Equation 10 can be derived in a reduced form, because it is natural to include the components i_t and s_t as part of the cyclical component c_t. This gives us:

$$x_t = g_t + c_t$$

Equation 11

To estimate the trend component g_t, we can use a HP-filter to minimize the following expression:

$$\min_{g_t} \sum_{t=1}^{T} (x - g_t)^2 + \lambda \sum_{t=2}^{T-1} [(g_{t+1} - g_t) - (g_t - g_{t-1})]^2$$

Equation 12

Where the estimated cyclical component c_t is:

$$\min_{g_t} \sum_{t=1}^{T} (x - g_t)^2$$

Equation 13

In equation 12, T equals the number of observations, and lambda (λ) is a value between zero and infinity. Lambda acts as a smoothing parameter for the estimated trend. The expression consists of two terms, where the first term is the square of the cycle component c_t, which is the difference between observed time series and the trend component. The second term is the square of the difference between the trend and growth from period t to period $t + 1$. The term also consists of lambda, which controls smoothness. By setting a low lambda value, we get an estimated trend with less cycles and large impacts. By using a higher value, the estimated trend line becomes straighter, with longer cycles. If we use an infinitely high lambda, the estimated trend line gets linear. From the literature, we know that some lambda values are frequently used as rules of thumb. A lambda value of 100 is an established standard for annual data, 1600 for quarterly and 14 400 for monthly [77].

Furthermore, it can also be useful in an analysis to estimate deviations. This is done by subtracting the estimated trend g_t from the observed time series x_t [78]:

$$c_t = x_t - g_t$$

Equation 14

In equation 14, we receive the deviations in absolute numbers. In analyses, it is often more natural to use relative numbers, which is percentage in this instance. This can be done by taking the logarithm of the different components:

$$log(c_t) = log(x_t) - log\ (g_t)$$

Equation 15

By using equations X and Y, we can express the following expression for deviations using HP-filter. Similarly, the cycle component c_t is the residual:

$$\min_{g_t} \sum_{t=1}^{T} (x - g_t)^2 = x_t - \lambda \sum_{t=2}^{T-1} [(g_{t+1} - g_t) - (g_t - g_{t-1})]^2$$

Equation 16

With an expression for deviations with HP-filter, we can further use the logarithm to obtain the following equation for relative deviations from trend:

$$\log(c_t) = \log(x_t) - \log\ (\lambda \sum_{t=2}^{T-1} [(g_{t+1} - g_t) - (g_t - g_{t-1})]^2)$$

Equation 17

4.3.2 Advantages and Disadvantages of the HP-Filter

Detrending a time series with HP-filter is a widely used method, due to the advantage that it is easy to use and can be used as an additional tool in Excel. Another advantage is that you can estimate the trend directly from the time series. However, there are disadvantages of using the HP-filter that should be considered, i.e., that you choose the lambda value yourself. This is something it has received criticism for [79]. It is possible to determine the lambda value based on three different approaches. The first alternative is to choose a lambda value to get a given value of the ratio between the estimated trend and the observed value. The second approach is to select lambda values to achieve the same variance in estimated trend as others, for example other countries. The last approach is to choose a lambda value that gives a ratio between trend and observed time series that matches your intuition. The filter is also criticized for endpoint problems, which means that the filter can have estimation problems at the start and end of a time series. The cycles at the ends of the time series can be emphasized too much in the estimation, and therefore the trend can either be over- or underestimated. This is a consequence of the filter using both data observations backwards and forwards in time to

estimate the trend. At the end of the time series, you do not have access to observations forwards in time, and the filter gradually becomes more one-sided. The problem can be solved by extending the time series. Furthermore, the filter may have problems capturing structural break in the time series [79].

4.3.3 Multiple Linear Regression

In our analysis of how various factors affect inflation, we use a multiple linear regression model in Excel. The multiple linear regression model with x independent variables is expressed as:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + .. + \beta_k x_k + \epsilon$$

Equation 18

The expression provides a complete picture of the relationship between the dependent variable y, and the independent explanatory variables, $x_1, \dots, x_k$. β_0 is the y-intercept and $\beta_1, \dots, \beta_k$ are slope parameters and regression coefficients. The residual term, ϵ, denotes the effect of other factors, not included in the model, that can affect the relationship between the dependent variable and the independent variables [80].

The model uses ordinary least squares (OLS) to choose coefficients $\widehat{\beta_1}, \dots, \widehat{\beta_k}$ that minimize the sum of squared residuals [81]. The OLS procedure minimizes:

$$Min \sum_{i=1}^{n} \epsilon_i^2 = \sum_{i=1}^{n} (Y_i - \hat{Y}_i)^2 = \sum_{i=1}^{n} \left(Y_i - \hat{\beta}_0 - \hat{\beta}_1 x_{i1} - \hat{\beta}_k x_{ik}\right)^2$$

Equation 19

OLS is dependent on five assumptions for the estimates to be considered valid. The Gauss-Markov Theorem defines OLS as "the Best Linear Unbiased Estimator (BLUE) if these five assumptions hold [82]. When compared to other estimates, a BLUE estimator provides the lowest possible variance of the estimate. The following five conditions must apply for OLS to provide estimates that are BLUE:

- There is a linear relationship between the dependent and independent variables.
- Our data must have been randomly sampled.
- There is no perfect multicollinearity.

- The expected value of the residual must be equal to zero.
- The residuals are homoscedastic.

Although it is rare for all the Gauss Markov assumptions to be perfectly met in practice, they are nevertheless valuable as a benchmark because they indicate what the "ideal" conditions would be. Additionally, they enable us to identify potential trouble spots that could lead to inaccurate, or even useless, calculated regression coefficients.

4.3.4 Variance Inflation Factor

To make sure there is no perfect multicollinearity between the independent variables we will conduct a test for Variance Inflation Factor (VIF). It provides a measure of the amount of multicollinearity among the independent variables in a multiple regression model [83]. A large VIF value indicates a highly collinear relationship to the other independent variables that should be considered when structuring the model. Too much multicollinearity creates issues in the multiple regression model as the variables are influencing each other. As a result, they are not actually independent, which makes it difficult to conclude which variable is influencing the dependent variable. The equation for this is:

$$VIF_i = \frac{1}{1 - R_i^2}$$

Equation 20

Where R_i^2 is the unadjusted coefficient of determination for regressing the i^{th} independent variable on the remaining ones. A rule of thumb for interpreting VIF is that a value of one equals no correlation, a value between one and five equals moderate correlation, and a value greater than five equals high correlation. It is debatable exactly how large the parameter needs to be before it becomes problematic. Some authors suggest a value of ten and some as low as 2.5. We have chosen to use a value of five as our maximum level of VIF.

4.3.5 Leading, Lagging or Coincident Variables

Adjusting for leading and lagging variables is also important in statistical analysis, particularly in the context of regression modeling or time series analysis. All variables fall into one of three categories: Leading indicators, lagging indicators, and coincident indicators [84]. A coincident variable happens in real time, a lagging variable might validate an ongoing pattern, and a

leading variable might point toward a potential future outcome. Understanding the causal links between various factors is made easier by the identification of leading and lagging variables. Understanding which factors lead or lag relative to others offers insight into the direction of impact within a system. By calculating the cross-correlation between two time series, at different leads and lags, we can investigate which period has the highest correlation. A peak in the correlation at a positive lag suggests that the first time series leads the second, while a peak at a negative lag suggests the opposite.

5. Results

In this chapter, we will analyze the development in the CPI in Norway, using the methods presented in chapter 4. First, we use the HP filter to analyze the trend in CPI and investigate whether developments in the CPI deviate from trend. We then analyze potentially important factors that may influence CPI, to investigate whether the development in CPI can be explained based on these factors or not.

5.1 Trend and Deviations in CPI

All data is from Q1 1999 to Q2 2023. As recommended by Hodrick and Prescott, we use a lambda value of 1600 on our quarterly data [77]. From Figure 9, we can see the developments in CPI from 1999-2023. The index goes from 72.6 in Q1 1999 to 129.7 in Q2 2023. By calculating the average yearly increase, we get that CPI has increased by 2.4 percent each year in this period. This is fairly consistent with Norges Bank's inflation target, which changed from 2.5 percent to 2.0 percent in 2018 [85].

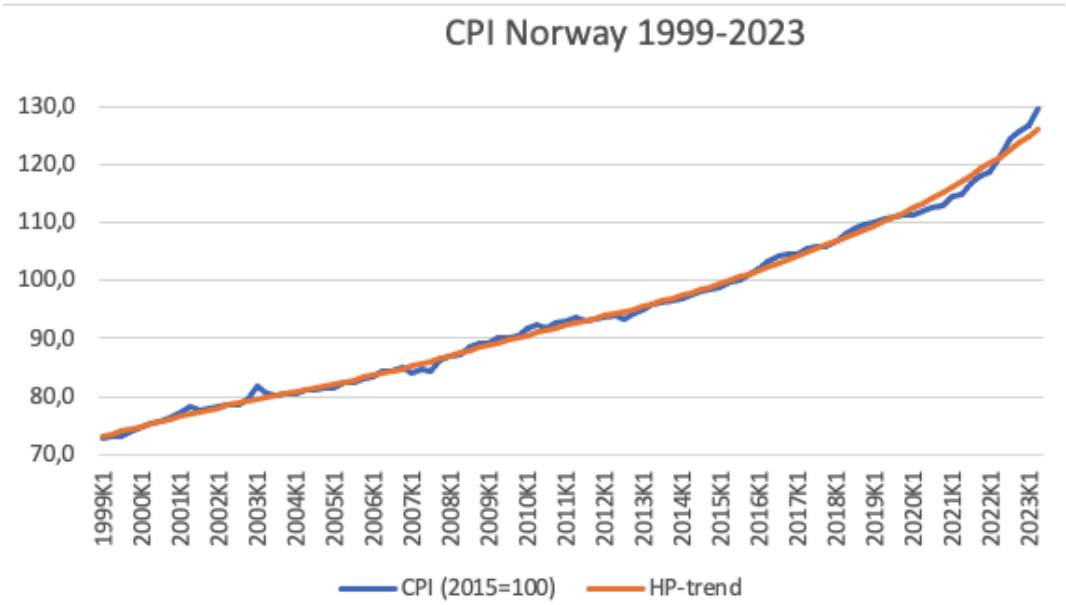

Figure 9: CPI Norway 1999-2023

As we can see from the graph, there are periods where CPI has increased significantly more or less than the trend. This is easier to analyze if we look at the deviations from the trend, illustrated in Figure 10.

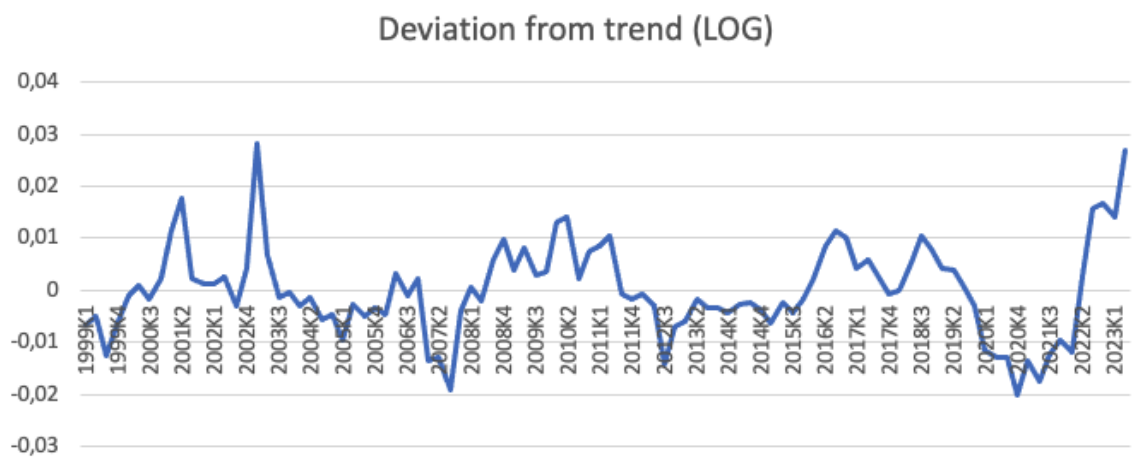

Figure 10: Deviations from trend 1999-2023

The deviation from trend is simply calculated by subtracting the trend from the observed time series, as previously explained. By taking the logarithm, we receive relative numbers, so that the change in deviations is expressed as percentage. In this period, deviations in CPI have fluctuated between three percent over trend and two percent under trend. CPI reached the bottom at approximately two percent below trend in Q4 2020 and reached the peak at three percent over trend in Q2 2023.

Inflation has increased significantly more than the trend during the last few years, but the question remains as to why inflation increased so rapidly, and which factors were the main drivers for increase. We will try to reach a better understanding of the main inflation drivers by doing a multiple regression analysis, with CPI as the dependent variable. The independent variables are chosen based on economic theory and known connections with inflation.

5.2 VIF-Test

When including several important economic factors, which may have strong connections, it is important that we investigate whether they are too correlated. Hence, before we conducted the regression analysis, we had to examine the correlation between the independent variables. The results from our VIF-test are shown in Table 1 below.

	R2	VIF
Dev. Policy rate	0,74992762	3,9988423
Dev. Savings rate	0,24914823	1,33182079
Dev. GDP	0,51834241	2,0761637
Dev. EUR/NOK	0,39864703	1,66291688
Dev. M2	0,4812542	1,92772646
Dev. K2	0,71697982	3,53331693
Dev. HICP	0,58859456	2,43069222
Dev. GSCPI	0,46252477	1,86055087
Dev. Unemployment	0,54547649	2,2001062

Table 1: Results from VIF-test

Because we chose to use a value of five as our maximum level of VIF, all independent variables are considered "moderately correlated" and within our acceptable level.

5.3 Leading and Lagging Variables

To achieve a better understanding of causality and the direction of influence, we adjusted for leading and lagging variables. The results from the cross-correlation between CPI and the independent variables are shown in Table 2.

Lead/Lag	Dev. Policy rate	Dev. Savings rate	Dev. GDP	Dev. EUR/NOK	Dev. M2	Dev. K2	Dev. HICP	Dev. GSCPI	Dev. Unemployment
-3	0,101278616	-0,021951935	0,36954709	-0,100942902	0,19739267	0,25374983	0,22964142	0,17179093	-0,126198095
-2	0,206257319	-0,295215448	0,43934392	-0,147579147	0,03350156	0,2095577	0,37421765	-0,0486445	-0,167636811
-1	0,262900178	-0,248794187	0,3498523	-0,069733308	-0,013332	0,15487257	0,44998618	-0,2309647	-0,109442142
0	0,273059758	-0,235888838	0,18650968	0,057022626	-0,1830386	0,09153844	0,48510604	-0,3556347	-0,103518554
1	0,221566859	-0,186969112	-0,03867529	0,163739408	-0,2910974	-0,0122797	0,38392061	-0,3654675	-0,089321798
2	0,117804087	-0,245758011	-0,1700821	0,246978976	-0,3170202	-0,1017381	0,25147875	-0,3669229	-0,058065582
3	0,003453902	0,001644437	-0,29315239	0,21829369	-0,2733355	-0,2080037	0,08599541	-0,31876	0,012008127

Table 2: Cross-correlation matrix

We analyzed correlation for each variable up to three periods lead and lag. Since each period is one quarter, this corresponds to 9 months lead and lag. The highest absolute value for cross-correlation for each variable is highlighted in green. CPI is set to time zero, which means that Policy rate and HICP are coincident, Savings rate, GDP, K2, and Unemployment are leading variables, and EUR/NOK, M2 and GSCPI are lagging variables, based on this method. By analyzing which lead/lag gave the highest cross-correlation, we adjusted the time series based on these results.

5.4 Multiple Regression Analysis

Based on the adjusted time series, we carried out a multiple regression analysis with CPI as the dependent variable. Given that it is easier to interpret results in percentage instead of absolute numbers, we took the logarithm of all variables, except from policy rate and savings rate. The reasoning behind this is that these variables are already expressed as percentage, and the fact that we cannot take the logarithm of negative values.

In this regression model, the explanatory variables explain about 46 percent of the change in CPI. At this stage, it is important to emphasize that all variables are expressed as deviations from trend and not the actual numbers. This means that we are analyzing how an increase in the deviations from trend in the independent variables will affect the deviations from trend in CPI. As CPI naturally increases over time, and low and stable inflation at about two percent is desired, we will use deviations and not actual numbers in our model. The reason for this is that several of the independent variables also naturally increase over time, such as GDP and money supply, and we would therefore get that these variables explain almost 100 percent of the increase in CPI. Rather than analyzing why inflation increases over time, we want to know why inflation increases significantly more than the trend in periods. The results from the regression analysis are shown in Table 3.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,67874102
R Square	0,46068938
Adjusted R Square	0,40220991
Standard Error	0,00650816
Observations	93

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	9	0,00300306	0,00033367	7,8777974	2,5899E-08
Residual	83	0,003515563	4,2356E-05		
Total	92	0,006518623			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	7,7803E-05	0,000680583	0,11431886	0,90926112	-0,0012758	0,00143145	-0,0012758	0,00143145
Dev. Policy rate	0,00195055	0,001059973	1,84019172	0,06931435	-0,0001577	0,0040588	-0,0001577	0,0040588
Dev. Savings rate	-0,0003208	0,000195967	-1,6371632	0,10538258	-0,0007106	6,894E-05	-0,0007106	6,894E-05
Dev. GDP	0,03111612	0,018988379	1,63869255	0,10506277	-0,006651	0,06888324	-0,006651	0,06888324
Dev. EUR/NOK	0,00828123	0,019611703	0,42225984	0,67392719	-0,0307257	0,04728812	-0,0307257	0,04728812
Dev. M2	**-0,13034**	0,034522089	**-3,775555**	0,00029894	-0,1990031	-0,061677	-0,1990031	-0,061677
Dev. K2	**0,18462704**	0,062603176	**2,94916403**	0,00413828	0,06011184	0,30914223	0,06011184	0,30914223
Dev. HICP	**0,27210853**	0,122346646	**2,22407836**	0,02885881	0,02876597	0,51545109	0,02876597	0,51545109
Dev. GSCPI	-0,0011484	0,001641085	-0,6997659	0,48603015	-0,0044124	0,00211568	-0,0044124	0,00211568
Dev. Unemployment	**0,01015497**	0,0023639	**4,29585469**	4,7001E-05	0,00545327	0,01485667	0,00545327	0,01485667

Table 3: Regression results

When using a 95 percent confidence interval, the interval has a probability of 95 percent to contain the true value of β_i. With 93 observations, the critical T-value for a 95 percent confidence interval is 1.99 [86]. This means that coefficients with an absolute value above 1.99 are considered significant. The significant variables in this regression analysis are M2, K2, HICP and Unemployment rate. We will now interpret their beta values.

M2

With a T statistic of -3.77, M2 is strongly significant. A beta value of -0.1303 implies that when M2 increases by one percent, CPI decreases by 0.13034 percent. This is the opposite of what we had expected, as M2 is a known contributor to inflation. Based on the Quantity Theory of Money, an increase in money supply will result in an increase in prices, holding velocity and volume constant. The reason why we observe this counter-intuitive beta value may have to do with causality. This also aligns with the results from the cross-correlation matrix, where we saw that M2 had the highest correlation with a two-period lag. When interpreting the results the other way, we get that when inflation increases, money supply decreases with a two-period lag. This makes more sense, as central banks often implement contractionary fiscal policy, influencing money supply, when inflation increases above the target. Interpreting the beta value the other way, M2 decreases with one percent when inflation increases with 0.1303 percent.

K2

The credit indicator K2 is also significant, with a T-value of 2.949. When K2 increases by 1 percent, CPI increases by 0.1846 percent. The fact that credit volume is a significant contributor to inflation aligns well with intuition and economic theory. An increase in credit volume will most likely lead to higher consumer spending and business investments, resulting in an increased demand for goods and services. This can potentially result in Demand-Pull inflation if the economy is operating near its full capacity. If credit expansion also leads to an increase in money supply, it may contribute to currency depreciation, which in turn yields higher import prices and increased inflation. We found that the highest correlation between K2 and CPI was with a three-period lead for K2, which means that it takes approximately 6 to 9 months before the increase in credit volume affects inflation. The intuition behind this is that it takes time for people and businesses to respond to changes in credit availability, and investments to materialize.

HICP

Inflation in the Euro Area is also a significant variable, with a T-value of 2.22. When HICP increases by 1 percent, CPI increases by 0.2721 percent. A strong connection between inflation in the Euro Area and Norway is not surprising. Norway has significant trade relations with EU members, and a change in EU inflation leads to imported inflation. Raw materials, intermediate goods, and finished products are all imported from EU countries. An increase in the prices of these imported products therefore affects the overall cost structure in Norway. Also, if the EU experiences higher inflation than Norway, the demand for Norwegian goods and services may increase, which can lead to higher prices.

Unemployment

With a T-value of 4.2958, unemployment is also a strongly significant variable. When unemployment increases by 1 percent, CPI increases by 0.0101 percent. As with money supply, this goes against economic theory. According to the Phillips Curve, unemployment and inflation have an inverse relationship. We would therefore expect a negative beta value, with inflation decreasing when unemployment increases. If we had observed that unemployment was a lagging indicator, such as M2, we could have implemented the same reasoning for the illogical results. We did however observe that unemployment has the highest correlation with a lead of two periods. We also observed that the correlation between unemployment and CPI is negative, which is the opposite of the results in the regression analysis.

Endogeneity may be a key concept in this context. Endogeneity occurs if there is a two-way relationship between the dependent variable and one or more independent variables. While high unemployment generally leads to lower inflation due to reduced consumer spending, expansionary monetary policies may be implemented by central banks in response to periods of economic distress, which may contribute to higher inflation. In these situations, the two variables are jointly determined, and the causal relationship may not be accurately captured by the regression results. The fact that the beta value is positive by only 0.0101 supports this reasoning.

6. Case Study: The Country Inflation Left Behind

In this case study, we will introduce a comprehensive overview of the macroeconomic landscape in Switzerland and Norway. To further assess the similarities and differences between the two countries, we will carry out an analysis on key economic indicators, such as GDP growth, fiscal- and monetary policies, unemployment rates, along with other parameters that can explain why Switzerland, a relatively similar country to Norway in many aspects, have managed to keep inflation at such low levels.

6.1 Introduction

Strong economic growth returned as the world economy began to recover from the COVID-19 pandemic, but so did inflation. For several years, the rate of inflation has remained low, but during 2022, inflation in most advanced countries reached its highest level in more than 40 years [87]. The dramatic increase in inflation that started in 2021, was not anticipated by central banks or most analysts, and as a result, policymakers were hesitant to act. The belief that the inflation burst would be brief further delayed action [88].

The invasion of Ukraine by Russia, as well as new COVID-19 lockdowns in China, coincided just as we were beginning to recover from the pandemic in Europe, raising concerns among businesses and consumers that inflation will continue to be high long beyond 2022 [89].

The COVID-19 pandemic presented us with a mix of shocks affecting both the supply and demand sides in ways we have never seen before. These shocks spread through supply chains, resulting in supply and demand constraints in several industries. The monetary and fiscal authorities both took extensive action in response to the pandemic. Massive stimulus programs and accommodating monetary policies shielded the economy from both liquidity crises and mass layoffs. The introduction of vaccines also made it possible for economies to progressively reduce lockdown measures, reviving economic activity and releasing consumer savings at a previously unprecedented rate.

After the initial COVID-19 restrictions were lifted, it led to an upsurge in economic activity worldwide. Consumers increased their savings rate during the pandemic, choosing not to consume as much, but they were now raising their rate of consumption. Because of the

expanding economy and consumer demand, businesses could now raise their pricing without worrying about losing customers.

Many suppliers were unprepared for the rise in customer demand, especially regarding electronics. The pandemic has revealed that many businesses are not completely aware of how vulnerable their supply chain connections are to global shocks. Shortages of essential components, combined with an increasing demand for products containing these components, eventually led to Demand-Pull inflation, where demand outpaced the available supply of consumer goods.

According to the ECB, almost half of the growth in inflation can be accounted for by the increased cost of energy [90]. Due to a decline in production and an increase in demand, the cost of electricity, gas, and oil has increased globally. Since energy is a main component in most production, the increase in energy prices has a multiplier effect on other costs, making it extremely impactful on inflation. In addition to this, the EU's energy costs have skyrocketed in consequence of Russia's invasion of Ukraine and the sanctions that followed. Given the shock in oil and gas prices brought on by the war, Cost-Push inflation got even worse through these extreme energy prices [89].

To fight inflation, central banks have increased interest rates historically fast. Coming off historically low interest rates during the pandemic, central banks in the western world have taken very aggressive actions to fight against inflation. From July 2022, ECB and Norges Bank have increased interest rates with respectively 450 and 425 basis points [91] [92]. Since its peak in 2022, inflation has eventually come down to more acceptable levels, but still roars above the inflation target at two percent [93] [94].

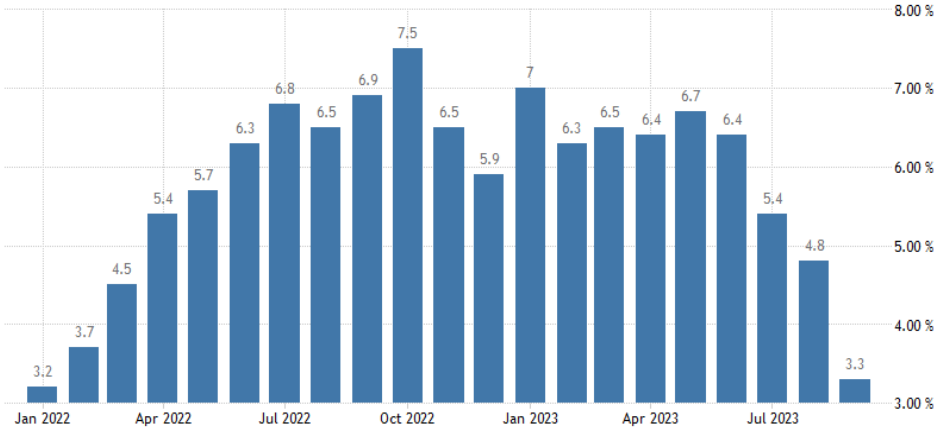

Figure 11: Inflation Norway Jan 2022 - Sep 2023 [95]

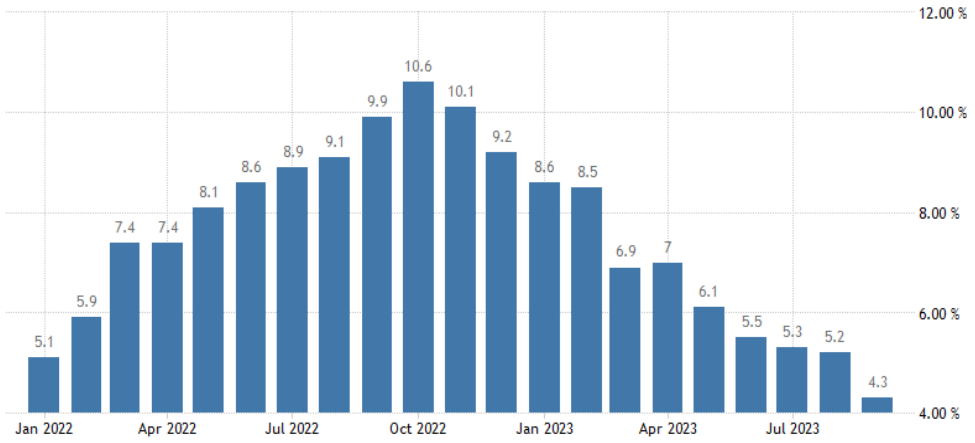

Figure 12: Inflation Euro Area Jan 2022 - Sep 2023 [96]

Figure 11 and 12 show inflation rates, measured in CPI, in Norway and the Euro Area from January 2022 to September 2023. Inflation in both areas dramatically increased from January 2022, with peaks in October 2022 at 7.5 percent for Norway and 10.6 percent for the Euro Area. Inflation increased quicker and with a higher peak for the Euro Area, but it has also decreased quicker. Inflation in Norway has been stickier than in several other European countries. The reason for this is that the Norwegian currency, the krone, has been historically weak compared to other currencies. The devaluation of the krone has delayed the decline in inflation, mainly because imported consumer goods get more expensive [97]. However, the newest rates show a strong decline in inflation for September, with 3.3 percent for Norway and 4.3% for the Euro Area. The main reason for this is the decrease in energy prices, which has been a main driver for inflation post COVID-19. If we look at CPI-ATE, this is still at 5.7 percent for Norway while the core inflation for the Euro Area is 4.5 percent [98] [99]. Both central banks projects inflation to continue to gradually decline, meeting the target at 2% in the end of 2025 [100] [101].

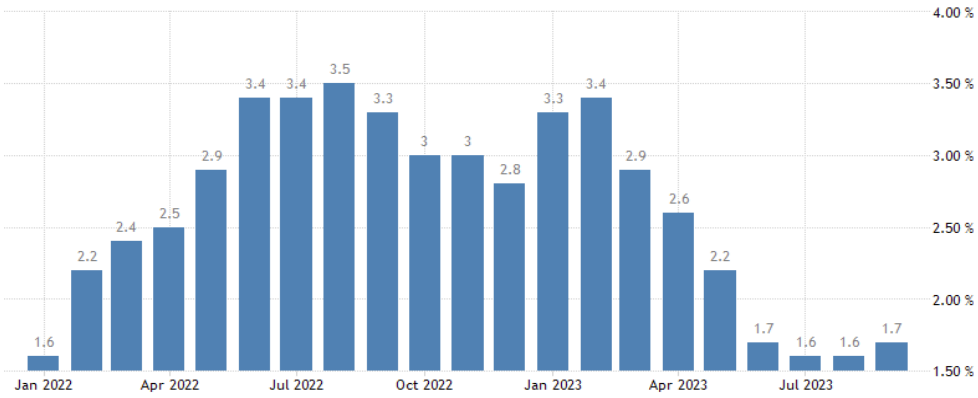

Figure 13: Inflation Switzerland Jan 2022 – Sep 2023 [103]

Considering the rapidly increasing price levels across most developed countries, Switzerland is the exception, with inflation markedly below the rates in the Euro Area, the US and Norway [102]. From Figure 13, we can see that Switzerland has had considerably lower rates of inflation than Norway and the Euro Area from the start of 2022 until September 2023. This is a remarkable phenomenon in the European economy, and particularly when we compare the inflation in Switzerland to inflation in relatively similar countries, e.g., Norway. In this case study, we will discuss several reasons for how Switzerland, a big participant in both the European and the global economy, have managed to restrain the inflation rates that have proven to be a major challenge in most western countries.

6.2 Overview of Norway and Switzerland

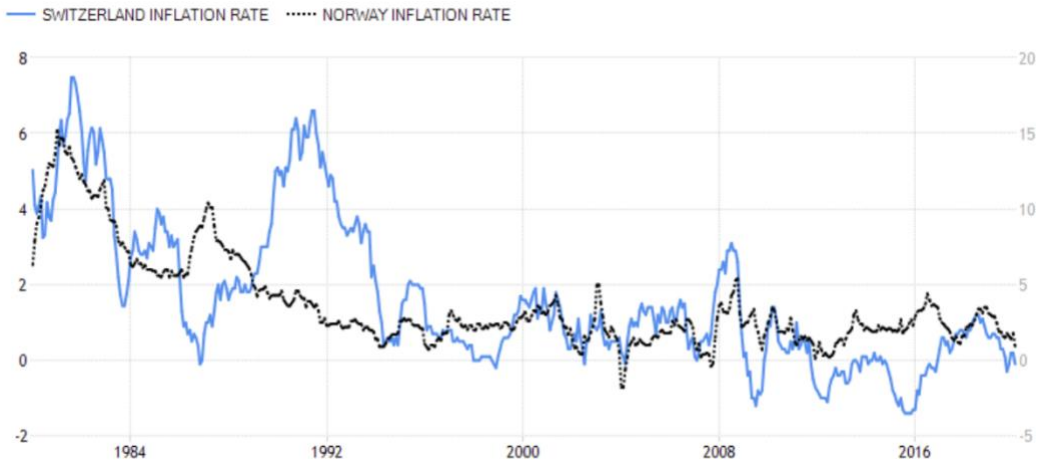

Figure 14: Inflation Norway and Switzerland 1980 – 2020 [103].

Like Norges Bank, the Swiss National Bank has defined an inflation target to equate price stability. According to the SNB, there is price stability when the rise in the Swiss consumer price index is less than two percent annually, which is comparable to Norges Bank's target of keeping the annual growth in consumer prices close to two percent over time [104].

Inflation in Switzerland was estimated to -0.7 percent in 2020, which means that, on average, consumer prices and the cost of living decreased [105]. In Switzerland, the inflation is calculated by the Federal Statistical Office, who computes the Swiss consumer price index each month. In the figure above, inflation rates from both Switzerland and Norway from 1980 to 2020 is illustrated. The trend seems to be somewhat similar during the past 40 years, with the exception being the period from the late 1980's to early 1990's where Switzerland saw a

relatively large increase in inflation, mainly due to an overheated economy, spiraling rents caused by mortgage rate increases, and a steep rise in the price of oil [106].

During World War 1, Switzerland experienced a major inflation period, caused by the massive cost increases for the national defense [107]. To compensate for this, the Swiss government introduced extraordinary increases in taxes and indebtedness on the capital market. However, as the war continued, ever-increasing amounts of money began circulating in the economy and the inflation rate rose above 20 percent. As wage increases could not manage to compensate for the leap in prices, the purchasing power decreased dramatically.

In the 1970's, inflation rates rose close to twelve percent, mainly due to the US conducting aggressive expansive monetary policy. The situation in North America had worldwide repercussions because of the fixed exchange rates that were in place at the time. The Swiss inflation rates returned to normal shortly after the country decided to decouple from the fixed exchange rate system in 1973 and revalue the franc. With the global discard of the fixed exchange rate system, Switzerland does no longer need to worry about adopting inflation, which means that a shock has to occur for the country to experience such inflation rates in the future.

The main takeaway from this graph, however, is that Switzerland has had significantly lower inflation than Norway, with negative inflation rates being common during the past 10 to 15 years.

6.2.1 COVID-19 and Government Measures in Switzerland

Switzerland was one of the European countries where COVID-19 hit strong and early, with the first confirmed infection case registered on the 24th of February 2020 [108]. The Federal Council declared a state of emergency on the 16th of March just a few weeks later, resulting in closed schools, bars, restaurants, shops, and entertainment facilities. Public gatherings of more than four people were prohibited, along with a recommendation towards all inhabitants of staying home. All borders were severely controlled, restricting entry for citizens of both Schengen and non-Schengen countries.

Reopening of the economy: As the number of active and new cases decreased rapidly from late April the same year, the authorities began following a three-phase plan with the intention of gradually reopening the economy. Businesses such as dental practices and hair salons were

allowed to resume operations on the 27th of April, and a further easing on the 11th of May saw shops, museums, libraries, travel agencies, restaurants and schools reopen. Starting from the 6th of June, events with up to 300 people were once more permitted. Just a few weeks later, this restriction was expanded to 1000 people. After consulting with neighboring countries, border restrictions were loosened from the 11th of May, gradually allowing more people to cross [108].

Second wave: By the end of September, the number of new infections began surging once again. Therefore, on the 19th of October, the Federal Council reintroduced many of the restrictions from April, along with other containment measures, e.g., a mandatory facemask requirement in all public indoor spaces, including public transport areas. As hospitals began approaching their capacity because of the increasing number of new infection cases, the Federal Council announced several new restrictions throughout December. Just before Christmas in 2020, to contain the spread of a new and even more contagious variant from South Africa and UK, the Federal Council introduced an entry ban and retroactive quarantine for people approaching from either one of the two countries. Most containment measures and restrictions were either continued or even tightened in January and February the following year [108].

Second reopening of the economy: The restrictions and containment measures taken in the second wave, along with vaccination progress, helped bring down the numbers of infection cases, as well as the proportion of infected people needing hospitalization. Therefore, on the 1st of March 2021, outdoor areas, shops, libraries, and museums were reopened. Some further easing was introduced throughout the next weeks, but it was not until the 21st of April that the Federal Council once again announced their three-phase plan. By the end of June, 34 percent of the population were fully vaccinated and around half of the population had received at least one dose of vaccines. Following the vaccination status, the restrictions and containment measures were gradually loosened from May, and further on throughout June when facemask requirements were lifted along with the requirement to work from home. Restrictions on face-to-face teaching, limits on group sizes at restaurants, and capacity for shops, sports facilities and leisure were also abolished. The restrictions for entering the country were significantly relaxed as well [108].

Fiscal Measures

At the very beginning of the pandemic, the Federal Council introduced several federal level support packages, totaling CHF 73 billion, i.e., 10.4 percent of Switzerland's GDP in 2019 [108]. In the package of CHF 10 billion that was announced on the 13th of March, CHF 8 billion was allocated towards partial unemployment compensation, with the rest going towards financial aid for affected businesses, loan guarantees and loss compensation. A second package of CHF 32 billion was announced only a week later. The aim of this package was to support bridging loans, extend short-time work allowances, compensate the loss of earnings for self-employed people, offer interest-free deferral of social security contribution payments, and extend the payment periods for taxes to federal suppliers. On the 25th of March, the Federal Council announced additional measures of CHF 600 million per month, before doubling the size of the loan guarantee program to CHF 40 billion at the beginning of April.

Along with the reopening of the economy, the government's focus shifted from providing an economic emergency lifeline, to fine-tuning the support measures and ensuring policy continuity. On the 1st of July, the government introduced a financing plan for public transport and freight companies, as well as an extension of the revenue compensation for self-employed people and the maximum period of short-time work compensation.

As the second wave brought on more restrictions on economic activity, the government needed to continue supporting the economy. Thus, several smaller measures were carried out throughout the year 2020, with the most notable being another extension of the short-term work scheme coverage and compensation of income losses. With the introduction of tighter restrictive measures in January 2021, the Federal Council expanded the fiscal support further, to meet the negative economic impact which this entailed. Therefore, the limit of support that a firm could receive was increased, along with another extension and expansion of the coverage of short-term work schemes. On the 27th of January, the Federal Council announced new fiscal support packages of CHF 8.5 billion, before a new package of CHF 6 billion was launched later in February. During the spring and early summer of 2021, several smaller supplementary measures were introduced to contribute to the vaccination process and subsidize testing, as well as helping the cultural sector and event industry. The compensation for loss of earnings and the maximum period for drawing short-term work allowance was extended respectively until the end of 2021 and 24 months [108].

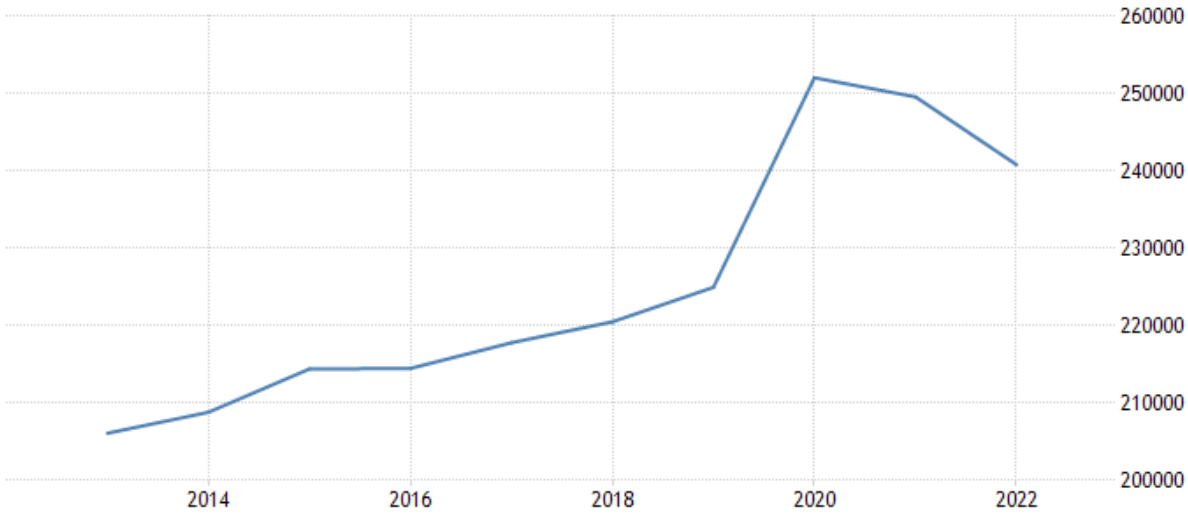

Figure 15: Fiscal Expenditure in Switzerland, CHF million, per annum [109]

As illustrated in the graph above, Swiss fiscal expenditure reached a peak in 2020, totaling roughly CHF 252 billion. From 2021 to 2022, fiscal expenditure in Switzerland decreased from around CHF 250 billion to around CHF 240 billion. The average of fiscal expenditure in Switzerland between 1980 and 2022 is CHF 153.3 billion.

Monetary and Macro-Financial Measures

With the intention of dealing with liquidity bottlenecks, the Federal Council ordered a debt enforcement standstill from the 19th of March to the 4th of April 2020. The Swiss National Bank (SNB) lowered the interest rate, activated a US dollar liquidity swap, increased the frequency of the 7-day maturity operations from weekly to daily, and offered a new 84-day maturity [108]. Additionally, the SNB also announced that the threshold factor for exempting sight deposits from negative interest rates would be raised. Later, as a new COVID-19 refinancing facility, the SNB allowed banks to obtain liquidity from them. The rate calculation for the SNB's liquidity-shortage financing facility was also adjusted, i.e., reducing the borrowing cost from the facility.

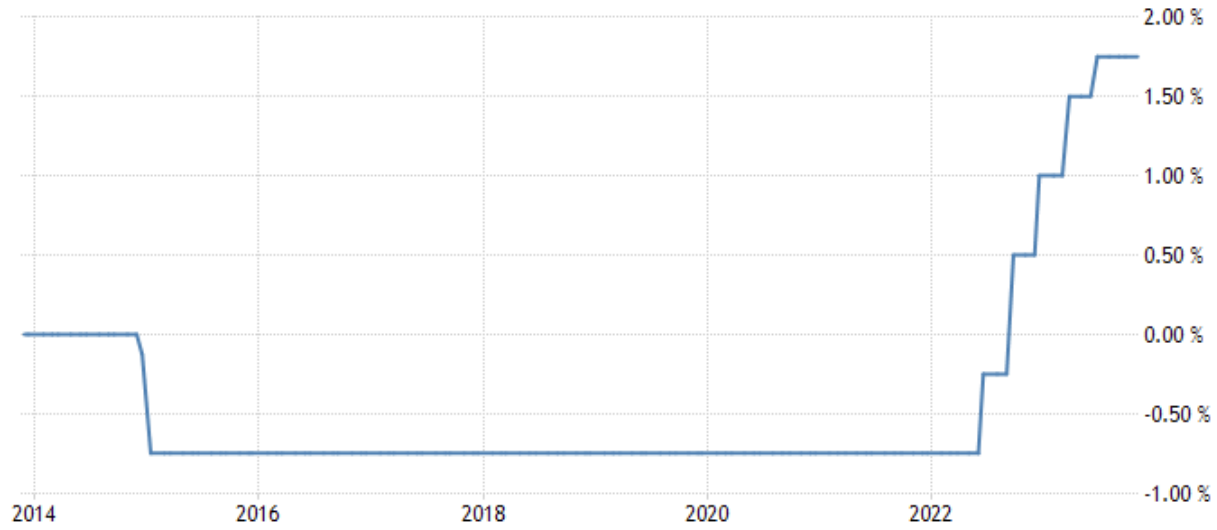

Figure 16: Interest rates in Switzerland [103]

Somewhat unexpectedly, the SNB kept the policy rate steady at 1.75 percent in its September 2023 meeting, stating that the significant tightening of the monetary policy during the past quarters is countering the remaining inflationary pressure [103]. Given that the forecasts projected an increase of 0.25 percentage points before the meeting, the standstill signals a pause in the rate-hike campaign that began in the summer of 2022. However, to ensure price stability, policymakers added that a further tightening of the monetary policy cannot be ruled out. At the September 2023 meeting, inflation forecasts were kept at 2.2 percent for both 2023 and 2024.

Exchange Rate and Payment Balance

SNB's interventions in the foreign exchange market were increased to restrict a potential appreciation of the franc, and the Bank purchased equivalent to CHF 110 billion in 2020 [108]. These interventions in the foreign exchange market declined in 2021, totaling CHF 296 million in the first quarter. SNB's sight deposits increased by roughly CHF 123 billion during a 16-month period starting in February 2020, which is a measure of the amount of franc injected through interventions in the foreign exchange market, the refinancing facility, and repo operations.

6.2.2 COVID-19 and Government Measures in Norway

Only two days after the first confirmed infection in Switzerland, on the 26th of February, Norway registered their first case of COVID-19. After several weeks of gradually increasing infection rates, the number of new cases reached a peak at the very end of March. The

Norwegian government introduced a wide range of installments and measures to stabilize the economy and mitigate the spread of the virus, i.e., quarantine requirements, travel restrictions, closure of universities, firms and schools, and social distancing [108]. Like the situation in Switzerland, the virus hit Norwegian society in several waves, which resulted in constantly changing requirements and recommendations, as well as several lockdowns and re-openings.

Fiscal Measures

A central challenge in Norwegian fiscal policy is how to manage fluctuating and transitory income from the petroleum sector. The Norwegian Government Pension Fund Global was established in 1990, then called The Petroleum Fund. The oil revenues, defined as the state's net cash flow from the petroleum business, are saved in this fund, and is invested globally [110].

The background for establishing a petroleum fund was the unique and distinctive character of petroleum revenues, compared to the Government's other revenues. When the fund was created, there was an established procedure of how the transfer from the fund to the government budget was to be carried out. However, no guidelines had been established regarding the maximum annual withdrawal limit for large deposits from the fund. The budgetary rule, that was introduced by the government in 2000/2001, takes it one step further in limiting the size of the transfers to the expected real return of the fund over time, estimated to approximately 4 percent.

The budgetary rule specifies that the petroleum revenues should be used to even out fluctuations in the economy, which is based on the fact that changes in aggregate demand in the short term can influence the activity level in the economy [110]. The fiscal policy can facilitate an increase in aggregate demand if the expenditure over the budget is growing faster than the rest of the mainland economy, or if the budgetary revenues are growing slower than the rest of the mainland economy. In the long run, economic activity is more dependent on supply side conditions, i.e., the access of labor and physical capital, and technological improvements, which are also affected by fiscal policy.

The budgetary rule has been the basis for every governmental budget since 2002. Measured by the structural, oil-adjusted deficit over the governmental budget, the expenditure of petroleum revenues has increased from approximately two percent of trend-GDP for mainland Norway in 2002, to seven percent in 2016. But also in earlier years, way before the budgetary rule was introduced, we have seen massive changes in the use of petroleum revenues. In the

middle of the 1970s, we saw a particularly large increase in the expenditure of petroleum revenues, in conjunction with the active counter-cyclical policy that was conducted at the time. Equivalently, there was a significant increase in the use of petroleum revenues after the housing and bank crises in the latter 1980s. Both episodes were followed by consolidations, involving relatively large reductions in both the structural and the running oil-adjusted budgetary deficits.

The expansionary fiscal policy conducted in the years after the budgetary rule was introduced in 2001, coincided with a relatively strong rise in the Norwegian economy [110]. A very high price on oil, combined with a rather strong growth in the demand from the petroleum business, propagated in the mainland economy and resulted in growing prices and employment. Until late 2005, the growth in productivity was also high. The increase in employment was made possible due to labor immigration after the expansion of the EU in 2004.

According to Norwegian authorities, discretionary fiscal measures in 2020 amounted to NOK 131.3 billion, which equals 4.35 percent of Norwegian mainland GDP in 2020. Any losses from government guarantees and loans above budgeted loss provisioning, as well as the government bond fund, is naturally not included in the estimate. The fiscal measures in Norway during the pandemic includes the following:

Expenditure measures: The government introduced a household income protection scheme, which yielded more generous unemployment benefits, expanded child and sickness care, and greater wage subsidies for temporary leaves and lay-offs [108]. In addition to this, a business scheme was offered to compensate heavily affected firms for unavoidable fixed costs, grant start-ups, subsidize domestic flights, and the government fund that buys bonds issued by Norwegian companies was reinstated. Critical sectors, such as healthcare, were also further strengthened, and firms were subsidized on a condition of taking back workers that had been temporarily laid off earlier. Lastly, the government issued a green transition package and expanded the funding for educational institutions.

Revenue measures: The government decided to reduce the value added tax rate from 12 to 6 percent. Various tax payments were postponed and the employer tax for May and June 2020 were reduced. They also made a change in the CIT regulations, to help loss-making businesses reallocate their losses towards the taxed profits of previous years. To improve the liquidity in the petroleum sector, the government made temporary adjustments to the petroleum tax system. Along with this, employers' social insurance contributions were temporarily reduced,

and aviation charges were suspended. These measures were continued into 2021 and were heavily reflected in the revised budget that focused on promoting recovery and reducing the long-term economic effects of the crisis.

Figure 17 illustrates the peak in Norwegian fiscal expenditure during the first quarter of 2023, totaling approximately NOK 481 billion. From the second quarter of 2023 to the third quarter of 2023, fiscal expenditure in Norway decreased from approximately NOK 470 billion to roughly NOK 399 billion. The average fiscal expenditure in Norway per quarter from 1991 to 2023 is NOK 211 billion.

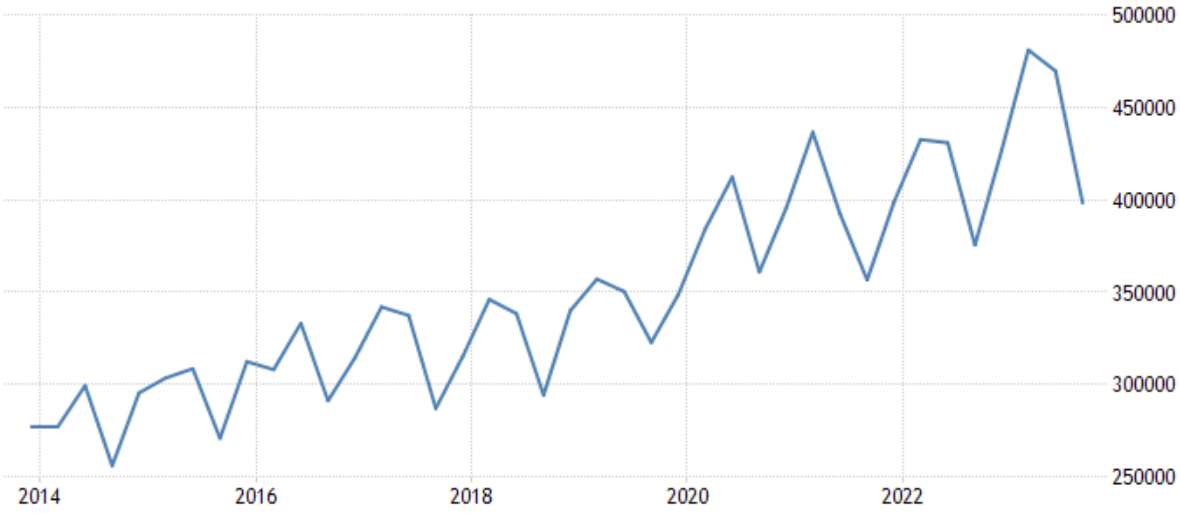

Figure 17: Fiscal expenditure in Norway, NOK million, per quarter [111]

Monetary and Macro-Financial Measures

Over the past 100 years, Norwegian monetary policy has evolved considerably. Supported by the Parliament, the Government has defined low and stable inflation as an objective for the monetary policy, and the central bank sets the policy rate with views of achieving this price stability [112].

Along with the outbreak of the First World War, the confidence in Norway's monetary system decreased. Converting banknotes into gold was no longer permitted, which led to a money supply out of control and rising inflation. In 1918, the inflation reached a level of 40 percent [112]. The new chairman of Norges Bank's board, appointed in 1920, Nicolai Rygg, regarded it as his obligation to restore the gold value of the Norwegian krone to previous values, i.e., parity policy. At the time, this was considered a precondition aimed at restoring faith and confidence in money as means of payment and saving, and in the monetary system in general.

In order to achieve parity, the Norwegian central bank adopted a deflationary monetary policy, introducing increased interest rates and lower volumes of credit. Combined with the international crisis, these measures resulted in massive financial instability. In the early 1920's, real interest rates were recorded at almost 40 percent, investments were cut in half, and both bankruptcies and unemployment peaked [113].

While being struck harder than most countries by the crisis in the 1920's, the impact of the Great Depression in the 1930's was milder on Norway. Regardless, as world trade contracted significantly from 1929 to 1933 [114], the crisis also affected the Norwegian economy, and paved way for a rather incremental change in the views regarding the economic system. The liberation in 1945 was the start of a new era of reduced independence for Norges Bank, when the Government, with the support of the Parliament, made decisions that were established by law to be central bank responsibilities. The first decades after the Second World War are characterized as a period with low nominal interest rates set by the Government, and regulation and fine-tuning seemed to be having the desired effect.

However, inflation got out of control in the 1970s, when the Norwegian economy got tangled up in a price-wage spiral. Although the Norwegian krone was devalued multiple times from 1976 to 1986 to handle high inflation on both wages and prices, it was not sufficient to prevent the manufacturing sector from declining. The high inflation implied that the monetary policy did not function as intended, and it became evident that we had to provide the economy with a nominal anchor. In hindsight, it was clear that unemployment could not be permanently reduced by accepting high levels of inflation [112].

Legislation was adopted in 1985, and Norges Bank received more independence. After the last devaluation in 1986, the Norwegian monetary policy was oriented towards a fixed exchange rate, that was to be the nominal anchor. However, the fixed exchange rate regime was abandoned as early as 1992, in the wake of a crisis in the European Monetary System. The crisis revealed the weakness of a fixed exchange rate in a world of deep financial markets and free capital flows. After parting ways with the regime, there was an underlying risk that the economy might once more lose its nominal anchor, but the Norwegian krone exchange rate was not substantially affected by this change [112].

From 1996, wage growth was considerably higher in Norway than in other countries. Petroleum revenues fluctuated widely from one year to the other, and the Norwegian krone was affected by the turbulence in international financial markets. The active use of Norges

Bank's instruments also helped destabilize the exchange rate, and volatility increased further on through 1998. Norges Bank decided to raise the interest rate on several occasions in 1998 to deal with the decrease in the krone value. The two-year span between 1996 and 1998 proved the difficulties of using the interest rate to fine-tune the exchange rate.

In recognition of these challenges, the central bank decided to gradually put more weight on influencing inflation developments as a prerequisite for gaining a more stable exchange rate over time. In 2001, the Government introduced an inflation target with annual consumer price inflation of close to 2.5 percent over time [55].

Ever since the mid-1990s, inflation has been low and stable, with the main objective of the monetary policy being to provide the economy with a nominal anchor. Every participant in the economy should be able to trust that the value of money remains stable over time. Both fluctuating inflation and high inflation yield random changes in the real value of assets and debt, which leads to unintended transfers between debtors and creditors. When inflation is low and stable, the relative price changes are more easily noticeable, i.e., businesses and households are able to make good decisions about investment and consumption. This state of low and stable inflation is by far the monetary policy's best contribution to economic growth, welfare, and employment [112].

Monetary: The key measure from the central bank during the pandemic involves lowering the policy rate by 1.5 percentage points down to 0 percent. Additional liquidity to banks through loans of different maturities was provided, and a face swap of USD 30 billion between the US Federal Reserve and Norges Bank. Lastly, banks received an expansion in their ability to borrow in US dollars against collateral.

Macro-financial: The countercyclical capital buffer was lowered by 1.5 percentage points, and banks were allowed to temporarily breach the liquidity coverage ratio. The mortgage regulations also received some slack, which allowed for an increase in the percentage of mortgages deviating from the regulations. Lastly, the Ministry of Finance urged banks and insurance companies to avoid distributing profits.

Figure 18: Interest rates in Norway [95]

As expected, the policy rate was kept unchanged at 4.25 percent at the monetary policy meeting on the 2nd of November 2023. However, as core inflation remains elevated, the interest rate is likely to be raised at the next monetary policy meeting in December. Although inflation has come down more and faster than expected, and the economic activity has been lower than projected, the depreciation of the krone contributes to sustaining inflation. In September 2023, inflation fell to 3.3 percent in Norway but the exchange rate against the US dollar has depreciated to March 2020 levels.

The Krone Exchange Rate

During the first few years after the establishment of Norges Bank in 1816, the government wanted to achieve price stability by tying the currency to other countries through the silver standard. The hyperinflation from the years before, when Denmark-Norway participated in the Napoleonic War, implied how crucial stability is in the monetary systems [115]. Thus, the government decided that "speciedaleren", the new currency, was to be pegged to silver at the par rate. However, the government took too long to fulfill this promise, and the exchange rate was initially too weak, which must be seen in light of the fact that the price level was too high. Redemption at par would mean a tightening of liquidity and a pressure on the silver holdings, which illustrates an important adaptation mechanism under the fixed rate regime, namely that the price level had to come down first. The promise of a par exchange rate for silver was not fulfilled until 1842 [116]. Norway held on with the fixed rate regime until the First World War. It is worth mentioning that Norway adopted the gold standard earlier than most countries and

introduced the krone as currency unit in 1874, when they entered a global fixed rate system [117].

During World War I and the beginning of 1920, Norway experienced a severe weakening of the krone and its value relative to gold. The backdrop was a strong growth in the money supply from the government, high price growth, and a lack of confidence in the foreign exchange market. The krone exchange rate kept on weakening until the middle of the 1920s, when the foreign exchange markets regained the confidence that Norges Bank would manage to restore the gold standard to the parity that applied prior to World War I. To achieve this, it was necessary that actors in the foreign exchange market started to invest in Norwegian kroner once again. After several years of deflation, parity was achieved in 1928. However, the fixed exchange rate system that was pegged to gold only lasted until the next financial crisis at the beginning of the 1930s [115]. The gold standard was then considered a straitjacket with no room for action when trying to stabilize economic development. This period displays an important challenge with the fixed exchange rate system, i.e., the difficulty of acknowledging and dealing with diverse considerations.

Another interesting period in Norwegian exchange rate history is the years after the gold standard was discarded, until the beginning of the 1990s. After inflation increased in the United States, and preconditions for stability relative to gold were no longer present, the Bretton Woods system collapsed. In the early years of the 1960s, under the Bretton Woods system of fixed exchange rates, the U.S dollar’s fixed value against gold was regarded as overvalued, and the system dissolved at the beginning of the 1970s, when President Nixon announced the suspension of the dollar’s convertibility into gold [118]. The exchange rates between central countries in the world economy were then either floating or adjusted several times. To strengthen the competitiveness, Norway devalued the krone several times during the 1970s and 1980s. However, this was regarded as ineffective, as other countries pursued the same strategy. In 1986, the government wanted to regain price stability by breaking the wage and price spirals that had formed because of the devaluations. Following one last devaluation, the government chose to defend the new krone value, and used the policy rate to further back the value. Despite financial setbacks and the Bank Crisis at the end of the 1980s, the government had to maintain a high policy rate. Thus, the fixed exchange rate policy resulted in high interest rates in a situation of economic setbacks. However, the inflation eventually came down. Following a breakdown in the European fixed exchange rate policy in 1992, Norway discarded the fixed exchange rate regime in favor of inflation management.

Following the Second World War, the fixed exchange rate regime under the Bretton Woods system, combined with relatively modest and stable inflation in the United States, resulted in stable inflation also in Norway. In the 1970s and 1980s, Norway experienced increased fluctuations in inflation, following the collapse of the Bretton Woods system.

After the introduction of inflation management at the beginning of the 1990s, which probably contributed to favorable structural conditions in the economy, inflation has been unusually stable in Norway. The krone exchange rate has functioned as an airbag, damping the effects of economic disruptions. For example, Norges Bank pursued an expansive monetary policy when the oil price dropped in 2014, resulting in weakening of the krone. A counterfactual analysis conducted by Norges Bank, argued that a fixed exchange rate would amplify the setback. Later in this chapter, we will investigate the krone exchange rate and discuss whether its recent development has caused inflation to remain high in Norway.

6.3 Developments in Switzerland and Norway

During the last decade, the pandemic has caused some remarkable developments in several economic parameters and indicators. In this section, we will analyze these developments and investigate whether any of them can help explain how Switzerland has managed to recover from the pandemic, without increasing inflation as significant as in Norway and several other advanced economies.

6.3.1 Money Supply M2

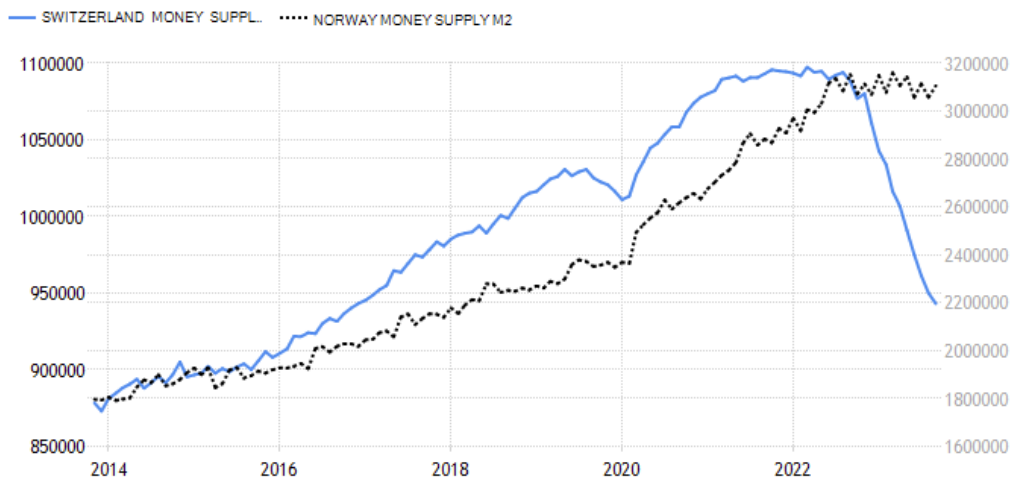

Figure 19: Figure 9: Money Supply M2 in Switzerland and Norway [101]

Both Swiss and Norwegian money supply M2 includes M1, i.e., the money supply that is composed of liquid deposits such as currency, savings deposits, and demand deposits [119]. M1 is the most liquid measure of money supply, simply because it only considers assets that either are, or can be, converted into cash quickly [120]. As well as M1, Swiss and Norwegian M2 also include short term bank deposits. Thus, M2 equals the total money supply, including all cash, money deposited in saving accounts, checking accounts, and other short-term saving vehicles. Time deposits and retirement account balances that exceed a certain limit are typically omitted from money supply M2 [121].

While Swiss money supply M2 decreased from approximately CHF 950 billion in August of 2023 to approximately CHF 943 billion in September 2023, Norwegian money supply M2 increased from approximately NOK 3.06 trillion in August of 2023 to approximately NOK 3.11 trillion in September of 2023.

From 2020, the money supply in both countries increased rapidly due to the pandemic, and the trend seems to be relatively similar in the countries, up until late 2022 when Swiss money supply drastically began dropping. As we have already stated, money supply is of great importance when assessing inflation. If the money supply grows faster than an economy's ability to produce goods and services, inflation is bound to be rising as more money is chasing less products [122] [123]. While it is true that inflation rates in Switzerland began reaching more normal levels after a decrease in the money supply, Swiss M2 is now significantly lower than what it was prior to the pandemic, and the Swiss inflation did not reach the two percent benchmark until June 2023, more than half a year after the initial fall in money supply. On top of this, the Swiss inflation is currently considerably higher than the levels prior to the pandemic. One would have to go all the way back to the beginning of 2017 to find levels like the current money supply, and at that time the Swiss inflation was approximately zero percent. Combined with the fact that Norwegian inflation has been decreasing significantly since the beginning of 2023, without reducing the money supply, we have no evidence to suggest that differences in money supply between Norway and Switzerland can reflect a significant proportion of the differences in inflation rates.

6.3.2 GDP Growth Rate

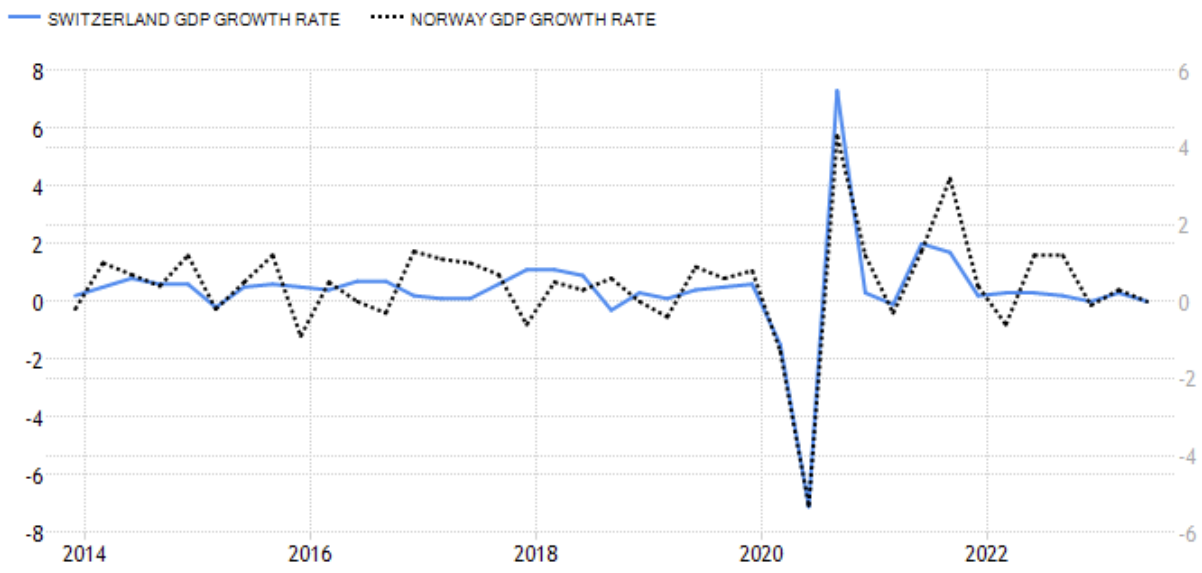

Figure 20: GDP Growth Rates in Switzerland and Norway [124]

In Switzerland, GDP stalled in the second quarter of 2023, missing out on the forecast that predicted a 0.1 percent expansion from the 0.3 percent in the first quarter. The data points in the direction of a renewed period without growth for the Swiss economy, suggesting that the tightening campaign conducted by the Swiss National Bank is being increasingly more transmitted halfway through the year [124].

GDP also stalled in Norway the second quarter of 2023, following a 0.3 percent expansion from the previous quarter [125]. Excluding the offshore sector, the mainland GDP missed expectations of a 0.1 percent growth in the second quarter of 2023.

Disregarding the massive deviations from trend during the pandemic, the development of GDP is relatively similar in Switzerland and Norway. Before the pandemic, both countries were stable at growth rates between zero and two percent, with GDP in Norway fluctuating somewhat more than in Switzerland, registering several periods of negative growth rates. However, out of the two countries during the pandemic, Switzerland registered the largest deviations from trend, falling to minus seven percent in 2020 and rising all the way up to nearly eight percent shortly after. In the aftermath of COVID-19, both Norway and Switzerland have recovered to the growth levels from before the pandemic. Fine margins separate the countries when assessing GDP growth, and there is no reason to believe that this factor is accountable for the previous and current differences in inflation rates.

6.3.3 Consumer Spending

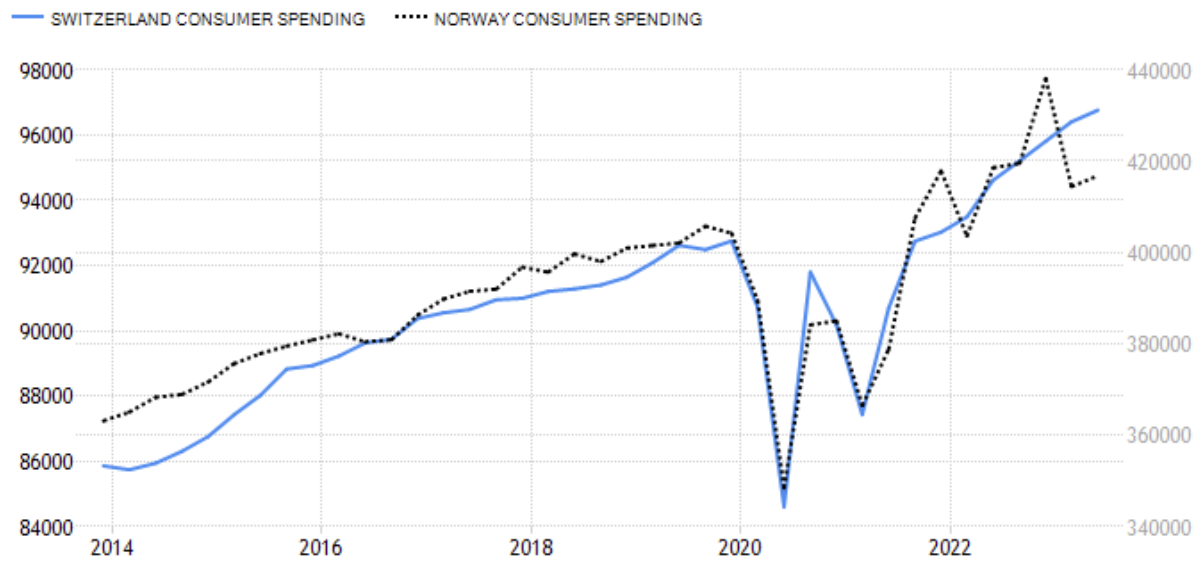

Figure 21: Consumer spending in Switzerland and Norway [126]

Swiss consumer spending increased from roughly CHF 96 billion in the first quarter of 2023 to approximately CHF 97 billion in the second quarter. From 1980 to 2023 the consumer spending in Switzerland has been around CHF 71 billion on average. Switzerland registered an all-time high consumer spending in the previous quarter and is undoubtedly catching up with the trend prior to the pandemic [126].

Norwegian consumer spending increased from approximately NOK 414 billion in the first quarter of 2023 to around NOK 417 billion in the second quarter. On average, the consumer spending in Norway has been roughly NOK 257 billion from 1978 until 2023. Consumer spending reached an all-time high in the last quarter of 2022, before dramatically dropping as much, or even more, than in the first quarter of 2021.

Before 2020, the trend in consumer spending was rising in both countries, before dramatically declining when people were forced to stay home to limit the spread of the virus. When society finally reopened, consumer spending began recovering in both Switzerland and Norway, erasing the two lows during the pandemic. However, there seems to be a substantial difference regarding consumer behavior between the countries. While Swiss consumers tend to increase spending slowly and steadily, Norwegian consumer behavior fluctuates to a larger extent, which is illustrated by the significant fall in Norwegian consumer behavior from the last quarter of 2022 to the first quarter of 2023. While Norges Bank found it necessary to act quite aggressively in their monetary policy to handle inflation, the Swiss National Bank has had the

opportunity to act more moderate in its monetary policy, which may explain much of the differences in consumer behavior, given the similar trend for greater parts of the decade.

Even though differences in consumer spending seem to be in place, the phenomenon cannot explain the differences in inflation. While steadily increasing in Switzerland, consumer spending has decreased substantially in Norway, compared to the levels one year ago. According to inflationary theories and models, this would suggest declining inflation rates in Norway, which in isolation is also true. The issue is that it cannot explain the low inflation rates in Switzerland.

6.3.4 Government Spending

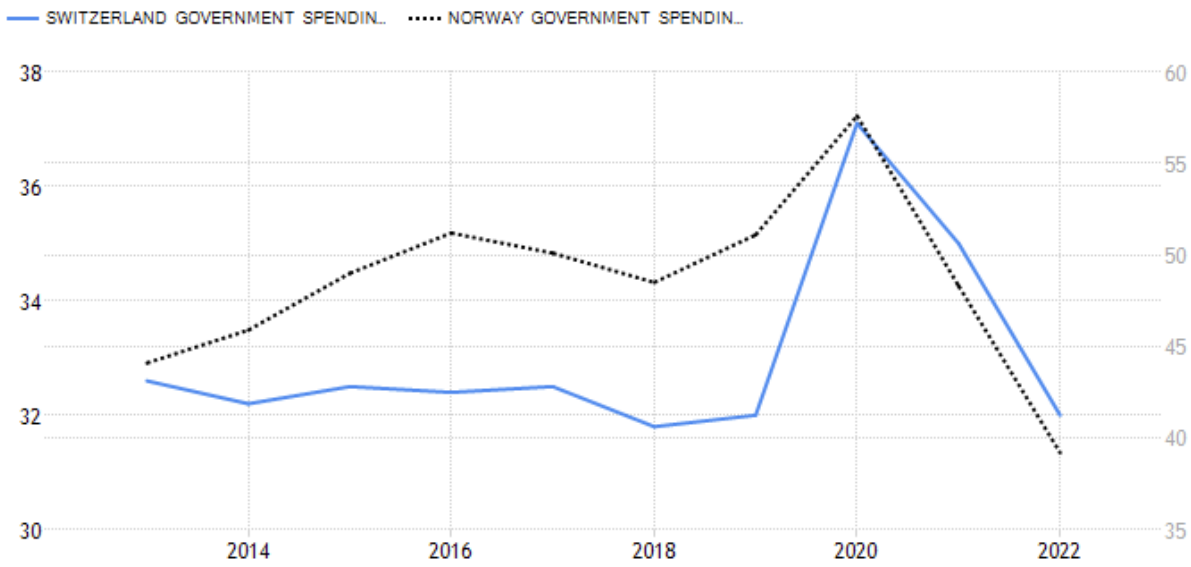

Figure 22: Government spending to GDP in Switzerland and Norway [127]

In 2022, Swiss government spending was recorded at 32 percent of GDP, which takes Switzerland back to the spending levels from before the pandemic. From 1990 until 2022, Switzerland averaged 32.2 percent of GDP on government spending, registering a clear peak in 2020 of 37.1 percent of GDP [127].

In 2022, Norwegian government spending was recorded at 39.2 percent of GDP, which is quite remarkable in a Norwegian context. Since 1990, Norway previously never registered a level of government spending to GDP lower than 40 percent. The current level is also significantly lower than any of the years in the last decade before the pandemic. The average consumer spending to GDP from 1990 until 2022 have been 47.6 percent, registering a relatively lonely peak in 2020 of 57.6 percent [128].

Apart from the fact that the Norwegian government seems to spend more than the Swiss, measured in percentage of GDP, the development is quite similar between the countries. In 2022, both governments made huge cuts to spending, compared to 2020 and 2021, which took the government spending in Switzerland down to the levels of before the pandemic. Already in 2021, the government spending in Norway was cut significantly, reaching pre-pandemic levels. Further decreasing expenditures in 2022 indicates the necessity to bring down Norwegian inflation rates even more.

Like the case with consumer spending, both Switzerland and Norway have decreased government spending, which should contribute towards lower inflation rates. Furthermore, the Norwegian government has decreased spending significantly more than the Swiss government, compared to the respective pre-pandemic levels. Therefore, government spending cannot explain why Swiss inflation rates have been, and still is, extensively lower than in Norway.

6.3.5 Unemployment Rate

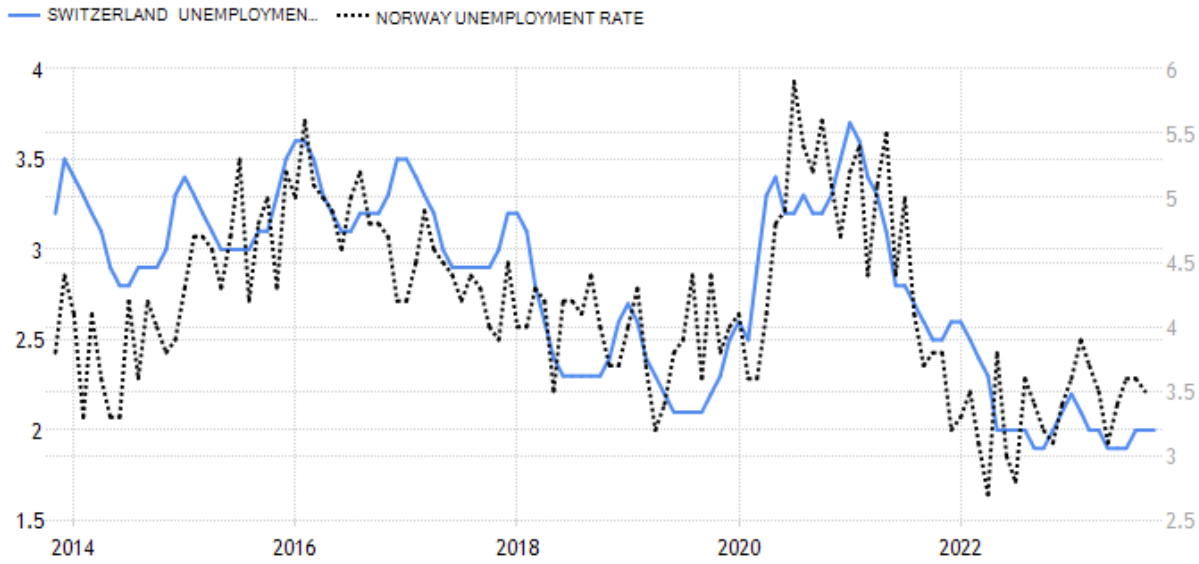

Figure 23: Unemployment rates in Switzerland and Norway [129]

Non-seasonally adjusted, the Swiss unemployment rate stood at 2.0 percent in October 2023, which is the same as in the previous month and close to the market expectations of 2.1 percent. Numerically, the number of unemployed in the Swiss labor force increased from 93,563 in September to 96,300 in October. In the same period, the juvenile unemployment rate, which measures jobseekers between the ages of 15 to 24, fell from 2.2 percent to 2.1 percent. Seasonally adjusted, the unemployment rate was 2.1 percent in October 2023 [129].

In Norway, the seasonally adjusted unemployment rate decreased from 3.6 percent in September to 3.5 percent in October, registering a three-month low. While the number of unemployed Norwegians decreased from 109,000 to 105,000 in this period, the number of employed Norwegians increased by 2,000 to a record high of 2.894 million. The labor force participation rate declined from 73.1 percent in both August and September to 73.0 percent in October. In the same period, the youth unemployment rate dropped from 11.8 percent to 10.5 percent [130].

The unemployment rate naturally increased in both Switzerland and Norway in 2020, as more people were laid off from their jobs. The development of the unemployment rate is relatively similar in the two countries, with Swiss unemployment being consistently lower than in Norway. Both countries are currently experiencing unemployment rates similar to the pre-pandemic ones, especially Switzerland, where unemployment is at a decade low. But also in Norway, the unemployment rate is lower than in several of the pre-pandemic years.

Given that both countries have experienced very similar developments in their unemployment rates, we have no evidence to suggest that the differences in inflation between Switzerland and Norway is caused by the differences in unemployment, and it certainly does not help clarify the low Swiss inflation. If anything, Norway should get the better effect on inflation, as inflation tends to rise when the unemployment rate is low, and contrarily decline when the unemployment rate is high [131].

6.3.6 Private Debt

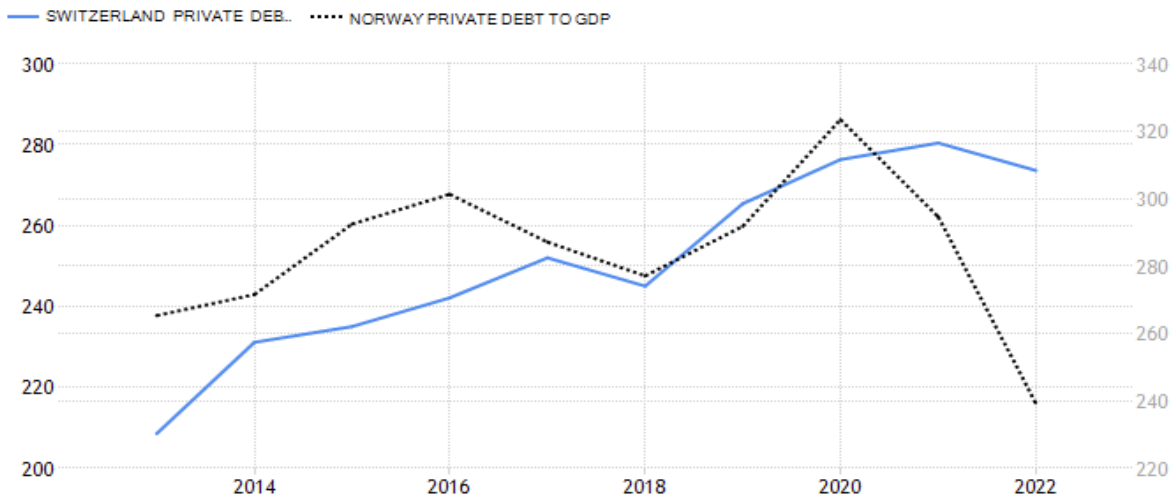

Figure 24: Private debt to GDP in Switzerland and Norway [132]

Private sector debt to GDP is measured identically in Switzerland and Norway, including the indebtedness of both sectors, namely non-profit institutions serving households and non-financial corporations and households, as a percentage of GDP.

Swiss private debt to GDP decreased from 280.40 percent of GDP in 2021 to 273.60 percent of GDP in 2022. From 1999 until 2022, private debt to GDP averaged 217.46 percent of GDP in Switzerland, reaching an all-time high in 2021 [132].

In Norway, private debt to GDP decreased from 294.56 percent of GDP in 2021 to 239.17 percent of GDP in 2022. From 1995 until 2022, Norwegian private debt to GDP averaged 254.24 percent, reaching a peak in 2020 of 323.43 percent [133].

Both Switzerland and Norway experienced increases in private debt to GDP during the first few years of the last decade. While the Swiss private debt continued to increase in the years that followed, the growth decreased in Norway in 2016, when the Norwegian economy began stalling due to a significant decline in the oil price, and a rather moderate international demand growth [134]. From 2018 until going separate ways in 2020, the development in private debt to GDP rate was relatively similar in the two countries. The growth in Swiss debt to GDP ratio continued to increase in 2021, before a slight correction in 2022. The Norwegian ratio, however, has not been as low as the current levels since the early 2000's. This decline comes in the wake of interest hikes, which have increased the policy rate from zero percent to 4.25 percent [135].

Also in this case, Norwegian development should be preferable when managing inflation, as high growth rates in private debt implies more economic activity, and low growth rates in private debt implies reduced demand and a cooler economy. Norwegian inflation has severely decreased from the peaks of late 2022, but there is nothing in the development of Swiss private debt to GDP that indicates that Swiss inflation should be lower than Norwegian inflation.

6.3.7 Household Saving

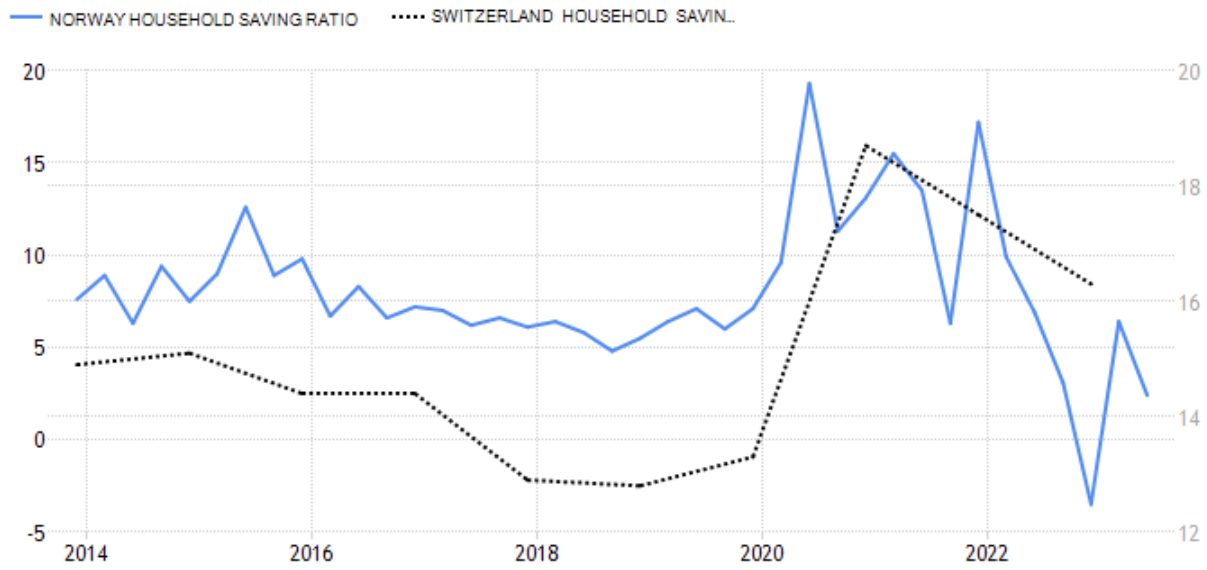

Figure 25: Household saving ratio in Switzerland and Norway [136]

In both Switzerland and Norway, the household saving ratio is the fraction of disposable income that is saved, and not consumed by households.

The household saving ratio in Switzerland declined from 17.5 percent in 2021 to 16.3 percent in 2022. From 1990 until 2022, the Swiss household saving ratio averaged 12.1 percent, reaching a peak in 2020 of 18.7 percent [136].

In Norway's case, we have access to quarterly data which illustrate that the household saving ratio decreased from 6.4 percent in the first quarter of 2023 to 2.4 percent in the second quarter of 2023. On average, the household saving ratio has been 6.08 percent from 1999 until 2023. Like Switzerland, the all-time high household saving ratio in Norway was registered in 2021, at 19.3 percent [137].

The household saving ratio has been consistently higher in Switzerland than in Norway the last decade. Prior to the pandemic, there was no special development in any of the countries, in terms of growth. However, in 2020, the household saving ratio increased in both countries, and especially in Norway, more than doubling the saving rate of private households. From 2022, the saving rate decreased in both countries, also this time significantly more in Norway than in Switzerland. Currently, the household saving ratio in Switzerland sits above the pre-pandemic levels, while the household saving ratio in Norway sits way below the pre-pandemic levels. This is most likely due to the interest hikes that have found place in Norway after the

pandemic, as a bigger proportion of the disposable income is now consumed by the banks through increased interest on loans, and less is therefore left for saving.

Isolated, the development of the household saving ratio in Switzerland and Norway may propose an explanation as to why inflation rates are lower in Switzerland than in Norway. However, it is highly unlikely that the consumer behavior in Norway has changed so drastically. Before 2020, private households in Norway saved, on average, between five and ten percent of their disposable income. Currently, the saving rate is close to zero percent, and from the consumer spending graph, we know that the development in spending does not match the suggestion of Norwegian households spending rather than saving. This implies that the decrease in the saving ratio is largely due to dramatic increases in interest costs [138].

At the same time, the fact that Norway has had significantly higher inflation than Switzerland since the beginning of 2022 until the summer of 2023 means that inflation in itself has been reducing Norwegian's ability to save money.

Therefore, we cannot conclude that the significant decline in the Norwegian household saving ratio is accountable for the elevated inflation in Norway, compared to Switzerland.

6.4 Inflation Challenges in Switzerland

Despite having had inflation well below their inflation target of two percent annually for a long period of time, as well as having considerably lower inflation than other western countries in the aftermath of COVID-19, which emphasizes a challenge with health insurance and inflation in Switzerland [105].

When computing the consumer price index in Switzerland, the Federal Statistics Office does not include health insurance premiums in their estimations, as they regard this as a transfer rather than a direct consumer cost. The inflation of health care costs is not directly related to the inflation of health insurance premiums, which imposes an issue, given the rapid increase in health insurance premiums. On average, the premiums have increased by 3.8 percent annually since 1996. The healthcare system in Switzerland is one of the most expensive globally, and for the average Swiss, these health insurance premiums account for between ten and 20 percent of expenses.

Even though the Federal Statistics Office has recognized this challenge and started publishing the Health Insurance Premium Index as an alternate index, it is presented separately from the consumer price index, and is not nearly as well documented.

6.5 The Solution

6.5.1 The Swiss Franc

The strong and solid Swiss franc is the main reason for Switzerland's high price stability [102]. While fluctuating considerably against the US dollar the past decade, leaving an uncertain trend in the relationship, the franc has strengthened towards both the euro and the pound, keeping a healthy trend for the Swiss currency. The fact that the franc is considered a safe haven for financial investments is one of the main reasons for this development.

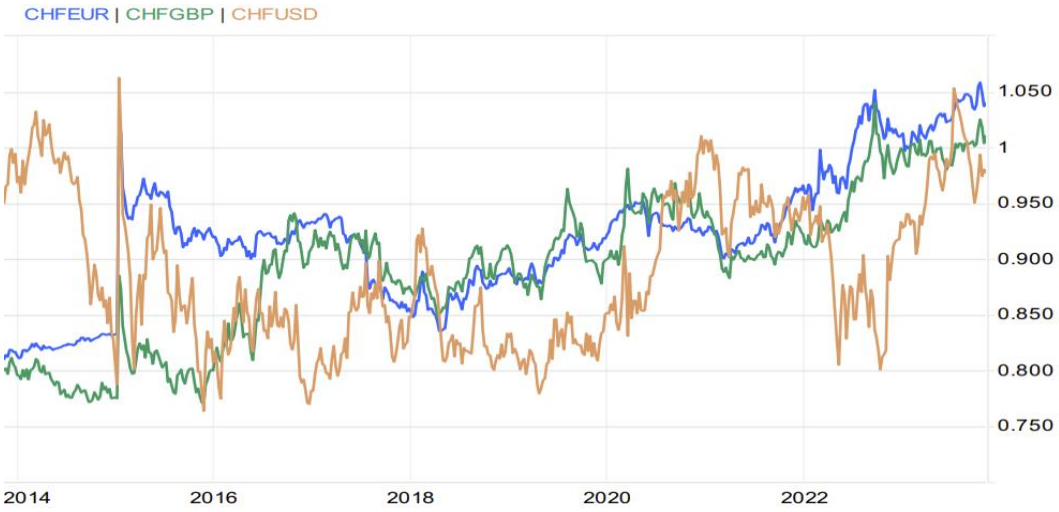

Figure 26: The Swiss franc to the euro, the pound, and the US dollar [139]

To invest in Swiss activities or securities, investors need Swiss franc, which contributes to driving up demand for the currency, resulting in appreciation. The Swiss franc has steadily strengthened against the euro, the pound, and the US dollar since the 1970s. In the last decade, the development against the US dollar has been somewhat uncertain, compared to the development against the euro and the pound. After a period of depreciation against the US dollar, the trend was turned around in November 2023, powered by speculation regarding whether the Federal Reserve is due to cut interest rates by the second quarter of 2024, which caused a broad depreciation of the dollar. A weakening Swiss economy and tame prices also restricted the monetary support for the franc. Swiss inflation held below the two percent

threshold for a fifth consecutive month, along with GDP stalling. Reduced concerns regarding a geopolitical escalation in the Middle East limited safe-haven demand for the franc, further driving the currency down against the euro and the pound. Despite the developments in the recent months, the franc is likely to end 2023 up against the euro, the pound, and the US dollar.

When the franc appreciates, the currency on the other side of the exchange conversely depreciates. This means that goods imported from these countries become cheaper, which helps dampen the inflation. On the other hand, a strengthening of the franc makes domestically manufactured products more expensive on foreign markets, which may limit Swiss exports to some extent. From late 2011 to the beginning of 2015, the economic pressure on Swiss companies was in fact so intense that the Swiss National Bank had to declare a minimum exchange rate of CHF 1.20 on EUR/CHF. The SNB was ready to enforce this minimum rate with the utmost determination and prepared to buy foreign currency in unlimited quantities to achieve this.

In comparison, the Norwegian krone has had a downward sloping trend against the euro, the pound, and the US dollar over the last decade. At the beginning of 2000, the krone began what would prove to be a steady climb against the pound and the dollar, and to a smaller extent against the euro. However, since the beginning of 2013, Norway has experienced a consistent decline in the exchange rate.

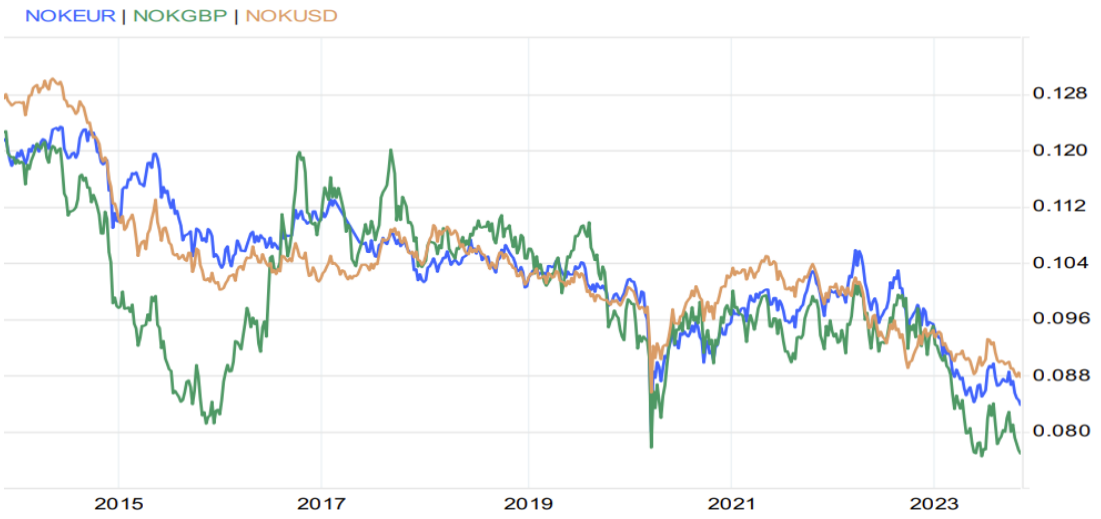

Figure 27: The Norwegian krone to the euro, the pound, and the US dollar [140]

After inflation targeting was introduced in 2001, three distinct weak periods particularly stand out, namely 2001, 2008, and 2013. After the first two periods, the krone exchange rate recovered relatively quickly, which has not been the case after 2013. Since 2016, the krone

exchange rate has not been in line with fundamental conditions and the oil price. The weak Norwegian krone in recent years appears to be largely attributable to factors related to the risk premium, such as the declining importance of oil and gas in the Norwegian economy, a relative reduction of foreign direct investment, and a decline in the industry-specific share price index linked to oil and gas production in Norway [141].

A potential solution to the weakening of the krone can be to peg the currency to euro, as Denmark has done. Denmark is the "Scandinavian champion" of low inflation and has experienced far less inflation than its neighboring countries Sweden and Norway, which both have had substantial currency depreciations. To peg the krone to euro can give increased stability and less fluctuations in the krone exchange rate. On the other hand, Norway would then give up the possibility to manage Norwegian monetary policy based on the developments within the Norwegian economy [5].

6.5.2 Electricity Prices and Demand for Fossil Fuels

Rising prices for oil, gas and coal have been a relatively large driver of inflation in many economies these past few years. In Switzerland, around 90 percent of the country's electricity is generated through hydropower and nuclear power, meaning that the increase in the prices for oil, gas and coal is not having as much of an impact in Switzerland as elsewhere. Additionally, the electricity market in Switzerland is a strictly regulated monopoly where private households are unable to choose their own electricity provider, and the pricing takes place according to the costs of generating electricity. This pricing practice is made possible by the fact that most electricity providers are integrated local grid operators who either buy the electricity inexpensively on long term contracts or by producing it themselves. Thus, the high marginal costs that are currently in place for gas power plants are not passed through to the consumer prices.

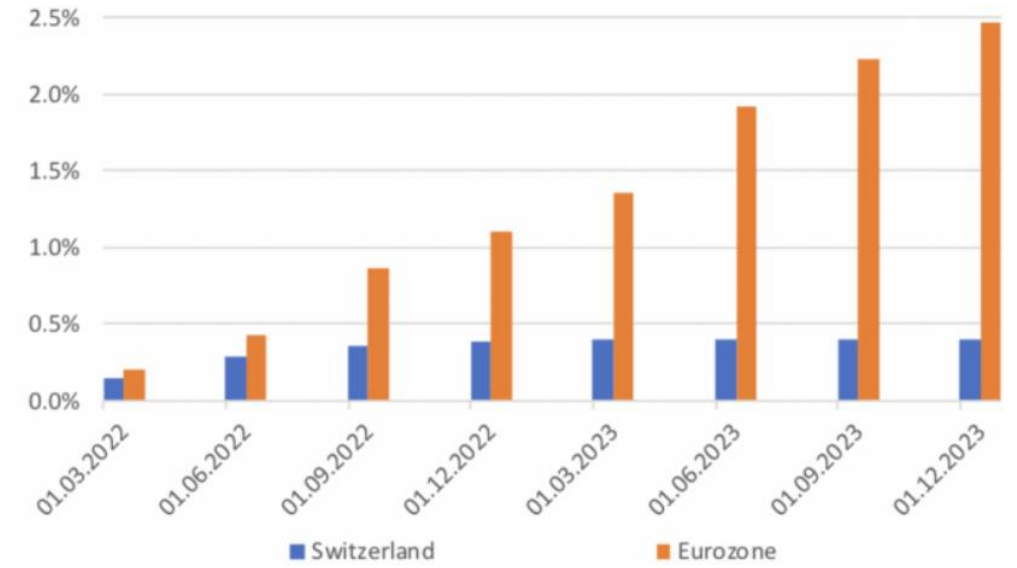

Figure 28: Impact on inflation of the shock to energy PPI [142]

6.5.3 Regulated Prices

Electricity is not the only product subject to price regulations, as prices on several other goods and services are regulated in Switzerland. In fact, almost one third of the products used to calculate the inflation rate is subject to price regulation, which is the most in Europe, by a relatively large margin. The percentage of administrated prices in the Swiss HCPI consumption basket is more than twice the percentage of administrated prices in the Norwegian HCPI consumption basket, with 30 percent in Switzerland compared to 14 percent in Norway. Next on the list behind Switzerland is the Netherlands, with 21 percent [102].

The fact that Swiss merchants are only able to adjust their prices at certain times means that regulated prices are less susceptible to short-term fluctuations in the market. Moreover, the regulating authorities are frequently being guided in pricing decisions by criteria unrelated to developments in the markets, meaning that the Swiss consumers are held isolated and not exposed to fluctuations in the global market.

6.5.4 Import Duties on Agricultural Products

Rising prices on agricultural products have been another driver for global inflation. However, Switzerland imposes such high import duties on agricultural products that the rising prices only play a restricted role in the country. While the average tariff on imported agricultural products is 12.6 percent on average in the European Union, the tariff in Switzerland is just under 43 percent.

The level of import duties imposed by Swiss authorities depends on whether an agricultural product is produced domestically or not. The import duty is set high if Swiss producers exist, but for products not produced domestically, e.g., fish and cotton, the import duties are set very low.

Because of the high level of protection that Swiss agricultural producers receive, Swiss food prices are to a high degree decoupled from the prices on the global market. Therefore, increases in global market prices have less of an impact on Swiss consumer prices.

6.5.5 Labor Productivity

Although an increasingly strong franc yields a negative impact on the international competitiveness of Swiss businesses, their products meet high demand all over the world. The Swiss economy's high level of productivity is arguably one of the main reasons for the overwhelming demand overseas. In a report from 2022, the OECD stated that the labor productivity in Switzerland is among the highest of OECD countries.

Figure 29: Gross value added per person employed in Switzerland, Germany, and the Euro Area [102].

The increasing productivity in Switzerland implies that the amount of input required to produce a specific quantity is reduced, which contributes to lower inflation.

6.5.6 Inflation Calculation

To calculate inflation, a representative sample of goods and services in the specific country is assembled, and the prices on these items are tracked over time. The composition of Switzerland's sample is slightly different than in the member states of the EU. Transportation

costs are a significant difference between the two pools. While given a low weight in the Swiss sample, transportation costs are strong drivers for inflation in the EU, because of the rapidly increasing energy prices.

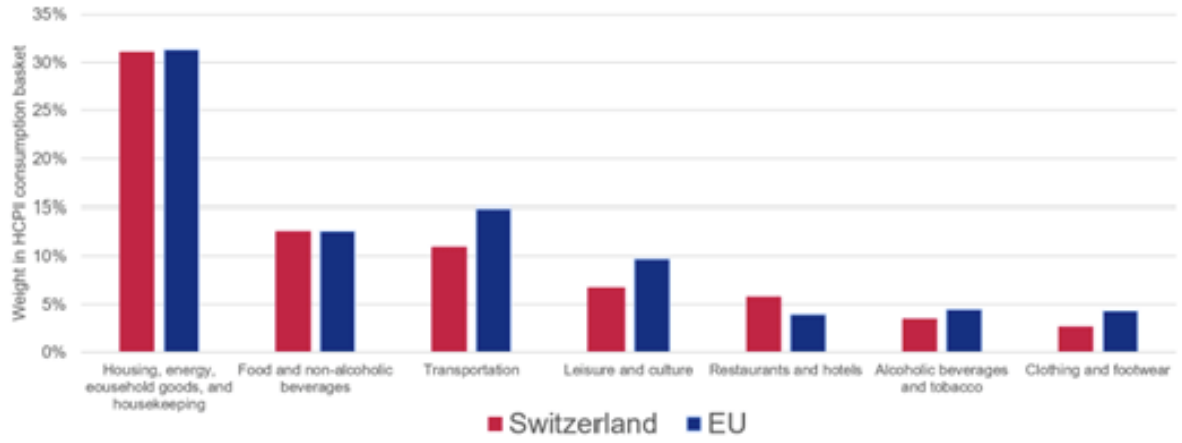

Figure 30: Goods and services in HCPI consumption basket [102].

Eurostat's Harmonized Index of Consumer Prices (HICP) system is commonly used for international comparisons of Swiss inflation. However, this often results in a discrepancy of the inflation rate in Switzerland, compared to the Swiss CPI, methodology for consumer prices.

6.6 Learnings from Switzerland

Several unique characteristics have helped dampen the inflation in Switzerland during the past few years. Even though the strong franc stands out as the main reason, it could also be reasonable to argue that the general weakening of the euro is a juxtaposed contributing factor alongside the franc. However, as illustrated in Figure 26: The Swiss franc to the euro, the pound, and the US dollar [139] the Swiss franc has strengthened against several currencies over the same period. Therefore, what is clear in any case is that the strengthened exchange rate against several of the major currencies has contributed to dampening the inflationary pressure in the Swiss economy.

Moreover, price regulations and other market interventions are much more likely to occur in Switzerland, compared to other European countries. These interventions can be considered a tool for Swiss authorities in their effort to curb inflation in an economic crisis. Nevertheless,

it is important to note that even though inflation rates in Switzerland have been, and still are, lower than in most other economies, inflation is roaring above the Swiss standards.

The special situation in Switzerland ensures a high domestic price level, typically significantly higher than in the Euro Area. The high import duties result in high food prices, which means that the consumers in Switzerland do not necessarily benefit from a reduction in these prices in the rest of the world.

It is also worth mentioning that, like Norway, Switzerland is one of the wealthiest countries in the world. Thus, prior to a global crisis, the prices are already at a high base [143]. According to the Economist Intelligence Unit, Zurich, and Geneva rank respectively 6th and 7th in the list of the world's most expensive cities. As Swiss citizens tend to spend a smaller proportion of their income on essentials such as accommodation and food, they are less impacted by price increases. Professor of economic history at the University of Zurich, Tobias Straumann, underlined this by stating that the share of food in the overall budget of households is not as big in Switzerland as in other countries because people are quite rich on average. During the summer of 2021, the cost of living in Switzerland was 51 percent higher than in Germany, which implies how the high cost of living can be regarded as the price for being insulated when inflation hits the global economy.

7. Conclusions

In the present thesis, we have examined the recent surge in inflation and tried to gain a better understanding of the factors influencing inflation. We answered this question by doing an empirical time series analysis, where we analyzed factors influencing inflation, as well as a case study analyzing the development of inflation in Norway compared to Switzerland.

Using HP-filter to construct a trend, we analyzed the deviations from trend in CPI. We further investigated whether the development in CPI could be explained by various economic factors by doing a multiple regression analysis.

In conclusion, our comprehensive time series analysis has shed light on the complex nature of inflation, emphasizing the crucial roles played by various economic factors. The empirical evidence found in our time series analysis suggests that money supply, credit volume, HICP and unemployment are the most influential factors contributing to higher inflation. Although only these factors were significant in this model, there are several other factors contributing to inflation, making inflation dynamics complex and difficult to manage.

The case study, focusing on a comparative analysis between Norway and Switzerland, further emphasizes the significance of currency strength in understanding inflationary trends. Notably, Switzerland's remarkably low inflation rates can be attributed to the robustness of its currency. This finding emphasizes the role of exchange rate dynamics in influencing a nation's inflation rate and suggests a nuanced approach when formulating economic policies. The depreciation of the Norwegian krone has led to higher and more persistent inflation, making monetary policy less efficient. Measures to strengthen the currency could be a potential solution to combat the high inflation.

As we navigate the realm of inflation, it becomes clear that a holistic understanding requires consideration of both domestic and international factors. Our research contributes to the ongoing discussion on inflationary determinants, providing insights that can inform policy decisions aimed at achieving price stability and sustainable economic growth.

Looking ahead, future research in this field may explore how inflation dynamics evolve considering the potential global economic trends, technological advancements, and geopolitical factors. By deepening our understanding of inflation, we can strive to develop

more effective and adaptive economic policies that promote stability and resilience in the face of a constantly changing economic landscape.

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9. Appendix

9.1 Raw Data with HP-Filter

Gross Domestic Product

	Løpende priser (mill. kr)	LN	HP-filter	Avvik BNP
1999K1	292301,000	12,586	12,675	-0,090
1999K2	299865,000	12,611	12,694	-0,083
1999K3	320149,000	12,677	12,712	-0,036
1999K4	354149,000	12,777	12,731	0,047
2000K1	364481,000	12,806	12,749	0,057
2000K2	359053,000	12,791	12,767	0,024
2000K3	378186,000	12,843	12,784	0,059
2000K4	407412,000	12,918	12,801	0,117
2001K1	397170,000	12,892	12,817	0,075
2001K2	389380,000	12,872	12,833	0,039
2001K3	384680,000	12,860	12,848	0,012
2001K4	395479,000	12,888	12,863	0,024
2002K1	376946,000	12,840	12,879	-0,039
2002K2	392696,000	12,881	12,894	-0,013
2002K3	385869,000	12,863	12,909	-0,046
2002K4	408634,000	12,921	12,925	-0,004
2003K1	410000,000	12,924	12,941	-0,017
2003K2	386588,000	12,865	12,958	-0,092
2003K3	403008,000	12,907	12,975	-0,068
2003K4	424498,000	12,959	12,992	-0,034
2004K1	436077,000	12,986	13,011	-0,025
2004K2	429875,000	12,971	13,030	-0,058
2004K3	442441,000	13,000	13,049	-0,049
2004K4	479730,000	13,081	13,069	0,012
2005K1	467549,000	13,055	13,089	-0,034
2005K2	489104,000	13,100	13,109	-0,009
2005K3	497954,000	13,118	13,129	-0,011
2005K4	542431,000	13,204	13,149	0,055
2006K1	552157,000	13,222	13,169	0,053
2006K2	538748,000	13,197	13,188	0,009
2006K3	548615,000	13,215	13,207	0,008
2006K4	585352,000	13,280	13,226	0,054
2007K1	569565,000	13,253	13,243	0,009
2007K2	567275,000	13,249	13,260	-0,012
2007K3	575997,000	13,264	13,277	-0,013
2007K4	647337,000	13,381	13,292	0,089
2008K1	630097,000	13,354	13,307	0,047
2008K2	660476,000	13,401	13,321	0,080
2008K3	656386,000	13,395	13,334	0,061
2008K4	675164,000	13,423	13,346	0,076
2009K1	600938,000	13,306	13,358	-0,052
2009K2	593913,000	13,294	13,370	-0,076
2009K3	603183,000	13,310	13,381	-0,071
2009K4	641678,000	13,372	13,393	-0,021
2010K1	640224,000	13,370	13,404	-0,034
2010K2	637990,000	13,366	13,415	-0,049
2010K3	628033,000	13,350	13,426	-0,075
2010K4	699104,000	13,458	13,437	0,021
2011K1	694540,000	13,451	13,447	0,004
2011K2	679519,000	13,429	13,458	-0,029
2011K3	688457,000	13,442	13,468	-0,026
2011K4	747413,000	13,524	13,478	0,046
2012K1	765311,000	13,548	13,488	0,060
2012K2	731282,000	13,503	13,497	0,005
2012K3	713923,000	13,479	13,506	-0,027
2012K4	772567,000	13,557	13,514	0,043
2013K1	752817,000	13,532	13,522	0,010
2013K2	763844,000	13,546	13,529	0,017
2013K3	756407,000	13,536	13,536	0,000
2013K4	817267,000	13,614	13,542	0,072
2014K1	801504,000	13,594	13,548	0,046
2014K2	775437,000	13,561	13,553	0,008
2014K3	767459,000	13,551	13,558	-0,007
2014K4	817377,000	13,614	13,563	0,051
2015K1	783966,000	13,572	13,568	0,004
2015K2	784474,000	13,573	13,572	0,000
2015K3	767040,000	13,550	13,577	-0,027
2015K4	794703,000	13,586	13,582	0,004
2016K1	754091,000	13,533	13,587	-0,054
2016K2	782801,000	13,571	13,593	-0,022
2016K3	748252,000	13,525	13,599	-0,073
2016K4	830891,000	13,630	13,605	0,025

Savings Rate Households

	Sparerate (prosent)	HP-filter	Avvik sparerate
1999K1	8,400	3,926	4,474
1999K2	5,900	4,014	1,886
1999K3	4,700	4,105	0,595
1999K4	-3,600	4,203	-7,803
2000K1	7,800	4,311	3,489
2000K2	4,500	4,431	0,069
2000K3	2,900	4,562	-1,662
2000K4	-1,700	4,708	-6,408
2001K1	6,500	4,868	1,632
2001K2	0,100	5,040	-4,940
2001K3	3,300	5,220	-1,920
2001K4	-1,300	5,404	-6,704
2002K1	9,300	5,585	3,715
2002K2	10,700	5,751	4,949
2002K3	8,500	5,896	2,604
2002K4	2,200	6,012	-3,812
2003K1	9,800	6,097	3,703
2003K2	11,800	6,145	5,655
2003K3	7,700	6,150	1,550
2003K4	4,600	6,114	-1,514
2004K1	9,300	6,037	3,263
2004K2	9,800	5,918	3,882
2004K3	3,500	5,760	-2,260
2004K4	3,900	5,566	-1,666
2005K1	12,200	5,339	6,861
2005K2	14,900	5,081	9,819
2005K3	4,300	4,799	-0,499
2005K4	7,000	4,503	2,497
2006K1	5,300	4,207	1,093
2006K2	-3,300	3,923	-7,223
2006K3	-0,900	3,665	-4,565
2006K4	-4,500	3,444	-7,944
2007K1	5,300	3,266	2,034
2007K2	-1,500	3,132	-4,632
2007K3	0,900	3,046	-2,146
2007K4	-2,900	3,007	-5,907
2008K1	5,400	3,016	2,384
2008K2	0,200	3,065	-2,865
2008K3	2,800	3,154	-0,354
2008K4	3,000	3,275	-0,275
2009K1	7,000	3,424	3,576
2009K2	4,400	3,594	0,806
2009K3	4,800	3,784	1,016
2009K4	2,500	3,990	-1,490
2010K1	5,600	4,209	1,391
2010K2	5,700	4,438	1,262
2010K3	4,100	4,676	-0,576
2010K4	0,100	4,921	-4,821
2011K1	9,100	5,170	3,930
2011K2	5,600	5,420	0,180
2011K3	5,700	5,667	0,033
2011K4	3,800	5,909	-2,109
2012K1	10,300	6,145	4,155
2012K2	7,400	6,370	1,030
2012K3	4,900	6,583	-1,683
2012K4	5,800	6,785	-0,985
2013K1	9,600	6,973	2,627
2013K2	8,300	7,146	1,154
2013K3	5,700	7,303	-1,603
2013K4	6,200	7,445	-1,245
2014K1	9,600	7,571	2,029
2014K2	9,000	7,679	1,321
2014K3	7,200	7,770	-0,570
2014K4	6,600	7,844	-1,244
2015K1	8,800	7,901	0,899
2015K2	15,900	7,941	7,959
2015K3	6,000	7,964	-1,964
2015K4	9,300	7,976	1,324
2016K1	6,900	7,979	-1,079
2016K2	10,600	7,978	2,622
2016K3	5,800	7,978	-2,178
2016K4	5,200	7,985	-2,785

Policy Rate

	Styringsrente (prosent)	HP-filter	Avvik styringsrente
1999K1	7,497	7,080	0,417
1999K2	6,547	6,968	-0,422
1999K3	5,953	6,857	-0,903
1999K4	5,500	6,745	-1,245
2000K1	5,500	6,634	-1,134
2000K2	5,810	6,520	-0,710
2000K3	6,560	6,403	0,157
2000K4	7,000	6,280	0,720
2001K1	7,000	6,148	0,852
2001K2	7,000	6,006	0,994
2001K3	7,000	5,852	1,148
2001K4	6,903	5,684	1,219
2002K1	6,500	5,505	0,995
2002K2	6,500	5,312	1,188
2002K3	6,977	5,109	1,867
2002K4	6,900	4,898	2,002
2003K1	5,970	4,680	1,290
2003K2	5,117	4,461	0,655
2003K3	3,393	4,247	-0,854
2003K4	2,473	4,042	-1,569
2004K1	2,027	3,853	-1,826
2004K2	1,750	3,682	-1,932
2004K3	1,750	3,534	-1,784
2004K4	1,750	3,409	-1,659
2005K1	1,750	3,310	-1,560
2005K2	1,750	3,234	-1,484
2005K3	2,000	3,182	-1,182
2005K4	2,160	3,150	-0,990
2006K1	2,290	3,136	-0,846
2006K2	2,583	3,137	-0,554
2006K3	2,873	3,147	-0,274
2006K4	3,207	3,164	0,043
2007K1	3,730	3,181	0,549
2007K2	4,093	3,194	0,899
2007K3	4,637	3,200	1,436
2007K4	5,047	3,194	1,852
2008K1	5,250	3,174	2,076
2008K2	5,450	3,138	2,312
2008K3	5,750	3,085	2,665
2008K4	4,780	3,017	1,763
2009K1	2,663	2,936	-0,273
2009K2	1,657	2,847	-1,190
2009K3	1,250	2,753	-1,503
2009K4	1,460	2,656	-1,196
2010K1	1,750	2,560	-0,810
2010K2	1,903	2,464	-0,561
2010K3	2,000	2,371	-0,371
2010K4	2,000	2,280	-0,280
2011K1	2,000	2,192	-0,192
2011K2	2,130	2,106	0,024
2011K3	2,250	2,022	0,228
2011K4	2,163	1,941	0,223
2012K1	1,703	1,861	-0,158
2012K2	1,500	1,785	-0,285
2012K3	1,500	1,711	-0,211
2012K4	1,500	1,639	-0,139
2013K1	1,500	1,570	-0,070
2013K2	1,500	1,502	-0,002
2013K3	1,500	1,436	0,064
2013K4	1,500	1,371	0,129
2014K1	1,500	1,307	0,193
2014K2	1,500	1,243	0,257
2014K3	1,500	1,180	0,320
2014K4	1,453	1,117	0,336
2015K1	1,250	1,055	0,195
2015K2	1,220	0,994	0,226
2015K3	0,983	0,935	0,048
2015K4	0,750	0,878	-0,128
2016K1	0,720	0,824	-0,104
2016K2	0,500	0,774	-0,274
2016K3	0,500	0,729	-0,229
2016K4	0,500	0,688	-0,188

2017K1	839954,000	13,641	13,613	0,029
2017K2	810604,000	13,606	13,620	-0,015
2017K3	794517,000	13,585	13,629	-0,043
2017K4	878028,000	13,685	13,638	0,047
2018K1	868396,000	13,674	13,648	0,027
2018K2	885375,000	13,694	13,658	0,035
2018K3	871530,000	13,678	13,670	0,008
2018K4	951280,000	13,766	13,682	0,083
2019K1	911610,000	13,723	13,695	0,028
2019K2	882674,000	13,691	13,710	-0,019
2019K3	858107,000	13,662	13,725	-0,063
2019K4	944545,000	13,758	13,742	0,016
2020K1	905655,000	13,716	13,761	-0,044
2020K2	805022,000	13,599	13,781	-0,182
2020K3	833800,000	13,634	13,803	-0,169
2020K4	917098,000	13,729	13,826	-0,097
2021K1	936896,000	13,750	13,851	-0,101
2021K2	969774,000	13,785	13,877	-0,092
2021K3	1045062,000	13,860	13,905	-0,045
2021K4	1259889,000	14,047	13,933	0,114
2022K1	1321835,000	14,095	13,962	0,133
2022K2	1309738,000	14,085	13,990	0,095
2022K3	1537974,000	14,246	14,019	0,227
2022K4	1401116,000	14,153	14,048	0,105
2023K1	1284676,000	14,066	14,076	-0,010
2023K2	1189865,000	13,989	14,104	-0,115

2017K1	5,500	8,001	-2,501
2017K2	11,100	8,031	3,069
2017K3	5,500	8,074	-2,574
2017K4	4,600	8,135	-3,535
2018K1	5,600	8,213	-2,613
2018K2	10,100	8,308	1,792
2018K3	3,700	8,418	-4,718
2018K4	4,300	8,541	-4,241
2019K1	5,000	8,673	-3,673
2019K2	11,900	8,807	3,093
2019K3	5,100	8,932	-3,832
2019K4	6,400	9,043	-2,643
2020K1	8,500	9,128	-0,628
2020K2	22,900	9,178	13,722
2020K3	10,400	9,178	1,222
2020K4	11,300	9,128	2,172
2021K1	13,600	9,023	4,577
2021K2	18,200	8,863	9,337
2021K3	5,500	8,650	-3,150
2021K4	14,700	8,391	6,309
2022K1	8,900	8,091	0,809
2022K2	10,500	7,760	2,740
2022K3	2,500	7,409	-4,909
2022K4	-5,700	7,048	-12,748
2023K1	5,200	6,687	-1,487
2023K2	6,700	6,326	0,374

2017K1	0,500	0,652	-0,152
2017K2	0,500	0,622	-0,122
2017K3	0,500	0,597	-0,097
2017K4	0,500	0,577	-0,077
2018K1	0,500	0,562	-0,062
2018K2	0,500	0,552	-0,052
2018K3	0,527	0,548	-0,021
2018K4	0,750	0,548	0,202
2019K1	0,773	0,552	0,221
2019K2	1,027	0,561	0,465
2019K3	1,277	0,575	0,702
2019K4	1,500	0,593	0,907
2020K1	1,330	0,617	0,713
2020K2	0,100	0,648	-0,548
2020K3	0,000	0,687	-0,687
2020K4	0,000	0,737	-0,737
2021K1	0,000	0,798	-0,798
2021K2	0,000	0,871	-0,871
2021K3	0,020	0,956	-0,936
2021K4	0,287	1,053	-0,766
2022K1	0,517	1,159	-0,642
2022K2	0,790	1,275	-0,485
2022K3	1,530	1,397	0,133
2022K4	2,447	1,524	0,923
2023K1	2,773	1,653	1,120
2023K2	3,200	1,784	1,416

Exchange Rate NOK/EUR

	NOK/EUR	LN	HP-filter	Avvik EUR/NOK
1999K1	8,602	2,152	2,110	0,042
1999K2	8,239	2,109	2,106	0,003
1999K3	8,223	2,107	2,103	0,004
1999K4	8,192	2,103	2,099	0,004
2000K1	8,111	2,093	2,096	-0,002
2000K2	8,199	2,104	2,092	0,012
2000K3	8,100	2,092	2,089	0,003
2000K4	8,044	2,085	2,086	-0,001
2001K1	8,203	2,104	2,083	0,021
2001K2	8,016	2,081	2,081	0,001
2001K3	8,008	2,080	2,079	0,002
2001K4	7,970	2,076	2,077	-0,001
2002K1	7,808	2,055	2,076	-0,020
2002K2	7,514	2,017	2,075	-0,058
2002K3	7,398	2,001	2,074	-0,073
2002K4	7,318	1,990	2,075	-0,084
2003K1	7,574	2,025	2,075	-0,051
2003K2	7,955	2,074	2,076	-0,003
2003K3	8,247	2,110	2,078	0,032
2003K4	8,222	2,107	2,079	0,028
2004K1	8,636	2,156	2,081	0,075
2004K2	8,260	2,111	2,082	0,029
2004K3	8,389	2,127	2,084	0,043
2004K4	8,198	2,104	2,085	0,019
2005K1	8,240	2,109	2,086	0,023
2005K2	8,049	2,086	2,088	-0,002
2005K3	7,882	2,065	2,089	-0,024
2005K4	7,879	2,064	2,090	-0,026
2006K1	8,024	2,082	2,091	-0,008
2006K2	7,833	2,058	2,092	-0,034
2006K3	8,063	2,087	2,093	-0,006
2006K4	8,266	2,112	2,094	0,018
2007K1	8,167	2,100	2,095	0,005
2007K2	8,106	2,093	2,095	-0,003
2007K3	7,914	2,069	2,096	-0,027
2007K4	7,887	2,065	2,096	-0,031

Money Supply M2

	M2 (mill. kr)	LN	HP-filter	Avvik M2
1999K1	634123,667	13,360	13,371	-0,011
1999K2	636830,667	13,364	13,392	-0,027
1999K3	660423,667	13,401	13,412	-0,012
1999K4	674685,333	13,422	13,433	-0,011
2000K1	695398,333	13,452	13,453	-0,001
2000K2	711039,333	13,474	13,473	0,001
2000K3	737412,000	13,511	13,493	0,017
2000K4	745011,333	13,521	13,513	0,008
2001K1	775066,000	13,561	13,533	0,028
2001K2	780980,000	13,568	13,553	0,016
2001K3	799276,000	13,591	13,572	0,019
2001K4	808141,000	13,602	13,591	0,011
2002K1	840517,333	13,642	13,610	0,032
2002K2	844060,667	13,646	13,629	0,017
2002K3	855674,000	13,660	13,647	0,012
2002K4	870594,333	13,677	13,666	0,011
2003K1	888272,333	13,697	13,684	0,013
2003K2	886196,333	13,695	13,703	-0,008
2003K3	896661,000	13,706	13,721	-0,015
2003K4	897625,667	13,708	13,740	-0,032
2004K1	913801,333	13,725	13,759	-0,034
2004K2	930800,333	13,744	13,778	-0,035
2004K3	939391,000	13,753	13,798	-0,045
2004K4	960420,000	13,775	13,818	-0,043
2005K1	989392,667	13,805	13,839	-0,034
2005K2	1015703,667	13,831	13,859	-0,028
2005K3	1045201,667	13,860	13,880	-0,020
2005K4	1068293,000	13,882	13,901	-0,019
2006K1	1094170,333	13,906	13,922	-0,016
2006K2	1130089,667	13,938	13,942	-0,005
2006K3	1166245,000	13,969	13,963	0,007
2006K4	1203002,667	14,000	13,983	0,018
2007K1	1263899,000	14,050	14,002	0,047
2007K2	1308729,333	14,085	14,021	0,063
2007K3	1365461,333	14,127	14,039	0,088
2007K4	1403369,333	14,154	14,057	0,098

Credit Volume K2

	K2	LN	HP-filter	Avvik K2
1999K1	1125055,000	13,933	13,934	-0,001
1999K2	1149482,333	13,955	13,958	-0,003
1999K3	1172152,667	13,974	13,981	-0,007
1999K4	1201416,333	13,999	14,005	-0,006
2000K1	1227751,000	14,021	14,029	-0,008
2000K2	1267096,000	14,052	14,052	0,000
2000K3	1299511,333	14,077	14,076	0,002
2000K4	1340146,000	14,108	14,099	0,009
2001K1	1385498,333	14,142	14,123	0,019
2001K2	1422346,000	14,168	14,146	0,021
2001K3	1448902,333	14,186	14,170	0,017
2001K4	1484313,667	14,210	14,193	0,017
2002K1	1507423,000	14,226	14,216	0,010
2002K2	1545824,333	14,251	14,240	0,011
2002K3	1571961,667	14,268	14,263	0,005
2002K4	1608232,667	14,291	14,286	0,004
2003K1	1638097,000	14,309	14,310	-0,001
2003K2	1669941,333	14,328	14,334	-0,006
2003K3	1693949,667	14,343	14,358	-0,015
2003K4	1728744,333	14,363	14,382	-0,020
2004K1	1758202,333	14,380	14,407	-0,027
2004K2	1803985,333	14,406	14,432	-0,027
2004K3	1841576,000	14,426	14,458	-0,032
2004K4	1894756,000	14,455	14,484	-0,029
2005K1	1942452,667	14,479	14,510	-0,031
2005K2	2011273,333	14,514	14,537	-0,023
2005K3	2069751,667	14,543	14,564	-0,021
2005K4	2145839,000	14,579	14,591	-0,012
2006K1	2208139,333	14,608	14,619	-0,011
2006K2	2283539,333	14,641	14,646	-0,005
2006K3	2354567,667	14,672	14,673	-0,001
2006K4	2421495,000	14,700	14,700	0,000
2007K1	2496594,667	14,730	14,727	0,003
2007K2	2594300,333	14,769	14,753	0,015
2007K3	2686807,667	14,804	14,779	0,025
2007K4	2780486,333	14,838	14,804	0,034

2008K1	7,956	2,074	2,097	-0,023
2008K2	7,940	2,072	2,097	-0,025
2008K3	8,059	2,087	2,096	-0,010
2008K4	8,935	2,190	2,096	0,094
2009K1	8,946	2,191	2,094	0,097
2009K2	8,841	2,179	2,093	0,087
2009K3	8,735	2,167	2,090	0,077
2009K4	8,395	2,128	2,088	0,040
2010K1	8,105	2,093	2,085	0,008
2010K2	7,910	2,068	2,082	-0,013
2010K3	7,956	2,074	2,079	-0,005
2010K4	8,054	2,086	2,076	0,011
2011K1	7,823	2,057	2,073	-0,016
2011K2	7,824	2,057	2,071	-0,014
2011K3	7,765	2,050	2,070	-0,020
2011K4	7,760	2,049	2,069	-0,020
2012K1	7,586	2,026	2,069	-0,043
2012K2	7,559	2,023	2,070	-0,047
2012K3	7,392	2,000	2,072	-0,072
2012K4	7,365	1,997	2,076	-0,079
2013K1	7,430	2,006	2,080	-0,075
2013K2	7,616	2,030	2,086	-0,056
2013K3	7,932	2,071	2,092	-0,022
2013K4	8,244	2,109	2,100	0,009
2014K1	8,347	2,122	2,108	0,014
2014K2	8,207	2,105	2,117	-0,012
2014K3	8,273	2,113	2,127	-0,014
2014K4	8,592	2,151	2,136	0,014
2015K1	8,731	2,167	2,146	0,020
2015K2	8,555	2,146	2,157	-0,010
2015K3	9,142	2,213	2,167	0,046
2015K4	9,336	2,234	2,177	0,057
2016K1	9,526	2,254	2,187	0,067
2016K2	9,320	2,232	2,196	0,036
2016K3	9,290	2,229	2,206	0,023
2016K4	9,036	2,201	2,215	-0,014

2008K1	1303634,667	14,081	14,073	0,007
2008K2	1313852,667	14,088	14,089	-0,001
2008K3	1333545,667	14,103	14,104	-0,001
2008K4	1360311,667	14,123	14,119	0,004
2009K1	1378698,333	14,137	14,133	0,003
2009K2	1391793,667	14,146	14,147	-0,001
2009K3	1398353,667	14,151	14,161	-0,010
2009K4	1401777,000	14,153	14,174	-0,021
2010K1	1411525,000	14,160	14,187	-0,027
2010K2	1421856,333	14,167	14,200	-0,033
2010K3	1458196,667	14,193	14,213	-0,021
2010K4	1490083,667	14,214	14,226	-0,012
2011K1	1523876,667	14,237	14,239	-0,003
2011K2	1548249,000	14,253	14,252	0,000
2011K3	1569003,000	14,266	14,265	0,001
2011K4	1591390,000	14,280	14,278	0,002
2012K1	1610249,333	14,292	14,290	0,001
2012K2	1617643,667	14,296	14,303	-0,007
2012K3	1648321,667	14,315	14,316	-0,001
2012K4	1667928,000	14,327	14,328	-0,001
2013K1	1684207,333	14,337	14,341	-0,004
2013K2	1704516,000	14,349	14,354	-0,005
2013K3	1741022,333	14,370	14,366	0,004
2013K4	1762607,333	14,382	14,378	0,004
2014K1	1797888,333	14,402	14,391	0,011
2014K2	1827899,667	14,419	14,403	0,016
2014K3	1860926,000	14,437	14,415	0,022
2014K4	1882705,333	14,448	14,427	0,021
2015K1	1918438,333	14,467	14,439	0,028
2015K2	1875593,667	14,444	14,451	-0,007
2015K3	1903169,000	14,459	14,463	-0,004
2015K4	1913286,000	14,464	14,476	-0,011
2016K1	1929901,000	14,473	14,488	-0,015
2016K2	1959737,667	14,488	14,501	-0,012
2016K3	2009314,333	14,513	14,514	0,000
2016K4	2024676,000	14,521	14,527	-0,006

2008K1	2859342,667	14,866	14,829	0,037
2008K2	2948524,333	14,897	14,853	0,044
2008K3	3004933,667	14,916	14,876	0,040
2008K4	3033471,333	14,925	14,898	0,028
2009K1	3079925,333	14,940	14,919	0,021
2009K2	3133488,667	14,958	14,940	0,018
2009K3	3162965,333	14,967	14,960	0,007
2009K4	3202637,000	14,979	14,979	0,001
2010K1	3246475,000	14,993	14,998	-0,005
2010K2	3299461,333	15,009	15,016	-0,007
2010K3	3341024,000	15,022	15,034	-0,012
2010K4	3398754,333	15,039	15,051	-0,012
2011K1	3457412,667	15,056	15,068	-0,012
2011K2	3525482,667	15,076	15,085	-0,009
2011K3	3578081,000	15,090	15,101	-0,011
2011K4	3647990,667	15,110	15,117	-0,007
2012K1	3716062,333	15,128	15,133	-0,005
2012K2	3776331,667	15,144	15,149	-0,005
2012K3	3837245,667	15,160	15,164	-0,004
2012K4	3907358,333	15,178	15,180	-0,001
2013K1	3959385,667	15,192	15,195	-0,003
2013K2	4038308,000	15,211	15,210	0,001
2013K3	4091792,333	15,224	15,225	0,000
2013K4	4161210,333	15,241	15,239	0,002
2014K1	4211244,333	15,253	15,254	-0,001
2014K2	4282520,000	15,270	15,269	0,002
2014K3	4339165,000	15,283	15,283	0,000
2014K4	4404052,000	15,298	15,297	0,001
2015K1	4459176,000	15,310	15,311	-0,001
2015K2	4541629,000	15,329	15,325	0,004
2015K3	4590667,000	15,340	15,339	0,000
2015K4	4649925,667	15,352	15,353	-0,001
2016K1	4698264,333	15,363	15,367	-0,004
2016K2	4771880,000	15,378	15,380	-0,002
2016K3	4833236,000	15,391	15,394	-0,003
2016K4	4899802,000	15,405	15,408	-0,003

2017K1	8,984	2,195	2,224	-0,028
2017K2	9,370	2,237	2,232	0,005
2017K3	9,349	2,235	2,241	-0,005
2017K4	9,616	2,263	2,249	0,015
2018K1	9,633	2,265	2,257	0,008
2018K2	9,554	2,257	2,264	-0,007
2018K3	9,578	2,259	2,272	-0,012
2018K4	9,634	2,265	2,279	-0,014
2019K1	9,742	2,276	2,286	-0,010
2019K2	9,716	2,274	2,293	-0,019
2019K3	9,851	2,288	2,299	-0,012
2019K4	10,092	2,312	2,306	0,006
2020K1	10,455	2,347	2,312	0,035
2020K2	11,020	2,400	2,317	0,082
2020K3	10,670	2,367	2,323	0,045
2020K4	10,757	2,376	2,328	0,048
2021K1	10,264	2,329	2,332	-0,004
2021K2	10,089	2,311	2,337	-0,025
2021K3	10,327	2,335	2,341	-0,007
2021K4	9,972	2,300	2,346	-0,046
2022K1	9,933	2,296	2,351	-0,055
2022K2	10,023	2,305	2,356	-0,051
2022K3	10,061	2,309	2,361	-0,052
2022K4	10,392	2,341	2,366	-0,025
2023K1	10,985	2,396	2,371	0,025
2023K2	11,655	2,456	2,377	0,079

2017K1	2055426,667	14,536	14,540	-0,004
2017K2	2093053,667	14,554	14,554	0,000
2017K3	2131708,667	14,572	14,568	0,005
2017K4	2148105,333	14,580	14,582	-0,002
2018K1	2174106,333	14,592	14,597	-0,005
2018K2	2233212,333	14,619	14,612	0,007
2018K3	2257167,000	14,630	14,628	0,002
2018K4	2253587,000	14,628	14,644	-0,015
2019K1	2273293,667	14,637	14,660	-0,023
2019K2	2312370,333	14,654	14,677	-0,023
2019K3	2367261,333	14,677	14,694	-0,017
2019K4	2357438,667	14,673	14,712	-0,039
2020K1	2408327,000	14,694	14,730	-0,036
2020K2	2551737,333	14,752	14,749	0,003
2020K3	2611741,333	14,776	14,768	0,008
2020K4	2642340,333	14,787	14,787	0,000
2021K1	2703615,333	14,810	14,806	0,004
2021K2	2801235,667	14,846	14,826	0,020
2021K3	2881918,667	14,874	14,845	0,029
2021K4	2900757,667	14,880	14,865	0,016
2022K1	2964259,000	14,902	14,884	0,018
2022K2	3046875,333	14,930	14,904	0,026
2022K3	3123784,667	14,955	14,923	0,032
2022K4	3083979,667	14,942	14,942	0,000
2023K1	3128071,333	14,956	14,961	-0,005
2023K2	3101340,333	14,947	14,981	-0,033

2017K1	4962261,333	15,417	15,421	-0,004
2017K2	5049426,333	15,435	15,435	0,000
2017K3	5126303,000	15,450	15,448	0,002
2017K4	5203419,000	15,465	15,462	0,003
2018K1	5228750,333	15,470	15,475	-0,006
2018K2	5317750,667	15,487	15,489	-0,002
2018K3	5386226,333	15,499	15,502	-0,003
2018K4	5474148,333	15,516	15,515	0,000
2019K1	5552837,333	15,530	15,529	0,001
2019K2	5645151,667	15,546	15,542	0,004
2019K3	5703564,667	15,557	15,555	0,001
2019K4	5781489,667	15,570	15,569	0,001
2020K1	5843647,000	15,581	15,582	-0,001
2020K2	5928613,667	15,595	15,595	0,000
2020K3	5996576,667	15,607	15,608	-0,002
2020K4	6083517,333	15,621	15,622	-0,001
2021K1	6161406,667	15,634	15,635	-0,001
2021K2	6263094,000	15,650	15,648	0,002
2021K3	6337759,000	15,662	15,661	0,001
2021K4	6418326,667	15,675	15,674	0,000
2022K1	6497674,000	15,687	15,687	0,000
2022K2	6591141,000	15,701	15,700	0,001
2022K3	6680642,333	15,715	15,714	0,001
2022K4	6768530,333	15,728	15,727	0,001
2023K1	6838318,667	15,738	15,740	-0,002
2023K2	6908937,000	15,748	15,753	-0,004

Inflation (HICP) Euro area

	HICP ECB	LN	HP-filter	Avvik HICP
1999K1	74,113	4,306	4,304	0,001
1999K2	74,493	4,311	4,310	0,001
1999K3	74,783	4,315	4,315	-0,001
1999K4	75,163	4,320	4,320	-0,001
2000K1	75,593	4,325	4,326	0,000
2000K2	75,900	4,329	4,331	-0,002
2000K3	76,453	4,337	4,336	0,000
2000K4	76,920	4,343	4,342	0,001
2001K1	77,093	4,345	4,347	-0,002
2001K2	77,840	4,355	4,353	0,002
2001K3	78,183	4,359	4,358	0,001
2001K4	78,360	4,361	4,363	-0,002
2002K1	79,043	4,370	4,369	0,001
2002K2	79,467	4,375	4,374	0,001
2002K3	79,813	4,380	4,379	0,000
2002K4	80,143	4,384	4,385	-0,001
2003K1	80,860	4,393	4,390	0,003
2003K2	81,013	4,395	4,395	-0,001
2003K3	81,430	4,400	4,401	-0,001
2003K4	81,760	4,404	4,406	-0,002
2004K1	82,257	4,410	4,412	-0,002
2004K2	82,873	4,417	4,417	0,000
2004K3	83,263	4,422	4,422	0,000
2004K4	83,623	4,426	4,428	-0,001
2005K1	83,963	4,430	4,433	-0,003
2005K2	84,537	4,437	4,439	-0,001
2005K3	85,200	4,445	4,444	0,001
2005K4	85,540	4,449	4,450	-0,001
2006K1	85,917	4,453	4,455	-0,002
2006K2	86,583	4,461	4,460	0,001
2006K3	87,043	4,466	4,466	0,001
2006K4	87,057	4,467	4,471	-0,005
2007K1	87,530	4,472	4,476	-0,005
2007K2	88,253	4,480	4,482	-0,002
2007K3	88,697	4,485	4,487	-0,002
2007K4	89,557	4,495	4,492	0,003
2008K1	90,450	4,505	4,497	0,007
2008K2	91,457	4,516	4,503	0,013
2008K3	92,097	4,523	4,508	0,015
2008K4	91,590	4,517	4,512	0,005
2009K1	91,350	4,515	4,517	-0,003
2009K2	91,583	4,517	4,522	-0,005
2009K3	91,753	4,519	4,527	-0,008
2009K4	91,950	4,521	4,531	-0,010
2010K1	92,430	4,526	4,536	-0,010
2010K2	93,023	4,533	4,541	-0,008
2010K3	93,313	4,536	4,545	-0,009
2010K4	93,797	4,541	4,550	-0,009
2011K1	94,790	4,552	4,554	-0,003
2011K2	95,473	4,559	4,559	0,000
2011K3	95,897	4,563	4,563	0,000
2011K4	96,500	4,570	4,567	0,002
2012K1	97,357	4,578	4,571	0,007
2012K2	97,837	4,583	4,575	0,008
2012K3	98,313	4,588	4,579	0,009
2012K4	98,733	4,592	4,582	0,010
2013K1	99,137	4,596	4,585	0,011
2013K2	99,257	4,598	4,588	0,010
2013K3	99,587	4,601	4,591	0,010
2013K4	99,553	4,601	4,593	0,007
2014K1	99,807	4,603	4,596	0,008
2014K2	99,807	4,603	4,598	0,005
2014K3	99,900	4,604	4,600	0,004
2014K4	99,730	4,602	4,602	0,001
2015K1	99,677	4,602	4,603	-0,001
2015K2	100,160	4,607	4,605	0,002
2015K3	100,093	4,606	4,607	-0,001
2015K4	100,070	4,606	4,609	-0,003
2016K1	99,720	4,602	4,610	-0,008
2016K2	100,073	4,606	4,612	-0,006
2016K3	100,343	4,609	4,614	-0,006
2016K4	100,820	4,613	4,616	-0,003

Global Supply Chain Pressure Index (GSCPI)

	GSCPI	HP-filter	Avvik GSCPI
1999K1	-0,1842	-0,3585	0,1743
1999K2	-0,3224	-0,3760	0,0535
1999K3	-0,4312	-0,3933	-0,0378
1999K4	-0,0377	-0,4105	0,3728
2000K1	-0,3240	-0,4272	0,1033
2000K2	0,0656	-0,4433	0,5089
2000K3	-0,1254	-0,4582	0,3328
2000K4	-0,8829	-0,4712	-0,4117
2001K1	-1,0030	-0,4814	-0,5216
2001K2	-1,0623	-0,4882	-0,5741
2001K3	-0,6907	-0,4910	-0,1997
2001K4	-1,1181	-0,4900	-0,6281
2002K1	-0,4503	-0,4853	0,0350
2002K2	-0,3230	-0,4773	0,1544
2002K3	-0,9008	-0,4667	-0,4341
2002K4	-0,8003	-0,4537	-0,3467
2003K1	-0,3274	-0,4390	0,1117
2003K2	-0,2641	-0,4236	0,1595
2003K3	-0,0408	-0,4082	0,3674
2003K4	-0,2106	-0,3936	0,1830
2004K1	-0,1352	-0,3803	0,2451
2004K2	0,4937	-0,3686	0,8623
2004K3	-0,0459	-0,3587	0,3128
2004K4	-0,1457	-0,3504	0,2047
2005K1	-0,2033	-0,3431	0,1398
2005K2	-1,1200	-0,3361	-0,7839
2005K3	-0,5424	-0,3288	-0,2136
2005K4	-0,4698	-0,3210	-0,1489
2006K1	-0,4751	-0,3124	-0,1627
2006K2	0,0588	-0,3030	0,3619
2006K3	-0,2339	-0,2931	0,0592
2006K4	-0,3911	-0,2824	-0,1087
2007K1	-0,7212	-0,2708	-0,4504
2007K2	-0,4771	-0,2581	-0,2191
2007K3	-0,1869	-0,2445	0,0576
2007K4	-0,4194	-0,2304	-0,1890
2008K1	0,0784	-0,2160	0,2943
2008K2	0,0776	-0,2017	0,2792
2008K3	0,1984	-0,1877	0,3861
2008K4	-1,1094	-0,1741	-0,9354
2009K1	-0,3255	-0,1606	-0,1649
2009K2	0,1176	-0,1477	0,2652
2009K3	-0,8000	-0,1357	-0,6643
2009K4	-0,6030	-0,1251	-0,4778
2010K1	-0,0021	-0,1166	0,1145
2010K2	0,2204	-0,1111	0,3315
2010K3	0,2534	-0,1097	0,3631
2010K4	0,5902	-0,1131	0,7032
2011K1	0,6200	-0,1218	0,7417
2011K2	0,8708	-0,1359	1,0067
2011K3	-0,1231	-0,1550	0,0318
2011K4	-0,0916	-0,1781	0,0865
2012K1	0,0131	-0,2042	0,2173
2012K2	-0,5357	-0,2322	-0,3034
2012K3	-0,3254	-0,2610	-0,0645
2012K4	-0,1515	-0,2893	0,1378
2013K1	-0,3008	-0,3164	0,0156
2013K2	-0,7041	-0,3410	-0,3631
2013K3	-0,4659	-0,3622	-0,1038
2013K4	-0,4267	-0,3790	-0,0477
2014K1	-0,4953	-0,3907	-0,1047
2014K2	-0,7311	-0,3964	-0,3347
2014K3	-0,7099	-0,3956	-0,3143
2014K4	-0,6129	-0,3877	-0,2252
2015K1	-0,3855	-0,3724	-0,0131
2015K2	-0,5446	-0,3496	-0,1950
2015K3	-0,4731	-0,3191	-0,1540
2015K4	-0,4626	-0,2810	-0,1817
2016K1	-0,6874	-0,2352	-0,4522
2016K2	-0,3974	-0,1820	-0,2154
2016K3	-0,1204	-0,1218	0,0015
2016K4	-0,1829	-0,0553	-0,1276

Unemployment rate

	Ledighet	HP-filter	Avvik arbeidsledighet
1999K1	2,7	2,95284372	-0,3
1999K2	2,9	3,02261063	-0,1
1999K3	3,1	3,09221952	0,0
1999K4	3,4	3,16143572	0,2
2000K1	3,4	3,23002944	0,2
2000K2	3,0	3,29791999	-0,3
2000K3	3,3	3,36513289	-0,1
2000K4	3,3	3,4315075	-0,1
2001K1	3,4	3,49684244	-0,1
2001K2	3,2	3,56085414	-0,4
2001K3	3,5	3,62319853	-0,1
2001K4	3,6	3,68330597	-0,1
2002K1	3,8	3,74052985	0,1
2002K2	3,7	3,79417147	-0,1
2002K3	3,6	3,84356933	-0,2
2002K4	3,8	3,88800303	-0,1
2003K1	4,0	3,92659998	0,1
2003K2	4,2	3,95843257	0,2
2003K3	4,4	3,98261906	0,4
2003K4	4,3	3,9984287	0,3
2004K1	4,2	4,0053916	0,2
2004K2	4,2	4,00322635	0,2
2004K3	4,4	3,99177316	0,4
2004K4	4,4	3,97099525	0,4
2005K1	4,4	3,94111096	0,5
2005K2	4,6	3,90260677	0,7
2005K3	4,6	3,85625595	0,7
2005K4	4,4	3,80326766	0,6
2006K1	4,2	3,74531588	0,5
2006K2	3,9	3,68444758	0,2
2006K3	3,4	3,62299386	-0,2
2006K4	2,8	3,56342058	-0,8
2007K1	2,9	3,50805422	-0,6
2007K2	2,7	3,45874411	-0,8
2007K3	2,7	3,41695955	-0,7
2007K4	2,5	3,38369563	-0,9
2008K1	2,7	3,35949935	-0,7
2008K2	2,8	3,34436538	-0,5
2008K3	3,0	3,33787621	-0,3
2008K4	3,1	3,33927411	-0,2
2009K1	3,3	3,34759017	0,0
2009K2	3,6	3,36170593	0,2
2009K3	3,4	3,38047319	0,0
2009K4	3,5	3,40289269	0,1
2010K1	4,1	3,42797736	0,7
2010K2	4,1	3,45480084	0,6
2010K3	3,8	3,48285678	0,3
2010K4	3,8	3,51204206	0,3
2011K1	3,5	3,54245179	0,0
2011K2	3,6	3,57436107	0,0
2011K3	3,5	3,60801843	-0,1
2011K4	3,6	3,64368845	0,0
2012K1	3,5	3,68156821	-0,2
2012K2	3,4	3,72182744	-0,3
2012K3	3,4	3,76452244	-0,4
2012K4	3,7	3,80950834	-0,1
2013K1	4,0	3,85641244	0,1
2013K2	3,9	3,90479362	0,0
2013K3	4,0	3,95430048	0,0
2013K4	3,9	4,00457863	-0,1
2014K1	3,8	4,05530225	-0,3
2014K2	3,4	4,10608015	-0,7
2014K3	4,0	4,15636159	-0,2
2014K4	3,9	4,20515451	-0,3
2015K1	4,6	4,25136912	0,3
2015K2	4,5	4,29372495	0,2
2015K3	4,8	4,33115937	0,5
2015K4	4,8	4,36273872	0,4
2016K1	5,2	4,38782233	0,8
2016K2	4,8	4,40604283	0,4
2016K3	5,0	4,41754046	0,6
2016K4	4,6	4,4227017	0,2

2017K1	101,497	4,620	4,619	0,001
2017K2	101,567	4,621	4,621	0,000
2017K3	101,767	4,623	4,624	-0,001
2017K4	102,273	4,628	4,626	0,001
2018K1	102,790	4,633	4,630	0,003
2018K2	103,327	4,638	4,633	0,005
2018K3	103,890	4,643	4,636	0,007
2018K4	104,247	4,647	4,640	0,007
2019K1	104,193	4,646	4,644	0,002
2019K2	104,737	4,651	4,649	0,003
2019K3	104,973	4,654	4,654	0,000
2019K4	105,307	4,657	4,659	-0,002
2020K1	105,350	4,657	4,665	-0,008
2020K2	104,947	4,653	4,671	-0,018
2020K3	104,920	4,653	4,678	-0,025
2020K4	105,047	4,654	4,685	-0,031
2021K1	106,313	4,666	4,693	-0,027
2021K2	106,887	4,672	4,701	-0,029
2021K3	108,100	4,683	4,710	-0,027
2021K4	109,910	4,700	4,719	-0,020
2022K1	112,823	4,726	4,729	-0,003
2022K2	115,503	4,749	4,739	0,011
2022K3	118,140	4,772	4,749	0,023
2022K4	120,870	4,795	4,759	0,036
2023K1	121,863	4,803	4,769	0,034
2023K2	122,630	4,809	4,780	0,030

2017K1	0,1674	0,0169	0,1505
2017K2	0,0127	0,0942	-0,0815
2017K3	0,3520	0,1759	0,1761
2017K4	0,7544	0,2615	0,4929
2018K1	0,3701	0,3504	0,0197
2018K2	0,4362	0,4423	-0,0060
2018K3	0,4691	0,5371	-0,0680
2018K4	0,4664	0,6345	-0,1681
2019K1	0,2929	0,7343	-0,4414
2019K2	-0,3471	0,8361	-1,1832
2019K3	-0,1833	0,9393	-1,1226
2019K4	0,0974	1,0425	-0,9450
2020K1	1,2760	1,1436	0,1325
2020K2	2,6504	1,2399	1,4105
2020K3	1,5709	1,3289	0,2420
2020K4	0,8410	1,4089	-0,5679
2021K1	1,8126	1,4783	0,3343
2021K2	2,7863	1,5351	1,2512
2021K3	3,1437	1,5778	1,5659
2021K4	4,1047	1,6053	2,4995
2022K1	3,0170	1,6177	1,3993
2022K2	2,7987	1,6167	1,1820
2022K3	1,3791	1,6047	-0,2257
2022K4	1,1802	1,5850	-0,4049
2023K1	-0,1314	1,5607	-1,6921
2023K2	-1,3189	1,5346	-2,8536

2017K1	4,5	4,42227704	0,1
2017K2	4,5	4,4171278	0,1
2017K3	4,3	4,40816387	-0,1
2017K4	4,1	4,39634694	-0,3
2018K1	4,1	4,38257109	-0,3
2018K2	3,9	4,36754519	-0,5
2018K3	4,2	4,35180149	-0,2
2018K4	3,8	4,33558005	-0,5
2019K1	4,0	4,31902603	-0,3
2019K2	3,5	4,30194986	-0,8
2019K3	4,0	4,28396258	-0,3
2019K4	4,1	4,26417401	-0,2
2020K1	3,8	4,2415165	-0,4
2020K2	4,6	4,21481979	0,4
2020K3	5,5	4,18263765	1,3
2020K4	5,1	4,14376462	1,0
2021K1	5,0	4,09781857	0,9
2021K2	5,0	4,04501503	1,0
2021K3	4,2	3,98613339	0,2
2021K4	3,6	3,92254989	-0,3
2022K1	3,3	3,85577446	-0,6
2022K2	3,2	3,78711542	-0,6
2022K3	3,2	3,71753374	-0,5
2022K4	3,2	3,64762344	-0,4
2023K1	3,7	3,57765509	0,1
2023K2	3,4	3,50761947	-0,1

9.2 Deviation from Trend with Lag/Lead

	Dev. Policy rate	Dev. Savings rate	Dev. GDP	Dev. EUR/NOK	Dev. M2	Dev. K2	Dev. HICP	Dev. GSCPI	Dev. Unemployment	Dev. CPI
1999K4	-1,245273	1,886153	-0,082806	0,011816	0,001202	-0,000570	-0,000779	0,508853	-0,122611	-0,006028
2000K1	-1,133644	0,595204	-0,035946	0,002766	0,017482	-0,002775	-0,000413	0,332836	0,007780	-0,000980
2000K2	-0,710359	-7,802516	0,046555	-0,001149	0,007772	-0,006928	-0,001707	-0,411675	0,238564	0,000904
2000K3	0,156637	3,488644	0,057176	0,021159	0,027562	-0,005950	0,000211	-0,521606	0,169971	-0,001607
2000K4	0,719841	0,069215	0,024431	0,000597	0,015630	-0,007940	0,000947	-0,574121	-0,297920	0,002097
2001K1	0,851654	-1,662455	0,059068	0,001835	0,019484	-0,000050	-0,002153	-0,199679	-0,065133	0,011435
2001K2	0,994027	-6,408060	0,116738	-0,001127	0,011437	0,001591	0,002132	-0,628075	-0,131508	0,017704
2001K3	1,148379	1,631744	0,075033	-0,020322	0,031849	0,008812	0,001179	0,035035	-0,096842	0,002266
2001K4	1,218839	-4,939693	0,039444	-0,057913	0,017371	0,018586	-0,001918	0,154371	-0,360854	0,001101
2002K1	0,995486	-1,920041	0,011878	-0,073066	0,012490	0,021399	0,001409	-0,434110	-0,123199	0,001333
2002K2	1,187639	-6,703882	0,024369	-0,084169	0,011316	0,016532	0,001393	-0,346679	-0,083306	0,002517
2002K3	1,867325	3,715399	-0,038734	-0,050538	0,012978	0,017365	0,000389	0,111667	0,059470	-0,002972
2002K4	2,002498	4,948611	-0,012973	-0,002556	-0,007850	0,009527	-0,000844	0,159508	-0,094171	0,004321
2003K1	1,289944	2,604239	-0,045879	0,032083	-0,014725	0,011384	0,002695	0,367421	-0,243569	0,028038
2003K2	0,655198	-3,812326	-0,004243	0,027540	-0,032464	0,004798	-0,000778	0,183045	-0,088003	0,006903
2003K3	-0,853680	3,702681	-0,017001	0,075088	-0,033683	0,004150	-0,001022	0,245091	0,073400	-0,001438
2003K4	-1,569037	5,655407	-0,092395	0,029018	-0,034637	-0,001070	-0,002362	0,862256	0,241567	-0,000573
2004K1	-1,826021	1,549686	-0,067974	0,043054	-0,045165	-0,005650	-0,001699	0,312832	0,417381	-0,002996
2004K2	-1,932133	-1,514185	-0,033800	0,018678	-0,043073	-0,015481	0,000365	0,204709	0,301571	-0,001287
2004K3	-1,783731	3,263124	-0,025247	0,022510	-0,033704	-0,019577	-0,000354	0,139763	0,194608	-0,005770
2004K4	-1,659300	3,881890	-0,058470	-0,002092	-0,028058	-0,027474	-0,001462	-0,783880	0,196774	-0,004540
2005K1	-1,559544	-2,259652	-0,049037	-0,024185	-0,020205	-0,026957	-0,002835	-0,213601	0,408227	-0,009514
2005K2	-1,484130	-1,665689	0,012111	-0,025563	-0,019210	-0,031931	-0,001465	-0,148879	0,429005	-0,002740
2005K3	-1,181749	6,861000	-0,033639	-0,008357	-0,016109	-0,029465	0,000913	-0,162717	0,458889	-0,005017
2005K4	-0,990165	9,818680	-0,008745	-0,033551	-0,004501	-0,030986	-0,000538	0,361879	0,697393	-0,003360
2006K1	-0,846403	-0,498675	-0,010998	-0,005640	0,006568	-0,022890	-0,001572	0,059238	0,743744	-0,004631
2006K2	-0,553537	2,496776	0,054506	0,018343	0,017574	-0,021227	0,000742	-0,108715	0,596732	0,003132
2006K3	-0,274111	1,093183	0,052514	0,005392	0,047454	-0,012324	0,000642	-0,450411	0,454684	-0,001146
2006K4	0,043009	-7,222864	0,008569	-0,002766	0,063449	-0,011014	-0,004582	-0,219077	0,215552	0,002351
2007K1	0,549131	-4,565457	0,007844	-0,027333	0,087750	-0,004761	-0,004510	0,057642	-0,222994	-0,013564
2007K2	0,898867	-7,944176	0,054351	-0,031185	0,097770	-0,001366	-0,001597	-0,189022	-0,763421	-0,013007
2007K3	1,436487	2,034254	0,009338	-0,022752	0,007449	-0,000376	-0,001858	0,294343	-0,608054	-0,019270
2007K4	1,852364	-4,631926	-0,011685	-0,024727	-0,000652	0,003431	0,002574	0,279247	-0,758744	-0,004115
2008K1	2,075976	-2,145750	-0,012711	-0,009525	-0,001066	0,015497	0,007351	0,386134	-0,716960	0,000666
2008K2	2,312309	-5,907352	0,088522	0,094399	0,004058	0,024728	0,013348	-0,935352	-0,883696	-0,001918
2008K3	2,665049	2,384472	0,046796	0,096844	0,003206	0,033808	0,015336	-0,164870	-0,659499	0,005718
2008K4	1,763108	-2,865383	0,079945	0,086786	-0,001226	0,037275	0,004916	0,265236	-0,544365	0,009855
2009K1	-0,272938	-0,353510	0,060554	0,076975	-0,010094	0,044244	-0,002540	-0,664281	-0,337876	0,003910
2009K2	-1,190281	-0,274711	0,076252	0,039890	-0,020981	0,040239	-0,004765	-0,477843	-0,239274	0,008080
2009K3	-1,502607	3,576431	-0,052170	0,007737	-0,027217	0,027534	-0,007643	0,114508	-0,047590	0,003031
2009K4	-1,196194	0,805507	-0,075511	-0,013492	-0,032982	0,021357	-0,010202	0,331478	0,238294	0,003615
2010K1	-0,809713	1,015870	-0,071366	-0,004660	-0,020735	0,017971	-0,009669	0,363110	0,019527	0,013025
2010K2	-0,561086	-1,489628	-0,020695	0,010528	-0,012046	0,007407	-0,007915	0,703221	0,097107	0,014076
2010K3	-0,371066	1,391228	-0,034058	-0,016005	-0,002524	0,000587	-0,009412	0,741728	0,672023	0,002197
2010K4	-0,280051	1,261587	-0,048582	-0,013797	0,000480	-0,004524	-0,008808	1,006667	0,645199	0,007434
2011K1	-0,191543	-0,576274	-0,075286	-0,019891	0,000973	-0,006524	-0,002771	0,031837	0,317143	0,008377
2011K2	0,024465	-4,820867	0,021018	-0,019860	0,002362	-0,011741	0,000002	0,086458	0,287958	0,010432
2011K3	0,228098	3,929659	0,003703	-0,042628	0,001407	-0,011945	0,000130	0,217317	-0,042452	-0,000672
2011K4	0,222803	0,180165	-0,028740	-0,047421	-0,006705	-0,011821	0,002244	-0,303439	0,025639	-0,001748
2012K1	-0,158119	0,033058	-0,026012	-0,071942	-0,000570	-0,009003	0,007087	-0,064464	-0,108018	-0,000703
2012K2	-0,284838	-2,109369	0,046117	-0,079041	-0,001353	-0,010599	0,008197	0,137823	-0,043688	-0,002900
2012K3	-0,210759	4,155159	0,060134	-0,074677	-0,004202	-0,007410	0,009455	0,015575	-0,181568	-0,014396
2012K4	-0,139110	1,030231	0,005447	-0,055638	-0,004726	-0,004860	0,010335	-0,363117	-0,321827	-0,007142

2013K1	-0,069652	-1,683157	-0,027321	-0,021597	0,004011	-0,004504	0,011257	-0,103766	-0,364522	-0,006064
2013K2	-0,002060	-0,984655	0,043353	0,009478	0,003945	-0,004045	0,009542	-0,047719	-0,109508	-0,001637
2013K3	0,064035	2,627139	0,009691	0,013590	0,011449	-0,001301	0,010160	-0,104682	0,143588	-0,003277
2013K4	0,129002	1,154244	0,016976	-0,012123	0,015767	-0,003266	0,007337	-0,334654	-0,004794	-0,003316
2014K1	0,193171	-1,602964	0,000442	-0,013557	0,021511	0,001440	0,007585	-0,314334	0,045700	-0,004527
2014K2	0,256792	-1,244832	0,071571	0,014431	0,021047	-0,000277	0,005465	-0,225173	-0,104579	-0,002796
2014K3	0,319993	2,029298	0,046318	0,020454	0,027785	0,001820	0,004425	-0,013106	-0,255302	-0,002247
2014K4	0,336075	1,320860	0,007900	-0,010181	-0,006868	-0,000812	0,000863	-0,194958	-0,706080	-0,003873
2015K1	0,194806	-0,569980	-0,007462	0,045980	-0,004399	0,001520	-0,001450	-0,154013	-0,156362	-0,006297
2015K2	0,225745	-1,243881	0,050777	0,056979	-0,011336	0,000336	0,001659	-0,181662	-0,305155	-0,002470
2015K3	0,048327	0,898853	0,004422	0,067187	-0,015089	0,000972	-0,000721	-0,452172	0,348631	-0,004462
2015K4	-0,128152	7,958697	0,000486	0,035734	-0,012351	-0,000687	-0,002686	-0,215403	0,206275	-0,001588
2016K1	-0,104428	-1,964437	-0,026656	0,023129	-0,000209	0,003637	-0,007974	0,001454	0,468841	0,002128
2016K2	-0,274489	1,324389	0,003900	-0,013684	-0,005696	0,000469	-0,006305	-0,127556	0,437261	0,008614
2016K3	-0,228924	-1,078658	-0,053741	-0,028276	-0,004012	-0,000534	-0,005589	0,150491	0,812178	0,011404
2016K4	-0,188152	2,621760	-0,021981	0,005202	0,000429	-0,003952	-0,002962	-0,081523	0,393957	0,009964
2017K1	-0,152448	-2,178345	-0,073218	-0,005422	0,004702	-0,002108	0,001462	0,176101	0,582460	0,004034
2017K2	-0,121969	-2,784599	0,024888	0,014584	-0,002011	-0,002987	-0,000283	0,492873	0,177298	0,005693
2017K3	-0,096778	-2,501266	0,028515	0,008438	-0,004724	-0,002922	-0,000939	0,019738	0,077723	0,002547
2017K4	-0,076860	3,069129	-0,014873	-0,007415	0,006964	-0,003834	0,001197	-0,006042	0,082872	-0,000649
2018K1	-0,062141	-2,574375	-0,043385	-0,012359	0,002089	0,000033	0,003181	-0,067984	-0,108164	-0,000152
2018K2	-0,052499	-3,534656	0,047406	-0,013798	-0,015473	0,001627	0,005091	-0,168080	-0,296347	0,005189
2018K3	-0,021106	-2,612986	0,026525	-0,009649	-0,023198	0,003071	0,006967	-0,441353	-0,282571	0,010325
2018K4	0,202234	1,791575	0,035299	-0,019074	-0,023054	-0,005532	0,006546	-1,183168	-0,467545	0,007672
2019K1	0,221059	-4,718401	0,008153	-0,011838	-0,016962	-0,002090	0,001872	-1,122563	-0,151801	0,004290
2019K2	0,465452	-4,241462	0,083449	0,006019	-0,038943	-0,002711	0,002563	-0,945040	-0,535580	0,003782
2019K3	0,702022	-3,673207	0,027630	0,035436	-0,035837	0,000089	-0,000069	0,132461	-0,319026	0,000675
2019K4	0,907088	3,093417	-0,018949	0,082444	0,003375	0,000994	-0,002203	1,410493	-0,801950	-0,002937
2020K1	0,713195	-3,832242	-0,062750	0,044908	0,007681	0,004142	-0,007546	0,241950	-0,283963	-0,011568
2020K2	-0,547676	-2,642769	0,016254	0,048069	0,000156	0,001125	-0,017618	-0,567881	-0,164174	-0,012979
2020K3	-0,687326	-0,628356	-0,044260	-0,003612	0,003736	0,001411	-0,024621	0,334305	-0,441517	-0,012927
2020K4	-0,737211	13,722460	-0,182130	-0,025365	0,019756	-0,001153	-0,030692	1,251227	0,385180	-0,020287
2021K1	-0,798358	1,221533	-0,168786	-0,006598	0,028658	0,000048	-0,026515	1,565903	1,317362	-0,013579
2021K2	-0,871336	2,172140	-0,097015	-0,046180	0,015687	-0,001767	-0,029460	2,499471	0,956235	-0,017467
2021K3	-0,936211	4,576797	-0,100643	-0,054873	0,017895	-0,000566	-0,026976	1,399294	0,902181	-0,012177
2021K4	-0,765841	9,336658	-0,092482	-0,050721	0,026000	-0,001019	-0,019605	1,182009	0,954985	-0,009586
2022K1	-0,642497	-3,149979	-0,045129	-0,051981	0,031618	0,002194	-0,003037	-0,225662	0,213867	-0,011815
2022K2	-0,484638	6,309346	0,113633	-0,024846	-0,000448	0,000907	0,010566	-0,404861	-0,322550	0,002574
2022K3	0,133010	0,809063	0,133016	0,025280	-0,005448	0,000418	0,023068	-1,692096	-0,555774	0,015750
2022K4	0,922693	2,739657	0,095053	0,079172	-0,033206	-0,000400	0,035723	-2,853560	-0,587115	0,016760