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Financial Instability and Financial Crises

An Empirical Study of the Implications of Financial Instability for the Development of Financial Crises.

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Abstract

The objective of this master thesis was to examine how financial instability manifest during Norwegian financial crises in the period 1899-2010. To answer our research question, we have analyzed financial and macroeconomic indicators during seven crises. This approach allowed us to assess whether a recurring pattern in indicators emerged during multiple crisis periods.

Firstly, we presented the crisis theories of Minsky, Kindleberger, Grytten, and Hunnes, aimed at explaining the upbuilding of financial crises. Secondly, we evaluated eleven financial and macroeconomic variables, which constituted the foundation of our data material. Thirdly, we outlined important characteristics of seven economic crises, to provide insight into the historical context of Norwegian financial crises. Collectively, these sections formed the foundation for our analysis and discussion.

To analyze the implications of financial instability, we conducted a deviation analysis and correlation analysis. The deviation analysis involved studying the changes in macroeconomic variables by decomposing the time series using an HP-filter. Additionally, the correlation analysis allowed us to examine the relationship between the monetary indicators and fluctuations in asset prices.

The results from our deviation analysis revealed a procyclical pattern in a majority of the examined macroeconomic indicators, with the only exceptions being bankruptcies and unemployment. The latter variables exhibited a countercyclical pattern. Furthermore, the correlation analysis revealed that the monetary indicators correlated with housing prices during the interwar crises. During the other crises, the correlation analysis revealed a pattern of credit tightening following the turning points in the housing and stock markets. Collectively, these findings suggested a correspondence between the development in financial and macroeconomic indicators, and the upbuilding of crises outlined in the theoretical framework. Hence, the pattern observed for all indicators aligned with the frameworks of Minsky and Kindleberger. Overall, our findings have emphasized the significance of financial instability in the progression of financial crises.

Acknowledgments

This thesis marks the completion of our MSc in Economics and Business Administration at the Norwegian School of Economics, where we both have specialized within the field of Financial Economics. Due to our collective interest in economic history and crisis theory, we engaged with our supervisor to explore a wider range of topics within this field. With guidance from our supervisor, we opted to examine the implications of financial instability by analyzing seven financial crises in Norwegian history.

The process of working on this thesis has been challenging, but highly interesting and educational. Collectively, the work has offered us the privilege of studying a topic of our choice and expanding our knowledge.

We express our gratitude to our supervisor, Professor Ola Honningdal Grytten, for his support and guidance during the writing process. His expertise and constructive input have proven valuable in the completion of this project. Furthermore, we want to thank the competent personnel at Norges Bank and Statistics Norway for their assistance with data collection.

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1. Introduction

1.1 Research Question

This master thesis seeks to answer the research question:

How does financial instability manifest during various Norwegian financial crises, 1899-2010?

To address this research question, we will examine eleven financial and macroeconomic indicators during seven crises. Our methodology includes examining the indicators within the framework of the financial instability hypothesis as proposed by Minsky and Kindleberger, which is integrated into the seven-stage dynamic crisis model. By analyzing financial crises in light of the seven-stage dynamic crisis model, we seek to investigate the implications of financial instability for the development of crises. Thus, we aim to examine whether a pattern is observable during various crisis scenarios.

1.2 Motivation

The motivation for this thesis lies in the aspiration to achieve a more comprehensive understanding of the underlying mechanisms and implications of financial instability. Previous research has thoroughly examined individual financial crises, considering each crisis as a unique event with specific contextual factors. However, we believe that a broader perspective may reveal a pattern essential to acknowledge when managing financial instability.

Crisis theory proposes that the concept of financial stability should be integral when explaining financial crises at an aggregate level. The theoretical frameworks of Minsky and Kindleberger suggest that increases in money supply and credit lead to overheating, asset bubbles, and subsequently, financial crises. In turn, these crises may spread to other markets and industries, resulting in significant contractions in the real economy. Consequently, we want to investigate whether this pattern is observable during seven economic crises in Norwegian history.

1.3 Approach and Limitations

Our approach involves utilizing historical data to analyze the development in financial and macroeconomic indicators during seven crises. This entails conducting a deviation analysis and correlation analysis of the economic variables. The findings derived from these analyses will be applied in the discussion, aiming to determine whether the crises and indicators adhere to a pattern consistent with crisis theory. Finally, we will employ this insight to assess the implications of financial instability for the development of crises.

A limitation of our analysis involves only examining the development of financial and macroeconomic indicators in the period 1899-2010. Thus, our thesis will exclusively focus on financial and macroeconomic aspects of crisis buildup and will not encompass socio-cultural aspects associated with the crises. Moreover, we have chosen to limit the scope of the study to encompass seven crises due to the absence of data for certain indicators during a significant portion of the 19th century. The included crises are the Kristiania Crisis, the Post-War Depression, the Parity Crisis, the Great Depression, the Stagflation, the Banking Crisis, and the Financial Crisis. Additionally, the selected timeframe is based on the objective to investigate a significant number of crises, seeking to determine the existence of patterns across several crisis periods. By employing this approach, we aim to establish a stronger foundation for generalizing the implications of financial instability for the development of crises.

Furthermore, we solely employ existing data series specific to Norway, thereby excluding international data series from our analysis. We also decided to utilize annual figures in our analysis due to limitations on quarterly data for most of our chosen financial and macroeconomic indicators. Using annual figures rather than quarterly figures may limit the ability to capture short-term fluctuations and dynamics. However, as we analyze several economic crises over an extended period, we consider annual data appropriate.

1.4 Outline

Chapter 2 provides a description of key concepts and definitions relevant to our research question. *Chapter 3* contains the theoretical framework employed in our discussion. This includes the theoretical frameworks of Minsky, Kindleberger, Grytten, and Hunnes which describe the evolution of financial crises. *Chapter 4* introduces the employed data sources, including an assessment of the reliability and validity of each financial and macroeconomic indicator.

Chapter 5 comprises the historical review of seven financial crises. This chapter describes the period preceding, during, and after each crisis. The historical review is based on qualitative data considered relevant to our specific research question. *Chapter 6* includes the analysis, which is designed to illustrate the changes in the financial and macroeconomic variables during each crisis period. The analysis is divided into two sections, consisting of a deviation analysis and a correlation analysis.

Chapter 7 provides a discussion on whether our results indicate the presence of a Minsky-Kindleberger pattern during the analyzed crises. Based on these findings, we aim to identify the implications of financial instability for the development of crises. *Chapter 8* encompasses our conclusions, providing a response to our specific research question.

2. Terminology

This chapter provides definitions and main economic concepts related to crisis theory. As crisis theory serves as the primary theoretical framework in this thesis, it is essential to establish a collective understanding of key concepts within this framework.

2.1 Definitions and Economic Concepts

2.1.1 Asset

Assets are economic resources owned by an organization or an individual which have a measurable value (Kaurel, 2021). In the present thesis the most relevant assets are real estate and investments such as stocks and bonds.

2.1.2 Asset Bubble

Asset bubbles occur when the market price of assets exceeds their fundamental value (Grytten, 2009a, p. 1). Bubbles often result from overheating of the economy and may arise in various markets, such as the housing and stock markets. The participants in these markets tend to perceive profit opportunities based on expectations of future price increases. Consequently, asset bubbles may expand even when market participants are aware of their existence.

Asset bubbles are divided into euphoric and non-euphoric bubbles (Grytten & Hunnes, 2016, p. 77). When market prices on assets exhibit substantial deviations from fundamental values and fundamental factors cannot explain the price growth, the bubble is referred to as euphoric. On the contrary, the bubble is considered non-euphoric in instances where the price growth can be explained by fundamental factors. Fundamental factors may include population growth or price changes for raw materials.

2.1.3 Overheating

The economy is overheating when short-term production is considerably higher than the long-term equilibrium (Grytten & Hunnes, 2016, p. 22). It implies that actual production levels exceed the production capacity at normal activity levels, causing an undue strain on the

economy.

2.1.4 Economic Crash

An economic crash occurs when an asset bubble bursts. This implies that asset prices fall suddenly, rapidly, and considerably more than normal market fluctuations would suggest (Grytten & Hunnes, 2016, p. 23). The sudden decline in prices may also lead to panic, which can cause stagnation in market activity. However, a crash is more limited than a financial crisis, and may occur without paramount and lasting effects on other financial markets. Hence, a crash may not necessarily lead to a crisis, and a crisis may occur without a crash.

2.1.5 Economic Crisis

An economic crisis can be defined as a crisis that "occurs when markets undergo a state where production levels are far below the normal equilibrium levels" (Grytten & Hunnes, 2016, p. 24). Economic crises can be divided into financial crises and real economic crises.

Financial Crisis

A financial crisis is "a severe disturbance in the financial markets, typically associated with steep declines in asset prices and insolvency among borrowers and financial institutions, spreading through the financial system, disrupting market functionality and resulting in significant consequences for economic activity and employment" (NOU, 2011, p. 9). Consequently, financial crises tend to occur due to significant changes in the financial markets, caused by shifts on the demand or the supply side of the economy (Grytten & Hunnes, 2014, pp. 24-25). On the demand side, reduced demand for money and credit may contribute to market stagnation. While on the supply side, fear of loss among creditors may result in a lower supply of money and credit than demand. Furthermore, financial crises may spread across national borders and impact the functioning of international markets.

Financial crises can be divided into four categories: banking crises, asset crises, currency crises and debt crises (Grytten, 2021, p. 180). Banking crises occur when a large proportion of banks become insolvent and are not able to meet their obligations. For instance, such a crisis may occur if customers lose confidence in the banking system, and a majority wants to withdraw

their money at once. Asset crashes often occur due to a collapse in asset prices and is commonly observed in the stock and housing markets (Grytten & Hunnes, 2016, pp. 25-26). Currency crises tend to occur when there is a significant drop in the credibility of monetary units. For instance, this crisis may arise due to weakened credibility and confidence in the currency. A debt crisis may arise when market participants are experiencing financing problems and can be divided into a consumer debt crisis, corporate debt crisis, and government financial crisis. A government financial crisis may arise if the public sector has excessively high debt and is unable to service it.

Real Economic Crisis

Real economic crises tend to occur due to a decline or stagnation in the overall economic production (Grytten & Hunnes, 2016, pp. 25-26). It may result from failures on the supply side or demand side of the economy. On the demand side, failures may involve reduced demand for goods and services caused by natural disasters, war, technological changes, or monetary policy. On the supply side, failures may involve a loss of competitiveness or inadequate production capacity.

2.1.6 Recession

The National Bureau of Economic Research (NBER) defines a recession as a substantial decline in economic activity, where the decline must satisfy three criteria: depth, diffusion, and duration (NBER, 2023). Firstly, depth indicate that the decline must be sufficiently deep. Secondly, diffusion entails that the downturn should be characterized by extensive contractions affecting various sectors of the economy. Thirdly, duration suggests that the contraction must last for a certain period, typically six months to a year (Sørensen & Whitta-Jacobsen, 2010, p. 359). However, the NBER considers the three criteria somewhat interchangeable. It implies that while each criterion needs to be met individually to some extent, extreme conditions identified by one criterion may compensate for weaker indications from another (NBER, 2023).

2.1.7 Depression

A depression is a significant and prolonged decline in economic activity (Johansen, 2021). Moreover, a depression is characterized by a substantial decrease in prices over time (Grytten, 2022c). Thus, a prolonged recession combined with persistent deflation, may result in a depression. Furthermore, a depression often evolves as a financial crisis, followed by a significant real economic crisis.

2.1.8 Stagflation

Stagflation refers to a scenario where economic development stagnates while simultaneously experiencing increased inflation and rising unemployment rates (Grytten & Hunnes, 2016, p. 222).

2.1.9 Financial Stability

Norges Bank employs the following definition to explain financial stability: "Financial stability means that the financial system is robust against disturbances in the economy in order to facilitate financial conveyance, execute payments and redistribute risk in a satisfactory manner" (Norges Bank, 2004, p. 24). Thus, financial stability entails implementing mechanisms within the financial sector, to mitigate the consequences of disturbances faced by financial institutions and financial markets (Lund & Solheim, 1999, p. 58). For financial institutions, ensuring financial stability implies establishing trust among market participants. In financial markets, financial stability involves avoiding excessive price fluctuations.

2.1.10 Financial Instability

In contrast to financial stability, financial instability is characterized by excessive fluctuations in asset prices and disruptions in the functioning of financial institutions and financial markets (Norges Bank, 2004, pp. 7-8). Additionally, financial instability is marked by disturbances in the access of credit and money supply. Historically, financial instability tends to transpire during substantial upswings in asset prices and debt.

2.1.11 Business Cycles

Sørensen and Whitta-Jacobsen define business cycles as fluctuations in a country's aggregate economic activity (Sørensen & Whitta-Jacobsen, 2010, p. 358). When analyzing business cycles, estimating the underlying trend over time is essential. The trend represents the progress the economy would have experienced if it had developed along an expected growth path (Grytten & Hunnes, 2016, p. 57). Thus, the trend is considered the potential output, while business cycles are perceived as deviations from the trend.

Business cycles are marked by phases of economic expansion, in which the economic activity grows, followed by periods of contraction, in which the economic activity falls (Sørensen & Whitta-Jacobsen, 2010, p. 358). Moreover, business cycles tend to last for more than a year. This implies that seasonal fluctuations within a year are not considered business cycles, as they are purely driven by seasonal variations in activity (Sørensen & Whitta-Jacobsen, 2010, p. 358). Lastly, Sørensen and Whitta-Jacobsen emphasize that recessions may turn into depressions, but not always. Hence, business cycles do not necessarily adhere to a strict periodic pattern, even though they often repeat themselves.

2.1.12 Output Gap

The output gap refers to the deviation between actual and potential output, providing an indication of the overall capacity utilization in the economy (Bjørnland, Brubakk, & Jore, 2004, p. 199). The term serves as an indicator of economic cyclical trends and is given by the following logarithmic function (Bjørnland, Brubakk, & Jore, 2004, p. 200):

$$ygap_t = y_t - y_t^* \tag{1}$$

Here, $ygap_t$ represents the output gap, which is the percentage deviation between the actual output (y_t) and potential output (y_t^*). A positive output gap occurs when actual output exceeds potential output and indicates economic pressure (Bjørnland, Brubakk, & Jore, 2004, p. 199). Conversely, a negative output gap implies the presence of unutilized resources. If actual output equals potential output, the output gap will be equal to zero. Since the economy is continually subjected to short-term disruptions, the scenario where the output gap equals zero is quite rare.

3. Theoretical Framework

This chapter will present a theoretical framework of crisis theories that form the foundation of our analysis. The framework encompasses three theories covering the typical development of financial crises. Thus, we will outline the crisis model of Minsky (1982), the crisis theory of Kindleberger (1996), and the seven-stage dynamic crisis model of Grytten and Hunnes (2016).

3.1 Minsky´s Model

The American economist Minsky developed a descriptive model consisting of five phases, aimed at explaining the upbuilding of financial crises (Minsky, 1982). Minsky's model (1982) is considered endogenous, presuming that the progression from an economy in equilibrium to the loss of financial stability is caused by weaknesses *within* the financial system (Grytten & Hunnes, 2016, p. 38). Additionally, the model is Keynesian, implying that the progression of financial crises ensues as an outcome of demand-side disturbances in the economy. The model suggests that the financial system lacks the capacity to manage external disturbances, often contributing to overheating. Minsky (1982) describes overheating as a situation characterized by optimism and credit expansion, frequently leading to speculation and the creation of asset bubbles.

3.1.1 Financial Instability Hypothesis

Minsky's approach to explaining the progression of financial crises is referred to as the financial instability hypothesis (Grytten & Koilo, 2019, pp. 168-169). According to Minsky (1982), it is essential to integrate financial relations in explanations of prices, income, and employment to understand economic behavior (Minsky, 1982, pp. 17-18). Therefore, Minsky (1982) emphasizes that financial markets must be considered when applying economic theory to explain economic phenomena at an aggregate level. Essentially, the financial instability hypothesis highlights the inherent instability within a capitalist economy (Minsky, 1982, p. 36).

Minsky (1982) emphasizes that the degree of stability within an economy depends on the three-step taxonomy, which consists of hedge finance, speculative finance, and Ponzi finance (Minsky, 1982, pp. 13-29). According to Minsky, the composition of these three forms of

financial activities plays a crucial role in determining whether a transition to crisis occurs or not. Minsky states that if hedge financing dominates, the economy tends to behave as an equilibrium-seeking and stabilizing system (Minsky, 1992). However, during periods of economic growth, when speculative and Ponzi financing holds more weight, the probability of instability and crisis rises.

During stable conditions, the three-step taxonomy suggests that hedge finance is most frequent (Minsky, 1982, pp. 13-29). Hedge finance is characterized by running income adequately covering debt repayment, implying a healthy form of financial activity. Furthermore, speculative finance involves speculating that market values on assets will increase. In this scenario, market participants expect that the increase will not only cover expenses but also generate profits. Since speculative finance presupposes a market value increase, the operational cash flows alone are not sufficient to cover the cost of debt. Thus, this kind of financial activity will only be sustainable if market prices rise. If the prices fall or stabilize the firms may have problems meeting their debt obligations.

Finally, in the case of Ponzi finance, neither returns from operations nor increased market prices are sufficient to cover costs (Minsky, 1982, pp. 13-29). At this stage, one will need to rely on capital issuance to meet obligations. This type of financing is not sustainable, and widespread use of Ponzi finance may leave the economy less resilient in dealing with financial shocks. Overall, an excess of speculative finance and Ponzi finance in the market can contribute to an increased risk of economic overheating and crisis.

3.1.2 The Model's Five Phases

(1) Displacement

In the initial phase, an exogenous demand shock occurs, resulting in a significant change in the economy (Kindleberger & Aliber, 2015, pp. 39-40). This disruption is referred to as displacement and involves the creation of new profit opportunities in specific parts of the economy. To take advantage of the new profit opportunities, market participants want to invest, and companies seek to adjust production to meet increased demand (NOU, 2011, p. 32). Consequently, the investment and production rates increase, leading to an economic upturn. Increased expected profits also create incentives for borrowing as a method of funding

new investments. This phase is characterized by hedge financing.

(2) Overtrading

The second phase is characterized by speculative finance (Kindleberger & Aliber, 2015, p. 42). There are expectations of profitability growth within the market, leading to additional increases in production and investment rates. In turn, this optimism can lead to increases in asset prices, triggering market participants to engage in speculation (NOU, 2011, p. 32).

(3) Monetary Expansion

In the third phase, optimism and investment opportunities will become more widely recognized among market participants (Kindleberger & Aliber, 2015, p. 41). Expectations of additional price increases will lead more participants to engage in investment opportunities. This leads to increased competition among financial institutions to secure market shares, which may contribute to reduced control and surplus of lending (NOU, 2011, p. 32). The increased lending may further drive up the demand for assets, which in turn results in additional price increases. The expansion will eventually be based on unrealistic expectations of asset values, as market values exceed fundamental values. Consequently, the market will experience imbalances, economic overheating, and upbuilding of bubbles. During this phase Ponzi financing becomes more prevalent.

(4) Revulsion

In the fourth phase, market participants will realize that the market is overheated (NOU, 2011, p. 32). This will make the market participants nervous and their expectations for the future will eventually shift from positive to negative. The result is a turning point in the economy, known as the Minsky Moment. The turning point is characterized by fewer people wanting to invest, and banks tightening their lending restrictions. In turn, this will result in falling market prices and a downturn in the economy (Kindleberger & Aliber, 2015, pp. 42-44).

(5) Discredit

In the final phase, a financial crisis has emerged (NOU, 2011, p. 32). A sharp decline in prices triggers panic and creates expectations of further price reductions. This will prompt the remaining investors to sell their assets, further exacerbating the downturn. When expectations

of potential profit decrease significantly, the market values of assets tend to fall below fundamental values. Financial institutions become more restrictive on lending and many market participants face liquidity problems and substantial losses (Kindleberger & Aliber, 2015, p. 46). Thus, the number of bankruptcies tends to increase.

3.1.3 Critics of Minsky's Model

While Minsky's model (1982) remains a valuable framework for understanding the development of crises, the model has been subjected to criticism from various sources. One of the prominent critics of Minsky's model is Kindleberger. Kindleberger argues that every financial crisis is associated with unique circumstances, and thus, Minsky's model can be seen as inadequate and overly rigid (Kindleberger & Aliber, 2015, pp. 47-48). Furthermore, Kindleberger (2015) highlights the irrelevance of the model because of changes in the structural and economic environment, including altered institutional regulations. The argument put forward is that today's markets are more complex, and thus, do not align with generalized theories. Kindleberger (2015) also argues that price bubbles are more unlikely today, as in an efficient market all available information is swiftly reflected in prices.

3.2 Kindleberger's Theory

Based on elements from Minsky's model, the economic historian Kindleberger developed a neoclassic and dynamic theory explaining the development of financial crises (Kindleberger & Aliber, 2015, pp. 32-46). Neoclassical implies that disruptions on the supply side of the economy are the primary causes of crises. In contrast to Minsky's model, the foundation of Kindleberger's theory is exogenous, implying that crises typically occurs due to external shock factors disrupting the stability of the economy (Grytten & Hunnes, 2016, p. 40). Relative to Minsky's phases, Kindleberger's phases are considerably less distinct (Grytten, 2022b).

Consistent with Minsky (1982), Kindleberger (1996) emphasizes the significance of money and credit expansion in the upbuilding of crises (Grytten & Hunnes, 2016, p. 40). Kindleberger argues that excess liquidity results in overheating of the economy and manic speculation within the asset markets. Thereafter, panic emerges, and market participants exit in fear of significant losses. Consequently, growth reverses, resulting in a crash and crisis. Kindleberger

refers to this progression as the anatomy of a crisis with three critical phases: mania, panic, and crashes.

3.2.1 Financial Stability and Hegemonic Power

Kindleberger's theory (1996) also highlights the significance of the hegemonic power in achieving financial stability. A hegemonic power is a dominant market participant with a considerable influence on the development of the economy (Kindleberger, 1987, ss. 288-291). This implies that the hegemonic power is a market participant who has the authority to influence other parties if a crisis occurs, in addition to being able to influence the duration and depth of the crisis. A hegemonic power is typically a public institution, such as a central bank or a regulatory authority (Grytten & Hunnes, 2016, p. 41).

Kindleberger's theory (1996) is based on the premise that increased money and credit volume in the economy can contribute to overheating (Grytten & Hunnes, 2016, p. 41). Since a hegemonic power can influence the volume of money and credit in the economy, it may help prevent crises from occurring. Similarly, the absence of a hegemonic power can increase the risk of a crisis occurring. Based on these elements, Kindleberger considers the hegemonic power to be essential in maintaining financial stability in the economy.

3.2.2 The Theory's Five Phases

(1) Monetary Expansion

In the first phase, an exogenous macroeconomic shock occurs, leading to a significant disruption in the economy. The shock results in improved expected profit opportunities in the economy and triggers mania (Kindleberger & Aliber, 2015, p. 17). In this phase, optimism and investment opportunities will become widely recognized among market participants (Kindleberger & Aliber, 2015, pp. 53-77). This increases the incentives to take on loans as more market participants seek to take advantage of the opportunity for increased expected profits. Financing investments through loans may further contribute to an expansion in credit and money supply. A significant difference between Minsky's and Kindleberger's theory is that according to the latter, an increase in the money supply and credit will not necessarily lead to speculative mania (Kindleberger & Aliber, 2015, p. 22). However, Kindleberger's

theory emphasizes that all speculative mania is a consequence of monetary expansion.

(2) Swindles

In the second phase, both speculative mania and panic coexist (Kindleberger & Aliber, 2015, pp. 143-182). The combination of mania and panic leads to a shift in focus among market participants, from a long-term perspective to a short-term perspective. Many market participants tend to become greedy and increasingly desperate to achieve higher profits. According to the theory, this lays the foundation for Swindles (Kindleberger & Aliber, 2015, pp. 143-182). Swindles involve legal speculation in assets, grey area activities, unethical activities, and financial misconduct. Such activities may result in the development of economic bubbles since economic growth is not based on fundamental values of assets.

(3) Critical Phase

The third phase in Kindleberger's theory resemble Minsky's phase of revulsion. After a period where the market is characterized by mania, speculation and optimism, a turning point occurs in this phase (Kindleberger & Aliber, 2015, pp. 104-131). At the turning point, optimism will turn to pessimism and expectations of future growth will be reduced considerably. This shift happens due to increased rationality and availability of information. Furthermore, banks tend to tighten their lending practices, and market participants tend to sell their assets. Consequently, an economic downturn ensues. Additional price reductions may increase panic and result in a crash. A crisis may also follow in the event of a market price collapse. During the critical phase, the theory emphasizes the role of the hegemonic power in reducing negative consequences and attempting to prevent a crisis (Grytten & Hunnes, 2016, p. 41).

(4) Domestic Propagation

A crisis and crash in the critical phase may also spread to one or more domestic markets (Kindleberger & Aliber, 2015, pp. 132-142). Since several markets are interconnected, a significant decline in one market may spread to another. A substantial market decline may also result in tightened lending practices among financial institutions, which can reduce credit supply in several markets at the same time. Consequently, a financial crisis has the potential to spread to the real economy (Kaminsky & Reinhart, 2000, pp. 145-168).

(5) International Propagation

Crashes and crises may also spread across borders (Kindleberger & Aliber, 2015, pp. 183-199). Due to increased globalization, there has been an increase in international investment, trade, and financial flows between countries (Kodres & Pritsker, 2002, pp. 769-799). As countries become more interconnected, the likelihood of price changes in one country impacting other nations' increases (Kindleberger & Aliber, 2015, pp. 183-199). Easy access to information may also lead to psychological perceptions and economic expectations spreading from one country to another. Hence, a financial crisis in one country may spread to international markets.

3.2.3 Critics of Kindleberger's Theory

Kindleberger's theory (1996) has been criticized for attributing an excessive emphasis on the role of the hegemonic power (Melberg, 1998). Melberg (1998) criticized Kindleberger's theory for having insufficient focus on other factors that may lead to economic fluctuations. The author argues that Kindleberger's theory places little emphasis on business cycles, which is a factor that may influence the course of the crisis. Hence, it can be argued that Kindleberger's theory may present an oversimplified description of the hegemonic power's role in the development of crises. Furthermore, the theory has also been criticized for placing greater emphasis on historical events than empirical evidence (Melberg, 1998). This implies that Kindleberger's theory is largely based on knowledge of historical events rather than empirical data when explaining the mechanisms of a hegemonic power. Additionally, Melberg (1998) argues that the Kindleberger does not give in-depth explanations as to why some periods do not align with the theory. By not considering these aspects, the validity of the theory may be weakened.

3.3 Seven-Stage Dynamic Crisis Model

Based on existing theory and empirical evidence from historical crises, Grytten and Hunnes (2016) have developed a dynamic model for crisis upbuilding. The model aims to describe how crises emerge by incorporating elements from Minsky's crisis model (1982) and Kindleberger's crisis theory (1996).

The seven-stage model is considered dynamic, which implies that the phases do not have clear

divisions and may overlap (Grytten & Hunnes, 2016, pp. 45-51). Additionally, the model is not completely deterministic. While the model presents seven distinct phases for crisis development, all crises do not necessarily progress through all phases. The seven phases of the model are presented below.

(1) Disturbance

The initial phase describes disturbances, often in the form of an exogenous macroeconomic shock. Disturbances are characterized by a notable change in economic activity and more optimistic market expectations (Grytten & Hunnes, 2016, pp. 46-51). The macroeconomic shock may occur on the supply side as suggested by Minsky (1982), or on the demand side as argued by Kindleberger (1996). Grytten and Hunnes state that supply-side shocks may occur due to new exploitation of vital natural resources or an introduction of new innovations. On the other hand, demand-side shocks may occur due to expansionary monetary and credit policies. Historically, wars have been a contributing factor to increased money supply and credit, which in turn stimulates economic activity.

(2) Overheating

The second phase is characterized by a solid expansion in credit and money supply, increasing the aggregated demand in the economy (Grytten & Hunnes, 2016, pp. 46-51). In this phase, market participants expect high market activity and profitability will continue. Thus, market participants tend to increase their investments in anticipation of future profits. The activity level surpasses normal levels, leading to imbalances in the economy. In turn, the sustained boom results in further speculation, driving up prices and increasing the demand for credit.

(3) Bubble Economy

The third stage is characterized by debt- and speculation-driven growth lacking a real economic basis (Grytten & Hunnes, 2016, pp. 46-51). As a result, the economy transforms into a bubble economy. In this stage, monetary and credit expansion has caused asset prices to rise far above their fundamental values. When market prices exceed fundamental values, it becomes evident that the economy is growing too rapidly, indicating the presence of bubbles. The speculative behavior associated with a bubble economy suggests that capital is injected

into asset markets even after the real economy has reached its saturation point.

(4) Nervousness

In the fourth phase, the market realizes the presence of an overheated economy (Grytten & Hunnes, 2016, pp. 46-51). This phase is characterized by uncertainty, as market participants do not know when financial markets will reverse. As a result, nervousness spreads in the market due to concerns about price decreases. This leads to a drop in demand for assets which are considered overvalued, and prices in asset markets exhibit significant fluctuations. Additionally, banks become more restrictive in lending due to uncertainty. Furthermore, market participants will heavily emphasize financial metrics from established and prominent companies. The reason is that a nervous market tends to react strongly to new information, regardless of whether the information is positive or negative.

(5) Turning Point

The economy has reached its turning point when the market reverses and negative expectations spread among market participants (Grytten & Hunnes, 2016, pp. 46-51). The turning point is characterized by panic, as investors fear substantial losses. As a result of the market turning, many market participants desire to sell their assets simultaneously, leading to an excess of supply. These imbalances cause the market prices to drop significantly, and the investment rates tend to decrease. Furthermore, banks and credit institutions exhibit reduced willingness to extend loans, further complicating investors' opportunity to obtain credit. According to the seven-stage model the phases of nervousness and the turning point may often coincide within the same temporal interval.

(6) Crisis

Once financial markets experience a significant and persistent meltdown, it becomes evident that the economy has entered a financial crisis (Grytten & Hunnes, 2016, pp. 46-51). A financial crisis is often characterized by pessimism, lack of investment capacity, and significant losses in asset markets. During financial crises, one typically observes substantial increases in bankruptcy rates and significant losses suffered by credit institutions. In fear of further losses, banks become substantially more restrictive in lending, causing shortages of capital in financial markets. As a result, asset prices drop significantly, and market participants

face enormous losses. Additionally, businesses encounter difficulties in securing capital, and resort to reducing their workforce, further diminishing household demand. Essentially, the economy enters a negative spiral where pessimism prevails, and investments are withheld.

(7) Spreading

The final phase of the model addresses the spread of financial crises to other markets in the economy (Grytten & Hunnes, 2016, pp. 46-51). Spreading to other markets happens because participants in one market often participate in multiple markets simultaneously. For instance, losses faced by market participants in one specific market may spread to credit institutions, as investments are often financed through loans. Consequently, credit institutions may encounter losses, potentially affecting other businesses. The spreading can happen domestically but also internationally due to extensive international trade in many sectors. Whether and to what extent the crisis spreads depends on the level of integration between markets and the course of the crisis.

4. Data

This chapter will provide a detailed explanation of the quantitative data material intended for use in our analysis. Firstly, we will describe the tools employed for processing the data material. Secondly, we will address the concepts of validity and reliability. This will provide guidelines for assessing the credibility of the findings in our analysis. Subsequently, we will present and evaluate a selection of financial and macroeconomic variables, which constitute the foundation of our data material. Collectively, we consider these variables to provide a comprehensive assessment of the development of financial crises. Table 4.1 summarizes the data sources employed in our analysis.

Variable	Source	Period
Total Credit (C3)	Eitrheim, Gerdrup, & Klovland (2004a). Statistics Norway (2023d)	1870-2019
Money Supply (M2)	Eitrheim & Klovland (2022)	1870-2019
Private Bank Loans	Eitrheim & Klovland (2022)	1870-2019
Commercial Bank Loans	Eitrheim & Klovland (2022)	1870-2003
GDP per Capita	Grytten (2022d)	1870-2019
Manufacturing Value Added (VA)	Grytten (2022d)	1870-2019 WWII missing
Bankruptcies	Eitrheim, Gerdrup, & Klovland (2004a). Statistics Norway (1872-1889)	1870-2019
Unemployment	Grytten (1994). Statistics Norway (1978). Statistics Norway (2023b)	1900-2019
House Price Index (HPI)	Eitrheim & Erlandsen (2004). Eitrheim (2022). Statistics Norway (2023a)	1870-2019
Stock Index	Eitrheim, Gerdrup & Klovland (2004b). Bloomberg (2023)	1915-2019
Policy Rate	Eitrheim & Klovland (2007)	1870-2019
Consumer Price Index (CPI)	Grytten (2020)	1870-2019

Table 4.1 – An overview of the data sources

4.1 Data Processing

4.1.1 Splicing

When analyzing economic variables over extended periods, it may be necessary to construct longer time series by combining multiple datasets. In the construction of continuous time series, there is a risk of heterogeneity due to potential variations in the estimation methods employed across different time series. Splicing enables us to address the disparity that arises at the point where the distinct series are joined.

The method of splicing is based on the idea of adjusting older series to align with novel series at their starting point (de la Fuente, 2014). However, in our study, some time series are overlapping, as shown in the figure below:

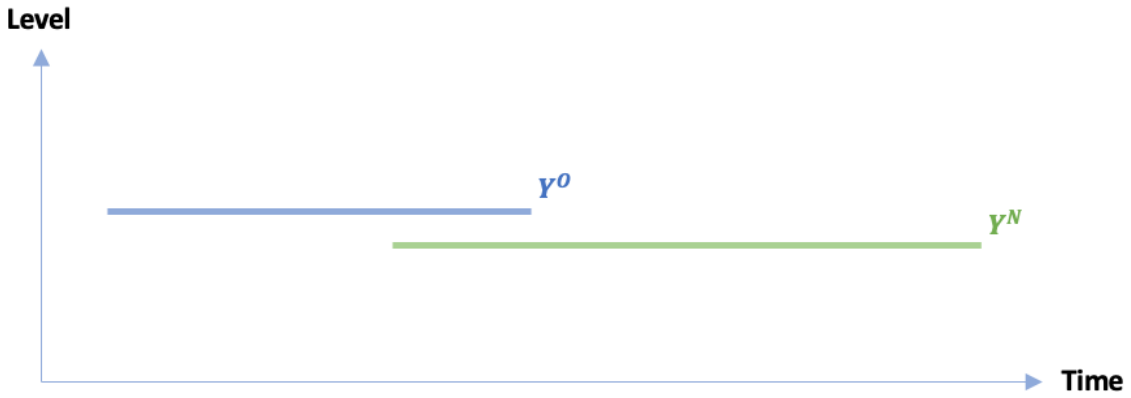

Figure 4.1 - Overlapping time series with a shift in levels.

Figure 4.1 illustrates the overlapping time series, where the blue line represents the older series Y^O and the green line represents the novel series Y^N. When figures of novel series and older series overlap, one should aim to maximize the extension of the novel series as far back as possible.

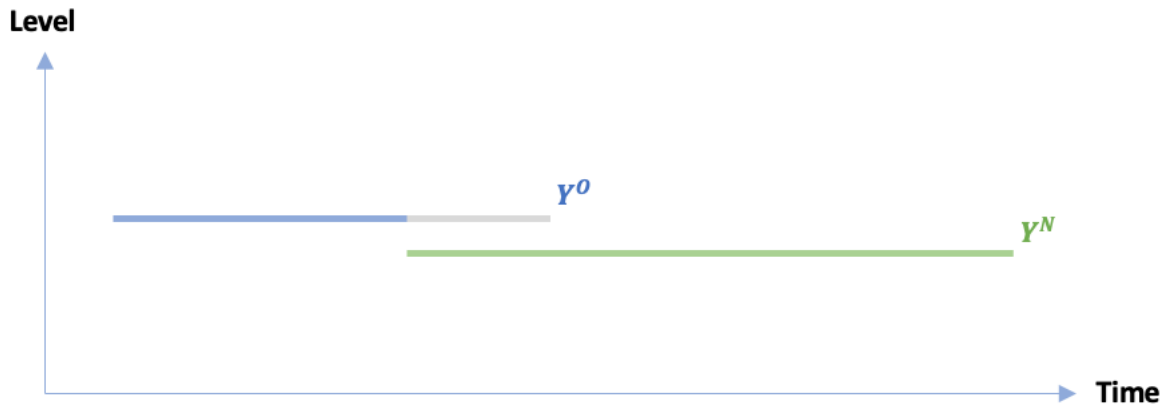

Figure 4.2 - Overlapping time series maximizing the extension of the novel series.

From Figure 4.2, it is evident that the novel series is employed to the furthest extent possible. Furthermore, there are disparities in levels between the older and the novel series, necessitating

the need for adjustment. The adjustment involves aligning the older series to the novel series, thereby eliminating the level differences.

To adjust the older series, it is necessary to compute a splicing factor (SF). The splicing factor can be obtained by taking the value of the variable of interest from the novel series (N) at time t and dividing it by the value of the variable of interest from the older series (O) at time t:

$$SF_t = \frac{Y_t^N}{Y_t^O} \tag{2}$$

Equation 2 shows the splicing factor at time t. We compute the splicing factor for each year (t) with overlapping values.

Furthermore, it is essential to compute an overall splicing factor by calculating the average of the computed splicing factors for the overlapping years:

$$\overline{SF} = \frac{\sum_{i=1}^{n} SF_i}{n} \tag{3}$$

Thereafter, the overall splicing factor $\overline{SF}$ is used to adjust each figure in the older series to align with the novel series, as shown in Equation 4:

$$Y_t^{spliced} = Y_t^O * \overline{SF} \tag{4}$$

The splicing process is finalized when all figures in the older series are multiplied with the overall splicing factor, providing us with a continuous time series.

Table 4.2 - A spliced time series with no level difference.

4.1.2 Interpolation

In this study, we use interpolation when calculating the missing values for the variable *Total Credit* (C3). Interpolation is the process of calculating the values of a function between two known data points (Holden, 2023). There are several methods of interpolation, depending on the growth of the curve within the interval. If the curve follows a linear growth pattern, linear interpolation is the appropriate method to use. However, if the growth within the interval is considered exponential, one would need to calculate an exponential growth factor when interpolating the time series. For the variable C3, we consider exponential growth as the appropriate growth curve. Thus, we have chosen to interpolate the time series with an exponential growth factor. The computation of the missing values of C3 can be expressed by Equations 5 and 6:

$$Y^{t+n} = Y^t + e^{r*n} \tag{5}$$

$$r = \frac{1}{T} * (\ln(Y(T) - \ln\big(Y(0)\big) \tag{6}$$

The method involves calculating the missing data point Y^{t+n}. The first term of Equation 5 (Y^t) represents the known value of the variable at time t. Furthermore, r denotes the growth rate and n the number of years after time t. The growth rate is based on Equation 5, where T represents the number of years in the interval between the two known data points. Finally, the last term of Equation 3 takes the natural logarithm (ln) of the first known value in the interval

$(Y(T))$, and subtracts the natural logarithm of the second known value in the interval. We compute the growth rate for all intervals in the time series with two known data points. This enables us to find the missing values using interpolation.

4.1.3 Deflation

Deflation is a method for comparing real values over time by dividing a series of figures representing evolution over time by a price index (Thomassen, 2020). In this thesis, we have employed a CPI deflator to convert nominal values within the house price index into real values. When using CPI as a deflator, the method involves converting nominal figures into real figures by adjusting for changes in the price index over time.

The conversion from nominal to real values can be expressed mathematically as shown in Equation 7:

$$HPI_t^{real} = \frac{HPI_t^{nominal}}{\left(\frac{CPI_t}{100}\right)} \quad (7)$$

4.2 Validity and Reliability

4.2.1 Validity

Validity refers to the extent to which data accurately and effectively represents the phenomenon or concept it is meant to measure (Johannessen, Tufte, & Christoffersen, 2016, pp. 43-44). It should be seen as a quality standard rather than an absolute concept considering whether data is valid or not. Data can exhibit a high level of reliability while demonstrating a low level of validity. For instance, if the data used in a study measures something other than what is relevant to the research question, the data is not considered valid.

4.2.2 Reliability

Reliability refers to the extent to which a study reflects reality. This implies the degree of accuracy and trustworthiness of the data (Johannessen, Tufte, & Christoffersen, 2016, pp. 27-28). Factors influencing the reliability of data include the type of data used and how the data is collected and processed. Data with a high level of reliability should provide an accurate representation of reality, remain consistent over time, and be consistently employed in comparable studies.

4.3 Data Collection

4.3.1 Total Credit (C3)

The credit indicator C3 is an index that refers to the public's total debt. Specifically, "the gross debt for the non-financial private sector and municipalities from domestic and foreign sources in NOK and foreign currency" (Statistics Norway, 2017b). The variable total credit is included in the analysis as it can provide valuable insights into the evolution of the private and government debt ratio, as well as the economic activity levels. Additionally, crisis theory emphasizes that the injection of credit into the economy may have a negative impact on the financial stability, if not matched by increased real economic activity (Grytten, 2021, p. 180).

Our selection of C3 over C2 is due to the significantly longer time span covered by C3 in the data set, rendering it a more reliable choice. Additionally, it includes both domestic and foreign debt, providing a more comprehensive understanding of credit conditions within the economy. We have chosen to include statistics about C3 from the historical statistical database of Norges Bank (Eitrheim, Gerdrup, & Klovland, 2004a). Norges Bank has based the C3 index on a comprehensive data set that has regularly been updated with more recent numbers. Thus, we consider this data to have relatively high reliability. The data set of Norges Bank only includes statistics in the period 1820-2016. Thereby, we have spliced the total credit from Norges Bank with total credit from Statistics Norway, to include statistics for the years 2017-2019 (Statistics Norway, 2023d).

A substantial part of the data set from Norges Bank consists of annual end-of-year statistics. However, in the period 1820-1899 the data only includes statistics for every tenth year. To our knowledge, no data sources are providing yearly statistics for the entire period of the analysis. Therefore, we have used interpolation with an exponential growth factor on ten-year data, to find the annual values for C3 before 1899. When using this type of interpolation, we assume that the C3 values between 1870-1889 develop with an exponential growth factor within each interval.

It seems reasonable that financial data exhibits non-linear growth patterns as total credit may be affected by various factors, such as interest rates, population growth, and economic policies, which could lead to exponential growth. Note that the use of exponential interpolation may reduce the reliability of the constructed time series, as it assumes constant growth within each interval. Thus, there may be uncertainty surrounding these estimates in the first subperiod. However, we have considered it a reasonable approach in this context, as we do not observe significant changes in the trend over the years 1820-1899.

4.3.2 Money Supply (M2)

The broad monetary concept, M2, is an index that includes the money-holding sector's holdings of Norwegian banknotes and coins, in addition to deposits that immediately can be converted into banknotes and coins (Lerbak, 2013, p. 3). Furthermore, M2 includes the remaining "uncommitted" bank deposits in Norwegian and foreign currency, as well as bank certificates and shares in money market funds. The variable *money supply* is included in the analysis, as it provides insight into the availability of money within the Norwegian economy. Moreover, crisis theory emphasizes that the injection of money into the economy may negatively impact financial stability, if not matched by increased real economic activity (Grytten, 2021, p. 180). Therefore, M2 is considered a valid variable in regard to our research question.

We have chosen to include statistics about M2 from Norges Bank's Occasional Papers No. 57 (Eitrheim & Klovland, 2022). The data includes annual end-of-year statistics in the period 1813-2021. Norges Bank has based the M2 index on a comprehensive data set and a trustworthy source. Thus, we consider this data to have relatively high reliability. The selection

of M2 over M1 and M3 is due to a significantly longer time span covered by M2, rendering M2 a more reliable choice. Additionally, M2 includes a broader range of assets compared to M1, providing a more comprehensive view of money supply within the economy.

4.3.3 Private Bank Loans

The variable *private bank loans* include two types of private bank loans: commercial bank loans and savings bank loans. When commercial banks and savings banks were introduced during the 19th century, they exhibited different organizational structures, lending practices, and regulatory arrangements (Eitrheim, Gerdrup, & Klovland, 2004a, p. 378). Commercial banks emerged as limited liability companies and were expected to operate in a manner similar to other non-financial firms, with minimal government interference. Therefore, placing deposits in commercial banks brought a certain level of risk for the depositors. In contrast, savings banks were structured as mutually held institutions and were designed to provide a dependable and secure avenue for individuals to store their funds. Hence, savings banks became subject to significantly more regulation and supervision compared to commercial banks. However, the distinction between the two types of private banks has gradually diminished over time.

Based on crisis theory, we know that unstable financial markets are frequently characterized by heightened lending activities among financial institutions (Grytten & Hunnes, 2014, p. 22). Thereby, data on private bank loans may provide valuable insights into the degree of financial stability during different economic crises. The reason we have chosen to include private bank loans rather than all bank loans is that private banks engage in procyclical lending, while state banks engage in countercyclical lending. Thus, private bank loans may provide better insight into the economic situation at various periods compared to state-owned bank loans.

We have chosen to include statistics about private bank loans from Norges Bank’s Occasional Papers No. 57 (Eitrheim & Klovland, 2022). The data includes annual end-of-year values in the period 1880-2019. The statistical data is regarded as highly reliable due to Norges Bank's established reputation and credibility in the field of statistical reporting.

4.3.4 Commercial Bank Loans

In addition to including a variable for private bank loans, we have chosen to include a variable that exclusively covers commercial bank loans. The reason for separating a distinct variable for commercial bank loans is that commercial banks had different organizational structures and lending practices compared to savings banks during a significant part of our analyzing period (Eitrheim, Gerdrup, & Klovland, 2004a, p. 378).

Another motivation for including a variable on commercial bank loans is that commercial banks constituted a significant share of total credit in the economy during our analyzing period. For instance, commercial banks accounted for 60 percent of the total credit in 1920, whereas savings banks accounted for 26 percent in the same period (Eitrheim, Gerdrup, & Klovland, 2004a, p. 381). Overall, when including a separate variable for commercial banks, we may better comprehend how lending from commercial banks has affected the credit market and, consequently, financial stability.

The distinction between commercial banks and savings banks has gradually blurred over time. Therefore, there is no separate data on commercial bank loans after 2003. Hence, we have included data on commercial bank loans in the period 1870-2003 in our analysis. The data is obtained from Norges Bank's Occasional Papers No. 57 (Eitrheim & Klovland, 2022). We consider the data to be of high reliability, as the historical statistical database of Norges Bank is reputable. Additionally, the data has been employed in comparable studies. One may argue that the reliability is somewhat compromised since the data does not cover our entire analyzing period. Nevertheless, we consider this issue minimal, as the distinction between the two types of banks has been blurred over time.

4.3.5 GDP per Capita

GDP measures the total value of goods and services produced in a country (Statistics Norway, 2017a). Thus, the measure provides insights into the condition and progress of a country's economy. In our analysis, we have included data for GDP per capita as it provides valuable information about economic development, activity levels and income distribution within the population. The data material is prepared and provided by Professor Ola H. Grytten (2022d) and includes annual values for GDP per capita in fixed 2015-prices for the period 1816-2021.

The reason we chose to include constant prices for GDP is because they are particularly well-suited for analyzing long-term trends. Specifically, fixed price adjustments make it easier to determine whether the economy is growing in volume or if the growth is mainly driven by price increases. A potential weakness associated with this approach may be that fixed price adjustment requires a specific year to be selected as the base year. This may introduce biases in the analysis if the choice of the base year is not representative of the economy's long-term development. However, since the data set is based on a trustworthy source, it seems reasonable to assume that this aspect has been considered when preparing the fixed data set.

In this analysis, we have chosen to include GDP for the entire Norwegian economy. Conversely, one can argue that using Mainland GDP in recent years may be a more suitable approach, as it can eliminate structural factors related to the expansion of petroleum production (Grytten, 2009b). However, the petroleum sector has a substantial impact on Norwegian economic cycles. Hence, we consider total GDP to be the preferred option, given its inclusion of petroleum production. Additionally, we do not have Mainland GDP data for periods preceding the last few decades. Therefore, to ensure consistency in our time series, we have chosen to use total GDP for our analysis.

4.3.6 Manufacturing Value Added (VA)

Manufacturing value added is an estimate that exhibits the net output from all activity related to resident manufacturing in an economy (UNIDO, 2023). Thereby, manufacturing VA can provide insight into the production activity in the manufacturing industries. The variable is included in the analysis as it has historically been one of Norway’s most significant export-oriented industrial sectors, especially in the period 1900-1950 (Regjeringen, 2001). Furthermore, during economic crises, manufacturing industries often face fluctuations due to decreased demand and supply chain disruptions, making it a valuable indicator to consider when analyzing the financial stability of the economy during a crisis.

Manufacturing VA is measured as the difference between the total value of the output produced by the manufacturing sector and the value of intermediate inputs used in the manufacturing process (OECD, 2023b). The data material is prepared and provided by

Professor Ola H. Grytten (2022d) and includes annual values in fixed 2015-prices. The time series spans from 1816-2021, apart from missing data in the period 1940-1945 due to uncertain measurements during World War II. Since our analysis excludes the period 1940-1945, we consider the absence of data to have a negligible impact on our overall analysis. Additionally, the data has been prepared and employed by reputable researchers, which strengthens the reliability of the data.

4.3.7 Bankruptcies

The variable *bankruptcies* includes the total number of "all types of firms/enterprises and individuals who have unpaid accounts and are by definition insolvent" (Statistics Norway, 2023c). The reason we have chosen to include the number of bankruptcies in our analysis is that during periods of financial instability and economic crisis, the likelihood of businesses going bankrupt tends to increase (Gjedrem, 1999). Thereby, data regarding the number of bankruptcies may provide valuable insights into the state of the economy at different points in time.

We have chosen to include statistics about the number of bankruptcies from Norges Bank's Occasional Papers No. 35 (Eitrheim, Gerdrup, & Klovland, 2004a). This data set includes annual end-of-year statistics in the period 1887-2015. To include the number of bankruptcies between 1870-1886 and 2015-2019 we have spliced the data set from Norges Bank with statistics from Statistics Norway. This includes statistics from the scanned books titled "Skiftevæsenet i Norge" in Statistics Norway's historical statistics database from 1872-1889[1]. For this data set, we use end-of-year statistics in the period 1870-1886. Additionally, we have used statistics from the StatBank of Statistics Norway for the period 2015-2019 (Statistics Norway, 2023f). Overall, we consider the data material to be reliable, as all our data sets employ the same definition for bankruptcies. Additionally, the data has been obtained from sources with high credibility within the field of statistical reporting.

[1] The data material on bankruptcies for the period 1870-1880 is obtained from Statistics Norway (1872; 1873; 1874; 1876; 1877; 1878; 1879; 1880; 1883; 1884; 1885; 1886; 1887; 1888; 1889).

4.3.8 Unemployment

The unemployment rate refers to the proportion of unemployed individuals within the labor force (Statistics Norway, 2023b). Based on existing crisis theory, unemployment is expected to follow a pattern where it decreases during economic booms and increases during downturns (Grytten & Hunnes, 2014, p. 22). Thus, we consider unemployment a suitable indicator for assessing changes in economic activity, particularly in relation to our specific research question.

An inherent challenge within our dataset is the absence of continuous unemployment statistics throughout the analysis period, as the data only extends back to the early 1900s. Hence, we have constructed a continuous time series by splicing data from three distinct time series. For the period 1900-1947, we have been provided with data prepared by Professor Ola H. Grytten (Grytten, 1994). From 1948-1971, we calculated the unemployment rate based on historical statistics on unemployed and employed individuals published by Statistics Norway (1978). Finally, the data for the last period spanning from 1972-2015, has been obtained from Statistics Norway's "Arbeidskraftsundersøkelse" (Statistics Norway, 2023b).

Since we have not been able to uncover statistics on unemployment before 1900, we are missing data for unemployment in the first analysis period. Consequently, the validity of the data on unemployment is somewhat compromised. One should also note that various sources may have employed different collection methods and calculation bases, which may weaken the reliability of the data. However, we consider the reliability of the data generally strong, as the sources used are considered reputable.

4.3.9 House Price Index (HPI)

The house price index refers to the value evolution of all previously owned houses transacted on the open market and is based on continuously updated price data (Statistics Norway, 2023e). The inclusion of HPI is motivated by its potential to provide insights into economic stability, and its relevance when examining the evolution of asset bubbles and financial crises. To find an indicator for HPI in the economy, we have chosen to include statistics from the historical statistical database of Norges Bank (Norges Bank, 2023b). The data set includes annual house price indices in the period 1819-2022. Initially, the index is based on nominal

values. However, to demonstrate the housing prices relative to other prices in the economy, we have chosen to deflate the index using a historical consumer price index provided by Grytten (2020).

The statistics consists of a time series that is calculated as a weighted average of registered and sold houses in four large Norwegian cities, Oslo, Bergen, Kristiansand and Trondheim. In the period 1819-1984, the house price index is based on the weighted repeated sales method (Eitrheim & Erlandsen, 2004). This method involves constructing an index based on repeated transactions of individual houses in the sample. The advantage of using a repeated sales method is that it only requires data about the sale price of the houses. However, a disadvantage is that it does not utilize all relevant information, as it only considers houses in the sample which are associated with two or more sales prices. In addition, this method does not consider changes in quality, which implies that it assumes constant quality of houses over time. This may reduce the data reliability, if house owners do not upgrade and maintain the quality of their house between every sale. However, if we assume that the house owners generally maintain the quality of their houses over time, changes in quality may not significantly affect the index (Eitrheim & Erlandsen, 2004, p. 369).

During 1819-1984 the HPI exhibits variations in the data sample. The reason is that it incorporates statistics from one to three cities, as opposed to the current index which is computed based on four cities (Eitrheim & Erlandsen, 2004). The reason is that data material for all four cities does not exist before 1897. Since the total index is based on fewer observations in the first period, the index appears to be more volatile during this period (Eitrheim & Erlandsen, 2004, p. 363).

In the years 1985-2005 the initial time series is spliced with an index that incorporates a weighted average of data from Norges Eiendomsmeglerforbund (NEF), Eiendomsmeglerforetakenes forening (EFF), Finn.no and ECON Poÿry's price statistics for real estate in Norway (Eitrheim, 2022). During this period, the house price index is based on a hedonic repeated sales method. This method is constructed based on detailed characteristics about houses in the sample, in addition to repeating transactions. In contrast to the repeated sales model, the hedonic model relies on a more extensive data set which includes additional information about house characteristics and sales prices (Eitrheim & Erlandsen, 2004). From 2005-2022 the time series is spliced with an index based on statistics from Statistics Norway

(Statistics Norway, 2023a). To construct the index, Statistics Norway also uses a hedonic repeated sales method. However, this data is reported as an annual average of quarterly data, rather than annual data.

Overall, the inconsistency concerning the number of cities included in the index in the previous years, in addition to the assumption of constant quality may impact the reliability of the dataset. However, we observe that the calculation of the index has been relatively consistent in the last century. The index is also widely used for research, annually updated, and obtained by sources with high credibility within the field of statistical reporting. Thus, we consider the data to provide a reliable index in this case.

4.3.10 Stock Index

Grytten and Hunnes (2014) argue that stock market crashes are a fundamental aspect of the modern understanding of financial crises. We have included the variable *stock index* in our analysis as it provides insight into how the stock market reacts to economic crises. The data material on stock indices is compiled from two different sources. From 1915-2001, we have obtained monthly data on stock indices from the historical monetary statistics of Norges Bank (Eitrheim, Gerdrup, & Klovland, 2004b). The data for the period 2001-2019, includes monthly data on the OSEBX-index extracted from Bloomberg. We consider the data material reliable as it has been extracted from two reputable sources, Norges Bank and Bloomberg. However, one should note that there is no publicly available data on stock indices before 1915. This implies that we are missing data for the first analyzing period, potentially weakening the reliability of the data material and trend estimations.

4.3.11 The Policy Rate

The policy rate serves as Norges Bank's primary tool for monetary policy, including stabilizing inflation and managing the economic developments in the Norwegian economy (Norges Bank, 2023c). Since the policy rate influences the bank's interest rates on customer deposits and loans, it indirectly affects the cost of credit. Furthermore, the adjustment of the policy rate is a crucial tool for the central bank to maintain financial stability. Thus, the policy rate may provide valuable insights into the monetary policy conducted by the Norwegian

central bank.

The data material for the policy rate is obtained from the Norges Bank´s Occasional Papers No. 38 (Eitrheim & Klovland, 2007). This data set includes annual statistics about the policy rate in the period 1818-1985, compiled using the end-of-month within each year**.** To find the annual statistics between 1986-2019, we have spliced the data set from the central bank with an additional data set from the same institution. The additional data set includes statistics for the policy rate in the period 1986-2023 and is continuously updated by Norges Bank (2023a). This data set includes all changes in the policy rate within a year. However, to be able to splice the statistics from both data sets, we compiled annual data using the average of end-of-month-data within each year**.**

Overall, we consider the data material reliable as it is publicly available and provided by a reputable source. Additionally, the variable is considered valid as it provides valuable insights into the monetary policy conducted by Norges Bank. Therefore, we consider the policy rate to be a critical variable to consider in addressing the given research question.

4.3.12 Consumer Price Index (CPI)

During economic crises, inflation may exhibit large fluctuations. The consumer price index (CPI) is a commonly applied measure of inflation, and it is defined as “the change in the prices of a basket of goods and services that are typically purchased by specific groups of households” (OECD, 2023a). Data for CPI is included in this thesis, as we have employed a CPI deflator to convert nominal values of the HPI into real values. When using CPI as a deflator, the method involves converting nominal figures into real figures by adjusting for changes in the CPI over time. The time series for the CPI is prepared by Ola H. Grytten and spans from 1492-2022 (Grytten, 2020). We consider the data material on CPI reliable as it has been employed in comparable studies and extracted from a reputable source.

5. Historical Review of Crises

This chapter will provide a historical review of seven economic crises based on existing literature. The review aims to explain how various crises have evolved in Norway. Since our discussion heavily relies on previous crises as reference points, it is essential to present an overview of each crisis to address the specific research question. Moreover, Norway's position as a small, open economy increases its vulnerability to global disruptions. Hence, we have also incorporated the key aspects of the crises within an international context.

5.1 The Kristiania Crisis (1899-1905)

During the 1890s, the money and credit markets underwent a significant expansion driven by several factors (Grytten, 2011, p. 11). The introduction of the differential system in 1893 made the money supply independent of gold reserves, thereby facilitating an expansionary monetary policy with low interest rates (Gjedrem, 2022; Grytten, 2011, p. 12). Simultaneously, the Norwegian government issued bonds abroad to raise capital (Gerdrup, 2003, p. 9). Collectively, these factors contributed to an increase in the overall money supply (Grytten, 2011, p. 12). Moreover, the number of banks grew rapidly in the 1890s, increasing the competitive pressure among credit institutions and further amplifying the considerable monetary and credit expansion (Grytten & Hunnes, 2016, p. 168).

Furthermore, increased industrialization and urbanization contributed to a substantial growth in population within major Norwegian cities (Grytten, 2011, p. 12). As a result, the demand for housing in the largest cities increased considerably, contributing to a significant rise in housing prices. Driven by the expansion of credit and money supply, speculation led to a further increase in housing prices. Following an international interest rate increase, Norges Bank decided to raise the interest rate in 1898 (Grytten & Hunnes, 2016, p. 170). Hence, holding debt became more expensive, and banks soon followed a more restrictive lending policy. However, in February 1899, Norges Bank decreased the policy rate by half a percentage point, only to raise it again in March 1899 (Søbye, 1999, p. 20; Gerdrup, 2003, p. 10). This resulted in a spread of uncertainty in asset markets, prompting investors to sell their assets.

The crisis fully manifested in June 1899, when rumors began to circulate that a major high-levered business named Chr. Christophersen was facing significant financial difficulties (Gerdrup, 2003, p. 10; Grytten & Hunnes, 2016, p. 170). When the company declared bankruptcy, it brought down two newly established banks in Kristiania, contributing to an acceleration of panic within asset markets (Grytten & Hunnes, 2016, pp. 170-171; Søbye, 1999, p. 17). Property prices fell dramatically, and the real estate markets in the biggest Norwegian cities crashed (Gerdrup, 2003, p. 10). Consequently, several companies within the construction sector went bankrupt, and many projects were halted (Grytten & Hunnes, 2016, p. 171). Rumors regarding the poor health of banks in Kristiania also spread across Norwegian borders, causing short-term loans from abroad to be cut off (Gerdrup, 2003, p. 10). Eventually, this resulted in a significant increase in the number of bankruptcies among banks (Grytten & Hunnes, 2016, pp. 171-172). Moreover, the unemployment rate rose significantly between 1899 and 1906 because of reduced economic activity.

5.2 The Post-War Depression (1920-1923)

The Post-War Depression was largely influenced by World War I, which was characterized by a substantial increase in money supply and lending (Grytten, 2011, pp. 13-14; Grytten & Hunnes, 2016, pp. 175-179). A combination of the suspension of the gold standard, production constraints, and low interest rates during the war, enabled a substantial monetary expansion (Grytten & Hodne, 2002, pp. 77-79). The result was a huge money surplus and inflationary pressures within the Norwegian economy. To mitigate inflation, price regulating measures were introduced, resulting in artificially low prices (Grytten & Hunnes, 2016, pp. 179-180). Coupled with limited investment opportunities during the war, a substantial amount of capital was directed into the asset markets. This facilitated significant increases in asset prices, which occurred despite corresponding increases in the real economy. Consequently, the Norwegian economy experienced an expansion of asset bubbles.

When the war ended, the expansionary monetary policy continued, contributing to a strong economic upturn in Norway (Grytten & Hunnes, 2016, pp. 178-180). Simultaneously, numerous households chose to withdraw from the stock market to allocate more capital for consumption. In turn, this resulted in a significant decline in the main index on the Oslo Stock Exchange, constituting the greatest stock market crash in Norwegian economic history (Grytten & Hunnes, 2016, p. 180).

Eventually, the boom turned into a recession, and Norges Bank introduced a contractionary monetary policy to stabilize the economy and regain trust in international markets (Grytten & Hodne, 2002, p. 98). However, introducing a contractionary monetary policy posed challenges, as the procyclical approach involved raising interest rates during an economic downturn (Grytten & Hunnes, 2016, pp. 180-181). Consequently, an extensive Post-War Depression ensued. Increased interest rates in combination with strong deflation, resulted in significantly high real interest rates (Grytten & Hodne, 2002, p. 102). This contributed to a negative shock to the Norwegian economy with highly profitable bank deposits and expensive loan-financed investments. The consequence was a tenfold increase in the number of bankruptcies in Norway in the period 1919-1921. Moreover, this impacted banks that did not receive repayment of their loans, resulting in bankruptcies among numerous banks (Gerdrup, 2003, pp. 19-21).

In total, the depression made a profound impact on the Norwegian economy, largely attributed to a substantial expansion in commercial bank lending, nearly unrestrained speculation in securities, and inadequate banking regulations (Grytten & Hunnes, 2016, p. 183). Additionally, the downturn in global trade adversely affected the Norwegian export sector. Thus, the Post-War Depression is considered the greatest financial crisis in Norway, involving a stock market crash, increased unemployment, and a drastic decline in GDP (Grytten, 2011, p. 14).

5.3 The Parity Crisis (1924-1927)

After the Post-War Depression, numerous countries managed to stabilize their economies (Grytten & Hunnes, 2016, p. 189). However, Norway remained unable to do so as it continued to cope with lingering repercussions from the Post-War Depression. This was primarily due to the Norwegian authorities maintaining a tight contractionary monetary policy, aiming to restore the currency to its initial par gold value. Norway chose to return to the gold standard, despite potential negative effects on domestic demand and competitiveness. However, it was particularly challenging, as the Norwegian currency had to rise to twice its market value to reach the par gold value (Grytten & Hunnes, 2016, p. 190).

There are several reasons for the objective to return to the gold standard (Grytten & Hunnes,

2016, p. 192). The first reason was that the gold standard had previously had a stabilizing effect on the Norwegian economy and contributed to economic growth in foreign trade (Grytten & Hodne, 2002, p. 103). Secondly, returning to the gold standard played a vital role in mitigating issues associated with trade deficits, budget deficits, inflation, and a weakened currency. The third reason was Norway's post-war indebtedness to the United States, requiring adherence to USD to prevent appreciation (Grytten & Hodne, 2002, pp. 103-104). The fourth reason was that the central banks adhered to a regulatory framework in which the parity requirement was politically determined.

Nevertheless, the parity policy resulted in more severe consequences than Norwegian authorities had anticipated (Grytten, 2021, p. 185; Grytten & Hunnes, 2016, p. 192). The tightening of monetary and credit policies contributed to a decrease in money and credit volume, which in turn resulted in reduced domestic demand for goods. Additionally, numerous companies had acquired substantial loans at negative real interest rates during World War I. Thus, the high real interest rates and reduced demand posed challenges for these firms in repaying their loans (Grytten & Hunnes, 2016, p. 196).

Consequently, numerous companies were unable to meet their debt obligations, resulting in bankruptcies among 130 Norwegian banks (Grytten & Hunnes, 2016, pp. 196-197). Thus, Norway encountered the most significant banking crisis in its history. Furthermore, the exchange rate rose due to the parity policy, which resulted in reduced competitiveness for Norway in international markets (Grytten & Hodne, 2002, p. 105). In turn, this led to a decline in exports and an additional decrease in Norwegian economic activity. Overall, the crisis escalated due to the procyclical monetary policy exacerbating the economic downturn (Grytten & Hodne, 2002, pp. 111-112). The outcome was an economy characterized by stagnation in production and high unemployment (Grytten & Hunnes, 2016, p. 200).

5.4 The Great Depression (1930-1933)

The Great Depression was also impacted by the consequences of World War I (Grytten & Hunnes, 2016, pp. 204-205). Following the war, the United States experienced an excess of liquidity, allowing them to provide favorable lending terms domestically and internationally. Since Germany faced post-war liquidity issues due to war reparations, accessing credit from American banks contributed to management of their short-term issues (Crafts & Fearon, 2010,

pp. 289-291). In October 1929, the New York Stock Exchange crash initiated the most severe global depression in modern history (Grytten, 2011, pp. 14-15). The crash resulted in a liquidity crisis among American banks, affecting loans to Germany and causing a shortage in European liquidity (Grytten & Hunnes, 2016, pp. 207-208).

Conversely, the Norwegian economy did not experience a bubble or a crash in the stock market during this period (Grytten & Hunnes, 2016, p. 207). The crisis was also less severe than for most countries, which can be explained by the early abandonment of the gold standard (Grytten & Hunnes, 2014, p. 14). However, the Norwegian export sector was impacted by the major global crisis, which resulted in a substantial decline in export revenues, GDP, and manufacturing output (Grytten, 2011, p. 15; Grytten & Hunnes, 2016, p. 2011). Additionally, the unemployment rate increased substantially in the 1930s compared to the 1920s, particularly in the industrial and construction sectors (Grytten, 1994, pp. 161-181).

In 1932, the downturn reached its turning point, and the economy experienced a rapid increase in demand for goods and services from abroad (Grytten & Hunnes, 2016, pp. 213-214). This was largely motivated by the early abandonment of the gold standard among Norwegian trading partners. However, unemployment rates did not align with the rapid rise experienced during the recovery of the crisis. Grytten (2009c) argues that the persistently high unemployment rates in the latter half of the 1930s stemmed from a combination of two main factors. Firstly, the United States introduced limitations on immigration in 1924, resulting in excess workers in the Nordic labor markets (Grytten, 2009c, pp. 369-403). Secondly, birth rates in the Nordic region experienced a substantial decline during the 1930s. Consequently, Norway experienced an upsurge in labor supply compared to the number of consumers, contributing to the ongoing issue of unemployment.

5.5 The Stagflation of the 1970s

The global economy experienced an almost uninterrupted economic expansion in the years 1950-1970 (Grytten & Hodne, 2002, p. 257; Grytten & Hunnes, 2016, p. 217). The expansion was characterized by stable business cycles, extensive government interventions, and Keynesian economic policies. However, the 1970s turned out to be an era of stagflation, marked by high unemployment rates and persistent inflation.

When the United States suspended the Bretton-Woods system in 1971, the USD was devalued, which resulted in increased uncertainty in international markets (Grytten & Hunnes, 2016, p. 223). Moreover, Western countries faced a decline in competitiveness during the mid-1970s, due to technological advantages and low labor costs in Asian countries (Gjedrem, 2002; Grytten & Hunnes, 2016, p. 224). In comparison, Western wages surged faster than productivity, which led to an increased inflationary pressure in the economy (Grytten & Hodne, 2002, p. 258).

Furthermore, the global economy experienced two major oil price shocks in 1973 and 1979 (Grytten & Hodne, 2002, p. 257; Grytten & Hunnes, 2016, p. 219). The two shocks, known as OPEC I and OPEC II, resulted in increased oil prices. The high oil prices caused production costs to rise significantly, contributing to inflationary pressure in the global economy. Additionally, high production costs made businesses reduce their production, resulting in reduced demand for labor. Hence, several countries experienced an era of high unemployment rates and persistent inflation.

Conversely, the unemployment rates in Norway were considerably lower than in other countries during the 1970s. This was attributed to a significant increase in expected oil revenues, resulting in a positive wealth effect on the Norwegian economy (Steigum, 2004, p. 28). However, Norway experienced high inflation rates during this period (Grytten & Hunnes, 2016, p. 222). To minimize the challenges related to high inflation, the Norwegian government introduced several measures. By reducing income tax and expanding price subsidies, the government aimed at mitigating households' expenses (Sejersted, 2018). Additionally, the government initiated expensive rescue operations for businesses and tax benefits for foreign investors as an incentive to engage in public development projects (Lange, 2020; Sejersted, 2018). However, after 1975, the Norwegian economy was affected by the adverse developments in the global economy, when prices of key export commodities declined (Grytten & Hunnes, 2016, p. 223).

5.6 The Banking Crisis (1988-1993)

Due to the presence of the Stagflation in the 1970s, the planned economy had lost its support (Grytten, 2011, p. 16; Grytten & Hunnes, 2016, pp. 227-232). This provided a foundation for a right-wing wave in Western countries during the 1980s. When Høyre won the Norwegian

election in 1981, they introduced a policy that involved a liberalization of credit markets (Grytten & Hodne, 2002, pp. 271-273). Simultaneously, the political objective was to pursue a low-interest rate policy, to incentivize investment activity. The combination of credit liberalization and low real interest rates contributed to a significant credit expansion during the 1980s. Furthermore, the strong credit expansion was followed by high oil and gas prices, and hence a substantial capital inflow to the Norwegian economy. The result was an overheating of the economy, in addition to a buildup of asset bubbles, financed by a credit bubble (Grytten & Hunnes, 2016, pp. 236-237).

In 1986, the price of oil fell dramatically due to a collapse in OPEC's cooperation (Grytten & Hodne, 2002, pp. 273-275; Grytten & Hunnes, 2016, p. 236). Since Norway is a net oil-exporting country, this collapse resulted in large trade deficits and reduced investment activity in the Norwegian oil industry. In turn, the economy also experienced weakened demand and rising unemployment. In October 1987, a turning point occurred with substantial world stock market crashes, and significant declines in housing prices. This also applied to Norway, which experienced the most extensive housing market crashes in its history (Grytten, 2011, p. 17).

To enhance the competitiveness of Norwegian industry, a contractionary monetary policy was introduced (Grytten, 2011, p. 17; Grytten & Hunnes, 2016, pp. 237-241). This involved conducting a procyclical policy, which further amplified the economic downturn. The increased real interest rates posed a challenge for market participants who had taken on high amounts of debt during the economic upturn. Consequently, numerous market participants were unable to meet their debt obligations, resulting in substantial losses for Norwegian banks (Grytten & Hodne, 2002, p. 276). In 1990, it became evident that a comprehensive banking crisis was looming (Grytten & Hunnes, 2016, p. 239). The crisis exhibited systematic traits, which resulted in widespread instability and numerous bankruptcies within the banking sector. Overall, the crisis can be encapsulated by the following statement: “Bad governance, bad banking and bad luck” (Skånland, 1989, p. 15).

5.7 The Financial Crisis (2007-2010)

In the fall of 2008, the global economy was hit by the most severe economic crisis since the 1930s (Grytten & Hunnes, 2016, p. 243). The crisis was triggered by a real estate market crash in the United States, which resulted in a national banking crisis with repercussions across the

entire world. In the American real estate market, increased accessibility of credit resulted in an extensive chain of loan-financed investments (Grytten, 2009b, p. 40; Grytten & Hunnes, 2016, pp. 250-251). This chain unfolded as individuals were granted mortgages by banks, which in turn sold portfolios of loans to investment banks. The combination of declining real estate prices in 2006 and increased unemployment, led to a notable rise in loan defaults. Consequently, a real estate market crash ensued and numerous American banks encountered a liquidity crisis (Grytten, 2011, p. 18; Grytten & Hunnes, 2016, p. 251).

In 2008, the major investment bank Lehman Brothers collapsed, triggering an immediate trust crisis in global financial markets (NOU, 2011, p. 44). Due to extensive international loans provided by American banks, the consequences of the real estate market crash extended to European banks (Grytten & Hunnes, 2016, pp. 251-255). However, in Norway, there were no signs of a banking crisis. To prevent a banking crisis, the Norwegian government provided Norwegian banks with Treasury bills in exchange for the banks' secure bonds. As for the Norwegian real estate market, the decline in real estate prices was relatively limited in a global context, with prices rapidly reversing from the turn of 2008/2009 due to lower interest rates (NOU, 2011, p. 70).

Conversely, Norway faced the fastest and second-largest stock market crash in its history during the fall of 2008 (Grytten, 2011, p. 19). The Oslo Stock Exchange was dominated by large, commodity-based companies (NOU, 2011, p. 70). Thus, significant declines in commodity prices in the summer of 2008 contributed to a pronounced and rapid decline in the Norwegian stock market. However, the economic downturn for Norway was limited due to several factors. Firstly, oil prices quickly rebounded after the crisis, which had a positive impact on Norwegian commodity-based companies (Grytten & Hunnes, 2016, pp. 254-255). Secondly, the demand for Norwegian products remained relatively high both domestically and internationally. Thirdly, Norges Bank exhibited a proactive approach in adjusting interest rates during the crisis, in addition to providing banks with liquidity (Grytten & Hunnes, 2016, pp. 251-255; NOU, 2011, p. 64).

6. Analysis

This chapter will examine the cyclical values of eleven financial and macroeconomic indicators. Initially, we will provide an explanation of the HP-filter, an analytical tool employed in the calculation of the cyclical values. Thereafter, we will conduct a deviation analysis, aimed at examining the changes in indicators during each crisis period. Finally, we will conduct a correlation analysis, used to assess the relationship between the monetary indicators and asset prices. A comprehensive overview of all cyclical values can be found in the Appendix.

6.1 HP-filter

The Hodrick-Prescott filter (HP-filter) is a method that can be used to identify business cycles and output gaps (Grytten & Koilo, 2019, p. 170). This method involves decomposing economic time series into a trend component and a cyclical component. In doing so, the filtering process can reveal underlying trends, deviations from the fundamental trend, and variations in business cycles (Hodrick & Prescott, 1997, p. 3). The trend component can be filtered from the time series data by minimizing the following function:

$$\min g_t = \sum_{t=1}^{T}(y_t - g_t)^2 + \lambda * \sum_{t=2}^{T}[(g_{t+1} - g_t) - (g_t - g_{t-1})]^2 \quad (8)$$

The function consists of the following variables: production at time t (y_t), trend at time t (g_t), number of observations (T), and the lambda parameter determining the smoothness of the trend line (λ).

Upon closer examination of the minimization function, the first term $(y_t - g_t)^2$ quantifies the deviation between observed GDP and trend GDP at time t. Consequently, this term provides the magnitude of the cyclical component c_t. The squaring of this term accounts for the potential positive and negative deviations from the trend. Additionally, the second term $[(g_{t+1} - g_t) - (g_t - g_{t-1})]^2$ represents the change in growth rate of the trend from one period (t) to the next $(t + 1)$.

6.1.1 Lambda

The smoothing parameter, lambda, is determined exogenously and restricts the extent to which the trend can vary (Grytten, 2022a). Since the choice of lambda is subjective, different values may be utilized based on variations in the data set. When lambda equals zero, it implies that the time series is entirely determined by the trend component. While if lambda equals infinity, the estimated trend will be constant, which means the trend line will be linear (Sørensen & Whitta-Jacobsen, 2010, p. 362). In practice, lambda will rarely equal either of these extreme values. Thus, it can be stated that the greater the value of lambda, the more significant the contribution of the cycle component to the time series. Overall, the choice of lambda depends on the intensity and volatility of the time series.

Based on international standards, the most common values to choose are $\lambda = 100$ for annual data, $\lambda = 1\,600$ for quarterly data and $\lambda = 14\,400$ for monthly data (Grytten & Hunnes, 2016, p. 61). However, Statistics Norway has proposed that a higher lambda provides a more accurate representation of the Norwegian business cycles (Benedictow & Johansen, 2005). Statistics Norway recommends choosing a lambda 25 times higher than the international standard for indicators related to business cycles. This implies a lambda value of 40 000 for quarterly data and 2 500 for annual data. Choosing a higher lambda in this case, may result in a smoother trend and more well-defined cycles, while also reducing potential end-point errors (Grytten, 2011, p. 22).

6.1.2 Advantages and Disadvantages of the HP-filter

The HP-filter is a frequently employed tool in empirical analyses within the field of macroeconomics (Bolghaug, 2014, pp. 41-42). This is attributed to the intuitive and user-friendly design of the HP-filter (Grytten & Hunnes, 2016, p. 61). Additionally, it has been incorporated as a tool within several statistical software programs including Excel and gretl. However, the filter also exhibits weaknesses, which will be addressed in the subsequent sections.

Imprecise Endpoints

The HP filter uses two-sided filtering to calculate the trend (Grytten & Hunnes, 2016, p. 61). This involves utilizing observations from both past and future time periods. However, this

approach introduces challenges at the end of the time series, where information from the preceding and subsequent period is lacking (Grytten, 2022a). Thereby, the two-sided filter will eventually transition into a one-sided filter (Bjørnland, Brubakk, & Jore, 2004). This may result in imprecise estimates at the endpoints, implying that estimated values for a given period today may differ from the estimated values for the same period in the future. To mitigate this issue, a strategy may involve extending the time series in both ends.

Duration

Another limitation associated with the HP-filter is the duration of the business cycles (Grytten & Hunnes, 2016, p. 56). The HP-filter operates under the assumption that the duration of upswings and downturns will be the same. However, this is not supported by empirical observations (Romer, 1999). Upswings tend to exhibit longer durations compared to downturns. Given the HP filter's sensitivity to the length of economic cycles, its application may yield misleading conclusions in cycle measurement. This is due to the filter's tendency to excessively adjust the trend, either upward or downward, particularly in the case of long economic cycles. Consequently, the HP-filter does not account for the variance in duration between successive economic cycles.

Choice of Lambda

Selecting an appropriate value for lambda can pose a challenge when aiming for an accurate smoothing of a trend (Grytten, 2022a). The assessment of the state of the economy heavily relies on the calculation of the output gap (Grytten & Hunnes, 2016, p. 61). Thus, when deciding on lambda, one must consider two aspects: to choose a lambda that provides the most accurate trend, or a lambda that yields the most accurate value for the cyclical component (Bolghaug, 2014, pp. 41-42). On the one hand, opting for a high lambda will prevent the trend from becoming excessively volatile in the short term. On the other hand, selecting a low lambda will result in a cyclical component that more closely aligns with the actual economic cycles. Thus, the choice of lambda depends on the emphasis placed on these two aspects.

Structural Changes

Another weakness of the HP filter is that it does not consider significant and rapid structural changes in the economy (Grytten, 2022a). For instance, a rapid structural change could be the

discovery of oil, or a labor market reform which contributes to significant change in the natural level of employment in the economy (Bolghaug, 2014, p. 42). The HP filter does not capture instantaneous shifts in the trend and will take structural changes into account by gradually adjusting the growth rate of the trend.

Despite these limitations, we still consider the HP-filter as a valuable instrument in our time series analysis. However, it is crucial to be aware of these limitations and incorporate these insights into the interpretation of the findings in the analysis.

6.2 Deviation Analysis

This section presents the deviation analysis, consisting of peaks and troughs of the cyclical values for macroeconomic indicators. In the following, we will examine the magnitude and the timing of the peaks and troughs. Appendix A and B displays the years of occurrence for all peaks and troughs. Table 6.1 below encapsulates an overview of the extreme points observed during various crises.

Variables	Lambda	The Kristiania Crisis		The Post-War Depression		The Parity Crisis		The Great Depression	
		Peak	Through	Peak	Through	Peak	Through	Peak	Through
Total Credit (C3)	2 500	4.67	-3.65	24.43	-7.48	24.43	-7.48	24.43	-3.68
Money Supply (M2)	100	5.83	-6.00	23.32	-10.75	23.32	-10.75	23.32	-5.58
Private Bank Loans	100	8.62	-5.08	30.24	-10.97	30.24	-10.97	30.24	-8.50
Commercial Bank Loans	100	16.06	-4.09	38.02	-18.16	38.02	-18.16	38.02	-12.10
GDP per capita	100	5.46	-4.16	4.70	-7.95	4.70	-7.19	5.52	-5.26
Manufacturing VA	100	9.95	-7.11	4.78	-18.32	3.36	-9.50	9.68	-11.18
Bankruptcies	2 500	-28.83	32.15	-75.03	53.07	-3.71	39.37	-18.85	8.21
Unemployment	100	-17.07	20.86	-52.94	59.94	-30.45	19.36	-22.46	24.70
House Price Index	2 500	24.38	-14.86	28.26	-30.68	28.26	-18.18	14.85	-4.97
Stock Index	100			54.43	-33.91	1.25	-3.09	17.32	-25.11

Variables	Lambda	The Stagflation		The Banking Crisis		The Financial Crisis	
		Peak	Through	Peak	Through	Peak	Through
Total Credit (C3)	2 500	11.54	-7.69	15.77	-8.35	8.51	-0.91
Money Supply (M2)	100	4.93	-15.57	8.46	-5.06	6.67	-2.49
Private Bank Loans	100	12.05	-20.93	23.04	-9.38	12.31	-7.89
Commercial Bank Loans	100	17.67	-20.33	18.77	-13.27		
GDP per capita	100	2.15	-2.95	3.17	-4.84	6.24	-2.48
Manufacturing VA	100	12.30	-3.79	5.67	0.00	8.31	-0.61
Bankruptcies	2 500	-12.36	48.62	-40.40	41.59	-27.21	23.85
Unemployment	100	-34.47	45.28	-41.60	23.56	-28.58	8.37
House Price Index	2 500	8.95	-10.06	43.35	-31.80	14.86	
Stock Index	100	56.50	-29.13	33.50	-27.19	49.20	-23.52

Table 6.1 - Overview of peaks and troughs in financial and macroeconomic variables

6.2.1 Approach

In the deviation analysis, the largest positive deviations are considered the peaks, and the largest negative deviations are considered the troughs. The only exceptions are the bankruptcies and unemployment indicators, where the inverse scenario prevails. The reason is that the latter indicators respond inversely to economic fluctuations, compared to the other indicators.

The HP-filtered trend is divided into three subperiods, where the first subperiod includes the years 1870-1910, the second subperiod includes the years 1910-1939, and the third subperiod includes the years 1946-2019. The reason for dividing the HP-filtered trend into three subperiods is to mitigate the noise during wars. However, we have incorporated World War I into the second subperiod. This decision is grounded in the historical review, emphasizing the impact of the war on the interwar crises[2]. Furthermore, we have chosen to expand the time series for each subperiod extensively in both directions, aiming to minimize the effects associated with endpoint errors related to the HP-filter.

We have chosen a lambda equal to 100 for the majority of variables, based on the international standard of lambda on annual data. The only exceptions are the GDP, HPI and Manufacturing VA indicators, for which we have chosen a lambda equal to 2 500. The choice of lambda for the latter variables aligns with Statistics Norway's guidelines, concerning lambda selection in association with business cycles, mentioned in Section 6.1.1. We have selected this lambda, due to our evaluation of a strong interconnection between business cycles and the GDP, HPI and manufacturing VA indicators. To be able to identify more well-defined cycles, employing a higher lambda for these variables seems most reasonable.

[2] The term “interwar crises” includes the Post-War Depression, the Parity Crisis, and the Great Depression.

6.2.2 Total Credit (C3)

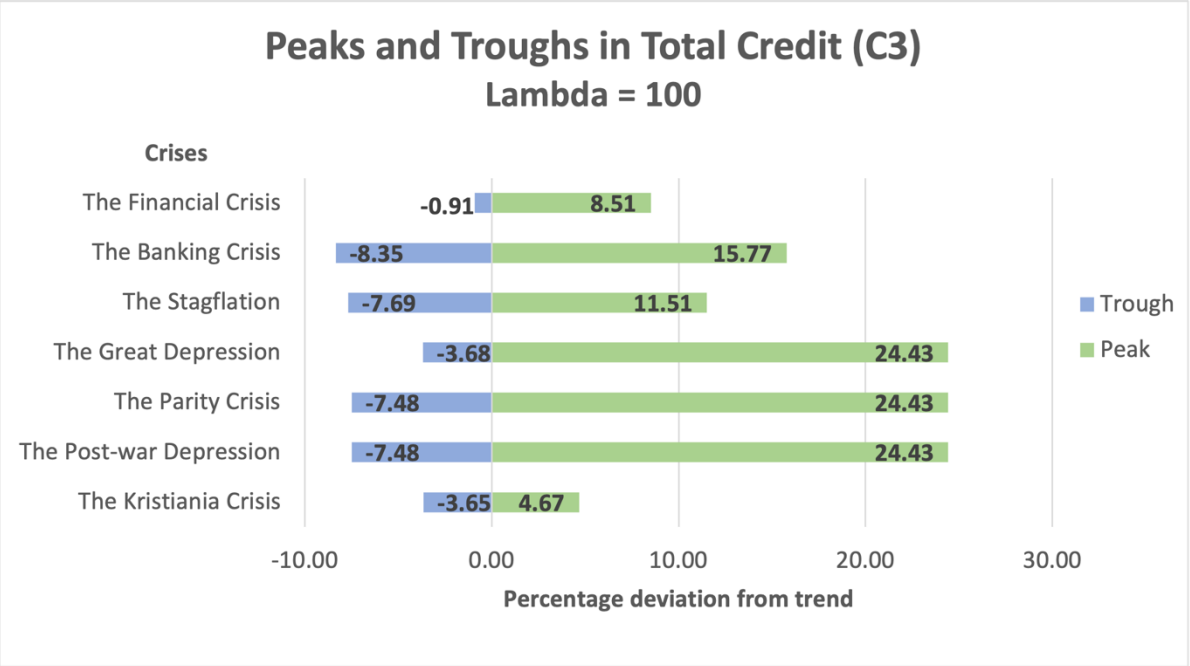

Figure 6.1 - Percentage peaks and troughs in C3 cyclical values during each crisis, HP-filtered with lambda = 100.

Figure 6.1 reveal substantial peaks in C3 for all crises, in addition to noteworthy troughs. For most crises the troughs are considerably smaller in magnitude than the peaks. The interwar crises exhibit the most profound peaks, along with the most substantial relative change in total credit. Conversely, the Kristiania Crisis exhibits the smallest positive deviations, along with the smallest relative change in C3. Moreover, the Financial Crisis of 2008 exhibits the smallest negative deviation. Nonetheless, during all crises, we observe the same procyclical pattern: a significant expansion in credit leading up to the crises, followed by a halt in the growth of credit.

6.2.3 Money Supply (M2)

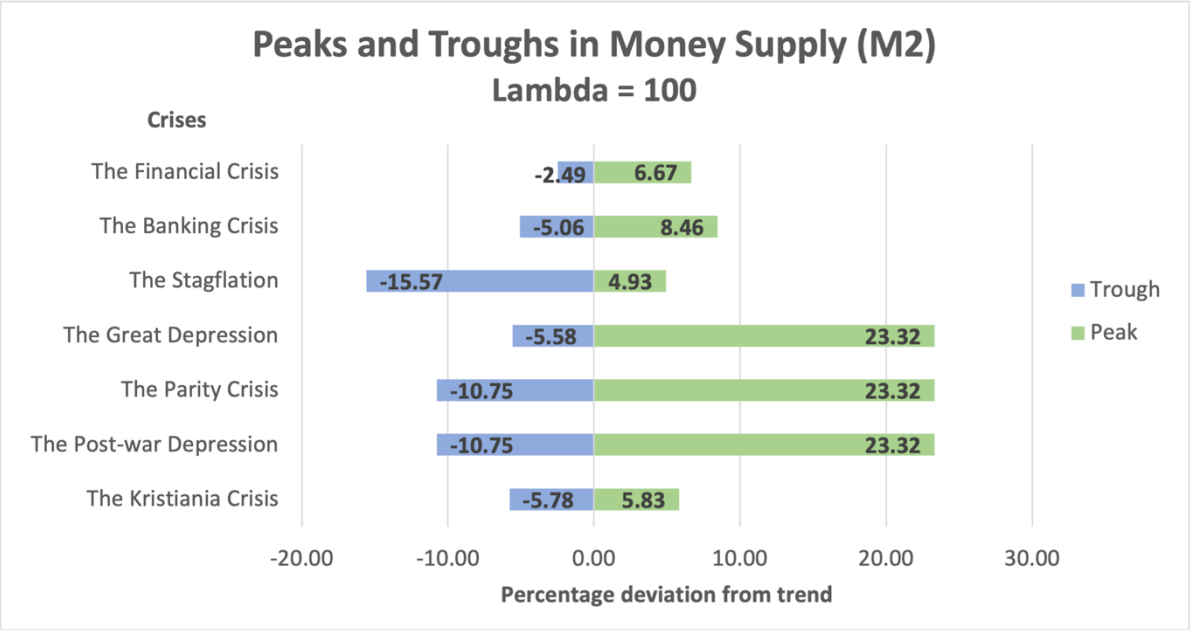

Figure 6.2 - Percentage peaks and troughs in M2 cyclical values during each crisis, HP-filtered with lambda = 100.

Figure 6.2 reveal significant peaks and troughs in M2 for all crises. Similar to C3, the interwar crises exhibit the most profound peaks, along with the most substantial relative change in M2. Conversely, the Financial Crisis exhibits the smallest negative deviation, along with the smallest relative change in money supply. Furthermore, the Stagflation exhibits the smallest positive deviation. Nonetheless, during all crises, we observe the same procyclical pattern: a significant expansion in money supply leading up to the crises, followed by a prolonged contraction in the growth of money supply.

6.2.4 Private Bank Loans

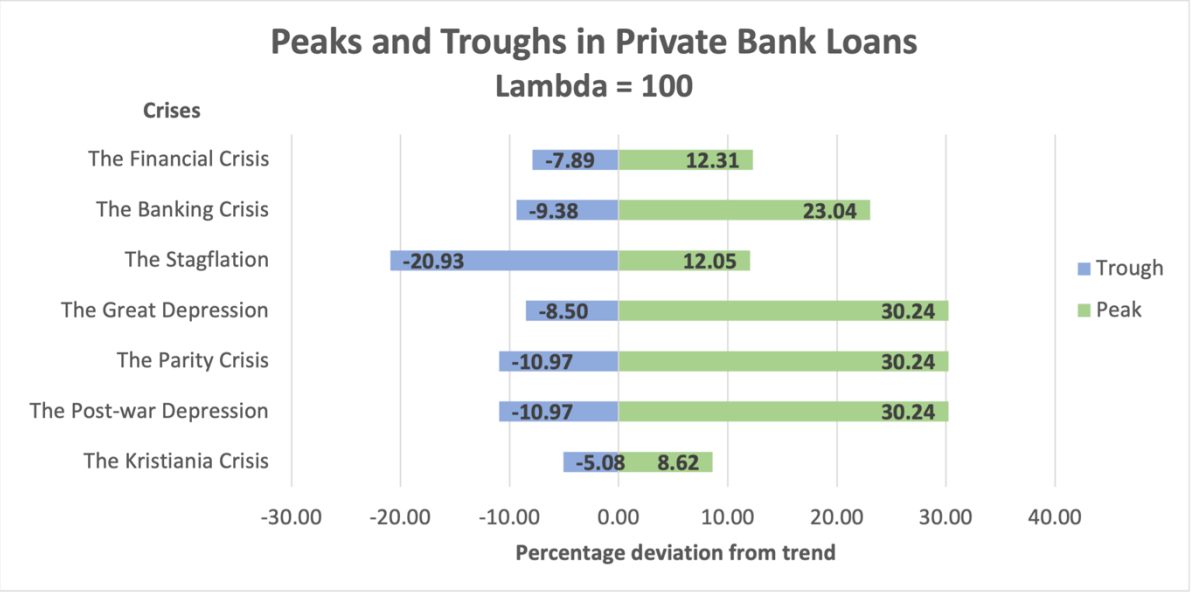

Figure 6.3 - Percentage peaks and troughs in cyclical values of private bank loans during each crisis, HP-filtered with lambda = 100.

Figure 6.3 reveals substantial peaks and noteworthy troughs in private bank loans for all crises. For most crises the troughs are considerably smaller in magnitude than the peaks. Similar to the previous indicators, the interwar crises exhibit the most profound peaks and significant troughs. Thus, the interwar crises also exhibit the most substantial relative change in private bank loans. Moreover, the Stagflation exhibits the most profound trough. Conversely, we observe the smallest relative change during the Kristiania Crisis, as it exhibits the smallest positive and negative deviations from trend. Collectively, our results indicate a procyclical lending pattern, in which banks exhibit elevated growth in lending preceding the crises, followed by a decline in lending.

6.2.5 Commercial Bank Loans

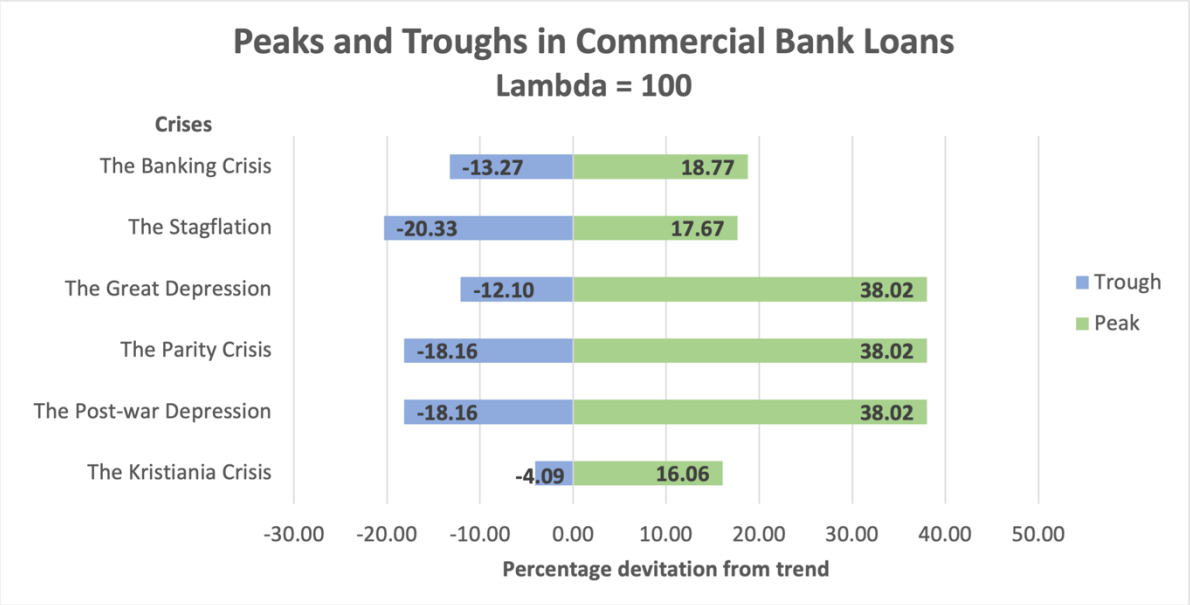

Figure 6.4 - Percentage peaks and troughs in cyclical values of commercial bank loans during each crisis, HP-filtered with lambda = 100.[3]

Figure 6.4 reveals substantial peaks and troughs in commercial bank loans for most crises. The interwar crises exhibit the most profound peaks and significant troughs, and thereby the most substantial relative change in commercial bank loans. Moreover, the Stagflation exhibits the most profound trough. Conversely, we observe the smallest relative change in commercial bank loans during the Kristiania Crisis, as it exhibits the smallest positive and negative deviations from trend. Collectively, our results indicate a pro-cyclical lending pattern, in which banks exhibit elevated growth in lending preceding the crises, followed by a decline in lending.

[3] The Financial Crisis is excluded from the analysis, as there is no available data on commercial bank loans after 2003.

6.2.6 GDP per Capita

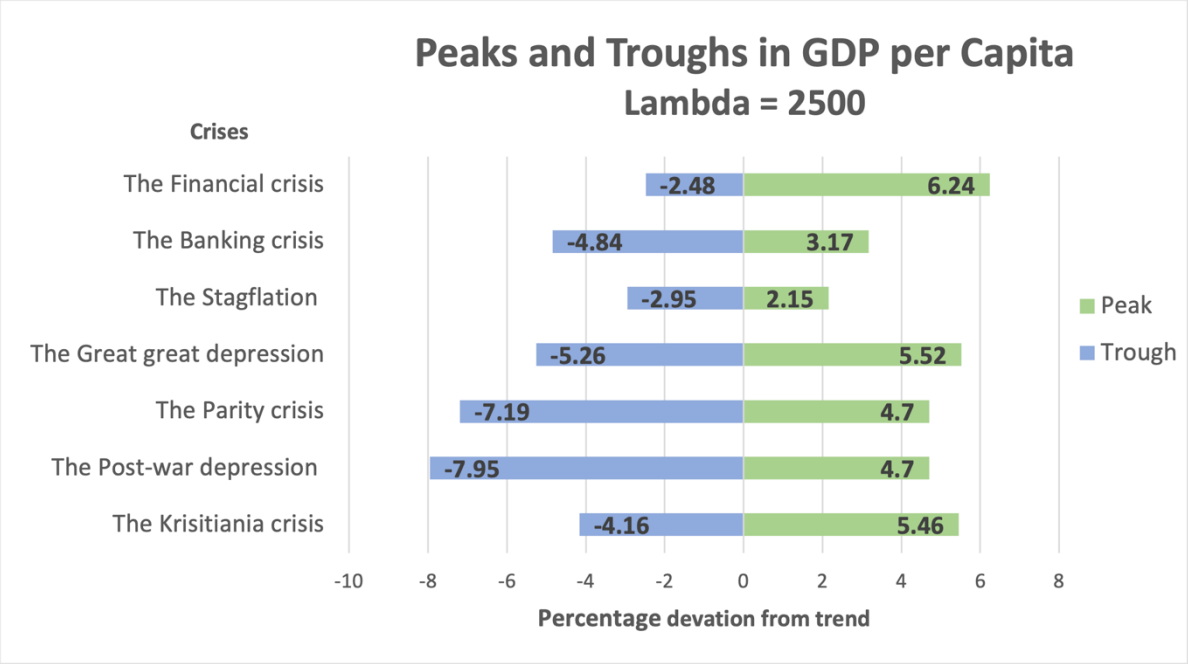

Figure 6.5 - Percentage peaks and troughs in cyclical values of GDP per capita during each crisis, HP-filtered with lambda = 2 500.

Figure 6.5 reveals noteworthy peaks and significant troughs in GDP per capita for all crises. The Post-War Depression and Parity Crisis stand out as the crises that exhibit the most profound troughs, along with the most substantial change in GDP. Moreover, the Financial Crisis exhibits the most substantial peak. Conversely, the Stagflation during the 1970s exhibits the smallest negative and positive deviations from trend. Collectively, we observe a pattern where GDP tends to increase in the years leading up to the crises, followed by a decline during or following the crises.

6.2.7 Manufacturing Value Added (VA)

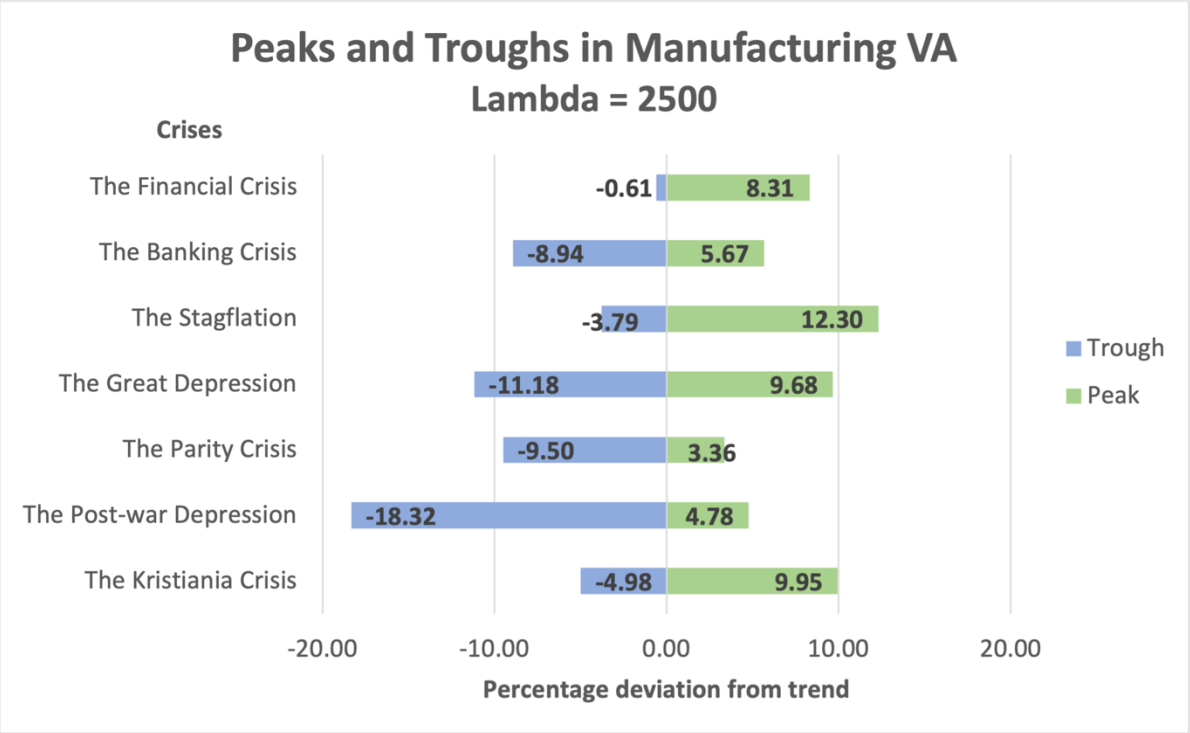

Figure 6.6 - Percentage peaks and troughs in cyclical values of manufacturing VA during each crisis, HP-filtered with lambda = 2500.

Figure 6.6 reveals substantial peaks and noteworthy troughs in manufacturing VA for all crises. Our findings reveal that the Stagflation exhibits the most significant peak, while the Post-War Depression exhibits the most substantial trough. The latter crisis demonstrates the largest relative change in manufacturing VA. Conversely, we only observe a slightly negative deviation from trend during the Financial Crisis, while the Parity Crisis exhibits the smallest peak. Collectively, we observe a pattern where manufacturing VA tends to increase in the years leading up to the crises, followed by a decline during the downturn.

6.2.8 Bankruptcies

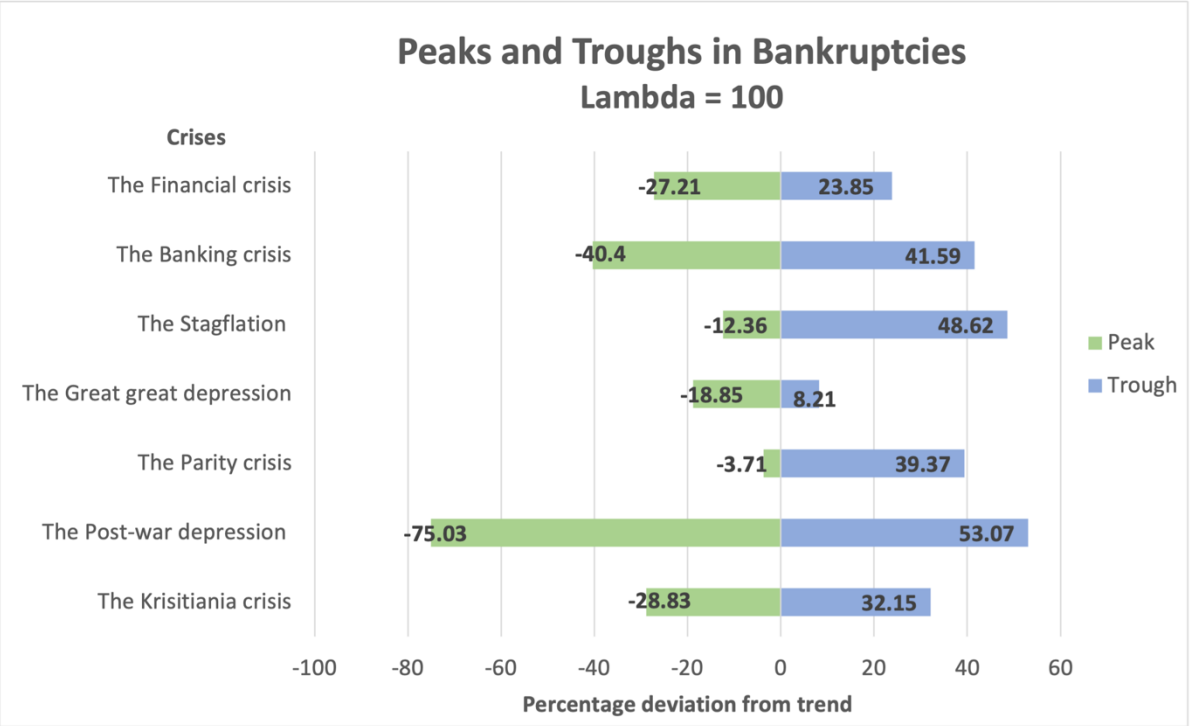

Figure 6.7 - Percentage peaks and troughs in cyclical values of bankruptcies during each crisis, HP-filtered with lambda = 100.

Figure 6.7 reveals substantial peaks for most crises, in addition to significant troughs in bankruptcies during all crises. The Post-War Depression exhibits the most profound trough and peak, and thereby the most substantial relative change in bankruptcies. Conversely, we observe the smallest relative change in bankruptcies during the Great Depression, as it exhibits a modest negative and the smallest positive deviation from trend. Collectively, we observe a countercyclical pattern for the bankruptcies indicator. This implies negative deviations from trend preceding the crises, and significant positive deviations during all crises.

6.2.9 Unemployment

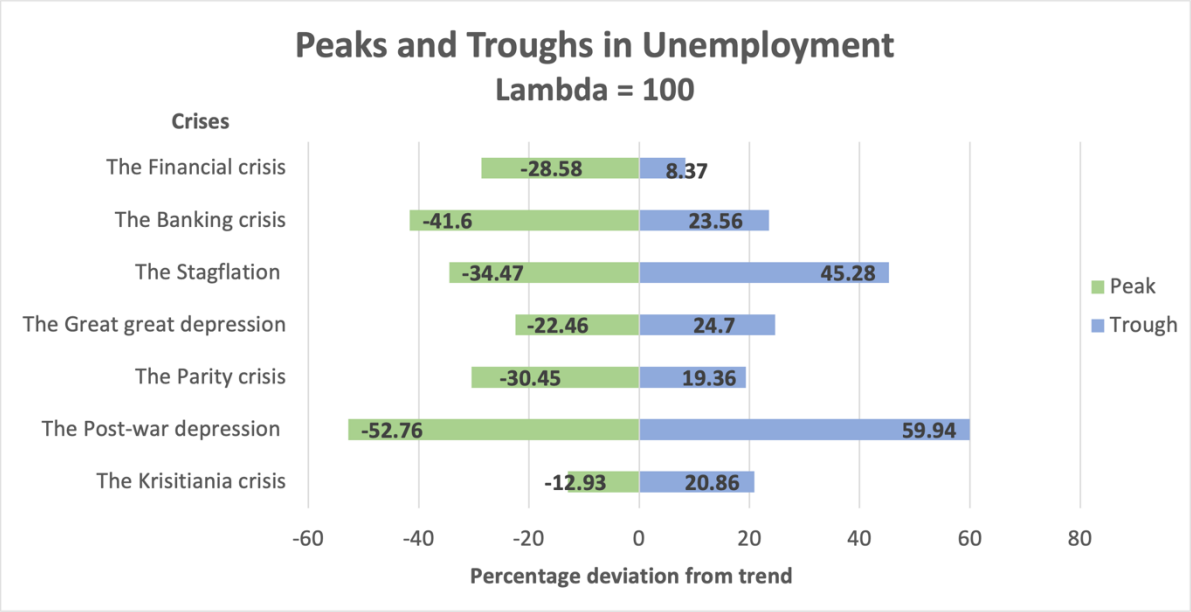

Figure 6.8 - Percentage peaks and troughs in cyclical values of unemployment during each crisis, HP-filtered with lambda = 100.

Figure 6.8 reveals substantial peaks for all crises, in addition to significant troughs in unemployment. The Post-War Depression exhibits the most significant positive and negative deviations from trend, demonstrating the most substantial relative change in unemployment. Conversely, we observe the lowest peak in unemployment during the Kristiania Crisis and the smallest trough during the Financial Crisis. Be noted that our data set is missing data for several years when analyzing the Kristiania Crisis, which may affect the reliability of the estimates for this crisis. Collectively, we observe a countercyclical pattern for the unemployment indicator. This implies negative deviations from trend preceding the crises, and significant positive deviations during all crises.

6.2.10 House Price Index (HPI)

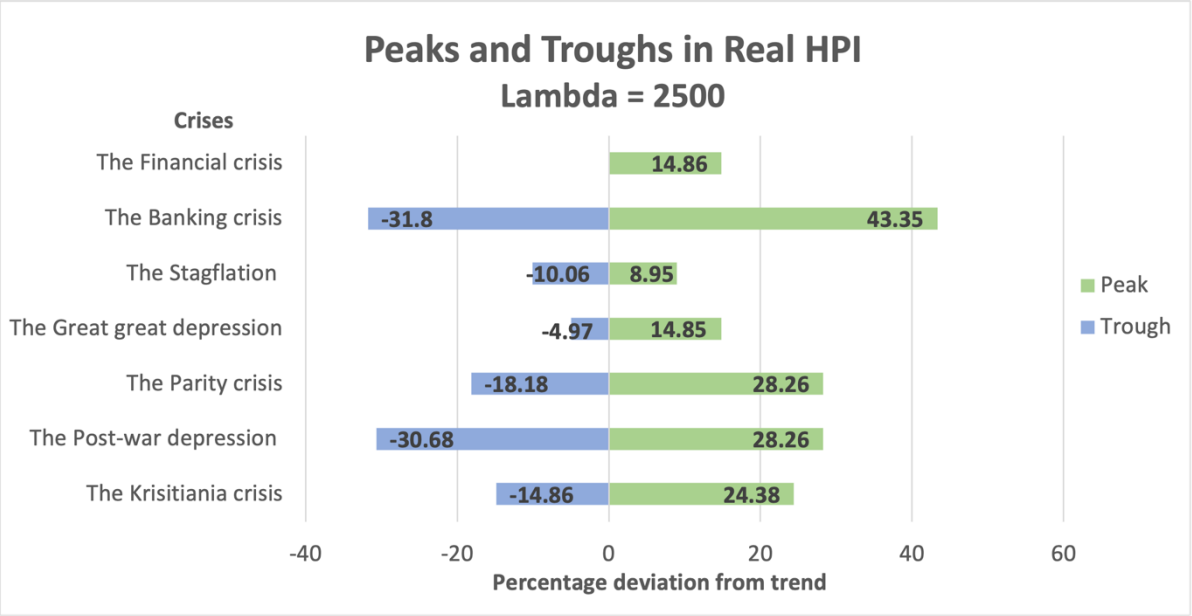

Figure 6.9 - Percentage peaks and troughs in cyclical values of real HPI during each crisis, HP-filtered with lambda = 2 500.[4]

Figure 6.9 reveals substantial peaks in HPI for all crises. Additionally, we observe noteworthy troughs for most crises. Our findings indicate that the Banking Crisis exhibits the most significant peak and trough, in addition to the most substantial relative change in HPI. Conversely, the Stagflation and the Great Depression exhibit the smallest peaks and troughs. Collectively, we observe a pattern where the HPI tends to reach its peak prior to or at the beginning of the crises, followed by a trough during the crises.

[4] The Financial Crisis does not exhibit a trough. An explanation is provided in Section 7.1.

6.2.11 Stock Index

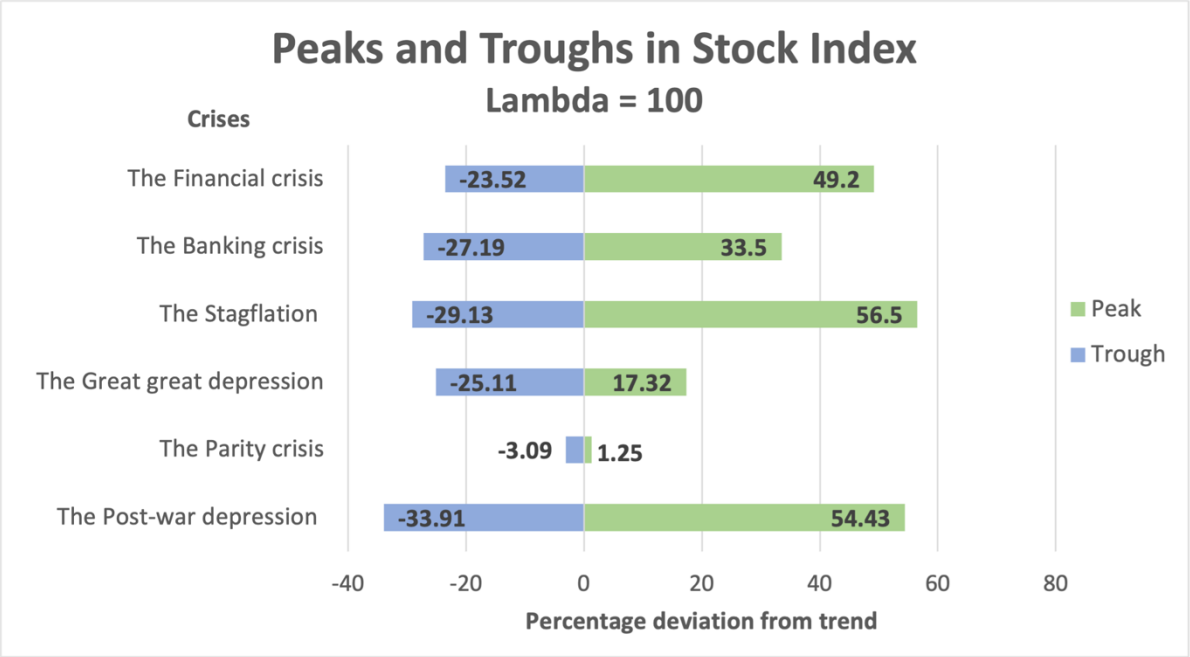

Figure 6.10 - Percentage peaks and troughs in cyclical values of stock index during each crisis, HP-filtered with lambda = 100.[5]

Figure 6.10 reveals significant peaks and troughs for the stock index in relation to all crises except for the Parity Crisis. The Post-War Depression exhibits the most significant negative deviation from trend, and the largest relative change in the stock index. Be noted that our data set is missing data for one year when analyzing the Post-War Depression, which may affect the reliability of the estimates for this crisis. Moreover, the Stagflation exhibits the greatest peak. Conversely, we observe the smallest relative change in trend during the Parity Crisis, as it clearly exhibits the smallest positive and negative deviations from trend. Collectively, during most crises, we observe a pattern where the stock index tends to reach its peak prior to or at the beginning of the crises, followed by a trough during the crises.

[5] Peaks and troughs for the Kristiania Crisis are excluded from this analysis, due to a limited data set for the stock index.

6.2.12 Policy Rate

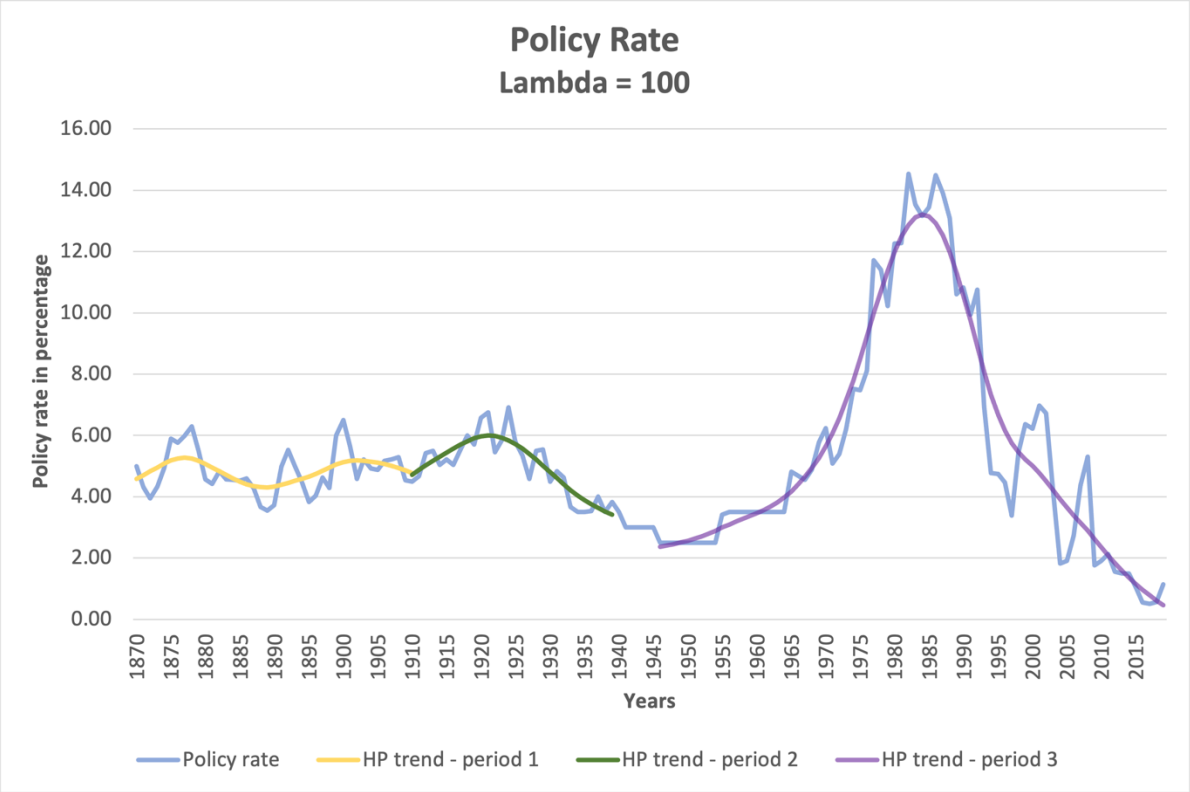

Figure 6.11 - Policy rate from 1870-2019, with the HP-trend for three subperiods.

During the mid-1890s, we observe that the policy rate was below the trend for several years. Thereafter, the policy rate exhibited a rapid increase between 1898 and 1900, which occurred during the Kristiania Crisis. Furthermore, we note that the policy rate remains below or near the trend throughout World War I, followed by two significant peaks in the first half of the 1920s. This indicates rapid increases in the policy rate during the Post-War Depression, and prior to the Parity Crisis. In the latter half of the 1920s, we note minimal fluctuations of the policy rate around the trend. Thereafter, following the Great Depression, we observe declining policy rates, yet remaining closely aligned with the trend.

During the Stagflation in the 1970s, we observe that the policy rates were below the trend during the first half of the decade. However, between 1976 and 1977, the policy rate exhibited a robust and rapid increase. Moreover, we observe declining policy rates from 1987 and in the years preceding the Banking Crisis. In the early 1990s, the policy rate was maintained above 10 percent for several years, signifying a cessation of the declining policy rates in the

preceding years. In the period prior to the Financial Crisis, we observe that the policy rate was significantly below trend, followed by a sharp increase in the policy rate between 2006 and 2008. Overall, these findings indicate policy rates below trend preceding the crises, and increased policy rates during the crises.

6.3 Correlation Analysis

To evaluate the empirical implications of financial instability during economic crises, it is imperative to assess the variables that frequently serve as indicators for such scenarios. Thus, a correlation analysis is used to assess whether the monetary variables[6] are leading, contemporaneous, or lagging indicators in relation to the HPI and stock index.

6.3.1 Analytical Tool

Correlation analysis is a technique used for assessing the strength and direction of the linear relationship between two variables. More precisely, the coefficient of correlation (ρ) quantifies the association between the independent variable (x) and the dependent variable (c). The coefficient of correlation is defined in the equation below (Sørensen & Whitta-Jacobsen, 2010, p. 369).

$$\rho(x_t, c_t) = \frac{\sum_{t=1}^{T}(x_t - \bar{x})(c_t - \bar{c})}{\sqrt{\sum_{t=1}^{T}(x_t - \bar{x})^2 * \sqrt{\sum_{t=1}^{T}(c_t - \bar{c})^2}}} \quad (9)$$

The strength of the correlation between two variables is determined by the magnitude of the correlation coefficient, which can take values between -1 and 1 (Sørensen & Whitta-Jacobsen, 2010, pp. 369-370). A value equal to -1 indicates a perfectly negative relationship, while a value equal to 1 suggests a perfectly positive relationship. If the correlation coefficient is close to or equal to 0, there is no linear relationship between the variables.

In our analysis, we will examine the correlation between the cyclical values of two variables. Thus, a positive correlation suggests that the independent variable x is exhibiting a procyclical

[6] The term «monetary variables» includes the variables C3, M2, commercial bank loans and private bank loans.

movement (Sørensen & Whitta-Jacobsen, 2010, pp. 369-370). Conversely, a negative correlation implies that x is demonstrating a countercyclical movement.

It should be noted that correlation coefficients require a thorough interpretation. However, no universal rule applies to all data sets, emphasizing the need for interpreting the correlation coefficients with great caution. Thus, the following threshold values serve as guidelines rather than strict rules for interpreting correlation coefficients (Johannessen, Tufte, & Christoffersen, 2016, p. 327).

- High correlation: $\rho > 0.70$
- Moderate correlation: $0.40 < \rho < 0.70$
- Low correlation: $\rho < 0.40$

To assess how a variable evolves over time in relation to another variable, we can calculate the correlation coefficient between the dependent variable (c) and the value of the independent variable (x) observed n periods earlier or later. By studying these results, one can uncover if x is a leading or lagging indicator of c. A leading indicator means that changes in x observed n periods earlier could potentially be associated with changes in c in the current period (Sørensen & Whitta-Jacobsen, 2010, p. 370). Conversely, a lagging indicator implies that x typically reaches its peaks and troughs n periods later than c.

An important note regarding correlation analysis, is that it does not provide insights into the causal relationship between two variables (Johannessen, Tufte, & Christoffersen, 2016, p. 331). Thus, it is crucial to exercise caution when interpreting correlation coefficients.

6.3.2 Approach

The correlation analysis will address two variables at a time, when examining the interconnection between cyclical values. In Section 6.3.3, the house price index is the dependent variable, and in Section 6.3.4, the stock index is the dependent variable. Moreover, both sections employ monetary indicators as the independent variables. The choice of dependent and independent variables is based on our objective to examine the potential relationship between monetary variables and fluctuations in asset prices. This selection stems from the fundamental significance of the included indicators in accordance with the financial

instability hypothesis.

The correlation analysis is divided into four periods: 1873-1908, 1913-1936, 1970-2000, and 1980-2010. Be advised that the HP-filter applied to each correlation period remains consistent with the three subperiods outlined in Section 6.2.1. Thus, the periods indicated in the correlation analyses solely denote the years for which correlations are examined. Furthermore, we do not deem it advantageous to incorporate leading and lagging values from prior or subsequent years beyond a three-year span, due to the influence of nearby cycles.

6.3.3 Explanatory Variables and House Price Index

Tables 6.2 to 6.5 provide the results of the correlation analysis for nominal house prices. Since nominal values allow us to focus on absolute changes in housing prices, we have chosen to use nominal house prices instead of real terms. Accordingly, we consider the absolute changes in housing prices to give more intuitive results when examining house prices in relation to monetary indicators.

Correlation with HPI (1873 - 1907)	**Leading (t-n)** 3	2	1	0	**Lagging (t+n)** 1	2	3
Total Credit (C3)	-0.3609	-0.1526	0.0757	0.3358	0.5903	**0.6487**	0.5569
Money Supply (M2)	-0.0015	0.1259	0.1130	-0.0026	-0.0855	0.0422	-0.0236
Commercial Bank Loans	0.0608	0.1709	0.2892	0.3873	0.4268	0.5610	**0.5617**
Private Bank Loans	-0.2820	-0.0267	0.2201	0.3290	0.2719	0.3085	0.2361

Table 6.2 - Correlation matrices with nominal HPI, 1837-1907. HP-filter subperiod 1.

Correlation with HPI (1913 - 1936)	**Leading (t-n)** 3	2	1	0	**Lagging (t+n)** 1	2	3
Total Credit (C3)	-0.1787	0.3212	0.6621	**0.8196**	0.7606	0.5511	0.1623
Money Supply (M2)	-0.0974	0.4403	0.7431	**0.8160**	0.7282	0.5128	0.0610
Commercial Bank Loans	-0.0336	0.5340	0.7772	**0.8387**	0.6718	0.3701	-0.1181
Private Bank Loans	-0.0862	0.4346	0.7366	**0.8546**	0.7442	0.4984	0.0537

Table 6.3 - Correlation matrices with nominal HPI, 1913-1936. HP-filter subperiod 2.

Correlation with HPI (1970 - 2000)	Leading (t-n) 3	2	1	0	Lagging (t+n) 1	2	3
Total Credit (C3)	-0.3347	-0.0882	0.2327	0.5135	0.6661	**0.7244**	0.6792
Money Supply (M2)	-0.3313	-0.1515	-0.0386	0.0364	0.1517	0.2906	**0.4759**
Commercial Bank Loans	**-0.4512**	-0.2144	0.0306	0.1962	0.2765	0.3421	0.3884
Private Bank Loans	-0.4782	-0.1693	0.1420	0.3614	0.4874	0.5673	**0.5856**

Table 6.4 - Correlation matrices with nominal HPI, 1970-2000. HP-filter subperiod 3.

Correlation with HPI (1980 - 2010)	Leading (t-n) 3	2	1	0	Lagging (t+n) 1	2	3
Total Credit (C3)	-0.4229	-0.1491	0.1855	0.4942	0.6846	**0.7377**	0.6723
Money Supply (M2)	-0.3126	-0.1652	-0.0377	0.0485	0.2058	0.3165	**0.4423**
Private Bank Loans	-0.4576	-0.1293	0.1885	0.4123	0.5293	**0.5743**	0.5593

Table 6.5 - Correlation matrices with nominal HPI, 1980-2010. HP-filter subperiod 3.

The results from our correlation analysis show that C3, M2, commercial bank loans, and private bank loans vary procyclically with house prices in connection with two or more of our analysis periods. For all the monetary indicators, we observe the strongest correlations during the second analysis period, when the indicators are contemporaneous. Regarding the other periods, the correlations are most significant when they lag by two or three years.

6.3.4 Explanatory Variables and Stock Index

Tables 6.6 to 6.8 provide the results of the correlation analyses for the stock index. Since our data set does not include observations for stock index prior to 1915, this section only includes three analyzing periods.

Correlation with Stock Index (1915-1936)	Leading (t-n) 3	2	1	0	Lagging (t+n) 1	2	3
Total Credit (C3)	-0.6733	-0.4800	-0.1447	0.2586	0.5544	**0.6862**	0.5488
Money Supply (M2)	**-0.6125**	-0.3795	-0.0334	0.3223	0.5490	**0.5785**	0.4012
Commercial Bank Loans	**-0.5815**	-0.3407	0.0303	0.3967	**0.5675**	0.5204	0.3199
Private Bank Loans	**-0.6249**	-0.4001	-0.0397	0.3352	0.5610	**0.5709**	0.3692

Table 6.6 - Correlation matrices with stock index, 1915-1936. HP-filter subperiod 2.

Correlation with Stock Index (1970-2000)	Leading (t-n)				Lagging (t+n)		
	3	2	1	0	1	2	3
Total Credit (C3)	0.0422	0.0405	0.0950	0.1462	0.1923	0.2580	0.2541
Money Supply (M2)	0.2375	0.1328	-0.0180	0.0221	0.1513	0.1735	0.0540
Commercial Bank Loans	0.1223	0.2256	0.3441	0.5266	0.6441	**0.6603**	0.5239
Private Bank Loans	0.0985	0.1955	0.3102	0.4455	**0.4971**	0.4800	0.3773

Table 6.7 - Correlation matrices with stock index, 1970-2000. HP-filter subperiod 3

Correlation with Stock Index (1985-2010)	Leading (t-n)				Lagging (t+n)		
	3	2	1	0	1	2	3
Total Credit (C3)	-0.2828	-0.1753	0.0641	0.3567	**0.5098**	0.4584	0.3010
Money Supply (M2)	-0.1427	-0.2043	-0.0964	0.2598	**0.4977**	0.4438	0.0799
Private Bank Loans	-0.1672	-0.0699	0.1572	0.4388	**0.5497**	0.4647	0.2026

Table 6.8 - Correlation matrices with stock index, 1985-2010. HP-filter subperiod 3.

The findings in our analysis indicate that C3, M2, commercial bank loans, and private bank loans, vary procyclically with the stock prices in all analysis periods. For both C3 and M2 the strongest correlation is observed during the first period, when C3 and M2 are a two-year lagging indicator for stock prices. During the third period, we also observe a moderate correlation when C3 and M2 are one-year lagging indicators for stock prices.

Furthermore, commercial bank loans and private bank loans exhibit the strongest correlation when both indicators are lagging by two years. For commercial bank loans, the strongest correlation is observed during the second analysis period, while for private bank loans it is observed during the first analysis period. A moderate correlation is observed during the first analysis period for commercial bank loans, and during the second and third analysis period for private bank loans, when the indicators are lagging by one year.

7. Discussion

This chapter will investigate whether we observe a Minsky-Kindleberger pattern during the analyzed crises. Based on these findings, we will identify the implications of financial instability for the development of crises. In the first section, the discussion is structured using the seven-stage dynamic crisis model, as it integrates the frameworks of both Minsky and Kindleberger. In the second section, we seek to identify the implications of financial instability based on our findings in the first section. This chapter will incorporate fundamental elements highlighted in the theoretical framework, historical review, and analysis. Moreover, Appendix A and B provide a comprehensive overview of the cyclical values and corresponding years.

7.1 Minsky-Kindleberger Pattern

7.1.1 Disturbance

The first phase in the seven-stage dynamic crisis model, involves a significant disturbance on either the demand side or supply side of the economy. In the years preceding the Kristiania Crisis, Norwegian cities experienced notable urban migration and considerable industrialization. Additionally, the government introduced a differential system and low interest rates. Collectively, these factors contributed to a significant increase in the economy's overall money supply. This aligns with the findings in our deviation analysis, as we observe increasing cyclical values of M2 and C3 in the 1890s. Hence, these characteristics suggest the occurrence of a demand-side shock to the economy prior to this crisis, which aligns with Minsky's model.

Due to the close interconnection between the interwar crises, we deem it relevant to consider them in conjunction. For all the interwar crises, World War I is considered the economic shock. A combination of the suspension of the gold standard, production constraints, and low interest rates during the war contributed to a significant increase in money supply and credit towards the end of the war. This aligns with the findings in our deviation analysis, as we observe an increasing positive change in M2 and C3 towards the end of the war. Furthermore, the expansionary monetary policy which allowed for extensive borrowing during the war, is apparent in Figure 6.11. In the figure we observe negative deviations from trend in the policy rate between 1914-1918**.** Collectively, these characteristics suggest that the war had

repercussions on both the demand and supply side of the economy.

When examining the Stagflation of the 1970s, the period 1950-1970 was characterized by economic expansion with Keynesian economic policies and extensive government interventions. This aligns with the findings in our deviation analysis in Appendix B, as we observe an increasing positive change in C3 and M2, in the periods 1950s to 1970s. Moreover, we observe a relatively low interest rate in the years before the 1970s in Figure 6.11. Collectively, these characteristics suggest the shock can be categorized as a demand-side shock.

In the years preceding the Banking Crisis, the Norwegian government pursued a policy which involved deregulation of the credit market and a low-interest rate policy. This is supported by our findings in Figure 6.11, where we observe decreasing policy rates in the years 1981-1988. Furthermore, we observe that the cyclical values of C3 gradually increase from 1981 in Appendix B. These characteristics suggest the occurrence of a shock to the demand side of the economy in the years preceding the crisis.

Before the Financial Crisis of 2008, international and national financial markets were characterized by expansionary monetary policies. Moreover, the Norwegian economy was affected by considerable international disruptions, which contributed to a shock to the Norwegian economy. The expansionary monetary policy is apparent in Figure 6.11, where we observe a decrease in the policy rate after 2002, and a policy rate lower than trend in the years 2003-2007. These characteristics suggest the occurrence of a shock to the demand side of the economy in the years preceding the crisis.

7.1.2 Overheating

The second phase of the seven-stage dynamic crisis model describes an overheating of the economy. The model emphasizes that overheating is a result of expansion in credit and money supply, which is also a significant characteristic of financial instability.

In connection with the Kristiania Crisis, the number of banks grew rapidly in the latter part of the 1890s, and consequently, lending increased. This aligns with the findings in the deviation

analysis which indicate positive deviations from the trend in the C3 and M2 indicators from 1898-1903 and 1898-1902, respectively. For the bank loan indicators, we observe positive deviations from the trend from 1898-1903. Thus, this indicates a money and credit expansion in the years leading up to the crisis.

Prior to the interwar crises, the economy experienced a robust expansion of the money supply and credit following World War I. This aligns with the results from the deviation analysis, which reveals positive deviations in the monetary indicators between 1917-1922. However, preceding the Great Depression, our findings indicate negative cyclical values from the mid-1920s to the mid-1930s. These negative deviations may be attributed to the prolonged contraction in the monetary indicators, triggered by the Post-War Depression and Parity Crisis. Thus, it seems reasonable to analyze all three crises in conjunction, as World War I is considered to have a direct or indirect impact on all interwar crises. Based on this assumption, our findings indicate a monetary expansion in the years preceding the interwar crises.

The years leading up to the Stagflation were characterized by an uninterrupted economic expansion. This aligns with the findings in the deviation analysis, where we observe significant positive deviations from the trend for the C3 and M2 indicators from the 1960s to the beginning of the 1970s. The bank loan indicators also reveal positive cyclical values for the majority of the 1960s and 1970s. These results indicate the presence of monetary expansion in the period leading up to the Stagflation.

The decade prior to the Banking Crisis was characterized by a significant credit boom, due to the liberalization of credit markets. This aligns with the findings in our deviation analysis, where we observe significant positive deviations from the trend from 1986-1992 for C3 and the banking indicators. The M2 cyclical values exhibit a lower deviation from the trend than the C3 indicator, yet persistently positive after 1987. In total, these findings suggest an increase in money supply and credit prior to the Banking Crisis.

In the years preceding the Financial Crisis, our deviation analysis reveals increasing cyclical values from 2005 for all monetary indicators. Additionally, we observe significant positive deviations from trend around 2007/2008 in the monetary indicators. Collectively, these findings suggest an increase in money supply and credit prior to the Financial Crisis.

7.1.3 Bubble Economy

According to the seven-stage dynamic crisis model, monetary expansion may facilitate speculation in asset markets, driving up prices of housing and stocks. In turn, the rapid increase in asset prices may cause asset bubbles, which are also a characteristic of financial instability.

Our deviation analysis on the cyclical values of housing prices and stock prices is presented in Figure 6.9 and Figure 6.10. The results indicate that all reported peaks regarding the house price index exhibit substantial positive deviations from the trend. Similarly, the stock index exhibits a substantial positive deviation from the trend during all analyzed crises, except for the Parity Crisis. In total, these findings indicate substantial growth in either housing prices or stock prices during all periods. Thus, we cannot rule out the possibility of bubble tendencies in the asset markets for the examined crises.

However, to assess the relationship between monetary expansion and increases in asset prices methodically, the results of the correlation analysis in Section 6.3 must be examined. Our results indicate a moderate to strong positive correlation between the monetary indicators and asset prices for most analyzing periods. This indicates a procyclical relationship between the variables. When the HPI serves as the dependent variable, the strongest correlations for all monetary indicators are observed during the period 1913-1936. This is illustrated in Table 6.3 when the monetary indicators are contemporaneous. These results indicate that the monetary variables and the housing prices co-vary during the three crises within the interwar period. This aligns with the theory that monetary expansion drives up prices in asset markets, contributing to bubble tendencies.

For the other periods for HPI, we observe the strongest correlations when the monetary indicators are lagging by two and three years in Tables 6.2, 6.4, and 6.5. When the stock index serves as the dependent variable, the strongest correlations for most monetary indicators are observed during the period 1915-1936. This is illustrated in Table 6.6, when the monetary indicators are lagging by two years. Moreover, in Tables 6.7 and 6.8, the monetary indicators exhibit the strongest correlations with the stock index when they lag by one or two years. Collectively, these results suggest that the monetary indicators typically reach their peaks later than the asset prices during several of our analyzing periods. These findings indicate that following increased activity in the asset markets, more financial institutions want to extend

their lending, thereby contributing to the upbuilding of asset bubbles. This aligns with the third phase of Minsky's model which involves reduced control and excess of lending.

Another aspect of the seven-stage model entails observing speculative behavior when capital is injected into the asset markets, after the real economy has reached a saturation point. Examining the cyclical values of GDP per capita in conjunction with the indicators for HPI and the stock index, we observe four instances in which the output gap reaches its turning points before the asset prices. During the Kristiania Crisis and the Great Depression, the turning points in GDP occur before HPI. As for the Banking Crisis, the turning point in GDP occur before HPI and the stock index. The years of the turning points are illustrated in Table 7.1, and the corresponding cyclical values can be found in Appendix A. Overall, these results indicate a speculative behavior which aligns with the seven-stage dynamic crisis model.

Crises	GDP per Capita	HPI	Stock Index
The Kristiania Crisis	1897	1898	
The Great Depression	1930	1933	
The Banking Crisis	1986	1987	1990

Table 7.1 - The year of the turning point in the output gap and asset prices.

7.1.4 Nervousness and Turning Point

The fourth and fifth phases of the seven-stage dynamic crisis model concern the stages of nervousness and the turning point. As the model argues that segments of these two phases often lie within the same period, we consider it appropriate to study them in conjunction.

In connection with the nervousness phase, it is appropriate to investigate whether our results indicate volatile asset markets during the crisis periods. Table 7.2 presents the number of years from the peak to the point where the HPI and stock index indicators exhibit negative deviations from the trend.

Crises	HPI	Stock Index
The Kristiania Crisis	3	
The Post-war Depression	2	3
The Great Depression	5	2
The Stagflation	2	2
The Banking Crisis	3	1
The Financial Crisis		2

Table 7.2 - The number of years from peak to negative deviation from the trend in asset prices.[7]

Table 7.2 reveals rapid decreases in housing prices and the stock index during most crises. We observe rapid declines in one or both asset markets, as the maximum number of years is three for most crises. This aligns with the seven-stage model, which posits nervous asset markets where participants withdraw simultaneously. However, for the Great Depression, the rapid decline in the stock index after 1929 is considered somewhat unexpected. This finding does not align with our historical review, which indicates the absence of a stock market crash in Norway during this period. However, since the Great Depression occurred right after a prolonged contraction following the first interwar crises, the HP-filter may capture the recovery in the stock market as too significant. Consequently, the cyclical values may appear artificially high. Thus, one may not assign excessive significance to the finding of a swift decline in the stock index associated with this crisis.

Furthermore, the seven-stage dynamic model emphasizes that a nervous market is characterized by a tightening of lending. Therefore, to identify when optimism turned into pessimism, it is crucial to examine the turning points in asset markets in relation to credit tightening. The years of the turning points in asset markets relative to the turning points in the credit indicators[8] are illustrated in Table 7.3, which is extracted from Appendix A.

[7] The Parity Crisis is excluded from further discussion in this section because it is not associated with a significant housing or stock market crash.

[8] The term “credit indicators” include the indicators C3, commercial bank loans and private bank loans.

Crises	HPI	Stock Index	C3	Private Bank Loans	Commercial Bank Loans
The Kristiania Crisis	1898		1900	1900	1900
The Post-War Depression	1914	1918	1920	1920	1920
The Parity Crisis	1914		1920	1920	1920
The Great Depression	1933	1929	1920	1920	1920
The Stagflation	1972	1973	1967	1971	1972
The Banking Crisis	1987	1990	1989	1987	1987
The Financial Crisis	2007	2007	2008	2008	

Table 7.3 - The year of the turning point in asset prices and credit indicators.[9]

Table 7.3 reveals that most crises exhibit significant contractions in C3 and the bank loan indicators following a decline in asset prices. Collectively, this indicates that banks and financial institutions tend to tighten their lending practices following substantial declines in asset markets. This is supported by a tightened monetary policy during the Kristiania Crisis, the Post-War Depression, and the Banking Crisis, which is apparent through an increase in the policy rate in Figure 6.11.

The Great Depression and the Stagflation stand out from the other crises, as Table 7.3 reveal tendencies of credit tightening before asset prices reach their peaks. Thus, the turning point in the asset markets seems to have occurred after credit tightening among banks and financial institutions. For the Great Depression, the results may be explained by the prolonged contraction following the preceding interwar crises. In relation to the Stagflation, the findings may suggest that participants in the asset markets withdraw when confronted with stringent lending conditions.

The pattern of credit tightening following the turning points in the housing and stock market corresponds to what Minsky refers to as the Minsky Moment. The results from the correlation analysis support this reasoning in several of our analyzing periods. From Tables 6.2, 6.4, and 6.5, the correlation analysis reveals a moderate to strong positive relationship between C3 and HPI when C3 is used as a two-year lagging indicator. Moreover, in Tables 6.6, 6.7, and 6.8,

[9] The stock index for the Parity Crisis is excluded from this table, as the crisis does not exhibit a significant decline in the stock price.

we observe a strong positive relationship between the credit indicators and the stock index when the credit variables are used as one- or two-year lagging indicators. Furthermore, the results from Table 6.3 reveal strong positive correlations between the monetary indicators and HPI when the indicators are contemporaneous. In total, these results indicate a procyclical relationship between credit and asset prices, with credit tending to decline following a fall in asset prices.

7.1.5 Crisis

The sixth phase of the seven-stage dynamic crisis model describes the characteristics of a financial crisis. These characteristics include a cessation of growth in credit and money supply, a significant decline in asset prices, and a substantial increase in bankruptcy rates. Based on the deviation analysis in Section 6.2, we will discuss whether the seven crises analyzed exhibit these characteristics.

When examining the Kristiania Crisis, the deviations from trend turn negative for the monetary indicators around 1904. Additionally, we observe deep troughs for all the monetary indicators. These findings indicate that the growth in monetary indicators halt after 1904. Furthermore, we observe the deviation in HPI turn negative in 1903 and reach a significant trough in 1905. The negative deviations in HPI, may suggest significant losses in asset markets. Furthermore, we observe a significantly deep trough in the bankruptcies indicator in 1903, after the real-estate crash in 1899. Collectively, these findings indicate that the characteristics of a financial crisis were apparent during the Kristiania Crisis.

When examining the interwar crises, the deviation from trend turns negative for the monetary indicators around 1923. Additionally, we observe negative deviations over an extended period, and substantial troughs for all monetary indicators. These findings indicate that the growth in monetary indicators halt in the years after 1923. For the Post-War Depression and Parity Crisis, we observe the deviations in HPI turn negative in 1916 and reach significantly deep troughs in 1921 and 1924, respectively. However, during the Great Depression we do not observe negative deviations in HPI over an extended period, except for a relatively modest trough in 1938.

Regarding the stock index, the Post-War Depression and the Great Depression exhibit negative deviations from trend from 1921 and 1931, respectively. Both crises also exhibit significant troughs in the stock index. Conversely, the Parity Crisis does not exhibit significant negative deviations in the stock index, except for a relatively modest trough in 1926. The negative deviations in asset prices suggest significant losses in one or both markets during the interwar crises.

Furthermore, the findings in our analysis suggest an increase in the number of bankruptcies in relation to the interwar crises. For the Post-War Depression and Parity Crisis, the bankruptcies indicator exhibits a substantial positive deviation from trend at their troughs in 1921 and 1926, respectively. The Great Depression also exhibits a positive deviation from trend at its trough in 1932, but it was less significant than for the previous crises. Collectively, these findings indicate that the characteristics of a financial crisis are apparent during the interwar crises.

When examining the Stagflation, the deviations from trend in C3 and M2 turn negative in the first half of the 1970s. Additionally, we observe significant troughs for both indicators in 1974 and 1979, respectively. These findings indicate that the growth in credit and money supply halt at the beginning of the 1970s. Furthermore, our findings suggest a stagnation in borrowing activity around the mid-1970s, as deviations from trend turn negative in 1978 for both bank loan indicators.

Additionally, we observe negative deviations in HPI and stock index from 1974 and 1977, respectively. We also observe significant troughs in both indicators. The negative deviations in HPI and stock index suggest significant losses in asset markets, with the stock index exhibiting the most substantial decline. Furthermore, the bankruptcies indicator exhibits substantial positive deviations from trend, especially at its trough in 1973. Thus, our findings suggest an increase in the number of bankruptcies in relation to the Stagflation. Collectively, these findings reveal that the Stagflation exhibits characteristics of a financial crisis.

When examining the Banking Crisis, the deviation from trend turns negative in 1993 for the C3 indicator, and in 1997 for the M2 indicator. Additionally, we observe significant troughs for both indicators. These findings indicate that the growth in credit and money supply halt around 1993. Furthermore, our findings suggest a stagnation in borrowing activity towards the end of the crisis, as deviations from trend turn negative in 1993 for both bank loan indicators.

Additionally, we observe negative deviations for HPI and the stock index from 1990 and 1991, respectively. Both indicators exhibit a significant trough in 1992. The negative deviations in HPI and stock index suggest significant losses in both asset markets. Furthermore, the bankruptcies indicator exhibits substantial positive deviations from trend from 1988, and a significant trough in 1992. This occurred after the extensive housing market crash in 1987. Thus, we observe an increase in the number of bankruptcies in relation to the Banking Crisis. Collectively, these findings indicate that characteristics of a financial crisis are apparent during the Banking Crisis.

When examining the Financial Crisis, the deviation from trend turns negative in 2011 for the C3 indicator, and in 2015 for the M2 indicator. These years also represent the troughs during the Financial Crisis. Collectively, these findings indicate a halt in the growth in credit and money supply in the years after the crisis. Furthermore, our findings suggest a stagnation in borrowing activity towards the end of the crisis, as deviations from trend turn negative in 2010 for the private bank loans indicator.

Additionally, we observe negative deviations in the stock index at its trough in 2009 and the years after. The negative deviations in the stock index suggest significant losses in the stock market. For the HPI, we observe a decline from 2008 until 2010, but we do not observe negative deviations during or after the Financial Crisis. Since our results do not reveal negative deviations, it may indicate that HPI has not reached an actual trough. The explanation for the rapid recovery in housing prices after the crisis may be attributed to the particularly strong interest rate channel of Norges Bank (NOU, 2011, p. 77). This is supported by a declining trend in the policy rate in the years after the Financial Crisis, as illustrated in Figure 6.11. Furthermore, the bankruptcies indicator exhibits a substantial trough in 2009, after an extensive stock market crash in 2008. Thus, we observe a significant increase in the number of bankruptcies in relation to the Financial Crisis. Collectively, these findings indicate that characteristics of a financial crisis are apparent during the Financial Crisis of 2008.

7.1.6 Spreading

The final phase of the seven-stage dynamic crisis model is characterized by stagnation in economic value generation and increasing unemployment. Based on the deviation analysis in Section 6.2, we will examine if each crisis exhibits these characteristics, and whether this suggests that each crisis has spread to the real economy.

When the overall economic value generation stagnates over time, it may indicate that the financial crisis has spread to other markets. For the Kristiania Crisis, this can be observed in the deviation analysis where the GDP and manufacturing VA indicators exhibit negative deviations in the years 1901-1906 and 1903-1906, respectively. When GDP remains significantly below trend for several years, it suggests a sustained decline in a country's overall economic activity. This is further substantiated by a stagnation in the manufacturing VA indicator, signifying a contraction in production activity within a significant industrial sector. We also observe positive deviations in unemployment, from 1903 until its trough in 1905. Collectively, these findings suggest a stagnation in value generation and increasing unemployment during the Kristiania Crisis, indicating a spreading to the real economy.

When studying the GDP and manufacturing VA indicators for the interwar crises, our findings indicate stagnation in the economic value generation towards the end of these crises. This is apparent as the GDP and manufacturing indicators exhibit negative deviations from trend during most of the 1920s and the first half of the 1930s. We also observe significant troughs in unemployment during each crisis. Collectively, these results suggest a stagnation in value generation and increasing unemployment during the interwar crises, indicating a spreading to the real economy.

When studying the Stagflation, the GDP indicator exhibits relatively small deviations from the trend during the 1970s, with deviations fluctuating around zero percent in the second half of the decade. Moreover, the manufacturing VA does not exhibit negative deviations during the 1970s, or significant and prolonged negative deviations in the following years. Hence, the overall economic value generation does not seem to exhibit a considerable contraction during the crisis. Furthermore, we observe large fluctuations between positive and negative deviations from trend in the unemployment indicator throughout the 1970s. Thus, the increase in unemployment did not persist over an extended period. Collectively, these findings suggest

the Stagflation encounters a correction rather than a spreading to the real economy.

When studying the GDP indicator for the Banking Crisis, our findings indicate profound negative deviations in the years 1988-1995. Similarly, we observe considerably negative deviations for the manufacturing VA indicator in the years 1988-1996. Furthermore, we observe significant positive deviations in unemployment in the years 1989-1996. Collectively, these findings suggest a stagnation in value generation and increasing unemployment during the Banking Crisis, indicating a spreading to the real economy.

When studying the Financial Crisis, the GDP indicator exhibits declining positive deviations from trend in the years 2007-2009, with deviations fluctuating around zero percent towards the end of the crisis. Moreover, the manufacturing VA does not exhibit significant negative deviations during the crisis. Hence, the overall economic value generation does not seem to demonstrate a considerable contraction during the crisis. Furthermore, the unemployment indicator only exhibits a relatively modest negative deviation in 2010. Thus, we observe an increase in unemployment but it was not pronounced, nor did it persist over an extended period. Collectively, these findings suggest the Financial Crisis encounters a correction rather than a spreading to the real economy.

Overall, the Stagflation and the Financial Crisis are the only crises that do not appear to progress into real economic crises. This may be explained by a strong hegemonic power during both crises. During the Stagflation, we know that the Norwegian authorities introduced several initiatives for economic relief, in addition to costly rescue packages. Similarly, during the Financial Crisis, Norges Bank adopted a proactive approach to interest rate adjustments, alongside measures to ensure liquidity. Thus, one could argue that the Norwegian authorities and Norges Bank played a significant role in containing real economic damages during both crises.

7.2 Implications of Financial Instability

Our findings from the phase of disruption indicate that all crisis progressions are initiated by a macroeconomic shock to either the supply side or the demand side of the economy. We have identified shocks with repercussions on the demand side of the economy preceding all seven crises. However, the interwar crises also exhibit disturbances on the supply side of the

economy. Nevertheless, our analysis suggests that all included crises are subjected to a significant change, which contributes to increasing optimism and demand, in addition to promoting growth in credit and money supply. Overall, this aligns with the disturbance in both Kindleberger's phase of monetary expansion and Minsky's phase of displacement.

Based on the findings from the phase of overheating, our analysis indicates a monetary expansion and overheating preceding all seven crises. This relies on the assumption that all interwar crises were affected by the consequences of World War I. Moreover, during the phase of the bubble economy, our findings indicate bubble tendencies in asset markets. This is apparent as we observe significant and rapid increases in housing and stock prices preceding all crises. Our results also reveal a close interconnection between the two phases, demonstrating a relationship between monetary expansion and speculation in asset markets. This is apparent in the correlation analysis, which suggests a procyclical relationship between the monetary variables and asset prices during all crisis periods. Collectively, disturbances to the economy resulting in significant increases in credit and money supply, along with substantial fluctuations in asset prices, indicate the presence of financial instability during all crises analyzed.

Our findings in the phase of nervousness suggest that heightened nervousness in asset markets leads to volatile markets characterized by large price fluctuations. Rapid price increases followed by rapid declines in asset markets, suggest the presence of asset crashes during most crises. Subsequently, we observe a shift from optimism to pessimism, which indicates the turning point of the crisis buildup. The turning point is apparent in our correlation analysis, which reveals a procyclical relationship between credit and asset prices. This suggests that credit tends to decrease after a decline in asset markets. These findings correspond to the Minsky Moment, where fewer market participants want to invest and financial institutions tighten their lending restrictions.

The findings from the crisis phase indicate that all examined crises can be categorized as financial crises. This is apparent as we observe a cessation in the growth of credit and money supply during economic downturns, a stagnation in borrowing activity, significant losses in asset markets, and significant increases in the number of bankruptcies. While this pattern remains consistent across all crises, the magnitude of the changes varies across different crisis periods.

From the phase of spreading, our findings reveal five out of seven examined crises exhibit characteristics that suggest they have evolved into real economic crises. Our results reveal stagnation in value generation and increasing unemployment during five crises, indicating a spreading to the real economy. The only exceptions are the Stagflation and the Financial Crisis which seem to have encountered a correction rather than a spreading to the real economy. In both crises, the decline in value generation and increase in unemployment appears neither profound nor prolonged. Furthermore, our historical review provides evidence of a strong hegemonic power during both crises, which may have played a significant role in mitigating real economic repercussions.

8. Conclusions

The objective of this study has been to examine the empirical implications of financial instability during the development of Norwegian financial crises. To answer our research question, we examined seven financial crises in the period 1899-2010. We conducted analyses of each individual crisis to assess whether a recurring pattern emerges across multiple crisis periods.

We conducted a deviation analysis to demonstrate changes in macroeconomic and financial indicators during each crisis period. In this analysis, we computed the percentage deviations from trend for eleven distinct indicators, employing an HP filter to calculate the underlying trend for each indicator. This approach allowed us to investigate the magnitude and timing of the peaks and troughs during each crisis. Furthermore, we conducted a correlation analysis to assess whether the monetary variables were leading, contemporaneous, or lagging indicators in relation to the HPI and stock index.

The results from the deviation analysis revealed a procyclical pattern in all monetary indicators. For C3 and M2, the findings indicated a significant expansion in the years leading up to the crises, followed by a contraction in the growth of credit and money supply. For the bank loan indicators our findings suggested that financial institutions exhibited elevated growth in lending preceding the crises, followed by a significant decline in lending. In relation to the GDP and manufacturing VA indicators, we observed a pattern where both indicators tended to increase in the years leading up to the crises, followed by a decline during or after the crises. For the bankruptcies and unemployment indicators, our results revealed significant increases in both indicators during all crises. Moreover, we observed a pattern where the HPI and stock index tended to increase prior to or at the beginning of the crises, followed by a significant decline during the crises. Finally, we observed policy rates below trend preceding the crises, and increased policy rates during all crises.

The correlation analysis revealed that the monetary indicators covaried with housing prices during the interwar crises. This aligns with the financial instability hypothesis, which emphasizes that monetary expansion stimulates price increases in the housing market. During the other crises, the correlation analysis revealed a pattern where credit tightening tended to occur following the turning points in the housing and stock market. This suggested that

nervousness emerged in asset markets, subsequently spread to money and credit markets, and consequently imposed stricter credit constraints.

Overall, our findings revealed that economic disturbances lead to a rapid expansion in money supply and credit. In turn, this resulted in an overheating of the economy and bubble tendencies in asset markets. Collectively, these characteristics indicate the presence of financial instability within the economy during all crises. Eventually, market nervousness emerged, leading to a turning point within the overheated economy. Consequently, the economy experienced crashes and crises, and in certain instances the crises spread to the real economy. In total, our findings indicated a pattern of significant positive cyclical values for most indicators prior to the crises, followed by substantial negative cyclical values during or after all seven crises. The only exceptions were the bankruptcies and unemployment indicators which exhibited an inverse pattern. Hence, the pattern observed for all indicators is in line with the theories of Minsky and Kindleberger, emphasizing the importance of the financial instability hypothesis in explaining economic crises.

In total, our analysis has identified a consistent pattern of implications resulting from financial instability in the development of financial crises. However, we cannot conclude that this pattern consistently recurs in all previous and future crises, based solely on this analysis. Thus, it may be imperative to perform further analyses concerning the relationship between monetary variables and asset prices. This will strengthen the foundation for drawing conclusions regarding the correlation between monetary expansion and asset inflation. Furthermore, to conclusively determine the presence of asset bubbles, one may conduct bubble tests. Nevertheless, we have examined a large quantity of indicators and crises, providing us with a solid foundation to discuss the implications of financial instability. Consequently, our findings reveal a pattern which provides a more comprehensive understanding of how financial instability manifests during Norwegian financial crises.

9. References

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10. Appendix A

The Kristiania Crisis										
Year	C3	M2	Private Banks Loans	Commercial Bank Loans	GDP per Capita	Manufacturing VA	Bankruptcies	Unemployment	HPI
1896	-0.68	-6.00	-8.42	-22.50	3.15	-7.11	-17.98		16.00
1897	-0.17	-1.25	-5.25	-13.62	5.46	-2.23	-21.18		18.67
1898	0.53	1.83	4.93	6.43	4.75	4.72	-28.83		24.38
1899	1.47	1.21	4.55	5.99	2.45	9.95	17.70		21.90
1900	4.67	5.08	8.62	16.06	0.99	5.24	12.09	-12.93	2.26
1901	2.67	5.83	6.88	14.40	-0.55	3.29	22.40	-4.40	-0.08
1902	0.95	1.39	2.45	7.65	-1.27	0.53	12.95	-0.98	2.74
1903	2.29	-0.71	0.81	4.36	-2.84	-3.58	32.15	7.52	-0.07
1904	-0.97	-3.00	-2.57	-1.39	-3.59	-4.80	6.45	11.48	-6.69
1905	-3.35	-5.78	-5.08	-4.09	-4.16	-4.98	-0.44	20.86	-14.86
1906	-3.65	-1.78	-3.99	-2.08	-0.52	-0.61	-7.40	-3.03	-5.04
1907	-1.91	0.47	-1.42	2.36	0.05	1.34	-23.23	-17.07	-11.17
1908	-0.43	-0.06	0.69	5.48	1.27	4.95	-7.01	-1.71	-8.72

Table 10.1 - Cyclical Values of financial and macroeconomic indicators for the Kristiania Crisis. Cyclical values of HPI are based on real figures.

The Post-War Depression

Year	C3	M2	Private Bank Loans	Commercial Bank Loans	GDP per Capita	Manufacturing VA	Bankruptcies	Unemployment	HPI	Stock Index
1914	-29.73	-38.17	-39.28	-49.11	4.95	6.45	20.91	35.02	28.26	
1915	-32.51	-36.12	-38.45	-45.30	6.32	14.21	12.38	6.29	3.01	-43.52
1916	-17.59	-17.13	-18.15	-17.03	9.58	17.58	-58.56	-44.56	-4.37	2.24
1917	-0.82	3.95	2.14	10.01	-2.69	9.65	-75.03	-52.94	-18.23	31.19
1918	11.39	18.11	17.57	26.26	-8.78	-2.95	-74.98	-51.94	-23.04	54.43
1919	16.97	20.57	24.91	32.86	1.48	2.16	-62.56	-52.76	-21.41	17.71
1920	24.43	23.32	30.24	38.02	4.70	4.78	-34.31	-51.37	-23.70	6.15
1921	18.84	20.71	20.70	24.94	-7.95	-18.32	53.07	59.94	-30.68	-30.67
1922	8.50	16.11	9.99	10.53	-3.84	-8.41	28.53	54.45	-13.17	-33.91
1923	1.65	-1.30	0.22	-5.13	0.61	-3.87	11.05	1.13	-6.47	-25.38
1924	-0.94	-2.20	-3.01	-8.00	-1.64	0.30	-1.84	-30.45	-18.18	-4.98
1925	-3.97	-5.21	-0.45	-3.86	-4.94	3.36	-3.71	-15.64	-16.51	1.25
1926	-7.48	-5.61	-7.67	-14.26	-7.19	-8.92	39.37	19.36	-9.96	-3.09
1927	-6.59	-10.75	-10.19	-17.75	-3.75	-9.50	36.82	12.52	-3.88	-0.47
1928	-5.39	-9.32	-10.97	-18.16	-1.89	-4.81	10.34	-4.52	4.94	7.25

Table 10.2 - Cyclical Values of financial and macroeconomic indicators for the Post-War Depression. Cyclical values of HPI are based on real figures.

The Parity Crisis										
Year	C3	M2	Private Bank Loans	Commercial Bank Loans	GDP per Capita	Manufacturing VA	Bankruptcies	Unemployment	HPI	Stock Index
1914	-29.73	-38.17	-39.28	-49.11	4.95	6.45	20.91	35.02	28.26	
1915	-32.51	-36.12	-38.45	-45.30	6.32	14.21	12.38	6.29	3.01	-43.52
1916	-17.59	-17.13	-18.15	-17.03	9.58	17.58	-58.56	-44.56	-4.37	2.24
1917	-0.82	3.95	2.14	10.01	-2.69	9.65	-75.03	-52.94	-18.23	31.19
1918	11.39	18.11	17.57	26.26	-8.78	-2.95	-74.98	-51.94	-23.04	54.43
1919	16.97	20.57	24.91	32.86	1.48	2.16	-62.56	-52.76	-21.41	17.71
1920	24.43	23.32	30.24	38.02	4.70	4.78	-34.31	-51.37	-23.70	6.15
1921	18.84	20.71	20.70	24.94	-7.95	-18.32	53.07	59.94	-30.68	-30.67
1922	8.50	16.11	9.99	10.53	-3.84	-8.41	28.53	54.45	-13.17	-33.91
1923	1.65	-1.30	0.22	-5.13	0.61	-3.87	11.05	1.13	-6.47	-25.38
1924	-0.94	-2.20	-3.01	-8.00	-1.64	0.30	-1.84	-30.45	-18.18	-4.98
1925	-3.97	-5.21	-0.45	-3.86	-4.94	3.36	-3.71	-15.64	-16.51	1.25
1926	-7.48	-5.61	-7.67	-14.26	-7.19	-8.92	39.37	19.36	-9.96	-3.09
1927	-6.59	-10.75	-10.19	-17.75	-3.75	-9.50	36.82	12.52	-3.88	-0.47
1928	-5.39	-9.32	-10.97	-18.16	-1.89	-4.81	10.34	-4.52	4.94	7.25
1929	-3.75	-5.68	-7.93	-11.66	3.01	5.84	-6.71	-20.41	10.55	17.32
1930	-2.76	-2.96	-8.50	-12.10	5.52	9.68	-12.63	-22.46	5.92	6.09

Table 10.3 - Cyclical Values of financial and macroeconomic indicators for the Parity Crisis. Cyclical values of HPI are based on real figures.

The Great Depression										
Year	C3	M2	Private Bank	Commercial Bank Loans	GDP per Capita	Manufacturing VA	Bankruptcies	Unemployment	HPI	Stock Index
1920	24.43	23.32	30.24	38.02	4.70	4.78	-34.31	-51.37	-23.70	6.15
1921	18.84	20.71	20.70	24.94	-7.95	-18.32	53.07	59.94	-30.68	-30.67
1922	8.50	16.11	9.99	10.53	-3.84	-8.41	28.53	54.45	-13.17	-33.91
1923	1.65	-1.30	0.22	-5.13	0.61	-3.87	11.05	1.13	-6.47	-25.38
1924	-0.94	-2.20	-3.01	-8.00	-1.64	0.30	-1.84	-30.45	-18.18	-4.98
1925	-3.97	-5.21	-0.45	-3.86	-4.94	3.36	-3.71	-15.64	-16.51	1.25
1926	-7.48	-5.61	-7.67	-14.26	-7.19	-8.92	39.37	19.36	-9.96	-3.09
1927	-6.59	-10.75	-10.19	-17.75	-3.75	-9.50	36.82	12.52	-3.88	-0.47
1928	-5.39	-9.32	-10.97	-18.16	-1.89	-4.81	10.34	-4.52	4.94	7.25
1929	-3.75	-5.68	-7.93	-11.66	3.01	5.84	-6.71	-20.41	10.55	17.32
1930	-2.76	-2.96	-8.50	-12.10	5.52	9.68	-12.63	-22.46	5.92	6.09
1931	1.48	-3.36	-6.02	-8.58	-5.26	-11.18	-18.85	15.61	12.60	-11.79
1932	0.43	-4.10	-5.25	-9.01	-4.46	-7.21	8.21	21.52	13.26	-25.11
1933	-2.75	-4.92	-5.20	-6.70	-3.53	-9.09	-6.96	24.70	14.85	-15.86
1934	-3.68	-5.58	-4.48	-6.30	-3.41	-7.61	-13.06	12.73	6.16	-13.11
1935	-3.38	-1.82	-1.78	-1.75	-0.91	-1.58	-19.90	7.86	2.06	-5.38
1936	-2.39	-2.80	-1.77	-0.50	1.85	4.79	-18.61	-0.96	7.18	7.82
1937	-0.86	1.90	1.58	5.81	4.92	8.21	-17.70	-12.41	2.91	26.98
1938	2.11	7.34	4.64	9.52	4.49	4.68	3.89	-12.30	-4.97	5.77
1939	7.14	7.79	15.02	24.07	6.43	10.30	44.01	-20.95	0.03	0.75

Table 10.4 - Cyclical Values of financial and macroeconomic indicators for the Great Depression. Cyclical values of HPI are based on real figures.

The Stagflation

Year	C3	M2	Private Bank Loans	Commercial Bank Loans	GDP per Capita	Manufacturing VA	Bankruptcies	Unemployment	HPI	Stock Index
1960	2.72	2.23	2.27	-3.47	-3.28	-9.12	-7.01	23.38	-2.61	4.91
1961	6.19	2.14	5.95	6.30	-1.64	-6.58	4.67	-7.85	-3.84	15.82
1962	7.51	3.35	7.82	6.81	-2.77	-8.16	-2.34	12.30	-3.64	2.97
1963	7.24	2.90	7.39	5.13	-3.16	-5.98	-0.83	32.60	0.25	-7.53
1964	9.21	3.04	8.65	6.88	-2.63	-0.69	8.37	12.27	-1.32	-1.12
1965	9.76	4.93	7.42	5.94	-1.72	2.03	-8.07	-8.28	3.82	-2.40
1966	11.40	4.14	8.97	10.89	-2.08	2.40	-2.22	-19.16	4.19	-10.39
1967	11.54	3.17	8.34	10.71	-0.31	-0.03	-7.75	-20.72	3.24	-20.10
1968	7.28	3.61	7.32	10.55	-2.30	2.34	-12.36	5.61	3.53	-18.84
1969	3.85	1.32	10.64	15.58	-1.92	6.25	-1.54	1.17	6.55	-8.55
1970	1.11	3.28	11.64	15.09	-4.16	3.68	-8.12	-30.24	7.71	9.97
1971	-0.98	2.18	12.05	16.55	-2.92	3.59	-5.46	-34.47	5.08	17.65
1972	-3.88	0.77	11.45	17.67	-2.07	6.05	19.87	30.09	8.95	6.92
1973	-4.81	-0.82	7.04	15.62	-1.96	10.08	48.62	7.32	4.97	56.50
1974	-7.69	-3.50	6.01	12.56	-2.23	12.30	45.71	0.64	-1.81	40.89
1975	-4.27	-3.26	4.50	11.55	-1.50	7.65	22.22	45.28	-3.52	-0.61
1976	-2.70	-0.55	3.43	8.65	0.24	5.56	-2.90	7.53	-10.06	2.16
1977	1.04	2.11	0.94	5.86	0.48	4.21	-6.23	-15.17	-2.70	-14.17
1978	-2.47	-0.27	-4.31	-3.87	0.56	1.13	4.04	-3.86	-1.29	-29.13
1979	-8.09	-15.57	-9.21	-12.16	1.20	4.50	8.34	0.49	-0.77	-13.94
1980	-7.89	-0.69	-15.48	-17.47	2.15	2.35	-11.26	-20.01	-4.04	-10.44
1981	-8.83	-2.32	-18.20	-19.50	0.23	-0.31	-20.49	-12.30	7.70	-15.61
1982	-5.63	-4.05	-20.63	-20.33	-2.95	-0.94	-21.33	5.91	15.96	-28.29
1983	-5.81	-5.79	-20.93	-20.17	-2.48	-3.79	-14.77	28.56	10.60	-12.47
1984	-2.54	2.08	-12.17	-12.04	0.11	1.22	-24.52	12.37	10.32	11.21
1985	-3.17	5.31	-0.14	-3.53	2.35	5.00	-34.43	-15.28	9.48	17.01

Table 10.5 - Cyclical Values of financial and macroeconomic indicators for the Stagflation. Cyclical values of HPI are based on real figures.

The Banking Crisis

Year	C3	M2	Private Bank Loans	Commercial Bank Loans	GDP per Capita	Manufacturing VA	Bankruptcies	Unemployment	HPI	Stock Index
1980	-7.89	-0.69	-15.48	-17.47	2.15	2.35	-11.26	-20.01	-4.04	-10.44
1981	-8.83	-2.32	-18.20	-19.50	0.23	-0.31	-20.49	-12.30	7.70	-15.61
1982	-5.63	-4.05	-20.63	-20.33	-2.95	-0.94	-21.33	5.91	15.96	-28.29
1983	-5.81	-5.79	-20.93	-20.17	-2.48	-3.79	-14.77	28.56	10.60	-12.47
1984	-2.54	2.08	-12.17	-12.04	0.11	1.22	-24.52	12.37	10.32	11.21
1985	-3.17	5.31	-0.14	-3.53	2.35	5.00	-34.43	-15.28	9.48	17.01
1986	6.98	-1.85	16.38	12.63	3.17	4.11	-40.40	-39.70	29.62	5.22
1987	12.29	4.36	23.04	18.77	1.70	5.67	-24.83	-41.60	43.35	6.43
1988	14.63	1.40	19.06	10.36	-1.82	-0.01	24.55	-17.89	30.51	-16.99
1989	15.77	2.47	19.45	10.96	-3.91	-4.49	31.33	16.78	4.90	22.78
1990	12.68	1.02	13.35	4.97	-4.84	-6.06	2.32	16.56	-8.89	33.50
1991	5.97	6.31	4.26	5.52	-4.73	-8.94	25.25	17.78	-21.29	-1.77
1992	2.02	8.46	1.10	2.63	-4.27	-8.55	41.59	22.82	-31.80	-27.19
1993	-1.52	1.80	-3.38	-4.67	-4.45	-7.49	25.54	23.56	-31.67	-16.48
1994	-6.41	1.37	-7.80	-11.69	-2.51	-5.55	-11.24	11.84	-26.05	-5.78
1995	-8.35	0.66	-8.78	-13.27	-1.25	-5.95	-13.44	3.49	-25.48	-8.49
1996	-7.66	0.46	-9.38	-8.16	1.00	-2.57	-13.08	4.44	-22.26	-0.70
1997	-4.02	-3.31	-2.62	0.69	3.62	1.35	-14.90	-9.75	-17.54	29.09
1998	-1.55	-5.06	-1.64	4.41	3.68	-0.28	-13.48	-25.02	-12.27	14.04
1999	0.06	-2.09	-2.97	-1.43	3.16	-0.70	-15.55	-22.36	-7.67	1.97
2000	3.16	-0.79	-0.62	3.12	3.83	-2.26	-6.68	-15.05	-1.85	18.06

Table 10.6 - Cyclical Values of financial and macroeconomic indicators for the Stagflation. Cyclical values of HPI are based on real figures.

The Financial Crisis										
Year	C3	M2	Private Bank Loans	Commercial Bank Loans	GDP per Capita	Manufacturing VA	Bankruptcies	Unemployment	HPI	Stock Index
2000	3.16	-0.79	-0.62	3.12	3.83	-2.26	-6.68	-15.05	-1.85	18.06
2001	2.04	-0.50	-1.86	4.89	3.66	-3.96	-7.20	-10.46	-2.34	-1.28
2002	-2.92	-0.91	-5.77	-0.29	3.07	-5.56	16.14	1.70	-2.09	-28.41
2003	-8.07	-6.59	-7.87	0.59	1.88	-3.59	35.31	19.39	-7.33	-39.00
2004	-9.80	-7.07	-10.67		3.93	-0.26	11.33	21.57	-1.26	-16.21
2005	-5.57	-6.47	-3.69		4.67	2.49	-8.27	26.75	1.25	5.46
2006	-3.00	-0.27	3.31		5.18	3.87	-21.70	-4.42	7.45	30.68
2007	2.34	6.67	11.78		6.24	6.50	-27.21	-28.58	14.86	49.20
2008	8.51	5.92	12.31		4.44	8.31	-8.39	-22.24	4.89	7.35
2009	0.02	1.05	7.34		0.39	-0.61	23.85	-5.06	0.37	-23.52
2010	1.32	0.46	-0.68		-0.98	0.21	7.39	8.37	1.90	-8.56
2011	-0.91	0.37	-3.90		-2.07	1.04	3.37	-4.44	4.52	-7.16
2012	-0.24	0.11	-7.89		-1.49	2.26	-11.27	-9.01	6.77	-11.57
2013	0.66	1.45	-3.83		-2.48	4.82	4.01	2.47	4.92	-4.97
2014	2.66	2.40	3.28		-2.37	7.08	7.25	-5.13	2.05	2.48
2015	3.65	-2.49	2.17		-2.22	1.27	-2.34	16.04	2.52	-0.48
2016	0.44	-2.01	-1.61		-2.73	-3.81	-2.51	19.00	2.55	-8.90
2017	-0.88	-0.39	-0.01		-1.96	-4.26	-4.19	4.84	2.48	1.03
2018	-2.34	0.57	0.86		-2.20	-3.24	3.21	-6.22	-1.83	9.46
2019	-0.28	0.63	0.21		-2.71	-2.25	1.22	-9.63	-4.41	3.56

Table 10.7 - Cyclical Values of financial and macroeconomic indicators for the Financial Crisis. Cyclical values of HPI are based on real figures.

11. Appendix B

Subperiod 1

Year	C3	M2	Private Bank Loans	Commercial Bank Loans	GDP per Capita	Manufacturing VA	Bankruptcies	Unemployment	HPI
1885	1.21	1.96	5.85	1.73	-4.53	-13.70	1.44		-0.97
1886	0.71	-0.49	-0.05	-12.91	-4.55	-19.83	18.31		-8.07
1887	-0.04	-1.91	-3.85	-17.99	-5.07	-19.84	28.75		-1.60
1888	-1.11	-0.20	-4.40	-17.82	-2.78	-15.80	-15.30		-6.91
1889	-2.54	4.09	-1.57	-13.24	-1.25	-8.89	-34.94		-12.10
1890	-4.33	3.32	1.05	-13.88	0.21	-7.79	-37.79		-9.34
1891	-3.22	-1.72	0.21	-18.54	-1.30	-7.65	-9.70		-6.69
1892	-2.41	-2.74	-1.80	-20.25	-2.20	-8.44	25.23		-4.50
1893	-1.85	-4.33	-3.94	-22.66	-1.03	-10.05	8.95		10.11
1894	-1.43	-4.40	-6.12	-24.26	0.57	-6.51	-8.27		5.54
1895	-1.07	-3.35	-7.30	-22.75	2.96	-6.91	-16.10		11.27
1896	-0.68	-6.00	-8.42	-22.50	3.15	-7.11	-17.98		16.00
1897	-0.17	-1.25	-5.25	-13.62	5.46	-2.23	-21.18		18.67
1898	0.53	1.83	4.93	6.43	4.75	4.72	-28.83		24.38
1899	1.47	1.21	4.55	5.99	2.45	9.95	17.70		21.90
1900	4.67	5.08	8.62	16.06	0.99	5.24	12.09	-12.93	2.26
1901	2.67	5.83	6.88	14.40	-0.55	3.29	22.40	-4.40	-0.08
1902	0.95	1.39	2.45	7.65	-1.27	0.53	12.95	-0.98	2.74
1903	2.29	-0.71	0.81	4.36	-2.84	-3.58	32.15	7.52	-0.07
1904	-0.97	-3.00	-2.57	-1.39	-3.59	-4.80	6.45	11.48	-6.69
1905	-3.35	-5.78	-5.08	-4.09	-4.16	-4.98	-0.44	20.86	-14.86
1906	-3.65	-1.78	-3.99	-2.08	-0.52	-0.61	-7.40	-3.03	-5.04
1907	-1.91	0.47	-1.42	2.36	0.05	1.34	-23.23	-17.07	-11.17
1908	-0.43	-0.06	0.69	5.48	1.27	4.95	-7.01	-1.71	-8.72
1909	1.32	1.79	1.66	6.68	0.94	5.56	3.13	9.05	-6.80
1910	2.96	2.73	2.26	6.88	4.14	11.73	-5.54	-9.91	-1.60

Table 11.1 - Cyclical Values of financial and macroeconomic indicators for subperiod 1. Cyclical values of HPI are based on real figures.

Subperiod 2										
Year	C3	M2	Private Bank Loans	Commercial Bank Loans	GDP per Capita	Manufacturing VA	Bankruptcies	Unemployment	HPI	Stock Index
1911	12.23	10.97	6.08	9.65	0.60	-7.24	15.80	37.55	15.92	
1912	-9.53	-14.85	-22.63	-13.92	1.59	1.12	31.94	-6.89	17.81	
1913	-21.75	-28.77	-37.41	-27.96	5.26	7.67	19.89	4.29	22.14	
1914	-29.73	-38.17	-49.11	-39.28	4.95	6.45	20.91	35.02	28.26	
1915	-32.51	-36.12	-45.30	-38.45	6.32	14.21	12.38	6.29	3.01	-43.52
1916	-17.59	-17.13	-17.03	-18.15	9.58	17.58	-58.56	-44.56	-4.37	2.24
1917	-0.82	3.95	10.01	2.14	-2.69	9.65	-75.03	-52.94	-18.23	31.19
1918	11.39	18.11	26.26	17.57	-8.78	-2.95	-74.98	-51.94	-23.04	54.43
1919	16.97	20.57	32.86	24.91	1.48	2.16	-62.56	-52.76	-21.41	17.71
1920	24.43	23.32	38.02	30.24	4.70	4.78	-34.31	-51.37	-23.70	6.15
1921	18.84	20.71	24.94	20.70	-7.95	-18.32	53.07	59.94	-30.68	-30.67
1922	8.50	16.11	10.53	9.99	-3.84	-8.41	28.53	54.45	-13.17	-33.91
1923	1.65	-1.30	-5.13	0.22	0.61	-3.87	11.05	1.13	-6.47	-25.38
1924	-0.94	-2.20	-8.00	-3.01	-1.64	0.30	-1.84	-30.45	-18.18	-4.98
1925	-3.97	-5.21	-3.86	-0.45	-4.94	3.36	-3.71	-15.64	-16.51	1.25
1926	-7.48	-5.61	-14.26	-7.67	-7.19	-8.92	39.37	19.36	-9.96	-3.09
1927	-6.59	-10.75	-17.75	-10.19	-3.75	-9.50	36.82	12.52	-3.88	-0.47
1928	-5.39	-9.32	-18.16	-10.97	-1.89	-4.81	10.34	-4.52	4.94	7.25
1929	-3.75	-5.68	-11.66	-7.93	3.01	5.84	-6.71	-20.41	10.55	17.32
1930	-2.76	-2.96	-12.10	-8.50	5.52	9.68	-12.63	-22.46	5.92	6.09
1931	1.48	-3.36	-8.58	-6.02	-5.26	-11.18	-18.85	15.61	12.60	-11.79
1932	0.43	-4.10	-9.01	-5.25	-4.46	-7.21	8.21	21.52	13.26	-25.11
1933	-2.75	-4.92	-6.70	-5.20	-3.53	-9.09	-6.96	24.70	14.85	-15.86
1934	-3.68	-5.58	-6.30	-4.48	-3.41	-7.61	-13.06	12.73	6.16	-13.11
1935	-3.38	-1.82	-1.75	-1.78	-0.91	-1.58	-19.90	7.86	2.06	-5.38
1936	-2.39	-2.80	-0.50	-1.77	1.85	4.79	-18.61	-0.96	7.18	7.82
1937	-0.86	1.90	5.81	1.58	4.92	8.21	-17.70	-12.41	2.91	26.98
1938	2.11	7.34	9.52	4.64	4.49	4.68	3.89	-12.30	-4.97	5.77
1939	7.14	7.79	24.07	15.02	6.43	10.30	44.01	-20.95	0.03	0.75

Table 11.2 - Cyclical Values of financial and macroeconomic indicators for subperiod 2. Cyclical values of HPI are based on real figures.

Subperiod 3.1										
Year	C3	M2	Private Bank Loans	Commercial Bank Loans	GDP per Capita	Manufacturing VA	Bankruptcies	Unemployment	HPI	Stock Index
1947	7.75	2.94	-7.92	-0.80	8.83	5.67	-21.60	-15.93	8.85	-3.63
1948	1.98	1.65	0.70	2.15	9.40	8.53	-0.22	-6.70	8.30	1.67
1949	0.68	-0.42	1.14	-0.39	6.24	5.40	4.39	12.77	14.50	-8.30
1950	-0.33	-4.33	7.30	2.14	5.67	6.68	8.02	32.46	11.22	-6.05
1951	0.48	0.30	11.96	0.95	4.82	5.23	-11.19	12.10	-7.20	2.96
1952	-1.76	2.02	10.44	4.88	3.41	-3.23	-9.57	-7.87	-11.85	-2.47
1953	-1.02	2.45	5.90	3.72	3.46	-2.45	8.30	-17.65	-5.36	-12.65
1954	0.64	3.27	6.08	4.70	3.57	-3.89	10.46	-17.27	-20.01	-5.91
1955	2.05	2.52	2.68	1.54	0.69	-6.12	4.36	14.06	2.27	2.93
1956	0.92	3.35	-4.39	-2.73	0.94	-3.09	16.51	14.29	-0.17	15.88
1957	2.45	3.17	-6.30	-1.43	-0.42	-5.73	0.99	-16.80	-2.54	16.32
1958	2.39	2.07	-9.00	-2.35	-5.21	-12.63	10.08	-16.93	-1.75	-6.72
1959	3.12	2.55	-7.83	-0.62	-4.44	-13.19	-4.16	-6.96	-7.93	-1.82
1960	2.72	2.23	-3.47	2.27	-3.28	-9.12	-7.01	23.38	-2.61	4.91
1961	6.19	2.14	6.30	5.95	-1.64	-6.58	4.67	-7.85	-3.84	15.82
1962	7.51	3.35	6.81	7.82	-2.77	-8.16	-2.34	12.30	-3.64	2.97
1963	7.24	2.90	5.13	7.39	-3.16	-5.98	-0.83	32.60	0.25	-7.53
1964	9.21	3.04	6.88	8.65	-2.63	-0.69	8.37	12.27	-1.32	-1.12
1965	9.76	4.93	5.94	7.42	-1.72	2.03	-8.07	-8.28	3.82	-2.40
1966	11.40	4.14	10.89	8.97	-2.08	2.40	-2.22	-19.16	4.19	-10.39
1967	11.54	3.17	10.71	8.34	-0.31	-0.03	-7.75	-20.72	3.24	-20.10
1968	7.28	3.61	10.55	7.32	-2.30	2.34	-12.36	5.61	3.53	-18.84
1969	3.85	1.32	15.58	10.64	-1.92	6.25	-1.54	1.17	6.55	-8.55
1970	1.11	3.28	15.09	11.64	-4.16	3.68	-8.12	-30.24	7.71	9.97
1971	-0.98	2.18	16.55	12.05	-2.92	3.59	-5.46	-34.47	5.08	17.65
1972	-3.88	0.77	17.67	11.45	-2.07	6.05	19.87	30.09	8.95	6.92
1973	-4.81	-0.82	15.62	7.04	-1.96	10.08	48.62	7.32	4.97	56.50
1974	-7.69	-3.50	12.56	6.01	-2.23	12.30	45.71	0.64	-1.81	40.89
1975	-4.27	-3.26	11.55	4.50	-1.50	7.65	22.22	45.28	-3.52	-0.61
1976	-2.70	-0.55	8.65	3.43	0.24	5.56	-2.90	7.53	-10.06	2.16
1977	1.04	2.11	5.86	0.94	0.48	4.21	-6.23	-15.17	-2.70	-14.17
1978	-2.47	-0.27	-3.87	-4.31	0.56	1.13	4.04	-3.86	-1.29	-29.13
1979	-8.09	-15.57	-12.16	-9.21	1.20	4.50	8.34	0.49	-0.77	-13.94
1980	-7.89	-0.69	-17.47	-15.48	2.15	2.35	-11.26	-20.01	-4.04	-10.44
1981	-8.83	-2.32	-19.50	-18.20	0.23	-0.31	-20.49	-12.30	7.70	-15.61
1982	-5.63	-4.05	-20.33	-20.63	-2.95	-0.94	-21.33	5.91	15.96	-28.29

Table 11.3 - Cyclical Values of financial and macroeconomic indicators for the first part of subperiod 3. Cyclical values of HPI are based on real figures.

Subperiod 3.2										
Year	C3	M2	Private Bank Loans	Commercial Bank Loans	GDP per Capita	Manufacturing VA	Bankruptcies	Unemployment	HPI	Stock Index
1983	-5.81	-5.79	-20.17	-20.93	-2.48	-3.79	-14.77	28.56	10.60	-12.47
1984	-2.54	2.08	-12.04	-12.17	0.11	1.22	-24.52	12.37	10.32	11.21
1985	-3.17	5.31	-3.53	-0.14	2.35	5.00	-34.43	-15.28	9.48	17.01
1986	6.98	-1.85	12.63	16.38	3.17	4.11	-40.40	-39.70	29.62	5.22
1987	12.29	4.36	18.77	23.04	1.70	5.67	-24.83	-41.60	43.35	6.43
1988	14.63	1.40	10.36	19.06	-1.82	-0.01	24.55	-17.89	30.51	-16.99
1989	15.77	2.47	10.96	19.45	-3.91	-4.49	31.33	16.78	4.90	22.78
1990	12.68	1.02	4.97	13.35	-4.84	-6.06	2.32	16.56	-8.89	33.50
1991	5.97	6.31	5.52	4.26	-4.73	-8.94	25.25	17.78	-21.29	-1.77
1992	2.02	8.46	2.63	1.10	-4.27	-8.55	41.59	22.82	-31.80	-27.19
1993	-1.52	1.80	-4.67	-3.38	-4.45	-7.49	25.54	23.56	-31.67	-16.48
1994	-6.41	1.37	-11.69	-7.80	-2.51	-5.55	-11.24	11.84	-26.05	-5.78
1995	-8.35	0.66	-13.27	-8.78	-1.25	-5.95	-13.44	3.49	-25.48	-8.49
1996	-7.66	0.46	-8.16	-9.38	1.00	-2.57	-13.08	4.44	-22.26	-0.70
1997	-4.02	-3.31	0.69	-2.62	3.62	1.35	-14.90	-9.75	-17.54	29.09
1998	-1.55	-5.06	4.41	-1.64	3.68	-0.28	-13.48	-25.02	-12.27	14.04
1999	0.06	-2.09	-1.43	-2.97	3.16	-0.70	-15.55	-22.36	-7.67	1.97
2000	3.16	-0.79	3.12	-0.62	3.83	-2.26	-6.68	-15.05	-1.85	18.06
2001	2.04	-0.50	4.89	-1.86	3.66	-3.96	-7.20	-10.46	-2.34	-1.28
2002	-2.92	-0.91	-0.29	-5.77	3.07	-5.56	16.14	1.70	-2.09	-28.41
2003	-8.07	-6.59	0.59	-7.87	1.88	-3.59	35.31	19.39	-7.33	-39.00
2004	-9.80	-7.07		-10.67	3.93	-0.26	11.33	21.57	-1.26	-16.21
2005	-5.57	-6.47		-3.69	4.67	2.49	-8.27	26.75	1.25	5.46
2006	-3.00	-0.27		3.31	5.18	3.87	-21.70	-4.42	7.45	30.68
2007	2.34	6.67		11.78	6.24	6.50	-27.21	-28.58	14.86	49.20
2008	8.51	5.92		12.31	4.44	8.31	-8.39	-22.24	4.89	7.35
2009	0.02	1.05		7.34	0.39	-0.61	23.85	-5.06	0.37	-23.52
2010	1.32	0.46		-0.68	-0.98	0.21	7.39	8.37	1.90	-8.56
2011	-0.91	0.37		-3.90	-2.07	1.04	3.37	-4.44	4.52	-7.16
2012	-0.24	0.11		-7.89	-1.49	2.26	-11.27	-9.01	6.77	-11.57
2013	0.66	1.45		-3.83	-2.48	4.82	4.01	2.47	4.92	-4.97
2014	2.66	2.40		3.28	-2.37	7.08	7.25	-5.13	2.05	2.48
2015	3.65	-2.49		2.17	-2.22	1.27	-2.34	16.04	2.52	-0.48
2016	0.44	-2.01		-1.61	-2.73	-3.81	-2.51	19.00	2.55	-8.90
2017	-0.88	-0.39		-0.01	-1.96	-4.26	-4.19	4.84	2.48	1.03
2018	-2.34	0.57		0.86	-2.20	-3.24	3.21	-6.22	-1.83	9.46
2019	-0.28	0.63		0.21	-2.71	-2.25	1.22	-9.63	-4.41	3.56

Table 11.4 - Cyclical Values of financial and macroeconomic indicators for the second part of subperiod 3. Cyclical values of HPI are based on real figures.