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An Anatomy of Financial Crises in Norway, 1830 - 2010¹

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Abstract

On the basis of a novel dataset, the paper investigates the anatomy of financial crises in Norway from 1830 to 2010. First, nine significant crises are identified. Second, the paper examines spillover effects to the real economy. We find a clear but not symmetric relationship. Third, the paper investigates key patterns in credit and money volumes. Major financial crises typically occurred after substantial money and credit expansion, causing financial instability.

Keywords: financial crises, real economy, credit and money, Norway

JEL codes: E32, E51, N13, N14

I

Minsky and Kindleberger argue that financial crises commonly develop through financial instability in different phases (Minsky 1982). First, markets lose their long-term equilibrium through significant shocks, causing the economy to run faster. Positive expectations cause the demand for credit to increase. Financial stability is lost, and credit bubbles arise. The economy becomes overheated, and asset bubbles are created. When markets turn, they face credit crunches, asset crashes, and recessions (Kindleberger and Aliber 2005, pp. 33-76). In their empirical studies of international financial crises, Tornell and Westermann conclude that financial liberalization often causes boom-bust cycles (Tornell and Westermann 2005).

This paper offers an anatomy of Norwegian financial crises as it seeks to answer three questions:

1. When was Norway hit by substantial financial crises between 1830 and 2010?
2. Do financial crises coincide with significant contractions in the real economy?
3. Have credit and money cycles been consistent with the Minsky-Kindleberger approach to financial crises?

In answering these questions, we first trace a chronology of financial crises. Second, we map co-movements of output gaps and key financial indicators. Third, we study developments in credit volume and money stock relative to financial crises.

II

Financial crises refer to situations in which financial institutions or assets lose value significantly. Goldsmith, defines a financial crisis as (Goldsmith 1982):

"a sharp, brief, ultra-cyclical deterioration of almost all financial indicators, short-

term interest rates, asset prices, commercial insolvencies and failure of financial institutions."

Kindleberger claims that financial crises often follow a succession of phases: exogenous shocks, speculative manias, financial distress, and economic meltdown (Kindleberger and Aliber 2005, pp. 1-20). During the 19th century and the first part of the 20th century, financial crises were associated with bank panics and credit crunches. The modern understanding of financial crises includes stock market crashes, financial bubbles bursts, currency crises, and sovereign defaults.

Drawing on established definitions, we understand financial crises to be significant negative development in several financial indicators, causing credit markets to work irrationally by not providing necessary credit to the economy.

III

In our work, money stock, credit volume, bank loans, house prices, bankruptcies, stock prices, GDP, manufacturing output, unemployment, and public finances are drawn from a project on Historical Monetary Statistics that is monitored by the Norwegian central bank.² The primary data are collected from rich and informative public and private records hosted by Statistics Norway, the central bank, the National Archive, regional archives, and the Wedervang Archive at the Norwegian School of Economics. Both the sources of data and the construction of the time series are well documented and must be considered valid and reliable for our purpose. They have been consulted by both domestic and foreign experts (Eitheim, Klovland and Qvigstad 2004, 2007).

M2 is the broad money stock. C3 is defined as total credit to the general public. Bank loans are loans from private banks. Observations on the number of bankruptcies cover registrations by local courts all over the country. The house price index is a repeated sales index covering the main cities from the early 1800s until the 1970s and the entire country thereafter. The historical stock price index represents all stocks reported on the Oslo Stock Exchange from 1914 onward. GDP and manufacturing are calculated from the production side on the basis of output and input statistics. Unemployment is extracted from labor market statistics, and public finances, from the ministry of finance.

We address the data in two ways. First, we look at the percentage deviation of the observed time series from estimated trends (table 1).³ Second, we present annual percentage changes (table 2).

IV

By holding existing literature up against financial indicators, we find that nine episodes may fall into our definition of financial crisis.⁴

{Table 1 near here}

{Table 2 near here}

Crisis no 1: The revolutionary crisis, 1848-1850.

Global impact. The first significant financial crisis that we address occurred in about 1848. From the mid-1840s, continental Europe experienced a huge increase in prices on crops and potatoes. This was due to both supply- and demand-side shocks. First,

years of poor harvests increased prices. Second, the Corn Laws, protecting domestic producers, were abandoned in the UK, and a substantial rise in demand for crops in international markets occurred. From early 1845 until the spring of 1847, prices on rye and wheat in continental Europe doubled. Working class families used 50 percent or more of their income on agricultural products in most of Europe (Merriman 1996, pp. 718-724). With increasing prices on demand-inelastic food, demand for industrial products fell. The industrial sector experienced a negative demand shock, leading to bankruptcies and credit crisis.

The problems contributed to political discontentment and revolutionary waves sweeping over continental Europe. In France, the monarchy was abolished under the February Revolution of 1848. Uprisings occurred in Italy, Austria-Hungary, and Prussia. Uncertainty decreased international trade. Financial markets struggled under a lack of trust and liquidity. In Austria-Hungary, political control was not regained until 1851, when monarchy was reestablished in 1852 in France (Tocqueville 1893; Bideleux and Jeffries 1998, pp. 295-296).

Domestic impact. As for Norway, a lack of confidence in its currency led to a decrease in the silver reserves kept by the central bank from 1846. The negative shift in international demand caused exports to drop and the silver reserves to shrink even further. Thus, the monetary policy had to be tight (Rygg 1918, pp. 289-308).

To avoid further loss of capital, silver redemption was suspended in the central bank's regional offices in Bergen and Oslo when the interest rates were raised at the headquarters in Trondheim (Hodne and Grytten 2000, pp. 216-217). Credit granted was radically reduced. Insolvencies and bankruptcies became daily affairs.

At the same time, the real estate market crashed after huge growth in asset prices until 1847. The crisis also had substantial spillover onto the real economy, with a significant contraction of the business cycle.

The problems ended after the government was granted a loan of 0.6 million speciedaler in London and thereafter a 1.5 million speciedaler long-term loan at Hambro's in Denmark.⁵ Shock waves, however, had an impact for another couple of years.

Crisis no 2: The Crimean crisis, 1857-1861.

Global impact. Another crisis hit the world economy after the Crimean War, October 1853 to February 1856. The war was fought between Russia on one side and an alliance of the United Kingdom, France, the Ottoman Empire, and the Kingdom of Sardinia on the other. It was officially triggered by interests of control over the Holy Sepulchre in Jerusalem. The more important underlying reason was the contest between the major European powers for influence over the territories of the declining Ottoman Empire. Most combat took place on the Crimean Peninsula, which the Russians had conquered from the Ottomans in 1774 and annexed in 1785.

The immediate impact on international demand was chiefly positive. The demand for services by the merchant fleet increased, and the freight rates rose substantially (Klovland 2009, pp. 266-284). The upheaval was fueled by a gold rush in California. The growth in business activity largely resulted from growth in the short-term credit volume. Speculative bubbles emerged owing to the expectation that prices on exported and imported goods would increase (Calomiris and Schweikart 1991, pp. 807-834).

After the war, prices fell considerably. Speculators ran into heavy losses. Ship owners and importers with large stocks of rye and wheat, which were purchased at high costs, were losers.

Domestic impact. As merchants and ship owners along the coast of Norway were heavily involved in speculation, the crises were a major blow for them. In Bergen alone, 88 traders and investors went bankrupt between 1856 and 1859 (Hodne and Grytten 2000, pp. 157-168).

At first, many merchants and investors were saved by *blanco* credits granted in Hamburg and London. However, when an international finance crisis began to spread globally from New York during the spring of 1857, financial centers were devastated. Almost 60 percent of the most important short-term creditors for Norwegian companies in Hamburg had to cease their activities. Other creditors demanded rapid cash redemption of their loans. In addition to a serious credit crunch, real estate prices stagnated after a booming decade.

The government and the newly established bank Den norske Creditbank joined forces in order to avoid financial panics and a stop in the credit market. Guaranties were given, and 320 foreign creditors with claims on 900 Norwegian companies were paid the equivalent of 1.65 million speciedaler. In 1858, the parliament approved a loan from Hambro & Son, London, of 3.6 million speciedaler in foreign currency.

During the late summer of 1858, most of the financial difficulties ceased, when the problems returned with new strength in Bergen (Seip 1957, pp. 513-538). The negative effects on industrial output lagged somewhat from the financial markets

and were likely the worst during winter 1860-1861. Real estate prices stagnated in the late phase of the crisis and fell until 1862.

Crisis no 3: The long depression, 1877-1880.

Global impact. The long depression reflects a series of depressive tendencies in the world economy from the mid-1870s until the early 1890s. Several international financial panics occurred, e.g., 1873, 1882, 1890, and 1893. The depression is considered part of a relative British decline (Musson 1959, pp. 199-228; Davis 2006, pp. 103-121). The international economy was flourishing under British leadership from 1850 to 1873 (Church 1975). Interest rates were low, international investments grew rapidly, and monetary expansion was substantial.

In the 1870s, international adoption of the gold standard considerably increased the international demand for gold. Thus, gold currencies appreciated relative to silver currencies. Consequently, they lost competitive power, and negative capital movements occurred. Asset bubbles turned into crashes.

Bordo and Meissner show that high debt in hard foreign currencies both transmitted and fueled the crisis. In times of depreciation pressure, it was difficult to defend national currencies. Debt service in gold became increasingly difficult. External funding dried up, and the economy contracted (Bordo and Meissner 2007, pp. 139-194).

Domestic impact. A large monetary expansion occurred within a few years before the crisis occurred. Dependent on trade with the UK, Norway suffered considerably. The per capita real GDP level of 1876 was not reattained until 1888 (Grytten 2004a, pp.

241-288). It took 38 years for prices to return to their 1874 level (Grytten 2004c, pp. 61-79).

According to county reports, the economy saw a strong boom from 1871 to 1873, with “fairytale” profits. Then, from 1874 to 1875, the dawn of a correction was reported. However, huge public investment and favorable harvests in agriculture and fisheries made 1876 the peak year of GDP.

In July 1869, the key interest rate of the central bank was 5.5 percent. During the following boom, it stabilized below four percent between 1871 and 1873 (Klovland 2007). From January 1869 until January 1874, the money supply increased by more than 53 percent (Klovland 2004b). Thereafter, Norway experienced two significant contractions from 1876 to 1879 and from 1887 1888 (Klovland 1989, pp. 24-31).

Norway, Denmark, and Sweden adopted the gold standard earlier than most other countries, with Sweden and Denmark adopting the standard in 1873 and Norway, in 1874. To protect the krone, interest rates were raised from 3.5 to 7.0 percent between 1872 and 1877. From January 1874 to January 1879, the money supply contracted by 28 percent.

Another important reason for the poor performance was the late transition from sail to steam in the merchant fleet (Fischer and Nordvik 1986). Substantial capital was invested in vessels constructed for timber freight. European imports of timber fell during the downturn, and the Norwegian merchant fleet was devastated. Several banks went bankrupt, particularly in the very south of the country, where the merchant fleet was a dominant economic factor. In Arendal, the second largest city in the area, three out of four banks went bankrupt during a local crash in 1886 (Johnsen 1998).

Crisis no 4: The Kristiania crisis, 1899-1905.

The next crisis was limited to the domestic economy. It was a combination of a credit and private estate crisis from the fall of 1899 until 1905, with considerable effects on the real economy.

When the gold standard was introduced in January 1874, parliament had decided to maintain the quotient system. According to this system, there had to be a minimum ratio between the metal reserves controlled by the central bank and the volume of issued notes. This quotient was set to 2:5. The system was procyclic, as the central bank ran deflationary monetary policy when metal coverage was low.

The system was abandoned in 1893, and a difference system was introduced. With this system, parliament could decide to issue excess notes independent of the metal coverage. This system allowed for less rigid monetary policy and low interest rates. At the same time, agriculture saw rapid growth in productivity, and labor was transferred to the rapidly growing manufacturing industry in urban areas (Søbye 1999, Gerdrup 2003). From 1890 until 1899, the population of Kristiania alone increased by 47 percent.

Demand for property increased dramatically. New buildings were financed by cheap credit. In February 1894, the money base (M0) was 53.8 million NOK. By September 1899, it was 86.7 million, an increase of more than 61 percent over 5.5 years (Klovland 2004b). Wages rose substantially, and house prices increased by 40-70 percent in the major cities during the same period (Eitrheim and Erlandsen 2004).

The expansion in the private estate market resulted from huge stock issues. (Knutsen 2007). Six new commercial banks were established in the city between 1896 and 1898. They specialized in high-risk loans. All of these banks went bankrupt

during the subsequent crash.

In late 1898, markets became nervous, and in 1899, the bubbles crashed. Prices on property fell considerably—59 percent in Kristiania from 1899 to 1904 and 43 percent in Bergen from 1898 to 1905. The annual number of bankruptcies increased from 241 in 1890 to 736 in 1903 (Eitrheim and Erlandsen 2004, pp. 372-375).

Crisis no 5: The post-war depression, 1920-1923.

Global impact. At the start of World War I, gold redemption of currencies was postponed and inflationary monetary policy was monitored to tackle financial challenges. Central bank rates were low, credit volumes increased, and states ran fiscal deficits (Romer 1988). At the same time, supply was limited because of the war.

A substantial increase in money, and higher product demand in combination with a decrease in supply, lead to money accumulation. Inflation skyrocketed, and most currencies depreciated compared with their gold values.

When the war ended and supply increased, the accumulation of money during the war led to a short and hectic boom until the late summer of 1920. By that time, Europe was struggling owing to huge fiscal problems.

The boom was transformed into a severe bust at the same time as governments had to reduce spending and tighten monetary policy. This led to huge financial problems, including bank and currency crises. A classical post-war boom-bust cycle occurred. GDP per capita fell by more than 15 percent in the UK. In Germany and several Eastern European countries, uncontrolled monetary expansion resulted in hyperinflation and economic meltdown.

Domestic impact. The money stock increased by a factor of five in Norway from 1914

to 1920. Thus, demand shifted outward when supply shifted inward. Hence, consumer price inflation skyrocketed, increasing by 207 percent from the outbreak of the war until the late summer of 1920. The krone depreciated by 50 percent from just before the war ended until the autumn of 1920 (Hodne and Grytten 2002, pp. 93-116).

Investments increased by 34 percent in two years from 1918 until 1920. Imports were more than double exports in 1919 (Grytten 2004a, pp. 274-285). Finally, during the late summer and autumn, the markets turned rapidly.

Along with the international recession, the central bank decided to adopt a deflationary monetary policy to bring the krone back to its par value in gold. Thus, the currency had to appreciate by 100 percent. The deflationary policy was monitored in two phases. The first started in the autumn of 1920.

Strong inflation turned into hard deflation as nominal interest rates were increased and credit from the central bank was reduced. Real interest rates peaked at close to 40 percent in the early 1920s. Investments were cut in half. Unemployment rates and bankruptcies reached all-time highs. Bank failures reached seven percent of GDP in 1923 and 1925, by far the highest losses ever in Norway. The development forced the central bank to halt the deflationary policy during the spring of 1923 (Hanisch, Søylen and Ecklund 1999, pp. 63-90).

Crisis no 6: The parity crisis, 1924-1927.

Global impact. During the 1920s, governments chose different strategies to stabilize their currencies. Germany, Poland, Austria, Hungary, and the Soviet Union adopted new currencies. Estonia, Romania, Bulgaria, Portugal, Greece, Yugoslavia, Finland, Belgium, Czechoslovakia, France, and Italy devalued their currencies. Finally, the UK, the US, Canada, Japan, the Netherlands, Switzerland, Sweden, Denmark and

Norway returned to their prewar gold parities.

Eichengreen concludes that the European countries clinging to the par gold value their currency struggled with overvalued currencies and, thus, low international trade volumes, as well as deflation and contracting domestic demand. This resulted in limited growth and capital flows, high unemployment rates, and bank failures. Countries that were able to restore the par value of their currency or that devalued their currency implemented more inflationary monetary policy, leading to higher demand and growth rates, lower unemployment, and thriving financial markets (Eichengreen 1990, pp. 24-56).

Domestic impact. During a suspension of deflationary monetary policy in 1923 and 1924, foreign trade was revived, the heavy deficits ceased, and unemployment fell. This allowed for a new period of deflationary policy. From late 1924 until May 1928, the Norwegian krone rose toward its par value. The consequence was again financial contraction and a stagnant economy, with more than a hundred bank failures. Economy-wide unemployment reached more than eight percent on an annual basis.

The depressions of the 1920s stands out as the worst financial crises recorded in Norway. According to national accounts, only the UK was hit harder in the early 1920s, after which Norway performed even worse during the mid-1920s.

As for this crisis, the time series reveal a credit crunch. This is translated into a decline in housing prices and the real GDP per capita. In 1926, there was also a large increase in the number of bankruptcies. The stock market was also negatively affected by the domestic monetary policy.

Crisis no 7: The great depression, 1930-1933.

Global impact. An international boom from the mid-1920s was transformed into the strongest global depression recorded in modern history. The downturn started when the overheated economy collapsed in the US from October 1929.

International financial instability gave the US and France huge capital inflow in the 1920s. One source was war reparations paid by Germany to France and Belgium; another was inter-allied debt paid from European allied powers to the US. In addition, both the US and France had undervalued their currencies and were protectionists. As a consequence, they accumulated capital, when most of Europe lost liquidity and was dependent on short-term credit granted by American banks.

Money and credit expansions during the “happy 20s” were reversed by contractions. The New York Stock exchange fell by 86 percent until the summer of 1933. GDP per capita fell by more than 15 percent globally (Maddison 2006). US banks were not able to renew their credits to Europe, as almost 10,000 of them went bankrupt and another 14,000 needed public protection. With 95 percent of American banks in liquidity shortage, the problems were transmitted to Europe (Kindleberger 1986, pp. 288-306).

Domestic impact. Although the crisis of the 1920s hit Norway harder than most other countries, the depression of the 1930s was milder in Norway (Grytten 1988). The relative success is best explained by the early abandonment of gold in September 1931, which allowed for looser monetary policy. This led to a milder depression and a more rapid recovery. Nevertheless, GDP per capita fell by 8.4 percent, and unemployment reached 11 percent in 1933 (Grytten and Brautaset 2001). Consumer prices fell by 54.2 percent from late 1920 until early 1934.

The banking system in Norway survived the crisis better than that in almost

every other capitalist country (Knutson and Ecklund 2000). The depression in Norway reached its turning point in December 1932, a few months later than in the UK (Klovland 1998). The recovery was rapid. However, unemployment stayed persistently high until 1941.

Crisis no 8: The banking crisis, 1988-1993.

Global impact. After World War II, credit markets became more regulated. During the neo-liberalistic wave in the late 1970s, however, they were deregulated worldwide. After years of stagflation during the 1970s and early 1980s, the world economy experienced a substantial boom, resulting in overheating and asset bubbles.

International trade increased substantially, capital flows increased even more, and financial markets thrived. A persistent drop in oil and gas prices in December 1985 fueled the economy, and the global boom continued. This made it more difficult to regain macro-financial stability, and debt and asset bubbles continued to grow.

During 1986, the US economy shifted from rapid growth to moderate expansion, and general inflation dropped. However, generous credits and monetary wealth had to be allocated to profitable investments. The most obvious choices were real estate and the stock market. In August 1987, Dow Jones peaked 44 percent over the previous years' closing. Then, Monday, October 19, 1987, stock markets around the world crashed.

Dow Jones Industrial Average dropped by 22.6 percent on that day. The spillover to the real economy caused recessions in many countries. The Nordic countries suffered more than most other economies. According to Jonung, this was due to a stronger financial liberalization process, since Scandinavia initially had more regulated financial markets than most other capitalist economies (Jonung 2008).

Domestic impact. An important goal for Norwegian politicians after World War II was to maintain low interest rates in order to motivate investments. The government set the key policy rate under the market rent. As a consequence, they created an incentive to invest and not to save. To stabilize the financial market, they were forced to set up credit restrictions.

When credit rationing was liberalized in the first half of the 1980s, the parliamentary majority maintained politically decided interest rates under the market rent. Real interest rates after tax were negative, creating a greater credit boom in Norway than in most other countries (Søilen 2002, pp. 181-223). At the same time, oil prices were high, and the inflow of capital was considerable (Knutson and Ecklund 2000, pp. 225-268). Credit granted by banks increased by 164 percent from 1983 until 1987 (Eitrheim, Grytten and Klovland 2007, pp. 412-416).

As a result, asset bubbles were created. From 1980 until 1987, real estate prices in Norway increased by 211 percent (Eirheim and Erlandsen 2004, pp. 372-375). Stock prices were 405 percent higher in September 1987 than in December 1980 (Klovland 2004a).

In 1986, oil prices fell under nine US dollars per barrel. Foreign trade went from a surplus to a deficit. In May, the krone was devalued by twelve percent. On October 20, 1987, the Oslo Stock Exchange main index responded to the international crash by falling 20 percent (Hodne and Grytten 2002, pp. 271-278).

Norwegian banks had expanded rapidly during the liberalization in the 1980s (Steigum 2009). Losses were severe. As difficult years approached, the government ran tight fiscal and monetary policies. Unemployment rose to heights comparable with that in the interwar period. Real house prices fell by 43 percent. GDP stagnated,

and investments fell by 21.7 percent (Hanisch, Søylen and Ecklund, 1999, pp. 255-362).

The most severe banking crisis since the 1920s resulted. Commercial banks lost 5.8 percent in 1991.⁶ The three largest commercial banks were taken over by the state in 1991 and 1993. This reflects a deliberate government policy of minimizing the impact of spillovers on to the real economy during the post-bubble banking crisis (Allen and Gale 1999).

Crisis no 9: The financial crisis of 2008

Global impact. Financial innovations and inflation targeting combined with minor inflation led to financial instability through low interest rates and a rapid increase in credit volumes worldwide. From 1992 to 2008, the credit volume almost quadrupled. Hence, asset bubbles emerged (Røed Larsen and Mjølhus 2009, pp. 84-96).

The housing bubble in the US partly resulted from investment banks with international funding buying loan portfolios from ordinary banks. The risk was considered limited since house prices grew almost continuously (Zandi 2009). When the markets turned, the investment banks ran into a liquidity crisis. In 2008, all the large investment banks in the US failed, with devastating spillover effects to international banks (Sorkin 2009).

During the autumn of 2008, credit markets had to be rescued by central bank and government measures and guarantees. Through this action, the world economy was rescued from a severe liquidity crisis. However, stock market and real estate markets crashed.

In the US, the decrease in house prices was about 40 percent; Spain, Ireland, and Denmark saw comparable numbers. In the Baltic states, the real estate markets

collapsed even more. GDP contracted between two and 16 percent in most capitalist economies in 2009.

Domestic impact. The impact on the Norwegian economy was limited despite a stock market crash of 64 percent in six months from May until November 2008. Real house prices dropped by 18 percent from August 2007 until December 2008 (Grytten 2009b).

Norway proved to be a winner; with limited stagnation and less unemployment than almost any comparable economy. Bank losses were also limited. This was both due to both Norway's less exposed financial sector and the relatively good performance of the Norwegian economy. The combination of governmental crisis packages, bailouts, and reduced taxes has led to fiscal crisis in many countries. Owing to its high petroleum revenues and limited financial crisis with minor spillovers to the real economy, Norway has avoided a similar situation.

V

It is of interest to map the historical relationship of financial crises and output contractions. The historical correlation coefficient between M2 and real GDP per capita is not higher than 0.027.

{Chart 1 near here}

If we calculate the same correlation for the years of financial crises, the correlation coefficient is 0.297. Hence, there is a substantially stronger correlation in times of crises than over the whole time span. We do not attempt to answer the question about the exact nature of this relationship. However, according to chart 1

there seems to be a mixed relationship between the financial economy and the real economy. One may experience a financial crisis without any significant effect on the real economy.

{Chart 2 near here}

A more relevant parameter would be the output gap. Chart 2 shows that output tends to contract considerably during or shortly after financial markets start to meltdown. We find such a relationship for all of our major financial crises, except for the par crisis in the mid-1920s, when output contraction was modest. However, this output contraction must be considered in connection with the huge contraction in the early 1920s, which made the potential decrease lower during the crisis that followed just afterward.

The coexistence of financial crises and output contraction is summed up in table 3. It reports negative output gaps and accumulated drops in GDP during or just after busts. Huge and lasting shocks ending in substantial financial busts historically result in contractions in the real economy.

{Table 3 near here}

Tables 1 and 2 also report that all the financial crises were associated with drops in manufacturing output, stagnant employment, and increased unemployment.

Is there a link between monetary and credit expansion on the one side and booms and busts on the other side, as argued by Minsky and Kindleberger?

{Chart 3 near here}

Chart 3 reports relative changes in the money stock (M2), bank loans (BL), and the credit volume (C3), calculated as logs ($\log_t - \log_{t-1}$). The graphs are presented as five-year symmetric averages. They reveal rapid increases in these parameters prior to all the financial crises that we have data for. Likewise, they show contraction in growth during financial crises. Two exceptions are found. Bank loans did not increase rapidly before the 1848 crisis. An important reason for this result is that the first Norwegian commercial bank was not founded until that year.

As for the Great Depression of the 1930s, we find neither significant increase in money and credit volumes prior to the crisis nor contraction during the crisis. This might be explained by fact that a financial boom occurred in the US and France owing to a huge increase in money and credit volumes, which was followed by a contraction in these variables during the crisis. Thus, this crisis was an international liquidity-driven boom-bust cycle affecting the Norwegian economy via the foreign sector (Eichengreen 1990, pp. 24-82). In addition, active central bank policy to aid struggling banks and rapid abandonment of gold redemption in September 1931 maintained liquidity in the domestic economy (Øksendal 2007).

Our empirical findings are also consistent with those of Tornell and Westermann (2005), who conclude that boom-bust cycles follow financial liberalization.

{Chart 4 near here}

Chart 4 plots monthly changes in the Oslo Stock Exchange main index. To make trends clearer, we HP-filter the data with the standard λ value of 14,400 (chart 5). By using this smoothing parameter, we clearly trace the boom of stock prices during the credit and money expansion from 1914 onwards. Thereafter, we map the largest stock market crash ever recorded in Norway in August 1918.

We find significant growth in stock prices along with considerable credit and money expansion in the 1980s before a new double crash in September to December 1987, as well as from July 1990 to September 1992 and before the 2008 crash.

{Chart 5 near here}

The evidence on the change in public debt is mixed (tables 1 and 2). However, there is a tendency for public debt to increase toward the end of a crisis period.

To visualize the pattern, charts 6 and 7 show a time-window approach. For each crisis, we define year t as the average of the crisis year, as outlined earlier in this paper. In addition, we look at the three years before and after the crisis. Then, we take the average over all nine crises.

{Chart 6 near here}

{Chart 7 near here}

As shown in chart 6, the economy is generally in a boom before a crisis. It should be noted that the figures summarize nine different crises over a time span of almost two

centuries. Nevertheless, the overall pattern seems to be consistent with existing knowledge of financial crises.

Table 4 presents numbers of the cost of financial crises measured as loss in real GDP per capita. From the table, we see that the crisis in the beginning of the 1920s had the largest drop in output.

{Table 4 near here}

Table 5 sums up the pattern of the indicators that we apply. For each variable, we qualitatively assess whether the variables follow a Minsky-Kindleberger pattern, i.e., an increase during the boom and then a decrease. Unemployment and bankruptcies are expected to have the opposite pattern. According to the table, the majority of the indicators follow such a pattern.

{Table 5 near here}

VII

Minsky and Kindleberger argue that monetary expansion through credit liberalization and increased loaning activity cause financial booms and busts with spillover effects to the real economy.

In this paper, we analyze whether these findings also apply to Norway. First, we identify financial busts on the basis of existing research and financial key indicators. We find nine major financial crises. Thereafter, we seek to determine whether financial crises had spillovers to the real economy. We find such a relationship for most crises.

Finally, the paper seeks to find out whether developments in money and credit stocks coincide with booms and busts. Our findings confirm that money and credit expansion seem to disturb financial stability and overfuel booms, ending in financial crises.

A next step in investigating these relationships could be to apply econometrics, by using cointegration and determining whether any Granger causality exists among the variables. This, we leave for future research.

Notes

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² The Data appendix presents the sources, descriptive statistics, and a plot of the variables.

³ We use the HP-filter $\lambda=100$. Owing to large shocks, we have split the filtering into three time periods: 1830-1914, 1914-1940, and 1940-2010.

⁴ Hodne and Grytten (2000, 2002); Sejersted (1993); Bergh et al. (1983); Hodne (1981); Hanisch et al. (1999); Knutsen and Ecklund (2000); Amdam et al. (2001); Lie and Vennesland (2010); Knutsen et al. (1998).

⁵ *Parliament Proposition* No 43 1890.

⁶ Stortingsmelding 39/1993. *Bankkrisen og utviklingen i den norske banknæringen*.

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Table 1. Economic variables and financial crises. Percentage deviation from trend.

Crisis no 1: 1848-1850											
Year	M2	C3	Bank loans	Bank-ruptcies	Housing index	Stock index	GDP per capita	Employment	Unemployment	Manufacturing output	Public debt
1845	7.44		10.60		-4.88		3.69				
1846	10.67		16.82		26.10		4.76				
1847	8.22		17.00		-23.81		-0.10				
1848	-5.33		4.79		-11.51		-6.35				
1849	-9.77		-4.95		-10.84		-4.84				
1850	-9.89		-11.00		-2.93		-3.73				
1851	-9.82		-10.87		9.22		0.87				
1852	-10.74		-9.55		-3.35		-1.63				
1853	0.29		-11.01		7.02		1.42				

Crisis no 2: 1857-1861											
1854	9.24		-4.09		-6.10		2.66				
1855	10.04		0.70		-1.92		6.29				
1856	7.98		6.58		-3.99		2.76				
1857	-2.91		-5.47		1.29		-4.24				
1858	-0.92		-0.64		8.75		-2.13				
1859	-4.79		-1.92		28.40		-1.54				
1860	-1.25		-0.72		3.05		0.30				
1861	-3.14		4.53		-7.00		-4.01				
1862	3.31		4.77		-2.90		2.60				
1863	4.79		8.23		-1.46		1.17				
1864	-0.81		4.24		-12.25		3.26				

Crisis no 3: 1877-1880											
1874	12.91		6.69		1.82		2.83				
1875	1.91		5.23		-1.09		3.59				
1876	5.17		6.88		6.46		4.52				
1877	0.21		5.57		0.29		3.49				
1878	-4.54		1.97		17.66		-1.81				
1879	-6.72		-3.68		10.50		-2.52				
1880	-1.63		-1.59		-4.72		-0.55				4.20
1881	-0.94		0.91		-0.82		-0.12				1.44
1882	3.50		3.18		-0.28		-0.54				-3.43
1883	4.46		3.94		-1.87		-1.41				-4.95

Crisis no 4: 1899-1905											
1896	-5.50		-7.77	-18.32	6.65		-0.50	-0.83	-13.83	-3.08	5.17
1897	-0.66		-4.39	-21.64	7.69		2.34	0.35	-29.69	4.34	-3.06
1898	2.65		6.08	-29.27	11.98		0.77	1.46	-34.21	9.16	-5.86
1899	2.09	1.67	5.86	17.06	10.89		1.60	2.21	-26.21	9.68	-3.78
1900	6.16	5.19	10.12	11.59	-5.26		0.84	1.61	0.10	6.35	-10.73
1901	6.94	3.41	8.41	22.00	-5.34		1.37	0.66	3.76	3.36	-0.82
1902	2.44	1.82	3.87	12.71	1.53		1.05	-0.56	12.26	0.11	-3.01
1903	0.17	3.13	2.00	32.02	3.18		-1.17	-0.48	17.53	-2.44	-2.33
1904	-2.40	-0.38	-1.80	6.45	-0.78		-2.64	-0.55	13.20	-7.00	9.03
1905	-5.59	-3.24	-4.92	-0.36	-8.89		-3.84	-0.59	18.77	-9.37	17.45
1906	-2.18	-4.26	-4.69	-7.27	2.39		-2.09	-0.52	8.03	-4.28	7.27
1907	-0.78	-3.57	-3.28	-23.12	-5.62		-0.34	-0.66	-0.97	-0.22	0.32
1908	-2.29	-3.46	-2.67	-6.92	-5.00		-0.19	-0.92	6.97	-0.01	-1.00

Crisis no 5: 1920-1923											
Year	M2	C3	Bank loans	Bankruptcies	Housing index	Stock index	GDP per capita	Employment	Unemployment	Manufacturing output	Public debt
1917	-1.96	-4.36	-3.96	-66.57	6.43	31.19	-4.48	-0.12	-0.94	8.29	-26.74
1918	13.68	8.64	13.07	-71.46	-10.41	54.43	-10.25	-0.29	-12.32	-6.00	-7.64
1919	17.85	15.04	22.04	-60.87	-7.83	17.71	2.74	2.26	-61.62	2.25	-8.93
1920	21.77	23.13	28.63	-34.37	-11.21	6.15	6.54	2.87	-48.19	4.33	-24.91
1921	20.00	18.12	20.10	49.77	-19.25	-30.67	-6.60	-1.41	51.57	-24.51	-2.23
1922	15.96	8.18	9.99	24.76	-0.03	-33.91	0.40	-1.88	47.29	-7.47	4.29
1923	-1.15	1.57	0.55	7.65	6.90	-25.38	0.19	0.71	-2.77	-0.99	3.35
1924	-1.89	-0.87	-2.50	-4.65	-8.52	-4.98	-2.80	2.28	-32.59	3.67	-4.82
1925	-4.83	-3.82	0.19	-6.14	-8.91	1.25	-0.17	1.15	-17.67	8.96	-1.71
1926	-3.95	-7.30	-7.05	36.38	-4.94	-3.09	-2.05	-1.23	17.18	-1.83	4.61

Crisis no 6: 1924-1927											
Year	M2	C3	Bank loans	Bankruptcies	Housing index	Stock index	GDP per capita	Employment	Unemployment	Manufacturing output	Public debt
1921	20.00	18.12	20.10	49.77	-19.25	-30.67	-6.60	-1.41	51.57	-24.51	-2.23
1922	15.96	8.18	9.99	24.76	-0.03	-33.91	0.40	-1.88	47.29	-7.47	4.29
1923	-1.15	1.57	0.55	7.65	6.90	-25.38	0.19	0.71	-2.77	-0.99	3.35
1924	-1.89	-0.87	-2.50	-4.65	-8.52	-4.98	-2.80	2.28	-32.59	3.67	-4.82
1925	-4.83	-3.82	0.19	-6.14	-8.91	1.25	-0.17	1.15	-17.67	8.96	-1.71
1926	-3.95	-7.30	-7.05	36.38	-4.94	-3.09	-2.05	-1.23	17.18	-1.83	4.61
1927	-10.39	-6.39	-9.59	34.40	-0.85	-0.47	-1.72	-1.16	10.95	-1.64	7.09
1928	-8.98	-5.19	-10.42	8.77	5.25	7.25	-0.80	-0.02	-5.54	4.86	7.66
1929	-5.38	-3.57	-7.44	-7.75	7.85	17.32	4.93	0.92	-21.09	10.19	-1.42
1930	-2.70	-2.59	-8.08	-13.36	1.98	6.09	9.03	1.07	-19.46	9.91	-4.35

Crisis no 7: 1930-1933											
Year	M2	C3	Bank loans	Bankruptcies	Housing index	Stock index	GDP per capita	Employment	Unemployment	Manufacturing output	Public debt
1927	-10.39	-6.39	-9.59	34.40	-0.85	-0.47	-1.72	-1.16	10.95	-1.64	7.09
1928	-8.98	-5.19	-10.42	8.77	5.25	7.25	-0.80	-0.02	-5.54	4.86	7.66
1929	-5.38	-3.57	-7.44	-7.75	7.85	17.32	4.93	0.92	-21.09	10.19	-1.42
1930	-2.70	-2.59	-8.08	-13.36	1.98	6.09	9.03	1.07	-19.46	9.91	-4.35
1931	-3.16	1.62	-5.68	-19.33	6.89	-11.79	-2.97	-2.53	14.87	-14.23	5.29
1932	-3.96	0.54	-5.00	7.82	6.42	-25.11	-1.72	-1.38	16.26	-2.23	6.02
1933	-4.83	-2.67	-5.03	-7.12	7.16	-15.86	-2.82	-1.69	23.87	-5.27	10.44
1934	-5.53	-3.63	-4.38	-13.06	-0.38	-13.11	-2.98	-1.15	15.32	-5.67	5.50
1935	-1.80	-3.35	-1.75	-19.77	-3.30	-5.38	-1.80	-0.85	12.89	-1.31	4.12
1936	-2.81	-2.38	-1.80	-18.35	2.28	7.82	1.06	0.37	-1.75	1.94	-1.65

Crisis no 8: 1988-1993											
Year	M2	C3	Bank loans	Bankruptcies	Housing index	Stock index	GDP per capita	Employment	Unemployment	Manufacturing output	Public debt
1985	5.46	-3.13	-0.64	-34.43	-2.38	17.22	2.91	0.30	-14.83	-1.75	1.51
1986	-1.63	7.01	16.57	-40.40	16.87	5.48	4.07	3.11	-39.46	-3.47	25.11
1987	4.63	12.31	23.92	-24.83	31.96	6.76	2.96	4.50	-41.43	-1.81	3.44
1988	1.62	14.63	18.34	24.55	24.17	-16.69	-0.11	3.51	-17.72	-2.99	-13.14
1989	2.59	15.75	17.20	31.34	4.08	23.28	-1.84	0.07	16.94	6.87	-13.87
1990	0.96	12.63	9.58	2.33	-2.27	34.08	-2.67	-1.08	16.64	5.35	-23.82
1991	5.99	5.88	-0.46	25.25	-11.62	-1.32	-2.64	-2.37	17.81	-2.17	4.33
1992	7.79	1.88	5.02	41.60	-20.32	-26.87	-2.44	-3.00	22.78	-3.60	20.56
1993	0.76	-1.70	-0.62	25.55	-17.80	-16.15	-3.09	-3.55	23.45	-3.64	46.46
1994	-0.13	-6.63	-5.93	-11.23	-9.55	-5.51	-1.68	-2.80	11.65	-1.18	25.40
1995	1.62	-8.62	-7.50	-13.43	-8.64	-8.35	-1.06	-1.62	3.21	1.18	-3.43
1996	1.12	-7.96	-8.50	-13.08	-5.11	-0.73	0.50	-0.18	4.03	3.68	-11.75

Crisis no 9: 2008-2010											
Year	M2	C3	Bank loans	Bankruptcies	Housing index	Stock index	GDP per capita	Employment	Unemployment	Manufacturing output	Public debt
2005	-4.64	-4.96	-3.44	-8.40	0.19	1.58	1.34	-2.90	26.61	0.05	1.17
2006	0.19	-2.28	3.39	-21.82	6.93	24.34	2.02	-1.43	-3.46	-0.78	19.94
2007	8.53	3.17	11.58	-27.34	12.29	44.96	2.87	0.92	-23.70	-0.65	11.90
2008	5.01	9.35	11.68	-8.56	-1.00	7.75	1.03	2.85	-21.24	1.16	4.00
2009	0.65	0.60	-4.85	23.63	-4.55	-23.60	-2.38	0.83	-0.13	-0.68	-8.48
2010	-0.27	2.40	-1.92	7.25	-3.13	-4.27	-3.97	-0.49	15.67	-4.28	-9.26

Table 2. Economic variables and financial crises. Percentage annual changes.

Crisis no 1: 1848-1850											
Year	M2	C3	Bank loans	Bank-ruptcies	Housing index	Stock index	GDP per capita	Employment	Unemployment	Manufacturing output	Public debt
1845	9.27		15.02		0.71		4.19				
1846	7.18		16.77		34.60		1.72				
1847	1.92		10.53		-38.60		-4.02				
1848	-8.52		-1.08		18.53		-5.58				
1849	0.21		0.54		3.29		2.52				
1850	5.67		4.37		12.07		2.25				
1851	6.56		12.30		16.09		6.09				
1852	5.90		14.36		-8.66		-1.16				
1853	20.57		11.18		14.29		4.55				

Crisis no 2: 1857-1861											
Year	M2	C3	Bank loans	Bank-ruptcies	Housing index	Stock index	GDP per capita	Employment	Unemployment	Manufacturing output	Public debt
1854	16.92		21.84		-9.54		2.63				
1855	7.94		18.43		7.55		4.93				
1856	4.92		18.90		0.59		-2.10				
1857	-4.06		-0.88		8.10		-5.65				
1858	8.80		16.85		9.58		3.51				
1859	2.42		9.14		19.90		1.96				
1860	10.52		11.28		-18.91		3.32				
1861	4.51		15.07		-9.04		-2.88				
1862	13.59		8.89		5.27		8.51				
1863	7.92		11.62		2.57		0.11				
1864	0.61		3.58		-9.64		3.60				

Crisis no 3: 1877-1880											
Year	M2	C3	Bank loans	Bank-ruptcies	Housing index	Stock index	GDP per capita	Employment	Unemployment	Manufacturing output	Public debt
1874	8.62		14.83		15.06		2.77				
1875	-5.76		4.53		1.32		1.74				
1876	7.25		6.99		11.79		1.64				
1877	-1.34		3.40		-2.68		-0.47				
1878	-1.61		0.57		20.51		-4.80				
1879	0.80		-2.08		-4.11		-0.46				
1880	8.73		5.54		-12.39		2.29				
1881	3.76		5.63		5.48		0.74				-1.50
1882	7.54		5.05		1.76		-0.02				-3.65
1883	3.76		3.27		-0.38		-0.35				-0.30

Crisis no 4: 1899-1905											
Year	M2	C3	Bank loans	Bank-ruptcies	Housing index	Stock index	GDP per capita	Employment	Unemployment	Manufacturing output	Public debt
1896	3.16		6.14	2.05	7.82		1.45	1.48	-18.18	12.78	8.34
1897	11.59		11.26	1.15	3.08		3.83	1.77	0.00	12.81	-4.49
1898	9.77		18.97	-4.55	5.33		-0.66	1.64	11.11	9.17	0.67
1899	5.62		6.69	74.70	-0.47		1.66	1.21	30.00	4.40	6.01
1900	10.31	8.87	10.78	-0.17	-14.71		0.07	-0.20	53.85	0.38	-3.81
1901	6.70	3.22	4.44	13.14	-0.71		1.38	-0.60	15.00	0.38	15.02
1902	1.35	3.21	1.32	-5.73	6.21		0.61	-0.90	17.39	0.00	0.94
1903	3.43	6.13	3.66	17.76	0.39		-1.16	0.41	11.11	0.76	3.43
1904	3.11	1.26	1.61	-20.11	-5.14		-0.23	0.30	0.00	-1.13	13.89
1905	2.50	1.99	2.31	-8.33	-9.41		0.28	0.40	6.67	1.53	8.94
1906	9.96	4.14	6.15	-9.65	11.03		3.67	0.60	-9.38	10.53	-8.54
1907	7.79	6.31	7.70	-19.92	-8.75		3.90	0.50	-10.34	9.52	-7.26
1908	4.74	5.93	7.02	16.67	-0.05		2.45	0.50	3.85	5.59	-3.01

Crisis no 5: 1920-1923											
Year	M2	C3	Bank loans	Bank-ruptcies	Housing index	Stock index	GDP per capita	Employment	Unemployment	Manufacturing output	Public debt
1917	42.47	36.23	41.56	-34.01	-8.94	22.46	-10.12	0.79	70.00	0.56	-7.14
1918	25.65	24.44	27.17	13.40	-18.59	10.99	-5.02	0.53	17.65	-12.52	43.80
1919	10.22	13.86	14.31	72.73	0.14	-29.26	16.00	3.22	-45.00	9.89	11.51
1920	7.69	12.93	9.31	103.16	-5.32	-17.51	5.28	1.18	63.64	3.45	-7.44
1921	0.74	-0.61	-5.19	166.84	-9.57	-40.91	-10.82	-3.67	244.44	-26.30	45.10
1922	-2.99	-6.64	-8.78	-5.92	24.64	-14.17	9.63	0.00	11.29	25.63	17.81
1923	-15.75	-5.55	-10.47	-5.47	8.83	1.75	2.01	3.12	-26.09	10.20	8.36
1924	-3.10	-2.83	-6.34	-5.46	-12.13	15.34	-0.61	2.02	-23.53	8.17	-0.36
1925	-6.18	-4.10	-1.87	2.66	3.03	-2.74	5.45	-0.66	33.33	8.72	10.59
1926	-2.99	-5.18	-12.16	48.14	8.57	-11.76	0.90	-1.91	53.85	-6.79	12.77

Crisis no 6: 1924-1927											
Year	M2	C3	Bank loans	Bank-ruptcies	Housing index	Stock index	GDP per capita	Employment	Unemployment	Manufacturing output	Public debt
1921	0.74	-0.61	-5.19	166.84	-9.57	-40.91	-10.82	-3.67	244.44	-26.30	45.10
1922	-2.99	-6.64	-8.78	-5.92	24.64	-14.17	9.63	0.00	11.29	25.63	17.81
1923	-15.75	-5.55	-10.47	-5.47	8.83	1.75	2.01	3.12	-26.09	10.20	8.36
1924	-3.10	-2.83	-6.34	-5.46	-12.13	15.34	-0.61	2.02	-23.53	8.17	-0.36
1925	-6.18	-4.10	-1.87	2.66	3.03	-2.74	5.45	-0.66	33.33	8.72	10.59
1926	-2.99	-5.18	-12.16	48.14	8.57	-11.76	0.90	-1.91	53.85	-6.79	12.77
1927	-10.66	-0.89	-8.43	-1.90	8.79	-4.11	3.34	0.59	1.25	3.64	7.26
1928	-2.80	-0.65	-6.97	-21.28	10.68	2.07	4.04	1.76	-9.88	10.22	4.16
1929	-0.36	-0.15	-2.96	-19.17	6.54	5.28	9.04	1.65	-12.33	8.55	-6.18
1930	-1.14	-0.68	-6.51	-12.04	-2.13	-11.45	7.06	0.97	6.25	2.94	-1.61

Crisis no 7: 1930-1933												
Year	M2	C3	Bank loans	Bank-ruptcies	Housing index	Stock index	GDP per capita	Employment	Unemployment	Manufacturing output	Public debt	
1927	-10.66	-0.89	-8.43	-1.90	8.79	-4.11	3.34	0.59	1.25	3.64	7.26	
1928	-2.80	-0.65	-6.97	-21.28	10.68	2.07	4.04	1.76	-9.88	10.22	4.16	
1929	-0.36	-0.15	-2.96	-19.17	6.54	5.28	9.04	1.65	-12.33	8.55	-6.18	
1930	-1.14	-0.68	-6.51	-12.04	-2.13	-11.45	7.06	0.97	6.25	2.94	-1.61	
1931	-3.89	2.79	-2.94	-14.11	7.91	-16.97	-8.35	-2.65	47.06	-19.46	10.50	
1932	-3.70	-2.31	-4.14	21.58	1.92	-13.38	4.32	2.31	3.00	17.87	0.01	
1933	-3.17	-4.15	-4.17	-22.78	2.48	17.03	1.90	0.97	6.80	0.41	2.31	
1934	-2.36	-1.66	-2.74	-17.32	-5.85	9.38	2.96	2.00	-8.18	3.40	-7.21	
1935	2.89	-0.05	0.00	-19.71	-2.06	16.59	4.44	1.88	-4.95	8.82	-5.13	
1936	-1.52	0.96	-2.11	-12.92	6.44	22.56	6.22	2.92	-16.67	7.50	-10.06	

Crisis no 8: 1988-1993												
Year	M2	C3	Bank loans	Bank-ruptcies	Housing index	Stock index	GDP per capita	Employment	Unemployment	Manufacturing output	Public debt	
1985	13.76	9.14	31.81	2.76	1.46	21.05	5.04	2.23	-18.75	13.63	5.49	
1986	2.04	20.08	33.04	6.42	21.22	2.77	3.67	3.57	-23.08	4.01	25.39	
1987	15.65	12.82	18.64	45.51	13.23	14.85	1.30	1.92	5.00	7.69	-16.29	
1988	5.01	8.52	5.01	87.52	-6.60	-11.96	-0.71	-0.56	52.38	4.47	-15.26	
1989	8.60	6.32	7.62	16.58	-17.43	66.18	0.58	-3.07	53.13	16.24	-0.10	
1990	5.42	1.68	0.78	-15.92	-7.75	21.51	1.58	-0.93	6.12	3.67	-11.02	
1991	12.05	-2.21	-2.47	29.16	-10.87	-18.07	2.62	-1.03	5.77	-2.68	37.44	
1992	8.24	0.04	13.29	16.71	-10.35	-17.46	2.93	-0.25	7.27	2.93	15.31	
1993	-0.67	0.62	1.95	-10.28	3.97	28.04	2.18	0.00	1.69	4.08	20.15	
1994	5.31	-0.31	2.54	-29.55	12.65	26.07	4.46	1.55	-10.00	6.41	-16.18	
1995	8.23	3.64	7.28	-3.69	4.95	8.45	3.65	2.16	-9.26	5.80	-25.13	
1996	6.08	7.71	8.71	-1.20	9.36	20.84	4.57	2.55	-2.04	5.39	-11.23	

Crisis no 9: 2008-2010												
Year	M2	C3	Bank loans	Bank-ruptcies	Housing index	Stock index	GDP per capita	Employment	Unemployment	Manufacturing output	Public debt	
2005	11.66	15.83	18.86	-17.62	7.38	38.73	1.89	0.57	2.22	-0.30	-6.10	
2006	13.66	13.12	17.52	-14.35	12.71	33.92	1.63	2.84	-26.09	-2.10	23.24	
2007	16.75	15.62	17.65	-6.17	10.39	26.12	1.60	3.78	-23.53	-1.32	-3.61	
2008	3.79	15.42	8.30	27.84	-7.73	-20.50	-1.20	3.32	0.00	0.20	-4.48	
2009	2.35	-0.43	-8.42	37.83	0.59	-24.74	-3.01	-0.63	23.08	-3.50	-9.86	
2010	5.38	9.55	10.24	-11.53	5.66	32.52	-0.53	0.00	12.50	-5.35	1.40	

Table 3. Contractions in GDP during financial crises.

Crisis no	Years	HP-cycle ($\lambda = 100$)		First difference	
		Minimum value	Bottom year	Minimum value	Bottom year
1	1848-1850	-0.0647	1848	-0.0574	1848
		[2.3319]		[2.2967]*	
2	1857-1861	-0.0499	1861	-0.0581	1857
		[1.7973]		[2.3200]*	
3	1877-1880	-0.0252	1878	-0.0593	1879
		[0.9097]		[2.3600]*	
4	1899-1905	-0.0431	1905	-0.0117	1904
		[1.5545]		[0.7733]*	
	1830-1914				
	Std dev	0.0277		0.0300	
	Growth rate			0.0115	
5	1920-1923	-0.0660	1921	-0.1082	1921
		[1.4505]		[2.3939]*	
6	1924-1927	-0.0280	1924	-0.0061	1924
		[0.5011]		[0.5576]*	
7	1930-1933	-0.0298	1934	-0.0835	1931
		[0.6549]		[1.9496]*	
	1919-1939				
	Std dev	0.0455		0.0556	
	Growth rate			0.0249	
8	1988-1993	-0.0283	1993	-0.0071	1988
		[1.4068]		[1.7773]*	
9	2008-2010	-0.0247	2010	-0.0521	2010
		[1.2267]		[3.9100]*	
	1946-2010				
	Std dev	0.0201		0.0211	
	Growth rate			0.0304	

* Standard deviation from the average growth rate

Table 4. Cost of crises in percentage of GDP.

Real GDP per capita				
Crisis no	Years	No of years	No of years with negative deviation	Average deviation from trend in percentage
1	1848-1850	3	3	-4.97
2	1857-1861	5	4	-2.98
3	1877-1880	4	3	-1.63
4	1899-1905	7	3	-2.56
5	1920-1923	4	1	-6.60
6	1924-1927	4	4	-1.68
7	1930-1933	4	3	-2.50
8	1988-1993	6	6	-2.17
9	2008-2010	3	2	-3.17

Table 5. Do the crises follow a Minsky-Kindleberger pattern?

Crisis no	1	2	3	4	5	6	7	8	9
Years	1848-1850	1857-1861	1877-1880	1899-1905	1920-1923	1924-1927	1930-1933	1988-1993	2008-2010
Bottom year in HP-cycle	1848	1861	1878	1905	1921	1924	1934	1993	2010
Cost of crisis in percentage of GDP	-4.97	-2.98	-1.63	-2.56	-6.60	-1.68	-2.50	-2.17	-3.17
<i>Do the indicators follow a Minsky-Kindleberger pattern?</i>									
M2	Positive	Positive	Positive	Positive	Positive	Neutral	Negative	Positive	Positive
C3	-	-	-	-	Positive	Positive	Negative	Positive	Positive
Bank loans	Positive	Positive	Positive	Positive	Positive	Neutral	Negative	Positive	Positive
Bankruptcies	-	-	-	Positive	Positive	Positive	Positive	Positive	Positive
Housing index	Negative	Negative	Positive	Positive	Positive	Negative	Positive	Positive	Positive
Stock index	-	-	-	-	Positive	Neutral	Positive	Positive	Positive
Real GDP	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive
Employment	-	-	-	Positive	Positive	Neutral	Positive	Positive	Positive
Unemployment	-	-	-	Positive	Positive	Positive	Positive	Positive	Positive
Manufacturing output	-	-	-	Positive	Positive	Positive	Positive	Positive	Positive
Public debt	-	-	-	Neutral	Positive	Negative	Positive	Positive	Neutral

Chart 1. Output gaps and relative first-order differentials of money stock (M2) and bank loans (BL) for Norway. Five-year symmetric moving averages.

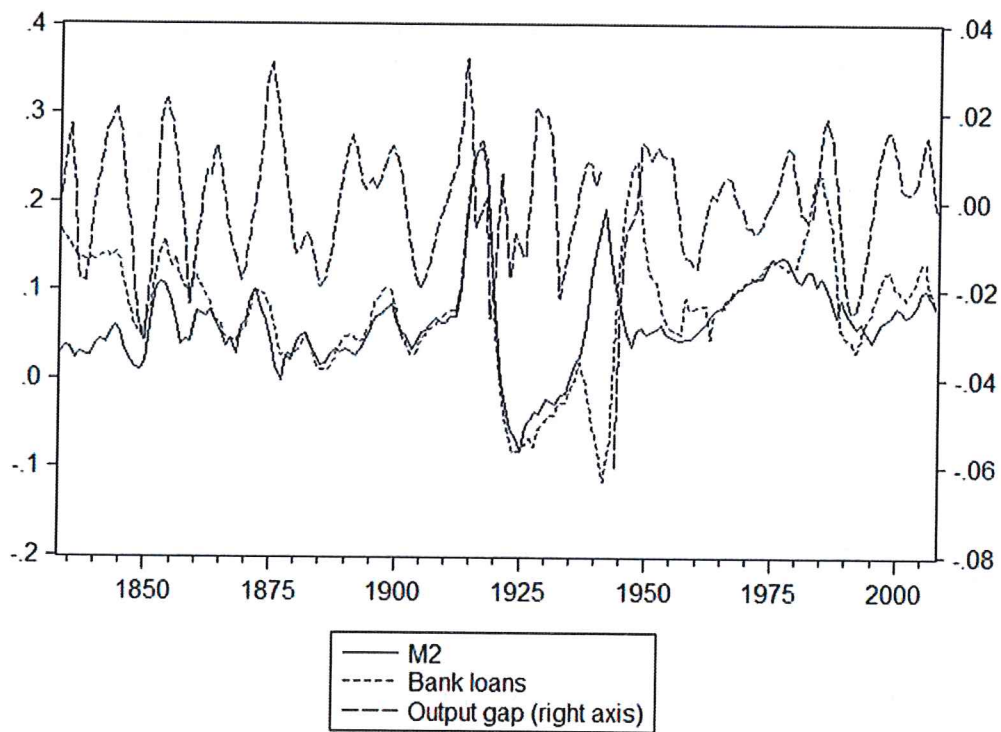


Chart 2. Output gaps for Norway. Five-year symmetric moving averages.

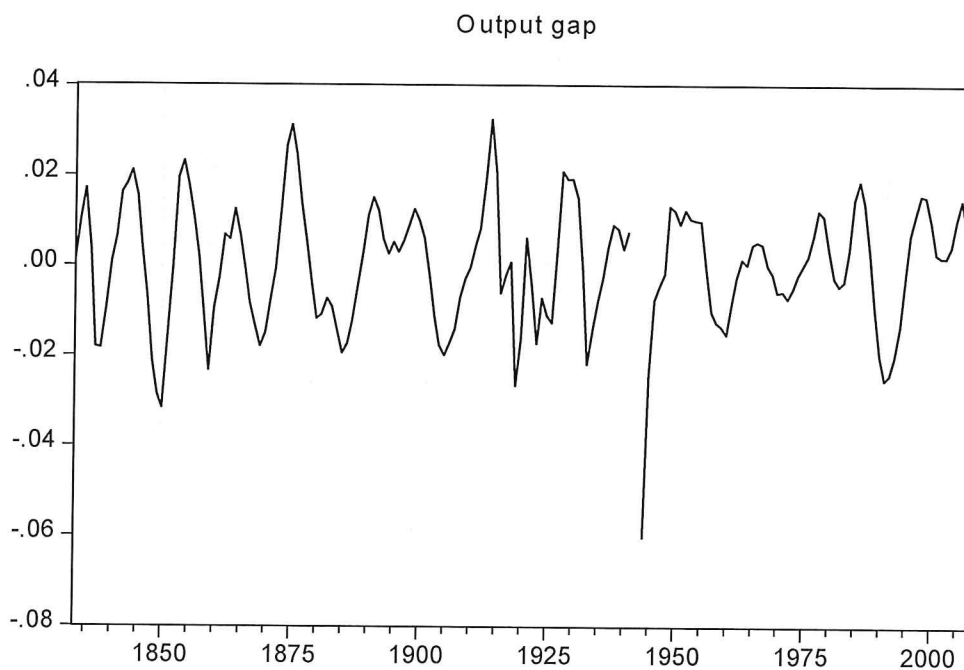


Chart 3. Relative first-order differentials of money stock (M2), bank loans (BL), and credits (C3) for Norway. Five-year symmetric moving averages.

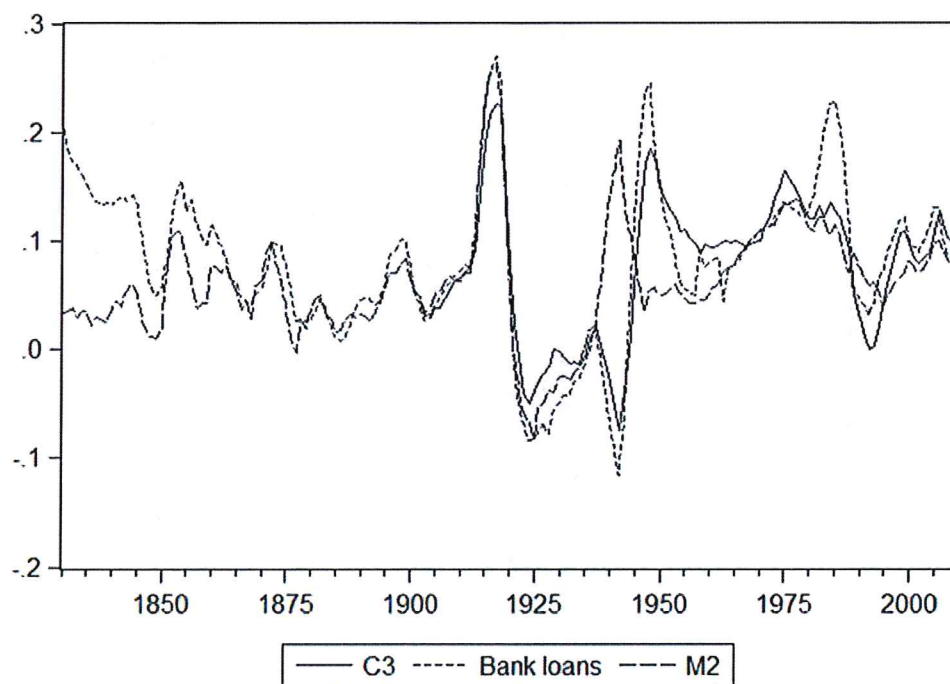


Chart 4. Oslo Stock Exchange main index. First differentials (logs) of monthly data.

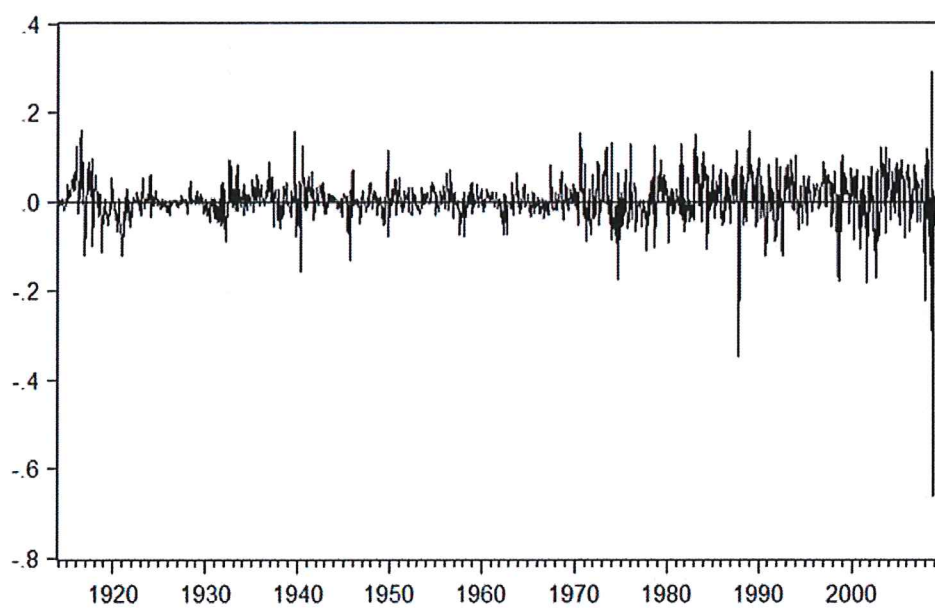


Chart 5. HP-filtered Oslo Stock Exchange main index. First differentials (logs) of monthly data, $\lambda=14,400$.

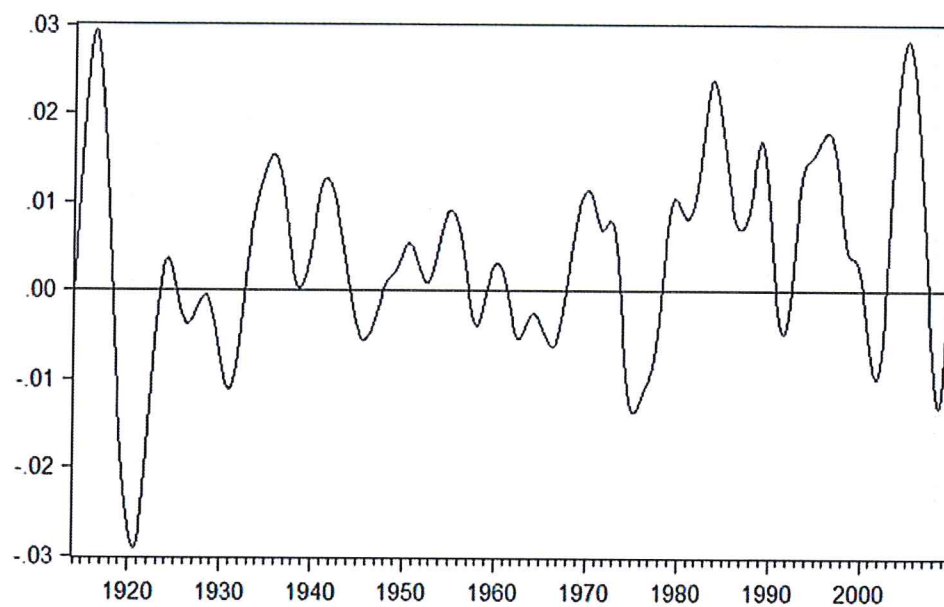


Chart 6. Economic variables and financial crises. Percentage deviation from trend.

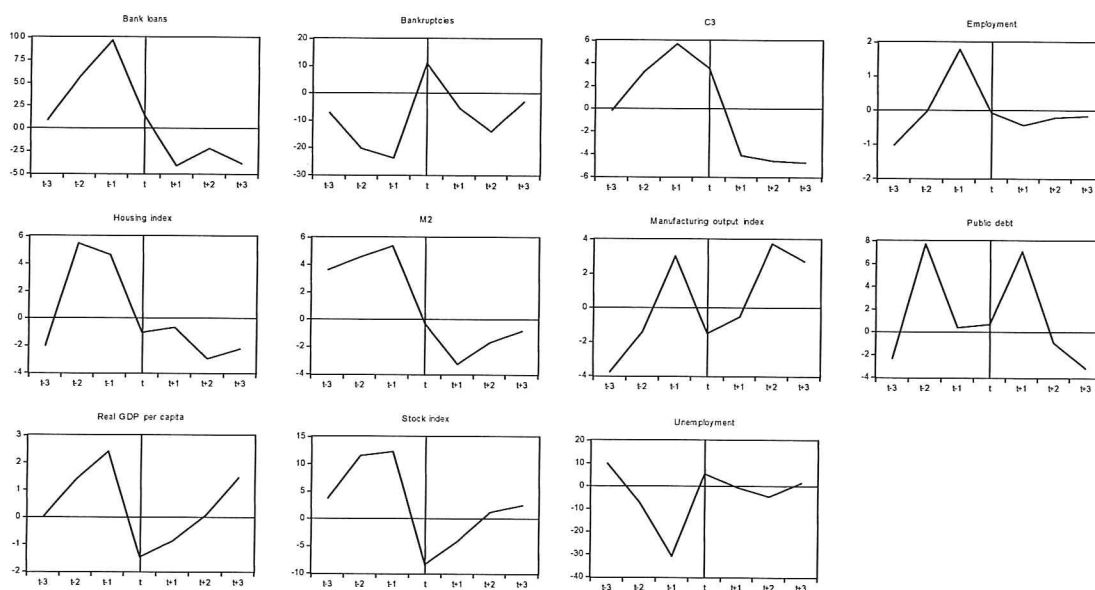
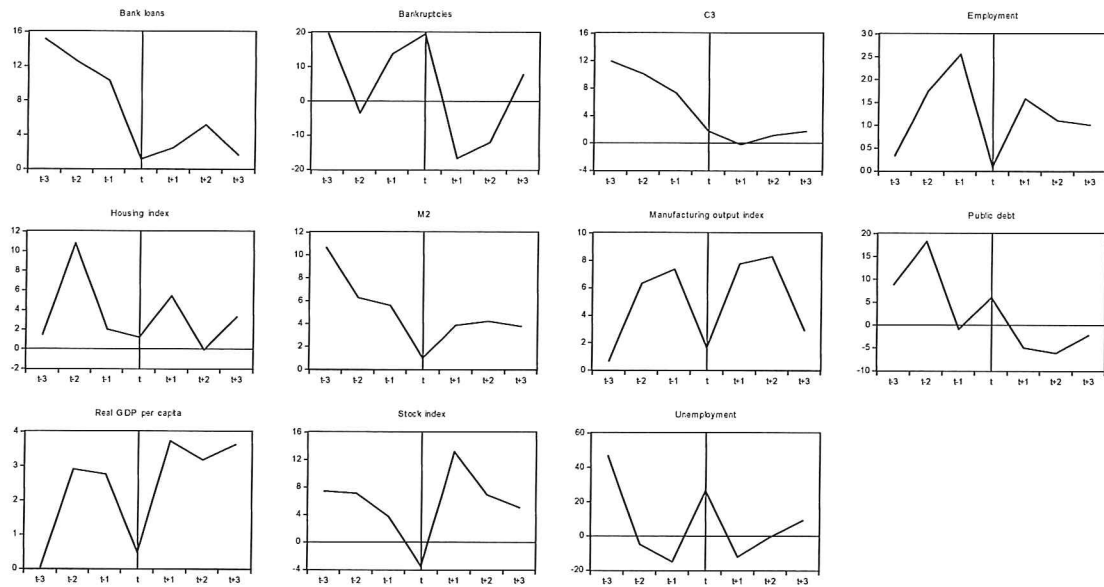


Chart 7. Economic variables and financial crises. Percentage of annual change.



Data Appendix

Variable	Description	Source	Time
M2	Currency in circulation less currency held by banks plus savings and bank deposits.	Klovland (2004)	1830–2010
C3	Total credit to the general public.	Eitrheim, Gerdrup and Klovland (2004)	1899-2010
Bank loans	Total credits.	Klovland (2004)	1830-2010
Bankruptcies	Number of bankruptcies	Eitrheim, Gerdup and Klovland (2004)	1887-2010
House price index	Weighted repeated sales method.	Eitrheim and Erlandsen (2004)	1830-2010
Stock index	Index	Klovland (2004)	1915-2010
Real GDP	Economy wide output	Grytten (2004)	1830-2010
Employment	Persons in 1,000	Statistics Norway (1994). Grytten (2000)	1895–2010 WWII missing.
Unemployment	Percentage	Statistics Norway (1994). Grytten (2000)	1895–2010 WWII missing.
Manufacturing output	Index	Venneslan (2007). Statistics Norway.	1895–2010
Public debt	Percentage	Abbas et.al. (2010), Statistics Norway.	1880–2010.

Table A1. Descriptive statistics

Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
Bankruptcies	1,149	480	5,749	53	1,445	124
C3	488,390	20,537	4,592,995	970	965,138	112
Employment in 1,000	1,564	1,524	2,524	944	446	110
House price index	38	35	124	8	21	181
Bank loans	165,254,945	1,988,000	2,620,000,000	1,575	474,000,000	181
M2	121,556	3,136	1,612,252	24	304,874	181
Manufacturing output index	30	12	104	1	35	116
Public debt in percentage of GDP	30	28	86	10	12	125
Real GDP per capita	101,894	35,957	437,485	11,840	122,693	175
Stock index	1,128	278	10,189	70	2,016	96
Unemployment	3.3	2.4	11.0	0.9	2.4	110

Chart A1. Plot of the variables.

