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FINANCIAL CRISIS IN NORWAY AND JAPAN

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Financial Crisis in Norway and Japan[1]

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Abstract

Three Nordic countries, Norway, Finland and Sweden, and Japan had experienced the severe financial crisis after the rapid asset price increase in almost the same period. However the recovery was fast in Nordic countries, while Japan experienced a prolonged recession, so called lost two decades. This study explains the difference and similarity of two crises, comparing the factors behind the bubble and bust in Norway and Japan.

The paper also focuses on the role of monetary policy in both countries. Miyagawa and Morita (2012, 2013) statistically analyzed the important role of money in the up and down swing of economy in the Japan's economy. They had taken the role of expectation in the money demand. The same VAR model was performed to the Norwegian crisis, taking into consideration the financial anxieties in the period of financial boom and crisis. The estimation results showed that money played the important role in the bubble and bust in Norway as in Japan.

1. Introduction

Three Nordic countries, Norway, Finland and Sweden had experienced the severe financial crisis after the rapid asset price increase in almost the same period. The banking crisis in Norway had occurred in 1987-1993, the crisis in Finland in 1991-1994, and the crisis in Sweden in 1990-93. The financial crisis also occurred in Japan after the bust of bubble in 1990. A typical boom-bust cycle would seem to follow the similar path; a rapid expansion of credit following the financial deregulation, the fierce competition among financial institutes,

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lack in risk management on the part of financial institutes, problems of asymmetric information, bullish expectation and euphoria among the people, bubble bust due to the external shock, increase in nonperforming loan, deterioration of balance sheet of financial institutes, credit crunch, financial crisis. These factors are observed among the countries which experienced the bubble and bust, though there seems to be significant differences in terms of scale and timing.

However the most important common factors behind the bubble and bust are the financial deregulation and monetary easing. Only financial deregulation does not create the asset bubble without monetary easing. For example, B. Eichengreen and C. Arteta (2000) indicate that bubble and bust occurred when financial deregulation and macroeconomic economic environment combine to create the asset bubble after investing the lending boom episodes of more than 90 countries. H. Shigemi (1995) also showed the same scenario in the process of the bubble and bust after examining the asset price inflation of major countries. Many researches have been done about the Japan's bubble and bust. Bernanke and Gertler (1999) and Ahearne et al. (2002) reached the similar conclusion from the analysis of Japan's economy in different way. Bernanke and Gertler concluded that Japanese monetary policy was too tight after the bust of bubble in the beginning of 1990s, using a monetary policy rule. Ahearne et al. stated that deflation could have been averted through early monetary easing by using a macroeconomic model of the Japanese economy (FRB/Global). Both researches suggested that the delay of monetary easing deepened and prolonged the depression.

Miyagawa and Morita (2012) statistically analyzed the Japan's bubble and prolonged recession after the bust of bubble by VAR model along their story. They concluded that money takes an important role in up and down of asset prices. Miyagawa and Morita (2013) showed the effectiveness of monetary policy even at the zero lower bound on interest rate during the period of quantity easy monetary policy from 2001 through 2006. The Bank of Japan published several papers on the ineffectiveness of monetary policy in the deep deflationary economy. For example BOJ (2003) showed that there exists no more cointegration among money stock and the real economic variables based on formal statistical tests. Miyagawa and Morita (2012, 2013) statistically showed the important role of money in the up and down swing of economy, by taking into consideration the role of expectation in the money demand. Once the economy fall into the severe deflation, people to tend to increase the precautionary demand which has not a positive effect on the economy, even if central bank try to increase money stock. They adopted the idea of precautionary demand, defined by the difference between actual money stock and transaction demand. Precautionary money demand crucially increases in the deep depression, which decrease the transaction demand.

The aim of the paper is to examine how the Norwegian economy was recovered from the severe financial crisis. Japan's depression continued for much longer period, though the recovery of three Nordic countries was very prompt. The paper will start with the chronological explain of financial crisis of Norway and Japan respectively in section 2 and 3. The paper will perform the statistical analysis by VAR model on the Norwegian financial crisis in section 4. The conclusion will be summarized in section 5.

2 Norway's Financial Crisis

In Nordic countries, credit rapidly expanded in the around 1985 because of the financial deregulation. Three Nordic countries, Finland, Sweden, and Norway had experienced the rapid rise and fall in the asset price in the years around 1990. In Denmark, the asset inflation was not as sharp as in other three countries[2]. Banks became very competitive to make a loan

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[2] The reasons why the asset inflation was not strong in Denmark come from the fact that the

to the commercial and residential property as well as stock. Because of the strong competition, nominal interest rates were kept at a low level. Moreover real interest rates were even lower, sometimes negative due to the inflation and tax advantage. Expanded loan rapidly increased the asset prices. The rise in asset prices enhanced the capability of firms and households to borrow funds. Asset prices rapidly increased and created the speculative bubbles. However the bubble had suddenly busted. The burst of bubble caused an amount of nonperforming loans which hampered the financial system. The collapse of the banking system damaged the real sector of the economy through the disintermediation of the credit. The common factors behind the asset bubble are the financial liberalization and monetary easing. Financial liberalization itself does not create the bubble without monetary easing. The process of the rapid rise and fall of the asset prices in Norway will be examined in this section[3].

2.1 Financial regulation in Norway
In Norway, banks were heavily regulated in both the quantity and rates for their lending by the mid-1980s as in other Nordic countries. The interest rates were artificially kept at a low level. The excess demand for lending was controlled by the credit rationing. Banks were also required to invest in government bonds. Foreign exchange and international capital movements were also strongly regulated. The government controlled the financial system through the subsidized loans to politically important sectors, such as the residential sector, and industrially depressed regions in the northern Norway. They still continued to provide the subsidized funds on a large scale even after the housing are already enough.

The strongly regulated financial system was kept even after government changed to a conservative party. The reasons why Norway preferred to keep a government controlled financial system are summarized in the following three factors, according to E. Steigum (1992)[4]. 1. Strong political pressure groups gained considerably from the subsidized loans. 2. Norwegian politicians had strong anti-market sentiments. 3. Many households and firms had lots of debts. High debts of the firms and households have been special features of the Norway's credit market. However the Central Bank and Ministry of Finance was obliged to follow the international trend toward deregulation

2.2 Financial deregulation
The Norway's economy was stagnant affected by the international economy in the beginning of 1980s.The GDP growth rate fall into almost zero percent in 1982 as shown in Figure 1. The Norges Bank (Central Bank of Norway) kept the monetary easing and a financial deregulation has started in 1984, which has triggered the excessive credit expansion. Due to the abolition of the regulation of new branch establishments, the number of branches rapidly increased. The branches of commercial banks and savings banks increased by 15% and 5.5% respectively from 1983 to 1987. The number of employees had increased by 28% in savings banks and by 19% in commercial banks from 1983 to 1987. The loans mainly expanded to the newly established small firms, real estate, construction, and services industries. The lending by financial institutions to firms and households grew at 12% from 1984 to 1986, roughly three times the average growth rate in the years prior to deregulation[5]. The easy monetary policy

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country had joined the European Economic Community (now the European Union). As a result, the deregulation process had already started around 1975 and interest rates were relatively high to meet the exchange rate targets within the European Monetary System. See Howells Peter and Keith Bain (2008) P. 175.

[3] The section mainly depends on E. Steigum (1992, 2005) and Timothy Edmonds (2008).

[4] E. Steigum (1992), P.3.

[5] E. Steigum (1992), P.11.

had continued until The Norges Bank raised interest rates to protect the Kroner from depreciating in December 1986. The commercial banks expanded the loans under the fierce competition with non-bank financial institutions which were less regulated under the easy monetary conditions. Figure 2 indicates the growth rate of bank lending and Figure 3 shows the GDP ratio of total credit. Figure 2 shows that bank lending rapidly increased in 1984. Figure 3 shows that its GDP ratio increased from 30 % in 1984 to 60% in 1988.

| Table 1	The Process of Financial Liberalization in Norway
1980	The rates for individual loans were not regulated; rather the average level was regulated through interest rate declaration from the Ministry of Finance
1984	Supplementary reserve requirements were removed
1985	Interest rate declaration were removed and interest rate monitoring was introduced
1986	Supplement reserve requirements ware reintroduced. The limits of the commercial and savings bank borrowing facility at the Norges Bank were increased markedly. Foreign banks were permitted to open subsidiaries.
1987	The supplementary reserve requirement were removed. Perpetual subordinate capital was excluded from the limitations on approved loan capital. The Banking, Insurance and Securities Commission issued guidelines for assessing nonperforming loans and entering them in accounts.
1989-91	Remaining foreign exchange controls were removed.
1990	Foreign banks were allowed to operate through branch offices.

(Source) Jarmo Pesola (2001) p.52.

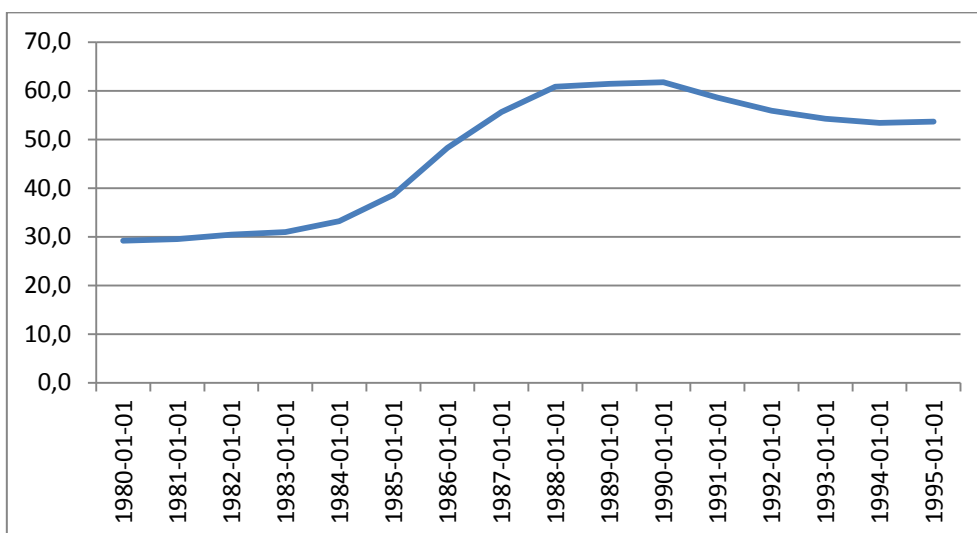**Figure 1 Real GDP growth rate (year on year %) in Norway**
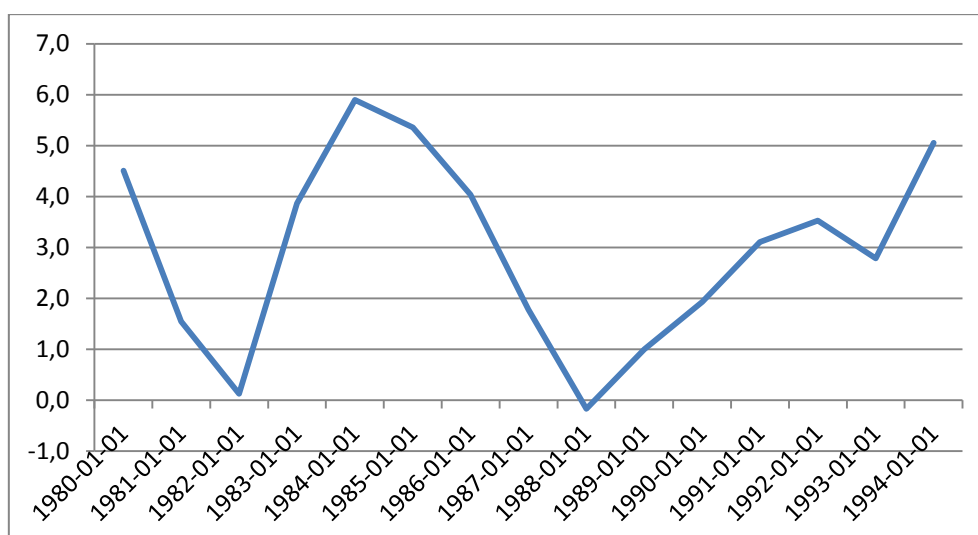
(source) FRED St. Louise FRB Data Base
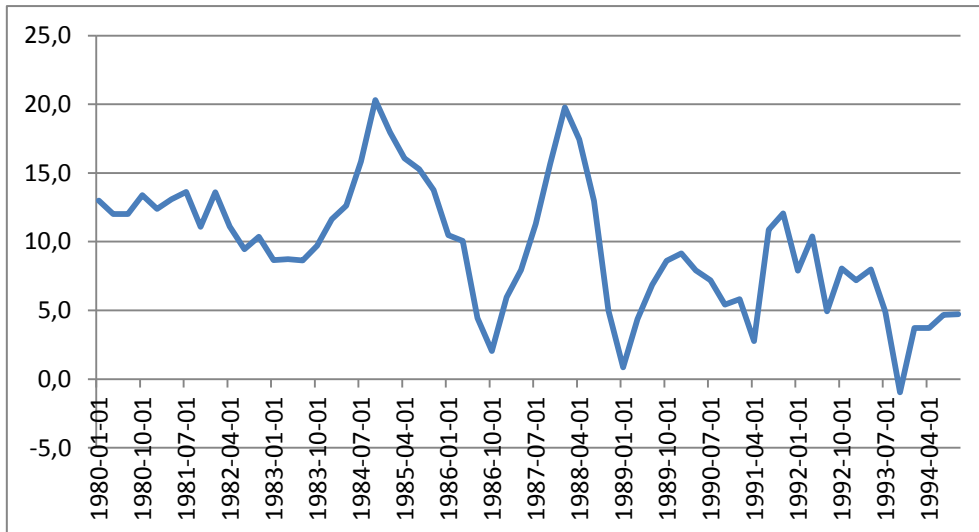
Figure 2 Bank Credit growth rate (year on year %)
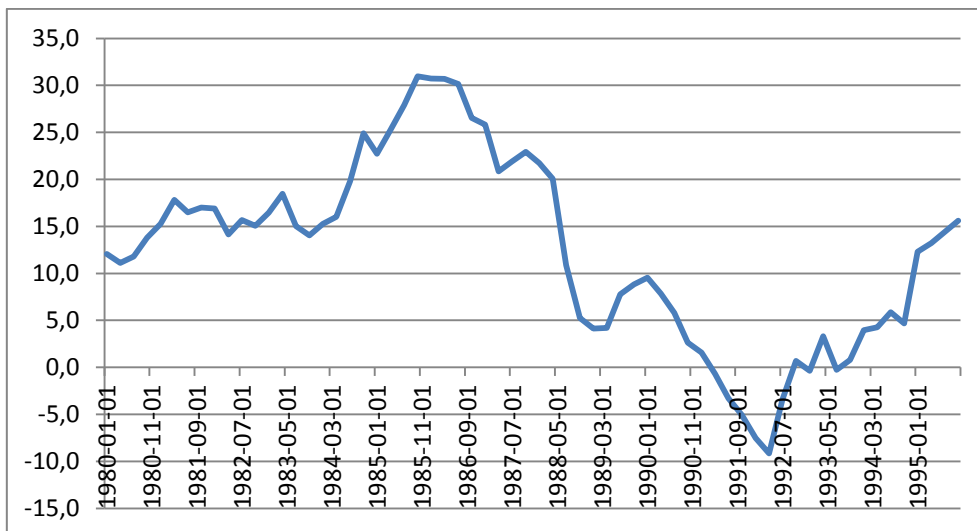
(source) FRED St. Louise FRB Data Base

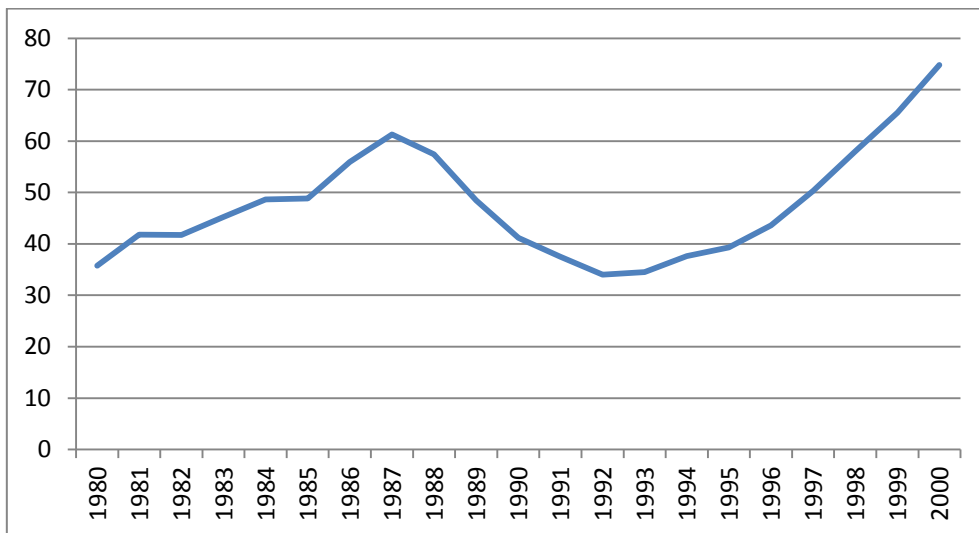**Figure 3 Bank Credit (GDP %)**

(source) FRED St. Louise FRB Data Base

Figure 4 Money Growth Rate (M2) in Norway

(source) FRED St. Louise FRB Data Base
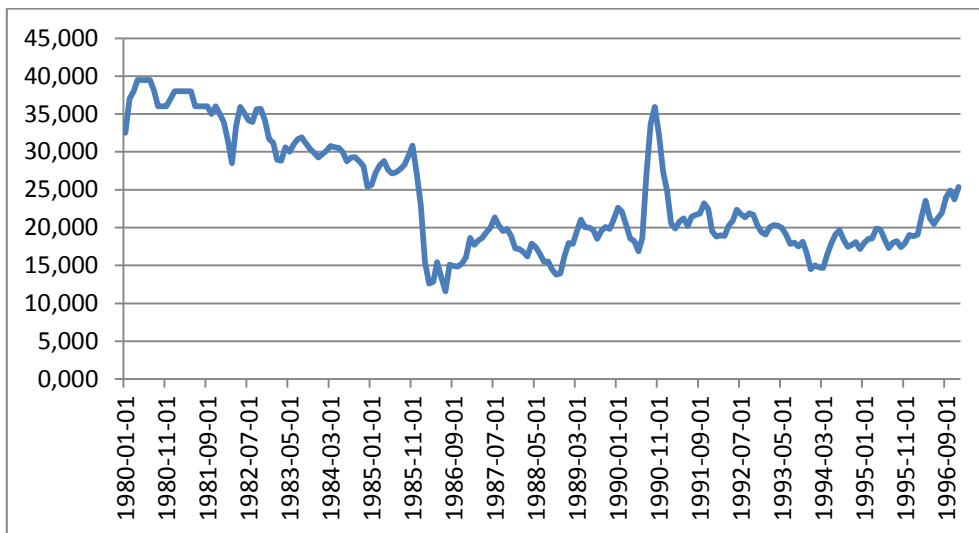
Figure 5 Real price of real estate

(source) FRED St. Louise FRB Data Base

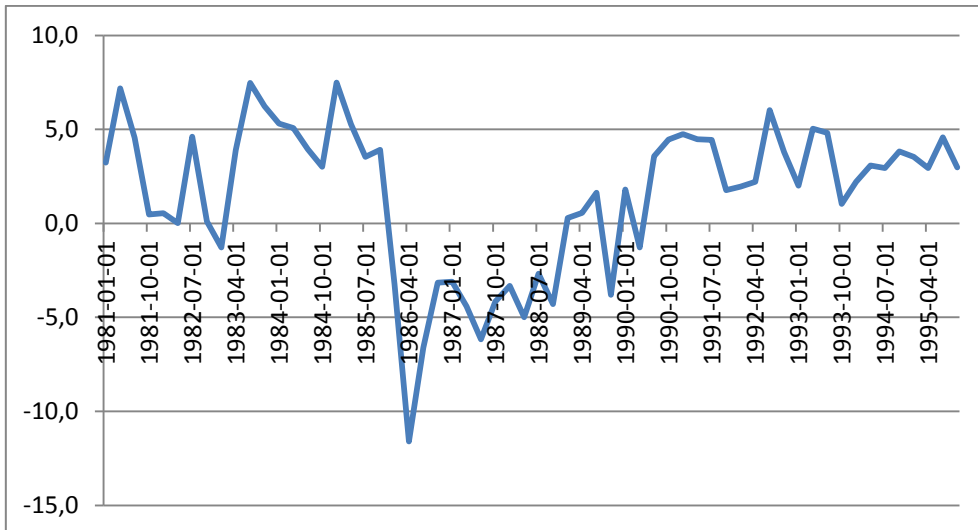**Figure 6 Share Price (Norway)**
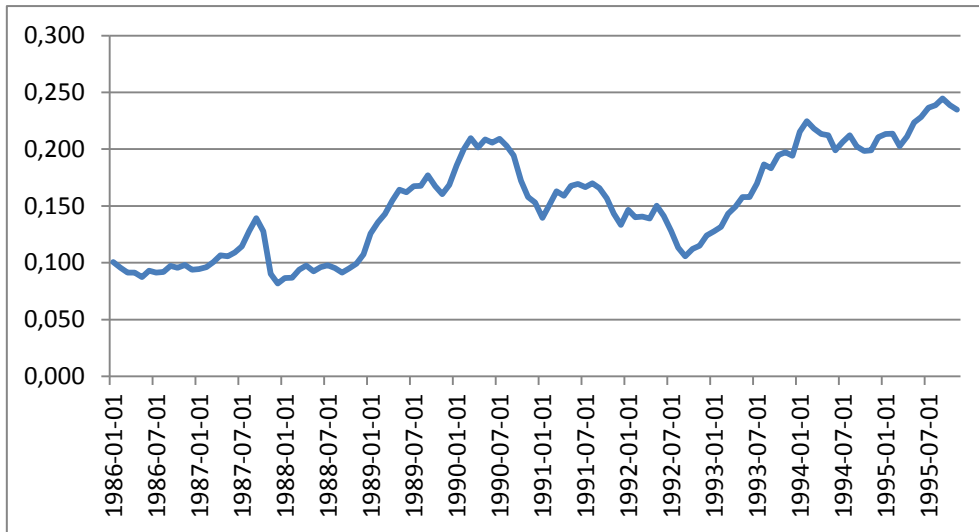
(source) FRED St. Louise FRB Data Base
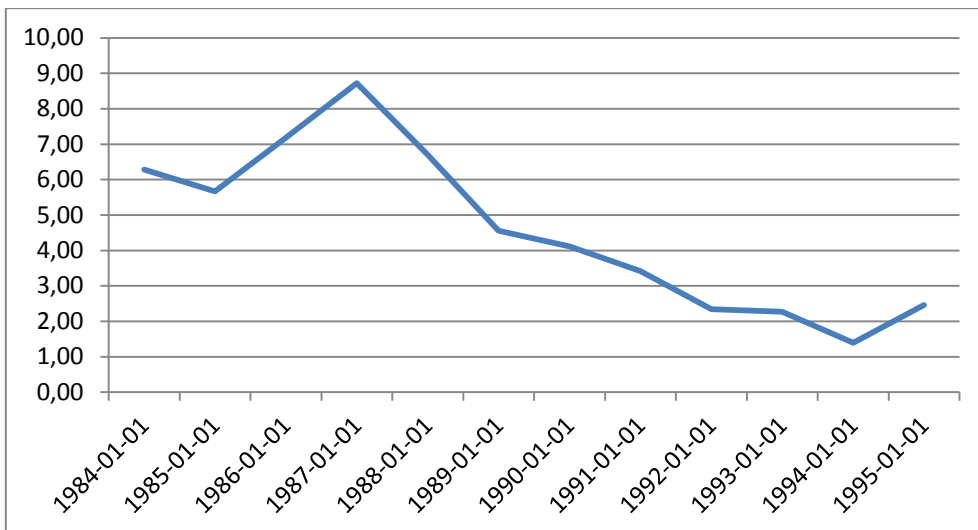
Figure 7 Oil Price , us$/barrel

(source) FRED St. Louise FRB Data Base

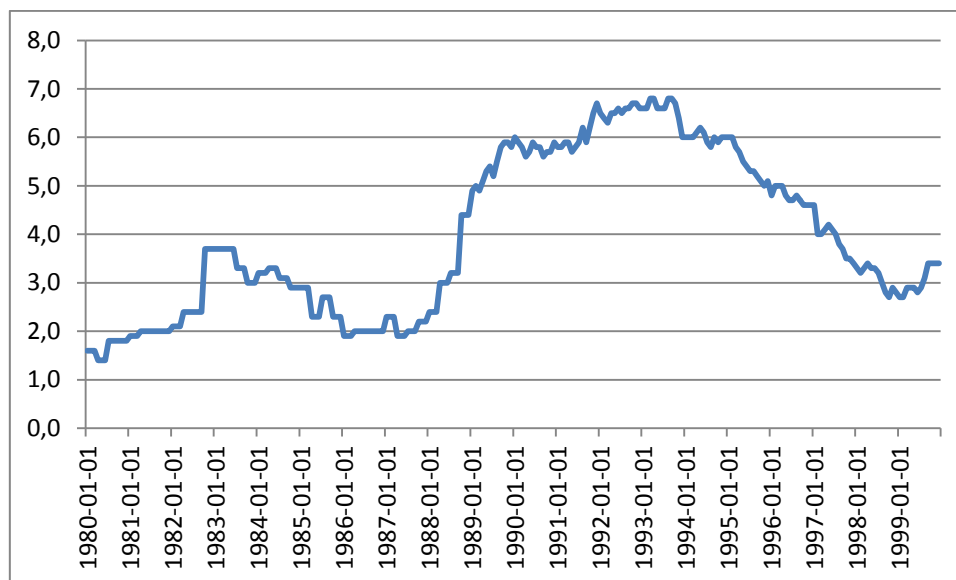**Figure 8 Current account balance (GDP%)**

(source) FRED St. Louise FRB Data Base

Figure 9 Inflation (CPI)

(source) FRED St. Louise FRB Data Base

Figure 10 Unemployment rate

(source) FRED St. Louise FRB Data Base

The bank credits had rapidly increased in the period 1984-1987. The money stock also rapidly increased during 1986 as reported in Figure 4. The real after-tax interest rate became almost zero. Thus, not only firms but also households increase the borrowing from financial institutes to buy house, cottage, and yachts and even expensive holidays abroad[6]. As a consequence, assets prices rapidly increased. The price of housing had increased by 40% in the period 1984 -1987 as shown in Figure 5. The share prices also rapidly increased by 1987 as reported in Figure 6. The expanded loan contributed to the rise of asset prices, which enhanced the value of borrowers´ assets as their collateral, which in turn promoted bank lending.

2.3 Bubble bust
The oil price had rapidly declined in 1986 as shown in figure 7. The current account balance got worse. Its GDP ratio had rapidly fallen into the minus as shown in Figure 8. Petroleum-related industries which are principal industries in Norway were damaged. However the restrictive fiscal policy was implemented in 1987 and 1988 to reduce the real disposable income of households and to reduce imports. Monetary policy was also tightened to defend the fixed exchange rate system in December 1986. Money sock had rapidly declined. Its growth rate declined at 2.0% in Oct. 1986 after it peaked at 20.3% in Oct. 1984 as shown in Figure 4. The recession had started in 1988 when both housing prices and the share price started to decline. The real estate prices fall down by 40% from mid-1987 to 1991. The GDP growth rate fall into the minus in the first quarter 1988. The deepest recession continued from 1988 to 89 as shown in Figure 9. Unemployment rate rapidly increased in 1988, as shown in Figure 10. Inflation rate gradually declined after it reached at 8.7% in the first quarter 1987 as

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[6] E. Steigum (1992), P.9.

shown in Figure 11. Bankruptcies rapidly increased from 1426 in 1986 to 3891 in 1988 and 4536 in 1989 in response to the decline of real estate price[7]. Share price also rapidly declined in 1987 but soon recovered as shown in Figure 6. In Norway real estate price takes more important role in the behavior of macro economy than share price. Interest payment on housing loan was fully deductible from taxable income. The real interest rate on housing loan was almost negative. Housing market was liberalized in the early of 1980s. Apartment price came to be determined by the situation of the market. Money stock temporally increased in 1988 as shown in Figure 4. But its growth had not a positive effect on the asset price and economy. The reason seems to be that people try to hold money as precautionary demand as discussed later.

The rapid decline of real estate price started to damage the balance sheet of banks in Norway. The financial crisis erupted in the autumn of 1988, when a medium-sized commercial bank, Sunmorsbanken disclosed to have a big nonperforming loan. Immediately later many small banks, mostly savings banks also got into the financial difficulties with mounting nonperforming loans. They were merged with larger banks with the financial support of the deposit insurance. There exist two insurance, one for savings banks (Savings Banks' Guarantee Fund; SBGF) and the other for commercial banks (Commercial Banks's Guarantee Fund; CBGF). Both are private funds. However, by 1990 the deposit insurance funds for the saving banks lost almost funds. The main bankruptcy of the banks follows shortly after[8]. In Oct.1991, Christina Bank, Norway's second largest bank had bankrupt. In December 1991, another larger commercial bank, Fokus Bank had bankrupted. These two banks nationalized and owned by the government. In the end of 1991, Norway's largest bank, Den Norske Bank had bankrupted. The bank was also nationalized. Mergers and take-overs of banks was common way to achieve restructuring. Liquidations were not much used in the Nordic financial crisis. Only two small banks were liquidated in Norway[9].

2.4 Public fund injection
The Norges Bank swiftly provided problem banks with emergency liquidity supports. The government also promptly responded to the increasing of the problem banks. They are very afraid of the spread of crisis and collapse of the financial system. They established the crises resolution agencies to manage the public support and the restructuring of the banking system, which are independent of the Central Bank and the Ministry of Finance. Their prompt response is quite different from that of the Japanese government. They were very first to recognize the financial crisis They decided to establish the Government Bank Insurance Funds, capitalized with public funds of 5 billion NOK in March, and added an another 6 billion NOK to the fund and newly established the Government Bank Investment Fund with a capital of 4.5 billon NOK after the second largest bank, Christina Bank had bankrupted in Oct. 1991. Main problem banks were completely rescued by the public fund injection in 1991 and 1992. which hampered the systemic collapse of financial system in Norway. Japanese government reluctantly decided to take the same policy in 1997, seven years later after the bust of the bubble. The government's strong support for the problem banks dispelled the financial anxieties among the depositors and creditors of the Norwegian banks. The balance sheets of the banks rapidly improved in 1993, due to the strong support of the government. The public fund injected into the problem banks, mostly as their capital was returned to the government due to increase in share prices without the loss of taxpayers in the end. The fiscal

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[7] E. Steigum (1992), P.14.
[8] E. Steigum (2006), PP.228-230 and S. Honkaopja (2009) p.23.
[9] S. Honkaopja (2009) p25.

cost of bank support during the financial crisis is estimated to be -0.4% of 2001GDP[10]. That is to say, The Norwegian taxpayers got profits by injecting their money into the problem banks.

The Central Bank underestimated the effect of the financial deregulation on credit supply and aggregate demand. Financial liberalization was a big regime change. They targeted nominal interest rate in monetary policy. The politician did not agree to take a tight monetary policy. The largest political party, the Labor Party had insisted a lower nominal interest rate in its 1985 election campaign, though after tax real interest rate was very low. The nominal interest rate targeting policy seems to make the Central Bank to keep the easy policy. When the oil price started to decline in 1985[11], the Central Bank began to supply lots of liquidity into the banks in order to avoid the rise of nominal interest rate, which fueled the expansion of credit. The supply of such liquidity loans increased to 80 billion kroner in 1986[12]. This easy monetary policy prolonged the credit expansion and the boom in Norway.

Norway had decided to take a floating exchange rate system in December 1992 after Norwegian currency had been attacked. The Norges Bank was obliged to defend the Krona by increasing interest rate. Monetary policy tends to be pro-cyclical under the fixed exchange rate resume. However the currency attack was not so strong as in Sweden and Finland, because of fiscal stability supported by oil production and prompt recovery of financial system. They are now free from so called irreconcilable trinity of open economy; fixed exchange rate, independent monetary policy, and free international capital flow. They now implement a monetary policy discretionarily with a target of inflation rate.

3. Japan's Financial Crisis

3.1 Financial deregulation in Japan
The regulated financial market in Japan had many similar features as the financial market in the Nordic countries. As in Norway, Japanese financial system was highly regulated by the government. The interest rate was artificially kept at a low level in order to reduce the fund raising cost of the main industries. It was a kind of subsidy from the household to the industries. The Ministry of Finance strictly controlled the banks with the strong power. Security market was also strongly regulated. A cooperate finance mainly depended on the indirect financing through the financial intermediaries. Firms were strongly dependent on bank credit. The stock market in acquiring capital for firms played only a smaller role. This also characterized the Norway's capital market.

Japan's financial liberalization has started in 1980. It started first in the security markets. The restrictions concerning the fund-raising in the securities market were relaxed. As a result the Japanese large firms became less dependent on the banks. At the same time the liberalization of the deposit interest rates was only gradual and remained at a relatively high level. As a consequence the profits of the banks gradually declined. Banks were finally obliged to seek new lending opportunity among small business and property-related firms. The Japan's financial liberalization which was slow and incomplete caused the fierce competition among the financial institutes and created latter the severe problems of nonperforming loans. Hoshi (2001) empirically showed that the size of non-performing rapidly increased with growth of real estate lending, which was caused by the experience of losing existing customers to capital markets. He also showed that the rapid appreciation of land prices in the late 1980s fueled the growth of real estate lending.

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[10] Net fiscal cost of bank support is estimated to be 5.3% of 1997 GDP in Finland and 0.2% of 1997 GDP in Sweden. See K. Sandal(2004) and S. Honkaopja (2009) p.24.

[11] During 1986, the price of North Sea Brent Blend crude oil fell from $27 a barrel to $14.50 a barrel. T. Edmonds (2008) P.11.

[12] E. Steigum (1992), P.12.

3.2 Japan's bubble

Japan's bubble erupted in the latter half of 1980s after the Plaza agreement in Sept. 1985. Monetary easing has begun to contribute to the decline of USA's huge trade deficits, which was caused by the highly appreciated dollar. U.S. President Ronald Reagan had taken the tight monetary policy to oppress the inflation and reduced the tax rate to vitalize the economy, when he took an office in 1980. His economic policy, called Reganomics appreciated the dollar which substantially increased the trade deficit. The U.S trade deficit with Japan accounted for over half of its total trade deficit in the 1980s. U.S congress took very hard stance to the Japanese increasing trade surplus and threatened with retaliating trade measures. The Japanese government which worried about the deterioration of the relationship between U.S. and Japan gave a strong pressure on The Bank of Japan. The government persuaded The BOJ to take easy monetary policy by insisting the necessity of international coordination. Bank of Japan honestly follows to the indication of the government. The BOJ started to reduce the official discount rate; from 5% to 4.5% in Januarry30, 1986, from 4.5% to 4.0% in March 10, 1986, from 4.0% to 3.5% in April 21, 1986, from 3.5% to 3.0% in November 1, 1986, from 3.0% to 2.5% in February 23,1987. The BOJ kept the then lowest rate until May 1989 for two years and three months. Money stock had rapidly increased as shown in Figure 11.

Bullish expectation became intensified. The National Land Agency predicted in 1985 that the demand for office space will rapidly increase in Tokyo as international financial center. The self-confidence prevailed among the public. Both the stock and land prices had rapidly increased from 1988 through 1989, which could not be explained rationally by the fundamentals (Figure 11 and 12). The BOJ had seriously begun to search for the timing of policy change in 1989. However both government and general public did not admit, because they thought Japan, the world's largest creditor should take a positive stance to keep the policy coordination among industrial countries.

Figure 11 Money growth rate (M2%)
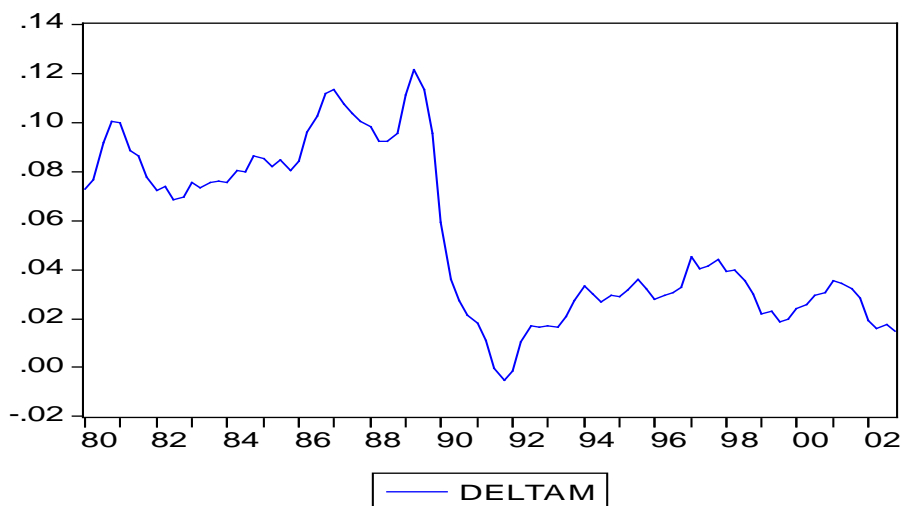
(source) Bank of Japan

Figure 12 Share price (Nikkei Dow-Jones Index)
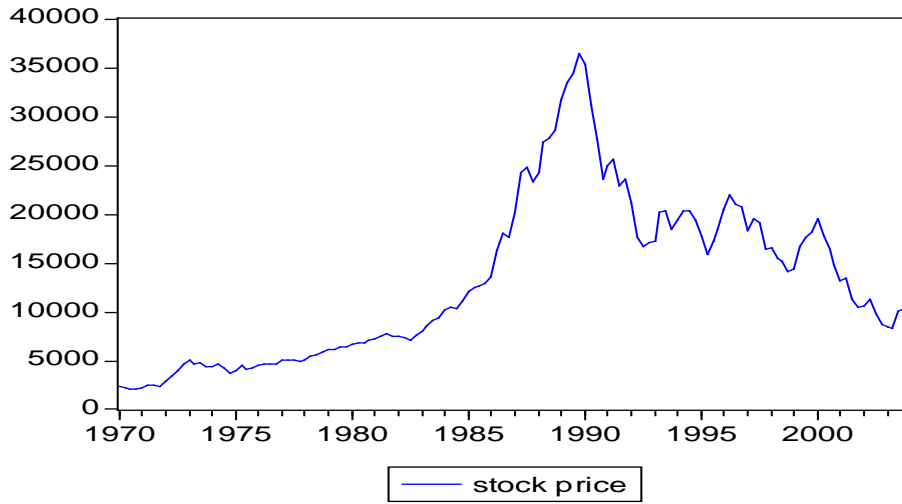
(source) Tokyo Stock Exchange

Figure 13 Land price %
(6 Large Urban Areas, average of residential, commercial, and industrial)
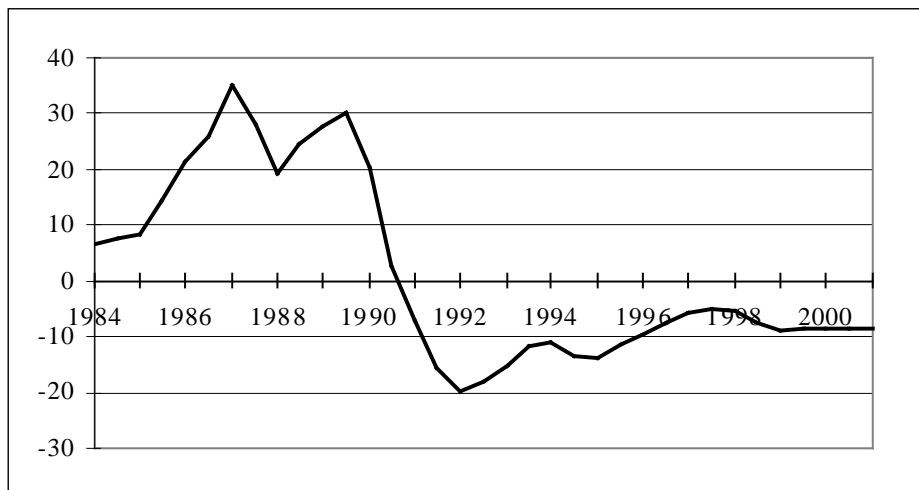

(source) Japan Real Estate Institute.

3.3 Bubble bust

The bubble had busted when the BOJ implemented the third rise of discount rate from 3.75 to 4.25 percent in December 1989 when a new governor Yasuo Mieno had took his office[13]. However the market was still bullish. Land and stock prices continued to rise to levels that could not be rationalized by the fundamentals of the Japanese economy. He had showed very strong stance to the bullish economy by fourth rise of discount rate from 4.25 to 5.25 percent[14]. He took the role of arbitrage of asset prices, unfortunately for the Japanese economy[15]. Furthermore governor Mieno had implemented the fifth rise of discount rate to 6.0 percent to avoid the homemade inflation caused by the Gulf War in August 1990. In addition the government also placed a ceiling on the total amount of financing available for real estate purchase.

The burst of the bubble began at last. The money stock (M2+CD) rapidly declined. It recorded negative year on year growth in mid –1992 as shown in Figure 11. After hitting a record high of 38,915 yen at the end of 1989, the stock price (Nikkei Dow-Jones Index) rapidly began to decline. In August 1992, stock price dipped below 15,000 yen, a 63 percent plunge from a peak level in Figure 12. Land price began to fail after hitting a peak in September 1990 and kept falling until now as shown in Figure 13. In response to the asset price decline, the BOJ reduced the discount rate six times from July 1991 to February 1993. The discount rate was ultimately reduced from 6.0 percent to 2.5 percent. The government also implemented the fiscal stimulus by spending a total of 29.9 trillion yen in two years from 1992 to 1993. Land and stock prices were promoted to decline. Prices continued to decline and increased the deflationary pressure. Firms were obliged to continue the adjustment of their balance sheet damaged by the decline of asset prices. The economy had been getting worse and worse through the financial accelerator mechanism[16].

3.4 Financial Crisis

Prime Minister Hashimoto who worried about the future of the government finance, made a policy to reconstruct the financial structure. He was afraid that fiscal condition would get worse and worse with the coming of aging society in Japan. He decided to increase the consumption tax from 3 to 5 percent and abolish a special income tax cut in April 1997, which amounted to a tax increase of 9 trillion yen. Consumption had rapidly shrunk in

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[13] The BOJ had increased the official discount rate from 2. 5% to 3.25% on May 31, 1989 at last. The BOJ was obliged to keep the lowest rate, 2.5% since the Louvre Agreement in 1987, to help the weak US dollar. West German which is also required to keep the monetary easing by US, changed its policy to a tight one in the summer of 1988. German could avoid the bubble, though their policy change is said one of the factors which triggered the sudden decline of NY stock market in 1the summer of 1988.

[14] New governor Mieno was hailed as an "Onihei of Heisei era", a famous police leader, who had strongly fought against the gangs in the Edo era more than 200 years ago. The bubble was mainly discussed from the view point of income and asset distribution. This Mieno's episode reflect well the public feeling that "bubble-bursting" was a right minded from ethical view point.

[15] Nowadays many economists understand that central bank should not take the role of the arbitrage of asset prices. See Randal Parker (2002).

[16] The decline of assets price reduce the worth of collaterals, which reduce the lending ability, which decrease the lending and decline of asset prices as collateral. The vicious cycle is created starting with the first decline of asset prices See B. Bernake, M.Gertler and S.Gilchrist (1999) and B. Bernake (2007)

response to Hashimoto's tax increase policy[17]. Unfortunately for the Japanese economy, the East Asian economic crises occurred in July 1997. The fiscal contraction compounded by the Asian crisis decreased the aggregate demand substantially.

Under the deflationary conditions, a financial panic occurred. Hokkaido Takushoku Bank, one of Japan's city banks (largest twenty banks), and Yamaichi Securities Company, one of Japan's four largest security companies, failed in November 1997. The failure of two big financial institutions sent the sign that the government gave up the "too big to fail" policy. People thought no financial institutions were immune from failures. Rumors about the other banks' failure had spread out through Japan. The stock prices of many financial institutions sharply declined and "Japan premium" in the international money market jumped by around 100 basis points. Japanese banks were obliged to pay the additional basis points for raising funds in the oversea financial markets. The premium is calculated as the difference between the quoted rates of TIBOR in the Tokyo offshore market and LIBOR in the London offshore market. Bonds issued not only by Japanese financial institutions but also by Japanese government were downgraded at the investment grade ratings by international credit-rating agencies, such as Moody's.

3.5 Protracted public fund injection
The government hesitated to quickly resolve the nonperforming loans and bank problems which weakened financial institutions and caused long recession. The government officially announced in late 1995 that nonperforming loans totaled 38 trillion yen, 4 percent of outstanding loans. In 1998, nonperforming loans increased to 73.1 trillion yen, 12 percent of all loans or 10 percent of GDP. All efforts by the government and private banks to decrease nonperforming loans did not succeed in reducing them at all because of the severe deflationary pressure.

Public fund injection was heavily delayed to rescue the problem financial institutes. The delay was caused by the political turmoil to solve the problem non-banks, *jusen* which first got the severest damage by the nonperforming loans NPLs immediately after the bubble bust in 1990. Seven *jusen (non-bank financial institute)* were set up by the Japanese major financial institutes as their subsidiaries in 1970s, which focuses on the mortgage lending market. The *Jusen* were obliged to make a high risk investment during the boom when their parents' financial institutes expanded their business territory to the housing loan market. They were severely damaged by the burst of the bubble.

The Inspection of MOF found there was a loss of 6.4 trillion yen which reached a half of the total assets in Aug. 1995. It became a big political issue who should bear the loss, when all seven *jusen* came into insolvent. The Diet of 1996 finally passed a law that allowed injecting the public fund worth 685billion yen, after the heated criticism and dispute.
Because it was a relief method of problem banks without any management and administrative responsibility, it drew heavy criticism from the public. After this, public funds became a political tab.

In response to the serious situation, the government decided to provide 30 trillion yen funds by issuing bonds. The government was not willing to inject public funds into the problem banks reflecting the process of the *Jusen* problem in 1996 at first. However the financial panic was so severe that neither the congress nor the public strongly opposed an injection of public funds to assist the problem banks. The public fund worth 30 trillion yen was admitted for the financial stability in February 1998 (It was expanded into 60 trillion yen in the end of 1998). The 30 trillion yen was divided into the following two categories: 13 trillion yen was prepared for the enforcement of the Deposit Insurance System, while the

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[17] Hashimoto admitted his fault and regretted lots after retirement, saying that he was deceived by the official of Ministry of Finance.

remaining 17 trillion yen was intended for the capital injection of the problem financial institutions.

The government actually injected 1.8 trillion yen into 21 large banks to raise their capital ratio in March 1998. However Management did not apply for sufficient amounts of funding out of fear taking responsibility. In addition, to avoid the spread of a financial crisis, this handout was evenly distributed among the banks. The convoy system, under which the government fully protects financial institutions, was upheld. Thus, the injection of funds had no significant effect on the banks. As a result Long-Term Credit Bank and Nippon Credit Bank both went bankrupt in 1998 even after the injection of public funds. The public fund worth 7.5 trillion yen was again injected in March 1999. The implementation was quite different from the former injection. Banks were strongly required to submit a detailed and meaningful restructuring plan[18].

3.6 Monetary easing
The signs of deflation were apparent. In response to the serious situation, both the BOJ and the government admitted at last that Japanese economy had fallen into the deflation. The Japanese economy was thus caught in a vicious circle, so-called deflationary spiral indicated by Irving Fisher (1933). Decline in demand—Decline in production and price—Decline in employment (decline in consumption) and Increase in loan in real term (decline in investment)—Decline in demand. GDP recorded negative growth for 5 consecutive quarters from the 1997 Q4 onward (for the first time since the start of GDP statistics in 1955). The BOJ also realized the risky situation in the Japanese economy. The call money rate was reduced to 0.25 percent in 1998. Eventually, the BOJ conducted the zero interest policy by reducing the call money rate virtually zero percent in February 1999. Furthermore the BOJ adopted the quantitative easing policy measures in March 2001[19]. Owing to the expansionary policy, the financial panic seemed to settle down. The Japanese economy began to show signs of recovery.

4 A Statistical Analysis

The relationship between money and the real economy became unstable on the surface, because people tend to increase money as precautionary demand in the depression, especially in the financial crisis. Thus, Central Bank tends to insist that they can't do anything to revitalize the economy in the deep depression. Bank of Japan also repeated the ineptness of monetary policy in the depression. For example, BOJ (2003) shows that there is not any close relationship among money stock and the real economy by performing the cointegration analysis among M2, real GDP and opportunity cost based on the data extending the period to 2002. Other researches have been performed on the monetary policy and the prolonged depression. Ugai (2006) surveys the empirical researches on the effectiveness of monetary policy, especially on the Quantity Easy Monetary Policy (QEMP) taken by the BOJ in March 2001. Many researches denied the effect of QEMP, or showed the very limited effect, if any, according to his survey.

Miyagawa and Morita (2013) analysed the relationship between the Japan's economy and money, by using the VAR mode, taking into consideration the role of financial anxieties created in the depression. They employed the 5 variables; the Current Account Balances at

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[18] Cargil, T.F., M.H. Hutchison, and T. Ito, (2000), p. 66.
[19] The BOJ changed the operating target for money market from the uncollateralized call rate to the outstanding current account balances held by financial institutes at the BOJ.

the BOJ (CAB), Money Stock (M2+CD), Business Cycle of Tankan Diffusion Index, the uncollateralized overnight call rate, real GDP, and the core Consumer Price Index (CPI). They employed Business Cycle of Tankan Diffusion Index to capture the psychological change of people due to the financial anxieties.

First they performed the VAR model without taking into consideration the role of financial anxiety. They could not find a positive effect of money stock. However they could find that monetary policy has a positive effect on the real economy when they estimated again by decomposing money stock into transaction money and precautionary money, using the same VAR approach. Some argued that Japan's economy already fall into a liquidity trap in which additional monetary easing would lose its effectiveness, because the monetary base and bonds became perfect substitutes. They insisted that additional money would be absorbed as a precautionary demand even if central bank increased the base money. The money stock would not have any effect on the economy if people hold additional money stock by the precautionary motivation. Miyagawa and Morita concluded that BOJ's strong commitment to continue easy monetary policy will dispel the financial anxieties, and decrease the precautionary demand. As a result monetary easing has a positive effect on the real economy even under the zero lower bound on interest rate.
The same method will be performed into the Norwegian financial crisis in this section.

4.1 The Data Property

Variables and their symbolic notations are given below. The data we estimate here are oil price, money stock defined by m2, real GDP, price of real estate, inflation rate (CPI), business survey, and transaction money .These data are symbolized, respectively, *oil , m2,rgdp,restate, inflation_cpi_a ,b_ survey,* and *trans_ m2*. Business survey is employed to capture the psychological change of people due to the financial anxieties. The data is similar to the Diffusion Index issued quarterly by Bank of Japan known as TANKAN. Transaction money is defined by the difference between money stock and precautionary demand. The precautionary demand is a function of financial anxieties. This function will be explained later. All data are obtained from FRED, Data Base of St. Louise Federal Reserve Bank.

We apply two conventional unit-root tests, DF-GLS (ERS) and KPSS test to the time series for each variable. ERS tests the unit root of the time series as the null hypothesis, while KPSS test the stationarity as the null hypothesis. The results are shown in table 2. *B_survey* becomes stationary, while *oil_texas* and *log(rgdp)* are detected to be nonstationary. *log(rm2)* and *log(r_estate)* are neither stationary nor nonstationary, and are assumed to be nonstationary. *Inflation_cpi_a* is assumed to be stationary. *log(trans_m2_modified)* to be estimated later becomes nonstationary. The 1st differenced process of each nonstationary variable is shown to be stationary, although details are omitted here for economy of space.

Table 2 Unit root test (1983q1,1995q4)

	ERS		KPSS	trend
	t-value	lag	LM-value	
b_survey	-2.132917**	0	0.174707	const.
oil_texas	-1.383537	0	0.421987*	const.
log(rm2)	-3.22989**	0	0.17161**	trend+const.
log(rgdp)	1.382083	2	1.088434***	const.
log(r_estate)	-2.022997**	4	0.510605**	const.
inflation_cpi_a	-2.581228	1	0.088067	trend+const.
log(trans_m2_modified)	-2.532530	0	0.165008**	trend+const.

Each of ***, ** and * implies significance level of 1%, 5% and 10% respectively.

4.2 Model

We estimate five-variable VAR that consists of *oil, trans_ m2, restate,cpi_a* and *real GDP*. All variables are estimated by 1 st difference, following the result of unit-root test. The sample period is from Q1 1983 through Q4 1995, although estimation of precautionary demand is carried out from Q1 1980 through Q3 2005, and hence transaction money (*trans_m2=m2-precautionary demand*) is given during the same period 1980 through 2005.

Letting the operator *dlog(.)* be defined by *dlog(z(t))=log(z(t)-log(z(t-1)* and letting *x* be defined by

$$x = \left(dlog(oil), dlog(trans\_m2), dlog(restate), inflation_{cpi}, dlog(real\ GDP)\right)',$$

we consider a growth rate system described by VAR (Vector Auto Regression) model of the form:

$$x(t) = A_0 + A_1 x(t-1) + A_2 x(t-2) + \varepsilon(t)$$

**Estimation of precautionary demand in (1980q1-2005q3)**
We shall consider estimation of precautionary demand in the following form:

dlog(rgdp(t))=c1*dlog(rgdp(t-1))+c2*dlog(rgdp(t-2))+c3*dlog((m2(t)-precautioanry demand(t-1))/price(t-1))+c4*dlog((m2(t-2)-precautionary demand(t-2))/price(t-2))+e(t), (1)

where *e(t)* is independent and identically distributed Gaussian noise process. Maximum likelihood method is used for the estimation of precautionary demand.
The estimated precautionary demand is shown as the difference between two lines in Figure 14. The exact estimation process of precautionary demand will be shown at Appendix.

Figure 14 Actual money and the Transaction money
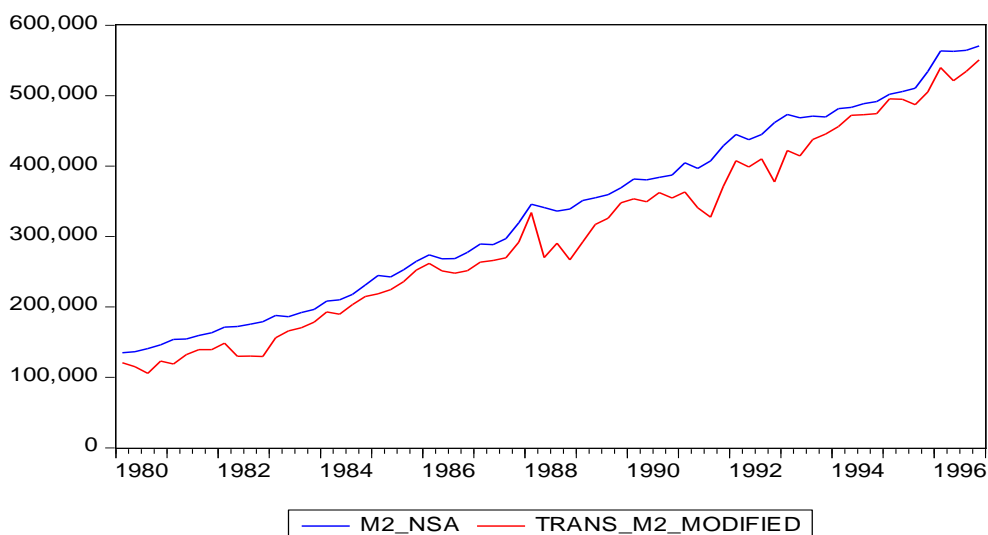
4.3 Estimation results

The dynamic impulse response functions are shown in Figure 15. We focus on the period of bubble and bust from 1983q1 through 1995q4. The first to 5th column show the dynamic responses of each variable to oil price shock, money stock shock ,price of real estate shock, business survey shock and real GDP shock, respectively. The solid line shows the point estimate of impulse response function, while the dotted lines imply 95 % confidential interval. We especially focus on the monetary shock in the second column.

The interesting findings in the second column show that money stock (transaction money shock) has a positive effect on real output. Output starts to increase immediately after an increase of money. The positive effect keeps for 6 months. The positive response is statistically significant at 5 % level at first quarter and gradually insignificant with time. Money shock has a positive effect on real estate price. Money certainly contributed to boost and bust the real estate price. Money also has a tendency to induce inflation. In third column real estate shock has a positive effect on the real GDP. The rise of real state price seems to increase output by stimulating the consumption and investment through the wealth effect. In the fifth column GDP shock has a positive effect on real estate and a negative effect on inflation. In the first column oil price shock has a tendency to increase GDP. But its effect is not as strong as expected. The oil price shock on money is intriguing. In Norway decline of oil price is supposed to have a negative effect on the real economy. In fact, The Norges Bank increased interest rate to defend the Krona in 1988 as already explained in the above. This policy is thought to have caused the collapse of real estate market. The monetary policy tends

to be a pro cyclical, in a small open economy like Nordic countries. But the oil price shock indicates the negative effect on the money in the first quarter. The Norges Bank is considered to take a counter cyclical policy in the burst of real estate bubble by increasing the liquidity into the market. The positive policy is interpreted to contribute to the prompt recovery.

Thus, we can summarize the effect of monetary policy in Norway as follows. Money stock has a positive effect on the real economy, though The Norges Bank implemented monetary policy by targeting the short term interest rate. However the impact of money stock on real estate is not as strong as expected, though it has a positive effect. A new variable related to the property tax system seems to be included into the model. Payment of interest on housing loan was deductible from the taxable income during the bubble period in Norway. The tax system is thought to promote the rise of asset price under the monetary easing.

Figure 15 Impulse Response Functions; 1983q1-1995q4
d(oil_texas) dlog(trans_rm2_modified) inflation_realestate inflation_cpi_a dlog(rgdp)
lag=2
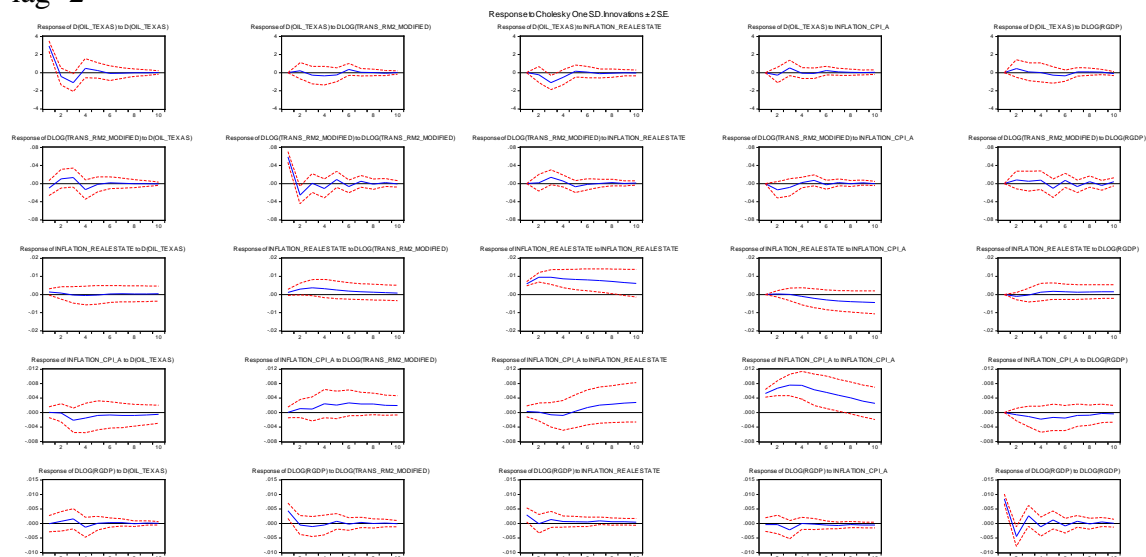
5 Conclusion

The bubble is caused by monetary easing under the financial deregulation. The bubble busts by the external shock, such as a sudden monetary policy change in Japan, unexpected decline of oil price in Norway. The policy response after the collapse is important. Monetary easing and public fund injection takes a crucially important role to revitalize the economy after the collapse. The latter is especially important to avoid the collapse of financial system. The policy response of both countries was quite different. In the case of Japan, both of monetary easing and public fund injection was delayed. This policy mistake caused the prolonged recession, called "lost two decades in Japanese economy". On the contrary Norweigian government swiftly responded to the crisis, by establishing a new fund to rescue the problem banks. As a result, they could regain the tax money with some profits after the crisis ended. The reason why project funds injection was delayed in Japan was explained as follows. Bank

management, Government, and politicians tried to avoid their responsibility. Bank management were afraid to be blamed for mismanagement and restructuring. Government also try to avoid blame from the public for insufficient monitoring. Politician was afraid to lose the vote by using tax payer's money. In addition everybody believed that land prices would recover in due cource. The myth of Land, land price will never decline, was survived in Japan.

The delay of monetary easing is also very imoportant factor. The BOJ did not take a positive easy monetary policy untill the economy falled into the severe crisis in 1998, though many resarches has been done to blame BOJ's negative policy stance. The BOJ repatedly insisted there do not exisit the cointegration between money and economy by showing the statistical evidence. They also arguedd that centeral bank can't do anything to revitarize the economy, which falled into the liquidity trap.

The statistical evidence shows that money had played an important role in the bubble and bust cycles in Norway. The Norges Bank chnaged the exchange rate sysstem from the pegged to floating. The Norges bank was free from the irreconcilable trinity of open economy; fixed exchange rate, independent monetary policy, and free intarnational capital flow. The new resume made it possible for centarl bank to implement descritionary monetary policy. The Bank also adopted the inflation target policy in 1999 to avoide inflation. These policies can be thought to contribute to the recovery and the stability in the Norway's economy.

Appendix

The estimation of precautionary demand is estimated as follows.
First precautionary demand is assumed to be

precautionary demand=|k1+k2*ngdp+k3*b_survey*m2|,   (A1)

where, the 2nd term on the RHS means that precautionary demand is a function of GDP as Keynes said, and where the 3rd term means the fact such that precautionary demand increases in depression and decreases in heated economy, that is, precautionary is a function of business survey multiplied by m2 money. Assuming that each of the oil crisis in 1979 and Lehman shock in 2008 exhibits the same amount of business survey, the amount of precautionary demand apparently differs each other. Therefore, *b_survey* in (A1) is multiplied by *m2* **(Remark)** Since *b_survey* in (A1) takes negative value as well as positive value, we have to introduce the absolute value notation |.|. Without the absolute value formulation, the maximum likelihood estimation does not give us convergence result of calculations in many cases.

The concrete formulation and calculation results are given by :

dlog(rgdp)=c(2)*dlog(rgdp(-1))+c(3)*dlog(rgdp(-2))
+c(4)*dlog((m2_nsa(-1)-@abs(c(5)+c(6)*(ngdp(-1)/10000)^1+c(8)*b_survey(-1)*m2_nsa(-1)/100000))/gdpdef(-1))

+c(40)*dlog((m2_nsa(-2)-@abs(c(5)+c(6)*(ngdp(-2)/10000)^1+c(8)*b_survey(-2)*m2_nsa(-2)/100000))/gdpdef(-2))   (

LogL: LOGL01A_RM2
Method: Maximum Likelihood (Marquardt)
Date: 08/20/14   Time: 13:45
Sample: 1980Q4 2005Q3
Included observations: 100
Evaluation order: By observation
Convergence achieved after 35 iterations

	Coefficient	Std. Error	z-Statistic	Prob.
C(2)	0.083713	0.100341	0.834279	0.4041
C(3)	0.530971	0.102943	5.157903	0.0000
C(4)	0.027660	0.024063	1.149465	0.2504
C(5)	8411.175	15001.24	0.560698	0.5750
C(6)	1694.278	1460.193	1.160311	0.2459
C(8)	-1017.155	683.4280	-1.488314	0.1367
C(40)	-0.044171	0.031496	-1.402438	0.1608
C(50)	0.009861	0.000729	13.53365	0.0000

Log likelihood	319.5117	Akaike info criterion	-6.230235
Avg. log likelihood	3.195117	Schwarz criterion	-6.021821
Number of Coefs.	8	Hannan-Quinn criter.	-6.145886

Since *b_survey* can be be described by
b_survey=max{b_survey,0}+min{b_survey,0},
we change b_*survey* by introducing
modified b_survey= max{b_survey,0}+K*min{b_survey,0},   (A3)
where K is set to be 0.37268. Replacing *b_survey* in (A1) by the above *modified b_survey* in (A3) with the estimated parameters *c(.)* fixed, we can see that

|k1+k2*ngdp+k3*modified b_survey*m2|= k1+k2*ngdp+k3*modified b_survey*m2
=nonnegative,   (A4)
that is, we need not mind the situation stated in Remark. We call modified precautionary demand with *b_survey* replaced by *modified b_survey*, and hence we define
trans_m2_modified=m2-modified precautionary demand.   (A5)

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