



温州肯恩大学  
WENZHOU-KEAN UNIVERSITY

**The Transition of Japan Monetary Policy**

In Partial Fulfillment of the Requirements

for the Bachelor of Science in Finance

by

Chen Duidui

1063685

December 2021

# **The Transition of Japan Monetary Policy**

Chen Duidui

## **Abstract**

Japan's economy suffered a lot after the price bubble burst in the last three decades. In order to turn the decline tendency out, the Bank of Japan continued to adjust its monetary policy. The paper will mainly focus on monetary policy in Japan last 30 years. Firstly, the research will introduce the background of monetary policy change in Japan and three monetary policies implemented by the Bank of Japan: zero-interest-rate policy, quantitative easing, and quantitative and qualitative easing. Then, the research will build line charts and use linear regression to analyze the effects of monetary policies and test the relationship between monetary policy and economic factors in Japan. At the last of the research, the paper will summarize the findings from line chart and linear regression analysis.

## **Introduction**

Loose requirements for borrowing and mass speculative opportunities made Japan experience a period of bubble economy from the early 1980s. There was a false boom in real estate and the stock market during the bubble economy period. Finally, the sharp reduction in financial assets triggered a substantial economic recession in Japan. The Bank of Japan has adjusted its monetary policy in the last 30 years to deal with the stagnant economic situation.

The paper will investigate Japan's monetary policy in the last 30 years. Japan is an important economic entity and has contributed a lot to developing the world economy in recent decades. Unlike other normal western countries that implement market economies, Japan continuously improved its monetary policy. Therefore, Japan can be a reference to observe the change of economic factors and adjustment of monetary policies from the 1990s. The learning experience from the case of Japan monetary policy can help other countries formulate suitable monetary policy according to the current situation of the economy, especially during economic recessions. Moreover, mistakes made by Japan monetary policies can be negative examples for other countries to avoid making similar economic problems.

The research question is, what are central Japan's monetary policies to save the economy after the 1990s? What is the relationship between Japan's monetary base, interest rate, and other economic factors? The paper will describe the economic situation, the background of monetary policy change in Japan, and explain some important monetary policies implemented by the Bank of Japan in the last 30 years.

For example, zero interest rate policy from 1999 to 2000, quantitative easing from 2001-2006, quantitative and qualitative easing from 2013 to 2016. Then, the research will compare the difference among these policies in policy content, policy objective, and policy effects. The research will also analyze the effects of monetary policies by dividing the whole economic condition into different economic factors. Data set of economic growth, price level, and the exchange rate will be used in the research. The research will explore the relationship between the monetary policy (monetary base and interest rate) and other economic factors to explain the effectiveness of the monetary policy.

## Literature Review

### Monetary Policy before The Recession

In the early 1980s, the bank of Japan implemented an excessively expansionary monetary policy to encourage domestic consumption and investments. The low-interest rate and loose requirement for credit triggered large-scale speculations and caused the price bubble in the land and the stock market, which finally led to the recession.

Oizumi (1994) researched the cause of the price bubble in Japan. Oizumi stated that the policy of 'utilizing the ability of private enterprises and 'deregulation' encouraged private enterprises to invest in city development and construction to achieve the goals of expanding economic activities. Another reason for the price bubble is the lower cost of credit. At that time, the increase in the exchange rate of Japanese yen to dollar was averse to Japan's export in international transactions. To weaken the adverse effects of appreciation, the Bank of Japan frequently reduced the interest rate and increased the money supply to stimulate domestic demand. Schnabl (2015) researched comparing the business cycle between Japan and Europe and agreed with this viewpoint. Schnabl added that these expansionary policies made a relatively loose environment for people to borrow money. Many funds flowed into land investment and the stock market, leading to an unexpected rise in these asset prices. Moreover, a significant number of real estates were chosen as collateral due to appreciation potential. The bubble burst since the bank increased the interest rate and made more tight regulations about the land transaction in the late 1980s,

Another policy called quantitative restriction was included in Japan's monetary policy in the late 1980s. Under the quantitative restriction, the bank of Japan and Prime Minister Agency give limitations to banks about providing loans to the real estate industry to restrain the boom of credit. Sonada and Sudo (2016) researched the feasibility of macroprudential instruments to stabilize economic cycles by studying the quantitative Restriction policy in Japan. They concluded that the quantitative restriction played a role in reducing borrowing-lending activities related to the real estate industry and land price. However, quantitative restriction damaged the balance sheets of banks and other firms and negatively affected the whole economy. In other words, quantitative restriction, as a part of tight monetary policy, accelerated the recession.

Past research showed that the importance of monetary policy influenced speculative activities and financial assets price in the 1980s of Japan. For further research, more data can be used to explore the relationship between the economic factors and price level of land or stock during the bubble period to support their statements.

### **Adjustment in Monetary Policy**

After experiencing a recession, the Bank of Japan continually changed its economic policy and used unconventional monetary policies.

The zero-interest-rate policy was implemented bank of Japan in 1999. To deal with the negative inflation rate and credit crunch, the Bank of Japan maintained the short-term interest rate near zero to lower the cost of borrowing. Kazuo's research

(2011) summarized and analyzed the effectiveness of Japan's monetary policy and other G7 countries from 1990-2010. Kazuo's paper indicated that the zero-interest-rate policy is more like a plan that the central bank promised to control the interest rate low until the ending of deflation. Thus, the zero-interest-rate policy was an example of a forward guidance strategy. Although the zero-interest-rate policy relieved the pressure of deflation, it was soon ended in 2000. According to Fructoso and Pedro's research (2021) about the relationship between Japan monetary policy and inflation rate, the bank of Japan increased the interest rate because it made the wrong evaluation of the economic condition. However, with the burst of the IT bubble in 2001, the economy got worse. Bank of Japan had to adopt the zero-interest-rate policy again and finally implemented the quantitative easing policy.

Another example is quantitative easing. The central bank purchases some target assets to increase the money supply and stimulate economic activities. Under the meager interest rate situation, quantitative easing is more suitable than traditional open market operations because it can expand the money base of the country. David and his partners (2015) did a study about testing the effectiveness of quantitative easing in Japan. They mainly explored the impacts of quantitative easing in banks and found that quantitative easing had considerably positive effects on the banks' lending liquidity. The quantitative helped the recovery of Japan's economy from 2001-2006, although the net effects were minor, which might be because of the offset by adverse shocks of the post-bubble economy. Since Japan gave up the quantitative easing policy and experienced the global financial crisis, the economy worsened. A new

quantitative easing program called comprehensive monetary easing was implemented in 2010 but failed to change the situation of the negative inflation rate.

After the new Prime Minister Abe came into power in late 2012, the Bank of Japan modified past quantitative easing policy and executed a new quantitative and qualitative easing in 2013. This policy aimed to achieve about two percent of the inflation rate per year by the massive scale of purchasing other financial assets and increasing the central bank's balance sheet. The research by Takashi (2015) examined the effects of quantitative and qualitative easing on Japan's economy. The research concluded that quantitative and qualitative easing helped lower the interest rate while raising the inflation rate in the initial year. However, the economy started to worsen. There were fewer influences of quantitative and qualitative easing after the rise in the consumption tax and slow development of newly-start industries. Jounko (2019) explained that the Bank of Japan could not achieve the target inflation and stimulate the economy only by expanding banks' balance sheets.

Previous research discussed the zero-interest-rate policy, quantitative easing, quantitative easing, and qualitative easing and their effects in the last two decades after the recession. Connecting them can get a roughly whole track of Japan's non-traditional monetary policy for the research. Moreover, other economic indicators such as the unemployment rate, exchange rate, and tax rate can enhance the reliability of their statement.

### **Analysis of Monetary Policy**

In the research by Miayo and Okimoto (2017) to assess the macroeconomic

effects of the quantitative and qualitative easing, they used a time-series approach to examine the effectiveness of the policy. Furthermore, the smooth-transition vector autoregression model was applied with data of actual output, inflation, monetary base, bonds yield, stock prices, and exchange rate. Finally, they found the quantitative and qualitative easing had made the continuous increase in macroeconomic factors. The time-series approach and smooth-transition vector autoregression model can be a feasible method to analyze the effects of changing monetary policies on Japan's economy in this research. The paper can use other economic factors such as land price to investigate the relationship between land price and a series of monetary policies for further research.

Another research by Max (2017) focused on the effectiveness of different Japanese monetary policies before and after 2001. The research used a structural dynamic factor model and 135 important economic factors from 1985 to 2014. The research showed that the monetary policies before 2001 had more effects on GDP while the monetary policies after 2001 concentrated more on the price level. Max's research can provide valuable data, which will be analyzed in further research. This paper can collect data from 2015-2020 from the official website of the bank of Japan to supplement Max's research outcome.

### **Problems of Japan Economy**

In the last three decades, some significant problems troubled Japan's economy, even several of them are still not solved currently. The liquidity trap made Japan's economy develop difficultly. Under the low-interest condition, monetary policies no

longer substantially affect the whole economy. Moreover, Hyeog's research (2015) mentioned other problems were the inefficiency in resource reallocation and zombie lending. Hyeog's research stated that the banks continued to provide loans to the firms which lost the ability to operate generally in the 1990s had adverse effects on the allocation of resources. Furthermore, it finally became a factor that made the slow recovery of Japan's economy.

## **Methodology**

The correlation research design was chosen in the paper since it assists in finding the changing trend of one variable due to the change of the other variable. The research will use a quantitative approach to analyze the overall effects of monetary policy. Chart analysis and linear regression are the main methods applied in the research. Monetary policy plans to change the amount of monetary base and interest rate to influence economic activities, and economic factors such as economic growth, price level, and exchange rate reflect one country's economic situation. Therefore, the research will focus on the monetary base, interest rate, and economic factors.

Independent variables are monetary base and interest rate. Dependent variables are economic factors. The relationship among the monetary base, interest rate, and each economic factor will be tested independently. The following content will use the example of monetary base, interest rate, and GDP to demonstrate the leading analysis methods of this research.

## **Data**

Data collection is necessary to investigate the relationship between variables. The research collects data by searching in the related documents of Bank of Japan official website, World Bank, and other economic statistic websites such as FRED and Trading Economics. The change of monetary base and interest rate results from monetary policy. They can be chosen as references to quantify the monetary policy. The research will use GDP growth rate and inflation rates as indicators to evaluate economic growth and price levels. The followings are data descriptions of variables

that will be used in the research:

Monetary base – average outstanding monthly data of monetary base from 1990 to 2020 in Japan. The unit is 100 million Japanese yen.

Interest rate – monthly basic discount rate and basic loan rate released by Bank of Japan from 1990 to 2020. The unit is percent per annum.

Gross domestic product – quarterly data from 1994 to 2020 in Japan. The unit is billions of chained 2015 Japanese yen.

Consumer price index and inflation – monthly data from 1990 to 2020 in Japan. The base year of CPI is 2015 (2015 index=100). The inflation rate is calculated based on the CPI.

Exchange rate – monthly data from 1990 to 2020. The unit is the exchange rate of one Japanese yen to the dollar.

### **Trend Analysis and Line Chart Analysis**

After collection and arrangement, a part of the raw data of the monetary base is shown in the following table.

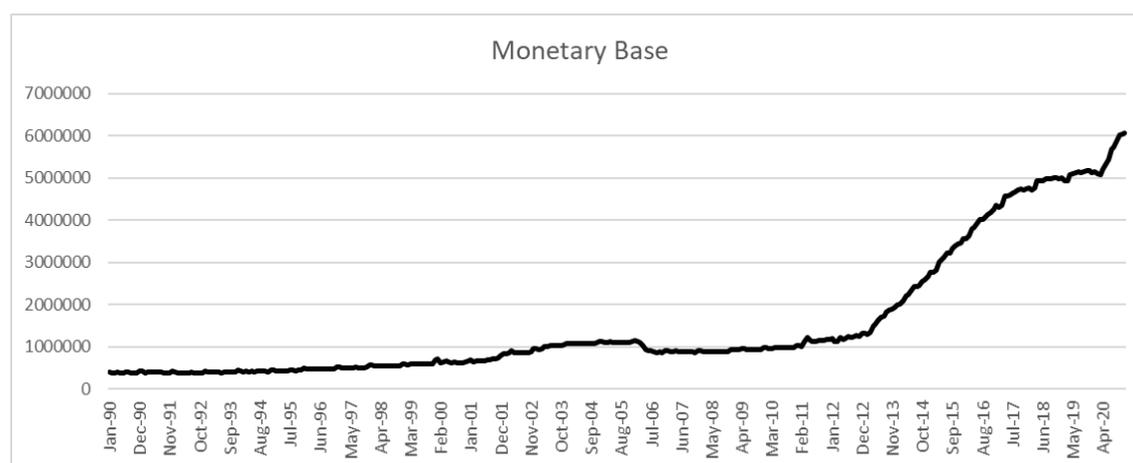
Month	Monetary Base
Jan-90	396438
Feb-90	379074
Mar-90	387141
Apr-90	398966
May-90	388227
Jun-90	380177
Jul-90	397725

Before making charts for observing trends and relationship analysis, the research will calculate the change rate of the variables. The percentage change = (current year data-last year data)/ last year data\*100%. After calculation, the outcome is shown in

the following table.

Month	Monetary Base	Change	Change rate
Jan-90	396438		
Feb-90	379074	-17364	-4.38%
Mar-90	387141	8067	2.13%
Apr-90	398966	11825	3.05%
May-90	388227	-10739	-2.69%
Jun-90	380177	-8050	-2.07%
Jul-90	397725	17548	4.62%

The research will apply line charts for analysis to observe change trends in visual. Use time as the horizontal axis and change rate as the vertical axis to set up the line chart. The following line chart can clearly describe the changing trend of the monetary base from 1990 to 2020 in Japan.



### Multiple Linear Regression

The chart analysis is used to understand the changing trend of a single variable. Multiple linear regression will explore the relationship of independent variables on the dependent variable. The relationship between monetary policy and each economic factor such as GDP, inflation rate, and the exchange rate will be tested individually and orderly. The equation is  $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + e$ .

In the example of testing the relationship among the monetary base, interest rate,

and GDP,

$Y$  = dependent variable (GDP)

$X_1, X_2$  = independent variable (monetary base, interest rate)

$\beta_0$  = constant value,

$\beta_1, \beta_2$  = slope coefficient of the regression

$e$  = error term.

Hypotheses are:

$H_0$  = The monetary base and interest rate changes have no effects on GDP.

$H_1$  = There is a positive relationship between monetary base and GDP. There is a positive relationship between interest rate and GDP.

$H_2$  = There is a negative relationship between monetary base and GDP. There is a negative relationship between interest rate and GDP.

$H_3$  = There is a positive relationship between monetary base and GDP. There is a negative relationship between interest rate and GDP.

$H_4$  = There is a negative relationship between monetary base and GDP. There is a positive relationship between interest rate and GDP.

After integrating monetary base change rate data and GDP growth rate data into one table, the research can create a multiple regression model in excel or other financial analysis software.

The  $R^2$  value is the coefficient of determination on the summary output page. Within the range from 0 to 1, the higher  $R^2$  value shows a stronger relationship among the dependent and independent variables. In the regression coefficients table, the p-

value tests the possibility that the coefficients of variables equal zero. The correlation is significant when the p-value is less than 0.05.

## Results and Discussion

### Monetary Policy

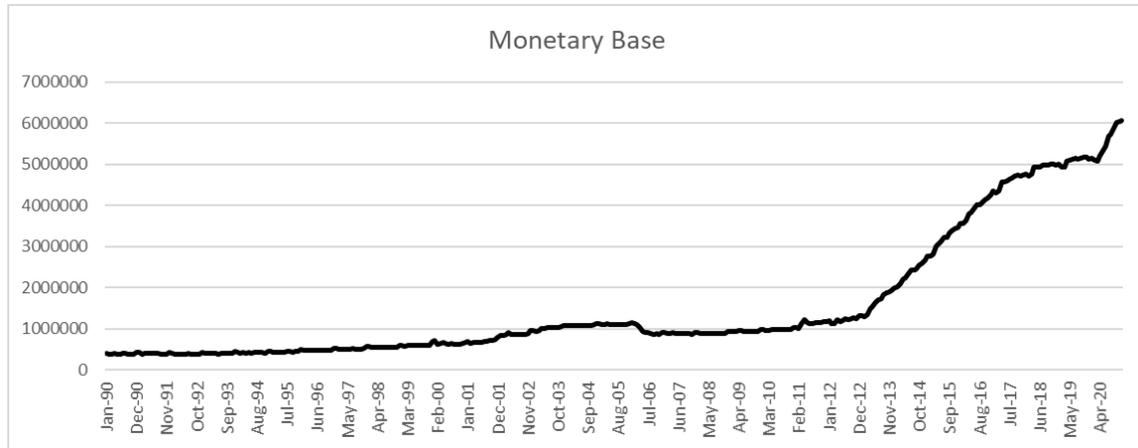


Figure 1: Monetary Base

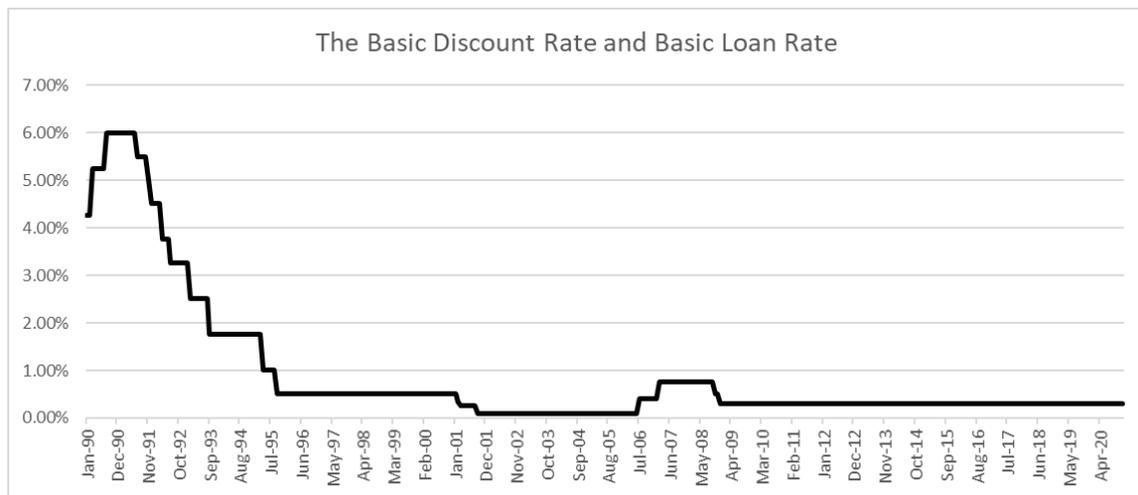


Figure 2: Interest Rate

The first figure shows the changing trend of the monetary base from 1990 to 2020 in Japan. The monetary base is keeping a rising trend. From 1990 to 2002, the monetary base increased from around 40 trillion yen to 100 trillion yen. Although there were some fluctuations between 2003 and 2012, the monetary base was relatively stable and around 100 trillion yen. However, after Abe's monetary policies were implemented, the monetary base increased significantly. It increased from 130

trillion to 500 trillion. The speed of increase started to be slow after 2018. In the last 30 years, the monetary base increased by nearly 20 times. For the interest rate, it gradually went down from 1991 to 1995. After 1995, the interest rate kept low, which was less than one percent and around zero percent.

In general, the Bank of Japan has implemented an expansionary monetary policy in the last three decades. It set a low-interest rate to reduce the cost of borrowing, which is beneficial for credit and investing activities. At the same time, the Bank of Japan increased a lot in its money supply to help financial institutions and enterprises. Citizens are also encouraged to purchase and produce activities to revive the economy.

### Economic Factors

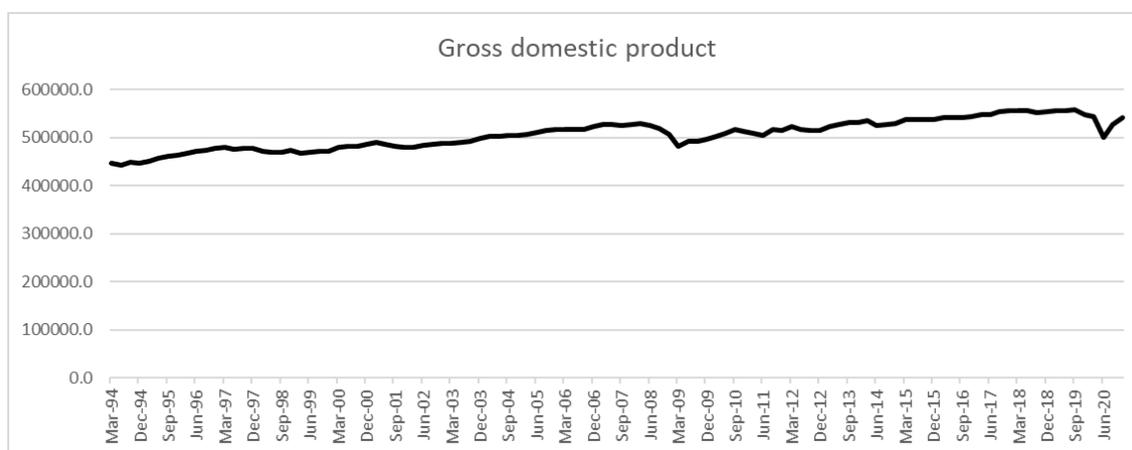


Figure 3: GDP

GDP grew very slowly in Japan. It increased from 450 trillion yen to 540 trillion yen in around 30 years. There are two apparent reductions in GDP. One is in 2008 due to the global financial crisis, and another is in 2020 due to the COVID-19. Except for these two reductions, small economic recessions existed in Japan. It is normal to

observe a negative GDP growth rate in Japan.

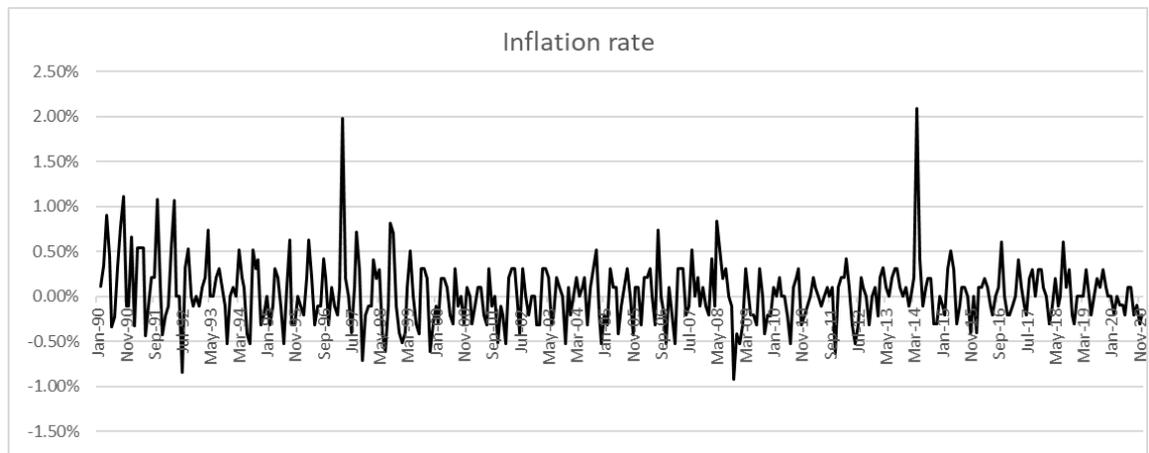


Figure 4: Inflation Rate

Most of the time, the inflation rate fluctuated between negative one percent and one percent. A low inflation rate is favorable for the whole economic development. However, some new problems will be caused when the inflation rate is below zero. The negative inflation rate problem, which is called deflation, always existed in Japan's economy. Under this situation, the price of products is lower than the previous level. In addition, it will lower the profits of enterprises while increasing the actual cost of debt and finally discourage credit, production, and investing activities. If deflation is not solved in the long term, there is a negative effect on Japan's economy.



Figure 5: Exchange Rate

The exchange rate of the Japanese yen had many fluctuations in the last 30 years. In general, the exchange rate increased from 1990 to 1995. Then it began to decrease in 1996. From 1999 to 2009, with rises and falls, the exchange rate of one Japanese yen was within 0.008 to 0.01 dollars. There was a gradual rise in the exchange rate from 2009 to 2011, and it reached the highest point, 0.013, in October 2011. After 2011, the exchange rate went down and finally kept within 0.009 to 0.01. It is a good phenomenon because keeping the exchange rate of the Japanese yen stable within a specific range in the long term can promote international transactions and attract foreign investments to some extent.

### Relationship between Monetary policy and Economic Factor

Regression Statistic	
Multiple R	0.103174529
R Square	0.010644983
Adjusted R Square	0.005268054
Standard Error	0.031633075
Observations	371

ANOVA					
	df	SS	MS	F	Significance F
Regression	2	0.003962082	0.001981	1.979751	0.139571736
Residual	368	0.368239735	0.001001		
Total	370	0.372201817			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.007219076	0.002845274	2.537217	0.011586	0.001624041	0.012814
Monetary base	1.2605E-09	1.11145E-09	1.134103	0.257489	-9.2509E-10	3.45E-09
Interest rate	-0.14586934	0.122106782	-1.1946	0.233011	-0.38598393	0.094245

Table 1: Monetary Policy and GDP

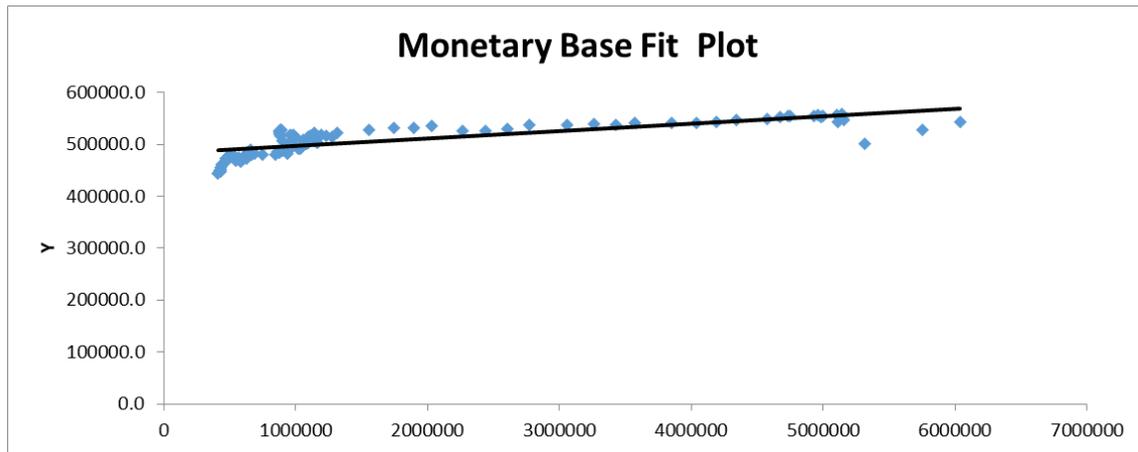


Figure 6: Monetary Base and GDP

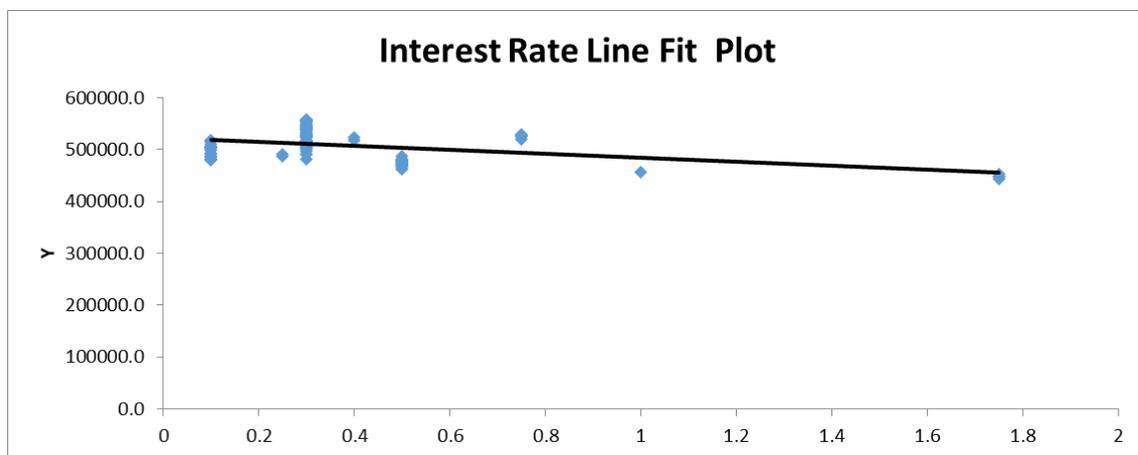


Figure 7: Interest Rate and GDP

As the outcome of linear regression shows, the relationship between monetary policy and GDP is strong in Japan. The correlation is significant due to the extremely low p-value. There is a positive relationship between monetary base and GDP and a negative relationship between interest rate and GDP. In other words, increasing the money supply and reducing the credit rate can stimulate Japan's economy to develop. It indirectly proves the rationality that the Bank of Japan implemented expansionary monetary policy in the last 30 years.

Regression Statistic	
Multiple R	0.808704338
R Square	0.654002707
Adjusted R Square	0.647348913
Standard Error	17689.35839
Observations	107

ANOVA					
	df	SS	MS	F	Significance F
Regression	2	61512637054	3.08E+10	98.29019	1.07592E-24
Residual	104	32542993621	3.13E+08		
Total	106	94055630676			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	493097.4503	3651.679193	135.0331	1.2E-118	485856.0334	500338.9
Monetary base	0.013225326	0.001103005	11.99027	2.53E-21	0.011038026	0.015413
Interest rate	-22484.4025	5487.459419	-4.09742	8.29E-05	-33366.2405	-11602.6

Table 2: Monetary Policy and Inflation Rate

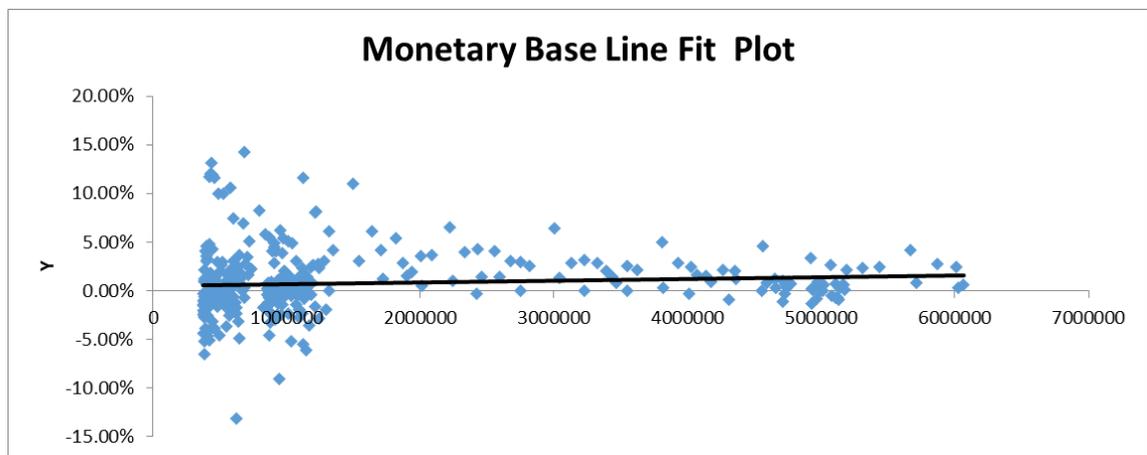


Figure 8: Monetary Base and Inflation Rate

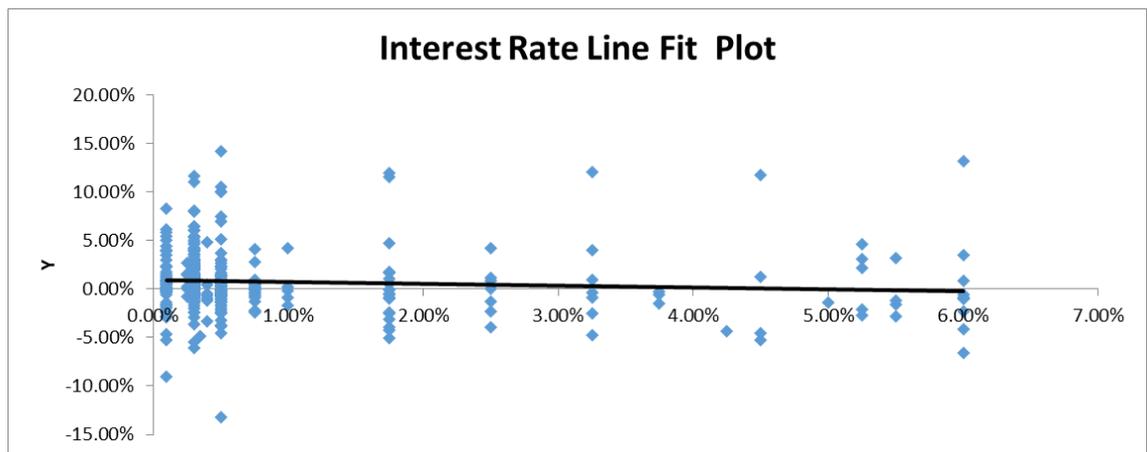


Figure 9: Interest Rate and Inflation Rate

The relationship between monetary and inflation rate is very weak, reflecting that

the change of monetary policy does not have apparent effects on Japan inflation. The phenomenon of the liquidity trap can be a reason to explain the ineffectiveness of monetary policy in controlling the inflation rate. In the liquidity trap, although the interest rate is low as possible, citizens are still willing to hold or save their cash instead of consumption and investment. In that situation, monetary policy gradually loses its effects even if the Bank of Japan expands the money supply and lowers the interest rate.

Regression Statistic	
Multiple R	0.424794072
R Square	0.180450004
Adjusted R Square	0.176007998
Standard Error	0.001217265
Observations	372

ANOVA					
	df	SS	MS	F	Significance F
Regression	2	0.000120387	6.02E-05	40.62354	1.13415E-16
Residual	369	0.00054676	1.48E-06		
Total	371	0.000667146			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.009739358	0.000109476	88.96321	2.2E-251	0.009524082	0.009955
Monetary base	-8.6099E-11	4.27696E-11	-2.01309	0.044831	-1.702E-10	-2E-12
Interest rate	-0.04187051	0.004667332	-8.97097	1.51E-17	-0.05104841	-0.03269

Table 3: Monetary Policy and Exchange Rate

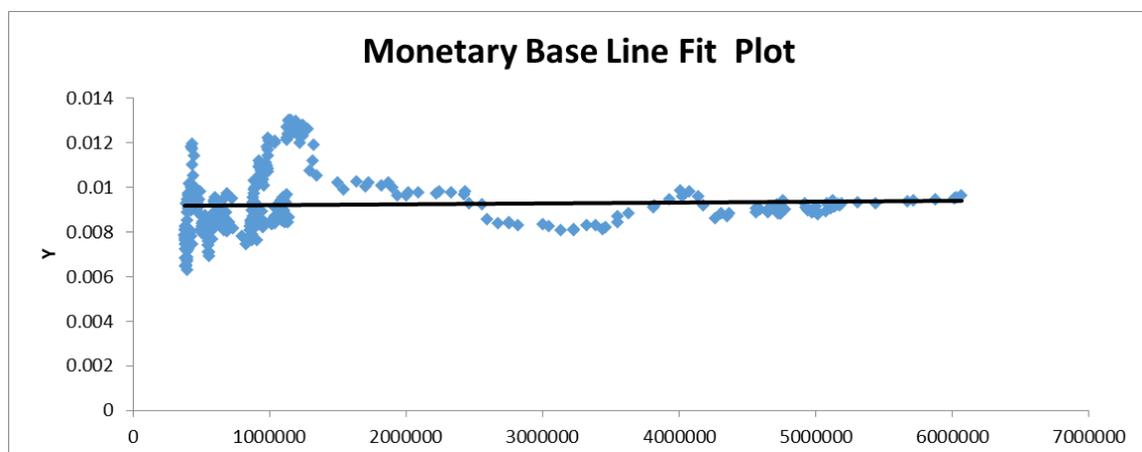
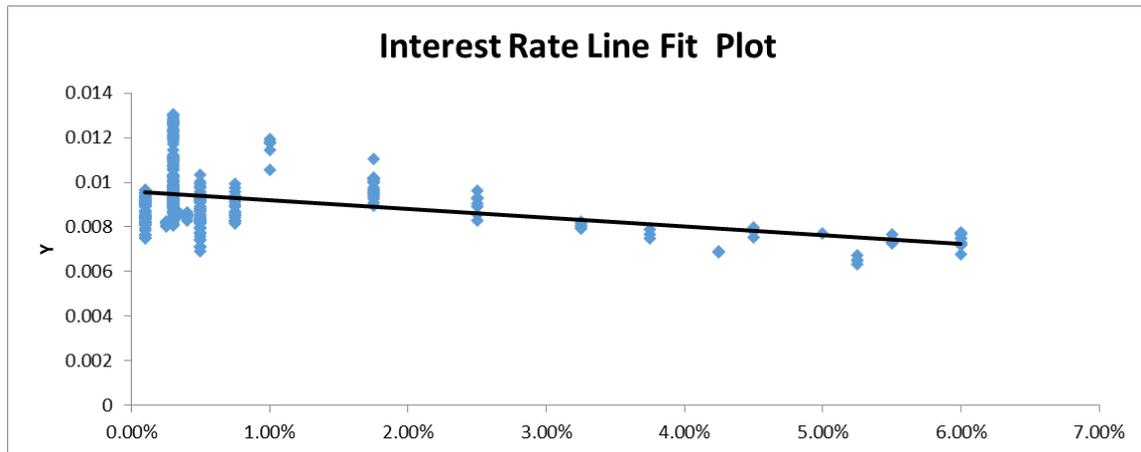


Figure 10: Monetary Base and Exchange Rate



## **Conclusion**

Bank of Japan has implemented unconventional expansionary monetary policies such as zero-interest rate, quantitative easing, and quantitative and qualitative easing in the last three decades. In general, expansionary policies were implemented by the Bank of Japan. They increase the money supply and lower credit costs to encourage economic growth, raise the inflation rate, and stabilize the economy.

As a result, the GDP grows slowly, and recessions sometimes happen. The inflation rate is at a low level, but deflation always exists. The exchange rate gradually becomes stable and within a specific range.

There is a positive relationship between monetary base and GDP and a negative relationship between interest rate and GDP. Increasing the money supply and raising the interest rate will lower the exchange rate. The relationship between monetary policy and inflation is very weak, which shows the ineffectiveness of Japan's monetary policy in solving the problem of deflation.

In conclusion, the transition of Japanese monetary policy influences economic factors and helps to recover Japan's economy. To enhance the effectiveness of the monetary policy, the Bank of Japan needs to get rid of the liquidity trap. Moreover, some leftover problems such as zombie lending and unequal allocation of resources should be solved soon.

## **Limitation and Contribution**

As for the causal relationship, the research may need to determine the dependent and independent variables. The research assumes that change in the monetary base and interest rate is the cause of economic factors. It needs to consider that the central bank may adjust the monetary base and interest rate due to the current economic situation. In other words, the problem of whether the change of economic factors affects the monetary policy decision should be paid attention to in further research.

Time lag effects should be considered in the research. It will take some periods (12-18 months) to transmit monetary policies' effects to the economy. Comparing the current monetary base and interest rate with next year's economic factors is suitable for regression.

The research analyzes the relationship between the monetary policy and each economic factor independently. The interaction among these economic factors (dependent variables) is not tested.

The research introduces three monetary policies: zero-interest-rate policy, QE, and QQE, to help readers know more about Japan's monetary policy's transition. The research used line chart analysis and simple linear regression to explore the effects of monetary policies, which are much easier to understand and accept than other complex methods. However, the research just used historical data in the analysis. For further research, an autoregressive model will be applied to forecast variable change trends and give suggestions in monetary policy.

## Reference

- Bowman, D., Cai, F., Davies, S., & Kamin, S. (2015). *Quantitative easing and bank lending: Evidence from Japan*. *Journal of International Money and Finance*, 57, 15–30.  
<https://doi.org/10.1016/j.jimonfin.2015.05.002>
- Egea, F. B. (2021). *Monetary policy strategy and inflation in Japan*. Documentos Ocasionales No. 2116. 37.
- Hanisch, M. (2017). *The effectiveness of conventional and unconventional monetary policy: Evidence from a structural dynamic factor model for Japan*. *Journal of International Money and Finance*, 70, 110–134. <https://doi.org/10.1016/j.jimonfin.2016.08.002>
- Koeda, J. (2019). *Macroeconomic effects of quantitative and qualitative monetary easing measures*. *Journal of the Japanese and International Economies*, 52, 121–141.  
<https://doi.org/10.1016/j.jjie.2018.12.006>
- Kwon, H. U., Narita, F., & Narita, M. (2015). *Resource reallocation and zombie lending in Japan in the 1990s*. *Review of Economic Dynamics*, 18(4), 709–732.  
<https://doi.org/10.1016/j.red.2015.07.001>
- Matsuki, T., Sugimoto, K., & Satoma, K. (2015). *Effects of the Bank of Japan's current quantitative and qualitative easing*. *Economics Letters*, 133, 112–116.  
<https://doi.org/10.1016/j.econlet.2015.05.025>
- Miyao, R., & Okimoto, T. (2017). *The Macroeconomic Effects of Japan's Unconventional Monetary Policies*. 27.
- Oizumi, E. (1994). *Property Finance in Japan: Expansion and Collapse of the Bubble Economy*. *Environment and Planning A: Economy and Space*, 26(2), 199–213.  
<https://doi.org/10.1068/a260199>
- Schnabl, G. (2015). *Monetary Policy and Structural Decline: Lessons from Japan for the European Crisis\**. *Asian Economic Papers*, 14(1), 124–150.  
[https://doi.org/10.1162/ASEP\\_a\\_00327](https://doi.org/10.1162/ASEP_a_00327)
- Sonoda, K., & Sudou, N. (2016). *Is Macroprudential Policy Instrument Blunt?* (SSRN Scholarly Paper ID 2715602). Social Science Research Network.  
<https://papers.ssrn.com/abstract=2715602>
- Ueda, K. (2011). *The Effectiveness of Non-traditional Monetary Policy Measures: The Case of the Bank of Japan* (CARF F-Series CARF-F-252). Center for Advanced Research in Finance, Faculty of Economics, The University of Tokyo.

<https://econpapers.repec.org/paper/cfifseres/cf252.htm>