Re-evaluation of BOJ's Unconventional Monetary Policy after the Global Financial Crisis: Comprehensive Monetary Easing (CME) vs. Quantitative and Qualitative Monetary Easing (QQE)

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Abstract

This paper aims to reexamine the effectiveness of BOJ's unconventional monetary policies especially before and after the current Quantitative and Qualitative Monetary Easing (QQE) to compare with the monetary policy under former BOJ Governor Shirakawa, including Comprehensive Monetary Easing (CME) Policy after the Global Financial Crisis. The analysis based on the Bayesian Vector autoregressive, BVAR) model indicates that in general monetary policy before QQE including the period of CME had significant effects on the economy and market, including Exchange Rate, Interest rates, bank lending, and industrial production, while QQE has not put significant impact on the market nor the real economy. The results indicate that while QQE has not attained the original objectives, the BOJ policy before QQE (during 2008 and March 2013) has actually worked in its original purpose of stabilization of the markets / economy and achieved recovery from the worst situation after the Global Financial Crisis.

Keywords Comprehensive Monetary Easing (CME); Quantitative and Qualitative Monetary Easing (QQE); Effectiveness of monetary policy

JEL Codes E44 E52 F37 GIO G20

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Introduction

This paper examines the effectiveness of Bank of Japan (BOJ)'s monetary policy on the financial markets and the real economy during the post-Global Financial Crisis in Japan, focusing on the BOJ's monetary policy including Comprehensive Monetary Policy (CME) and the current Quantitative and Qualitative Monetary Easing Policy (QQE) as the major policy 'Abenomics.' until today. In the past literature the effects of monetary easing policies on the financial market and the real economy for the period of CME have not been examined intensively, as compared with that of QE (2001-2006) or QQE (2013 to date).Therefore, this paper is the first attempt to examine the BOJ's monetary easing policies just after the Global Financial Crisis before QQE intensively.

As BOJ's non-traditional monetary policies under the former Governor Shirakawa the Comprehensive Monetary Easing (CME) was introduced in October 2010, which includes: (i) setting the call rate to be lower (form0.1% to 0-0.01%); (ii) continuation of zero interest rate to have higher expectations of price levels; (iii) diversification of assets to be purchased by BOJ, including ETF, J-REIT other than JGBs/ other securities, and (iv) special fund established for asset purchase. Even before CME, BOJ already introduced interest rate applied for BOJ current account and special operation for increased lending to firms. Therefore, it would be necessary to assess the effectiveness of monetary easing during the pre-CME period.

The major purposes of QQE introduced in April 2013 are to achieve economic growth through yield curve to be controlled and commitment to achieve inflation with 2% by supplying massive monetary base in the market. However, this may will focus mainly on the massive supply of money in the market.

The overall results of analyses in this paper indicate that monetary easing under QQE has not been effective in putting any impact upon the markets and the real economy, while the monetary policy introduced before QQE (after the Global Financial Crisis under former Governor Shirakawa), including CQE, had worked in several aspects: real effective exchange rate, interest rate, bank lending. The stagnation of the Japanese economy just after the Global Financial Crisis would be mainly from the global market and economic conditions, which brought about appreciation of Yen and stagnation of exports to main trade partners, including China and the US. As a domestic monetary policy, the monetary easing by BOJ has worked effectively under the period of CQE rather than QQE.

This paper examines the effects of BOJ's monetary easing policy on the Japanese markets, based on the analysis of Bayesian VAR (BVAR) model, focusing on the changes before and after the initiation of Quantitative and Qualitative Monetary Easing (QQE)

(April 2013 to date). The analyses include variables such as monetary base, BOJ Current Account, money stocks [M2], Government bond of Japan (JGB) yield, call rate, the stock prices (Nikkei index), real effective exchange rate (RERR) (Japanese Yen). Bank lending, as well as industrial production from Sept.2008 to Oct. 2018.

The major findings of the analysis obtained in this paper are as follows: (i) During the Period of Sept. 2008 and March 2013. Monetary base (MB) and BOJ current account (BOJAC) had significant effects on the money stock (M2) and Bank lending as well as the real effective exchange rate (REER); (ii) MB/BOJAC also put significant effect on the interest levels (Call rate/ KGB yields), as well as stock prices; (iii) The overall effects of Comprehensive Monetary Easing (CME) are the same as the above, but the effects are more significant in the former period before CQE in general; (iv) The effects of QQE has not given significant effect on REER, so that QQE cannot be regarded as a factor for Yen's depreciation after April 2014 (initiation period of QQE and Abenomics); (v) MB/BOJAC also did not have significant effects on interest levels, as well as bank lending, nor industrial production. Therefore, QQE has less effective in the market and real economy, as compared with that under the former period of QQE (during Sept.2008-Mar.2013).

In this paper, Section 1 describes the overall monetary easing policy and the impact on the economy and markets after the Global Financial Crisis in Japan. In Section 2 the relevant studies in the past literatures are presented and evaluated by pointing out the different and unique nature of this thesis. After the general introduction on the analytical model (Bayesian VAR) in Section 3, Section 4 presents an analysis on the effects of monetary easing on the Japanese market and real economies.

1. Monetary Policy and Financial Market in Japan

1 .1 General Feature of the Monetary Easing Policy

Monetary base, including Bank of Japan (BOJ) Current Account, has increased significantly, especially under the current Quantitative and Qualitative Monetary Easing (QQE), and the amount reached to ¥497trillion and ¥384 trillion, respectively in December 2018 (Fig.1). The size of the monetary base with almost 100% of GDP and BOJ Current Account with 77% of GDP in Japan in 2018 (Fig.1).

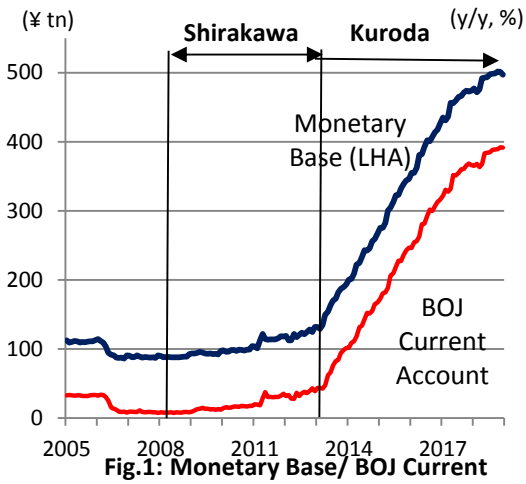

Fig.1: Monetary Base/ BOJ Current Account (Japan)

Source: Bank of Japan

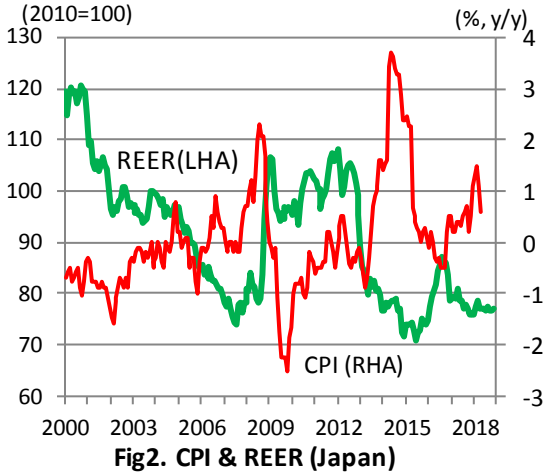

Fig2. CPI & REER (Japan)

Sources: BIS, Bureau of Statistics

The exchange rate (real effective exchange rate) has not been affected by the increase of monetary base, though it is mistakenly understood that massive monetary easing under QQE has facilitated Yen's depreciation (Fig.2). Monetary base (MB) had no significant association with the real effective exchange rate. It cannot be claimed that monetary easing under QQE has facilitated Yen's depreciation that could sustained Japanese firms' export competitiveness. In fact, it has been caused by the global market condition when the Euro Crisis (or GIIPS crisis) peaked out in late 2012, so that concentration of global portfolio investment in Japan, which caused Yen's appreciation, had been terminated as foreign investors diversified their portfolio at that period. Although CPI target has been set at 2 %(y/y) since April 2013, it has been mainly influenced by the exchange rate (REER) (Fig.2). These facts show that advocated monetary easing under QQE has not achieved the objectives and the official explanation on the inflation mechanism has been wrong[1].

Even under such a monetary easing policy, industrial production in Japan has not increased substantially until today (Fig.3), and monetary base has not always been associated with the stock prices (Fig.4). The temporary rise of stock prices in Tokyo in spring 2013 might be the result of investors' expectation of the Japanese authority's stance in the monetary policy, rather than the actual change in the monetary base[2].

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[1] The official target of 2% inflation could be achieved by massive expansion of monetary base, which has been officially explained in the initial stage of QQE under the 'Abenomics'

[2] Fukuda (2011) argues that foreign banks in Japan may utilize the excess reserve of the BOJ Current Account and call market for short-term investment in the monetary / financial market, not in lending to manufacturing industry. Kikuchi (2013) suggested that under the excessive monetary easing, liquidity could be used for 'speculative investment'. He also maintained that monetary easing in fact provided 'Hedge Funds' with important resources for financial investment.

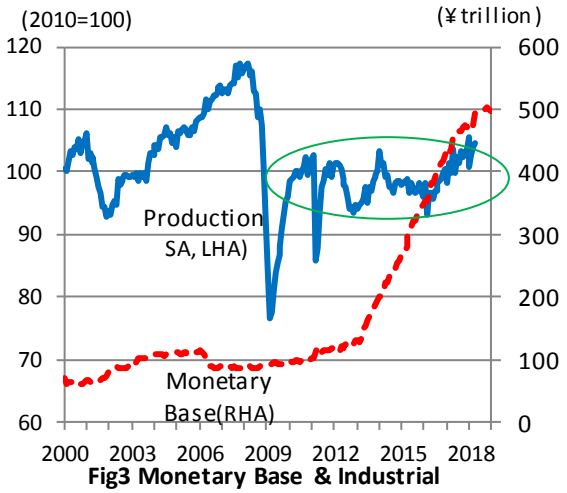

Fig3 Monetary Base & Industrial Production (Japan)

Sources: Bankfo Japan,, IFS)database (IMF)

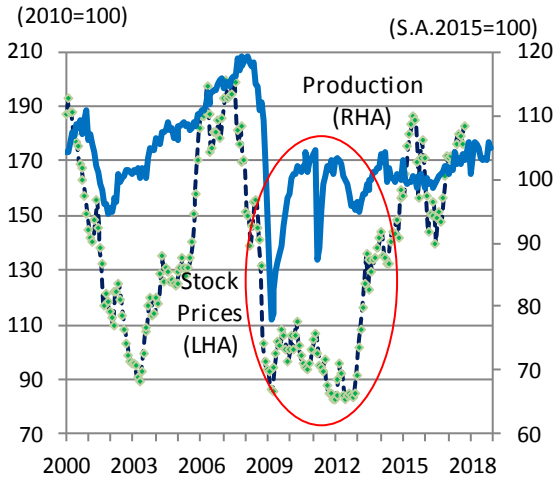

Fig.4: Stock & Production (Japan)

Sources: Bank of Japan, IFS (IMF)

The bank lending has not increased substantially, despite of massively increased monetary base since 2013[3] (Fig.5). This could be partly explained by the fact that bank lending to the productive sector has not increased, irrespective of increase in the banks' BOJ current account.

The background of insignificant association between the volume of monetary base and REER could be accounted for by the fact that capital flows have increased significantly which have influenced on the market in Japan in recent years.

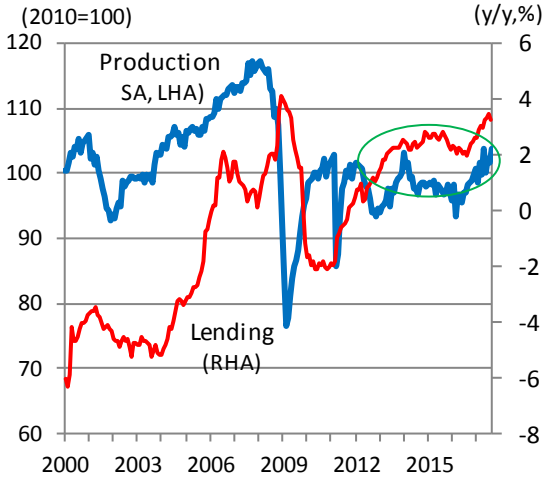

Fig.5: Lending & Production (Japan)

Sources: Bankfo Japan,, IFS)database (IMF)

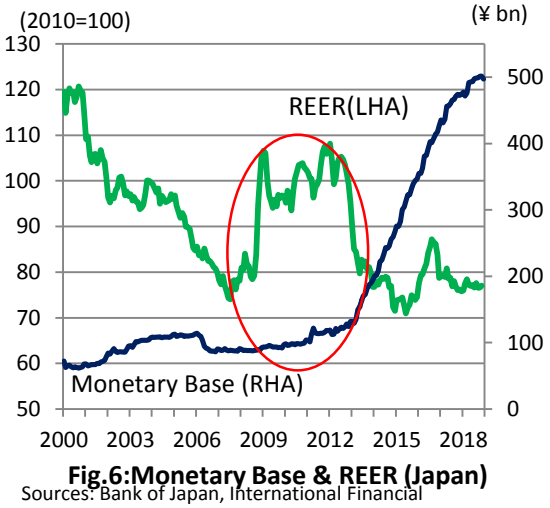

Fig.6:Monetary Base & REER (Japan)

Sources: Bank of Japan, International Financial Statistics (IFS) database (IMF)

The non-traditional monetary policies adopted both by CME and QQE may be

[3] Foreign banks may mobilize the resources delivered in the Japanese market, and they transfer the money to the Headquarters to be lend to 'Hedge Funds' that trade stocks in the Tokyo market which accelerated the exchange of yen to dollars. Depreciation of yen would cause the stock prices higher in recent years, since it would enlarge the yen denominated corporate profit. Kikuchi (2014) claims that tapering of the QE3 would require further continuation of BOJ's QQE policy.

evaluated by the actual performance in terms of impacts on the market and real economy. In this paper, the effects of monetary easing on the financial market, especially the interest rates, including call rate and JGB yield (average) will be presented. As seen in Fig.7, significant changes in interest rates during the post-Global Financial Crisis period before QQE under former BOJ Governor (Shirakawa) and the current QQE under Kuroda. It is shown by the fact that the changes in M2 have closely associated with capital flows (Fig.8).

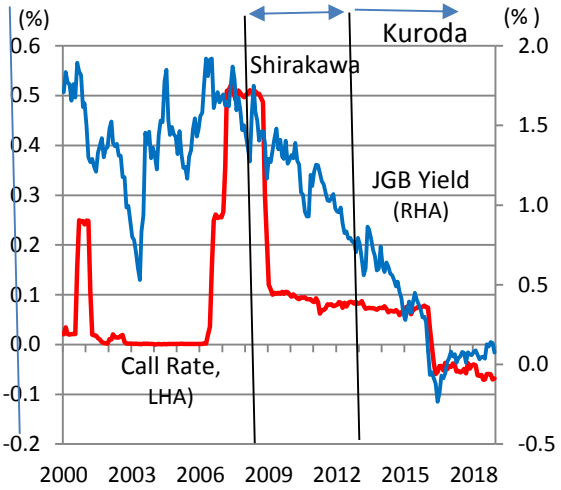

Fig.7: Call Rate & JGB Yield (Japan)

Sources: Bank fo Japan,, IFS)database (IMF)

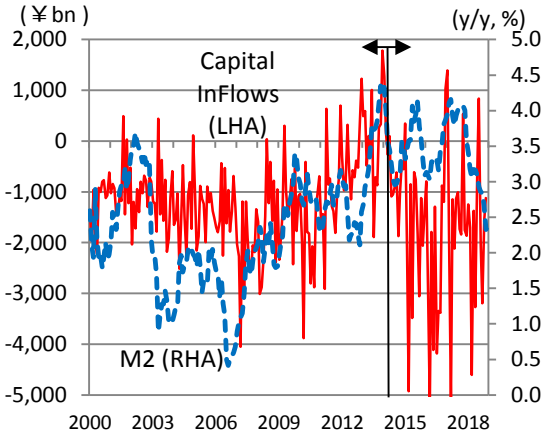

Fig.8: Capital Flows (Net) and M2

Note: The figures show the net capital inflows
Source: Bank of Japan

It should be noted that that growth of M2 and capital flows has been correlated especially since April 2013, when the QQE was introduced. It could imply that net financial outflows have closely associated with reduced domestic banks' money stock, which indicates that domestic financial resources have directly been influenced by capital movement especially transfer of capital and financial resources to foreign markets in accordance with the monetary expansion under the QQE. This could indicate that money stock held in the domestic financial sector is negatively correlated with the net capital inflows that originated from liquidity in the global market. Thus, money stock in Japan is now closely linked to the overseas market, under the regime of fully liberalized capital market. It is necessary, therefore, that monetary policy should be analysed in the context of capital flows that put significant effects on the effectiveness of domestic monetary policy in Japan. In this regard, more detailed analysis would be necessary to investigate such capital flows and the effects on the markets globally, which is out of scope of this paper.

2. Research on the Effects of Monetary Policy on the Economy and market in Japan

Several studies have been undertaken on monetary policy and its effects on the Monetary/financial market as well as the real economy in Japan, but past studies have focused mostly on the period of BOJ's Quantitative Monetary Easing [QE] (April 2001 - March 2006), and very few studies have examined the effects of monetary easing policy after the 'Lehman Shock' (2008), including the BOJ's Comprehensive Monetary Easing (CME) and the current QQE Policy Phase Since April 2013.

Some studies suggest that QE (2001 - 2006) in Japan put the bond yield lower and had certain effects on the maturity and yield curve of the Japanese Government Bond (JGB), thereby stabilizing the market.[4] However, the other studies, including Shiratsuka, et al. (2010) have proved that the effect of QE on the real economy was insignificant[5]. Major analyses based on VAR models on the monetary policy in Japan were initiated before Quantitative Monetary Easing (2001-2006), including the by Teruyama (2001), which shows monetary policy had become ineffective, but the period of the analysis was confined to the analysis in the 1990s. Other studies based on the VAR models are basically analyses on the Quantitative Monetary Easing (QE) Policy period (2001 -2006).

Harada and Masujima (2008) pointed out that the Quantitative Monetary Easing (2001 -2006) was effective in the real economy through the asset effects of stock market, based on the VAR model. Honda, Kuroki and Tachibana (2010) also show the effectiveness of monetary easing policy during 2001-2006 by adopting variables of CPI, industrial production, and call rate. BOJ Current Account, Nikkei stock prices, and industrial production, based the VAR models. On the other hand, Nakashima et al. (2017) claims that under the Quantitative Monetary easing during 2001 ~2006 the quantitative easing shocks had contractionary effects, while qualitative easing shocks had expansionary effects on the real economy.

All these Studies mainly dealt with the first generation of Quantitative Monetary Easing (QE) during 2001 -2006. Therefore, it cannot be justified to claim that the current QQE as an effective tool to be effective for the real economy, since the magnitude of monetary base under the QQE cannot be comparable in its size to that under the during the QE (2001-2006), which was much smaller in that period.

Some studies analysed the monetary policy during the period after the Global Financial Crisis, including the study by Honda and Tachibana (2011) which extended the

[4] Okina and Shiratsuka (2004) and Baba et al (2006) indicated that the monetary easing policy did lower the yield curve of the government bond (JGB) with longer period, but the effects on the price levels and the real economy were limited. Ugai (2006) also suggested that the monetary easing had some effect in terms of lower risk premium during the QE period (200 1 -2006). ,

[5] Shirastuka et al. (2010) also pointed out that the QE policy might put expectation of monetary easing policy to be continued among the private sector, but the effect on the real economy is limited

covered period from 1996 to March 2010, with dummy variable for the period of Quantitative Monetary Easing (2001-2006). They claim that monetary policy was effective in increasing industrial production through the route of stock market.
Honda (2014) also maintained that 'non-traditional' monetary easing policy has worked for the real economy through several channels, including asset effects[6]. On the other hand, Arai (2016) pointed out that magnitude of' estimated pass-through of monetary shocks to stock prices and the exchange rate in Japan is substantially smaller than that in the US during the period 1998-2013.

These studies cannot be regarded as analyses on the real effects of QQE since April 2013 until today. In addition, the monetary easing since 2013 has not directly linked to stock prices in Japan, as shown in the analysis of this paper. Noguchi (2013a, b) who maintains that monetary easing policies in Japan have not resulted in positive effect on the real economy.

Miyao (2016, 2017) claims that the monetary easing policy under the current QQE was effective, based on the VAR model with impulse response functions by comparing the period before and after November 2012, covering the periods March 2001 - March 2012 and March 2001 - March 2015. However, the results shown in his argument cannot be persuasive, with respect to the effectiveness of QQE. In fact, the size of monetary easing policy under the QE (2001-2006) was smaller than that of QQE, and the effects on the market and the real economy are quite different from that under the current QQE[7].

Therefore, the results of previous studies may not be valid for evaluation of the 'true' effectiveness of monetary easing that has significantly increased in the post Global Financial Crisis (2008), especially under the QQE. In this respect, Ohta (2013, 2014a, 2014b, 2017) already suggested that non-traditional BOJ's monetary easing policy especially QQE has not put significant effects on the real economy and the domestic financial market, which is very volatile and affected by short-term capital flows. Ohta (2017) pointed out the fact that BOJ's monetary base has been utilized for the US market which could be contributed to the recovery of the US market and economy. Also, Ohta (2018) suggested that BOJ's monetary easing has had substantially

[6] Honda (2014) maintains the effectiveness of asset effects in Japan, however, the monetary easing since 2006 has not directly linked to stock prices in Japan, as shown in the analysis of this paper.
[7] The GDP growth converted to monthly basis used by Miyao also should be dealt cautiously, since it would make incorrect results in those VAR analyses. It should be noted that Comprehensive Monetary Easing (CME) by BOJ [Oct. 2010-March 2013] is included during this period, and that the magnitude and volume of QQB is so different in scale. In fact, the CMP was more effective than that under the QQE in terms of interest rate policy on the market. See Ohta (2013, 2014b). Also note that the analysis includes some variable of GDP converted in to monthly basis from quarterly figures, and it would be very uncertain and not effective variable to be applied in such an analysis like VAR model. Thus, the robustness of the analysis by Miyao is not very sold.

positive impacts on the Chinese market and the real economy. These would indicate that BOJ's monetary policy has been ineffective since substantial money flew out to the other countries from Japan, and very few amount of money supplied under the QQE has been utilized for the real economy in domestic market and economy in Japan.

Some authors have examined the effects of monetary easing by major advanced central banks, including unconventional quantitative monetary easing policies of the FRB and ECB. Fratzscher et al. (2016) have analysed the effects of US monetary easing (QE1, 2, 3) based on multiple regression models, while Anayaet al (2017.) analysed the spillover of U.S. unconventional monetary policy to emerging markets with global structural VAR model. The analysis based on VAR by Kucharcukova et al. (2016) also indicated that the monetary easing of ECB has not put significant effect on output in the six non- Euro EU countries. Churm at al. (2015) showed that the monetary easing by Bank of England has put positive effects on the UK economy by the analysis based on BVAR model.

However, there has been no study on the effects of Japan's monetary easing on the economy and market during the period of non-traditional monetary policy after the Lehman shock before QQE to compare that under QQE on the effects in the market, covering the latest period in Japan.

The overall result of the analysis in this paper which covers the period from September 2008 to December2018 shows that monetary easing policy in Japan has become increasingly less effective in controlling the domestic market, especially after the introduction of QQE and that it has become ineffective for BOJ to put positive effect on the real economy. The normally expected results of monetary easing on the market, including exchange rate, interest rates, and bank lending, as well as the impact on the real economy (industrial production) are clearly seen during the period Sept. 2008 and Mar.2013, rather than the period under QQE (April 2013- to date).

3. Methodology

3 l. General Explanation of the Analysis

This section is devoted to explanation on the BVAR model for the analyses on the effects of monetary policy on monetary and capital/ financial market, foreign exchange, as well as the real economy in Japan in the next section (Section5). The effects of US monetary easing on the US domestic and the Japanese markets are also examined in Section 6.

The whole period (Sept. 2008- Dec. 2018) is divided into the following periods:
(i) Post-Global Financial Crisis Period including COJ's Comprehensive Monetary Easing before QQE [September 2008 – March 2013]

(ii) Post-Lehman Shock Period before CME (Sept.2008-Sept.2010)
(ii) Whole period of BOJ's Quantitative and Qualitative Monetary Easing (QQE) [April 2013 – December 2018]
(iv) Phase Ⅱ of QQE since November 2014 to date (Nov.2014-Dec.2018)

It should be noted that after the termination of QE3 by FRB (October 2014), the pace of massive increase of monetary base was strengthened since November 2014. Therefore, it would be necessary to examine the effects of monetary expansion on the market and economy.

3.2 Bayesian VAR (BVAR) Model

The difference between BVAR and standard VAR models lies in the fact that the model parameters are treated as random variables, and prior probabilities are assigned to them. The Bayesian vector autoregressive (BVAR) model is used to avoid problems of collinearity and over--parameterization that often with the use of VAR models.

The VAR is essentially fails to correctly estimate the influence of parameters on the data and vice versa, and it may not have an economic meaning, as pointed out by Rummerl (2015). Thus, a Bayesian VAR (BVAR) model is used in this paper to have an economic meaning to the VAR model.

$$Y_t = c + A_1 y_{t-1} + \cdots + A_p y_{t-p} + \varepsilon_t$$

The VAR model above is similar to an AR model, however, the coefficients consists of vectors where c is a vector of constants. A_i and A_p are parameters matrices, Y_t is the vector of the endogenous variable, i.e. the data variable and lastly ε_t is a white-noise vestor error term. The model relies on A_p and if it is estimated incorrectly due to limitation of data or sample period, then models based on the VAR model become imprecise,

The use of BVAR would allow A_p to be influenced by y_{t-p}. It introduced the real probability of the even by first giving it prior information (i.e. a prior belief of the event) then followed by a positive belief and lastly the evidence of probability (i.e. real probability). The model uses Litterman-Minnesota prior which is a simple go-to model in macroeconomics. It incorporates the prior belief that the endogenous variables in the VAR follow a random walk process while stationary variables follow a simple AR process.

The model of this paper is based on the model given as the above, but it is with Bayesian inference. In this paper the BVAR model is set as done by Churn et al. (2015), and the prior is set as loose prior. The lag selection for the model is four. In the analysis, assessment is made on the BOJ's impacts on different channels.

3.3 Data

In this analysis, empirical Bayesian method, in which a prior distribution, is estimated from the data. BVAR model could be used to estimate the response to some shock variables It should be also noted that those period that should deal with monthly in this paper. The models used in the following sections are as follows:

The first shock is provided by the monetary policy instruments (variables), against other variables which include:

(i) Monetary Base; BOJ Current Account (BOJAC); Money stocks (M2)

(ii) Real Effective Exchange Rate [REER];

(iii) Market variables: average Japanese Government bond yield (JGB Yield); Call Rate; Stock Prices [Share]

(iv) Inflation: CPI [year-on-year]

(v) Bank lending [year-on-year]

(vi) Industrial production, seasonally adjusted index (Prod)

The variables for the analysis in this paper are listed as follows:

Variables	Abbriviation	Sources
BOJ Monetary Base	Monetary Base (MB)	Bank of Japan (major data series)
Bank of Japan Current Account	BOJ AC	Bank of Japan (major data series)
Money Stocks	M2	Bank of Japan (major data
Real Effective Exchange Rate	REER	BIS effective exchange rate indices
Overnight interbank rate	Call Rate	Bank of Japan (major data series)
Government Bond Yields	Yield	IFS database (IMF)
Consumer price index	CPI	Statistical Office (Japan), International Financial Statistics (IFS) database (IMF)
Bank Lending	Lending(y/y)	Bank of Japan (major data series)
Nikkei Stock Prices	Stock(Nikkei)	Nikkei Profile database http://indexes.nikkei.co.jp/nkave/archives/data
Industrial Production	Prod （2010＝100）	IFS database (IMF) Ministry of Economy & Industry

The order of each variables of the BVAR model is determined by the shock of the monetary policy and the impact on the market and the real economy. The based on BVAR Model uses each variable as a level.

(i) Model 1: Effects of monetary easing on the real economies

Monetary Base (MB) /BOJAC/M2; Real Effective Exchange Rate (REER); Share prices (Share); Industrial Production (PROD, S.A.)

(as the first variable shock BOJAC & Money Stock (M2) used)

(ii)) Model 2: Effects of monetary easing on the markets

Monetary Base (MB) /BOJAC/M2; Call Rate; JGB Yield; CPI (y/y)

(iii) Model 3: Effects of monetary easing on the bank lending & production

JPN MB/ BOJAC]; Money Stock (M2); Bank Lending; Industrial Production

(PROD)

3.4 Cholesky ordering

In examining the impulse response functions, the order of the variables are to be made in Cholesky ordering. The orders are made in lower triable of in the model, where most exogenous variables come first, and the most endogenous variables come last. To investigate the respective impact of monetary base, the Cholesky ordering is as follows:

(i) Model 1

BOJ MB/BOJAC/M2
BOJ MB/BOJAC/M2 REER
BOJ MB/BOJAC/M2 REER Share
BOJ MB/BOJAC/M2 REER Share Prod

(ii) Model 2

BOJ MB/BOJAC/M2
BOJ MB/BOJAC/M2 Call Rate
BOJ MB/BOJAC/M2 Call Rate JGBYield
BOJ MB/BOJAC/M2 Call Rate JGBYield CPI

(iii) Model 3

BOJ MB/BOJAC
BOJ MB/BOJAC M2
BOJ MB/BOJAC M2 Lend
BOJ MB/BOJAC M2 Lend Prod

4. Evaluation of the Effects of Monetary Easing Policy on the Market and Real Economy in Japan

The analysis in this section is to evaluate monetary easing policies since Lehman Shock (Post-Global Financial Crisis) period in Japan by comparing those periods before and after the Quantitative and Qualitative and Qualitative Monetary Easing (QQE). Particularly, this paper focuses on the period when several measures undertaken under the former Governor of Bank of Japan (Mr. Shirakawa), including the Comprehensive Monetary Easing (CME) introduced in October 2010 to March 2013, as compared with the period of QQE under the Kuroda BOJ until today.

In this paper, the analyses are made for each of the period given below:

(i) Sept. 2008 – March 2013 'Whole period after the Global Financial Crisis, including CME)
(ii) Sept. 2008 – Sept.2010 (Crisis period after the Global Financial Crisis before CME)
(iii) April 2013 – Dec. 2018 (Whole period of QQE until today)
(iv) Nov.2014 – Dec. 2018 (Phase II of QQE)

The periods (i) and (ii) are under former BOJ Governor Shirakawa, while (iii) and (iv) are that under the current Governor Kuroda.

The reason why such different periods are examined would be to measure how the current QQE especially under the Phase II (strengthened quantitative monetary easing) since November 2014 is different in the effects on the market and the real economy as compared with that former period before QQE.

4.1 Impulse Response Functions

The results suggest that the Comprehensive Monetary Easing (CME) had relatively been successful in putting expected results on the REER, interest rates as well as bank lending in the market, while BOJ's monetary easing policy under QQE has not given positive effect on the market including the real effective exchange rate, interest rate levels, and had very limited impact upon the domestic lending and industrial production in Japan.

4.1.1 Impulse Responses (1): The effects of Monetary Base / BOJ Current Account on the real economy

As shown in Fig.8-1 and 8-2, monetary easing under Shirakawa BOJ period has actually effective in (i) depreciation of EFFR; (ii) positive for share prices (though not very significant); (iii) positive Industrial Production; (iv) Monetary base and BOJ Current Account Bank put significant bank lending. These results are more significant especially during the former period (Sept.2008-Sept.2010) before the CME, during which the responses were not so much significant positive in the real economy.

On the other hand, the results of monetary easing under QQE during Apri.2013-Dec.2018 are generally not significant as the impacts on the market was very limited in terms of the effects on the share prices and the exchange rate (REER) (Fig.8-3). There are no significant impacts of monetary base on bank lending as well as share prices during the whole period of QQE.

The impulse responses during the QQE II (Nov.2014- 2018) are also the same: there are no significant responses of REER, Share Prices, and Industrial production (Fig.8-4). The responses of bank lending and production to the shock of MB/ BOJ current account

also show insignificant responses to the monetary expansion during the same period.

The results of impulse response functions show that in the total period QQE monetary expansion has not put significant impact on the market: interest rates, exchange rate as well as the real economy. This is so different from the general responses before QQE.

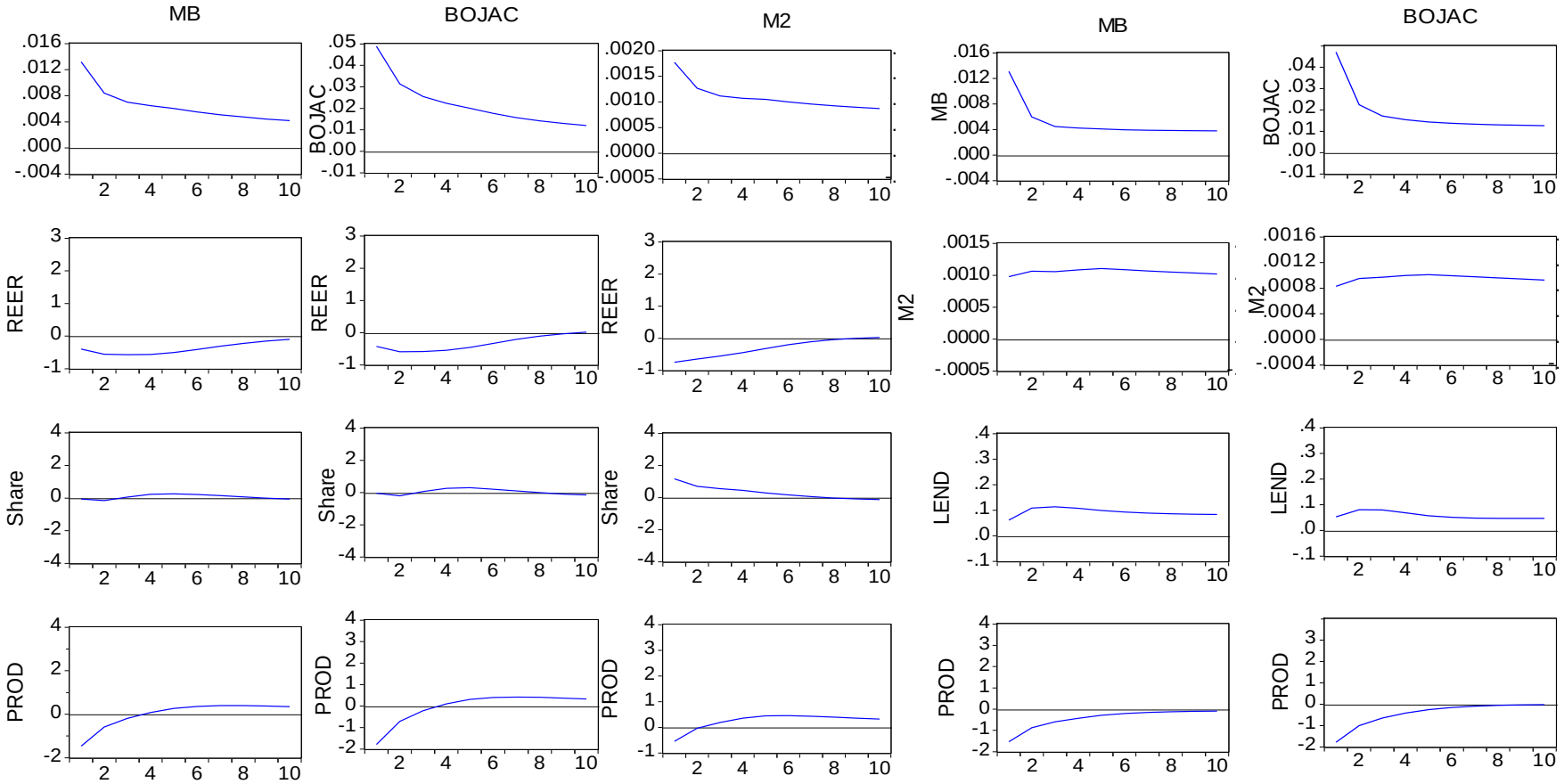

Fig. 8-1: Japan: Impulse Response to Monetary Base & Money Stock (Sept.2008-Mar.2013)

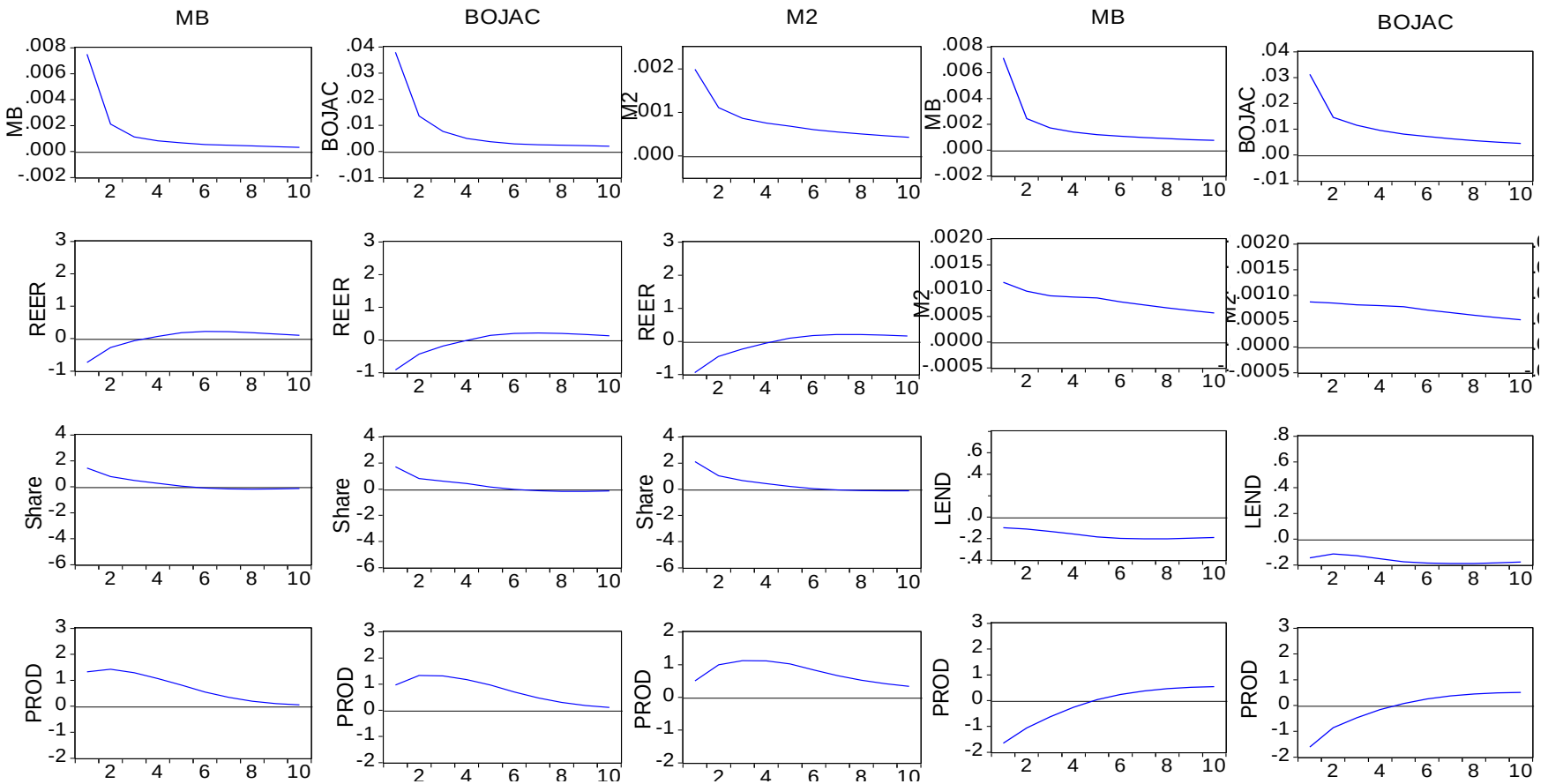

Fig. 8-2: Japan: Impulse Response to Monetary Base & Money Stock (Sept.2008-Sept.2010)

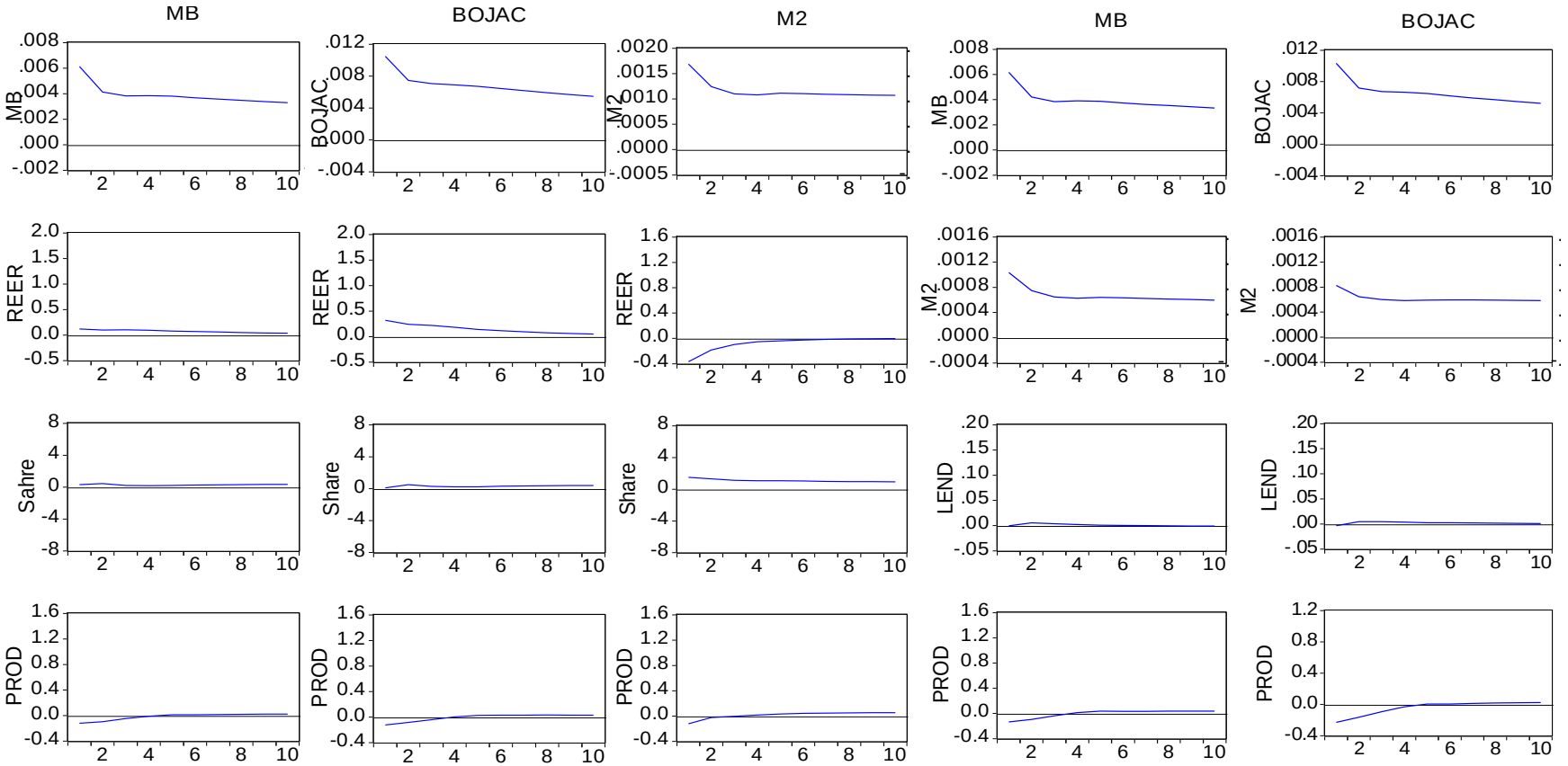

Fig. 8-3: Japan: Impulse Response to Monetary Base & Money Stock (Apr. 2013-2018)

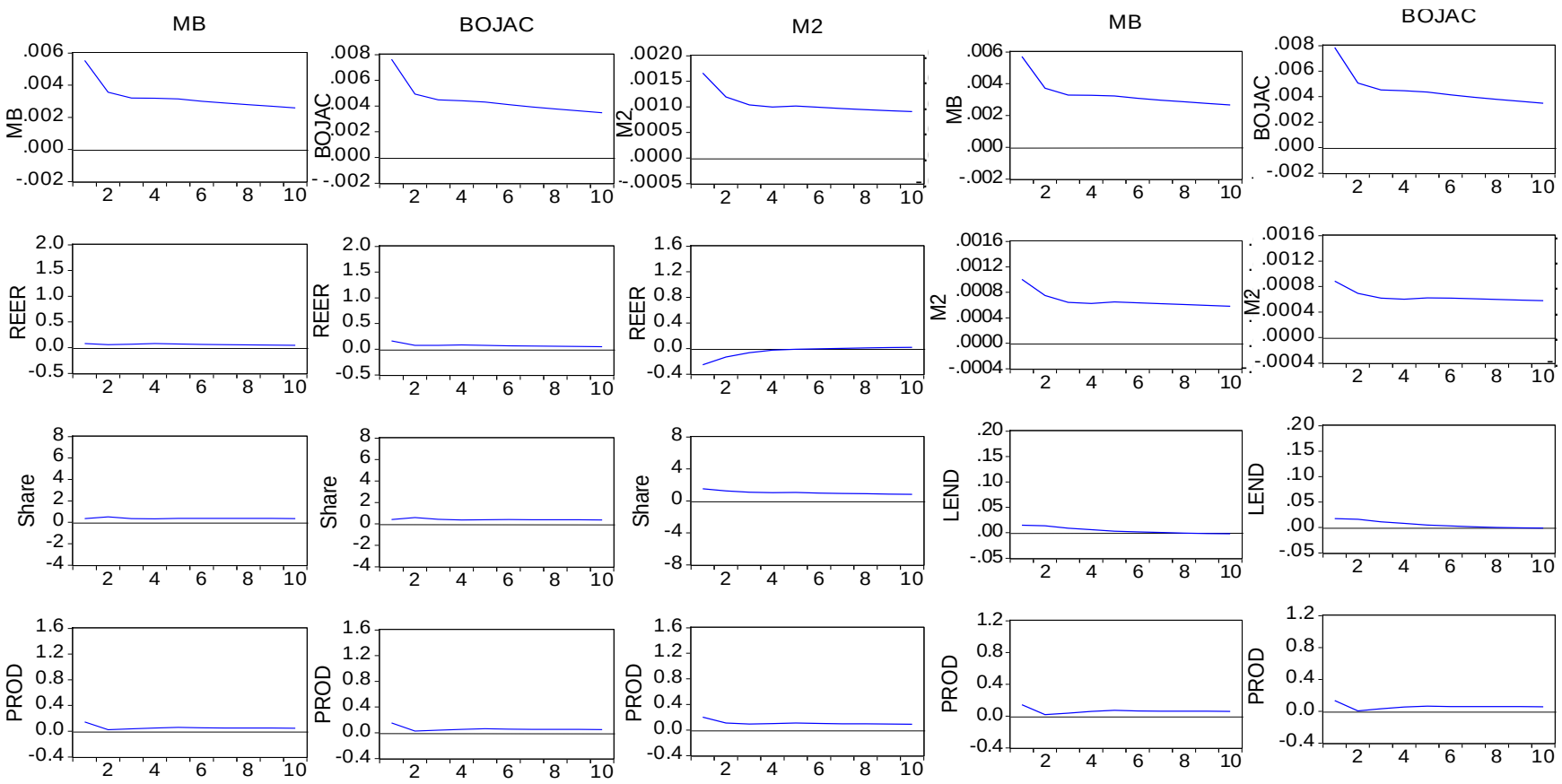

Fig. 8-4: Japan: Impulse Response to Monetary Base & Money Stock (Nov. 2014- Dec.2018)

4.1.2 Impulse Responses (2): The effects of Monetary Base / BOJ Current Account on the financial market

Before QQE period the effects of monetary base and BOJ Current Account (BOJAC) on the interest rates (call rate, JGB Yield) and inflation (CPI) were significant: the former became negative and the latter positive during the period of Sept.2008-Mar.2013 (Fig.9-1). Similar results are obtained in the case of the pre-CME period (Sept.2008-Sept.2010) (Fig.9-2).

However, all the response functions show insignificance in the financial market during the total period QQE (Apri.2013-2018) (Fig.9-3). The responses in the financial market during the Phase II period of QQE (Nov.2014 - Dec.2018) were somehow effective in lowering the interest rates, especially call rate, however, the effects of MB/ BOJAC and M2 on CPI are all negative (Fig.9-4). It shows that there is no effectiveness under such a massive monetary expansion in terms of putting effect on CPI under QQE Phase II. It shows that there is no positive response of CPI to the monetary easing under the whole period of QQE (Fig.9-3, 9-4).

It should be noted that although the effects of increase in money stock (M2) on JGB yield were significant during the former period of QQE (Apr.2013-Ja.2016), it is insignificant during the whole period (Fig.9-3, 9-4).

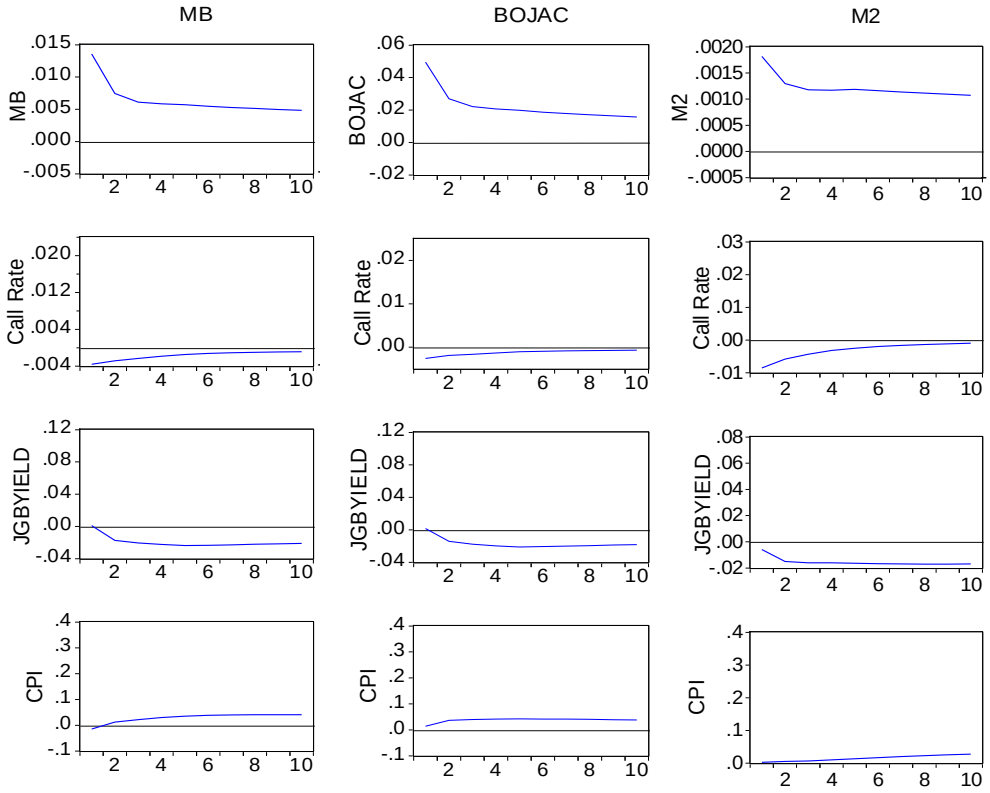

Fig. 9-1: Impulse Response to MB/BOJAC/M2 (Sept.2008-Mar.2013)

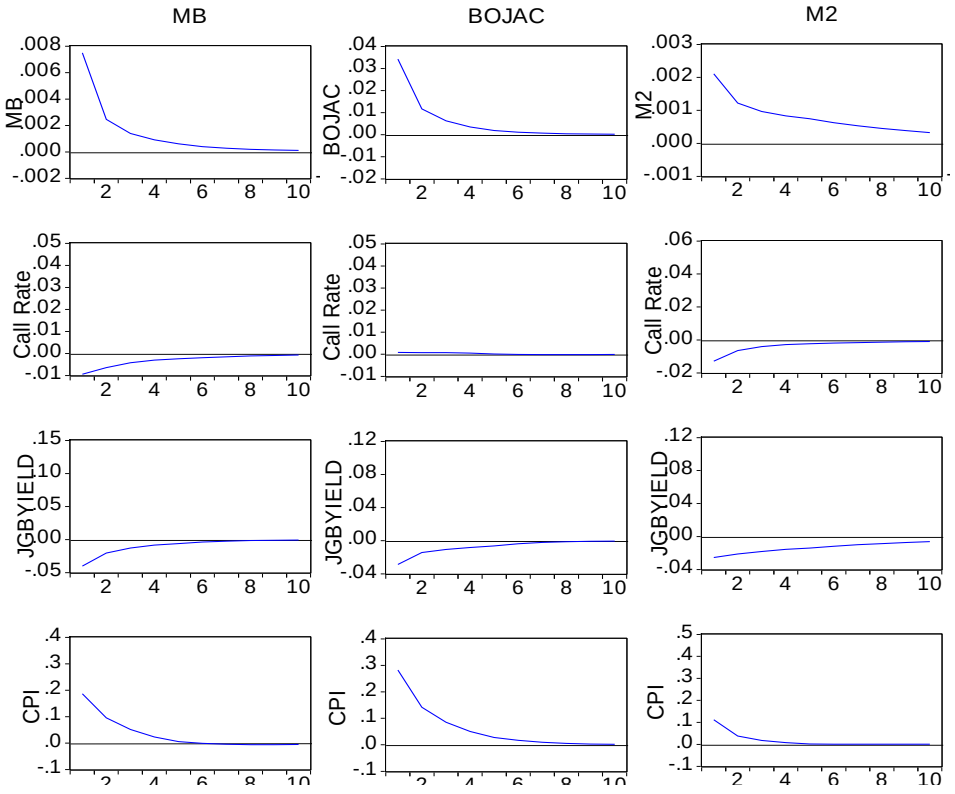

Fig. 9-2: Impulse Response to MB/BOJAC/M2 (Sept. 2008-Sept.2010)

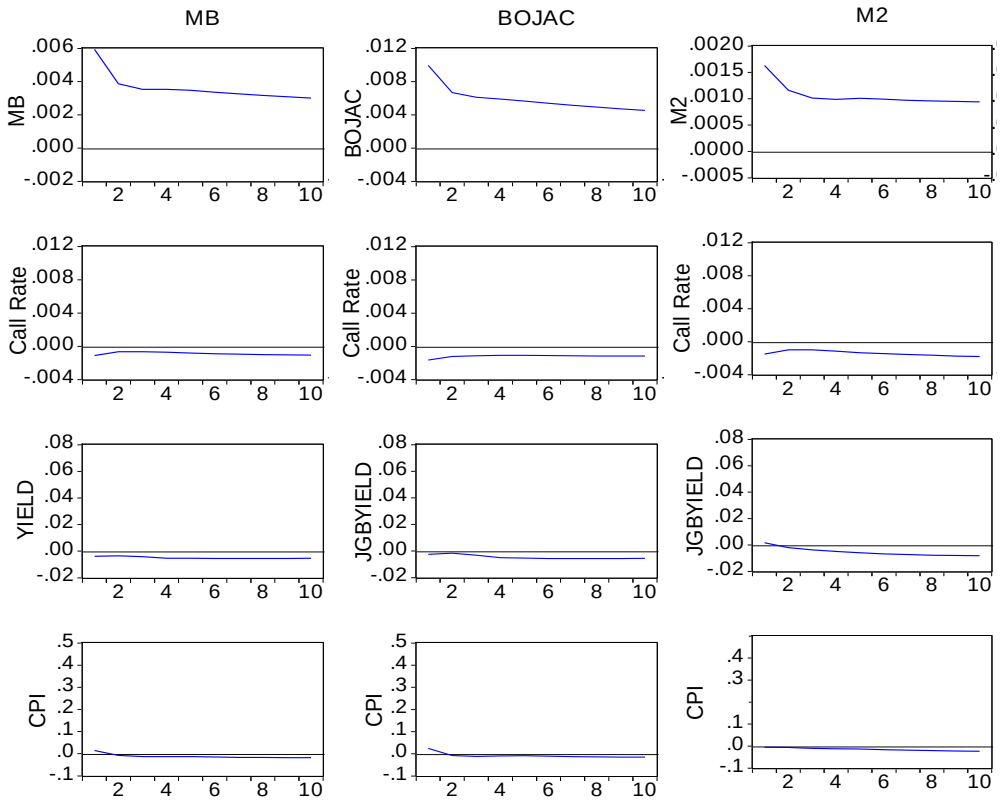

Fig. 9-3: Impulse Response to MB/BOJAC/M2 (Apr. 2013-2018)

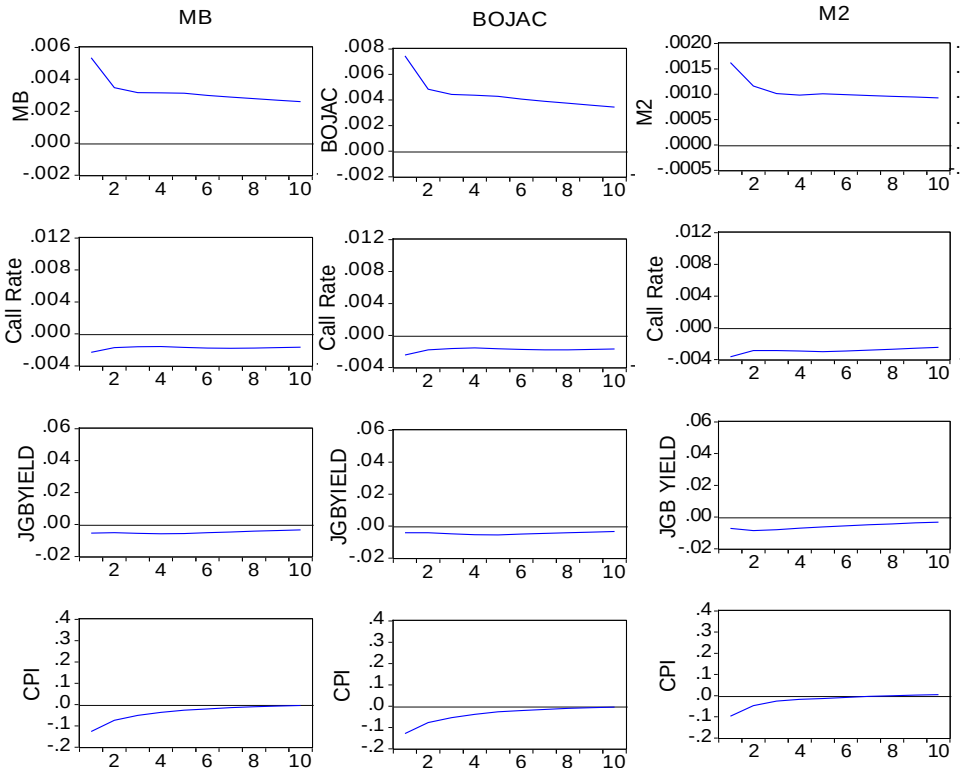

Fig. 9-4: Impulse Response to MB/BOJAC/M2 (Nov. 2014- Dec.2018)

4.2 Variance Decomposition

In this section, the variance decompositions of several key variables (Industrial production; CPI; REER; bank lending) on monetary easing are shown to show ineffectiveness of QQE as compared with that under CME and the former period of monetary policy during the Post Lehman Shock period.

4.2.1 Effects of monetary easing on the Economy

The variance decomposition of Industrial production and inflation (CPI) of BVAR analyses are used to show how monetary easing policies are effective in the real economy.

During the period Sept.2008-Mar.2013 (former period before the QQE) there were substantial effects of monetary easing on the real economy (Table 1). The monetary base (MB), for example, increased their share of decomposition in industrial production during the period, as compared with the period of QQE..

The share of MB in industrial production in the variance decomposition reached 14.7% in the last period of 10 months among the BVAR analysis on MB, REER, Share ad Production, and 18.7% on MB, M2, Bank Lending and Production during March 2008 - March 2013. It shows that there were some effects of monetary base on industrial production during the period.

Table 1: Variance Decomposition (Industrial Production)

	Period	S.E.	MB	REER	SHARE	PROD
Sept..2008-Mar.2013	1	3.784	15.033	0.042	2.670	82.255
	2	4.291	13.604	0.746	3.421	82.229
	9	4.746	14.220	5.166	4.289	76.326
	10	**4.759**	**14.689**	**5.137**	**4.267**	**75.907**
	Period	S.E.	MB	M2	LEND	PROD
	1	3.615	17.935	0.110	0.365	81.590
	2	4.032	19.096	0.202	1.577	79.125
	9	4.498	18.905	1.619	10.811	68.665
	10	**4.523**	**18.740**	**1.734**	**11.517**	**68.009**
Apr.2013-Dec.2018	Period	S.E.	MB	REER	SHARE	PROD
	1	1.326	0.837	0.088	0.536	98.539
	2	1.381	1.267	0.084	1.880	96.769
	9	1.432	1.370	0.246	4.308	94.075
	10	**1.432**	**1.393**	**0.258**	**4.309**	**94.039**
	Period	S.E.	MB	M2	LEND	PROD
	1	1.220	1.224	1.198	0.482	97.095
	2	1.251	1.734	2.928	0.850	94.489
	9	1.328	1.972	10.546	1.650	85.832
	10	**1.333**	**2.038**	**11.005**	**1.641**	**85.316**

Sources: BOJ database, BIS, METI, IMF (IMF)

On the other hand, the shares of MB and that of BOJAC were only 1.4% and 0.26%, respectively in the last period of 10 months of variance decomposition of BVAR analysis

on industrial production during the QQE period (Apr.2013-Dec.2018). and that of MB on the variance decomposition on MB, M2 bank lending and production is also low with 2.04%, while the share of M2 reached 11.0%

The above results show that monetary base had more impact upon the real economy (industrial production) during the former period before QQE.

4.2.2 Effects of monetary easing on the Financial Market

The share of MB in the variance decomposition of BVAR analysis on CPI reached 4.1% during Sept. 2008-Mar. 2013. Although the figure may be small, it is substantially larger than that during the QQE period (Apr.2013-Dec.2018). Also, the shares of decomposition of MB and call rate are larger in the period Sep.2008-Mar.2013.

The results indicate that monetary easing under QQE has not put any impact upon inflation rate, despite the fact that the major purpose of 2% inflation target under Kuroda BOJ has been widely advocated in the past years. This is one of the critical facts of failure of QQE in inflation targeting.

Table2: Variance Decomposition (CPI)

	Period	S.E.	MB	Call Rate	YIELD	CPI
Sept..2008-Mar.2013	1	0.348	0.183	1.524	0.005	98.289
	2	0.405	0.199	3.214	0.063	96.524
	9	0.478	3.517	8.758	1.388	86.337
	10	**0.481**	**4.123**	**8.764**	**1.550**	**85.563**
Apr.2013-Dec.2018	Period	S.E.	MB	Call Rate	YIELD	CPI
	1	0.486	0.083	0.115	0.000	99.802
	2	0.562	0.082	0.116	0.487	99.315
	9	0.683	0.398	2.658	3.269	93.675
	10	**0.687**	**0.458**	**3.210**	**3.297**	**93.036**

Sources: BOJ database, BIS, METI, IMF (IMF)

4.2.3 Effects of monetary easing on the Exchange Rate (REER)

While the share of MB in the in the last period of 10 months of variance decomposition of BVAR analysis on REER reached 10.8% during Sept. 2008-Mar.2013, the figure during the QQE period (Apr.2013-Dec.2018) was only 0.6%. It shows that massive quantitative money supply during QQE has not resulted in any significant impact upon the REER. This is contrary to the general explanation that QQE has facilitated Yen's depreciation of Yen, as a result of 'Abenomics'. However, the results would show that there has practically no impact on the exchange rate though monetary easing under the QQE. The exchange rate of Yen has possibly been made by the foreign investors' trading activities in the global market, and BOJ's massive quantitative MB has never achieved Yen's depreciation under the QQE.

Table 3: Variance Decomposition (REER)

Sept..2008-Mar.2013	Period	S.E.	MB	Call Rate	YIELD	CPI
	1	2.568	2.392	97.608	0.000	0.000
	2	3.200	4.573	92.149	1.042	2.237
	9	3.986	10.726	76.364	1.198	11.712
	10	**3.990**	**10.766**	**76.268**	**1.220**	**11.746**
Apr.2013-Dec.2018	Period	S.E.	MB	Call Rate	YIELD	CPI
	1	1.646	0.504	99.496	0.000	0.000
	2	1.941	0.615	97.297	1.735	0.353
	9	1.646	0.504	99.496	0.000	0.000
	10	**1.941**	**0.615**	**97.297**	**1.735**	**0.353**

4.2.4 Effects of monetary easing on Bank Lending

While the share of MB /BOJAC/M2 in the in the last period of 10 months of variance decomposition of BVAR analysis on bank lending reached 18.8%, 6.8% and 8.9&, respectively during Sept. 2008-Mar.2013, under the Kuroda e figures during the QQE period (Apr.2013-Dec.2018) were only 0.14%. 0.64% and 6.8%, respectively. It indicates that there was no significant impact upon on bank lending during the period of QQE, while that during former period (Sept.2008-Mar.2013) was substantially large.

Therefore, the results clearly indicate that massive supply of money under QQE has not realized increasing bank lending for productive activities in the domestic economy, which was originally intended under the Kuroda's BOJ.

Table 4: Variance Decomposition (Bank Lending)

Sept..2008-Mar.2013	Period	S.E.	MB	BOJAC	M2	Lend
	1	0.975	18.074	7.063	8.985	65.878
	2	1.004	18.761	6.959	8.873	65.408
	9	0.975	18.074	7.063	8.985	65.878
	10	**1.004**	**18.761**	**6.959**	**8.873**	**65.408**
Apr.2013-Dec.2018	Period	S.E.	MB	BOJAC	M2	Lend
	1	0.174	0.133	0.711	6.901	92.255
	2	0.203	0.139	0.635	6.840	92.386
	9	0.174	0.133	0.711	6.901	92.255
	10	**0.203**	**0.139**	**0.635**	**6.840**	**92.386**

Sources: BOJ database, Statistics Bureau, IFS(IMF)

Concluding Remarks

This paper re-examined the effectiveness of BOJ's unconventional monetary policies especially before and after the current Quantitative and Qualitative Monetary Easing (QQE) to compare with the monetary policy under former BOJ Governor Shirakawa, including Comprehensive Monetary Easing (CME) Policy after the Global Financial Crisis. The analysis based on the Bayesian Vector autoregressive, BVAR) model

indicates that in general monetary policy before QQE including the period of CME had significant effects on the economy and market, including Exchange Rate, Interest rates, bank lending, and industrial production, while QQE has not put significant impact on the market nor the real economy as the major policy of 'Abenomics.' until today.

The overall results of analyses indicate that while the monetary policy introduced after the Global Financial Crisis under former Governor Shirakawa, including CQE had worked in several aspects: real effective exchange rate, interest rate, bank lending, while the monetary easing under QQE has not been effective in putting any impact upon the markets and the real economy.

This paper examines the effects of BOJ's monetary easing policy on the Japanese markets, based on the analysis of Bayesian VAR (BVAR) model, focusing on the changes before and after the initiation of Quantitative and Qualitative Monetary Easing (QQE) (April 2013 to date). The analyses include variables such as monetary base, BOJ Current Account, money stocks [M2], Government bond of Japan (JGB) yield, call rate, the stock prices (Nikkei index), real effective exchange rate (RERR) (Japanese Yen). Bank lending, as well as industrial production from Sept.2008 to Oct. 2018.

The major findings of the analysis obtained in this paper are as follows: (i) during the Period of Sept. 2008 and March 2013. Monetary base (MB) and BOJ current account (BOJAC) had significant effects on the money stock (M2) and Bank lending as well as the real effective exchange rate (REER); (ii) MB/BOJAC also put significant effect on the interest levels (Call rate/ KGB yields), as well as stock prices; (iii) The overall effects of Comprehensive Monetary Easing (CME) are the same as the above mentioned period in general; (iv) The effects of QQE has not given significant effect on REER, so that QQE cannot be regarded as a factor for Yen's depreciation after April 2014 (initiation period of QQE and Abenomics); (v) MB/BOJAC also did not have significant effects on interest levels, as well as bank lending, nor industrial production. Therefore, QQE has less effective in the market and real economy, as compared with that under the former period of QQE (during Sept.2008-Mar.2013).

The results indicate that while QQE has not attained the original objectives, the BOJ policy under the former Governor Shirakawa before QQE (during 2008 and March 2013) has actually worked in its original purpose of stabilization of the markets / economy and achieved recovery from the worst situation after the Global Financial Crisis. The analyses in this paper would indicate that the stagnation of the Japanese economy just after the Global Financial Crisis was mainly from the global market and economic conditions, which brought about appreciation of Yen and stagnation of exports to main trade partners, including China and the US. Thus, the results would deny some views that Shirakawa's

monetary policy was in failure during his days. On the contrary, the monetary easing by BOJ worked effectively under the period of CQE rather than QQE, as domestic monetary policies in terms of effectiveness which is originally meant by such policies.

Although this paper has not shown detailed mechanism that monetary easing has not worked in industrial production and interest rate levels as well as bank lending during the whole period of QQE, the facts finding on the effectiveness (or ineffectiveness) of massive monetary easing and unconventional policy measures since the Global Financial Crisis could be shown. Thus, this paper's major objective of re-evaluation of unconventional monetary policy under the former Governor Shirakawa, including Comprehensive Monetary Easing (CME) has been fulfilled by confirming that the policy actually worked for the market and the real economy during the period before QQE. The analyses in the paper also shows that those policies introduced under the name of QQE have been ineffective in reviving the Japanese economy and not fulfilled the original objectives of QQE: to recover the stagnant economy through exchange rate, interest rates and attaining the inflation target in the past 5-6 years.

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