
Hideaki Ohta *

Abstract

This paper examines the effectiveness of monetary policy on domestic monetary and financial markets as well as the real economy in Japan under increasing capital flows in Japan from 2001 to 2013, based on the VAR (Vector autoregressive) model. The result shows that the monetary policy instruments (monetary base, the Bank of Japan current account, and call rate) have become increasingly influenced by capital flows recently. Particularly, the effects of capital flows, especially short-term capital flows (portfolio, other investments, derivatives), have put significant impact on the major monetary policy variables. It is also shown that the excess reserves of the BOJ account may be utilized for financial investment, not for productive investment in the real economy. The monetary policy has thus become less effective in controlling the domestic market, as part of the policy tools used in reviving and expanding the real economy. Therefore, Bank of Japan is expected to take sensible monetary policy in the context of the global economic and market conditions, especially the international capital flows, which are significantly influenced by the monetary policy of advanced economies.

Introduction

The effects of monetary easing policies, particularly Quantitative Easing (QE) [2001-2006] on the financial market and the real economy, have been studied by several scholars, but there has not been any consensus whether such a policy has put positive impact on the real economy in Japan. Moreover, it would be important to consider the aspect of increasing international capital flows, which have put significant impact upon the capital market and monetary policies in any country.

* College of International Relations, Ritsumeikan University  hoviolin@fc.ritsumei.ac.jp

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especially after the Global Financial Crisis (2008), under monetary easing policies adopted by advanced countries.

This paper examines the effectiveness of Bank of Japan (BOJ)’s monetary policy on domestic monetary and financial markets as well as the real economy in Japan under increasing capital flows from April 2001 to August 2013, based on the VAR (Vector autoregressive) model.

Bank of Japan initiated the QE in 2001, which was terminated in March 2006, while BOJ continued the ‘Zero interest-rate’ policy introduced in 1999. Monetary easing policies have been introduced not only in Japan, but also the USA and Europe since the Global Financial Crisis, triggered by the ‘Lehman Shock’ in September 2008. BOJ introduced Comprehensive Monetary Easing since 2010, which is followed by Quantitative and Qualitative Monetary Easing (QQE) Policy. QQE includes the program of asset purchase, with bond buying by US$1.4 trillion in two years, started under the new Governor Kuroda in Spring 2013.

The global market has bottomed out, and stock prices in Tokyo as well as New York have gone up significantly since December 2012, when the FRB introduced the additional policy of third round of quantitative easing (QE3). The new phase of QE3 includes large-scale asset purchases, through trading of Government Bonds (T-Bills) with the amount of $ 85 billion per month in addition to mortgage-backed securities (MBS). This measure have resulted in massive capital flows in the global market.

The monetary and financial market in Japan has become increasingly influenced by the global capital flows, and that has affected the domestic monetary policy by the Bank of Japan recently. The new QQE policy pushed up stock prices with depreciation of exchange rate of Yen by May 2013. However, such a measure has not directly increased in bank lending and the domestic industrial production. In this regard, the monetary easing policy of FRB’s QE2 also has not been proved as effective in reviving the US economy.1

The global liquidity has been increased by the quantitative monetary easing policy introduced in major advanced countries, including the US monetary easing (QE2 and QE3), and such policies have increasingly influenced on the monetary policy in many countries. Japanese monetary market is also considered to be

1. Martin Feldstein argues that QE2 led to a rise in the stock market, which in turn contributed to increasing consumption and the strong performance of the US economy in late 2010 (Statement on 24 February 2011). However, QE2 has put significant effect on the pressure for currency appreciation and inflation, and the higher commodity prices in the global market, while the effects on the domestic economy is not significant. The effect of QE3 is also questioned by Mr. Fischer, Governor of Dallas Reserve Boad (See Bloomberg dated 10th April, 2013).
increasingly affected by the capital flows.

This paper has examined the effects of BOJ’s monetary policy on the market as well as the real economy during the period from April 2001 to August 2013, based on the analysis of VAR model, including variables such as monetary base, BOJ Current Account, as well as call money (overnight non collateral interbank rate). The other variables include money stocks (M2), bond yield, real effective exchange rate, bank lending, and industrial production.

The major findings of the analysis obtained in this paper are summarized as follows:

First, the BOJ’s monetary policy has become increasingly ineffective, in the sense that any monetary policy instrument (BOJ Current Account, Base Money, and Call Rate) has put insignificant effect on the monetary and financial market as well as the real economy over the whole period 2.

Second, the domestic monetary easing policy has not been effective in expanding the productive activities and there has not been causal relationship between monetary policy variables and industrial production.

Third, monetary easing policy has become ineffective in providing positive impact on the stock market since 2006, so that there is no significant effect on industrial production even indirectly via stock markets.

Fourth, those monetary policy variables have strengthened causal relationship with short-term capital flows, and that also affected the domestic monetary and financial market recently, especially after the Global Financial Crisis.

1. Research on Monetary Policy in Japan

A number of 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 mostly have focused on the period of QE (2001-2006) very few research on the impact of monetary policy on the economy and the domestic market after 2006 has been undertaken until today. Moreover, the studies in the past mainly focused on the domestic market variables, and there are very few studies which deal with evaluation on the monetary policy and its effects on the financial and real economy, taking into consideration the effects of capital flows in Japan.

Several studies suggest that the QE (2001-2006) in Japan put the bond yield lower and had certain impact on the maturity of the bonds. For example, Okina

2. Noguchi(2013b) maintais that monetary easing policies in Japan as well as that in the USA have not resulted in positive effect on the real economy.
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 there was some lower risk premium during the QE period (2001-2006). Kimura and Small (2006) indicated that some effect on portfolio rebalance, which shows that risk premium is higher for stock prices, while that of corporate bonds with higher credit ratings is lower after the introduction of the QE.

Shirakawa (2008,2009), on the other hand, pointed out that the effect of QE on the real economy was insignificant, while he admitted some certain effect on the overall stability of monetary system was observed in Japan. Shiratsuka et al. (2010) also pointed out that QE might put expectation of easing policy to be positive among the private sector, but the effect on the real economy is limited.

Komiya (2002) criticized ineffectiveness of the monetary easing policy in the sense that it could not increase in the money stocks. Noguchi (2013a) also maintains that monetary easing policy has not been effective in putting positive impact upon the real economy, and that it would be difficult to put the economy out from deflation, though he admitted that some effect in terms of the policy duration effect of the government bonds and yield curve.

Monetary policy should be used to have impact on the real economy (GDP), and in this respect, Voutsinas and Werner (2011) insists that bank credit growth as one of the more orthodox intermediary targets should be emphasized, and maintains that the Quantitative Easing policy in Japan during 2001-2006 was not very effective to achieve a stable long-term relationship with nominal GDP growth.

Major analyses based on VAR models on the monetary policy in Japan have been initiated in the 2000s, including the work by Teruyama (2001), which shows monetary policy had become ineffective, but the study was confined to the analysis in the 1990s. The major studies on monetary policy cover almost all the period of Quantitative Easing Policy (QE) (2001-2006). Harada and Masujima (2008) pointed out the effectiveness the Quantitative Monetary Easing on the real economy through stock market, based on the VAR model. Honda, Kuroki and Tachibana (2010) also show the effectiveness of monetary easing policy (2001-2006) by adopting variables of CPI, industrial production, call rate, BOJ Current Account, Nikkei stock prices, and industrial production, based the VAR models. The study by Honda and Tachibana (2011) extended the covered period from 1996 to March 2010, including dummy variable for the period of Quantitative Monetary Easing (2001-2006), and claims that monetary policy was effective in increasing
industrial production through the route of stock market. Honda (2013) further indicates that significance of ‘Quantitative and Qualitative Monetary Easing’ since 2013 in terms of expanding the monetary base.

These studies based on the VAR models are basically analyses of the Quantitative Easing Policy period (2001-2006), but not covered more recent period until today. Therefore, the results of previous studies may not be valid for the discussion on the period after 2006. Most studies in the past have not examined the effects of monetary easing policy after the ‘Lehman Shock’ (2008), including the BOJ’s Comprehensive Monetary Easing (CME) since 2010, and the current QQE Policy Phase since Spring 2013.

It should not be underestimated that the impact of capital flows on the domestic monetary and financial markets and monetary policy in Japan. Recent cross-border capital flows, especially short-term capital, have put significant effect on the global market. Despite the fact that international capital flows have put significant impact upon the domestic market and the real economy, the major past studies have not taken up the aspect of international context of the effects of capital flows on the domestic monetary and financial markets, as well as domestic monetary policy in Japan.

This paper analyses the effects of monetary easing policy in Japan, not only during 2001-2006 but also the ‘post’ QE period, from 2006 until 2013(August), based on the VAR models. The results of the study show that monetary policy variables (monetary base and BOJ Current Account, call rate) have been ineffective in controlling the monetary and financial markets, as well as the real economy. It also shows that the effect of monetary policy has now become ineffective in providing positive impact upon the industrial production, not only through bank lending but also though the channel of stock market recently. This could be due to capital flows under the FRB’s monetary easing policy, especially QE2(October 2010 to June 2011), as well as the current QE3.

2. Monetary Policy and Financial Market in Japan

Monetary base in Japan has increased significantly, as compared with the early 2000s, and it amounted to 98.8 trillion Yen as of October 2013 (Fig.1). On the other hand, call rate has remained in low level, except the period between 2006 and 2008 (Fig.2).

3. In this regard, Miyao(2006) shows that monetary policy had become ineffective in the 1990s through the analysis based on VAR model.
The size of the monetary base and BOJ Current Account in Japan are almost 36% of GDP (estimated as of September 2013) and 18.7%, higher than that of the USA with 20.8% and 13.6%, respectively (Fig.3).
Despite such a monetary easing policy, industrial production has not increased until today (Fig.4). The money stock (M2) has no close correlation with the industrial production, and it suggests that bank has not provided lending the productive sector (Fig.5).

**Fig.4 Monetary Base & Industrial Production (Japan)**

![Monetary Base & Industrial Production (Japan)](image1)

**Fig.5 M2 & Industrial Production (Japan)**

![M2 & Industrial Production (Japan)](image2)

Capital flows have influenced on domestic money stocks (M2), which is shown by the fact that the changes in M2 have negative correlation with capital flows (Fig.6). This could indicate that money stock held in the domestic financial sector has been mobilized for overseas lending and financial investment, not in the domestic market. This trend has become significant in recent years after the Global Financial Crisis. Thus, money stock is closely linked to the overseas market under the current regime of capital market liberalization. It is necessary, therefore, that monetary policy should be analysed under the context of capital flows that put significant effects on the domestic market.
3. Vector Auto regression (VAR) Model and Analysis on Monetary Policy

This section is devoted to explanation on the VAR (Vector auto regression) model to be used for analysis 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 (Section 4). The effects of capital flows on the monetary policy variables are also examined by the VAR in Section 5.

The variables (monthly) include Bank of Japan Current Account (BOJ AC), Monetary Base (MB), Call Rate, Real Effective Exchange Rate (REER), CPI, Money Stock (M2), Government bond yield (Yield), Nikkei stock prices (Nikkei), Industrial production (seasonally adjusted, [Prod]), Bank Lending. Capital Flows variables include: Foreign Direct Investment (FDI); Portfolio Investment (Portfolio); Other Investment (Other), Derivatives (Derivative). Logarithm is used for BOJAC, MB, REER, M2, and Nikkei.

The whole period (2001-2013) is divided into four periods:
(i) Quantitative Monetary Easing Period (April 2001- March 2006)
(ii) Period until ‘Lehman Shock’ (April 2006 – August 2008)
(iii) Post-Global Financial Crisis Period (September 2008 – February 2011)
(iv) Comprehensive Monetary Easing (CME) and Quantitative and Qualitative Monetary Easing (QQE) by Japan (March 2011 – August 2013)

The sources of variables are used as follows:

<table>
<thead>
<tr>
<th>Variables</th>
<th>Abbreviation</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank of Japan Current Account</td>
<td>BOJ AC</td>
<td>Bank of Japan (major data series)</td>
</tr>
<tr>
<td>BOJ Monetary Base</td>
<td>Monetary Base (MB)</td>
<td>Bank of Japan (major data series)</td>
</tr>
<tr>
<td>Overnight interbank rate</td>
<td>Call Rate</td>
<td>Bank of Japan (major data series)</td>
</tr>
<tr>
<td>Capital Flows (FDI, Portfolio)</td>
<td></td>
<td>Bank of Japan (major data series)</td>
</tr>
<tr>
<td>Investment, Other Investment, Other Derivative</td>
<td>FDI, Portfolio, Other, Derivative</td>
<td></td>
</tr>
<tr>
<td>Real Effective Exchange Rate</td>
<td>REER</td>
<td>BIS effective exchange rate indices</td>
</tr>
<tr>
<td>Consumer price index</td>
<td>CPI</td>
<td>Statistical Office (Japan), International Financial Statistics (IFS) database (IMF)</td>
</tr>
<tr>
<td>Money Stocks</td>
<td>M2</td>
<td>Bank of Japan (major data series)</td>
</tr>
<tr>
<td>Government Bond Yields</td>
<td>Yield</td>
<td>IFS database (IMF)</td>
</tr>
<tr>
<td>Nikkei Stock Prices</td>
<td>Stock(Nikkei)</td>
<td>Nikkei Profile database</td>
</tr>
<tr>
<td>Bank Lending</td>
<td>Lending(y/y)</td>
<td>Bank of Japan (major data series)</td>
</tr>
<tr>
<td>Industrial Production</td>
<td>Production(Prod) (2005 = 100)</td>
<td>IFS database (IMF)</td>
</tr>
</tbody>
</table>

3.1 Vector Auto Regression (VAR) Model

The VAR model used in this paper is based on the equation given below. The first shock is provided by the monetary policy instruments (variables), including BOJ Current Account (BOJAC), Monetary Base, and Call Rate. The other variables include market variables such as money stocks (M2), average government bond yield (Yield), and Stock Prices (Nikkei), as well as other variables of Banks’ lending (Lend), Real Effective Exchange Rate (REER), Consumer Price Index (CPI), Industrial Production (Prod). The order of each variables of the VAR model is determined by the shock of the monetary policy and the impact on the market and the real economy.

\[ Y_t = c + A_1 Y_{t-1} + A_2 Y_{t-2} + \ldots + A_p Y_{t-p} + B \varepsilon_t \]

Where \( c \) is constant vector matrix; \( A_i : (n \times n) \) matrix; \( \varepsilon_t : (n \times 1) \) Shock Vector; \( B : \varepsilon_t (n \times 1) \) : matrix for changing the disturbance term vector (\( u_t \) (\( u_t = B \varepsilon_t \))

The variables are in principle are used for the analysis with first-order difference to have stationarity, except some variables which are used at level include the industrial production (\( y/y \)), FDI. The lag order by SIC (Schwarz criterion, or Bayesian information criterion, BIC), Variables : BOJAC [or MB or Call Rate], REER, CPI, Nikkei, Production.

VAR Models are for estimating the impact of monetary policy shocks on the domestic monetary/financial markets and industrial production (for Model 1) and that of monetary policy on the foreign exchange, as well as industrial production via stock markets (for Model 2). The effects of capital flows on monetary policy variables are analysed by Model 3. The models include the following variables, and
the Choleski ordering is determined as the shock of monetary policy variables and relevant variables as follows:

[Model 1]¹ : Effects of Monetary Policy on the monetary and financial market and production
(i) Monetary policy variables: BOJ Current Account Balance (BOJAC); Monetary Base (MB); Call Rate
(ii) Market variables: money stocks (M2); average government bond yield (Yield); Bank lending (Lend); Industrial Production (Prod)

[Model 2]¹ : Effects of Monetary Policy on the foreign exchange rate, price and capital market, as well as industrial production
(i) Monetary policy variables: BOJ Current Account Balance (BOJAC); Monetary Base (MB); Call Rate
(ii) Foreign exchange market and other market variables: Real Effective Exchange Rate (REER); Consumer Price Index (CPI); Stock Prices (Nikkei); Industrial Production (Prod)

[Model 3]² : Effects of (i) capital flows (net) on (ii) monetary policy variables
(i) Foreign Direct Investment (FDI); Portfolio Investment (Portfolio); Other Investment (Other), Derivatives (Derivative)
(ii) Monetary policy variables: BOJ Current Account Balance (BOJAC); Monetary Base (MB); Call Rate

¹Analysis presented in Section 4.
²Analysis presented in Section 5.

3.2 ADF Test and Stationarity of variables

Prior to the analysis based on VAR models, stationarity of the variables involved in the regression is tested by ADF (augmented Dickey-Fuller) method for the unit root tests (Table 1). FDI, derivatives, industrial production (y/y) has unit root without first lag. The ADF test results show that unit root is rejected for the first lag of other variables, which is expressed as I (1).
### Table 1: Augmented Dickey-Fuller (ADF) test (Japan)

<table>
<thead>
<tr>
<th>2001-2006</th>
<th>ADF t-adf p-value lag significance model</th>
<th>ADF t-adf p-value lag significance model</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOJAC (log)</td>
<td>level -3.40 0.0147 0 ** intercept, trend</td>
<td>1st diff -3.00 0.042 7 *** intercept, trend</td>
</tr>
<tr>
<td>Monetary Bas (log)</td>
<td>level -5.11 0.000 7 *** intercept, trend</td>
<td>1st diff -2.87 0.055 2 ** intercept, trend</td>
</tr>
<tr>
<td>Call Rate</td>
<td>level -2.89 0.052 7 intercept, trend</td>
<td>1st diff -7.82 0.000 0 *** intercept, trend</td>
</tr>
<tr>
<td>FDI</td>
<td>level -6.92 0.000 0 *** intercept, trend</td>
<td>1st diff -8.2 0.000 2 *** intercept, trend</td>
</tr>
<tr>
<td>Portfolio</td>
<td>level -1.97 0.299 5 intercept, trend</td>
<td>1st diff -9.51 0.000 4 *** intercept, trend</td>
</tr>
<tr>
<td>Other</td>
<td>level -1.54 0.506 5 intercept, trend</td>
<td>1st diff -8.49 0.000 4 *** intercept, trend</td>
</tr>
<tr>
<td>Derivative</td>
<td>level -5.16 0.000 0 *** intercept, trend</td>
<td>1st diff -10.5 0.000 0 *** intercept, trend</td>
</tr>
<tr>
<td>REER (log)</td>
<td>level -0.21 0.931 0 intercept, trend</td>
<td>1st diff -6.92 0.000 0 *** intercept, trend</td>
</tr>
<tr>
<td>CPI (y/y)</td>
<td>level -2.73 0.229 0 intercept, trend</td>
<td>1st diff -7.72 0.000 0 *** intercept, trend</td>
</tr>
<tr>
<td>M2 (log)</td>
<td>level -3.07 0.125 11 intercept, trend</td>
<td>1st diff -9.79 0.000 1 *** intercept, trend</td>
</tr>
<tr>
<td>Yield(Govt)</td>
<td>level -1.81 0.686 0 intercept, trend</td>
<td>1st diff -7.28 0.000 0 *** intercept, trend</td>
</tr>
<tr>
<td>Stock(Nikkei) Price</td>
<td>level -0.14 0.939 0 intercept, trend</td>
<td>1st diff -5.73 0.000 0 *** intercept, trend</td>
</tr>
<tr>
<td>Lending (y/y)</td>
<td>level -3.31 0.989 5 intercept, trend</td>
<td>1st diff -6.23 0.000 0 *** intercept, trend</td>
</tr>
<tr>
<td>Production (S.A.)</td>
<td>level 0.08 0.962 1 intercept, trend</td>
<td>1st diff -9.80 0.000 0 *** intercept, trend</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2006-2013</th>
<th>ADF t-adf p-value lag significance model</th>
<th>ADF t-adf p-value lag significance model</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOJAC (log)</td>
<td>level 0.67 0.991 0 intercept, trend</td>
<td>1st diff -10.07 0.000 0 *** intercept, trend</td>
</tr>
<tr>
<td>Monetary Bas (log)</td>
<td>level 4.92 0.0007 0 *** intercept, trend</td>
<td>1st diff -10.7 0.000 0 *** intercept, trend</td>
</tr>
<tr>
<td>Call Rate</td>
<td>level 3.14 1.000 3 intercept, trend</td>
<td>1st diff -4.46 0.001 2 *** intercept, trend</td>
</tr>
<tr>
<td>FDI</td>
<td>level -1.72 0.419 1 intercept, trend</td>
<td>1st diff -5.25 0.000 0 *** intercept, trend</td>
</tr>
<tr>
<td>Portfolio</td>
<td>level -9.20 0.000 0 *** intercept, trend</td>
<td>1st diff -10.6 0.000 1 *** intercept, trend</td>
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<tr>
<td>Other</td>
<td>level -4.09 0.002 2 *** intercept, trend</td>
<td>1st diff -8.55 0.000 4 *** intercept, trend</td>
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<tr>
<td>Derivative</td>
<td>level -2.98 0.041 1 *** intercept, trend</td>
<td>1st diff -8.58 0.000 4 *** intercept, trend</td>
</tr>
<tr>
<td>REER (log)</td>
<td>level -1.62 0.469 1 intercept, trend</td>
<td>1st diff -6.23 0.000 0 *** intercept, trend</td>
</tr>
<tr>
<td>CPI (y/y)</td>
<td>level -2.34 0.162 1 intercept, trend</td>
<td>1st diff -6.63 0.000 0 *** intercept, trend</td>
</tr>
<tr>
<td>M2 (log)</td>
<td>level 3.64 1.000 10 intercept, trend</td>
<td>1st diff -7.26 0.000 0 *** intercept, trend</td>
</tr>
<tr>
<td>Yield(Govt)</td>
<td>level -1.58 0.487 0 intercept, trend</td>
<td>1st diff -10.10 0.000 0 *** intercept, trend</td>
</tr>
<tr>
<td>Stock(Nikkei) Price</td>
<td>level -4.82 0.001 0 *** intercept, trend</td>
<td>1st diff -10.03 0.000 0 *** intercept, trend</td>
</tr>
<tr>
<td>Lending (y/y)</td>
<td>level -1.51 0.526 0 intercept, trend</td>
<td>1st diff -7.66 0.000 0 *** intercept, trend</td>
</tr>
<tr>
<td>Production (S.A.)</td>
<td>level -1.84 0.359 1 intercept, trend</td>
<td>1st diff -7.13 0.000 0 *** intercept, trend</td>
</tr>
</tbody>
</table>

Note: The period is from April 2006 to August 2013 (to July 2013 for Capital flows [FDI, Portfolio, Other, Derivative]).

Source: Author’s calculation based on Bank of Japan and IFS database (IMF)
The variables which are confirmed stationarity with the first lag are as follows:

Portfolio; Other Investment; BOJ Current Account; Monetary Base; Real effective exchange rate (REER); Money Stock (M2); Nikkei Average (Nikkei); CPI (y/y); Average Government Bond yield (Yield); Bank Lending (Lend).

It should be noted that some of the variables including Portfolio and Other investment show stationarity without first lag, depending on the period. The analyses based on the VAR models used the variables with first order difference, depending on the ADF test results.

3.3 Granger Causality Test

This section focuses on the causality between the variables of monetary policy and foreign exchange rates, monetary and financial markets, as well as the real economy (industrial production). Granger causality tests are essentially those measures to improve in forecasting association and correlation between the variables. By using an F-test to jointly test for the significance of the lags on the explanatory variables, this in effect tests for ‘Granger causality’ between these variables.

The analysis is based on the monthly data of each variable during the period April 2001 to August 2013, dividing 2001-2006 (Quantitative Easing), 2006-2008 (Post QE), 2008-2011 (Post Global Financial Crisis), and 2011-2013 (Comprehensive Monetary Easing and New Quantitative & Qualitative Easing Phase). The results of Granger Causality test of each variable, with the average of the first, 2nd, 3rd and 4th (quarter) lags are summarized in Table 2.

Among the monetary policy variables, BOJ Current Account (BOJAC) Granger causes Nikkei stock prices, and Nikkei has Granger Causes industrial production (Prod) during the period 2001-2006, which indicates that there was causality route from BOJAC to Industrial production through the stock market. However, causality from BOJAC to industrial production and Nikkei to industrial production became insignificant after 2006, during the whole periods from 2006 to 2013.

Thus, the causality between the domestic monetary policy and the capital and financial market has become insignificant recently. In this regard, the period 2008-2011 was some special period when the Global Financial Crisis hit the global market, so that the significant causality from BOJAC and monetary base (MB) to Nikkei was not positive but negative one, as it is shown in the next section of impulse response functions.

BOJ Current Account and bank lending have not direct causal relationship with industrial production during the whole period of 2001-2013. This result suggests that industrial production by Japanese firms, especially large firms, have not been dependent on monetary base and bank loans. In this regard, it could be related to the significant monetary easing that was introduced in global scale.

Table 2: Japan: Granger Causality (2001-2013)

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>FDI</td>
<td>0.797</td>
<td>0.256</td>
<td>1.247</td>
<td>1.409</td>
<td>1.583</td>
<td>2.637</td>
<td>3.549</td>
</tr>
<tr>
<td>Portfolio</td>
<td>0.512</td>
<td>1.224</td>
<td>2.532</td>
<td>2.864</td>
<td>3.212</td>
<td>4.212</td>
<td>4.949</td>
</tr>
<tr>
<td>Other</td>
<td>0.962</td>
<td>0.364</td>
<td>1.248</td>
<td>1.970</td>
<td>2.138</td>
<td>2.565</td>
<td>3.599</td>
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<tr>
<td>BOJAC</td>
<td>0.725</td>
<td>0.411</td>
<td>1.245</td>
<td>1.996</td>
<td>2.187</td>
<td>2.614</td>
<td>3.596</td>
</tr>
<tr>
<td>MB</td>
<td>0.658</td>
<td>0.428</td>
<td>1.245</td>
<td>1.996</td>
<td>2.187</td>
<td>2.614</td>
<td>3.596</td>
</tr>
<tr>
<td>Call Rate</td>
<td>0.524</td>
<td>0.428</td>
<td>1.245</td>
<td>1.996</td>
<td>2.187</td>
<td>2.614</td>
<td>3.596</td>
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<tr>
<td>REER</td>
<td>0.664</td>
<td>0.782</td>
<td>1.245</td>
<td>1.996</td>
<td>2.187</td>
<td>2.614</td>
<td>3.596</td>
</tr>
<tr>
<td>CPI</td>
<td>0.725</td>
<td>0.411</td>
<td>1.245</td>
<td>1.996</td>
<td>2.187</td>
<td>2.614</td>
<td>3.596</td>
</tr>
<tr>
<td>M2</td>
<td>0.658</td>
<td>0.428</td>
<td>1.245</td>
<td>1.996</td>
<td>2.187</td>
<td>2.614</td>
<td>3.596</td>
</tr>
<tr>
<td>Yield</td>
<td>0.524</td>
<td>0.428</td>
<td>1.245</td>
<td>1.996</td>
<td>2.187</td>
<td>2.614</td>
<td>3.596</td>
</tr>
<tr>
<td>Nikkei</td>
<td>0.664</td>
<td>0.782</td>
<td>1.245</td>
<td>1.996</td>
<td>2.187</td>
<td>2.614</td>
<td>3.596</td>
</tr>
<tr>
<td>Lend</td>
<td>0.725</td>
<td>0.411</td>
<td>1.245</td>
<td>1.996</td>
<td>2.187</td>
<td>2.614</td>
<td>3.596</td>
</tr>
<tr>
<td>Prod</td>
<td>0.658</td>
<td>0.428</td>
<td>1.245</td>
<td>1.996</td>
<td>2.187</td>
<td>2.614</td>
<td>3.596</td>
</tr>
</tbody>
</table>

Note: 1 This period is from April 2001 to March 2006; April 2006 to August 2008; September 2008 to February 2011, and March 2011 to August 2013. 2 Calculation based on the average of 1st to 4th lags of the variables. ***, **, * denote significance at 1%, 5%, and 10%.

4. The corporate profit of Japanese firms increased by more than 60% (y/y) and reached to US$62.9 billion in November 2011. This would account for the decrease in the Japanese firms’ dependence on the bank loans significantly (Reuters 2012).
Call Rate, on the other hand, Granger Causes industrial production during the periods 2001-2006 and 2008-2011. The real effective exchange rate (REER) Granger Causes Call Rate and industrial production, while the direction of Granger causality from Call Rate to REER is not significant during the same period. These results suggest that the depreciation of yen during the period 2008-2011 is related to the interest rates, including Call Rate.

Bank lending Granger causes industrial production in a limited scale during 2006-2008; however, it is negatively correlated during the period. This indicates that the money has not been fully utilized for the domestic real economy.

Real effective exchange rate (REER) has granger causality with industrial production during 2008-2011. On the other hand, REER has no causality with BOJ Current Account (BOJAC) during the same period, and this could be caused by global monetary flows after the Lehman shock. It could be also accounted for by the fact that BOJAC and Monetary Base have no significant causality with domestic monetary market variables.

3.4 Variance Decomposition: The Influence of Monetary Policy Variables on the Domestic Real Economy

The analysis on variance decomposition shows that from which variables share variance is formed. The impact of the monetary policy on the real economy is analysed by variance decomposition of each monetary policy variables (BOJ Current Account, Monetary Base, Call Rate), as shown in Table 3. The variance decomposition indicates the share percentage of variables of real effective exchange rate (REER), and Nikkei average stock price (Nikkei), bank lending (Lend), industrial production (Prod), and monetary policy variables are included in the decomposition in the analysis. Thus, this analysis will identify the effects of monetary policy on exchange rate, stock prices, lending, as well as production through the degrees of variance decomposition.

The shares of BOJ Current Account in variance decomposition of industrial production were 16.1% (10th lag period, heareafter) and 17.0% during 2006-2008 and 2008-2011, respectively, but it declined to 3.6% during 2011-2013. The share of monetary base in industrial production also declined from 10.4% during 2008-2011 to 2.2% during 2011-2013.

On the other hand, the shares of BOJ Current Account and Monetary Base in variance decompositions of lending remained relatively low over the whole period 2001-2013.

The share of real effective exchange rate (REER) has significant importance
in variance decomposition in all the variables of bank lending and stock prices (Nikkei). Particularly, the share of REER for Nikkei among the decomposition including BOJAC was only 4.8% during 2001-2006, but it increased to 40.1% during 2011-2013. Similarly, the share of REER for Monetary Base and Call Rate increased from 4.97% to 45.3, and from 8.1% to 41.0%, respectively, in the same period.

Table 3: Variance Decomposition of BOJ Account, Monetary Base and Call Rate

| Source | Author's calculation based on the data of Bank of Japan |

The results indicate that monetary policy variables have become increasingly ineffective in industrial production, bank lending and stock prices. Also note that REER has increasingly influenced on the stock prices and bank lending. This could be due to the fact that the domestic real economy and financial markets have become increasingly influenced by capital flows and foreign exchange transactions after the Lehman Shock until recently. Thus, the impact of capital flows on the domestic markets and economy will be analysed in the next section.
4. Effects of Monetary Policy on the Domestic Market and Economy

4.1 Impulse Response Functions: Monetary Policy Shocks on the Financial Markets and the Real Economy

In order to verify the effects of monetary policy (BOJ Current Account, Monetary Base, Call Rate) on the domestic economy, impulse response functions of the two VAR models are examined. The first model includes variables of bank lending, money stocks (M2), as well as government bond yield, to identify the effects of monetary policy instruments via financial markets and bank lending on industrial production. The second model includes variables of CPI, real effective exchange rate (REER) and stock prices to test some effects on the production via exchange rate and stock markets. The two models are the same as the previous section (3.1).

[Model 1]: Effects of Monetary Policy on the monetary and financial market, as well as the industrial production [Fig7-1, 2, 3*]

Y = (BOJAC [or MB or Call Rate], M2, Yield, Lend, Prod), c

[Model 2]: Effects of Monetary Policy on the foreign exchange rate, price and capital market, as well as the industrial production [Fig8-1, 2, 3*]

Y = (BOJAC [or MB or Call Rate]), REER, CPI, Nikkei, Production (Prod), c

*Appendix

In the above VAR models, the first variable is one of the variables related to monetary policy; Bank of Japan Current Account (BOJAC), Monetary Base, and Call Rate (overnight), followed by variables of monetary and financial markets as well as real economy. The results of impulse response functions are summarized as follows:

(i) Effects on the Real Economy

Over the period 2006-2013, the response functions of Bank of Japan Current Account (hereafter BOJAC) and Monetary Base (MB) show no significant impact on the industrial production (Fig.7-1, 7-2) 5. Although the shocks of the BOJAC and MB might have given some positive impact upon stock prices (Nikkei) during 2001-2006, which could pushed up the production, there is no evidence of such a route of positive response from the monetary policy variables since 2006 (Fig.8-1,

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5. Iwata (2011) insists that BOJ’s monetary easing policy may not directly increase in bank lending, but the policy may change the expection of inflation among the public, which may activate stock tradings and increase monetary velocity, and that would result in increase in bank lending for investment. The impulse response functions based on the VAR model in this paper, however, show no such a significant response.
The results of impulse response functions are in line with the results of Granger Causality test (Table 2).

The impulse response functions of Bank lending (Lend) to BOJAC and MB are not statistically significant, and even negative over the period 2001-2013, especially in recent period of 2011-2013, when MB increased significantly (Fig.7-1, 7-2). This indicates that the original objective of expanding production through bank lending by means of increasing monetary base has not been realized. Monetary base may be used for some other purposes such as financial investment in global markets recently.

The response of bank lending to call rate is insignificant during the whole period, while it shows negative response of industrial production during 2008-2011 (Fig.7-3). The result is conformed to that of Granger causality test (Table 2)\(^6\). It may explain the fact that the interest rate could influence on the real economy during the period of Global Financial Crisis (2008-2011), however, the response function has become insignificant during 2011-2013. It should be noted that call rate has been set in principle in the narrow range of zero to 1 percent, and it might have nullified the interest rate policy in the past decade\(^7\).

(ii) Effects on Monetary / Financial Market

Monetary Base (incl. BOJAC) has neither significant effect on the money stock (M2) nor the government bond yield (Fig.7-1, 7-2). This indicates that quantitative monetary easing policy has very limited effect on the bond market (Fig.7-1, 7-2). However, the impulse response functions during 2011-2013 indicate significant shock to the M2 and bond yield, which shows positive response, rather than negative one. This indicates that money stock in the domestic market has not been influenced by monetary base, and it implies that monetary market has become influenced by capital flows, which are significantly correlated with the US monetary policy, especially after the QE 2 period. The response of yield to Call Rate has no significance (Fig.7-3).

The response of yield to BOJAC and Monetary Base had not been significant until 2011, while the response became significantly positive during 2011-2013, which is not in line with the orthodox monetary theory (Fig.7-1,7-2).

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6. Miyao (2006) demonstrated that increase in monetary base would raise the interest rate, which may have negative impact on industrial production. The study, however, the covered period was from 1975 to 1998, so that the result may not be hold in the current market in Japan.

7. Harada and Masujima (2008) indicate that Fisher effect, which accounts for increase in the long-term interest caused by the increase in monetary base. However, their argument is not focused on the BOJ call rate involved.
The impulse response of stock prices (Nikkei) to Monetary Base (incl. BOJAC) shows negative response, rather than positive one during 2008-2011 and 2011-2013. This shows that monetary easing has not been effective for stock prices since the Global Financial Crisis, which is different from the period 2001-2006, when some positive response of Nikkei price was seen (Fig.8-1, 8-2).

The above results show that BOJ’s monetary policy has very limited impact upon the domestic market. It should be also noted that the stock prices have no significant effect on the industrial production recently.

(iii) Effects on the Foreign Exchange Rate

Monetary base (incl. BOJAC) has not influenced on the real effective exchange rate (REER) over the whole period (2001-2011), while it has slight positive impact on the REER during the period 2011-2013 (Fig.8-1, 8-2). However, the result of the Granger Causality test on BOJAC (and Monetary Base) and REER shows no significant causality from BOJAC (and Monetary Base) to REER during 2011-2013.

(iv) Effects on the Price Level (CPI)

The impulse functions of CPI to the shock of BOJ Current Account and Monetary Base shows no significant response of CPI (Fig.8-1). While the response function of CPI to Monetary Base shows positive response only during the period 2011-2013, it is not statistically significant (Fig.8-2). Call rate also has no significant effect on CPI.

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8. Miyao (2009) indicates that the money stock has put no significant influence on the price levels since 2000.
Fig. 7-1: BOJ Account, M2, Yield, Lend, Production

Japan: Impulse Response to BOJ Account [1]

Fig. 7-2: Monetary Base , M2, Yield, Lend, Production

Japan: Impulse Response to Monetary Base [1]
Fig. 7-3: Call Rate, M2, Yield, Lend, Production

Japan: Impulse Response to Call Rate [1]

Fig. 8-1: BOJAC, REER, CPI, Nikkei, Production

Japan: Impulse Response to BOJ Account [2]

Fig. 8-2: Monetary Base, REER, CPI, Nikkei, Production
Japan: Impulse Response to Monetary Base [2]

Fig. 8-3: Call Rate, REER, CPI, Nikkei, Production
Japan: Impulse Response to Call Rate [2]
The above results of the impulse response functions on monetary policy variables (BOJAC, Base Money, and Call Rate) are summarized as follows:

First, the response of stock prices to BOJAC and Monetary Base (MB) shows no significant influence on the market and economy after the period of Monetary Easing (2001-2006), and there is even some negative response of the Nikkei stock prices to BOJAC and MB since 2008 until today. Monetary Base (and BOJAC) has not influenced on the money stock (M2) since 2006.

Second, Monetary Base and BOJAC have not put significant impact upon bank lending activities. This trend has become significant since 2006, when cross-border capital flows increased significantly. In fact, the response functions show that bank lending to the BOJAC and Monetary Base has put negative impact on bank lending since 2011.

Third, Monetary Base and BOJAC have no significant impact upon the real effective exchange rate (REER) over the period from 2001-2011. It should be noted that BOJAC and Monetary Base put pressure on appreciation of the real effective exchange rate (REER) since 2011, rather than depreciation, which is contrary to the orthodox theory, where monetary expansion has put the exchange rate to weaken. Therefore, the foreign exchange rate under extremely low interest rate bound, is largely determined by some other factors, such as economic outlook and interest rate differences between Japan and foreign markets, especially the US market.

Fourth, the impulse response of REER to Call Rate is not statistically significant over the whole period (2001-2013). This result indicates that normal monetary policy in interest rate cannot be effective in the monetary market in Japan. It is also to be noted that REER has Granger cause industrial production, but it has no significant causality with BOJAC and call rate. It shows that normal monetary policy through the changes in interest rate cannot be effective.

Thus, the results of analyses based on the VAR model clearly indicate that BOJ’s monetary policy has become increasingly ineffective in stimulating the real economy through bank lending and other monetary policy instruments. Also noted that there is no effective impact of stock prices on the production through easing monetary policy (i.e. increase in the base money or BOJ Current Account).

5. The Effects of Capital Flows on Monetary Policy Instruments

Discussion in the previous section suggests that the BOJ’s domestic monetary policy has become very limited in controlling the domestic monetary market, as

well as the real economy recently. This section deals with the effects of capital flows on the monetary policy variables (BOJAC, MB, Call Rate), based on the VAR model, including the Granger Causality test and impulse response functions.

5.1 VAR (Vector Auto Regression) Model: Estimation of the Capital Flows on the Domestic Monetary Policy Instruments

The model deals with capital flow variables and monetary policy variables, and the Choleski ordering is determined as the shock of monetary policy variables and capital flows (net) as follows:

[Model 3] : Effects of (i) capital flows (net) on (ii) monetary policy variables

(i) Foreign Direct Investment (FDI); Portfolio Investment (Portfolio); Other Investment (Other), Derivatives (Derivative)

(ii) Monetary policy variables: BOJ Current Account Balance (BOJAC); Monetary Base (MB); Call Rate

5.2 Capital Inflows and Monetary Policy Variables: Granger Causality Test

As shown in Table 4, causality between the capital flows and domestic monetary policy variables has become significantly increased recently.

Table 4: Japan: Granger Causality (2001-2013)

<table>
<thead>
<tr>
<th>Year</th>
<th>FDI</th>
<th>Portfolio</th>
<th>Other</th>
<th>Derivative</th>
<th>BOJAC</th>
<th>MB</th>
<th>Call Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001-2006</td>
<td>1.566</td>
<td>1.250</td>
<td>3.531 **</td>
<td>0.632</td>
<td>0.509</td>
<td>1.328</td>
<td></td>
</tr>
<tr>
<td>2006-2008</td>
<td>0.924</td>
<td>0.782</td>
<td>2.437</td>
<td>2.504</td>
<td>2.501</td>
<td>0.307</td>
<td></td>
</tr>
<tr>
<td>2008-2011</td>
<td>0.797</td>
<td>1.548</td>
<td>0.501</td>
<td>1.778</td>
<td>1.257</td>
<td>11.61</td>
<td></td>
</tr>
<tr>
<td>2011-2013</td>
<td>0.382</td>
<td>0.892</td>
<td>1.034</td>
<td>1.010</td>
<td>0.706</td>
<td>2.894</td>
<td></td>
</tr>
</tbody>
</table>

Note: 1 The period is from April 2001 to March 2006; April 2006 to August 2008; September 2008 to February 2011, and March 2011 to August 2013.
2 Calculation based on the average of 1st to 4th lags of the variables
3 Figures are F-value. ***, **, * denote significance at 1%, 5%, and 10%.
Source: Author’s calculation based on IFS database (IMF), Bank of Japan
There are strong causal relationships between BOJ Current Account (BOJAC) and Monetary Base and capital flow variables, especially short-term capital flows (portfolio, other investment, and derivatives) between 2011 and 2013. It should be noted that the causality between call rate and short-term capital flows also became significant during 2011 and 2013, which was not observed until 2008.

This could be explained by the fact that short-term capital flows have become increasingly influenced on the domestic monetary policy variables, especially after the Global Financial Crisis. It could be result of increasing global capital flows in the post-Lehman Shock under the excessive liquidity provided by the major industrial countries, including the USA, EU and Japan. Thus, BOJ's monetary policy has become increasingly difficult to control over the money stock and the financial market through the major monetary policy instruments.

5.3 VAR Model and Variance Decomposition of the Capital Flow Variables

The impact of capital flows (FDI, Portfolio, Other Investment, and Derivatives) on the monetary policy variables (BOJAC, MB, Call Rate) are analysed by the variance decomposition (Table 5).

Table 5: Variance Decomposition of BOJ Account and Monetary Base (2)

<table>
<thead>
<tr>
<th>Period</th>
<th>BOJ Account</th>
<th>FDI</th>
<th>BOJAC</th>
<th>MB</th>
<th>CALL</th>
<th>FDI</th>
<th>BOJAC</th>
<th>MB</th>
<th>CALL</th>
<th>FDI</th>
<th>BOJAC</th>
<th>MB</th>
<th>CALL</th>
<th>FDI</th>
<th>BOJAC</th>
<th>MB</th>
<th>CALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001-2005</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
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<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
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<tr>
<td>2006-2008</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
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<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
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<tr>
<td>2009-2011</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
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<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>2012-2013</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
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<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Note: The detailed decomposition tables are not shown in the figure.

Source: Author's calculation based on the data of Bank of Japan

Hideaki OHTA
While capital inflows had not put any significant impact on the BOJ Current Account (BOJAC) as well as monetary base (MB) during the period 2001-2006, the result of variance decomposition shows increasing influence of capital flows on the monetary policy variables in recent years, and the results indicate the following facts:

First, the share of FDI of variance decomposition among all the monetary policy variables (BOJ Current Account, Monetary Base, and Call Rate) increased substantially after 2006 until recently. This fact indicates that monetary policy variables have become increasingly influenced by even relatively long-term investment as FDI recently. It could be due to the fact that capital flows under the category of FDI, including M&A and other forms of transactions have become financial transactions of short-term investment.

Second, the shares of variance decomposition of portfolio investment and other investment among the Monetary Base increased significantly during 2006-2013, as compared with the period 2001-2006. Thus, the capital flows, especially short-term investment flows, have increased the share of decomposition among the Monetary Base recently.

The share of derivatives of variance decomposition of all the monetary policy variables (BOJ Current Account, Monetary Base, and Call Rate) increased substantially especially during the Global Financial Crisis period (2008-2011). Particularly, the increase in the share of derivatives among the call rate indicates the fact that unstable short-term transactions through derivatives increased substantially, especially during the 'Post Lehman Shock' period of 2008-2011.

The results of variance decomposition on the monetary policy variables indicate that capital flows have played significant role in money/financial markets, and influenced on the BOJ current Account, Monetary Base, as well as Call Rate since 2006. Particularly, the impact of capital flows on the monetary policy variables during the post-Global Financial Crisis has increased significantly. The next section deals with Impulse Response Functions, which indicate that the impact of capital flows on the domestic monetary policy variables increased substantially.

5.4 Impulse Response Function Capital Flows and Monetary Policy Indicators

The influence of capital flows on the monetary policy variables (BOJ Current Account, Monetary Base, Call Rate) are analysed by the impulse response functions (Fig.9-1, 9-2, 9-3, 9-4).
Fig. 9-1: FDI, REER, BOJAC, Monetary Base, Call Rate
Japan: Impulse Response to FDI

Fig. 9-2: Portfolio, BOJAC, Monetary Base, Call Rate
Japan: Impulse Response to Portfolio

Fig.9-3: Other, BOJAC, Monetary Base, Call Rate
Japan: Impulse Response to Other Investment

Fig.9-4: Derivative, BOJAC, Monetary Base, Call Rate
Japan: Impulse Response to Derivatives
First, FDI has relatively small impact upon the response of monetary policy variables (BOJAC, MB, and Call rate) except during the period 2008-2011 (Fig.9-1). During the post-Lehman Shock period, FDI outflows increased especially in Asia under the increasing pressure of appreciation of Yen. It could explain the rise of call rate, as FDI outflows increased the result is broadly in line with the Granger Causality test.

Second, portfolio investment has significant impact on the monetary base (incl. BOJAC) and call rate since 2006 (2006-2013), and the result is in line with the Granger Causality test. The impulse response function of BOJAC and Monetary Base to portfolio investment shows negative response both periods 2008-2011 and 2011-2013 (Fig. 9-2). This suggests that portfolio investment has alternative sources to monetary base.

Third, the impulse response of BOJAC and Monetary Base to Other investment was limited during 2001-2006 (Fig.9-3). However, other investment has increasingly put impact on the monetary base and BOJAC during 2008-2011 and 2011-2013. The impulse response of call rate also shows significant response to short-term capital flows.

Finally, although general impact of derivatives on the monetary policy variables were limited and insignificant during the period 2001-2006 and 2006-2008, the effects of inflows of derivatives have increased since the Global Financial Crisis, especially during 2008-2011.

The above results indicate that short-term capital flows (portfolio, other investment, derivatives) have increased their influence on the levels of BOJCurrent Account and Monetary Base, as well as Call rate. Therefore, BOJ’s monetary policy has become increasingly influenced by capital flows which have put impact upon the monetary policy variables recently.

6. The Effectiveness of Monetary Policy in Japan

6.1 Ineffectiveness of Domestic Monetary Policy and Influence of Capital Flows

The results of the analyses in the previous sections indicate that significant monetary easing policy has become ineffective in the domestic monetary market. Such a change is probably caused by significant increase in the global capital flows which have affected the domestic monetary policy in Japan recently. Major points of the analysis are summarized as follows:
(i) The monetary policy instruments (BOJ Current Account, Monetary Base, Call Rate) have become ineffective in the financial market as well as the real economy; capital flows, especially short-term investments have become influenced on the monetary policy instruments and the market in Japan.

(ii) The change in call rate has become uncertain in the domestic market.

(iii) BOJ’s monetary easing policy has become ineffective in providing positive effect on the real economy, and it has no more causality with the productive activities even via stock prices since 2006, especially after the post Global Financial Crisis.

(iv) Monetary policy has no significant effect on the inflation rate (CPI).

(v) There is no significant effect of monetary policy on the real effective exchange rate.

(vi) Monetary Policy has no direct causality with the industrial production and stock prices.

Capital flows in the global market have increased significantly since late 2000s, which have put substantial impact on the BOJ’s monetary policy instruments. Therefore, the overall effect of monetary policy has become insignificant in influencing the economic activities and monetary market recently.

With regard to foreign exchange rate and monetary easing policy, the effect of monetary policy on the real effective exchange rate (REER) is negligible and insignificant over the whole period (2001-2013). The causal relationship between Monetary Base (including BOJ Current Account) and foreign exchange market is not statistically significant. Yen exchange rate is more affected by the economic conditions of the US and other major countries, which is influenced by other factors, such as the difference in interest rates between the countries. In this respect, Yen’s depreciation since the early 2013 was mainly caused by several external factors, including the improvement in the US economy and monetary expansion expectation under the ‘Abenomics’, widening the interest rate differentials between Japan and the US market due to the more robust recovery of the US economy, as compared with that of Japan, etc. The monetary easing

9. Shirakawa(2008) pointed out that foreign banks’ utilization of excess reserve of the BOJ Current Account in mobilizing for investment in financial market, and that foreign investor’s influence on the central banks monetary policy. This could be influenced by ‘excess liquidity’ caused by the US monetary policy, QE 2 and QE3 in particular, which have contributed to increase in liquidity in the global market.
policy under new Governor Kuroda of BOJ might have induced currency depreciation though massive propaganda of ‘Qualitative and Quantitative Monetary Easing (QQE)’. However, the results of this paper’s analysis based on the VAR models indicate that monetary easing policy has not put any statistically significant effect on the real effective exchange rate. In fact, the exchange rate is mostly determined by the foreign investors’ portfolio preference, which is influenced by the overall economic conditions that affects differences in interest rates between Japanese and the U.S. markets, as well as European market.

In summery, major monetary policy instruments could not put significant influence on the real economy, nor domestic monetary market. The result of impulse response functions of the VAR models shows that monetary policy instruments have not realized the originally expected effects, as shown in Table 6.

<table>
<thead>
<tr>
<th>Table 6: Effects of Monetary Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>----------</td>
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<tr>
<td>M2</td>
</tr>
<tr>
<td>MB Call Rate</td>
</tr>
<tr>
<td>Yield</td>
</tr>
<tr>
<td>MB Call Rate</td>
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<tr>
<td>Lend</td>
</tr>
<tr>
<td>MB Call Rate</td>
</tr>
<tr>
<td>REER</td>
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<tr>
<td>MB Call Rate</td>
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<tr>
<td>CPI</td>
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<tr>
<td>MB Call Rate</td>
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<tr>
<td>Stock</td>
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<tr>
<td>MB Call Rate</td>
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<tr>
<td>Prod</td>
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<td>MB Call Rate</td>
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Notes 1 'Original' denotes originally expected effects.
2 + denotes increase or appreciation; ▲ denotes minus effects or decrease - denotes insignificance in the impulse responses.

6.2 Expanding ‘Excess’ Reserves of BOJ Current Account and Financial Investment

As a new monetary easing policy of BOJ, Qualitative and Quantitative Monetary Easing Policy (QQE) was introduced in April 2013. However, the monetary policy through Base Money supply may not be utilized for investment activities for industrial production. The analysis conducted in this paper clearly shows that BOJ’s monetary policy instruments have had not directly causality

with any monetary variables nor real economy (reduction) during the whole period (2001-2013).

The excess liquidity in the BOJ Current Account may be utilized for financial investment in the global market, while bank lending has been stagnated even under the extremely monetary easing policy in massive scale, which is now common to advanced economies, especially Japan and the USA. The monetary easing policies, therefore, may accelerate 'carry trade' for capital and financial investment in the global market 10.

The share of foreign banks among the BOJ Current Account amounted to 9.3 trillion Yen, which is larger than that of regional banks (9.2 trillion Yen), and trust banks (7.7 trillion Yen) in September 2013 (Fig.10-1). Foreign banks could utilize the reserve at the BOJ Current Account for the investment in government bonds or Yen carry trade through the accounts between the central office and foreign branches, and the share of the latter has increased substantially 11. It should be noted here that the minimal required amount of the BOJ Current Account is 31 billion Yen, while the actual amount is about 300 times of the required reserve amount. The excess reserve amount of foreign banks is substantially larger than that of Japanese commercial banks, which is 10 times of the minimum amount. In this regard, Fukuda (2011) pointed out that the excess reserve may be utilized for investment in the global market. As shown in Fig10-2, the US stock prices have risen with the increase in excess reserve of the BOJ Current Account. Kikuchi (2013) also suggested that under the excessive monetary easing, liquidity could be used for 'speculative' investment 12. Thus, the reserve money is not utilized for productive investment but financial investment for securities, currency and other derivatives globally.

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10. Fukuda (2011) suggests 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.

11. Morita (2013) indicated that Yen carry trade has increased, due to such a trade by foreign banks.

12. Kikuchi (2013) pointed out the fact that monetary easing in fact has provided 'Hedge Funds' with important resources for financial investment. 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.
Therefore, excess reserves of BOJ Current Account are possibly utilized for financial investment globally. This could be one of the reasons why the monetary policy has become ineffective in stimulating the real economy though increase in bank lending, while bank lending has become ineffective in productive activities in Japan. It should be also noted that capital flows have increasingly influenced not only on the foreign exchange rate but also domestic financial market.

The global monetary policy, particularly the US monetary policy, has put significant impact upon the global market in recent years. The quantitative easing 3 (QE3) initiated in September 2012 was initially confined to the MBS(mortgage backed securities) trading, but it was extended to the purchase of Government Bonds (T-bills) by FRB in December 2012, which accelerated liquidity supply in the global market through carry trade and other means. However, the termination of QE3 foreseen in 2014 may put pressure on the monetary policy in Japan. This is because the current BOJ’s Qualitative and Quantitative Monetary Easing
policy might be expected to continue to provide the global market with abundant liquidity, as a ‘safety net’ of global money supply, after the termination of the QE 3 in the US market. However, global financial investments through carry–trade are not the original objective of the monetary easing policy in Japan, which should be used for reviving the domestic economy rather than the global market, where speculative financial investment by hedge funds and other institutional investors are increasing significantly.

**Concluding Remarks**

This paper analyses the impact of monetary policy on the financial market, foreign exchange and the real economy, based on the VAR models over the period between April 2001 and August 2013, which covers the Quantitative Easing Policy (2001-2006), Comprehensive Monetary Easing (2010-2011), as well as the latest Qualitative and Quantitative Monetary Easing (QQE) Policy (2013). The result of the analysis based on the VAR models shows that monetary policy instruments have not realized the originally expected effects, and the results are summerised as follows:

First, BOJ’s monetary policy instruments (Current Account, monetary base, call rate) have become ineffective in controlling the monetary and financial market, as they have not put positive and significant impact on the monetary market, especially money stock (M2).

Second, there has not been any significant increase in bank lending by increasing monetary base, and no significant positive effect on the real economy in terms of industrial production is observed. In this regard, any effect of monetary easing on industrial production via stock market has not been observed since 2006 until today.

Third, monetary easing in terms of increase in BOJ Current Account and monetary base on the real exchange rate and price levels, as well as industrial production, have not realized the expected results, especially during the period 2008-2011, and 2011-2013.

Fourth, call rate has not provided significant effect on the monetary and the real economy, especially in the post Global Financial Crisis of 2008-2013.

Lastly, capital flows, especially short-term capital flows (Portfolio, Other investment and Derivatives), have put significant impact upon the monetary policy variables (Monetary Base, BOJ Current Account, Call Money).

As shown in the analysis in this paper, it would be now difficult to have
significant impact on the market by the BOJ’s monetary policy only under the increasing capital flows. Therefore, quantitative easing monetary policy has very limited effect on the real economy, while the capital inflows and outflows have had causality with the BOJ’s monetary policy variables (BOJAC, MB, Call Rate) significantly in recent years. In this context, the US monetary policy, particularly QE2 and QE3 have significant impact on the global market though providing excessive liquidity, and encouraging carry-trade for short-term investment globally. In the case of Japan, the excess reserve of the BOJ current account might have accelerate financial investment through the carry trade, which is supposed to have increased under the BOJ’s QQE (Qualitative and Quantitative Monetary Easing Policy). The effect of QE3 (especially since December 2013, when T-bills were added in the trading by the FRB) is significant on the capital and foreign exchange market in Japan.

Therefore, Bank of Japan needs to conduct monetary policy in consideration of the global market situations, including the US monetary policy in cooperation with the government authority (MOF). Thus, Bank of Japan is expected to take sensible monetary policy in the context of the global economic and market conditions, especially the international capital flows, which are significantly influenced by the monetary policy of advanced economies. Accordingly, the monetary authority may have to coordinate with the major overseas monetary authorities, especially FRB, in considering the effects of monetary policies on the global economy and markets. In this sense, some capital account and financial management may be considered to attain Japan’s independence on the domestic monetary policy in the medium to long term perspective.

13. The significant rise of stock price 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, and it was only after April 2013 that the stock price (Nikkei, etc.) reached its highest level in the past few years. Since this paper covers the period until August 2013, the analysis could not fully cover the period of monetary expanding period to be expected to reach over 200 trillion in 2014/15. However, it is now clear that the additional monetary base would not be effective in expanding the real economy, but it could be utilized for global financial investment through carry trade.
References


* denotes that the papers are written in Japanese.