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中文摘要：本文藉由1998 - 2013年日本數據，研究貨幣政策在名義利率零下限狀況中的影響。我發現，擴張性貨幣政策衝擊的作用會直接影響公司債券收益率，特別是在高級公司債券收益率上。然而，預估之流轉股票價格和匯率的幅度大大地小於美國，且在多數情況中於統計上是不顯著的。

中文關鍵詞：利率零下限，非常規貨幣政策，識別不均一分散，日本銀行

英文摘要：This paper investigates the effects of monetary policy announcements at the zero lower bound using Japanese data from 1998 to 2013. I find that the effect of expansionary monetary policy shocks is directly passed on to corporate bond yields, notably for high-grade corporate bond yields. However, the magnitude of estimated pass-through to stock prices and the exchange rate is substantially smaller than in the U.S., and not statistically significant in most cases.

英文關鍵詞：Zero Lower Bound, Unconventional Monetary Policy, Identification through Heteroscedasticity, Bank of Japan

The Effects of Monetary Policy Announcements at the Zero Lower Bound

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Abstract

This paper investigates the effects of monetary policy announcements at the zero lower bound using Japanese data from 1998 to 2013. I find that the effect of expansionary monetary policy shocks is directly passed on to corporate bond yields, notably for high-grade corporate bond yields. However, the magnitude of estimated pass-through to stock prices and the exchange rate is substantially smaller than in the U.S., and not statistically significant in most cases.

Keywords: Zero Lower Bound, Unconventional Monetary Policy, Identification through Heteroscedasticity, Bank of Japan

J.E.L. codes: E43, E44, E52, E58

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1 Introduction

The effect of unconventional monetary policy at the zero lower bound (ZLB), that includes forward guidance and asset purchases, has been a centerpiece of the debate in macro-finance since many advanced economies reached the ZLB after the financial crisis of 2008. Since the crisis, a number of important contributions have been made regarding this topic.¹ However, the analysis in the literature primarily focuses on the U.S. economy after the crisis, which is restricted by a short sample, and researchers are not sure about the effect of unconventional monetary policy in a different environment.

In this paper, I study the effects of unconventional monetary policy in Japan, which has experienced a substantially longer period at the ZLB, from 1995 to the present.² Specifically, I use the method of identification through heteroscedasticity, which was originally proposed by Rigobon (2003) and Rigobon and Sack (2003, 2004) and has been widely used in the recent literature,³ to estimate the pass-through of monetary policy shock. Identification is based on the assumption that the variance of monetary policy shocks is particularly high on important announcement days, whereas nothing unusual happens to other shocks on these days.

To assess the stimulative effect of monetary policy on aggregate demand, I focus on the pass-through of monetary policy shock to three financial assets, which are of interest to central banks: corporate bonds, stocks and the exchange rate. First, I study the pass-through to corporate bond yields, because the reduction in the borrowing cost of firms is a key channel through which monetary policy could stimulate aggregate demand. Second, I analyze the pass-through to stock prices, which is relevant because the response of stock prices could increase consumption through the wealth effect. Finally, I evaluate the pass-through to the exchange rate, through which aggregate demand can be boosted via the trade balance.

The results show that there is a stark contrast between the pass-through to corporate bond yields and the pass-through to stock prices and the exchange rate. For corporate bond yields, there

¹For example, see D’Amico and King (2013), Gagnon et al. (2011), Krishnamurthy and Vissing-Jorgensen (2011), and Wright (2012) for the Fed’s Large-Scale Asset Purchases (LSAPs) programs, and see Joyce et al. (2012) for the Bank of England’s asset purchases. For more comprehensive review, see Bernanke (2012). For the comparison across advanced economies, see Rogers et al. (2014).

²Figure 1 shows the comparison between policy rates in Japan and the U.S.

³For example, see Gilchrist and Zakrajsek (2013) and Raskin (2013).

is a statistically significant and about one-to-one pass-through, notably for high-grade corporate bond yields. On the other hand, the pass-through to stock prices and the exchange rate is not statistically significant in most cases. However, these estimates in Japan are markedly different from the estimates in U.S. based on the data from 2008 to the present. While I find one-to-one pass-through to corporate bond yields in the U.S., which is broadly similar to Japan, the U.S. pass-through to stock prices and the exchange rate is statistically significant, and its magnitude is substantially larger than that of Japan.

In addition, I use a simple event study to analyze the effects of announcements in 2013, to show that these announcements have substantial effect even on stock prices. The announcements in 2013 are associated with the regime change of Bank of Japan's (BOJ) monetary policy to commit to the 2-percent inflation target by 2015. Unlike the previous announcements, these announcements had substantial effects, not only on corporate bonds, but also on stock prices. This difference may be due to the different nature of the BOJ's commitment after 2013; the commitment is open-ended and the BOJ announces that it will do whatever it takes to achieve the target.

Lastly, I provide several robustness checks, to which the main results are generally robust. First, I analyze the pass-through to other financial assets: (1) real estate investment trusts (REIT), (2) credit default swaps (CDS), and (3) the exchange rate of the OECD and Asian economies. Second, I estimate the pass-through based on more selected set of announcements. Third, I consider subsamples focusing on different programs: 2001-2006, 2006-2010, and 2010-2013. Fourth, I provide the analysis based on the principal component of government bond yields with different maturities. Last, I use alternative sets of non-announcement days.

The remainder of the paper is organized as follows: Section 2 describes the methodology used in the paper, Section 3 explains the data and background of Japanese monetary policy, Section 4 presents the results. Section 5 concludes.

2 Method

This section describes an analytical framework to estimate the pass-through of monetary policy shocks on various financial assets. Based on the standard setup of two simultaneous equations, I

present a simple event study and the framework of identification through heteroscedasticity.

2.1 Setup

Consider the system of two simultaneous equations between the change in the interest rate and the growth rate of the asset price, Δi_t and Δs_t . The notation follows Rigobon and Sack (2004):

$$\Delta i_t = \beta \Delta s_t + \gamma X_t + \varepsilon_t, \tag{1}$$

$$\Delta s_t = \alpha \Delta i_t + \delta X_t + \eta_t, \tag{2}$$

where X_t is a common exogenous shock that simultaneously affects both the interest rate and the asset price, ε_t is a monetary policy shock, and η_t is a shock to the asset price.

In this system, I primarily focus on estimating the parameter α because it indicates how much monetary policy shocks affect asset prices through the changes in the interest rate. However, the OLS estimate of the pass-through, α , is biased since both variables, Δi_t and Δs_t , are simultaneously determined in the system.⁴

2.2 Event Study

An event study is a simple way to estimate the pass-through using a directly measured monetary policy surprise. By picking the important announcements and regarding them as a complete surprise, we can use the corresponding changes in the asset prices to estimate the effect of monetary policy shocks. Gagnon et al. (2011) directly measured the effect of the Fed's Large-Scale Asset Purchases (LSAP) by assuming that the announcements about the LSAP were complete surprises, and added up the changes on the announcement days. Though the event study is based on the strong assumption that no other material news came within the announcement window, it can provide useful benchmark results.

⁴For the derivation of the OLS estimate and its bias, see Appendix A.1.

2.3 Identification through Heteroscedasticity

To obtain a consistent estimate of the pass-through under weaker assumptions, we employ a scheme called identification through heteroscedasticity, proposed by Rigobon (2003) and Rigobon and Sack (2003, 2004). Essentially, it uses the shift of the variances of endogenous variables between the announcement days and non-announcement days as instruments for the identification.

I introduce some notation and assumptions to describe this scheme of identification. First, I denote a subset of the policy announcement days as A and a subset of the non-announcement days as \bar{A} .⁵ Second, I denote the number of announcement days and non-announcement days as T_A and $T_{\bar{A}}$, and thus the total number of days as $T \equiv T_A + T_{\bar{A}}$. Finally, I assume that the variance of monetary policy shock is larger on the announcement days than on the non-announcement days, but the variance of other shocks are the same across these two sets of days. Under this assumption, the difference of the conditional variance-covariance matrices in these two sets of days, $\mathbf{\Omega}_A$ and $\mathbf{\Omega}_{\bar{A}}$, only depends on the variance of monetary policy shocks. Specifically, we can compute the difference of the variances, $\Delta\mathbf{\Omega}$, as follows:

$$\Delta\mathbf{\Omega} \equiv \mathbf{\Omega}_A - \mathbf{\Omega}_{\bar{A}} = \frac{\sigma_{\varepsilon|A}^2 - \sigma_{\varepsilon|\bar{A}}^2}{(1 - \alpha\beta)^2} \begin{pmatrix} 1 & \alpha \\ \alpha & \alpha^2 \end{pmatrix}, \quad (3)$$

where $\sigma_{\varepsilon|A}^2$ and $\sigma_{\varepsilon|\bar{A}}^2$ are the conditional variances of monetary policy shocks on the announcement days and the non-announcement days, respectively.⁶ This is because the effect of other shocks cancels out by taking the difference between the announcement days and non-announcement days.

As discussed in Rigobon and Sack (2004), α can be estimated by using $\Delta\mathbf{\Omega}$ as the instruments for identification. To formalize the instruments, we first define endogenous variables. Let $\mathbf{\Delta i}_A$ and $\mathbf{\Delta s}_A$ be $T_A \times 1$ vectors of variables on the announcement days, and $\mathbf{\Delta i}_{\bar{A}}$ and $\mathbf{\Delta s}_{\bar{A}}$ be $T_{\bar{A}} \times 1$ vectors of variables on the non-announcement days. Then, we can combine these two vectors into $T \times 1$ vectors of endogenous variables:

⁵Unlike Rigobon and Sack (2004), all business days that do not belong to A are treated as the non-announcement days. To make this point clear, I denote a subset of the non-announcement days as \bar{A} . The results using alternative sets of the non-announcement days are presented in Section 4.4.5.

⁶For the derivation, see Appendix A.2.

$$\Delta \mathbf{i} \equiv [\Delta \mathbf{i}_A, \Delta \mathbf{i}_{\bar{A}}]', \quad (4)$$

$$\Delta \mathbf{s} \equiv [\Delta \mathbf{s}_A, \Delta \mathbf{s}_{\bar{A}}]'. \quad (5)$$

Given these endogenous variables, $\Delta \mathbf{i}$ and $\Delta \mathbf{s}$, instruments are constructed by normalizing with the number of days in each subset of days, and by flipping the signs of the variables on the non-announcement days:

$$\mathbf{z}_i \equiv \left[\frac{1}{T_A} \Delta \mathbf{i}_A, -\frac{1}{T_{\bar{A}}} \Delta \mathbf{i}_{\bar{A}} \right]', \quad (6)$$

$$\mathbf{z}_s \equiv \left[\frac{1}{T_A} \Delta \mathbf{s}_A, -\frac{1}{T_{\bar{A}}} \Delta \mathbf{s}_{\bar{A}} \right]'. \quad (7)$$

It is easy to see that \mathbf{z}_i and \mathbf{z}_s are relevant and valid instruments to identify the pass-through in Equation (2). First, these instruments are correlated with the endogenous variables as long as the variances on the announcement days and non-announcement days are different. On the other hand, these instruments are uncorrelated with the shocks to the asset prices as presented in Equation (3).⁷

In this paper, I use the orthogonality of both instruments as the moment conditions for GMM estimation. Though I can estimate the pass-through by IV estimation using just one instrument, as implemented in Rigobon and Sack (2004), GMM estimation should provide more efficient estimates. The moment conditions are described as follows:

$$E[f_t(\alpha)] = 0, \quad (8)$$

where

$$f_t(\alpha) = Z_t \cdot e_t,$$

$$Z_t = [z_{i,t}, z_{s,t}]',$$

$$e_t = \Delta s_t - \alpha \Delta i_t.$$

⁷For the proof of the orthogonality, see Appendix A.3.

The GMM estimate of α can be obtained by solving the minimum distance problem:

$$\alpha_{GMM} = \arg \min_{\alpha} f_T(\alpha)' W f_T(\alpha), \quad (9)$$

where $f_T(\alpha) = \sum_{t=1}^T f_t(\alpha)$ and W is an appropriate 2×2 weighting matrix. I use the two-step GMM for the estimation, in which I first use the identity matrix as a weighting matrix to solve the minimization problem, and then use the inverse of estimated variance-covariance matrix of the moment conditions in the first step as a weighting matrix in the second step. Inference for the GMM estimation is based on heteroscedasticity-robust standard errors.

3 Data and Background

This section describes the data and background to show that there is enough variation to identify the pass-through of monetary policy shock. After describing the data, I provide a brief summary of Japanese monetary policy. Then, I explain the selection of important announcements and provide a statistical analysis showing that the selection is valid in terms of identification.

3.1 Data

I estimate the pass-through of monetary policy shocks to three financial assets: (1) corporate bond yields, (2) stock prices, and (3) the exchange rate. The analysis is based on daily data from April 1998 to December 2013, all of which are obtained from the Bloomberg.

The details of the series are described as follows:

1. Japanese Government Bond (JGB) yield: generic yield with a maturity of 5, 10 and 20 years;
2. Corporate bond yield: the Bloomberg Fair Value (BFV) indices of AA and BBB corporate bond yields for the industrial sector, with a maturity of 5 and 10 years;⁸
3. Stock prices: Nikkei 225;
4. Exchange rates: spot exchange rates of the U.S. dollar, measured by the Japanese yen.

⁸The AA index and the BBB index are available from June 8, 1999 and January 30, 2003, respectively. The BBB index with a maturity of 10 years is not available from February 6, 2012.

I compute the daily changes in levels for the JGB and corporate bond yields, and the continuously compounding rate of daily change for stock prices and the exchange rate. The data between March 11 and March 18, 2011 is excluded from the analysis to eliminate the effect of the earthquake in March 2011.

3.2 Brief Summary of Japanese Monetary Policy

The BOJ's overnight interest rate has been reduced to nearly zero for approximately two decades, and three different programs of unconventional monetary policies have been implemented. Table 1 summarizes the timeline of the important events in Japanese monetary policy, and Figure 2 shows the volume of monetary base.⁹

The first program was called “quantitative easing” (QE) and implemented from March 2001 to March 2006 under Governors Hayami and Fukui. Under the QE program, the BOJ set its current account balance as the main policy target and purchased long-term JGBs to achieve this target.¹⁰ The QE program was terminated in March 2006, and the overnight interest rate was gradually raised to 0.5 percent. However, in response to the global financial crisis in 2008, the BOJ reduced the overnight interest rate to zero again.

The second program was called “comprehensive monetary easing” (CME) and implemented from October 2010 to April 2013 under Governor Shirakawa. Under the CME program, the BOJ purchased not only JGBs, but also commercial paper and risky assets such as ETFs and REITs, while also making a commitment to keep the policy rate at zero. This is the policy prescription proposed by Eggertsson and Woodford (2003). In addition, the BOJ provided various forms of lending programs to financial institutions.

Most recently, the BOJ substantially expanded its asset purchase program and launched it as “quantitative and qualitative monetary easing” (QQME). The QQME program has been implemented since April 2013 under Governor Kuroda. Under the QQME program, the BOJ commits to achieving 2 percent inflation by 2015. To achieve this goal, the BOJ announced that it would

⁹For more comprehensive accounts of BOJ's monetary policy, see Ito and Mishkin (2006) and Ueda (2012b).

¹⁰For an analysis of the QE program, see Ugai (2007) and Shiratsuka (2010). More recently, Shibamoto and Tachibana (2013) analyze the effects of the QE program using the method of identification through heteroscedasticity. Kimura and Nakajima (2013) use a variant of regime-switching structural VAR using the data from 1981 to 2012, with ad hoc shrinkage in certain parameters.

increase the monetary base at a pace of 60 to 70 trillion yen per year, and extend the average maturity of its JGB holdings from three years to seven years.¹¹

3.3 Selection of Monetary Policy Announcements

The selection of the important announcements is crucial for the analysis in this paper, and I select 41 announcement days from April 1998 to July 2013 based on Ueda (2012a). The exact dates and overview are listed on Table 2. These dates are associated with the BOJ's "official" change in its monetary policy.¹²

In addition, I include other dates when strong signals concerning future changes in BOJ's monetary policy were made. For example, I include the days when the new BOJ governor was nominated and the confirmation hearing was held by the National Diet in 2013. On the other hand, I do not include other meeting days or the days of speeches by the BOJ governor or other board members. This is because including trivial or indirect news announcement days will make the distinction between the announcement days and the non-announcement days unclear, which undermines the identification as discussed in Wright (2012).

3.4 Standard Deviations of the Series

To see whether the actual data is consistent with the assumptions for the identification, Table 3 compares the standard deviations of the daily changes on the announcement days and non-announcement days. Consistent with the assumptions, the standard deviations are higher on the announcement days than on the non-announcement days for almost all series, except for the BBB yield with a maturity of 10 years.

To test whether the variances in these two sets of days are significantly different, I conduct three statistical tests: the F-test, the block bootstrap and the stationary bootstrap. All tests are based on the null hypothesis that the population variance in these two sets of days are equal. Since the F-test assumes that each observation is independent, I use the block bootstrap and the

¹¹For details, see Kuroda (2013).

¹²I exclude two dates from the list in Ueda (2012a), April 13, 1999 and March 14, 2011. First, I exclude April 13, 1999 because the commitment to keep the policy rate at zero made by the BOJ governor is not entirely clear. Ueda (2012a) also notes that the market reacted to this event very slowly. However, including this date does not materially change the results. Second, I exclude March 14, 2011 since this is the meeting right after the earthquake.

stationary bootstrap to take the heteroscedasticity observed in the daily data into account. In the block bootstrap, I construct an artificial sample by resampling the block of 10 days to preserve heteroscedasticity. On the other hand, in the stationary bootstrap, the length of the block is randomly determined.¹³ After constructing an artificial sample, I compute the variance ratio in the artificial sample. By repeating this exercise, I can form the bootstrap distribution of the variance ratio and compute the p-values based on the percentile of the sample variance ratio.

The null hypothesis is rejected for most series, with the sample variance ratio larger than one, except for the 10-year BBB corporate bond yields. Therefore, we could conclude that the variance is significantly larger on the announcement days. The F-test tends to reject the null hypothesis more often than the other two tests based on the bootstrap.

4 Results

In this section, I present GMM estimates showing that the pass-through of monetary policy shock is one to one for corporate bond yields, but it is smaller than the U.S. estimates for stock prices and the exchange rate. In addition, I provide an event study showing that the announcements in 2013 have substantial effects on asset prices. Lastly, I present several robustness checks using additional variables and subperiods to confirm the main results.

4.1 Event Study

Table 4 presents the results of the event study focusing on the QQME program in 2013. The results show that the announcements of the QQME program led to a substantial decline in the long-term JGB and corporate bond yields. Furthermore, stock prices substantially increased on these announcement days, but the effect on exchange rates was mixed.

The results show that the long-term JGB and corporate bond yields substantially declined responding to the announcements. Specifically, the JGB yields declined 11.4 (10 years) and 17.7 (20 years) basis points on April 4th, and the cumulative decline on all announcements was 14.0 (10 years) and 23.3 (20 years) basis points, respectively. Corporate bond yields also declined on

¹³More specifically, an artificial sample is constructed by the Bernoulli trial, either to pick a random sample or the sample on the next day. I set the probability of the latter as 0.9 to make the expected length of the block 10 days.

these days, but the magnitude is smaller than JGB yields. The 10-year AA bond yield declined 9.72 basis points on April 4, and the cumulative decline was 10.65 basis points.¹⁴

The results also show that stock prices substantially increased on the announcement days. The cumulative increase of the Nikkei 225 and TOPIX indices was 5.18 percent and 3.68 percent, respectively. On the other hand, the effect on exchange rates was mixed. Even though the announcement on April 4 led to a substantial depreciation of the Japanese yen, 3.49 percent for the U.S. dollar and 4.16 percent for the euro, this effect was quickly offset on subsequent announcements.

4.2 GMM Estimates of Pass-Through

Table 5 presents the pass-through to corporate bond yields, stock prices, and the exchange rate. The results show that there is a statistically significant and nearly one-for-one pass-through to corporate bond yields, notably for high-grade bond yields. On the other hand, the pass-through to stock prices and the exchange rate is negative but the estimated magnitude is quite small and not statistically significant in most cases. It is important to note that this analysis estimates the *average* effects of unconventional policies, and these estimates cannot be interpreted as the effects of individual policies, forward guidance, or asset purchases.

I present the estimates of the pass-through to different asset prices based on an individual JGB yield. This is because monetary policy shocks primarily influence the overall level of the JGB yields, and the change in JGB yield with any maturity should reflect such shocks.

4.2.1 Corporate Bond Yields

For the AA corporate bond yields, most of the pass-through is statistically significant, with a magnitude from 0.84 to 0.99. It implies that an expansionary monetary policy shock, which lowers the 20-year JGB yield by 100 basis points, will lower the 10-year AA corporate bond yield 84 basis points. All estimates are smaller than one and statistically significant.

On the other hand, the estimates of the pass-through to the medium-grade corporate bond yields varies; the estimated magnitude is from -2.90 to 1.12. The estimates are positive in most

¹⁴The effects for yields with shorter maturities are trivial, primarily because they are all stuck at the zero lower bound.

cases, which suggests that monetary policy shocks are passed on to BBB corporate bond yields to some extent. However, no estimate is statistically significant because of the large standard errors.

4.2.2 Stock Prices

The estimates of the pass-through to stock prices are mostly negative, ranging between -1.19 and -0.12. These estimates imply that an expansionary monetary policy shock, which lowers JGB yields by 100 basis points, increases stock prices by 0.12 to 1.19 percent. However, few of them is statistically significant. In other words, the estimated magnitude of the pass-through to stock prices is so small that the estimates are not significantly different from zero in most cases.

4.2.3 Exchange Rates

The results show that the pass-through to the exchange rate is mostly negative, with the magnitude between -0.4 and -0.2. These estimates imply that an expansionary monetary policy shock, which lowers JGB yields by 100 basis points, leads a depreciation of the Japanese yen by 0.2 percent to 0.4 percent.¹⁵ However, only the pass-through from the 20-year JGB yield, -0.2, is statistically significant.

These results are consistent with the prediction of conventional interest rate parity, which suggests that the expected return on domestic assets should be the same as the exchange-rate adjusted expected return on foreign assets. In other words, a decline in the JGB yield should be adjusted by a depreciation of the Japanese yen, which would boost the stimulative effect of expansionary monetary policy shocks. However, the estimated magnitude of the pass-through is quite small and few estimates are statistically significant.

4.3 Discussion of the Results

Given these results, I first provide the comparison between Japanese and the U.S. results. Though Japanese results are similar to the U.S. results in their signs, the estimated magnitude of pass-through is considerably smaller for stock prices and the exchange rate.

¹⁵Since I use the exchange rate that measures the value of non-Japanese currency by the Japanese yen, a rise in the exchange rate implies depreciation of the Japanese yen.

4.3.1 Comparison with the U.S. Estimates

Table 5 also presents the estimates of pass-through in the U.S. using the same methodology. For corporate bond yields, Japanese and U.S. estimates are similar in their signs and magnitudes. On the other hand, the magnitude of the Japanese estimates for stock prices and the exchange rate is substantially smaller than that of the U.S. estimates, though the sign of Japanese estimates is consistent with the predictions of economic theories.

To measure the monetary policy shock in the U.S., I used the daily data of zero-coupon bond yields computed by Gürkaynak et al. (2007) with the maturities of 5, 10, and 20 years. To estimate the pass-through to corporate bond yields, stock prices, and the exchange rate, I used Bank of America Merrill Lynch effective corporate bond yields with AA and BBB ratings, the Dow Jones Industrial Average, and the spot exchange rate against the Euro. I used the sample from December 2008 to April 2015, when the U.S. economy was at the ZLB.

For corporate bond yields, the pass-through to corporate bond yields is broadly similar in Japan and in the U.S. Similar to the Japanese case, the pass-through to high-grade bond yields with the rating of AA is statistically significant, and its magnitude is close to one, which is consistent with Raskin's (2013) findings.¹⁶ In addition, I found a significantly positive pass-through to the BBB bond yields in the U.S.

For stock prices, the pass-through is negative in both Japan and the U.S., but the estimated magnitudes are substantially smaller in Japan. While the Japanese estimates are marginally negative and statistically insignificant, the U.S. estimates are between -7.19 and -10.80 and are statistically significant.¹⁷ Though these estimates are slightly larger than the estimates Gürkaynak et al. (2005) and Bernanke and Kuttner (2005) obtained before the Great Recession, they are consistent with recent findings in Claus et al. (2014): Using the estimated shadow short rate, they found that the monetary policy surprise has a larger impact on asset prices at the ZLB period and suggest

¹⁶To explain the limited pass-through to the medium-grade bond yields found in Krishnamurthy and Vissing-Jorgensen (2011), Krishnamurthy and Vissing-Jorgensen (2012) propose the safety premium, which is the premium investors pay to satisfy their unique demand for safe long-term assets. Since the medium-grade corporate bonds are not regarded as safe assets, the decline of the government bond yields do not affect their yields. Krishnamurthy and Vissing-Jorgensen (2011) argue that the effect of the Fed's LSAP announcements is primarily due to reduction in the safety premium.

¹⁷These estimates are larger than Kiley's (2013) estimates at the ZLB, which range from -3.0 to -1.5. This difference is likely due to a different methodology of identification, since Kiley (2013) uses intraday data and focuses on a much narrower window around the announcements.

some kind of structural change in the monetary transmission mechanism at the ZLB. Similar to the Japanese situation, Rosa (2012) documents that the Bank of England's announcements about gilt purchases do not have statistically significant effects on stock prices.

For the exchange rate, the magnitude of Japanese estimates, -0.2, is also substantially smaller than the U.S. estimates, even though the sign of pass-through is negative in both countries. The U.S. estimates are between -6.57 and -9.27 and highly statistically significant. These estimates are largely consistent with the findings in Neely (2013) and Glick and Leduc (2013), which report that the pass-through to the exchange rate during the Great Recession is around -3 to -4. The difference in the magnitude could be due to the difference in the methodology and the usage of intraday data.

4.3.2 Comparison of Announcements Before and After 2013

The comparison of the event study and GMM show that the announcements in 2013 had substantial effects, not only on corporate bonds, but also on stock prices. It may be because the announcements in 2013 were associated with the BOJ's regime change, in which the BOJ made an open-ended commitment to achieve the inflation target, creating a huge surprise.

Before 2013, number of papers including Ito and Mishkin (2006) are critical of the passive stance of the BOJ.¹⁸ However, Romer (2013) describes the policy change in 2013 as “an honest-to-goodness regime shift” and “(the BOJ) took dramatic actions and pledged convincingly to do whatever it takes to end deflation.” Consistent with her argument, some survey measures show that inflation expectations have substantially increased in 2013. For example, Figure 3 shows the upward shift of the inflation expectation in the mean of the ESP Forecast (survey of professional forecasters in Japan) in 2013, which could be up to 0.8 percent. Hausman and Wieland (2014, 2015) also provide similar analysis and conclude that the set of policy package called “Abenomics,” which includes the introduction of the QQME program in 2013, raised long-run inflation expectation.¹⁹

However, even though the announcements in 2013 have had substantial effects on stock prices, the GMM estimates in this paper are not statistically significant since I have estimated an average

¹⁸Based on a New-Keynesian model with two different regimes (a targeted-inflation regime and a deflation regime), Aruoba et al. (2014) provide an interpretation that the BOJ's passive stance has triggered an adverse shock that moves the economy into the deflation regime.

¹⁹On the other hand, Fujiwara et al. (2014) argue that there is no significant increase in inflation expectation at 10-year horizon after the introduction of the QQME, and the effect of monetary policy is quite limited.

effect over the full sample from 1998 to 2013. As presented in Table 4, the average effects of monetary policy announcements based on the pre-2013 event study have been much smaller than those in 2013. This finding is consistent with those of other studies in the literature. For example, Ueda (2012a) conducted an event study of monetary policy announcements between 1999 and 2011 and showed that the announcements regarding the QE programs lowered the JGB and corporate bond yields but did not significantly affect stock prices or exchange rates. Lam (2011) conducted an event study from 2008 to 2011, which covered part of the CME program, and obtained similar results as Ueda (2012a).

4.4 Robustness Checks

In this section, I provide several robustness checks, to which the main results are generally robust. First, I analyze the pass-through to other financial assets. Second, I conduct the analysis based on the set of selected announcements. Third, I consider subsamples focusing on different programs. Fourth, I provide the analysis based on the principal component of JGB yields. Last, I use alternative sets of non-announcement days.

4.4.1 Additional Variables

I extend the analysis using three kinds of additional variables: (1) REITs, (2) CDS index, and (3) exchange rates in other OECD and Asian economies.²⁰ These variables are of interest for slightly different reasons. First, REITs are of interest because the BOJ purchased them in the QE programs. Second, the analysis of the CDS index will shed some light on the effects of the QE programs on credit default risk as discussed in Gilchrist and Zakrajsek (2013). Lastly, I focus on exchange rates relative to these countries because the so-called “yen-carry trade,” in which investors borrow money in the Japanese yen and invest in high-interest rate currencies, has been prominent since the late 1990s. These high-yield currencies include the Australian and New Zealand dollars and other emerging Asian currencies.²¹

Table 6 presents the standard deviations and variance ratios of these variables. Consistent with

²⁰The REIT index is available from April 2003.

²¹For details, see Hattori and Shin (2008).

the assumptions of the identification, the standard deviations are higher on the announcement days than on the non-announcement days for all series. In addition, most of these differences are statistically significant.

Table 7 shows the GMM estimates of the pass-through to the REITs, the CDS index, and exchange rates using the baseline announcement days. For the REITs, the pass-through is mostly negative and some of them are statistically significant. The negative pass-through implies that an expansionary monetary policy shock lead to the increase in the price of these financial assets. The magnitude of the pass-through to the REITs is between -0.46 and -0.16. The pass-through to the CDS index is positive, but the magnitude varies substantially with the maturity of the JGB yields and none are statistically significant. The pass-through to exchange rates in the OECD and Asian economies is negative in almost all cases, with a magnitude between -0.14 and -0.22. The estimates are similar to the estimates for the U.S. dollar and the euro, which suggests that the expansionary monetary policy shocks lead a depreciation of the Japanese yen relative to all other currencies. However, the magnitude of the depreciation is quite small.

4.4.2 Selected Announcements

In order to shed some light on the effects of the asset purchases, I have conducted an analysis using a selected set of announcements explicitly related to asset purchase programs, both in Japan and the U.S.²² Though estimating the effects of individual policies is extremely difficult because the announcements often contain information about different policies, the results based on the selected set of announcements could still serve as a useful benchmark.

As presented in Table 8, the results are broadly similar to the results of the baseline case: The pass-through to corporate bond yields is statistically significant, and its magnitude is close to one in most cases. On the other hand, the pass-through to stock prices and the exchange rate is mostly negative, but its magnitude is small and not statistically significant. In addition, the estimated magnitude of the U.S. pass-through is substantially larger than that of Japan for stock prices and the exchange rate and is statistically significant in most cases.

I also report the weak-identification robust confidence sets in the online appendix to determine

²²The selection of U.S. monetary policy announcements is based on Rogers et al. (2014).

if the differences in the variances on the announcement and non-announcement days are large enough for identification.²³ While the weak-instrument robust confidence sets often fail to identify the relevant confidence sets in the baseline case, they do identify the relevant confidence sets in many cases for the selected announcements. This result suggests that eliminating less-relevant announcements greatly improves identification.

4.4.3 Analysis of Subsamples

To analyze how different QE programs affect corporate bond yields and asset prices, I conduct the same analysis in three subsamples focusing on the different QE programs: (1) the QE program (2001-2006), (2) the period between the QE and the CME programs (2006-2010), and (3) the CME program (2010-2013). The results are presented in Table 9. The period before the QE program (1998-2001) and the QQME program (2013-) are excluded since the number of announcements are too small.

The findings are broadly similar to the main results. The QE programs have statistically significant pass-through to corporate bond yields, mostly one-to-one, but the pass-through to the stock prices or exchange rates is not statistically significant. For the high-grade corporate bond yields, pass-through is mostly one-to-one with a magnitude between 0.36 and 1.87. Unlike the main results, the pass-through to the medium-grade bond yields is statistically significant in some cases, with the magnitude between 0.44 and 1.98. Such a wide range of estimates may reflect their volatility due to small samples in the subperiods. The signs of pass-through to stock prices are mixed but none are statistically significant. The pass-through to exchange rates is negative in most cases, but only a few estimates are statistically significant.

Furthermore, there is no obvious difference in the pass-through in different subperiods, which suggests that the effects of different QE programs are broadly similar over time. One evident difference is that the pass-through from the 5-year JGB yield is not statistically significant during the CME program between 2010 and 2013. But this is because the 5-year JGB yield is extremely low in this period.

²³I use two statistics presented in Appendix A.4 to derive weak-instrument robust confidence sets: the S statistic in Stock and Wright (2000), an extension of Anderson and Rubin's (1949) statistic to GMM, and the K statistic in Kleibergen (2005).

4.4.4 Analysis Using the Principal Component of JGB Yields

To jointly analyze the pass-through from the JGB yields with different maturities, I conduct the same analysis using a principal component of these JGB yields. Table 10 presents the results for main and additional variables. The results are broadly similar to the main results. The pass-through to the high-grade corporate bond yields is positive and statistically significant, whereas the pass-through to the stock prices and exchange rates is negative but not statistically significant in most cases.

4.4.5 Alternative Set of Non-Announcement Days

I use two alternative definitions of non-announcement days to estimate the pass-through of monetary policy shock. First, following Rigobon and Sack (2004), a non-announcement day is defined as one business day prior to the announcement day. Accordingly, the number of announcement days and non-announcement days are the same. Second, following Gilchrist and Zakrajsek (2013), I exclude all the BOJ meeting days from the set of non-announcement days because some trivial or indirect news released on these meeting days may contaminate the identification. The estimates using these alternative definitions are not listed to conserve space, but the results are essentially the same as the baseline set of non-announcement days.

5 Conclusion

This paper analyzes the effects of unconventional monetary policy in Japan, which has been stuck at the ZLB for a substantially longer period than any other economy. To discuss if we could learn any lessons from Japanese experience, this paper compares the estimates of the pass-through of monetary policy shocks with the U.S. estimates.

By using the tools of an event study and identification through heteroscedasticity, I find that the effects of expansionary monetary policy shocks are directly passed on to corporate bond yields, notably for high-grade bond yields. However, the pass-through to stock prices and the exchange rate is not statistically significant in most cases. These results contrast with the U.S. results, where the pass-through to all assets is statistically significant.

To interpret such differences in the effects of unconventional monetary policy, one may focus on the characteristics of the financial markets. For example, because of various institutional reasons, the Japanese financial markets may be more segmented than the U.S. markets and may not be responsive to monetary policy shocks. On the other hand, one could focus on the different economic environment in Japan and the U.S. to explain different pass-through. More specifically, since the Japanese economy has been stuck at the ZLB for two decades, it would be extremely difficult for any announcement to change expectations about future inflation or short rates. Investigating the reason for such differences across countries is critical for the evaluation of the effects of unconventional monetary policy and is a question for future research.

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A Appendix

A.1 Derivation of the OLS Estimate

Describe the system of equations (1) and (2) in matrix form:

$$\begin{pmatrix} 1 & -\beta \\ -\alpha & 1 \end{pmatrix} \begin{pmatrix} \Delta i_t \\ \Delta s_t \end{pmatrix} = \begin{pmatrix} \gamma \\ \delta \end{pmatrix} X_t + \begin{pmatrix} \varepsilon_t \\ \eta_t \end{pmatrix}. \quad (10)$$

By solving this equation, we obtain the reduced-form solution of the system,

$$\begin{pmatrix} \Delta i_t \\ \Delta s_t \end{pmatrix} = \frac{1}{1 - \alpha\beta} \left[\begin{pmatrix} \beta\delta + \gamma \\ \alpha\gamma + \delta \end{pmatrix} X_t + \begin{pmatrix} 1 \\ \alpha \end{pmatrix} \varepsilon_t + \begin{pmatrix} \beta \\ 1 \end{pmatrix} \eta_t \right]. \quad (11)$$

Let σ_X^2 , σ_ε^2 , and σ_η^2 as the variance of each shock. Then, the OLS estimate of α in equation (2) is

$$\hat{\alpha}_{OLS} = \frac{Cov(\Delta i_t, \Delta s_t)}{Var(\Delta i_t)}, \quad (12)$$

$$= \frac{(\beta\delta + \gamma)(\alpha\gamma + \delta)\sigma_X^2 + \alpha\sigma_\varepsilon^2 + \beta\sigma_\eta^2}{(\beta\delta + \gamma)^2\sigma_X^2 + \sigma_\varepsilon^2 + \beta^2\sigma_\eta^2}. \quad (13)$$

Accordingly, the bias of the OLS estimate is

$$\hat{\alpha}_{OLS} - \alpha = \frac{(1 - \alpha\beta)[\delta(\beta\delta + \gamma)\sigma_X^2 + \beta\sigma_\eta^2]}{(\beta\delta + \gamma)^2\sigma_X^2 + \sigma_\varepsilon^2 + \beta^2\sigma_\eta^2}. \quad (14)$$

Equation (14) indicates that the OLS estimate has a non-zero bias, unless there is a certain restriction on parameters (such as $\alpha\beta = 1$). For the discussion about the signs of the bias in the OLS estimates, see Gilchrist and Zakrajsek (2013).

A.2 Derivation of Conditional Variance

Denote the conditional variances of the shocks on the announcement days as $\sigma_{X|A}^2$, $\sigma_{\varepsilon|A}^2$, and $\sigma_{\eta|A}^2$. Similarly, denote the conditional variances of the shocks on the non-announcement days as $\sigma_{X|\bar{A}}^2$, $\sigma_{\varepsilon|\bar{A}}^2$, and $\sigma_{\eta|\bar{A}}^2$. Given the reduced-from solution of the system in equation (11), the conditional

variance-covariance matrices of the system, $\mathbf{\Omega}_A$ and $\mathbf{\Omega}_{\bar{A}}$, are computed as follows:

$$\mathbf{\Omega}_A = \frac{1}{(1-\alpha\beta)^2} \begin{pmatrix} (\beta\delta + \gamma)^2 \sigma_{X|A}^2 + \sigma_{\varepsilon|A}^2 + \beta^2 \sigma_{\eta|A}^2 & (\beta\delta + \gamma)(\alpha\gamma + \delta) \sigma_{X|A}^2 + \alpha \sigma_{\varepsilon|A}^2 + \beta \sigma_{\eta|A}^2 \\ \cdot & (\alpha\gamma + \delta)^2 \sigma_{X|A}^2 + \alpha^2 \sigma_{\varepsilon|A}^2 + \sigma_{\eta|A}^2 \end{pmatrix}, \quad (15)$$

$$\mathbf{\Omega}_{\bar{A}} = \frac{1}{(1-\alpha\beta)^2} \begin{pmatrix} (\beta\delta + \gamma)^2 \sigma_{X|\bar{A}}^2 + \sigma_{\varepsilon|\bar{A}}^2 + \beta^2 \sigma_{\eta|\bar{A}}^2 & (\beta\delta + \gamma)(\alpha\gamma + \delta) \sigma_{X|\bar{A}}^2 + \alpha \sigma_{\varepsilon|\bar{A}}^2 + \beta \sigma_{\eta|\bar{A}}^2 \\ \cdot & (\alpha\gamma + \delta)^2 \sigma_{X|\bar{A}}^2 + \alpha^2 \sigma_{\varepsilon|\bar{A}}^2 + \sigma_{\eta|\bar{A}}^2 \end{pmatrix}. \quad (16)$$

Assume that the variance of the monetary policy shock is larger on the announcement days than on the non-announcement days, but the variance of the other shocks are the same across these two sets of days. Namely, we assume that

$$\sigma_{\varepsilon|A}^2 > \sigma_{\varepsilon|\bar{A}}^2, \quad (17)$$

$$\sigma_{X|A}^2 = \sigma_{X|\bar{A}}^2, \quad (18)$$

$$\sigma_{\eta|A}^2 = \sigma_{\eta|\bar{A}}^2. \quad (19)$$

When taking the difference between $\mathbf{\Omega}_A$ and $\mathbf{\Omega}_{\bar{A}}$ in equations (15) and (16), only the variances of the monetary policy shock remain and the variances of other shocks cancel out. Thus we obtain

$$\mathbf{\Omega}_A - \mathbf{\Omega}_{\bar{A}} = \frac{\sigma_{\varepsilon|A}^2 - \sigma_{\varepsilon|\bar{A}}^2}{(1-\alpha\beta)^2} \begin{pmatrix} 1 & \alpha \\ \alpha & \alpha^2 \end{pmatrix}. \quad (20)$$

A.3 Orthogonality of Instruments

To see that two instruments, \mathbf{z}_i and \mathbf{z}_s , are orthogonal to the residuals \mathbf{e} , compute $\sum_{t=1}^T \mathbf{Z}_t \cdot \mathbf{e}_t$.

$$\sum_{t=1}^T Z_t \cdot e_t = \mathbf{Z}' \cdot \mathbf{e} \quad (21)$$

$$= \begin{pmatrix} \mathbf{z}'_i \\ \mathbf{z}'_s \end{pmatrix} (\Delta \mathbf{s} - \alpha \Delta \mathbf{i}) \quad (22)$$

$$= \begin{bmatrix} \frac{1}{T_A} \Delta \mathbf{i}'_A, & -\frac{1}{T_{\bar{A}}} \Delta \mathbf{i}'_{\bar{A}} \\ \frac{1}{T_A} \Delta \mathbf{s}'_A, & -\frac{1}{T_{\bar{A}}} \Delta \mathbf{s}'_{\bar{A}} \end{bmatrix} [\Delta \mathbf{s}_A - \alpha \Delta \mathbf{i}_A, \Delta \mathbf{s}_{\bar{A}} - \alpha \Delta \mathbf{i}_{\bar{A}}] \quad (23)$$

$$= \begin{bmatrix} \frac{1}{T_A} \Delta \mathbf{i}'_A \cdot (\Delta \mathbf{s}_A - \alpha \Delta \mathbf{i}_A) - \frac{1}{T_{\bar{A}}} \Delta \mathbf{i}'_{\bar{A}} \cdot (\Delta \mathbf{s}_{\bar{A}} - \alpha \Delta \mathbf{i}_{\bar{A}}) \\ \frac{1}{T_A} \Delta \mathbf{s}'_A \cdot (\Delta \mathbf{s}_A - \alpha \Delta \mathbf{i}_A) - \frac{1}{T_{\bar{A}}} \Delta \mathbf{s}'_{\bar{A}} \cdot (\Delta \mathbf{s}_{\bar{A}} - \alpha \Delta \mathbf{i}_{\bar{A}}) \end{bmatrix} \quad (24)$$

$$= \begin{bmatrix} (\hat{\Omega}_{A,12} - \alpha \hat{\Omega}_{A,11}) - (\hat{\Omega}_{\bar{A},12} - \alpha \hat{\Omega}_{\bar{A},11}) \\ (\hat{\Omega}_{A,22} - \alpha \hat{\Omega}_{A,21}) - (\hat{\Omega}_{\bar{A},22} - \alpha \hat{\Omega}_{\bar{A},21}) \end{bmatrix} \quad (25)$$

$$= \begin{bmatrix} \Delta \hat{\Omega}_{12} - \alpha \Delta \hat{\Omega}_{11} \\ \Delta \hat{\Omega}_{22} - \alpha \Delta \hat{\Omega}_{21} \end{bmatrix} \quad (26)$$

Since $\Delta \mathbf{\Omega} = C \begin{pmatrix} 1 & \alpha \\ \alpha & \alpha^2 \end{pmatrix}$, we have

$$\sum_{t=1}^T Z_t \cdot e_t \xrightarrow{p} 0. \quad (27)$$

Accordingly, we have moment condition $E[Z_t \cdot e_t] = 0$.

A.4 Weak-Identification Robust Confidence Set

One concern of identification through heteroscedasticity is that the difference between the announcement days and non-announcement days may not be large enough for strong identification. In order to address the issue of weak identification, I employ the two statistic that could derive weak-instrument robust confidence sets: the S statistic in Stock and Wright (2000), an extension of the Anderson and Rubin's (1949) statistic to GMM, and the K statistic in Kleibergen (2005).²⁴ These statistics test the null hypothesis for a hypothesized value of the parameter, based on the moment conditions evaluated at the hypothesized value. The confidence set is derived as the set of parameter values for which the test accepts the null hypothesis.

The S statistic is defined as follows:

$$S(\alpha_0) = \left[\sqrt{\frac{1}{T}} f_T(\alpha_0) \right]' \hat{V}_{ff}(\alpha_0)^{-1} \left[\sqrt{\frac{1}{T}} f_T(\alpha_0) \right], \quad (28)$$

where

$$\hat{V}_{ff}(\alpha) = Var \left(\sqrt{\frac{1}{T}} f_T(\alpha) \right), \quad (29)$$

which is an estimate of the asymptotic variance-covariance matrix of the moment conditions. Note that the S statistic is based on the objective function in the minimization problem in Equation 9, but the value is evaluated at the hypothesized value of the parameter, α_0 . The S statistic has a chi-square null limiting distribution, with the number of moment conditions as the degrees of freedom.

The K statistic is defined as follows:

$$K(\alpha_0) = \frac{1}{4T} \left(\frac{\partial S(\alpha)}{\partial \alpha} \Big|_{\alpha_0} \right) [\hat{D}'_T(\alpha_0) \hat{V}_{ff}(\alpha_0)^{-1} \hat{D}_T(\alpha_0)]^{-1} \left(\frac{\partial S(\alpha)}{\partial \alpha} \Big|_{\alpha_0} \right)', \quad (30)$$

$$= \left[\sqrt{\frac{1}{T}} f_T(\alpha_0) \right]' \left[\hat{V}_{ff}(\alpha_0)^{-\frac{1}{2}} P_{\hat{V}_{ff}(\alpha_0)^{-\frac{1}{2}} \hat{D}_T(\alpha_0)} \hat{V}_{ff}(\alpha_0)^{-\frac{1}{2}} \right] \left[\sqrt{\frac{1}{T}} f_T(\alpha_0) \right], \quad (31)$$

²⁴For details, see Stock et al. (2002).

where

$$\hat{D}_T(\alpha) = q_T(\alpha) - \hat{V}_{\alpha f}(\alpha)\hat{V}_{ff}(\alpha)^{-1}f_T(\alpha),$$

$$q_T(\alpha) = \frac{\partial f_T(\alpha)}{\partial \alpha},$$

$$\hat{V}_{\alpha f}(\alpha) = Cov\left(\sqrt{\frac{1}{T}}f_T(\alpha), \sqrt{\frac{1}{T}}q_T(\alpha)\right), \quad \text{and}$$

$$P_{\hat{V}_{ff}(\alpha_0)^{-\frac{1}{2}}\hat{D}_T(\alpha_0)} = \hat{V}_{ff}(\alpha_0)^{-\frac{1}{2}}\hat{D}_T(\alpha_0)[\hat{D}_T(\alpha_0)'\hat{V}_{ff}(\alpha_0)^{-1}\hat{D}_T(\alpha_0)]^{-1}\hat{D}_T(\alpha_0)'\hat{V}_{ff}(\alpha_0)^{-\frac{1}{2}}.$$

Essentially, the K statistic uses an optimal subset of moment conditions to improve the power of the tests. In other words, by using a subset of more relevant moment conditions, we could improve the efficiency of the test statistic, which leads to the higher power of the tests. The only difference between the S statistic in Equation (28) and the K statistic in Equation (31) is that the K statistic uses the variance-covariance matrix adjusted by the projection matrix based on $\hat{D}_T(\alpha)$. $\hat{D}_T(\alpha)$ is a residual of the gradient of moment conditions, $q_T(\alpha)$, after projecting it on the level of the moment conditions, $f_T(\alpha)$. By construction, $\hat{D}_T(\alpha)$ is orthogonal to $f_T(\alpha)$ and we use this orthogonality to improve the efficiency. The K statistic also has a chi-square null limiting distribution, with the number of parameters as the degrees of freedom.

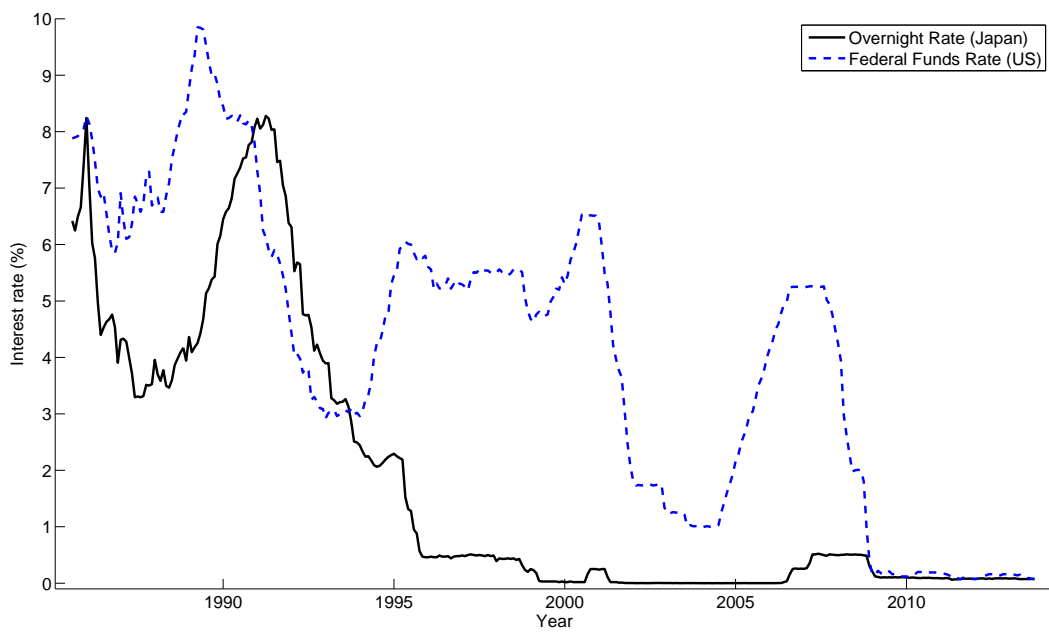


Figure 1: BOJ's overnight policy rate and Fed's federal funds rate from 1985 to 2013

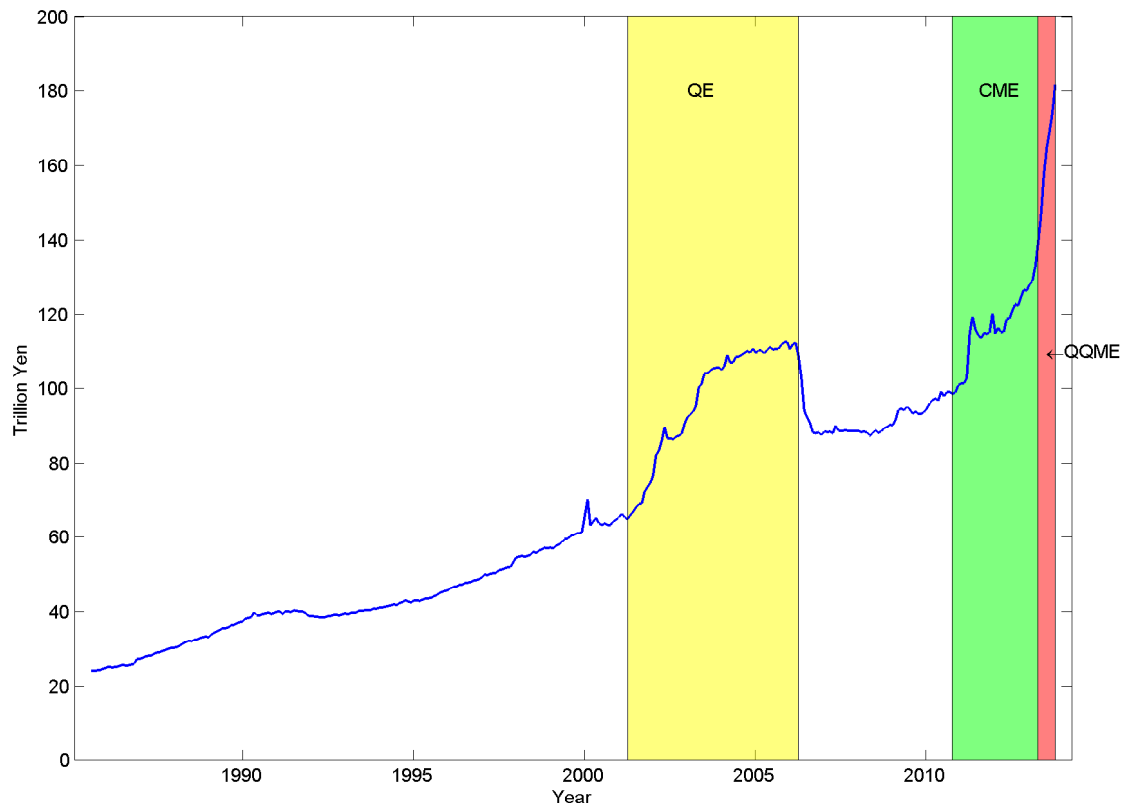


Figure 2: Monetary Base from 1985 to 2013

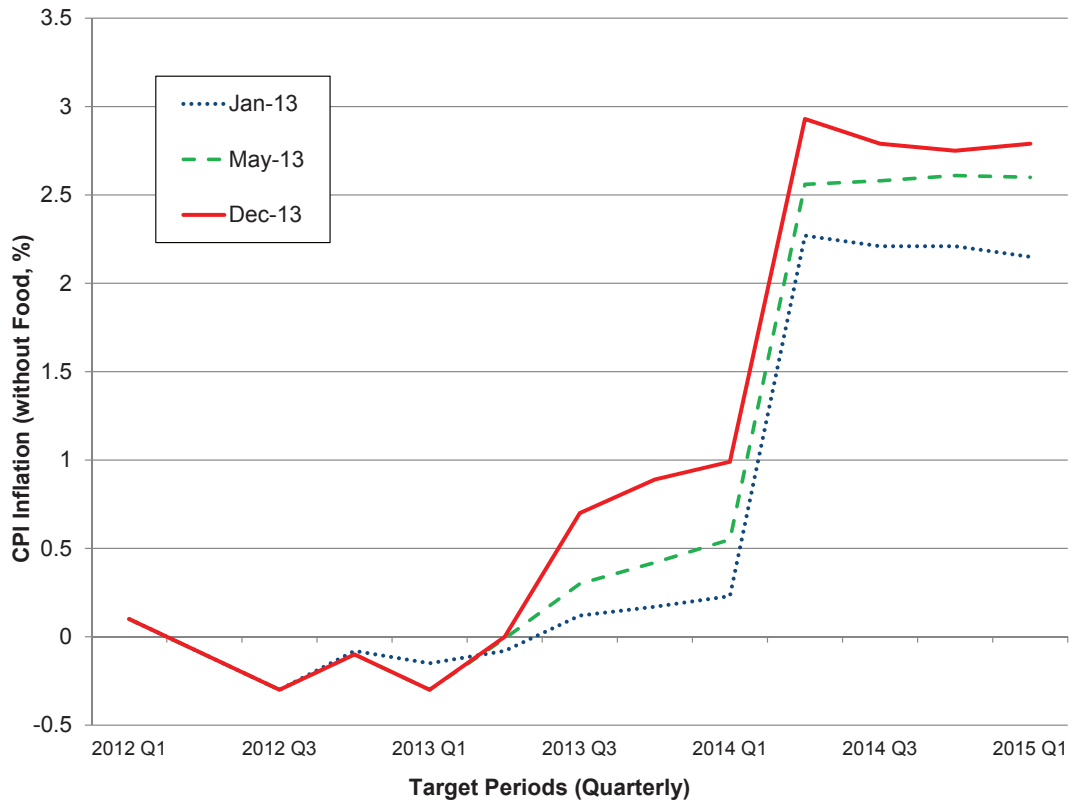


Figure 3: ESP Inflation Forecast in 2013 (Target Periods of 2013–2015)

Date	Event	Policy Rate(%)	Governer
4/14/1995		1.0	Matsushita
9/8/1995		0.5	
4/1/1998	The revised BOJ act came in effect	0.5	Hayami
2/12/1999		0	
8/11/2000		0.25	
3/19/2001	Quantitative Easing (QE) launched	0	
3/9/2006	QE terminated	0	Fukui
7/14/2006		0.25	
2/21/2007		0.5	
10/31/2008		0.3	Shirakawa
12/19/2008	JGB purchase increased	0	
10/5/2010	Comprehensive Monetary Easing (CME) launched	0	
4/4/2013	CME terminated, and Quantitative and Qualitative Monetary Easing (QQME) launched	0	Kuroda

Table 1: Timeline of BOJ's Monetary Policy

Date	Event	Summary
9/9/1998	BOJ Statement	Policy rate reduced to 0.25 percent
<i>2/12/1999</i>	<i>BOJ Statement</i>	<i>Policy rate reduced close to zero</i>
8/11/2000	BOJ Statement	Policy rate raised to 0.25 percent
<i>3/19/2001*</i>	<i>BOJ Statement</i>	<i>Quantitative easing (QE) launched (policy rate close to zero)</i>
<i>8/14/2001*</i>	<i>BOJ Statement</i>	<i>QE expanded</i>
<i>12/19/2001*</i>	<i>BOJ Statement</i>	<i>QE expanded</i>
<i>2/28/2002*</i>	<i>BOJ Statement</i>	<i>JGB purchase increased</i>
9/18/2002*	BOJ Statement	Stock purchase announced
<i>10/30/2002*</i>	<i>BOJ Statement</i>	<i>QE expanded</i>
3/25/2003*	BOJ Statement	Stock purchase expanded
4/8/2003*	BOJ Statement	ABS purchase announced
<i>4/30/2003*</i>	<i>BOJ Statement</i>	<i>QE expanded</i>
<i>5/20/2003*</i>	<i>BOJ Statement</i>	<i>QE expanded</i>
<i>10/10/2003*</i>	<i>BOJ Statement</i>	<i>QE expanded</i>
<i>1/20/2004*</i>	<i>BOJ Statement</i>	<i>QE expanded</i>
<i>3/9/2006*</i>	<i>BOJ Statement</i>	<i>QE terminated</i>
7/14/2006	BOJ Statement	Policy rate raised to 0.25 percent
2/21/2007	BOJ Statement	Policy rate raised to 0.5 percent
9/18/2008*	BOJ Statement	Dollar swap
10/31/2008	BOJ Statement	Policy rate reduced to 0.3 percent
12/2/2008*	BOJ Statement	Facilitation of corporate finance
<i>12/19/2008*</i>	<i>BOJ Statement</i>	<i>JGB purchase increased (policy rate reduced close to zero)</i>
2/3/2009*	BOJ Statement	Stock purchase restarted
<i>3/18/2009*</i>	<i>BOJ Statement</i>	<i>JGB purchase increased</i>
12/1/2009*	BOJ Statement	Fixed-rate 3-month operation
12/18/2009*	BOJ Statement	“Inflation target” clarified
3/17/2010*	BOJ Statement	Fixed-rate operation expanded
5/21/2010*	BOJ Statement	Growth enhancing operation
8/30/2010*	BOJ Statement	Fixed-rate 6-month operation
<i>10/5/2010*</i>	<i>BOJ Statement</i>	<i>Comprehensive monetary easing (CME) launched</i>
8/4/2011	BOJ Statement	CME expanded
10/27/2011	BOJ Statement	CME expanded
2/14/2012	BOJ Statement	CME expanded
4/10/2012	BOJ Statement	CME expanded
4/27/2012	BOJ Statement	CME expanded
10/30/2012	BOJ Statement	CME expanded and the joint statement with the government issued
12/20/2012	BOJ Statement	CME expanded
1/22/2013	BOJ Statement	CME expanded and inflation target clarified
2/25/2013	Nomination of the new governor	
3/4/2013	Confirmation hearing from the new governor at the National Diet	
4/4/2013	BOJ Statement	Quantitative and qualitative monetary easing (QQME) launched

a. Dates with superscript are listed in Table 2 of Ueda (2012a). The announcement days that are directly related to the JGB purchase and the QE programs are written in italics.

Table 2: Dates of BOJ’s Monetary Policy Announcements

Series	Announcement	Non-Announcement	Variance Ratio
JGB			
<i>5 year</i>	3.18	2.85	1.25
<i>10 year</i>	4.28	3.28	1.70 ^{**} _†
<i>20 year</i>	4.88	3.55	1.89 ^{**} _†
Corporate Bond Yield			
<i>AA, 5 year</i>	3.50	2.68	1.71 ^{**} _†
<i>AA, 10 year</i>	3.92	2.88	1.85 ^{**} _†
<i>BBB, 5 year</i>	3.64	2.74	1.76 ^{**} _†
<i>BBB, 10 year</i>	3.21	3.13	1.06
Stock Prices			
<i>Nikkei 225</i>	2.19	1.56	1.96 ^{**} _†
<i>TOPIX</i>	2.02	1.41	2.07 ^{**} _†
Exchange Rates			
<i>US Dollar</i>	1.06	0.71	2.22 ^{**} _†
<i>Euro</i>	1.24	0.84	2.17 ^{**} _†

a. This table compares the standard deviation of daily changes on the announcement days and non-announcement days. Daily changes of the yield in basis points and daily percent changes of the stock prices and exchange rates are used.

b. Superscripts *, ** denote the significance at the level of 10% and 5%, respectively, based on the F-test.

c. Subscripts †, ‡ denote the significance at the level of 10% and 5%, respectively, based on the block bootstrap with 10,000 replications. The stationary bootstrap leads to similar results as the block bootstrap.

Table 3: Standard Deviations and Variance Ratio on the Announcement Days and the Non-Announcement Days

Date	Event	JGB 5 Year	JGB 7 Year	JGB 10 Year	JGB 20 Year	AA 5 Year	AA 10 Year	BBB 5 Year	Nikkei 225	TOPIX	US Dollar	Euro
<i>2/25/2013</i>	<i>Nomination</i>	-1.30	-2.00	-2.20	-2.00	-1.37	-1.71	-0.73	2.40	1.77	-1.73	-2.71
<i>3/4/2013</i>	<i>Confirmation Hearing</i>	-1.90	-2.30	-4.40	-7.30	-0.69	0.88	-0.96	0.30	0.11	0.79	1.87
<i>4/4/2013</i>	<i>BOJ Statement</i>	-1.20	-5.50	-11.40	-17.70	-2.08	-9.72	-1.65	2.18	2.67	3.49	4.16
4/26/2013	BOJ Statement	1.50	1.40	0.80	-0.70	3.02	-0.71	1.83	-0.30	-0.99	-1.23	-1.10
5/22/2013	BOJ Statement	-1.20	0.50	1.20	1.70	-1.04	1.27	-1.02	1.59	0.44	0.64	0.26
6/11/2013	BOJ Statement	4.20	6.30	4.70	4.50	5.39	5.57	5.19	-1.47	-0.98	-2.80	-2.39
7/11/2013	BOJ Statement	-0.80	-3.80	-2.70	-1.80	-3.94	-2.61	-2.06	0.39	-0.04	-0.72	0.20
Baseline Events		-4.40	-9.80	-18.00	-27.00	-4.14	-14.17	-3.76	4.97	5.24	1.64	1.37
Cumulative		-0.70	-5.40	-14.00	-23.30	-0.71	-10.65	0.18	5.18	3.68	-2.47	-1.65
Average before 2013 (Negative Surprise)		-2.31	-2.48	-2.12	-1.70	-2.14	-1.75	-2.11	-0.61	-0.54	-0.15	0.11
Average before 2013 (Positive Surprise)		2.13	3.45	2.73	2.77	2.03	2.52	1.59	0.24	0.29	0.12	0.36

a. This table shows the daily changes of the yields and the daily percent changes of stock prices and exchange rates on the days listed above.

b. Baseline events are listed in Table 2 and written in *Italic*.

c. This table also shows the average effects using the pre-2013 data when there are positive/negative changes in 5-year JGB yield as a reference.

Table 4: Effects of the QQME Announcements on JGB, Corporate Bond Yields, Stock Prices and Exchange Rates

	Japan		U.S.	
	Estimate	Std. Error	Estimate	Std. Error
Panel A: Pass-Through from 5-Year Government Bonds				
<i>AA Corporate Bond</i>	0.99**	(0.25)	0.70**	(0.07)
<i>BBB Corporate Bond</i>	1.12	(1.13)	0.61**	(0.09)
<i>Stock Prices</i>	-1.19	(1.59)	-8.07**	(3.81)
<i>Exchange Rate</i>	-0.40	(0.83)	-7.52**	(0.93)
Panel B: Pass-Through from 10-Year Government Bonds				
<i>AA Corporate Bond</i>	0.94**	(0.05)	0.63**	(0.07)
<i>BBB Corporate Bond</i>	1.09	(1.24)	0.58**	(0.07)
<i>Stock Prices</i>	-0.20	(0.17)	-7.19*	(3.74)
<i>Exchange Rate</i>	-0.20	(0.16)	-6.57**	(0.87)
Panel C: Pass-Through from 20-Year Government Bonds				
<i>AA Corporate Bond</i>	0.84**	(0.21)	0.73**	(0.33)
<i>BBB Corporate Bond</i>	-2.90	(14.96)	0.63**	(0.31)
<i>Stock Prices</i>	-0.12	(0.08)	-10.80*	(6.15)
<i>Exchange Rate</i>	-0.20**	(0.09)	-9.27**	(3.09)

- a.* This table shows the pass-through to the corporate bond yields, stock prices, and exchange rates. Superscripts *, ** denote the significance at the level of 10% and 5%, respectively. Heteroscedasticity-robust standard errors are presented in the parenthesis.
- b.* For Japan, the corporate bond yield with the maturity of 5 years is used for the pass-through from 5-year government bonds, and the corporate bond yield with the maturity of 10 years is used for the pass-through from 10- and 20-year government bonds. Nikkei 225 index is used for stock prices and the spot exchange rate against US dollar is used for the exchange rate.
- c.* For the U.S., the effective corporate bond yield are used for all maturities. Dow Jones industrial average index is used for stock prices and the spot exchange rate against Euro is used for the exchange rate.

Table 5: GMM Estimates of the Pass-through to Corporate Bond Yield, Stock Prices and the Exchange Rate

Series	Announcement	Non-Announcement	Variance Ratio
Financial Assets			
<i>REIT index</i>	2.14	1.52	1.99 _† **
<i>CDS index</i>	5.30	4.19	1.60*
Exchange Rates: OECD Countries			
<i>Australian Dollar</i>	1.26	1.12	1.26
<i>Canadian Dollar</i>	1.22	0.94	1.67 _† **
<i>Korean Won</i>	1.34	1.07	1.56 _† **
<i>New Zealand Dollar</i>	1.29	1.10	1.38*
<i>UK Pound</i>	1.20	0.85	2.01 _† **
Exchange Rates: Asian Economies			
<i>Hong Kong Dollar</i>	1.06	0.71	2.26 _† **
<i>Singapore Dollar</i>	0.90	0.69	1.71 _† **
<i>Taiwanese Dollar</i>	1.01	0.75	1.82 _† **
<i>Thai Baht</i>	0.97	0.80	1.49 _† **

a. This table compares the standard deviation of daily changes on the announcement days and non-announcement days for additional variables: REITs, CDS, and the OECD and Asian exchange rates. Daily changes of the yield in basis points and daily percent changes of the exchange rates are used.

b. Other notes are the same as in Table 3.

Table 6: Standard Deviation and Variance Ratio of the Series on the Announcement Days and the Non-Announcement Days

Pass-through from	5-Year JGB		10-Year JGB		20-Year JGB	
	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error
<i>REIT Index</i>	-0.43	(0.28)	-0.36*	(0.19)	-0.30**	(0.12)
<i>CDS Index</i>	1.09	(0.82)	0.77	(0.53)	0.30	(0.23)
<i>Australian Dollar</i>	0.07	(0.46)	-0.16	(0.14)	-0.14*	(0.08)
<i>Canadian Dollar</i>	-0.84	(1.44)	-0.24	(0.20)	-0.21**	(0.11)
<i>Korean Won</i>	-0.78	(1.23)	-0.18	(0.17)	-0.18**	(0.11)
<i>New Zealand Dollar</i>	-0.34	(0.75)	-0.21	(0.19)	-0.17**	(0.09)
<i>UK Pound</i>	0.03	(0.36)	-0.15	(0.18)	-0.20*	(0.11)
<i>Hong Kong Dollar</i>	-0.51	(1.02)	-0.21	(0.17)	-0.20**	(0.10)
<i>Singapore Dollar</i>	-0.04	(0.19)	-0.15	(0.13)	-0.15**	(0.07)
<i>Taiwanese Dollar</i>	0.02	(0.23)	-0.10	(0.12)	-0.15*	(0.08)
<i>Thai Baht</i>	-0.07	(0.28)	-0.15	(0.15)	-0.15**	(0.08)

a. This table shows the pass-through to additional variables: REIT, CDS, and the OECD and Asian-Pacific exchange rates.

b. Other notes are the same as in Table 5.

Table 7: GMM Estimates of the Pass-through to Additional Variables

	Japan		U.S.	
	Estimate	Std. Error	Estimate	Std. Error
Panel A: Pass-Through from 5-Year Government Bonds				
<i>AA Corporate Bond</i>	0.41	(0.26)	0.73**	(0.05)
<i>BBB Corporate Bond</i>	0.12	(0.22)	0.70**	(0.04)
<i>Stock Prices</i>	0.06	(0.26)	-7.77*	(4.12)
<i>Exchange Rate</i>	-0.14	(0.11)	-8.13**	(1.01)
Panel B: Pass-Through from 10-Year Government Bonds				
<i>AA Corporate Bond</i>	0.78**	(0.18)	0.69**	(0.03)
<i>BBB Corporate Bond</i>	0.86**	(0.21)	0.65**	(0.02)
<i>Stock Prices</i>	-0.24	(0.35)	-7.48*	(4.23)
<i>Exchange Rate</i>	0.09	(0.08)	-7.27**	(0.90)
Panel C: Pass-Through from 20-Year Government Bonds				
<i>AA Corporate Bond</i>	0.78**	(0.19)	1.23**	(0.19)
<i>BBB Corporate Bond</i>	0.81**	(0.15)	1.17**	(0.18)
<i>Stock Prices</i>	-0.39	(0.25)	-13.21*	(7.99)
<i>Exchange Rate</i>	0.05	(0.07)	-11.31**	(2.05)

a. This table shows the pass-through to the corporate bond yields, stock prices, and exchange rates, based on a selected set of the announcements.

b. Other notes are the same as in Table 5.

Table 8: GMM Estimates of the Pass-through to Corporate Bond Yields, Stock Prices and the Exchange Rate (Selected Announcements)

	2001-2006 (QE)	2006-2010	2010-2013 (CME)
Panel A: Pass-Through from 5-Year JGB			
<i>AA Corporate Bond</i>	1.02**	1.03**	1.99
<i>BBB Corporate Bond</i>	1.04**	1.13**	1.81
<i>Nikkei 225</i>	-0.66	-0.43	0.52
<i>US Dollar</i>	-0.04	-0.05	8.19
Panel B: Pass-Through from 10-Year JGB			
<i>AA Corporate Bond</i>	0.98**	0.98**	2.26**
<i>BBB Corporate Bond</i>	0.60*	0.77**	1.98**
<i>Nikkei 225</i>	-0.05	1.59	0.41
<i>US Dollar</i>	-0.03**	-0.20	-0.03
Panel C: Pass-Through from 20-Year JGB			
<i>AA Corporate Bond</i>	0.97**	0.98**	0.71**
<i>BBB Corporate Bond</i>	0.44**	1.22**	1.08**
<i>Nikkei 225</i>	-0.06	0.89	0.12
<i>US Dollar</i>	-0.02	-0.19	0.06
Number of Announcements	13	13	9

a. This table shows the pass-through to the corporate bond yields, stock prices, and exchange rates in the subsamples: 2001-2006 (the QE program), 2006-2010, and 2010-2013 (the CME program).

b. Other notes are the same as in Table 5.

Table 9: GMM Estimates of the Pass-through in Subperiods

	Estimate	Std. Error
Panel A: Pass-Through to Main Variables		
<i>AA, 5 year</i>	0.57**	(0.32)
<i>AA, 10 year</i>	0.76**	(0.25)
<i>BBB, 5 year</i>	1.41	(0.80)
<i>BBB, 10 year</i>	0.58	(0.50)
<i>Nikkei 225</i>	-0.09	(0.22)
<i>TOPIX</i>	-0.05	(0.19)
<i>US Dollar</i>	-0.06	(0.11)
Panel B: Pass-Through to Additional Variables		
<i>Euro</i>	-0.00	(0.07)
<i>REIT Index</i>	-1.18	(1.52)
<i>CDS Index</i>	1.77	(2.54)
<i>Australian Dollar</i>	-0.05	(0.10)
<i>Canadian Dollar</i>	-0.15	(0.23)
<i>Korean Won</i>	-0.17	(0.26)
<i>New Zealand Dollar</i>	-0.08	(0.14)
<i>UK Pound</i>	-0.00	(0.08)
<i>Hong Kong Dollar</i>	-0.08	(0.14)
<i>Singapore Dollar</i>	-0.04	(0.08)
<i>Taiwanese Dollar</i>	-0.01	(0.05)
<i>Thai Baht</i>	-0.04	(0.08)

a. This table presents the pass-through based on the principal component of JGB yields with a maturity of 5,10 and 20 years.
b. Other notes are the same as in Table 5.

Table 10: GMM Estimates of the Pass-through based on the Principal Component of JGB Yields

Conference Report to National Chengchi University

1. Name and Position

- Name: Natsuki Arai (荒井 夏來)
- Position: Assistant Professor
- Department: International Business Department
- College: College of Commerce

2. Details of the Presentations

- Institution 1: Asian Development Bank
- Dates: April 28, 2016
- Venue: Asian Development Bank, Manila, Philippines

- Institution 2: The Bangko Sentral ng Pilipinas (Central Bank of Philippines)
- Dates: April 29, 2016
- Venue: Central Bank of Philippines, Manila, Philippines

3. Paper presented at the conference

(Title)

The Effects of Monetary Policy Announcements at the Zero Lower Bound

(Abstract)

This paper investigates the effects of monetary policy announcements at the zero lower bound using Japanese data from 1998 to 2013. I find that the effect of expansionary monetary policy shocks is directly passed on to corporate bond yields, notably for high-grade corporate bond yields. However, the magnitude of estimated pass-through to stock prices and the exchange rate is substantially smaller than in the U.S., and not statistically significant in most cases. Such differences may reflect a higher degree of market segmentation or smaller scope to achieve further accommodation in Japan.

4. Comments and questions received during the presentations

- Interpretation of estimated coefficients (pass-through from long-term interest rate to asset prices) is not entirely clear due to identification problem. Is it possible to use intra-daily data to confirm your results?
 - Unfortunately intraday data is not available.

- If there is any correlation between monetary policy shock and asset price shock, is it possible to disentangle these effects? (For example, central banks purchased stock as well as a part of unconventional monetary policy, which should have direct effect on stock prices)
 - Unfortunately, such correlation between monetary policy shock and asset prices is also reflected in the estimate, and it is not possible to disentangle it. However, since BoJ may intend to boost the asset prices, this estimate is still a subject of interest.

- How can you pick the important announcement days? Does identification depend on the selection of the announcements?
 - Yes, identification depends on the selection of announcement days. In fact, if you select too many trivial announcement days, it will dampen identification. Therefore, I select important announcement days, and pick the dates when BoJ officially changed its monetary policy. (They are mix of forward guidance and asset purchases) I have 41 announcement days from 1998 to 2013.

- Can you look at the changes on the real variables, using the technique such as VAR, instead of indirectly measuring the financial variables?
 - It is a very good question, and our focus is of course on the effects of monetary policy on real variables. Unfortunately, under this framework, the availability of high-frequency data is essential, and I cannot directly look at real variables since they can only be observed monthly or quarterly.

- Instead of looking at the exchange rates of individual currencies, can you check the trade-weighted real exchange rate to see the effects of monetary policy announcements?
 - Of course we can, but unfortunately we haven't done yet. However, I'm pretty sure that the results will be similar anyway: no effect of BOJ's monetary policy announcements on the exchange rates.

- How do you think about the recent policy change by bank of Japan to introduce negative interest rates?
 - It is a good question. One implication of this paper is that the effects of unconventional monetary policy depends on economic environment, and by nature it is limited compared to conventional policy. I think it's a right policy move to show that bank of Japan committed to its 2% inflation target, but the effect of negative interest rate policy will not be too big anyway.

5. People I met at the conference

- Abdul Abiad (Asian Development Bank)

Conference Report to National Chengchi University

1. Name and Position

- Name: Natsuki Arai (荒井 夏來)
- Position: Assistant Professor
- Department: International Business Department
- College: College of Commerce

2. Details of the Conference

- Name: NBER summer institute 2016
- Dates: July 12-15 (Forecasting and empirical methods), July 16 (EF&G) 2016
- Venue: Royal Sonesta Hotel (Cambridge, MA, USA)

3. Interesting Presentations at the Conference

- “Measuring Macroeconomic Uncertainty and its Impact on the Economy” by Andrea Carriero (Queen Mary University of London), Todd Clark (Federal Reserve Bank of Cleveland), and Massimiliano Marcellino (Bocconi University)
(Abstract)

Recent research has focused on measuring economic uncertainty and its impact on the economy. In this paper we introduce a new econometric framework to analyze these issues. Specifically, we build a VAR model for a possibly large set of variables whose volatility is driven by a common unobservable factor, which can be interpreted as the underlying aggregate uncertainty and can also affect the levels of the variables. Hence, contrary to most existing measures, ours reflects changes in both the conditional mean and volatility of the underlying variables, and is estimated taking explicitly into account the existence of aggregate uncertainty. Moreover, our approach allows simultaneous estimation of the uncertainty and its impact on the economy, providing also a coherent measure of the uncertainty around them, while most existing studies rely on a two-step approach with one model used to estimate uncertainty and a second one to assess its effects. We introduce a new Bayesian estimation method for the model, which is computationally efficient and allows for estimation even of large models. We then apply the method to estimate uncertainty and its effects using US data, finding that at least medium sized models (about 20 variables) are needed for proper estimation of uncertainty, there is indeed substantial commonality in uncertainty, sizable effects of uncertainty on key macroeconomic variables, but also some uncertainty about uncertainty and its effects. Similar results also hold separately for macroeconomic and financial uncertainty, which can be separately identified in an extended version of our model.

- Using the large-scale VAR to estimate the volatility of common factors, which the authors regard as uncertainty
- Find sizable effects on macroeconomic variables.

- “Measuring the Effects of Federal Reserve Forward Guidance and Asset Purchases on Financial Markets” by Eric T. Swanson (University of California at Irvine and NBER)

(abstract)

I adapt the methods of Gurkaynak, Sack, and Swanson (2005) to estimate two dimensions of monetary policy during the 2009–2015 zero lower bound period in the U.S. I show that, after a suitable rotation, these two dimensions can be interpreted as “forward guidance” and “large-scale asset purchases” (LSAPs). I estimate the sizes of the forward guidance and LSAP components of each FOMC announcement between January 2009 and October 2015, and show that those estimates correspond closely to identifiable features of major FOMC announcements over that period. Forward guidance is more effective at moving short-term Treasury yields, while LSAPs are more effective at changing long-term Treasury and corporate bond yields. Both types of policies have significant effects on medium-term Treasury yields, stock prices, and exchange rates. There is some evidence that the effects of LSAPs are not persistent, but that result is driven entirely by the behavior of bond yields around the FOMC’s major “QE1” announcement in March 2009.

- Trying to decompose the effect of forward guidance policy and large-scale asset purchases, using the methodology of Gurkaynak, Sack and Swanson (2005)
 - Finding that forward guidance policy is more effective to move short-term rates, while large-scale asset purchases are effective to move the long-term rates.
 - Effects of large-scale asset purchases are not persistent.
- “The Making of Hawks and Doves: Inflation Experiences and Voting on the FOMC” by Ulrike Malmendier (University of California at Berkeley and NBER), Stefan Nagel (University of Michigan and NBER), and Zhen Yan (University of Michigan)

(abstract)

Macroeconomic models of monetary policy assume that central bankers form rational beliefs based on all available data. We show that personal lifetime experiences significantly affect the forecasts and voting behavior of FOMC members. We link experience-based inflation expectations to the desired level of nominal interest rates using a forward-looking formulation of the Taylor rule. We test the predicted relationship on data of the FOMC voting history from March 1951 to January 2014. We find that a one standard-deviation increase in experience-based forecasts increases the unconditional probability of a hawkish dissent also by about one third, and decreases the unconditional probability of a dovish dissent by about one third. Our results are robust to accounting for the different voting patterns of regional presidents and governors by allowing the thresholds for dissent to vary between groups as well as by other characteristics. We also find a strong direct impact of experiences on forecasts. The difference between FOMC and staff members' inflation forecasts is strongly related to their difference in lifetime experiences of inflation. Our findings imply that personal experiences affect even experts' expectation formation.

- Examine the FOMC policymaker’s characteristics to and their voting patterns (consent or dissent) to see if their life experience matters.
- Finding that whether they experience of inflation in their life time (in interwar Germany or great inflation) affects their voting patterns.

4. Conference program

NATIONAL BUREAU OF ECONOMIC RESEARCH, INC.
SI 2016 Forecasting & Empirical Methods

Allan Timmermann and Jonathan H. Wright, Organizers

July 12-15, 2016

Royal Sonesta Hotel

Longfellow Room
40 Edwin Land Boulevard
Cambridge, Massachusetts

PROGRAM

Tuesday, July 12

8:00 am Coffee and Pastries

8:30 am Daniel Lewis, Harvard University
Eben Lazarus, Harvard University
James H. Stock, Harvard University and NBER
Mark W. Watson, Princeton University and NBER
[*HAR Inference: Kernel Choice, Size Distortions, and Power Loss*](#)

9:15 am Lawrence DW. Schmidt, University of Chicago
Yinchu Zhu, University of California at San Diego
[*Quantile Spacings: A Simple Method for the Joint Estimation of Multiple Quantiles Without Crossing*](#)

10:00 am Break

10:30 am Matteo Barigozzi, London School of Economics and Political Science
Marco Lippi, Universitat di Roma, La Sapienza
Matteo Luciani, Federal Reserve Board of Governors
[*Non-Stationary Dynamic Factor Models for Large Datasets*](#)

11:15 am Davide Pettenuzzo, Brandeis University
Gary Koop, University of Strathclyde

Dimitris Korobilis, University of Glasgow, Adam Smith Business School
[Bayesian Compressed Vector Autoregressions](#)

12:00 n Lunch and Adjourn

Wednesday, July 13

8:00 am Coffee and Pastries

8:30 am Sydney C. Ludvigson, New York University and NBER
Sai Ma, New York University
Serena Ng, Columbia University and NBER
[Uncertainty and Business Cycles: Exogenous Impulse or Endogenous Response?](#)

9:15 am Andrea Carriero, Queen Mary University of London
Todd Clark, Federal Reserve Bank of Cleveland
Massimiliano Marcellino, Bocconi University
[Measuring Macroeconomic Uncertainty and its Impact on the Economy](#)

10:00 am Break

10:30 am Mario Forni, Universita di Modena
Luca Gambetti, Universitat Autònoma de Barcelona
Luca Sala, Bocconi University
[VAR Information and the Empirical Validation of DSGE Models](#)

11:15 am Geert Bekaert, Columbia University and NBER
Eric Engstrom, Federal Reserve Board of Governors
Andrey Ermolov, Fordham University
[Macro Risks and the Term Structure of Interest Rates](#)

12:00 n Lunch and Adjourn

6:00 pm Clambake

Thursday, July 14

8:00 am Coffee and Pastries

- 8:30 am Harrison Hong, Princeton University and NBER
Weikai Li, Hong Kong University of Science and Technology
Jiangmin Xu, Peking University
[*Climate Risks and Market Efficiency*](#)
- 9:15 am Christiane J.S. Baumeister, University of Notre Dame
Lutz Kilian, University of Michigan
[*A General Approach to Recovering Market Expectations from Futures Prices with an Application to Crude Oil*](#)
- 10:00 am Break
- 10:30 am Martin M. Andreasen, Aarhus University
Jens Christensen, Federal Reserve Bank of San Francisco
Kevin Cook, Federal Reserve Bank of San Francisco
Simon Riddell, Federal Reserve Bank of San Francisco
[*The TIPS Liquidity Premium*](#)
- 11:15 am Eric T. Swanson, University of California at Irvine and NBER
[*Measuring the Effects of Federal Reserve Forward Guidance and Asset Purchases on Financial Markets*](#)
- 12:00 n Lunch and Adjourn

Friday, July 15

- 8:00 am Coffee and Pastries
- 8:30 am Emre Yoldas, Federal Reserve Board
Zeynep Senyuz, Federal Reserve Board
[*Financial Stress and Equilibrium Dynamics in Money Markets*](#)
- 9:15 am Torben G. Andersen, Northwestern University and NBER
Nicola Fusari, Johns Hopkins University
Viktor Todorov, Northwestern University
[*The Pricing of Tail Risk and the Equity Premium: Evidence from International Option Markets*](#)
- 10:00 am Break

- 10:30 am Mathias S. Kruttli, Board of Governors of the Federal Reserve System
From Which Consumption-Based Asset Pricing Models Can Investors Profit? Evidence from Model-Based Priors
- 11:15 am Simone Manganelli, European Central Bank
Asset Allocation with Judgment
- 12:00 n Lunch and Adjourn

Conference Report to National Chengchi University

1. Name and Position

- Name: Natsuki Arai (荒井 夏來)
- Position: Assistant Professor
- Department: International Business Department
- College: College of Commerce

2. Details of the Conference

- Name: 2015 the Joint Statistical Meetings
- Dates: August 8–13, 2015
- Venue: the Washington State Convention Center, Seattle, US

3. Paper presented at the conference

(Title)

Evaluating the Efficiency of the FOMC's New Economic Projections

(Abstract)

Since 2007, FOMC policymakers have been publishing detailed numerical projections of macroeconomic series over the next three years. By testing whether the revisions to these projections are unpredictable, I find that FOMC's efficiency is generally accepted for inflation, but often rejected for real economic variables, notably for the unemployment rate. The rejection is due to the strong autocorrelation of revisions, which may reflect information rigidity of FOMC's unemployment projections. The joint efficiency of the entire projection is accepted in most cases.

4. Comments and questions received during the presentation

- What is the effects of small sample size?
(I use the bootstrap for the inference to take the property of small sample into account. In addition, I conduct carefully designed Monte Carlo exercise to suggest that the power of the test is strong enough to have rejections.)
- How do you think about the effects of aggregation in your results?
(It is true that I analyzed the efficiency of midpoints, which is a very specific way to aggregate the multiple policymaker's projections. First, individual data is not available, and this is the best I can do. In addition, to address this concern, I conduct Monte Carlo exercise and showed that the effects of aggregation are quantitatively negligible.)

- Is there any way to connect different projections with individual policymakers? (Currently, no. Only thing I know is the ranges of projections for individual variables. However, it is possible that more detailed material will be released in the future, which enables us to conduct more detailed research)
- The sample you have (2007-2015) contains the Great recession, which is an extremely turbulent period. Does it affect your analysis? (Yes, of course. However, the main point of the paper is that FOMC's forecasting performance is worse relative to the private forecaster's forecast (SPF) over the same period. In the paper, I also provide the comparison between FOMC and SPF, and find totally different results before the Great recession. Whether this difference is due to the length of forecast horizons or other factors is an open question in the literature.)

5. People whom I met at the conference

- Neil Ericsson (Federal Reserve board)
- Tara Sinclair (George Washington University)
- Fred Joutz (George Washington University)
- Youngdeok Hwang (IBM T. J. Watson Research)

Conference Report to National Chengchi University

1. Name and Position

- Name: Natsuki Arai (荒井 夏來)
- Position: Assistant Professor
- Department: International Business Department
- College: College of Commerce

2. Details of the Presentation

- Name of the conference: 2016 SNDE (Society of Nonlinear Dynamics and Econometrics) Conference
- Dates: March 10 and 11, 2016 (Presentation was on March 10, 2016)
- Venue: the University of Alabama in Tuscaloosa, Alabama, USA

3. Paper presented at the seminar

(Title)

The Effects of Monetary Policy Announcements at the Zero Lower Bound

(Abstract)

This paper investigates the effects of monetary policy announcements at the zero lower bound using Japanese data from 1998 to 2013. I find that the effect of expansionary monetary policy shocks is directly passed on to corporate bond yields, notably for high-grade corporate bond yields. However, the magnitude of estimated pass-through to stock prices and the exchange rate is substantially smaller than in the U.S., and not statistically significant in most cases. Such differences may reflect a higher degree of market segmentation or smaller scope to achieve further accommodation in Japan.

4. Comments and questions received during the presentation

- Interpretation of estimated coefficients (pass-through from long-term interest rate to asset prices) is not entirely clear due to identification problem. Is it possible to use intra-daily data to confirm your results?
 - Unfortunately intraday data is not available.
- If there is any correlation between monetary policy shock and asset price shock, is it possible to disentangle these effects? (For example, central banks purchased stock as well as a part of unconventional monetary policy, which should have direct effect on stock prices)
 - Unfortunately, such correlation between monetary policy shock and asset prices is also reflected in the estimate, and it is not possible to disentangle it. However, since BoJ may intend to boost the asset prices, this estimate is still a subject of interest.
- How can you pick the important announcement days? Does identification depend on the selection of the announcements?
 - Yes, identification depends on the selection of announcement days. In fact, if you select too many trivial announcement days, it will dampen identification. Therefore, I select important announcement days, and pick the dates when BoJ officially changed its monetary policy. (They are mix of forward guidance and asset purchases) I have 41 announcement days from 1998 to 2013.
- Can you look at the changes on the real variables, using the technique such as VAR, instead of indirectly measuring the financial variables?
 - It is a very good question, and our focus is of course on the effects of monetary policy on real variables. Unfortunately, under this framework, the availability of high-frequency data is essential, and I cannot directly look at real variables since they can only be observed monthly or quarterly.

5. People I met at the conference

- Tatevik Sekhposyan (Texas A&M University)
- Kevin Lansing (Federal reserve Bank of San Francisco)
- Minchul Shin (University of Illinois at Urbana-Champaign)

科技部補助計畫衍生研發成果推廣資料表

日期:2016/10/07

科技部補助計畫	計畫名稱: 調查預測無效率之原因: 政治壓力與誤解
	計畫主持人: 荒井夏來
	計畫編號: 104-2410-H-004-208- 學門領域: 總體經濟學與貨幣經濟學
無研發成果推廣資料	

104年度專題研究計畫成果彙整表

計畫主持人：荒井夏來			計畫編號：104-2410-H-004-208-				
計畫名稱：調查預測無效率之原因：政治壓力與誤解							
成果項目			量化	單位	質化 (說明：各成果項目請附佐證資料或細項說明，如期刊名稱、年份、卷期、起訖頁數、證號...等)		
國內	學術性論文	期刊論文		0	篇		
		研討會論文		0			
		專書		0	本		
		專書論文		0	章		
		技術報告		0	篇		
		其他		0	篇		
	智慧財產權及成果	專利權	發明專利	申請中	0	件	
				已獲得	0		
			新型/設計專利		0		
		商標權		0			
		營業秘密		0			
		積體電路電路布局權		0			
		著作權		0			
		品種權		0			
		其他		0			
	技術移轉	件數		0	件		
		收入		0	千元		
	國外	學術性論文	期刊論文		2	篇	"Evaluating the Efficiency of the FOMC' s New Economic Projections," Journal of Money, Credit and Banking 48, (2016) pp. 1019-1049, "The Effects of Monetary Policy Announcements at the Zero Lower Bound," accepted to International Journal of Central Banking
			研討會論文		0		
			專書		0	本	
專書論文			0	章			
技術報告			0	篇			
其他			0	篇			
智慧財產權及成果		專利權	發明專利	申請中	0	件	
				已獲得	0		
			新型/設計專利		0		
		商標權		0			
		營業秘密		0			

		積體電路電路布局權	0		
		著作權	0		
		品種權	0		
		其他	0		
	技術移轉	件數	0	件	
		收入	0	千元	
參與計畫人力	本國籍	大專生	1	人次	學習型兼任助理
		碩士生	4		學習型兼任助理
		博士生	0		
		博士後研究員	0		
		專任助理	0		
	非本國籍	大專生	0		
		碩士生	0		
		博士生	0		
		博士後研究員	0		
		專任助理	0		
其他成果 (無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。)					

科技部補助專題研究計畫成果自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現（簡要敘述成果是否具有政策應用參考價值及具影響公共利益之重大發現）或其他有關價值等，作一綜合評估。

1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估

達成目標

未達成目標（請說明，以100字為限）

實驗失敗

因故實驗中斷

其他原因

說明：

2. 研究成果在學術期刊發表或申請專利等情形（請於其他欄註明專利及技轉之證號、合約、申請及洽談等詳細資訊）

論文： 已發表 未發表之文稿 撰寫中 無

專利： 已獲得 申請中 無

技轉： 已技轉 洽談中 無

其他：（以200字為限）

3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性，以500字為限）

本文藉由1998 - 2013年日本數據，研究貨幣政策在名義利率零下限狀況中的影響。我發現，擴張性貨幣政策衝擊的作用會直接影響公司債券收益率，特別是在高級公司債券收益率上。然而，預估之流轉股票價格和匯率的幅度大大地小於美國，且在多數情況中於統計上是不顯著的。

本文討論的政策意涵是雙重的：首先，本文的結果指出非常規貨幣政策的影響取決於經濟環境，儘管非常規貨幣政策在美國是有效的，但日本在長期通貨緊縮下，難以藉此改變人們的期望。第二，決策者應該意識到中央銀行事務的立場，且須表現出決心實現目標的態度。與2013年前由日本銀行發佈的公告不同，2013年日本銀行所發布的貨幣政策公告被視為政權更迭，具有重大的影響。

4. 主要發現

本研究具有政策應用參考價值： 否 是，建議提供機關中華民國中央銀行（勾選「是」者，請列舉建議可提供施政參考之業務主管機關）

本研究具影響公共利益之重大發現： 否 是

說明：（以150字為限）

目前許多發達經濟體受困於或非常接近名義利率的零下限，因此，理解非常規

貨幣政策的影響，具有非常重要的政策意涵。本文在這個問題的探討上，作出了相當大的貢獻。