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Policy announcement and credit risk: zero interest rate policy and quantitative monetary easing policy

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Abstract

This paper examines how changes in the Bank of Japan (BOJ)'s monetary policy stance affect credit risks during the non-traditional monetary policy period. We divide its policy period into the zero interest rates policy (ZIRP) and the quantitative monetary easing policy (QMEP) to compare each policy effect. First, we find that the introductions of both the ZIRP and the QMEP lower the 20-year credit risk. Moreover, the QMEP lowers the 10-year credit risk. Next, it is found that the credit risks increase after the termination of ZIRP but decrease after it of QMEP. The market response on the policy announcement of the termination of the easing monetary policy is different.

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1. Introduction

The Japanese economy has been in a deep recession since the burst of the asset price bubble of the early 1990s and the banking sector has suffered from severe loan problems since the late 1990s. As a remedy, the Bank of Japan (BOJ) acted the zero interest rate policy (ZIRP) from February 1999 to August 2000[1] and the quantitative monetary easing policy (QMEP) from March 2001 to March 2006. In addition, the BOJ added a commitment on the ZIRP and a clarification of commitment of the QMEP to stabilize the financial system and stimulate the economy. The ZIRP and QMEP are both non-traditional monetary policies. The non-traditional monetary policy was the BOJ's first attempt to ease or stabilize the financial system. Krugman (1998, 2000), Woodford (1999), Reifschneider and Williams (2000), and Eggertson and Woodford (2003) point out the effect of expectation control in attempts to ease the monetary policy. In several papers related to Japanese non-traditional monetary policy, Fujiki and Shiratsuka (2002), Okina and Shiratsuka (2004), Oda and Ueda (2007), and Hanabusa (2009) support the existence of the policy duration effect throughout the flatness of the yield curve and Kimura and Small (2006) find a reduction in the credit spread of high-grade corporate bonds. Baba *et al.* (2006) suggest that the QMEP reduced the dispersion of negotiable certificates of deposit issuance rates across banks and flattened the credit spreads for each credit rating category.

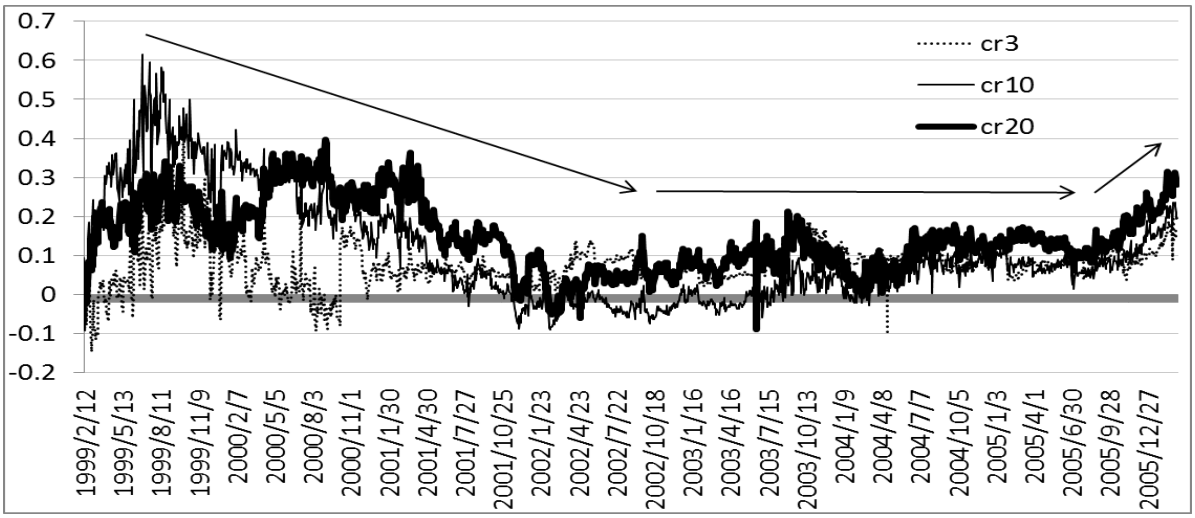
Figure 1 shows the credit risk (the difference between Japanese government bond, or JGB, yields and swap yields) of the banking sector. If this value increases, it indicates the credit risk of the banking sector is rising. Credit risk declined from 1999 to 2003, but has risen since 2005. Table 1 shows the mean and variance of credit risks. Credit risk is high on average in 1998 before the ZIRP: the 3-year risk is 0.190, 10-year is 0.382, and 20-year is 0.359. Conversely, the 3-year credit risk from February 15, 1999, to April 13, 1999—the period from the introduction of the ZIRP to the addition of commitment of the ZIRP—is -0.030. The 10- and 20-year credit risks from March 20, 2001, to October 10, 2003—the period from the introduction of the QMEP to the clarification of commitment of the QMEP—are 0.002 and 0.091, respectively. Therefore, it is considered that the ZIRP and QMEP are useful for lowering credit risk.

Banerjee *et al.* (2016) and Spencer (2016) examine the impact of a financial crisis on credit risks. This paper's aim, however, is to examine the relationship between the BOJ's announcements and credit risks. We therefore verify the effects of the following six policy statements: introduction of the ZIRP, addition of commitment of the ZIRP, termination of the ZIRP, introduction of the QMEP, clarification on the commitment on the QMEP, and

[1] In this paper, we use the term "ZIRP" in a narrow sense, referring to the first ZIRP of the late 1990s and do not consider the low interest rate policy from March 2001 to July 2006. We consider this period the "QMEP" period. The QMEP is considered to be an extended ZIRP. See Oda and Ueda (2007).

termination of the QMEP. We find that the announcements of the termination of the ZIRP and QMEP influence credit risks differently; in addition, ample liquidity lowers these risks. Thus, the non-traditional monetary policy is considered to have an important role in the financial markets.

Fig. 1: Banking sector credit risks



Note: cr3, cr10, and cr20 denote 3-, 10-, and 20-year credit risks ($cr_{3,t}$, $cr_{10,t}$, and $cr_{20,t}$), respectively.

Source: Thomson Reuters Datastream.

Table 1: Mean and variance of credit risks

[a]	$cr_{3,t}$	$cr_{10,t}$	$cr_{20,t}$	[b]	$cr_{3,t}$	$cr_{10,t}$	$cr_{20,t}$
Mean	0.190	0.382	0.359	Mean	-0.030	0.185	0.141
Variance	0.005	0.003	0.006	Variance	0.004	0.009	0.005
Number	259	259	259	Number	42	42	42
[c]	$cr_{3,t}$	$cr_{10,t}$	$cr_{20,t}$	[d]	$cr_{3,t}$	$cr_{10,t}$	$cr_{20,t}$
Mean	0.096	0.340	0.235	Mean	0.051	0.199	0.272
Variance	0.007	0.007	0.004	Variance	-0.796	0.654	0.058
Number	348	348	348	Number	156	156	156
[e]	$cr_{3,t}$	$cr_{10,t}$	$cr_{20,t}$	[f]	$cr_{3,t}$	$cr_{10,t}$	$cr_{20,t}$
Mean	0.066	0.002	0.091	Mean	0.096	0.074	0.128
Variance	0.001	0.002	0.004	Variance	0.001	0.002	0.003
Number	669	669	669	Number	629	629	629

Note: [a] 1/5/1998–12/31/1998, [b] 2/15/1999–4/13/1999, [c] 4/14/1999–8/11/2000, [d] 8/14/2000–3/19/2001, [e] 3/20/2001–10/10/2003, [f] 10/13/2003–3/9/2006

The rest of the paper is organized as follows. In Section 2, we explain in detail the

non-traditional monetary policy in Japan. Section 3 describes the methodology and data, Section 4 presents empirical results, and Section 5 concludes.

2. Non-traditional Monetary Policy

The ZIRP encouraged the policy interest rate (uncollateralized overnight call rate) to drop as low as possible. This policy was implemented from February 12, 1999, to August 11, 2000. The aim was to avoid increased deflationary pressure and an economic downturn. BOJ Governor Masaru Hayami, announced on April 13, 1999, that the BOJ was committed to maintaining the ZIRP "until deflationary concerns are dispelled,"[2] which indicated a considerable period of time. This affected the expectations of the financial markets, in which short-term interest rates declined rapidly, the yield curve became extremely flat, and long-term interest rates became stable. On August 11, 2000, the BOJ held a monetary policy meeting and decided to end the ZIRP.

The QMEP was subsequently implemented from March 19, 2001, to March 9, 2006. The aim was to avoid declining prices as well as to prepare a basis for sustainable economic growth.[3] Ugai (2006) details findings from a survey of the QMEP,[4] which highlighted the following three points. First, the BOJ aimed to provide ample liquidity by increasing its current account balance (CAB) as the operating policy target to achieve a CAB target in excess of the required reserves. Second, the BOJ was committed to providing ample liquidity until the consumer price index (CPI) became stable at zero percent or showed an annual increase. Third, the BOJ increased the purchase of long-term JGBs required to facilitate a smooth funds supply. On October 10, 2003, the BOJ clarified the condition of the QMEP termination, which was the realization of the core CPI.[5] On March 9, 2006, the BOJ held a monetary policy meeting and decided to end the QMEP.

3. Data and Methodology[6]

We use Japanese daily data to examine how changes in BOJ's monetary policy stance affect credit spreads. The credit spreads are the difference between 3-year (medium-term interest rates), 10-year (long-term interest rates), and 20-year (super long-term interest rates) JGB yields and swap yields. To measure the effect on market expectations, we use the event study approach and daily time series of the medium-, long-, and super long-term credit spreads.

[2] See BOJ (1999).
[3] At that time, Japan's economy headed toward recession triggered by the bursting of the US IT bubble and experienced a decline in stock prices as well as financial instability.
[4] Hanabusa (2012, 2017) also examines the impact on financial markets under the QMEP.
[5] See BOJ (2003).
[6] I acquired this data when I was a graduate student at Kobe University.

The event study is the standard technique for measuring economic variable reactions to an announcement, event, or economic shock. This approach assumes that the market is efficient. Thus, an announcement from the central bank is likely to change the determination of credit spreads as long as it is unexpected by the market. This analysis is based on Campbell *et al.* (1997). Ball and Brown (1968) and Fama *et al.* (1969) introduce and apply the event study methodology. We explain and estimate each credit spread reaction to the announcements. The constant mean return model is represented as follows:

$$cr_{i,t} = \mu_i + v_{i,t}. \tag{1}$$
$$\mathrm{E}[v_{it}] = 0, \quad \mathrm{Var}[v_{it}] = \sigma_{v_i}^2 \ ,$$

where $cr_{i,t}$ is the credit spread ($i = 3, 10, 20$), μ_i is the constant term, and $v_{i,t}$ denotes the uncorrelated error term with mean zero and constant variance. First, we define the two-day event window, $t_0 = 0$ and t_1=1. The terms t_0 and t_1 are defined as the day of and that after the BOJ announcement, respectively. μ_i is an unknown parameter. Second, we set the estimation window to 35 and 40 days before each policy announcement, which is approximately equal to the time between the day of the introduction of the ZIRP and the addition of commitment of the ZIRP.[7]

To examine the effect of each announcement on credit spreads, we calculate the abnormal returns of credit spreads ($AR_{i,t}$) from equation (1). $AR_{i,t}$ is given by the difference between the estimated return ($\widehat{\mu_i}$) and the realized return ($r_{i,t}$):

$$AR_{i,t} = r_{i,t} - \widehat{\mu_i}. \tag{2}$$

$\widehat{\mu_i}$ is the sample mean. Next, the cumulative abnormal returns of each firm (CAR_i) is calculated using equation (2):

$$CAR_i = \sum_{t=t_0}^{t_1} AR_{i,t} \ .$$

Finally, to test the null hypothesis that the announcement does not affect credit spreads, we employ the following J_1 and J_2 statistics:

$$J_1 = \frac{CAR_i}{[\widehat{\sigma_{v_i}^2}]^{\frac{1}{2}}} \ , \tag{3}$$

$$J_2 = [\frac{(L_1-3)}{(L_1-1)}]^{\frac{1}{2}} RACAR_{\mathrm{i}} \ , \tag{4}$$

where

$$RACAR_{\mathrm{i}} = \frac{CAR_i}{\widehat{\sigma_{v_i}}}.$$

L_1 denotes the length of the estimation window. $\widehat{\sigma_{v_i}}$ is the sample variance. The sample period is 35 and 40 days before each announcement, which includes the introduction of the

[7] The day of the introduction of the ZIRP and the addition of commitment of the ZIRP is February 12, 1999, and April 13, 1999, respectively. The change of the policy stance is therefore about 40 days.

ZIRP (February 12, 1999), addition of commitment of the ZIRP (April 13, 1999), termination of the ZIRP (August 11, 2000), introduction of the QMEP (March 19, 2001), clarification of commitment of the QMEP (October 10, 2003), and termination of the QMEP (March 9, 2006). The data source is the Thomson Reuters Datastream.

4. Empirical result

Tables 2 and 3 show the empirical results. Tables 2 and 3, [A] rank, summarize the effects of the introduction of the ZIRP on credit risks. The response to the announcement is negative for all maturities in the case of t_1. The reaction of the 20-year credit risk to the announcement is negative and statistically significant at the 1% level. However, the reactions of the 3-year and 10-year credit risks are statistically insignificant at the 10% level. These results indicate the introduction of the ZIRP decreases the super long-term credit risk for the banking system, but does not affect the medium-term and long-term credit risks.

[B] rank summarizes the effects of the addition of commitment of the ZIRP on credit risks. The response to the announcement is positive for all maturities. The reactions of the 10-year and 20-year credit risks to the announcement are statistically significant but the response of the 3-year credit risk is not statistically significant at the 10% level in the case of t_1. Therefore, the market expects the banking sector risk to increase with the addition of commitment of the ZIRP and does not consider the monetary policy effective enough to help the banks. However, Okina and Shiratsuka (2004) point out that the interest rate drops after 15 business days. Perhaps the market needs time to process the implications of a policy announcement.

[C] rank summarizes the effects of the termination of the ZIRP on credit risks. The reactions of credit risks of all maturities to the announcement are negative but the reaction of the 20-year credit risk is not statistically significant at the 10% level ($t = t_1$). This suggests that credit risks respond to the direction expected of monetary easing policy against monetary tightening policy. This result indicates that the market expects the stabilization and recovery of the banking system to continue even after the termination of the ZIRP. Because the economic growth rate in this period is positive owing to the US IT bubble, the market may consider the termination of the ZIRP an indication of economic recovery.

[D] rank summarizes the effects of the introduction of the QMEP on credit risks. The response of the 3-year credit risk to the announcement is positive and statistically insignificant, but the responses of the 10-year and 20-year credit risks are negative and statistically significant ($t = t_1$). The introduction of the QMEP decreases the 10-year and 20-year credit risks. Thus, the QMEP is an effective monetary policy for credit risks.[8]

[8] The effectiveness of the QMEP was related to the effect of the commitment. The BOJ committed to monetary easing until the year-on-year rate of increase in the CPI (nationwide, excluding fresh foods)

Table 2: Estimation result 1: credit risk

[A]	$cr_{3,t}$		$cr_{10,t}$		$cr_{20,t}$	
t	J_1 statistics	J_2 statistics	J_1 statistics	J_2 statistics	J_1 statistics	J_2 statistics
0	0.064	0.062	-0.432	-0.421	-1.449	-1.412
1	-0.440	-0.429	-1.208	-1.177	-3.158**	-3.078**
[B]	$cr_{3,t}$		$cr_{10,t}$		$cr_{20,t}$	
t	J_1 statistics	J_2 statistics	J_1 statistics	J_2 statistics	J_1 statistics	J_2 statistics
0	1.133	1.104	1.916†	1.867†	1.161	1.132
1	1.629	1.588	3.381**	3.295**	1.870†	1.822†
[C]	$cr_{3,t}$		$cr_{10,t}$		$cr_{20,t}$	
t	J_1 statistics	J_2 statistics	J_1 statistics	J_2 statistics	J_1 statistics	J_2 statistics
0	-1.479	-1.441	-0.993	-0.968	-0.031	-0.030
1	-3.371**	-3.286**	-2.475*	-2.412*	-0.724	-0.706
[D]	$cr_{3,t}$		$cr_{10,t}$		$cr_{20,t}$	
t	J_1 statistics	J_2 statistics	J_1 statistics	J_2 statistics	J_1 statistics	J_2 statistics
0	0.197	0.192	-1.534	-1.495	-1.213	-1.182
1	0.549	0.535	-3.216**	-3.134**	-2.750**	-2.680**
[E]	$cr_{3,t}$		$cr_{10,t}$		$cr_{20,t}$	
t	J_1 statistics	J_2 statistics	J_1 statistics	J_2 statistics	J_1 statistics	J_2 statistics
0	-0.552	-0.538	-0.943	-0.919	-1.289	-1.256
1	-1.104	-1.076	-1.885†	-1.838†	-2.577**	-2.512*
[F]	$cr_{3,t}$		$cr_{10,t}$		$cr_{20,t}$	
t	J_1 statistics	J_2 statistics	J_1 statistics	J_2 statistics	J_1 statistics	J_2 statistics
0	0.314	0.306	1.292	1.260	1.799†	1.754†
1	1.831†	1.784†	3.266**	3.183**	4.195**	4.089**

Note: This reports the results of estimation window (=35).

[A] introduction of the ZIRP, [B] addition of commitment of the ZIRP, [C] termination of the ZIRP, [D] introduction of the QMEP, [E] clarification of commitment of the QMEP, [F] termination of the QMEP

† shows that null hypothesis is rejected at the 10% significance level.

* shows that null hypothesis is rejected at the 5% significance level.

** shows that null hypothesis is rejected at the 1% significance level.

[E] rank summarizes the effects of the clarification of commitment of the QMEP on credit risks. The reaction to the announcement is negative in all maturities. The 3-year credit risk is not statistically significant at the 10% level. Thus, it has not been able to sufficiently reduce

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became stable at or above zero percent.

the banking sector risk in the medium term.

Table 3: Estimation result 2: credit risk

[A]	$cr_{3,t}$		$cr_{10,t}$		$cr_{20,t}$	
t	J_1 statistics	J_2 statistics	J_1 statistics	J_2 statistics	J_1 statistics	J_2 statistics
0	-0.159	-0.155	-0.578	-0.563	-1.587	-1.546
1	-0.784	-0.764	-1.467	-1.430	-3.439**	-3.352**
[B]	$cr_{3,t}$		$cr_{10,t}$		$cr_{20,t}$	
t	J_1 statistics	J_2 statistics	J_1 statistics	J_2 statistics	J_1 statistics	J_2 statistics
0	1.128	1.100	1.621	1.580	1.148	1.119
1	1.608	1.567	2.923**	2.849**	1.947†	1.898†
[C]	$cr_{3,t}$		$cr_{10,t}$		$cr_{20,t}$	
t	J_1 statistics	J_2 statistics	J_1 statistics	J_2 statistics	J_1 statistics	J_2 statistics
0	-1.581	-1.541	-1.093	-1.065	-0.158	-0.154
1	-3.590**	-3.499**	-2.623**	-2.557*	-0.955	-0.931
[D]	$cr_{3,t}$		$cr_{10,t}$		$cr_{20,t}$	
t	J_1 statistics	J_2 statistics	J_1 statistics	J_2 statistics	J_1 statistics	J_2 statistics
0	0.021	0.020	-1.665†	-1.623	-1.336	-1.302
1	0.189	0.185	-3.484**	-3.396**	-3.009**	-2.933**
[E]	$cr_{3,t}$		$cr_{10,t}$		$cr_{20,t}$	
t	J_1 statistics	J_2 statistics	J_1 statistics	J_2 statistics	J_1 statistics	J_2 statistics
0	-0.361	-0.352	-0.796	-0.776	-0.789	-0.769
1	-0.722	-0.703	-1.593	-1.553	-1.577	-1.537
[F]	$cr_{3,t}$		$cr_{10,t}$		$cr_{20,t}$	
t	J_1 statistics	J_2 statistics	J_1 statistics	J_2 statistics	J_1 statistics	J_2 statistics
0	0.483	0.471	1.392	1.357	1.860†	1.812†
1	2.055*	2.003*	3.426**	3.339**	4.275**	4.167**

Note: This reports the results of estimation window (=40).

[A] introduction of the ZIRP, [B] addition of commitment of the ZIRP, [C] termination of the ZIRP, [D] introduction of the QMEP, [E] clarification of commitment of the QMEP, [F] termination of the QMEP

† shows that null hypothesis is rejected at the 10% significance level.

* shows that null hypothesis is rejected at the 5% significance level.

** shows that null hypothesis is rejected at the 1% significance level.

[F] rank summarizes the effects of the termination of the QMEP on credit risks. The response to the announcement is positive in all maturities and these credit risks are statistically significant at the 1% level. This result implies that the termination of the QMEP

is an unexpected tight monetary policy for the credit risks of the banking sector. During 2001–2006, the BOJ provided ample liquidity to the banking system by purchasing JGBs. Baba *et al.* (2006) examines the reduction of the risk premium for banks, using the negotiable certificates of deposits issuance rates and the bond issuance rates of banks during the low interest rate policy period. The market anticipates the increase in the cost and risk of the banking system after the termination of the QMEP.

Therefore, we find that the introductions of both the ZIRP and QMEP lower the long-term and super long-term credit risks. In addition, credit risks increase after the termination of the ZIRP but decrease after the QMEP. The introductions of both the ZIRP and QMEP result in the expected effect of a monetary easing policy. However, the responses of the termination of the ZIRP and the QMEP differ. A large amount of liquidity was supplied to the market under the QMEP and the credit risk was sufficiently lowered. Hanabusa (2017) argues that the liquidity supply reduced the expected short-term interest rates and their volatilities. The credit risk increased due to the termination of the monetary easing policy. On the other hand, credit risk was still declining when the ZIRP was terminated because the recovery of the world economy and diminishing concerns over the financial system could be predicted.[9]

5. Conclusion

In this paper, we have examined how the changes in the monetary policy stance affected the credit risks in Japan during the non-traditional monetary policy period. The main findings can be summarized as follows. First, the introductions of both the ZIRP and QMEP lowered the 20-year credit risk. In addition, the QMEP lowered the 10-year credit risk. These monetary policies caused an easing effect on the financial markets. This is consistent with previous papers (Fujiki and Shiratsuka, 2001; Okina and Shiratsuka, 2004; Baba *et al.*, 2006; Ugai, 2006; Oda and Ueda, 2007; Hanabusa, 2009).

Second, the addition of commitment of the ZIRP increased the 10-year credit risk. However, we did not obtain robust results against the clarification of commitment of the QMEP.

Finally, credit risks responded negatively to the termination of the ZIRP but positively to that of the QMEP. After the termination of the QMEP, the market expected that the credit risks would increase overall.

Thus the introduction of policies of the ZIRP and QMEP reduced the credit risk of the banking sector. However, the credit risk decreased after the cancellation of the ZIRP and it

[9] BOJ (2000) states that "Japan's economy has substantially improved, due to such factors as support from macroeconomic policy, recovery of the world economy, diminishing concerns over the financial system, and technological innovation in the broad information and communications area."

increased after the QMEP. This is related to future economic expectations and sufficiently reduced credit risk.

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