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4. Japanese Money Markets During Periods of Low or Zero Interest Rates

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Executive Summary

Very low short-term interest rates may be expected to reduce the profitability of trading in money markets and thus to reduce the scale of activity in those markets. This note discusses the impact of Japan's very low policy interest rates since 1995 on activity in the yen money market, with an eye towards possible lessons to be learned. Our main findings are as follows:

- During periods of very low but non-zero interest rates (as low as 25 basis points), the uncollateralized money markets were able to maintain a moderate level of activity. However, periods of zero overnight interest rates in Japan were associated with very low levels of activity in uncollateralized money markets.
- In contrast, the size of collateralized money markets grew during zero interest rate periods. With overnight call rates close to zero and the spread between uncollateralized and collateralized rates near zero, lenders may have shifted to collateralized markets where lending was less risky.
- Periods of zero interest rates may have had permanent effects on some markets. Activity in the uncollateralized call market rebounded when, on two occasions, the policy rate rose from zero. But activity did not climb back to the levels prevailing immediately before the rate had reached zero. However, the decline in activity in that market may also have resulted from the deregulation of competing markets.
- As was the case for other uncollateralized markets, the commercial paper (CP) market shrank during periods of zero overnight interest rates. However, any adverse impacts this may have had were likely limited because of the relatively small size of the CP market in Japan. Because the U.S. corporate sector is relatively more dependent than Japan's corporate sector on non-bank sources of funding such as commercial paper, a decrease of CP market activity during zero interest rate periods could have a more adverse impact on the U.S. economy.

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The impact of very low interest rates on Japanese money markets

We consider three distinct interest rate regimes: (i) a “regular” monetary policy period, when the policy rate (the red line in Chart 1) was on average near 3 percent; (ii) three low interest rate periods (LIRP) which are shaded in green in Chart 1, when the policy rate was 15-to-50 basis points; and (iii) the periods of the zero interest rate policy (ZIRP) and quantitative easing policy (QEP), which are shaded in grey in Chart 1, when the policy rate was near zero.²

Uncollateralized Money Markets

During the “regular” monetary policy period, the uncollateralized call market was the largest uncollateralized money market of any kind in Japan. This market is a short-term interbank market comparable to the federal funds market in the United States, although it is bigger in size, both on absolute terms and as a share of GDP (see Table 1).

As shown in the upper left panel of Chart 1, when the overnight call rate dropped from 2.25 percent in March 1995 to 50 basis points in October 1995, the amount of loans outstanding in the uncollateralized call market did not register much change. In early 1999, however, when the Bank of Japan (BoJ) put in place the ZIRP, the amount of outstanding loans in the call market dropped sharply. Conversely, during the short period from August 2000 to March 2001, when the BoJ raised its target for the uncollateralized call rate to 25 basis points, the amount outstanding in the market doubled immediately, from about 9 trillion yen in July 2000 to 18 trillion yen in August 2000. Outstanding amounts dropped again in early 2001 when the BoJ introduced the QEP and brought overnight rates back to zero. The average amount outstanding in the uncollateralized call market during the QEP was 6 trillion yen, the lowest level of the periods we describe. BoJ researchers report that, along with the decline in outstanding amounts in the market at that time, banks also shut down many of the lines of credit they had established with each other.³

As with the uncollateralized call market, the amounts outstanding in the certificates of deposit (CD) and the commercial paper markets (shown in the middle and bottom left panels of Chart 1) decreased during periods of zero interest rates and rebounded significantly in the short period from August 2000 to March 2001, when the BoJ raised its target for the call rate from zero to 25 basis points. The top panel of Chart 2 shows that this basic pattern holds for domestic non-financial CP, although financial CP appears to have been less sensitive to the varying regimes.

Collateralized Money Markets

In contrast to the uncollateralized markets, the collateralized money markets we study (the collateralized call market and the market for repurchase agreements, shown in the right-hand side of Chart 1) tended to grow during ZIRP and QEP and to stabilize or shrink during low but

² The regular monetary policy period is from January 1992 to August 1995. The LIRP periods lasted from September 1995 to February 1999, August 2000 to March 2001, and April 2006 to December 2008 respectively. The ZIRP and QEP periods are from March 1999 to August 2000 and March 2001 to March 2006 respectively.

³ Financial Markets Department, Bank of Japan (2006), “Financial Markets Report – Supplement – Issues Regarding Money Markets after the Conclusion of the Quantitative Easing Policy.”

non-zero interest rate periods. There are two complementary factors that may have contributed to the growth of these markets when overnight interest rates were zero. First, the growth during the period of QEP reflected a simultaneous increase in Japanese government bonds (JGBs) held by large financial institutions, which led to an increased use of JGBs for collateral.⁴ Second, with overnight uncollateralized call rates close to zero, the spread between uncollateralized and collateralized rates was also near zero, and in such circumstances it may have made economic sense for lenders who were able to do so to move to collateralized markets, where lending was less risky. During the QEP, the average spread between uncollateralized and collateralized overnight call rates was only one half of a basis point, which may have been too low to cover the additional risk of making an unsecured loan relative to a collateralized loan.

Comparing the Impact of a Zero Target Rate to Low but Positive Target Rates

As can be seen in the charts, the activity in uncollateralized markets showed very large declines when the policy interest rate moved from a small but positive rate to zero, raising the question as to whether a zero rate has a disproportionate impact on money markets. To answer this question, we regress the monthly amount outstanding in the call markets on the level of the uncollateralized call rate and a dummy variable equal to one during the zero interest rate periods (ZIRP and QEP), also controlling for lagged industrial production, lagged outstanding liabilities, and seasonal dummy variables.⁵ We then test the hypothesis that the amounts outstanding during the zero-interest rate regime are different from what would be predicted by a simple linear relation between the amount outstanding in the money market and the level of the uncollateralized call rate. We find that, controlling for economic activity and the level of the interest rate, the size of the uncollateralized call market decreased substantially during zero interest rate periods, while the size of the collateralized call market increased substantially (Table 2). Thus, the move from low interest rates to a zero interest rate regime did appear to have had a disproportionate impact on money markets in Japan.

Market Recovery after the QEP

At the end of QEP, BoJ researchers expressed concerns that the time needed for institutions to re-establish their creditworthiness in the market might be prolonged. However, there were relatively few problems associated with the recovery of money market activity.⁶ That said, the data show that, with the uncollateralized call rate target in both cases at 50 basis points, the outstanding amount in the uncollateralized call market in 2008 remained less than half of what it was in 1997. This may indicate that the period of zero interest rates had a permanent impact on the uncollateralized call market, although some of the activity in that market may also have been replaced by the CD and CP markets, whose growth was encouraged by deregulation in

⁴ Financial Markets Department, Bank of Japan (2006), "Financial Markets Report – Supplement – Issues Regarding the Money Markets after the Conclusion of the Quantitative Easing Policy." The increase of Japanese government bonds (JGB) held by large financial institutions reflected the increase in issuance of these bonds by the government to finance its increasing deficit.

⁵ We exclude from our analysis the amount outstanding in the commercial paper, certificate of deposit and repurchase agreement markets because these markets were heavily regulated during the "regular" monetary policy period and the first LIRP period.

⁶ Some foreign banks, which were unable to immediately reestablish lines of credit, did experience minor problems after the end of QEP.

the late 1990s.⁷ In contrast, the current amounts outstanding in the collateralized call market are similar to those in 1997. Thus, the period of zero interest rates may have had a permanent effect on the uncollateralized call market, but not in the collateralized call market.

Possible implications for the United States

ZIRP and QEP were intended to reduce financing costs, increase liquidity, and thus support lending and aggregate spending. However, by compressing activity in the money markets, it is possible that these policies might have disrupted the flow of credit by financial institutions to the non-financial sector. Japan's experience during the zero interest rate periods provides some interesting implications for the United States.

During the QEP period, the BoJ acted as the market maker by providing ample liquidity to banks. As a result, interbank money markets were, in effect, replaced by central bank lending, and likely without a significant negative impact on the ability of banks to make loans. Further, interbank markets appear to have recovered smoothly (if in some cases incompletely) after QEP ended.

However, the one nonbank money market we examined, the domestic nonfinancial commercial paper market, did decline noticeably during the ZIRP and QEP periods. The impact of the decline in nonfinancial CP on the real sector in Japan is difficult to gauge. As shown in the lower panel of Chart 2, overall private bank loans to the non-financial sector declined as well, so nonfinancial corporations do not appear to have replaced CP funding with lending from other sources. Even so, it remains unclear whether the contraction of the CP market adversely affected nonfinancial firms to a significant extent. First, Japanese firms are relatively less dependent on CP markets and more dependent on bank loans for their funding (see the comparison of Japan and the United States in Table 1). Additionally, at least some of the decline in both nonfinancial CP outstanding and in loans to the nonfinancial sector, both shown on Chart 2, may owe to reductions in the demand for borrowing rather than reduction in its supply. Notably, corporate savings rose significantly during this period in Japan as well as in many other countries, and firm's needs for external finance diminished as their retained earnings rose.

However, a contraction of non-bank money markets in the United States might generate greater complications than likely was the case in Japan during the QEP period. Many U.S. firms depend more heavily on non-bank money markets for their funding than in Japan. And to the extent that the on-going recession eats into cash-flow and profits, U.S. firms may be less able to forego financing than their Japanese counterparts were earlier in this decade, when economic growth was recovering and profits were rising.

⁷ The CD market experienced considerable growth in October 1995 when the minimum issuance unit was lowered, restrictions on maturities were relaxed, and issuance limitations based on the company's net worth were eliminated. Prior to 1998, CP issuers were not allowed to sell CP directly to institutional investors and banks were not allowed to issue CP.

Table 1. Comparison of the US and Japanese Money Markets

Amounts outstanding are in billions of dollars or as a share of GDP as of June 2008.

	Japan Markets			US Markets		
	Market	Amount Outstanding in billions of US dollars	Amount Outstanding as a share of GDP (%)	Market	Amount Outstanding in billions of US dollars	Amount Outstanding as a share of GDP (%)
Interbank Market	Uncoll. Call	\$140	2.9	Federal Funds	\$109	0.8
				Eurodollar	\$430.2*	3.1
Other Money Markets	Coll. Call	\$97	2.0			
	CD	\$3,065	63.0	CD	\$3,617	26.2
	CP	\$161	3.3	CP	\$1,741	12.6
	Repo	\$1,184	24.3	Repo	\$1,755	12.7
MMMF	MMMF	\$2,82	57.2	MMMF	\$3,480	25.2

*Source: Federal Reserve Board H.6 release. The data is as of February 2006. The Japanese call markets are short-term interbank money markets comparable to the federal funds market in the United States.

Table 2. Does a target call rate of 0 basis points have a significant effect on money markets?

We regress the monthly amount outstanding in each call market on its own lag, a dummy variable equal to one during the zero interest rate periods (ZIRP/QEP) and zero otherwise, the level of the call rate, lagged industrial production growth, and monthly dummies to control for seasonality in the data. The sample period is from January 1992 to August 2008.

	Uncollateralized Call Market		Collateralized Call Market	
	Coef.	t-stat	Coef.	t-stat
ZIRP/QEP	-1738.692	-3.83	843.760	4.5
Call Rate	118.292	0.94	293.035	3.98
Lagged IP	-13.279	-0.13	87.990	1.89
Lagged Dep. Var.	0.910	41.43	0.7531	17.36

Chart 1

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Japan's Uncollateralized and Collateralized Markets

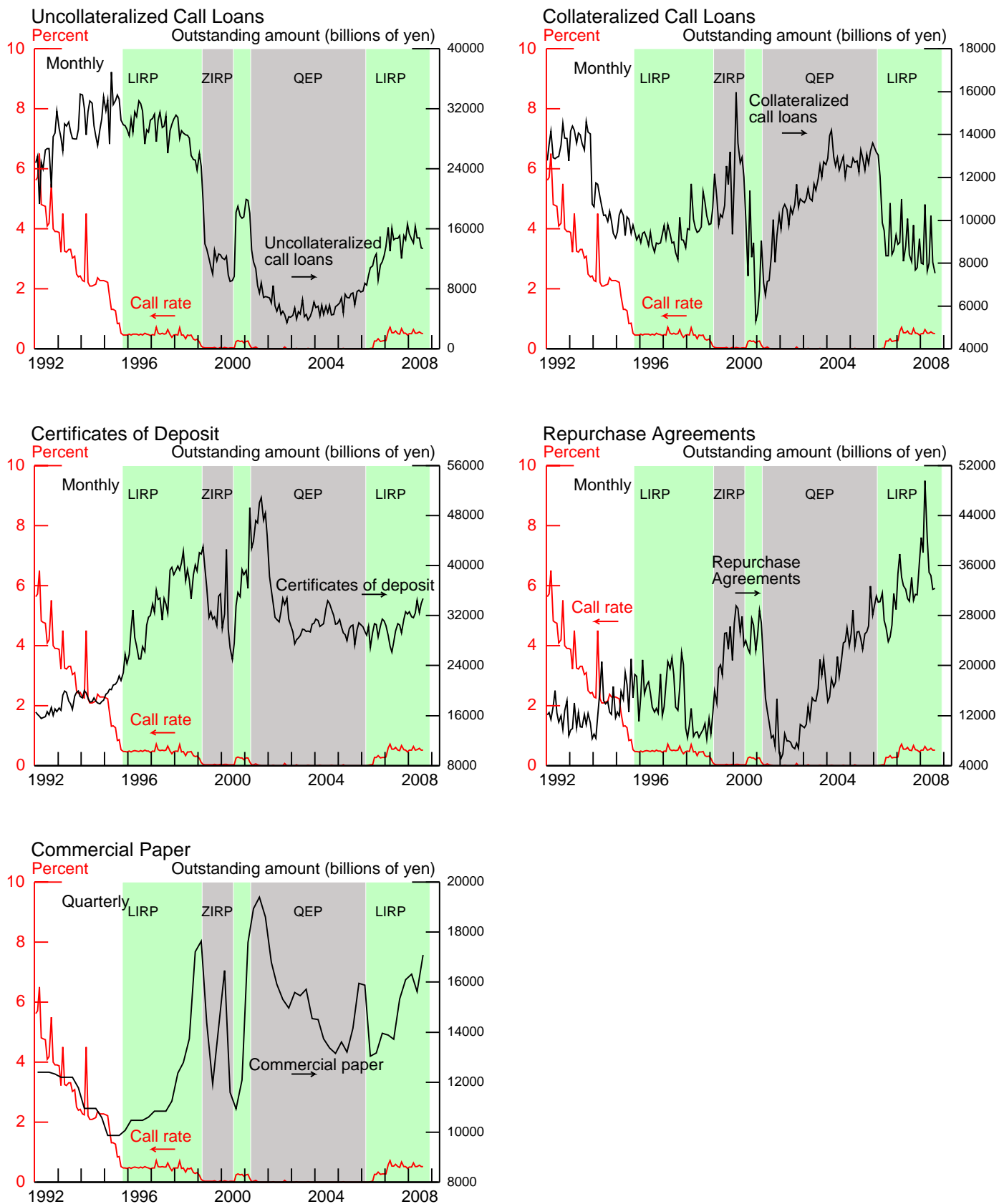
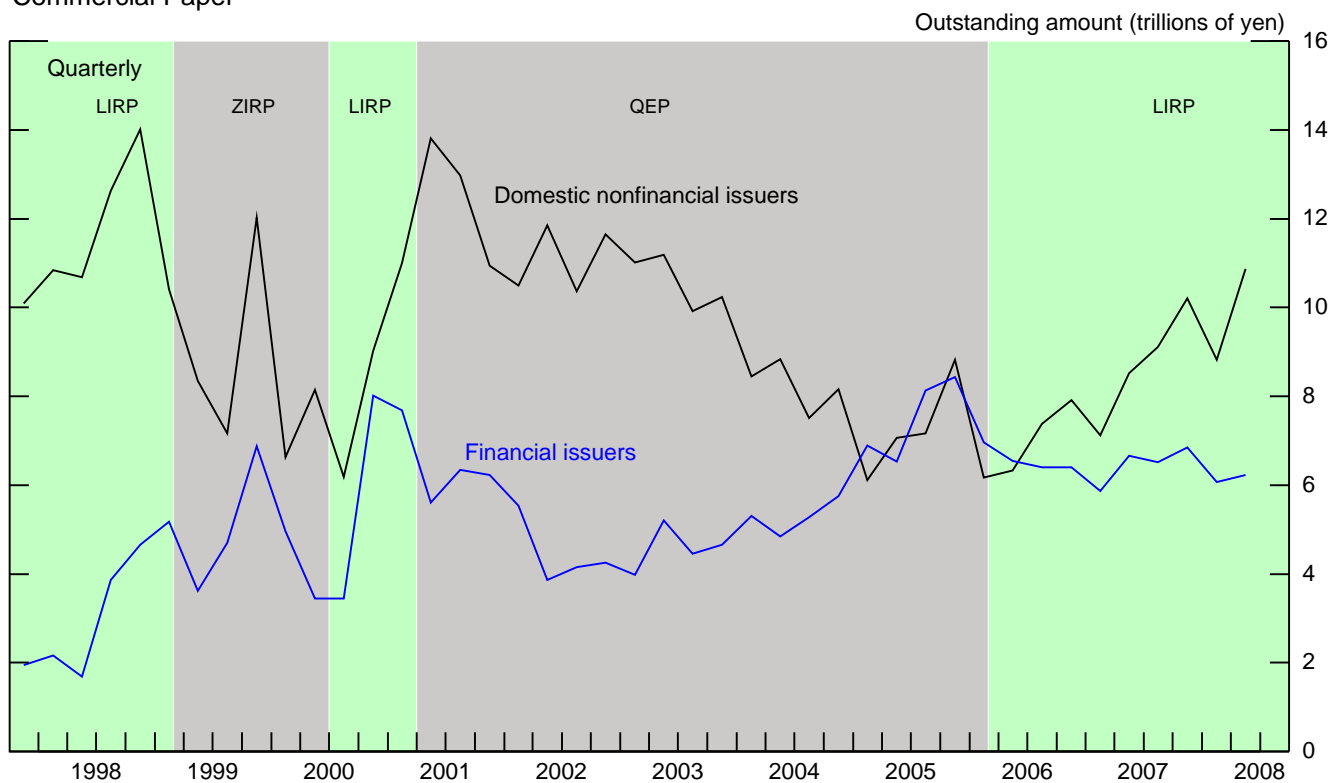


Chart 2

12-04-08

Commercial Paper



Private Bank Loans to Nonfinancial Sector in Japan

