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in Japan:
Lessons from the 1990s***

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Policy Reactions to the Financial Crisis in Japan: Lessons from the 1990s

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Abstract:

We describe the propagation of the recent financial crisis to Japan and compare current monetary policy reactions by the Bank of Japan (BoJ) with actions taken during the 1990s and with current policy reactions by other major central banks. First, we review the recent literature on the origins and propagation mechanisms of financial crises. Then, we ask how the financial crisis was transmitted to Japan and describe the policy responses by BoJ. We proceed and ask what lessons have been learned by other central banks from the financial crisis of the 1990s.

JEL Classification: G21, E42, E52

Keywords: Financial crisis · Quantitative/qualitative easing · Exit strategy · Japan

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1. Introduction

Japan has recently experienced the second major financial crisis of the last two decades. While the first crisis of the 1990s was entirely home-made and had effects that were largely confined to Japan, the recent crisis originated outside Japan – mainly in the US and the UK – and was transmitted not only to Japan but to all other major economies worldwide.¹ The Bank of Japan (BoJ) and other Japanese government agencies, such as the Financial Services Agency (FSA), started to react to the financial crisis in September 2008 – taking into account experiences made during the first financial crisis. Compared with measures taken in other countries, especially in the US but also in Europe, the policy reaction taken in Japan was rather modest quantitatively and temporary. This modest reaction may not only be due to the fact that Japan was hit less hard by the current crisis but also because authorities learned from experiences made during the 1990s.

In this paper, we describe the propagation of the current financial crisis to Japan, analyze the policy actions taken by BoJ and compare them with policy reactions in the European Monetary Union (EMU), the UK, and in the US. Though the current financial crisis is a global phenomenon, the Japanese case is of special interest for the following three reasons: First, already during the first financial crisis, BoJ had to act as a lender of last resort and to provide financial assistance to single financial institutions and to financial markets to prevent a meltdown of the financial system. Differences between policy reactions then and now help us to understand what kind of financial assistance is appropriate during a financial crisis to regain financial stability.² Second, all major central banks have significantly reduced policy interest rates and have almost shifted towards a zero interest rate policy (ZIRP) and a policy of quantitative/qualitative easing (QEP). While this is new territory for most central banks, the Bank of Japan had already followed such a policy until 2006 (see, e.g., Bebenroth and Vollmer, 2007). Hence, the monetary policy measures taken by BoJ in the 1990 may serve as a blueprint for the conduct of ZIRP and QEP in other countries during a financial crisis. Finally, BoJ – as some other major central banks – has augmented her monetary policy framework and has, e.g., introduced a deposit facility which did not exist in Japan during the first financial crisis. Hence, the Japanese case allows us to understand what functions such a deposit facility serves and why other central banks started to adjust their monetary policy toolkits.

The literature offers so far only few analyses of the impact of the current world financial crisis on Japan and of the policy actions taken by BoJ. One exception is Kamezaki (2009) who provides a short chronological overview over policy reactions by BoJ after the collapse of Lehman Brothers in September 2008 without comparing them with policy reactions in other countries; another is Sato

¹ While the World's real GDP growth is expected to be minus 1.3 percent in 2009, the world economy experienced a positive growth during the 1990s, even combined with the Asian crisis. See Kamezaki (2009).

² In doing so one has to keep in mind that Japan has in the meantime improved its regulatory framework and has adopted a financial safety net which is widely regarded as being state of the art (Tamaki, 2008; Tanaka, 2008); hence, differences in policy reactions during the 1990s and the actual financial crisis may also be due to an improved quality of the regulatory framework.

(2009) who describes the current situation of Japan's financial system and analyzes FSA's recent policy responses. Borio and Nelson (2008), Chailloux et al. (2008), Committee on the Global Financial System Report (2008), Bank of Japan (2009a, 2009b), and Bank for International Settlements (2009a, 2009b) analyze rescue programs that were adopted in several countries, after Lehman Brothers' default, in order to support banks and other financial institutions. Neither of these papers, however, relates the current policy measures taken in Japan to the experiences as made during the first financial crisis but rather take the recent financial crisis as a historically single event.³ They neglect to explain what lessons were learned in Japan from the financial crisis during the 1990s.

In this paper, we compare the policy reaction in Japan during the current crisis with policy reactions taken in Japan during the 1990s and with policy actions taken recently in the member countries of EMU, in the UK, and in the US.⁴ Our aim is to find out how strongly Japan was hit from the recent financial crisis and whether Japanese authorities reacted differently to the current crisis than during the 1990s or then authorities in other countries. We ask to what extent the actual policy reactions by the Japanese authorities can be traced back to experiences made during the first financial crisis and what lessons have been learned from the experiences made during the 1990s. We find out that Japanese banks were hardly involved in the production and distribution of subprime-related products and show how the financial crisis was transmitted to Japan through capital outflows. We argue that Japanese authorities reacted differently to the actual financial crisis than other central banks not because Japan was hit less badly by the current crisis but because Japan learned from experiences made during the first financial crisis.

The rest of the paper is organized as follows: Section 2 briefly reviews the recent theoretical and empirical literature on the origins and the propagation of a financial crisis in general. Section 3 turns to the Japanese case, describes the origins of the recent financial crisis and analyzes recent policy reactions by the BoJ. Section 4 compares them with policy actions taken during the 1990s and with recent policy reactions in other countries. Section 5 provides some concluding remarks.

2. Origins and propagation of a financial crisis: An overview over the recent literature

The recent literature on financial crises addresses three interrelated questions: What causes a financial crisis? What makes it spread over a national banking industry, across borders and into the real sector of the economy? What are the proper policy responses to a financial crisis?

³ An exception, however, is Shiratsuka (2009) who re-examinizes Japan's experience of QEP until 2006 in light of current policy reactions. Another exception is Hoshi and Kashyap (2009) who analyze the tools taken by the US government to rehabilitate the US banking industry and compare them with measures taken in Japan during the 1990s.

⁴ We thus follow the case study approach which involves data collections through personal interviews, verbal or written reports, or observations; see Yin (2003).

With respect to the first question, it is consensus that a financial crisis is characterized by a crisis of the national banking industry.⁵ Banks are fragile institutions that simultaneously grant loans and issue demandable deposits. They thus create liquidity but, at the same time, are exposed to the risk of a bank run, i.e. a situation where all depositors, even without actually facing liquidity needs, wish to withdraw their deposits. Such a run may result either from a coordination failure among depositors, i.e., depositors withdraw deposits because they believe that other depositors will also do so (Diamond and Dybvig, 1983). More important, a bank run may also be triggered by changing fundamentals and by expectations that a bank's capital cushion will be used up when assets devalue (Jacklin and Bhattacharya, 1988; Diamond and Rajan, 2000).

The literature offers three major explanations for such a devaluation of banks' assets.⁶ One strand accuses swings in asset prices to monetary policy changes and asserts that bank failures stem mainly from a less accommodative monetary policy, resulting in a collapse of the housing market and of the securitization market. According to this view, monetary policy, measured, e.g., by the US federal funds rate, has a statistically significant effect on housing starts. During the early 1980s, US monetary policy has been relatively predictable and systematic, resulting in a substantial decline in the volatility in residential construction; after September 11, 2001, however, the Fed had reduced the federal funds rate considerably to an all-time low in 2003/2004. This helped to foster an extraordinary surge in the demand for interest-sensitive sectors as housing and caused a house-price boom.⁷ As the federal funds rate began to return to normal levels after 2004, housing demand fell and brought down construction price and housing price inflation which resulted into a sharp rise in delinquency and foreclosure rates (Ahearne et al., 2005; McQuinn and O'Reilly, 2007; Taylor, 2007: 8-10).⁸

Housing prices also rose in other countries but financial innovation was much more elaborated in the US (and in the UK). Hence, a second strand of the literature blames the increased diffusion of the 'originate-and-distribute-business' in banking and the massive increase in the size of all types of markets for credit risks for the emergence of the banking crisis. 'Originate-and-distribute-business' means a bank not holding a loan on its balance sheet either to sell it directly or to buy a synthetic product – such as a credit default swap (CDS) – that effectively insures the bank against non-performance.⁹ Both, direct loan sales and the use of

⁵ Sometimes, banking crises are accompanied by currency crises and/or a state default. This was also true in some countries during the current financial crisis but not yet in case of the economies considered here (the Greece case notwithstanding).

⁶ For surveys over the causes of the recent financial crisis see Acharya et al. (2009); Rajan (2009).

⁷ The US Fed motivated the decrease in interest rates by a 'global savings glut', i.e. an increase in net capital exports by some emerging markets in combination with the capital exports by traditional exporters, such as Japan and Germany. To prevent a recession, the Fed had to switch to a more accommodative monetary policy. See Bernanke (2005).

⁸ Measured by the S&P/Case-Shiller-Index, US housing price inflation reached 20 percent during parts of the period 2000-2004. See Taylor (2007: 3). Since the peak in 2006 residential and industrial real estate prices dropped by more than 30 per cent.

⁹ For more details on the functioning of the 'originate-and-distribute-business' see European Central Bank (2008a).

CDS allow for such a separation of credit risks off from loans. This strengthens banks' ability to manage risk because credit risks can be valued more accurately and can be more easily diversified (Deutsche Bundesbank, 2004: 36); on the other hand, asymmetric information may cause efficiency problems due to adverse selection and moral hazard (Parlour and Winton, 2008; Heyde and Neyer, 2008). Because the risk shedder is in a better position to assess the risk of an asset (i.e. the probability of an insurance event or the amount of a potential loss) than the risk taker, he has an incentive to pass on the bad risks. Moreover, the risk shedder can influence the probability of the insurance event or the amount of loss by losing his incentives to monitor loan customers. In consequence, a high market price for insurance protection is generated as a result of both adverse selection and moral hazard (Deutsche Bundesbank, 2004: 40).

Finally, the third strand accuses the decrease in asset prices to the bursting of an asset bubble, i.e., to the sudden revision of a speculative price increase (Kindleberger, 1978). An asset bubble is a situation where market participants buy assets in expectation of a further increase in asset prices; in that situation, an increase in asset demand is financed by loans which are expected to be repaid by gains from asset price increases. Then, the expectation of rising asset prices can be self-fulfilling. If asset prices, however, reach a certain ceiling, the process is reversed and asset prices start to fall. According to the explanation, housing prices in the US increased because market participants expected further future price increases and prices started to fall after housing prices reached unsustainable levels relative to borrowers income in 2004.

While all these explanations motivate why banks with large exposures on the housing and subprime markets start to get into troubles, they fail to explain why other banks without such exposures also come into difficulties. Such financial contagion may be caused by imperfections on the interbank markets which channel liquidity from banks with excess liquidity to banks with liquidity needs. Normally, the interbank market works smoothly, with interest rates for unsecured interbank loans being only slightly higher than interest rates on secured interbank loans or on central bank loans. Then, interbank markets tend to be very liquid, with a large number of participants and a high turnover. During a financial crisis, however, the funding of interbank markets becomes severely impaired, with rising interest rates and increased liquidity hoarding by banks.¹⁰ Instead of lending at the unsecured interbank market, banks start to use central bank's deposit and lending facilities excessively. Banks, therefore, take refuge at central banks which are forced to simulate the functioning of the interbank markets.

Such a breakdown in the functioning of the interbank markets may be caused by either increases in aggregate credit risk or by increases in aggregate liquidity risk. The first cause, an increase in aggregate credit risk, is relevant primarily for the unsecured segment of the interbank markets. It refers to a

¹⁰ Liquidity hoarding and interbank market spreads are reported, e.g., for US interbank markets and interbank markets in the Euro area. A standard measure of tensions in the unsecured interbank market is the spread between three months loan borrowing costs (measured by e.g. Euribor or LIBOR) and the overnight index swap (OIS) in three months' time which measures the difference between unsecured and secured interbank loans and hence serves as an indicator for liquidity. See Heider et al. (2009: 2); Eisenschmidt and Tapking (2009).

situation where participants perceive a decline in the repayment probability of an interbank loan, i.e. an increase in counterparty risk. This increase in counterparty risk causes an increase of interbank interest rates. As long as the overall level of counterparty risk is low, interest rates are low and there is full participation in the interbank market. Once counterparty risk rises, however, interest rates in the interbank markets rise beyond a certain threshold level and safer banks drop out of the interbank markets; this adverse selection causes a further increase in interest rates. In this situation, an increase in the dispersion of counterparty risk alone, without an increase in the level of risk, can lead to a breakdown of the interbank market either because lenders hoard liquidity (i.e. supply dries up) or borrowers drop out because of too high interest rates (i.e. demand dries up) (Heider, Hoerova and Holthausen, 2009).¹¹

The second potential cause of an interbank market breakdown is an increase in aggregate liquidity risk which, in contrast to increases in aggregate credit risk, is relevant for both secured as well as unsecured segments of the interbank market. It refers to a situation where participants in the interbank markets perceive either a decline in the quality of available collateral or an increase of the probability of a liquidity outflow in the near future. Such a participant may be a bank with a liquidity surplus. It can offer unsecured funds either in the overnight money market or in the term money market. If the bank lends funds in the term money market, it has to raise funds itself, if it faces liquidity outflows before the loan matures. To prevent this situation, the bank may prefer to lend repeatedly overnight until it receives the liquidity shock. As a consequence, with an increased liquidity risk, term money markets become illiquid while overnight money markets become more liquid, and the interest rate spreads between term money markets and overnight money markets increase. Increased liquidity hoarding hence leads to a rising liquidity interest rate premium and to a significant decline in unsecured term money market volumes (Eisenschmidt and Tapking, 2009: 6-7). Moreover, it may result in a drying-out of interbank markets if central banks offer a deposit facility and banks prefer to hold excess liquidity reserves at central banks instead of lending to the interbank markets.¹²

If interbank markets fail, banks' leverage problems and liquidity problems spread over to other banks, and this may also have a substantial impact on real activity. It may cause macroeconomic phenomena such as credit crunches and liquidity shortages. A credit crunch is a situation where banks' equity has fallen substantially and where banks are capital constrained and are not able to offer loans to investors (Tirole, 2007: 478-9).¹³ This may occur in a situation where

¹¹ For other papers that model the influence of credit risk on bank lending see Freixas and Parigi (2008); Longstaff (2008).

¹² For other models of a liquidity risk, based on Diamond and Dybvig (1983), see Allen and Gale (2000); Allen, Carletti and Gale (2009).

¹³ This situation is sometimes also referred to as the "lending channel" and focuses on the influence of banks' balance sheets on economic activity. A related situation is called the "balance sheet channel" which focuses on the influence of firms' balance sheet on their economic activity; it refers to a situation where firms' cash flows and collateral values have fallen substantially and where firms' increased leverage reduces investments. See Tirole (2007: 471).

information is distributed asymmetrically between a loan applicant (investor) and a large number of financiers (Holmstrom and Tirole, 1997). The investor has access to an investment project and project returns are random but depend on the investor's behaviour which is not observable by financiers. Such informational asymmetries may cause moral hazard on the part of the investor who will only receive external finance without a financial intermediary if he has enough assets available that can be invested into the project. A bank as a financial intermediary may improve on the situation because it can monitor the investor and preclude excess misbehaviour by the loan applicant. Since the bank also has an informational advantage over financiers, it may also be subject to moral hazard and has to invest its own capital into the project which is more expensive than uninformed capital because monitoring is costly. In this scenario, the bank is able to finance projects of investors who have not enough assets available to receive finance directly from financiers. Some investors with assets above a threshold value receive intermediated finance from the bank but not directly from financiers. This threshold value, however, increases if investors' projects become more risky or if the volume of informed capital available to banks in the economy falls, i.e. if banks face increased leverage, leading to a credit crunch.¹⁴

Capital regulations, such as minimum capital adequacy ratios set by the Basel committee and enforced by national regulatory authorities, may influence banks' lending behaviour procyclically, i.e., they have a relatively more severe impact on banks' lending during a recession than during a boom. This results from the fact that under Basel II regulations minimum capital adequacy ratios depend on the internal or external rating of the bank's assets which often varies procyclically because ratings are downgraded during recessions and upgraded during booms (Monfort and Mulder, 2000; Segoviano and Lowe, 2002; Amato and Furfine, 2004). It results in a similar procyclicality of risk weights which are smaller during recessions than during a boom. Banks, hence, possess more leeway during a boom to leverage their capital than during a recession.

Policy makers may react to bank leverage and liquidity problems by (i.) bank recapitalizations and by (ii.) supplying liquidity assistance to banks; moreover, they may (iii.) conduct a policy of quantitative or qualitative easing to facilitate corporate financing. Bank recapitalizations may in principle be conducted in two ways: Either (via the asset side of the banks' balance sheet) by buying toxic assets and transferring them to a 'bad bank', or (via the liability side of the banks' balance sheet) by injecting fresh equity capital (or junior debt) into the bank. Purchases of assets by regulators may cause inefficiencies if the banks' solvency is private information of the bank management and not known by the regulators. In that case, either a 'tough' bail-out policy (where the regulator closes down every insolvent bank) or a 'soft' bail-out policy (where the regulator supports every insolvent bank) induces adverse incentives for the bank management. In case of a tough bail-out the regulator is too rigid and induces bank managers of insolvent banks to conceal insolvency; in case of a soft bail-out policy, on the other hand, the regulator is too indulgent and induces managers of solvent banks pretending to be insolvent. Bank managers may be able to

¹⁴ For a survey of recent literature on the evolution of bank lending during the business cycle see European Central Bank (2009a).

camouflage their true solvency state by liquidating banks' assets and choosing to liquidate more (less) assets than would be optimal under symmetric information (Aghion, Bolton and Fries, 1999).¹⁵

If regulators inject equity capital into the bank, the regulator has to decide *ex ante* on a repayment scheme which guarantees incentive compatibility. Two extreme schemes are alternatively conceivable, one, where the regulator dispenses with a repayment and in effect grants a subsidy to the bank, or another where the regulator assumes the property rights from the bank owners and nationalizes the bank. The regulator's optimal choice should depend on the bank manager's behaviour: If the manager chooses a low-risk project, a subsidy is appropriate; if he, however, chooses to invest into a risky project, the bank should be nationalized. By announcing such behaviour, the regulator gives incentives to the bank manager not to invest into risky projects (Osano, 2002).¹⁶

While recapitalizations ensure the solvency of insolvent banks, emergency liquidity assistance by a lender of last resort (LLR) intends to restore the liquidity of either a single bank or the whole banking industry. Emergency liquidity assistance may be necessary when there is an increased liquidity preference in the economy which results into a run of a single bank or in a banking panic (Allen and Gale, 2000). The provision of emergency liquidity by the central bank (or the deposit insurance corporation) as a LLR may protect banks against these incidents. Financial assistance may either take the form of lending to the whole market or the provision of liquidity on special terms to a single institution. Liquidity provision to the whole market is inefficient as long as the interbank market does not work smoothly and the transfer of liquidity from one bank to another is impaired. In that case, the central bank or the deposit insurance has to ensure that single solvent banks with a liquidity shortage will receive the liquidity needed against collateral (Flannery, 1996).

Though a LLR may shield the banking sector against financial crises, the drawback is that liquidity assistance may create moral hazard on the part of banks that are insured against mismanagement of all types of risks.¹⁷ To limit these adverse effects, the LLR may provide liquidity to the market only at a penalty rate, i.e. at an interest rate higher than the market rate. Demanding a penalty rate, however, aggravates the bank's solvency problem and it may also send signals to market participants that the bank is in trouble; moreover, it may even give an incentive to managers to 'gamble for resurrection', i.e. to invest in projects with higher risks and higher returns in the hope of surviving. 'Constructive ambiguity' may be another device to constrain moral hazard. It can be defined as a situation in which the central bank retains discretion as to whether, when and under what conditions financial support of an individual financial institution will be provided. If the central bank keeps secret whether or not financial support will be granted, banks will not know individually whether they will be rescued or not; moreover, this might avoid imitation effects. If the central bank is ambiguous about the

¹⁵ For other papers that model a bank recapitalization via the asset side see Boot and Thakor (1993); Povel (1999); Corbett and Mitchell (2000) and Mitchell (2001).

¹⁶ For other models that discuss a bank recapitalization via the liability side see Osano (2005) and Oviedo and Sikdar (2008);

¹⁷ For a survey over the literature on the lender-of-last-resort-literature see Freixas et al. (2004).

conditions of financial assistance, it keeps a bank's shareholders and management uncertain about the costs they have to bear in the case of financial assistance

As a consequence, the central bank should make use of conditionality and make financial assistance conditional on the amount of uninsured debt issued by the failing bank. If the central bank is able to commit to a policy, it should follow a mixed strategy for small banks, i.e. exercising constructive ambiguity for all financial institutions below the uninsured debt requirement, but never bail-out a distressed bank above the debt requirement. Such a mixed strategy will always dominate a policy of systematic liquidation, because some inefficient liquidation is prevented; investors exert more effort in monitoring the bank, and the bank will choose a less risky portfolio. Under commitment, a central bank's ambiguity to supply LLR functions is hence 'constructive', because it produces an endogenous uncertainty that reduces moral hazard on behalf of commercial banks. Moreover, it is advantageous to not publicly announce this policy because the variable on which this policy is based is not readily observable or verifiable within the short period of time in which decisions have to be taken (Freixas, 1999; Cordella and Levy-Yeyati, 2003).¹⁸

While a LLR targets the financial industry, central banks may also reduce policy interest rates, intending to exert an expansionary influence on real activity. Such a policy, however, comes to a limit after interest rates have reached zero; then, a ZIRP is sometimes accompanied by a policy of quantitative and qualitative easing (QEP). Under 'quantitative easing', the central bank expands the size of its balance sheet through an increase in its monetary liabilities, i.e. base money. Because conventional monetary policy instruments address short-term money markets, central banks have to take unconventional monetary measures, like open market operations or direct lending to companies, which are not part of the monetary policy toolkit during normal times. This usually means either that gross bank reserves expand beyond the threshold necessary to achieve the policy interest rate target; or it means that the central bank is providing liquidity directly to borrowers and investors to credit markets.

The aim of both measures is to reduce long-term interest rates which are relevant for investments and long-term consumption decisions. Since central banks do not control long-term interest rates directly, they try to influence expected short-term interest rates in the future; if market participants expect a fall in short-term interest rates in the future as a result of quantitative easing, long-term interest rates will fall which might have an expansionary influence on the real activity (Bini-Smaghi, 2009; Benford et al., 2009). To have such an influence on market participants' expectations of future short-term interest rates and hence on long-term interest rates, the continuation of QEP has to be credible and its termination has to be linked to the occurrence of a verifiable event, like, e.g. the end of consumer price inflation and the increase of the rate of consumer price inflation above zero percent.

¹⁸ A central bank may also practice 'constructive ambiguity' not because it wants to constrain moral hazard but it receives a random and non-verifiable signal about bank's solvency and makes financial assistance dependent on the outcome of the signal which cannot be observed by outsiders. See Repullo (2000).

This indirect influence might be supplemented by ‘qualitative’ or ‘credit easing’, were the central banks changes the composition of the assets on its balance sheet towards less liquid and more risky assets. Normally, the provision of liquidity to financial institutions via interbank markets exposes central banks to low risk, as loans are usually short-term, over-collateralized and collateralized with high quality assets. Under qualitative easing, however, the central bank takes more term risk and credit risk in its portfolio, provides loans for longer terms and accepts less quality assets as collateral. This also may reduce expected short-term interest rates and long-term interest rates as well (Bank for International Settlements, 2009a: 66; Bernanke, 2009a).

To conclude, the literature offers precise answers to the question asked at the beginning of this section, but leaves open another possible reason why central banks actually took the policy measures taken during the recent financial crisis. Possibly, these policy reactions do not only reflect results of academic discussions but also experiences made by policy makers during former crises. Japan has experienced such a crisis during the 1990s, and it is worthwhile to explore whether these experiences may explain some of policy actions taken during the recent crisis in Japan as well as in other countries.

3. The Financial Crisis and Policy Reactions in Japan

In the US, the recent financial crisis started in autumn 2006 when – after a long-lasting boom in the housing markets – real estate prices in the US began to fall.¹⁹ During the housing boom the percentage of subprime mortgages had increased and a large number of them had been securitized as mortgage backed securities and sold to financial institutions other than the originators. Especially collateralized debt obligations (CDO’s) which allowed a securitization of subprime loans gained in importance. With an increased number of non-performing loans fire-sales of houses increased which led to a downward pressure on housing prices. Financial instruments that were issued to finance these real estate investments lost in value and endangered financial stability of mortgage banks. In April 2007, ‘New Century Financial’, the largest US mortgage bank in the subprime segment, went into bankruptcy.

In July 2007, rating agencies started to downgrade a large number of securities, collateralized with mortgage loans, which lost in value. As a consequence, financial firms which were dependent on financial funds borrowed on international money markets and which used asset backed securities as collateral, got into liquidity problems. In the US, two hedge funds belonging to ‘Bear Sterns’ failed and large European banks suffered from liquidity shortages. In August 2007, the US Fed and the European Central Bank enlarged the liquidity supply and the Fed started to reduce policy interest rates (from 5.5 percent to almost zero percent now). In September 2007, the British mortgage bank ‘Northern Rock’ suffered from a liquidity shortage which resulted in a bank run; the bank was nationalized in February 2008. In September 2008, the US Government assumed ‘Fannie Mae’ and ‘Freddie Mac’, the largest US home loan

¹⁹ Acharya et al. (2009) and Scharff (2009) give a short chronology of the current financial crisis between April 2007 and March 2009.

banks, under public conservatorship. On September 15, 2008, the US investment bank ‘Merrill Lynch’ was assumed by ‘Bank of America’, and ‘Lehman Brothers’ collapsed.

Unlike banks in Europe or the US, Japanese banks, however, were only marginally affected by the financial crisis until the failure of Lehman Brothers because they neither invested directly into subprime-related products nor conducted the ‘originate-and-distribute’-business with structured financial products, such as CDS, on a large scale.²⁰ This low engagement in the markets for subprime-related and structured financial products followed from experiences made during the first financial crisis that resulted into more conservative business policies; besides, Japanese banks are more focused on traditional banking services and less involved in the production and distribution of securitized financial products. In consequence, Japanese banks suffered only from small subprime related losses which amounted to 1,040 billion Yen until June 2009 (Table 1). These losses represented less than 2,2 percent of banks’ Tier-1-capital and were largely absorbed by capital buffers which exceeded mandatory requirements before the outbreak of the financial crisis (International Monetary Fund, 2008: 4; Bank of Japan, 2008a: 12; Shirakawa, 2008: 9).

Table 1: Exposure of Japanese deposit-taking institutions¹⁾ to subprime-related products (in billion Yen)

Date ²⁾	Tier-1-Capital	Direct Investments		‘Originate-and-Distribute’-Business	
		Book value	Realized Losses ⁶⁾	Book value	Realized Losses ⁶⁾
09/2007	49,408 ³⁾	1,407	141	138	19
12/2007	49,408 ³⁾	1,519	442	202	85
03/2008	50,071 ⁴⁾	1,019	725	107	288
06/2008	50,071 ⁴⁾	958	754	64	305
09/2008	50,071 ⁴⁾	797	803	26	316
12/2008	50,071 ⁴⁾	565	919	21	317
03/2009	47,929 ⁵⁾	449	1,001	17	324
06/2009	47,920 ⁵⁾	407	1,040	17	323

¹⁾ Major Banks, regional banks, co-operative financial institutions. ²⁾ End of month. ³⁾ End-March 2007. ⁴⁾ End-March 2008. ⁵⁾ End-March 2009. ⁶⁾ Accumulated since April 1, 2007.

Source: Financial Services Agency; <http://www.fsa.go.jp/en/news/2009/20090911-10.html>

Due to this limited subprime involvement of Japanese banks, funding costs on unsecured interbank markets increased much less and showed much less volatility than in Europe and the US. Since June 2007, the three month LIBOR-OIS spread for Japanese Yen increased to around 50 basis points which are much less than spreads for European Euros and for US Dollars which increased to

²⁰ Japan shared this feature with other Asian economies where financial institutions’ losses and public capital injections were small, too. See Bank of Japan (2009a: 9).

around 200 basis points (Euro) resp. 350 basis points (USD) (Bank of Japan 2009a: 6-7). Besides this, the Tokyo interbank market rate (TIBOR), the reference interbank rate for prime Japanese domestic banks – also remained stable. This was due to – in addition to the low subprime involvement – a stable deposit base of Japanese banks which finance only 10 percent of their liabilities in the interbank market.²¹ Finally, corporate bonds spreads over government bond yields rose in Japan much less than in the US and in Europe (International Monetary Fund, 2008: 6; Bank of Japan, 2008a: 9; Bank of Japan, 2009a: 7). Hence, there are barely any signs that the recent financial crisis was originated inside Japan or a result of a too high risk appetite of Japanese financial institutions.

This completely contrasts with the financial crisis of the 1990s in the run-up to which Japanese banks were implicitly protected under the “convoy system”. Under this system, banking supervision and regulation were conducted “in such a way as not to undermine the viability of the weakest banks” (Nakaso, 2001: 2). Instead, financial firm’s survival was implicitly guaranteed as long as all guidance by BoJ or the Ministry of Finance was observed. Disclosure rules were lax and takeover bids were hard to implement. As a consequence, market discipline was missing and banks did not behave like profit-maximizers but increased their loan supply far beyond the profit-maximizing level (Aoki et al., 1994; Porter et al., 2000; Revankar, Yoshino, 2008; Bebenroth et al., 2009). Increased loan supply by banks fueled housing prices that started to fall after 1989, resulting in a financial break-down as described above (Nakaso, 2001; Baba et al., 2005).

In September 2008, after the failure of Lehman Brothers, the recent financial crisis began to be transmitted to Japan. International capital movements were a major transmission channel. Despite the fact that interest spreads did not increase significantly, Japan’s interbank markets shrunk considerably as banks began to limit their provisions of funds. Amounts outstanding in the Call Money Market fell from more than 659.000 trillion Yen in December 2007 to around 250.000 trillion Yen in September 2009. Mainly foreign banks in Japan reduced their supply of funds on the Japanese interbank markets substantially while regional banks became more reluctant about investing funds under the complementary deposit facility introduced by BoJ (see Table 2; Bank of Japan 2009a: 43).²² In addition to this short-term liquidity outflow, foreign investors turned into net sellers on Japanese stock markets, and net foreign purchases of Japanese equities became negative. Especially hedge funds that faced liquidity constraints in funding and increased risk exposure sold stocks (Bank of Japan, 2009a: 56). This was crucial since foreign holdings of Japanese stocks account for a quarter of market capitalization and foreigners account for nearly two thirds of market turnovers. In consequence, Nikkei stock index fell from 18.000 JPY in

²¹ Unlike interest spreads inside Japan, spreads between three month (Japanese Yen) TIBOR and (Japanese Yen) LIBOR started to rise since September 2007. While TIBOR features mainly Japanese banks in the Tokyo market, Yen-LIBOR is dominated by offshore European and US banks. Hence, a rising spread reflected concerns by Japanese banks about a perceived credit risk towards foreign banks. See International Monetary Fund (2008: 6) and Iwada (2009).

²² Because of this outflow of short-term liquidity, it seems that Japanese financial markets helped to stabilize financial markets abroad. See also Kumakura (2008).

July 2007 to 7.000 JPY in March 2009; afterwards, it started to rise again. This fall in stock prices depressed the asset value of Japanese banks which hold around one third of their Tier-1-capital in stocks; it heavily impaired their capital basis, especially of major banks. Though banks' stock holdings are valued at acquisition prices and included considerable unrealized gains (from which, under Basel rules, 45% may be included into Tier-2-capital), the equity not only completely eliminate these unrealized gains but also affected Tier-1-capital (International Monetary Fund, 2008: 8).

Table 2: Japanese Call Money Market: Amounts Outstanding (2007-2009, in Trillion Yen)

Date	Major banks	Regional banks	Trust banks	Foreign banks	Others	Total
09/2007	170.440	26.728	48.030	228.927	160.404	634.529
12/2007	206.044	29.436	51.314	204.722	167.491	659.007
03/2008	214.271	37.224	45.324	207.040	171.477	675.336
06/2008	209.398	35.842	51.307	210.696	166.619	673.862
09/2008	212.477	35.859	50.578	153.534	149.690	602.138
12/2008	207.693	50.458	53.609	53.619	146.334	511.713
03/2009	170.710	40.825	44.464	21.171	121.044	398.214
06/2009	159.227	17.399	51.593	18.893	108.972	356.084
09/2009	112.709	11.049	30.743	14.730	79.643	248.874

Source: Bank of Japan: Time-series data. http://www.stat-search.boj.or.jp/index_en.html.

As a result of the increased liquidity preference worldwide, interest rate spreads on commercial papers (CPs) and on commercial bonds (CBs) over government bonds increased sharply, in particular for companies with lower ratings (Juhara, 2009).²³ At the same time, the volume of CPs and CBs outstanding decreased considerably (Bank of Japan, 2009a: 44), and especially companies with lower or medium credit ratings became difficulties to sell papers. This occurred mainly because of rising concerns about the funding availability of firms and decreased risk appetite by investors which preferred to increase precautionary liquidity demand, instead of holding corporate bonds (Nichikin Tankan, 2009). Large companies were able to compensate for this decreased turnover in CPs and CBs by increasing their bank borrowings; for small and medium-sized companies, however, bank borrowings fell under the level of 2007 (Shirakawa, 2008: 9; Bank of Japan, 2008c).

The Bank of Japan reacted to these developments in financial markets after September 2008 and implemented two reductions in policy interest rates and made several adjustments in their monetary policy framework. The intentions of these measures were, first, to ensure stability in financial markets and, second, to

²³ Besides, the ratings of a large number of firms were downgraded. See Bank of Japan (2009a: 60).

facilitate corporate finance.²⁴ To ensure financial market stability, Bank of Japan had signed immediately after the failure of Lehman Brothers - together with 13 other central banks - a bilateral currency liquidity agreement or swap facility with the US Fed that allows BoJ to acquire US Dollars from the Federal Reserve and lend them to domestic financial institutions (Bernanke, 2009a). On September 18, 2008, BoJ started to conduct USD funds-supplying operations against pooled collateral as a coordinated measure with five other central banks.²⁵ This was the first time BoJ supplied USD to domestic financial markets against domestic assets as collateral. The purpose of these measures was to satisfy the increased worldwide liquidity demand for US-Dollars and to alleviate pressures from US short term money markets.²⁶ The amounts outstanding in this facility (and in other facilities) end of May 2009 and end of September 2009 are given in Table 3.

To ease financing especially for small and medium-sized companies and to prevent a Yen appreciation, the Bank of Japan decided to lower the target rate for the uncollateralized overnight call rate twice by 20 basis points; the new target rate was lowered from 0.5 percent to 0.3 percent on October 31 and to 0.1 percent on December 19, 2008.²⁷ At the same dates, the basic loan rate and the basic discount rate were reduced to 0.5 percent and 0.3 percent, respectively. Moreover, BoJ introduced a ‘complementary deposit facility’ that allows banks to receive interest payments on excess balances with the central bank; the interest rate paid by BoJ was fixed at 0.1 percent.²⁸ This facility allows BoJ to attract liquidity and prevents the uncollateralized overnight call rate from falling significantly below the target rate.

Beginning on October 14, 2008, Bank of Japan introduced several measures to secure the stability of the financial system. To enhance stability of the stock market and in order to gauge market development, BoJ decided to suspend the sale of stocks purchased from financial institutions on the stock exchanges. Furthermore, on February 3, 2009, BoJ decided to resume its purchases of stocks held by financial institutions. Both measures were announced to be temporary and served a twofold purpose: to stabilize stock market prices and to reduce market risk associated with stockholdings. Finally, on March 17, 2009, BoJ announced its readiness to provide subordinated loans to financial institutions up to a total amount of one trillion Yen; a limit of 350 billion Yen per financial institution was set by BoJ. Eligible are banks which are subject to international capital standards and which are deemed creditworthy. The amount of each loan and the floating

²⁴ Appendix 1 offers a chronological compilation of the policy measures taken by BoJ. The information presented in this chapter refers to Bank of Japan (2009c) and Kamezaki (2009: 6-9). For further information see also the website of Bank of Japan.

²⁵ Bank of Canada, Bank of England, Federal Reserve, ECB, and Swiss National Bank.

²⁶ The first two operations were conducted through market-rate competitive auctions; from October 31 on, funds were provided at a fixed interest rate for an unlimited amount against pooled collateral. See Kamezaki (2009: 6).

²⁷ Since the end of first quantitative easing policy in March 2006, the uncollateralized overnight call rate is the main policy target of BoJ. By use of its policy instruments, BoJ encourages this call rate at the target level. See, e.g., Bebenroth and Vollmer (2007).

²⁸ The “complementary lending facility” is equivalent to the Eurosystem’s “deposit facility” which already exists since 1999. The US Fed., like BoJ, also introduced a deposit facility during the recent financial crisis in October 2008. See Borio and Nelson (2008); European Central Bank (2009b).

interest rate for the first five years are determined by an auction; the interest rate will increase after five years of loan disbursement (plus 1.5 percent). Auctions and loan disbursements are once every quarter. As an additional measure to ensure stability of the financial markets, BoJ expanded on October 18, 2008, its securities lending facility which allows BoJ to sell Japanese Government Bonds (JGBs) with repurchase agreements; the minimum fee rate applied for this facility was lowered from 1.0 percent to 0.5 percent. Moreover, BoJ announced that it will add floating-rate JGBs, inflation-indexed JGBs and 30-years Government bonds to the list of eligible JGBs for its repo operations.

Table 3: Amounts Outstanding of Short-term and Long-term Operations by Bank of Japan (May 29, 2009 and September 30, 2009)

Operation	Amounts outstanding		Upper limit
	May 29, 2009	Sep. 30, 2009	
US Dollar fund-supplying operations	25 billion USD	1.5 billion USD	Unlimited
Outright purchases of JGBs	46.1 trillion Yen	46.3 trillion Yen	/
JGB repo operations	7.4 trillion Yen	7.0 trillion Yen	/
Special fund-supplying operations to facilitate corporate financing	7.2 trillion Yen	6.9 trillion Yen	Unlimited
Stock purchases held by financial institutions	9.0 billion Yen	127.2 billion Yen	1 trillion Yen
Corporate debt as eligible collateral	10.3 trillion Yen	10.6 trillion Yen	/
CP repo operations	2.8 trillion Yen	2.8 trillion Yen	/
Outright purchases of CPs	0.5 trillion Yen	0.1 trillion Yen	3 trillion Yen
Outright purchases of CBs	142.0 billion Yen	0.3 trillion Yen	1 trillion yen
Provision of subordinated loans to banks	/	/	1 trillion Yen

Source: Bank of Japan (2009c).

Two months later, on December 19, 2008, BoJ started a policy of “credit easing” which has already been followed during the first financial crisis. Since the target rate for the uncollateralized overnight call rate has been lowered to 0.1 percent with further cuts almost impossible, BoJ decided to increase the amount of outright purchases of JGBs to 16.8 trillion Yen per year (from 14.4 trillion Yen per year); in March 2009, this amount was further increased to 21.6 trillion Yen per year. Also on December 19, the range of JGBs accepted in these outright purchases was expanded (floating-rate JGBs, inflation-indexed JGBs and 30-years Government bonds were added to the list of eligible JGBs). Later, debt instruments (bonds, dematerialized commercial papers, bills, commercial papers and loans on deed) issued by real estate investment corporations, government guaranteed dematerialized CBs and loans on deeds to the government and to municipal governments were all accepted as eligible. The same applied to bonds issued by foreign governments (US, UK, France and Germany).

To facilitate corporate financing, Bank of Japan announced on October 14, 2008, that it would increase the frequency and size of its commercial paper (CP) repo operations which were generally conducted quarterly. On December 2, the range of corporate debt was expanded that was accepted as eligible collateral in repo operations: While before debt instruments with credit ratings of “A- or higher” were accepted this criteria was eased to “B- or higher”. The BoJ also introduced a new credit facility called “Special Funds-Supplying Operations to Facilitate Corporate Financing” which utilizes corporate debt as eligible collateral. Under this facility, financial institutions may borrow from BoJ unlimited amounts of (three months) funds at an interest rate equal to the target rate for the uncollateralized overnight call rate. These operations were first conducted twice a month, but from February 2009 on, once a week (Bank of Japan, 2008b).

Also on December 19, 2008, the BoJ announced the introduction of outright purchases of commercial papers (CPs) as a temporary measure. This meant a much higher degree of credit risk taking than when commercial papers are taken as collateral for providing credit to financial institutions; it also meant a deeper involvement of BoJ into microeconomic resource allocation. For these reasons, BoJ decided not to buy these instruments directly from the issuer but only from financial institutions that are counterparties of the Bank and to buy them by means of competitive auctions. The total amount of purchases was limited to three trillion Yen; the outstanding amount if a single issuer’s CP purchased by BoJ shall not exceed 100 billion Yen. CPs bought by BoJ must be eligible as the Bank’s collateral, a-1 rated, issued before the auction date, and with a residual maturity up to three months. All purchases shall be conducted by December 31, 2009. As of end September 2009 the amount purchased by BoJ was 0.1 trillion Yen (see again Table 3).

On January 22, 2009, BoJ announced outright purchases of corporate bonds. Bonds to be purchased had to be rated “A or higher” and the maturity date should fall within a year at the end of the month in which the purchase was conducted. As with outright purchases of CPs, all purchases should be conducted by December 31, 2009, with a maximum purchased amount not more than 1 trillion Yen and the outstanding amount of a single issuer’s CB purchased by BoJ shall not exceed 50 billion Yen. As of end September 2009 the amount purchased was 0.3 trillion Yen.

As a consequence of BoJ’s operations, tightness in money market conditions eased and interest rate spreads declined. BoJ evaluated the impact of its measures on the spreads between issuing rates on CP’s with credit ratings a-1+, a-1, and a-2 and three months OIS rates (Bank of Japan, 2009a: 48-50): The spreads show risk premiums on corporate credit risk and on CP market liquidity risk. These dependent variables were regressed against three independent variables, such as the implied volatility of stock prices (as a proxy variable for changes in uncertainty over corporate financing), spreads between TIBOR and OIS rates (as a measure for the cost of unsecured bank lending) and the share of funds obtained through operations by BoJ in the amount outstanding in CPs (as a proxy for Bank of Japan’s measures to facilitate corporate financing). The results show significant downwards effects of the corporate financing measures taken by BoJ on CP issuance rates. Hence, these measures were effective in lowering CP issuance

rates (without going through the conventional transmission channels of policy interest rate cuts).²⁹

4. Past and Recent Crises: Lessons Learned

Policy measures taken by Bank of Japan and other central banks during the recent financial crisis differ significantly from the reactions by Japanese authorities in the 1990s. During the first financial crisis, the Japanese interbank market almost collapsed when in early November 1997 'Sanyo Securities' failed, a securities house which acted as a borrower in the interbank market. Though the amount of the default was relatively small, lender banks preferred placing their money with the Bank of Japan to lending in the interbank market for fear of being caught by another default. The consequence was that major financial institutions failed almost on a weekly basis until BoJ stepped in and injected massive liquidity into the market in late November 1997, i.e., several weeks after the outbreak of the crisis (Nakaso, 2001). In contrast to this episode, all central banks reacted immediately after the collapse of Lehman Brothers by injecting liquidity into the market, knowing that a collapse of the interbank markets might result in a domino effect and financial system instability. Providing immediate financial assistance to banks was probably the first major lesson learned by Japanese authorities from the financial crisis of the 1990s.

The second lesson learned concerns the introduction of accommodative policy measures and the switch to a more expansionary monetary policy. While during the 1990s, BoJ reduced its policy rate only gradually, from six percent in 1992 to zero percent in 1999, almost the same interest rate reduction was implemented by all major central banks during the recent crisis within 16 months (Shirakawa, 2009). After the Lehman collapse, the sharpest cut was implemented by BoE (450 basis points), followed by the ECB (325 basis points) and the Fed (175 basis points) which had already lowered interest rates from 5.25 percent in June 2006 to 2.0 percent in April 2008; since interest rates were already very low in Japan, interest rate cuts by BoJ were less pronounced (Bank of Japan, 2009a: 16). While monetary policy in Japan during the 1990s was often criticized as doing 'too little, too late', the recent policy reaction by central banks was faster and much more aggressive.

Because market participants might lose incentives to trade at market rate slightly above zero percent (if margins do not cover transaction costs anymore), all central banks started to pay interest on excess reserve balances and offered a 'complementary deposit facility'.³⁰ Introducing a deposit facility was the second lesson learned. Such a facility did not exist in Japan during the 1990s and authorities learned that if the key policy interest rate is lowered to zero, this may impede the functioning of the money market (Mizuno, 2009; Shiratsuka, 2009:

²⁹ Actually, the effects on CP issuance rates varied considerably by credit rating and were most powerful on a-1 ratings. See Bank of Japan (2009a: 50).

³⁰ In the case of the Euro-system, such a facility already existed and ECB raised interest rates paid on excess reserve balances; this increase was recalled later, but partially reintroduced in May 2009.

9).³¹ A purpose of an interest bearing deposit facility is to prevent such a situation.³² Its drawback, however, is that it drains off liquidity from the interbank markets (Furfine, 2003). Banks with excess liquidity deposit funds at accounts with the central bank instead of lending it to the market. Banks with a liquidity shortage become dependent on fund-supplying operations by the central bank. As a consequence, central banks have to recycle liquidity and to play the role of money market brokers. In other words: they have to practice ‘quantitative easing’.

Quantitative easing also happened during the recent financial crisis in the UK, the US, and in EMU where banks’ accounts with the central bank exploded and central banks’ balance sheets rose dramatically. This expansion was especially pronounced in the case of BoE and the US Fed, followed by the Eurosystem (Mizuno, 2009; European Central Bank, 2009b). Quantitative easing was accompanied by qualitative easing in the case of the Fed and the Eurosystem – but less in case of BoE which accepted only a limited degree of credit risk – where the volume of market operations outstanding increased, especially buying long-term securities and targeted lending programs. The Fed started to buy risky assets until February 2009 when it decided to start outright purchases of long-term Treasury Securities. Eurosystem increased the average term of its operations significantly and on June 23, 2009, it even started to carry out a series of refinancing operations with a maturity of twelve months, applying a fixed-rate tender with full allotment; two days later, it injected 442 Billion Euro through longer-term refinancing operations (European Central Bank, 2009c: 86). Besides, ECB lowered the minimum rating of assets eligible as collateral to “BBB” and even accepted asset backed securities with a minimum rating of “A-“ as eligible collateral (European Central Bank, 2008b; Neumann, 2009). Due to this substantial provision of long-term liquidity, tightening of money markets in the US and in Europe eased and the values of market operation outstanding returned to the levels before the Lehman collapse.

Compared with the other central banks, however, Bank of Japan followed both a policy of quantitative and credit easing to a much lesser degree (Table 4 compares policy reactions by BoJ with policy measures taken by other major central banks after failure of Lehman Brothers). The Bank prevented an expansion of its balance sheet which remained almost constant during the recent financial crisis; BoJ, hence, resisted from acting as a money market broker despite the fact that amounts outstanding on the call money market decreased significantly (Bank for International Settlements, 2009a: 98; Bank of Japan, 2009a: 20). In addition, Bank of Japan generated excess reserves after the Lehman collapse mainly by providing short-term funds in form of its ‘special fund-supplying operations to facilitate corporate financing’ which have a duration of three months. Besides, it has set ceilings for the amounts outstanding of government bonds it purchased, for outright purchases of CPs and CBs and for provision of subordinated loans to

³¹ See also Baba et al. (2005: 16), who report from the 1990s the situation that when the interbank rate was 0.001 percent the return of an investment of 10 billion Yen in the interbank market was only 273 Yen which did not cover trading costs anymore.

³² Another purpose is to prevent central banks from taking too much counterparty risks in intraday real time gross settlement systems. See Ennis and Weinberg (2007).

Table 4: Policy Reactions by Major Central Banks after the Collapse of Lehman Brothers

Objective	Policy measure	BoJ	ECB	BoE	Fed
Reduction of funding costs	▪ Policy interest rate cuts ^{a)}	From 0.50% to 0.10%	From 4.25% to 1.00 %	From 5.00% to 0.50 %	From 2.00% to 0.00-0.25%
Consistency of market rates with policy rates	▪ Interest rates on excess reserves	+	+ ^{b)}	+	+
	▪ Exceptional fine-tuning operations	+	+	+	+
	▪ Introduction of fixed-rate tenders with full allotment	+ ^{c)}	+ ^{d)}	-	-
	▪ Narrower corridor on overnight rates	-	+	+	+
	▪ Change in reserve requirements	-	-	+ ^{f)}	-
Financial system stability	▪ US Dollar repos/inter central-bank swap lines	+	+	+	+
	▪ Expansion of eligible collateral	+	+	+	+
	▪ Provision of subordinated debt	+	+	+	+
	▪ Exceptional long-term operations	+	-	-	-
	▪ Purchases of stocks held by financial institutions	+	-	-	-
	▪ Supporting measures of individual financial institutions	-	+ ^{e)}	-	+
Supporting non-bank credit markets	▪ CP funding/ purchase/ collateral eligibility	+	-	+	+
	▪ CB funding/ purchase/ collateral eligibility	+	-	+	-
	▪ Outright purchases of Government Bonds	+	-	+	+
	▪ ABS funding/ purchase/ collateral eligibility	-	+	+	+

a) Bank of Japan (BoJ): Target rate for the uncollateralized overnight call rate; Eurosystem (ECB): Main refinancing operations (fixed rate); Bank of England (BoE): Bank rate paid on commercial bank reserves; US Federal Reserve (Fed): Target federal funds rate.

b) Temporary increase of interest rate on excess reserves.

c) Special fund-supplying operations to facilitate corporate financing.

d) Fixed-rate tenders in main refinancing operations.

e) By single NCBs.

f) Expanded range over which reserves are remunerated.

Source: Bank for International Settlements (2009b: 97); Bank of Japan (2009a: 15); Central Bank's Websites.

banks and has set a time limit for the various special measures (Mizuno, 2009).

Finally, Bank of Japan has developed an exit strategy from quantitative and qualitative easing, and this was the third lesson learned by BoJ which was not assumed by the other central banks. Already in 2006, the Bank of Japan was able to exit from its policy of quantitative easing smoothly and swiftly for the following reason: When the termination of quantitative easing came in sight, the starting and ending dates of these operations were adjusted so that both did not fall on the same date; this allowed the Bank to avoid a rollover of such operations and to reduce total assets in its balance sheet. During the recent crisis, the bank also decided to decrease the frequency of outright purchases of corporate financing instruments as market conditions improves, so that BoJ's balance sheet will shrink accordingly (Mizuno, 2009).

Such an easy exit from quantitative and qualitative easing is not possible in the case of the other central banks where rising bank reserves were financed by issuing or collateralizing long-term and risky assets. If market participants perceive a reduction in counterparty and liquidity risks they will reduce their deposits with the central bank and look for better opportunities to lend out their reserves; that would produce faster growth in broad money, which could ultimately result in inflationary pressures - unless countervailing policy measures are adopted. When the financial crisis comes to an end, central banks must either eliminate these large reserve balances or, if they remain, neutralize any potential undesired effects on the economy. To reach this end, the US Fed will either pay higher interest on reserve balances or take various actions that reduce the stock of reserves; these actions embrace outright sales of long-term securities in the open market, arranging large-scale reverse repurchase agreements with financial market participants, including banks, that involve the sale by the Fed of securities from its portfolio with an agreement to buy the securities back at a slightly higher price at a later date, or selling bills by the Treasury depositing the proceeds with the Federal Reserve (Bernanke, 2009b, 2009c, 2009d). In addition, the US Fed announced the establishment of a term deposit facility in December 2009.

Observers cast doubt on whether this exit strategy is likely to be successful (Mizuno, 2009). Critics argue that neither the Fed nor the Eurosystem nor BoE have yet made clear when and under what conditions they will terminate their QEP, start lifting interest rates or trigger the use of the tools mentioned before. While BoJ had announced in October 2003 that it will maintain QEP until core CPI inflation becomes stable zero (or above), a similar announcement would not be credible in the current situation. When, e.g., the Eurosystem injected 442 Billion Euro of one-year liquidity at one percent interest rate against subprime collateral, it in fact subsidized the banking system. It helped politicians to avoid the unpleasant political drawback of using taxpayers' money to recapitalize banks and undertook a quasi-fiscal rescue operation, hoping that banks use risk-free profits generated from financial assistance to clean-up their portfolios and to recapitalize their balance sheets (Münchau, 2009). If exiting from this rescue operation is not credible, banks will not use their extra-profits to recapitalize their balance sheets and central banks will be forced to prolongate QEP. Hence, a credible exit strategy will be of outstanding importance.

5. Conclusions

This paper describes the reaction by the Bank of Japan during the recent financial crisis and compares them with measures taken during the 1990s and with recent policy reactions by other central banks. It argues that after the failure of Lehman Brothers, central banks immediately offered financial assistance to the financial sector, enlarged the range of eligible collateral and increased the number of counterparties. In addition, central banks quickly reduced interest rates and started to pay interest on banks' excess reserves to prevent interbank markets from collapsing. With these measures, current monetary policy reactions differ from the policy reactions in Japan during the 1990s, when BoJ waited several weeks before acting as a lender of last resort, only gradually reduced policy rates and did not pay interest on excess balances. Immediate financial assistance, quick transition to a more accommodative monetary policy and introduction of a deposit facility are probably the major lessons learned by central banks from the Japanese financial crisis of the 1990s.

Though all major central banks joined the 'ZIRP-club', Bank of Japan was much more resistant than the US Fed or the Eurosystem during the recent crisis to switch to QEP. Though the amounts outstanding on Japanese interbank markets shrunk considerably between September 2008 and April 2009, BoJ did not significantly enlarge its balance sheet. It neither engaged in credit easing because it mainly increased its short term lending to banks, nor did it accept asset backed securities with low ratings as eligible collateral. Bank of Japan hence did not take such a large swing from the bottle of 'quantitative/ qualitative easing' which makes it easier to exit from QEP. This reluctance may be understandable because the question how to exit from QEP is not answered yet. Three problems have to be considered: One is what tools should be used. Another is what circumstances will trigger the use of these tools. Finally, central banks have to build credibility that they will start exiting only when these circumstances occur.

Although the paper argues that some of the policy decisions taken during the recent financial crisis probably reflect experiences made in Japan during the 1990s, this does not mean that academic discussions, as reviewed in section 2, did not exert an influence on the the policy reactions. Quite the opposite is probably true. The recent literature on financial crises explains, e.g., why interbank markets fail, what role capital regulations play in the propagation of a crisis, or why direct financial assistance to single institutions may be helpful. These results, however, may be supplemented by experiences made in Japan during the 1990s to improve our understanding of the policy reactions taken during the last two years. It is for this reason why a case study, like this one, may be helpful.

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Appendix: Time Line of Policy Measures taken by the Bank of Japan (2008-2009)

Date	Measure
2008	
Sep. 18, 2008	Introduction of US Dollar fund-supplying operations
Sep. 29, 2008	Expansion of of US Dollar fund-supplying operations
Oct. 14, 2008	Expansion of the securities lending facility; Expansion of the purchase of JGBs with Repo agreements; Expansion of US Dollar fund-supplying operations; Provision of sufficient funds over the year-end (40 trillion Y); Increase in frequency and size of CP repo operations; Expansion in the range of ABCP as eligible collateral; Suspension of selling stocks held by the Bank of Japan;
Oct. 31, 2008	Reductions in policy interest rates: <ul style="list-style-type: none"> • New target for the uncollateralized overnight call rate: around 0.3%; • New basic loan rate: 0.5 %; Introduction of complementary deposit facility (rate applied: 0.1 %)
Dec. 02, 2008	Introduction of “special fund-supplying operations to facilitate corporate financing”; Expansion in the range of corporate debt as eligible collateral;
Dec. 19, 2008	Reductions in policy interest rates: <ul style="list-style-type: none"> • New target for the uncollateralized overnight call rate: around 0.1%; • New basic loan rate: 0.3 %; Expansion in the range of JGBs accepted in outright purchases; Outright purchases of JGBs (16.8 trillion Y per year)); Inclusion of Development Bank of Japan as counterparty in operations such as CP Repo op.; Expansion of “special fund-supplying operations to facilitate corporate financing”; Introduction of outright purchases of CPs;
2009	
Jan. 22, 2009	Acceptance of debt instruments issued by real estate investment corp. as eligible collateral; Expansion in the range of JGBs accepted in outright purchases; Expansion of outright purchases of CPs; Introduction of outright purchases of Government bonds
Feb. 3, 2009	Resumption of stock purchases held by financial institutions (rating BBB- or better)
Feb. 19, 2009	Inclusion of government-guaranteed dematerialized CP in eligible collateral; Expansion of “special fund-supplying operations to facilitate corporate financing”; Expansion of outright purchases of Government bonds; Expansion of the securities lending facility;
Mar. 17, 2009	Provision of subordinated loans to banks;
Mar. 18, 2009	Outright purchases of JGBs (21.6 trillion Y);
Apr. 7, 2009	Expansion in the range of eligible collateral for loans on deeds to the public sector;
Apr. 10, 2009	Provision of subordinated loans to banks;
May 22, 2009	Acceptance of US, UK, German, French Government Bonds as eligible collateral;
Jul. 15, 2009	Prolongation
Oct. 30, 2009	Expiration of temporary measures announced

Source: Bank of Japan (2009c)