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研究課題名（和文）The effects of unconventional policies in the post-crisis era

研究課題名（英文）The effects of unconventional policies in the post-crisis era

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研究成果の概要（和文）：15年にわたる日本の銀行データのパネルを使用して、本研究は非伝統的金融政策（量的緩和政策）が金融政策伝達の銀行融資チャネルに与える効果を分析する。調査結果から、日本の非伝統的金融政策が効果を発揮していることが示唆されている。日本においては、金融政策の伝達経路には銀行融資チャネルが存在するという結果が得られた。時間固定効果の含有や一般化最小二乗法の分析を行っても、結果は一貫している。
しかし、銀行業務理論の予測とは異なり、量的緩和政策の効果は主に資本不足のある銀行を通じて現れるようである。これらの結果は、銀行のバランスシートの問題がクレジットチャネルを妨げる重要な要因であることを示唆している。

研究成果の学術的意義や社会的意義
2007年から2008年にかけてのグローバル金融危機以降、世界中の中央銀行は従来とは異なる金融政策に頼るようになった。果たしてそれらは効果があったのだろうか？この研究では、日本とアメリカにおける従来とは異なる金融政策の大胆な実験の効果を分析する。

研究成果の概要（英文）：Using a panel of bi-annual bank data covering the full universe of Japanese commercial banks over a 15-year period, this study analyzes the effectiveness of unconventional monetary policy, specifically quantitative easing, on the bank lending channel of monetary policy transmission. The findings suggest that Japan's unconventional monetary policynworked: there is a bank lending channel of monetary policy transmission in Japan. Our results are robust to the inclusion of time fixed effects and generalized method of moments analysis.

However, contrary to the predictions of banking theory, the effects of QE seem to come mostly through undercapitalized banks. These findings suggest that bank balance sheet problems continue to be important factors impairing the credit channel.

研究分野：Financial Institutions and Services　(G20)

キーワード：financial institutions　unconventional policy　monetary policy　bank lending channel　credit channel　transmission mechanism

１．研究開始当初の背景

Since the global financial crisis of 2007–2008, central bankers around the world have been forced to abandon conventional monetary policy tools in favor of unconventional policies such as quantitative easing, forward guidance, and even lowering the interest rate paid on bank reserves into negative territory. In particular, facing the zero-lower-bound on interest rates, central bankers in the United States and Europe have shifted from their usual instrument of monetary policy—a targeted uncollateralized interest rate paid on overnight interbank loans—to targeting a certain level of bank reserves.

Japan was a pioneer of much of this unconventional monetary policy. The Bank of Japan (BoJ) first embarked on "forward guidance" (before the term was commonly used) in February of 1999 with its so-called "zero-interest rate policy" (ZIRP), by which BoJ Governor Hayami committed to keep the uncollateralized overnight interbank rate, the call rate, at zero "until deflationary conditions subside." The target call rate was raised to 25 basis points in August of 2000, but in retrospect, that rate raise seemed premature, and it was lowered again, this time to 15 basis points, in February 2001. With the economy still not performing at potential and mired in deflation, at its March 2001 meeting the BoJ shifted its monetary policy instrument from the call rate to the amount of bank reserves held on deposit at the BoJ.

Japan's bold experiment in targeting bank reserves was the world's first policy of quantitative easing (QE). Despite much controversy and debate, even among the monetary policy board members of the BoJ itself, this first round of quantitative easing, now referred to as "QE1," remained in effect for nearly six years. Over that period, the targeted balance of the BoJ's current account was raised several times. When the policy was first announced in March 2001, reserves were targeted at 5 trillion yen. That was raised to 6 trillion yen in August 2001 and then to a range between 10–15 trillion in December of the same year. When Hayami was succeeded by Governor Fukui in 2003, QE1 was expanded further to reach a target of 30–35 trillion by January 2004. Finally, on March 9, 2006, the BoJ lifted the quantitative easing policy by a 7–1 vote, citing that the three conditions for lifting QE, set out at the January 2004 monetary policy meeting, had been met. The BoJ's monetary policy instrument was switched from the BoJ current account balance back to the conventional instrument of the uncollateralized overnight call rate, although to assuage critics in the Ministry of Finance and Cabinet Office, the BoJ pledged that the targeted call rate would remain effectively at zero for some time: ZIRP would remain in place. Three months later, in July 2006, the BoJ made the historic decision to lift ZIRP and target a 25 basis point call rate. Interest rates in Japan had finally been normalized after more than six years of experimental policy.

At the end of Governor Fukui's term in March, Masaaki Shirakawa took over at the helm of the BoJ. He was soon facing the global financial crisis, or the "Lehman Shock" as it is sometimes referred to in Japan. By December 2008, policy rates were nearly at zero in the United States. The BoJ lowered the target call rate from 30 to 10 basis points and announced an increase in outright purchases of Japanese Government Bonds (JGBs) and some less conventional assets such as commercial paper. However, Governor Shirakawa insisted that this was not a return to QE. QE returned, however, in 2013, under Shirakawa's successor, Kuroda, and was promoted as the first of three "arrows" in Prime Minister Abe's economic plan, "Abenomics," which he placed at the center of his political agenda.

In April 2013, Governor Kuroda announced Qualitative and Quantitative Easing, or QQE. This was a pledge to end the "incremental" approach of the BoJ (presumably a dig at Shirakawa) by doubling the monetary base within one year and raising the average maturity of JGBs held by the BoJ. This was forecast to increase the size of the BoJ's balance sheet by about 1% of GDP each month, double the rate that had been set by the Federal Reserve Board of Governors (the Fed) under its program of "Large Scale Asset Purchases" (Fed Chair Ben Bernanke was, like Shirakawa, insistent that his policy was not QE). At the time of this writing, QQE remains in place, nearly ten years after it was implemented.

２．研究の目的

This research analyzes the path of monetary policy transmission in the case of unconventional policies such as QE and QQE.

One way QE is supposed to work is through the bank lending channel of monetary policy transmission. The central bank creates new money—usually electronically—and uses it to purchase large amounts of assets from commercial bank. This makes the commercial banks more liquid, which should lead to lower interest rates on loans and stimulate borrowing by businesses and households. This borrowing, in turn, is

used to finance new investment, which in turn stimulates economic growth and eventually inflation in the macroeconomy.

３．研究の方法

(1) Related Literature: A seminal article on the bank lending channel of monetary policy transmission is Anil Kashyap and Jeremy Stein's (2000) study, which found support for the existence of the bank lending channel in an analysis of quarterly balance sheet data on U.S. commercial banks from 1976 to 1993. Kaoru Hosono (2006) builds on the model proposed by Kashyap and Stein (2000), extending their empirical analysis to include not only liquidity, but also bank capital, in an analysis of the transmission of Japanese monetary policy during the period 1975 to 1999. Echoing some of the findings of Kashyap and Stein (2000), Hosono (2006) finds evidence of a bank lending channel in Japan, and concludes that it works more effectively through smaller, less liquid, banks with higher capital ratios. In sub-sample analysis however, Hosono (2006) demonstrates that the effectiveness of the bank lending channel of monetary policy transmission is asymmetric: during period of monetary tightening, bank liquidity plays an important role in transmission, while during periods of monetary policy tightening, bank capital becomes paramount.

The study most closely related to our study, however, is that of David Bowman et al. (2015) which examines the impact of unconventional monetary policy in Japan. Bowman et al. (2015) empirically evaluate the effect of Japan's first pioneering experiment with quantitative easing policy from 2001 to 2006 (QE1) on bank lending. They find a positive, statistically significant impact of bank liquidity on bank lending during the period of QE1 but conclude that it is so small as to be quantitatively, economically, rather insignificant.

(2) Data: We use an unbalanced panel of data on 147 Japanese banks' balance sheets and financial statements over the 15-year period between 2000 and 2015 from the Japanese Bankers Association (JBA). The data frequency is semi-annual, as balance sheet and financial statement information is reported every September and March (note that Japan's fiscal year runs from April 1 to March 31). Thus, our panel of data includes a total of 4,003 bank-period observations. Table 1 reports the summary statistics.

Table 1. Summary Statistics, 2000-2015

Variable Name	Mean	Standard Deviation	Min	Max
Loan Growth (log change, %)	0.85%	5.24	–103.73%	84.43%
Liquidity Ratio (%)	6.64%	3.91	1.13%	54.85%
Total Assets (log, million yen)	14.67	1.23	10.38	19.12
Total Deposits (log, million yen)	14.45	1.38	4.01	18.70
Equity Ratio (%)	5.04%	4.93	–78.82	79.83
Bad Loan Ratio (%)	81.79	95.55	–612.47	1,916.83
No. of Banks (i)	147			
No. of Time Periods (t)	30			
No. of Observations	4,003			

Source: Japanese Bankers Association.

(3) Empirical Methodology: Our baseline estimation regresses the panel of data described above using the following reduced-form equation:

$$\Delta\, log\, log\left(L_{i,t+1}\right) = \beta_0 + \beta_1 LR_{i,t} + BX_{i,t} + \varepsilon_{i,t+1} \quad (1) \qquad (19)$$

Where:

$\Delta\, log\, log\left(L_{i,t+1}\right)$ represents log change of loans for bank i at time $t + 1$

$LR_{i,t}$ represents the liquidity ratio of bank i at time t, defined as the ratio of liquid assets ("cash and due from banks" plus "call loans") divided by total assets

$X_{i,t}$ represents a vector of control variables, including the log of total assets, the log of total deposits, the equity ratio (the ratio of bank equity to total assets) and the bad loan ratio (the ratio of bad loans to total bank equity; bad loans are defined as the sum of "loan to borrowers in legal bankruptcy," "past due loans in arrears by six months or more," "loans in arrears by three months or more and less than six months" and "restructured loans") for bank i at time t

$\varepsilon_{i,t+1}$: represents the error term for bank i at time $(t + 1)$

In equation 1, the main parameter of interest is β_1, the coefficient on the liquidity ratio. If monetary policy is effective, the estimate of β_1 will be positive and statistically significant, indicating that a higher bank liquidity ratio leads to higher bank loan growth.

The empirical methodology used starts with a simple pooled ordinary least squares (OLS) regression, then turns to balanced panel data analysis, exploring the effect of including both individual and time fixed effects. Finally, to address concerns about lagged dependent variable bias, we report the results of generalized method of moments analysis (GMM).

4．研究成果

(1) Empirical Results:

Table 2. The Effect of Higher Bank Liquidity Ratios on Loan Growth
Dependent Variable: Loan Growth $\Delta log(L)_{i,t+1}$

	Pooled Ordinary Least Squares (OLS)	Panel Analysis with Individual Fixed Effects	Panel Analysis with Time Fixed Effects	Two Step System GMM	Two Step Difference GMM
Independent Variables	(1)	(2)	(3)	(4)	(5)
Constant Term	–0.00				
	(0.01)				
Liquidity Ratio, $LR_{i,t}$	0.06**	0.14***	0.06***	0.15**	0.19
	(0.03)	(0.03)	(0.03)	(0.08)	(0.12)
Log Total Assets	0.00	–0.05***	0.00	0.00	–0.06
	(0.00)	(0.01)	(0.00)	(0.00)	(0.06)
Equity Ratio, $ER_{i,t}$	0.08	0.53***	0.06	0.04	1.23**
	(0.06)	(0.10)	(0.06)	(0.20)	(0.50)
Bad Loan Ratio	–0.01***	–0.01***	–0.00***	–0.00	–0.01
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
No. Obs.	2,580	2,460	2,460	4,003	2,172

Note: Standard errors are written in parenthesis below the finding, and asterisks represent significant findings at the 10%*, 5%**, and 1%*** level, respectively. I=147 (or 133), T=30 (or 33), N=4,003 (or 2,460)

The results reported in Table 2, which reports the results of empirical estimation of equation (1), indicate that monetary policy was effective during the period of our study. For nearly all empirical methodologies—pooled OLS, panel data with individual fixed effects or time fixed effects, and for GMM—the coefficient estimate of interest is positive and highly statistically significant at the 5% or even 1% level. This suggests that banks with relatively higher liquidity ratios in a given period tend to have statistically significantly higher loan growth in the following period.

The size of the parameter estimate nearly doubles when individual bank fixed effects are accounted for in column (2), and when we address the possibility of endogeneity due to a lagged dependent variable on the right-hand side through two-step system GMM analysis.

(2) Conclusions: The empirical results presented above indicate that unconventional monetary policy has significant effects through the bank lending channel, although the impact on bank lending is quantitatively small. This raises questions as to the appropriateness of the policy implementation and the long-term implications of the policy for the banking sector and macroeconomy as a whole. In particular, further investigation is needed regarding potential differences in the impact of QE across banking institutions and potential unintended side effects of QE.

５．主な発表論文等

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オープンアクセス オープンアクセスではない、又はオープンアクセスが困難	国際共著 該当する

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〔図書〕　計0件

〔産業財産権〕

〔その他〕

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６．研究組織

	氏名 （ローマ字氏名） （研究者番号）	所属研究機関・部局・職 （機関番号）	備考

７．科研費を使用して開催した国際研究集会

〔国際研究集会〕　計0件

８．本研究に関連して実施した国際共同研究の実施状況

共同研究相手国	相手方研究機関