The Effectiveness of Unconventional Monetary Policy: Evidence from Japan

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Agenda

- Introduction
- Background
- Data and Methodology
- Results
- Conclusions
Introduction

• Since the global financial crisis, central bankers around the world have abandoned conventional monetary policy tools in favor of unconventional monetary policy (UMP) tools
  • Quantitative Easing (QE)
  • Forward Guidance
  • Negative Interest Rates

• Japan, which faced a crisis in its banking sector and came up against the zero lower bound on interest rates nearly a decade earlier, was a pioneer in the use of many of these unconventional policy tools

• Our paper analyzes the effectiveness of Japan’s bold experiment with unconventional monetary policy
QE: How it Works in Theory

Transmission mechanism through the bank lending channel

• Central bank creates new money to purchase large amounts of assets from commercial banks
• Commercial bank liquidity ↑
• Interest rates ↓
• Borrowing by business and households ↑
• Investment ↑
• Growth and inflation ↑
Research Question & Empirical Approach

• Was UMP – and QE in particular – effective at stimulating bank lending in Japan?

• We analyze the effectiveness of QE policies on the bank lending channel of monetary policy transmission by using a panel of bi-annual bank data from 109 Japanese banks over the period 1996-2015
Background: Japan as a Pioneer of UMP

• Forward Guidance & “Zero-Interest Rate Policy” (ZIRP)
  • In February 1999, BoJ Governor Hayami committed to keep the uncollateralized overnight interbank rate at zero “until deflationary conditions subside”
  • February 1999-August 2000, February 2001-July 2006
“QE1”

- Between March 2001 and March 2006, the targeted balance of the BoJ’s current account was raised several times (first to ¥ 5 trillion, later to ¥ 30-35 trillion)
- The BoJ expanded its balance sheet by 32.1% from ¥ 115.3 trillion to ¥ 152.3 trillion
- Purchases consisted of JGBs and short-dated financing bills or promissory notes ("tegata") predominantly from banks
- Between 2001 and 2006, the monetary base expanded by 70%
"QE2"

- Reluctant adoption of QE by Governor Shirakawa
  - Greenwood (2017): “Shirakawa was a reluctant expansionist”
- Expansion of the BoJ’s balance sheet through asset purchases by 35.5% from ¥ 121 trillion in October 2010 to ¥ 164 trillion in March 2013
  - At the end of QE2, the BoJ’s balance sheet was only slightly larger than at the end of QE1 (¥ 164 trillion compared with ¥ 152 trillion)
- The main assets purchased were JGBs and tegata, but also Tokyo-listed Exchange Traded Funds (ETFs) and Real Estate Investment Trusts (REITs)
• Qualitative and Quantitative Easing (QQE)
  • Appointment of Governor Kuroda by PM Abe in March 2013
  • 2-2-2 plan: within two years, the monetary base would be doubled and a new inflation target of 2% would be reached
  • From April 2013, the BoJ purchased assets to increase the monetary base at a rate of ¥ 60 trillion per year, and ¥ 80 trillion per year from November 2014
  • BoJ purchases of JGBs and other securities, mainly from banks

• QQE with Negative Interest Rate (NIRP)
  • Since January 2016, the BoJ applies a negative interest rate of –0.1% to current accounts, which financial institutions hold at the BoJ

• QQE with Yield Curve Control (“NIRP2”)
  • In September 2016, BoJ committed to keep 10-year JGB rate below zero
Data and Methodology

• We use panel data of 109 Japanese banks’ balance sheet and financial statements for the period 1996—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
  • NB: Japan’s fiscal year runs from April 1 to March 31

• Our panel of data includes a total of 4,003 observations
## Summary Statistics

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loan Growth (log change, %)</td>
<td>0.85%</td>
<td>5.24</td>
<td>-103.73%</td>
<td>84.43%</td>
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<tr>
<td>Liquidity Ratio (%)</td>
<td>6.64%</td>
<td>3.91</td>
<td>1.13%</td>
<td>54.85%</td>
</tr>
<tr>
<td>Total Assets (log, million yen)</td>
<td>14.67</td>
<td>1.23</td>
<td>10.38</td>
<td>19.12</td>
</tr>
<tr>
<td>Total Deposits (log, million yen)</td>
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<td>1.38</td>
<td>4.01</td>
<td>18.70</td>
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<tr>
<td>Equity Ratio (%)</td>
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<td>4.93</td>
<td>-78.82</td>
<td>79.83</td>
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<tr>
<td>Bad Loan Ratio (%)</td>
<td>81.79</td>
<td>95.55</td>
<td>-612.47</td>
<td>1,916.83</td>
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<tr>
<td>No. of Banks (i)</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>No. of Time Periods (t)</td>
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<td></td>
<td>40</td>
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<tr>
<td>No. of Observations</td>
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<td>4,003</td>
<td></td>
</tr>
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</table>
Econometric Specification

$$\Delta L_{i,t+1} = \beta_0 + \beta_1 LR_{i,t} + \beta_2 X_{i,t} + \varepsilon_{i,t+1}$$

where:

• $\Delta L_{i,t+1}$: log change of loans for bank $i$ at time $t + 1$

• $LR_{i,t}$: liquidity ratio of bank $i$ at time $t + 1$, defined as the ratio of liquid assets (“cash and due from banks” plus “call loans”) divided by total assets

• $X_{i,t}$: vector of control variables for bank $i$ at time $t + 1$, including
  • log of total assets
  • log of total deposits
  • equity ratio (ratio of bank equity to total assets)
  • bad loan ratio (ratio of bad loans to total bank equity)

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

$\beta_1$ is the main parameter of interest: if monetary policy is effective, the estimate of $\beta_1$ will be positive and statistically significant, indicating that a higher bank liquidity ratio leads to higher bank loan growth.
2\textsuperscript{nd} Specification to Check for Bank Health

\[ \Delta L_{i,t+1} = \beta_0 + \beta_1 LR_{i,t} + \beta_2 LR_{i,t} \times BH_{i,t} + \beta_3 X_{i,t} + \varepsilon_{i,t+1} \]

where

• \( BH \): dummy for healthy banks, defined as banks with an equity ratio above the sample mean

• and all other variables are defined as above
Econometric Methodology

• Pooled OLS, with Bank Type Dummies, Time Dummies, and both Bank Type and Time Dummies

• Panel Data Analysis with Individual Fixed Effects and Time Fixed Effects

• Generalized Method of Moments Analysis
Empirical Results: The effect of higher bank liquidity ratios on loan growth

<table>
<thead>
<tr>
<th>Dependent Variable: Loan Growth $\Delta L_{i,t+1}$</th>
<th>POLS</th>
<th>Individual FE</th>
<th>Time FE</th>
<th>Two Step System GMM</th>
<th>Two Step Difference GMM</th>
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<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>Constant Term</td>
<td>-0.00</td>
<td>0.14***</td>
<td>0.06***</td>
<td>0.15**</td>
<td>0.19</td>
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<td>(0.01)</td>
<td>(0.03)</td>
<td>(0.03)</td>
<td>(0.08)</td>
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<tr>
<td>Liquidity Ratio</td>
<td>0.06**</td>
<td>0.14***</td>
<td>0.06***</td>
<td>0.15**</td>
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<tr>
<td></td>
<td>(0.03)</td>
<td>(0.03)</td>
<td>(0.03)</td>
<td>(0.08)</td>
<td></td>
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<tr>
<td>Log Total Assets</td>
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<td>-0.05***</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.06</td>
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<tr>
<td></td>
<td>(0.00)</td>
<td>(0.01)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.06)</td>
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<tr>
<td>Equity Ratio</td>
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<td>0.06</td>
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<td>(0.06)</td>
<td>(0.10)</td>
<td>(0.06)</td>
<td>(0.20)</td>
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<td>-0.01***</td>
<td>-0.00***</td>
<td>-0.00</td>
<td>-0.01</td>
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<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
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<td>No. Obs.</td>
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<td>2,460</td>
<td>4,003</td>
<td>2,172</td>
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</table>
• The results indicate that UMP 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 more than 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
The effect of higher bank liquidity ratios on loan growth – controlling for bank health

<table>
<thead>
<tr>
<th>Dependent Variable: Loan Growth $\Delta L_{i,t+1}$</th>
<th>POLS</th>
<th>POLS with Bank Type Dummies</th>
<th>Time FE</th>
<th>Two Step System GMM</th>
<th>Two Step Difference GMM</th>
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<td>Independent Variables</td>
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<td>(0.09)</td>
<td>(0.12)</td>
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<tr>
<td>Liquidity Ratio</td>
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<td>0.08***</td>
<td>0.08***</td>
<td>0.18**</td>
<td>0.15</td>
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<td>(0.03)</td>
<td>(0.09)</td>
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<tr>
<td>Equity Ratio</td>
<td>0.15***</td>
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<td>0.13*</td>
<td>0.05</td>
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<td>(0.07)</td>
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<tr>
<td>Bad Loan Ratio</td>
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<td>-0.01***</td>
<td>-0.01***</td>
<td>-0.01</td>
<td>-0.01</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.01)</td>
</tr>
<tr>
<td>Liquidity Ratio x Healthy Bank Dummy</td>
<td>-0.07**</td>
<td>-0.07**</td>
<td>-0.07**</td>
<td>-0.12*</td>
<td>-0.07</td>
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<tr>
<td></td>
<td>(0.03)</td>
<td>(0.03)</td>
<td>(0.03)</td>
<td>(0.07)</td>
<td>(0.08)</td>
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Introduction  
Background  
Data and Methodology  
Empirical Results  
Conclusions
• The previous results are largely confirmed
  • Banks with relatively higher liquidity ratios in a given period tend to have statistically significantly higher loan growth in the following period

• The coefficient estimate on the interaction term of each individual banks’ liquidity ratio at time $t$ and the $HealthyBank$ dummy variable is highly statistically significantly negative

• This indicates that UMP was effective overall, but was relatively less effective at stimulating lending by healthy banks that were meeting their regulatory capital ratio requirement

• Put differently, the results suggest that although UMP was effective overall, the lending stimulated by providing banks with higher liquidity was mostly lending by sick, undercapitalized banks
  • Will this have adverse impact on financial stability?
(Preliminary) Conclusions

• Our preliminary results indicate that UMP is effective, although the impact on bank lending is quantitatively small
• Interestingly, the UMP seems to be particularly encouraging increased lending from sick, undercapitalized banks
• 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