Negative Impacts of Capital Injection Policies on the Capital Crunch: Evidence from Japan

Financial Regulation and Structure in Japan, Australia and East Asia
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Introduction

• **Capital Injection Policies**
  Governments have spent much taxpayers’ money on capital injections into the troubled banking sector which has suffered financial crises.

- In Japan
  - Two financial crises
  - ¥12 trillion, or 2% of Japan’s nominal GDP in 2008

- In the U.S
  - The current global financial crisis
  - $700BN

- In the EU (i.e., the 27 European member countries)
  - The current global financial crisis
  - €310BN
Avoiding a ‘capital crunch’

is one of the common goals of every capital injection policies.

What is the “Capital Crunch”? 

• The bank shrinkage resulting from binding capital requirements. 

  (Peek and Rosengren [1995])

  Under the Basel Capital Accord (Basel I )

  if bank capital decreases ➔ banks shrink their risk assets (bank loans)

• Multiple studies have demonstrated the existence of this phenomenon:
  - At the beginning of the 1990s in the United States (Peek and Rosengren [1995]...etc.)
  - At the end of the 1990s in Japan (Ito and Sasaki [1998, 2002] ...etc.)

  Expected Effect of the Capital Injection Policies
  Capital Injections ➔ banks increase their risk assets (bank loans)
Motivation

• Montgomery and Shimizutani (2009)
  - Examining the bank lending behaviour from FY1990 to 1999
  - Effects of the Capital Injection Policies from FY1997 to 1998
  - Capital injections increased domestic lending, in particular to small and medium enterprises (SME).

• Watanabe (2007)
  - Capital injections induced Japanese banks to accelerate supply of loans.

However...these positive conclusions are doubtful...
Total Amount of Loans of the Banking Sector (at the end of March)


(Source: Bank of Japan)
The Tankan “Lending Attitude of Financial Institutions” Diffusion Indices (DIs)


(Source: Bank of Japan)
This Paper

- This paper re-examine whether there was a positive impact of capital injections on the banks’ lending behavior as previous studies showed.
  - Using the data from the period including the early 2000s, which was excluded from the analysis of previous studies

Main Contributions
1. A negative impact of capital injections on the capital crunch.
2. Asymmetric effects on international and domestic banks.
3. Evidence that capital injections do not necessarily prevent a capital crunch, which suggests that the manner of conducting capital injections is an important matter.
Capital Crunch and Capital Injection Policies

Why are the capital injections believed to prevent the capital crunch?

• During a recession or depression
  - It is difficult or costly for banks to raise fresh external capital.
  - Banks’ capital base is likely being eroded by loan losses and so on.
• Under the Basel I, or the RBC (risk-based-capital) requirement,
  - Banks have a strong incentive to cut back on lending and raise their RBC ratio.

Capital Injections ➔ Bank Capital ↑
  ➔ [• Ease their Capital Regulatory Constraint
     • Increase Loan]
Capital Injection Policies

Japanese Capital Injections were done on the basis of two different laws

<table>
<thead>
<tr>
<th>Law Name</th>
<th>Total Amount (billion yen)</th>
<th>Injection Periods</th>
<th>Number of Banks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Function Stabilization Law</td>
<td>1,815.6</td>
<td>Mar. 1998</td>
<td>21</td>
</tr>
</tbody>
</table>

- The Early Strengthening Law was on a larger scale and its injected capitals were tailored to individual banks, unlike the Financial Function Stabilization Law.

- The banks that received a capital injection under the Early Strengthening Law had to submit a ‘Financial Revitalization Plan’, in which they had to set various numerical targets such as a target amount of loans, target capital ratios.

  ⭐ Pursuing both these two targets seems to be mutually inconsistent.

  Increasing loans ⇔ Lowering the capital ratio
The Possible Effects

Comparing the frameworks of these two laws,

**The ‘Financial Function Stabilization Law’**
- Smaller scale ➔ Smaller effects?

**The ‘Early Strengthening Law’**
- Larger scale
- The injected capitals were tailored to individual banks. ➔ Easing the capital crunch?
  - Stricter (←‘Financial Revitalization Plan’)
  - Banks put stronger focus on their capital ratio than their amount of loan ➔ Aggravated the capital crunch?

Which effects were observed in the Japanese banking sector from the 1990s to the mid-2000s?
Empirical Analysis –Method-

The rational expectations model of bank behaviour
Montgomery (2005) and Montgomery and Shimizutani (2009)

\[ \Delta \log(L_{i,t+1}) = a_0 + a_1 \Delta \log(L_{i,t}) + \beta_1 \text{Cap}_{i,t} + \gamma_1 (r^L_t - r^D_t) + \gamma_2 \Delta \log(GDP_{t+1}) + \epsilon_{i,t+1} \]

- \( \Delta \log(L_{i,t+1}) \): the annual growth rate of loans of bank \( i \) in fiscal year \( t \)
- \( \text{Cap}_{i,t} \): the bank’s individual capital ratio
- \( r^L_t - r^D_t \): the differential between the interest rates on loans and on deposits
- \( \Delta \log(GDP_{t+1}) \): the annual growth rate of nominal GDP in fiscal year \( t \)

If the banks’ lending behavior is restricted by their capital ratio (the banks face the capital crunch), \( \beta_1 \) is positive.
Empirical Analysis – Method -

\[ \Delta \log(L_{i,t+1}) = a_0 + \alpha_1 \Delta \log(L_{i,t}) + \beta_1 \text{Cap}_{i,t} + \gamma_1 (r^L_t - r^D_t) + \gamma_2 \Delta \log(GDP_{t+1}) + \beta_2 \text{Cap}_{i,t} \cdot \text{InjD}_{i,t+1} + \delta_1 \text{InjD}_{i,t+1} + \varepsilon_{i,t+1} \]  \hspace{1cm} \text{(1)}

- **InjD}_{i,t+1} :* Dummy variable 

  - **InjD}_{i,t+1 = 1 :* if bank \(i\) had injected funds in its liability side in year \(t+1\)

If capital injections could ease the capital crunch \( \Rightarrow \beta_2 \) is expected to be negative.

If capital injections aggravated the capital crunch, or the capital-injected banks were suffering it more than the other banks \( \Rightarrow \beta_2 \) is expected to be positive.

If capital injections could activated the lending behavior of capital-injected banks \( \Rightarrow \delta_1 \) is expected to be positive

If capital injections inactivated the behavior \( \Rightarrow \delta_1 \) is expected to be negative.
Empirical Analysis – Method –

• In order to examine the difference between the Financial Function Stabilization Law and the Early Strengthening Law, in addition to equation (1), we will estimate the following equation (2):

\[
\Delta \log(L_{i,t+1})
= a_0 + \alpha_1 \Delta \log(L_{i,t}) + \beta_1 \text{Cap}_{i,t} + \gamma_1 (r_t^L - r_t^D) + \gamma_2 \Delta \log(GDP_{t+1}) \\
+ \beta_3 \text{Cap}_{i,t} \cdot \text{StabD}_{i,t+1} + \delta_2 \text{StabD}_{i,t+1} + \beta_4 \text{Cap}_{i,t} \cdot \text{EarlyD}_{i,t+1} + \delta_3 \text{EarlyD}_{i,t+1} + \varepsilon_{i,t+1} \tag{2}
\]

\[
\text{StabD}_{i,t+1} = 1 \\
\text{if bank } i \text{ had funds from the Financial Function Stabilization Law in year } t+1
\]

\[
\text{EarlyD}_{i,t+1} = 1 \\
\text{if bank } i \text{ had funds from the Early Strengthening Law in year } t+1
\]
Empirical Analysis – Data –

The accounting information
- The financial panel data for all of the Japanese commercial banks (city banks, long-term credit banks, regional banks, 2nd regional banks and trust banks)
- Fiscal-year-end data on an unconsolidated basis from FY1993 to FY2006
- Mergers are accounted for by treating the merged entity as a new bank after the event.
- From the Nikkei Financial Quest database.

Interest Rates (for every March)
- The interest rates on loans: ‘interest rates on new loans and discounts’
- The interest rates on deposits: ‘average interest rates on time deposits’
- From the BOJ Time-Series Data Search

Nominal GDP (for Every Fiscal Year)
- From Ministry of Finance
Estimation Results (1)

International Banks

\[
\Delta \log(L_{i,t+1}) = a_0 + \alpha_1 \Delta \log(L_{i,t}) + \beta_1 \text{Cap}_i,t + \gamma_1 (r^L_t - r^D_t) + \gamma_2 \Delta \log(GDP_{t+1}) \\
+ \beta_2 \text{Cap}_i,t \cdot \text{InjD}_{i,t+1} + \delta_1 \text{InjD}_{i,t+1} + \varepsilon_{i,t+1} \tag{1}
\]

<table>
<thead>
<tr>
<th>Loan Ratio</th>
<th>Total Loans Capital Ratio</th>
<th>Tier1 Ratio</th>
<th>SME Loans Capital Ratio</th>
<th>Tier1 Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital ratio ( \cdot \text{InjD}_{t+1} )</td>
<td>3.419 ***</td>
<td>2.717 ***</td>
<td>(3.974)</td>
<td>(3.597)</td>
</tr>
<tr>
<td>Tier1 ratio ( \cdot \text{InjD}_{t+1} )</td>
<td>5.851 ***</td>
<td>2.528 **</td>
<td>(8.793)</td>
<td>(2.201)</td>
</tr>
<tr>
<td>( \text{InjD}_{t+1} )</td>
<td>-40.373 ***</td>
<td>-38.049 ***</td>
<td>-27.622 ***</td>
<td>-12.863 *</td>
</tr>
<tr>
<td>Obs.</td>
<td>133</td>
<td>133</td>
<td>131</td>
<td>131</td>
</tr>
</tbody>
</table>

t-statistics in parentheses; *Significant at 10%; **significant at 5%; ***significant at 1%
Method: Panel Generalized Method of Moments (Arellano and Bover [1995])
The unit of \( \Delta \log(\text{Loan}) \), Loan-Deposit interest rate spread, Capital ratio and Tier 1 ratio is %
The results reported are for the sample FY 1993-2006
Estimation Results (2)

International Banks

\[ \Delta \log(L_{i,t+1}) \]

\[ = a_0 + \alpha_1 \Delta \log(L_{i,t}) + \beta_1 \text{Cap}_{i,t} + \gamma_1 (\text{rt}_t^L - \text{rt}_t^D) + \gamma_2 \Delta \log(GDP_{t+1}) \]

\[ + \beta_3 \text{Cap}_{i,t} \cdot \text{StabD}_{i,t+1} + \delta_2 \text{StabD}_{i,t+1} + \beta_4 \text{Cap}_{i,t} \cdot \text{EarlyD}_{i,t+1} + \delta_3 \text{EarlyD}_{i,t+1} + \epsilon_{i,t+1} \quad (2) \]

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<td>Capital Ratio</td>
</tr>
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<td>(a) Financial Function Stabilization Law</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital ratio _t \cdot \text{StabD_t+1}</td>
<td>-1.478 (0.455)</td>
<td>7.540 (0.827)</td>
</tr>
<tr>
<td>Tier1 ratio _t \cdot \text{StabD_t+1}</td>
<td>2.629 * (1.791)</td>
<td>-14.160 (0.361)</td>
</tr>
<tr>
<td>\text{StabD_t+1}</td>
<td>19.179 (0.510)</td>
<td>-18.013 (-1.610)</td>
</tr>
<tr>
<td>(b) Early Strengthening Law</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital ratio _t \cdot \text{EarlyD_t+1}</td>
<td>10.937 *** (2.882)</td>
<td>-6.164 (-0.495)</td>
</tr>
<tr>
<td>Tier1 ratio _t \cdot \text{EarlyD_t+1}</td>
<td>7.611 *** (3.721)</td>
<td>20.430 (0.474)</td>
</tr>
<tr>
<td>\text{EarlyD_t+1}</td>
<td>-129.333 *** (-2.712)</td>
<td>-48.865 *** (-2.767)</td>
</tr>
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<td>Obs.</td>
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\text{t-statistics in parentheses; *Significant at 10%; **significant at 5%; ***significant at 1%}

\text{Method : Panel Generalized Method of Moments (Arellano and Bover [1995])}

The unit of \( \Delta \log(\text{Loan}) \), Loan-Deposit interest rate spred, Capital ratio and Tier 1 ratio is %.

The results reported are for the sample FY 1993-2006.
Analysis – International Banks-

**Estimation Results (1)**

- the cross-term coefficients are positive and the intercept coefficients are significantly negative.
- International banks which had received injected capital were suffering from capital crunch and decreased loans, both Total Loans and SME Loans.

**Estimation Results (2)**

- we find that the effects of and [the Early Strengthening Law](#) on Total Loans are stronger than those of the [Financial Function Stabilization Law](#).
- International banks which had injected money based especially on [the Early Strengthening Law](#) were suffering from capital crunch and decreased Total Loans.
Estimation Results (3)
Domestic Banks

\[
\Delta \log(L_{i,t+1}) = \alpha_0 + \alpha_1 \Delta \log(L_{i,t}) + \beta_1 \text{Cap}_{i,t} + \gamma_1 (r^L_t - r^D_t) + \gamma_2 \Delta \log(GDP_{t+1}) + \beta_2 \text{Cap}_{i,t} \cdot \text{InjD}_{i,t+1} + \delta_1 \text{InjD}_{i,t+1} + \varepsilon_{i,t+1} \quad (1)
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<td>Capital Ratio</td>
</tr>
<tr>
<td>Capital ratio $t \cdot \text{InjD}_{t+1}$</td>
<td>0.813 ***</td>
<td>3.129 ***</td>
</tr>
<tr>
<td>(2.797)</td>
<td>(8.758)</td>
<td></td>
</tr>
<tr>
<td>Tier1 ratio $t \cdot \text{InjD}_{t+1}$</td>
<td>0.467</td>
<td>2.303 ***</td>
</tr>
<tr>
<td>(1.184)</td>
<td>(10.170)</td>
<td></td>
</tr>
<tr>
<td>$\text{InjD}_{t+1}$</td>
<td>-14.548 ***</td>
<td>-10.462 ***</td>
</tr>
<tr>
<td>(-5.328)</td>
<td>(-2.870)</td>
<td></td>
</tr>
<tr>
<td>$\text{InjD}_{t+1}$</td>
<td>-29.302 ***</td>
<td></td>
</tr>
<tr>
<td>(-7.994)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\text{InjD}_{t+1}$</td>
<td>-15.833 ***</td>
<td></td>
</tr>
<tr>
<td>(-7.731)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obs.</td>
<td>557</td>
<td>556</td>
</tr>
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Method: Panel Generalized Method of Moments (Arellano and Bover [1995])
The unit of \(\Delta \log(\text{Loan})\), Loan-Dropit interest rate spread, Capital ratio and Tier 1 ratio is %
The results reported are for the sample FY 1999-2006
Estimation Results (4)

Domestic Banks

\[ \Delta \log(L_{i,t+1}) = a_0 + \alpha_1 \Delta \log(L_{i,t}) + \beta_1 Cap_{i,t} + \gamma_1 (r_t^L - r_t^D) + \gamma_2 \Delta \log(GDP_{t+1}) + \beta_3 Cap_{i,t} \cdot StabD_{i,t+1} + \delta_2 StabD_{i,t+1} + \beta_4 Cap_{i,t} \cdot EarlyD_{i,t+1} + \delta_3 EarlyD_{i,t+1} + \varepsilon_{i,t+1} \] (2)

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<th>Ratio</th>
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<th>SME Loans</th>
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</thead>
<tbody>
<tr>
<td>Capital ratio t \cdot StabD t+1</td>
<td>3.378 ***</td>
<td>5.898 ***</td>
</tr>
<tr>
<td>(15.766)</td>
<td>(22.722)</td>
<td></td>
</tr>
<tr>
<td>Tier1 ratio t \cdot StabD t+1</td>
<td>3.569 ***</td>
<td>5.785 ***</td>
</tr>
<tr>
<td>(12.684)</td>
<td>(16.099)</td>
<td></td>
</tr>
<tr>
<td>StabD_t+1</td>
<td>-38.698 ***</td>
<td>-30.545 ***</td>
</tr>
<tr>
<td>(-14.791)</td>
<td>(-8.135)</td>
<td></td>
</tr>
<tr>
<td>EarlyD_t+1</td>
<td>0.340</td>
<td>3.038</td>
</tr>
<tr>
<td>(0.153)</td>
<td>(1.199)</td>
<td></td>
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</table>

Effects of Capital Injection

(b) Financial Function Stabilization Law

<table>
<thead>
<tr>
<th>Ratio</th>
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<th>SME Loans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital ratio t \cdot EarlyD t+1</td>
<td>-0.920 ***</td>
<td>-0.194</td>
</tr>
<tr>
<td>(-4.775)</td>
<td>(-0.655)</td>
<td></td>
</tr>
<tr>
<td>Tier1 ratio t \cdot EarlyD t+1</td>
<td>-1.518 ***</td>
<td>-1.421 ***</td>
</tr>
<tr>
<td>(-5.391)</td>
<td>(-4.014)</td>
<td></td>
</tr>
<tr>
<td>EarlyD_t+1</td>
<td>0.340</td>
<td>3.038</td>
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Method: Panel Generalized Method of Moments (Arellano and Bover [1995])

The unit of \( \Delta \log(Loan) \), Loan-Delay deposit interest rate spread, Capital ratio and Tier 1 ratio is %

The results reported are for the sample FY 1999-2006
Analysis – Domestic Banks-

Estimation Results (3)

- Domestic banks which had received injected capital were suffering from capital crunch and decreased loans, both Total Loans and SME Loans.

Estimation Results (4)

- The Financial Function Stabilization Law: the cross-term coefficients are positive and the intercept coefficients are negative.
- Capital injections based on this Law were not effective enough to help the banks, and as a result, these banks suffered from Capital Crunch.

- The Early Strengthening Law: the cross-term coefficients are negative and the intercept coefficients are significantly positive.
- Capital injections based on this Law helped to free domestic capital-injected banks from capital regulatory constraint, and to increase bank loans.
Analysis
- What is the difference between success and failure?

• The different effects of the two laws on domestic capital-injected banks
  ➢ The Early Strengthening Law was on a larger scale and its injected capitals were tailored to individual banks, unlike the Financial Function Stabilization Law.

• The different effects of the Early Strengthening Law between international banks and domestic banks.
  ➢ The FSA’s supervisory stance between international and domestic banks.
  ➢ The FSA was said to have been hard on international banks and lenient to domestic banks at that time.

☆ The difference between success and failure has a lot to do with the frameworks of capital injection policies.
Conclusion

1. A negative impact of capital injections on the capital crunch.
2. Asymmetric effects on international and domestic banks.
3. Evidence that capital injections do not necessarily prevent a capital crunch

- Suggesting that the manner of conducting capital injections is an important matter.

What was and will be needed is;
A greater appreciation of the potential adverse effects that capital injection policies can have on the economy.