Does the Policy Lending of the Government Financial Institution Mitigate the Credit Crunch? Evidence from the Loan Level Data in Japan

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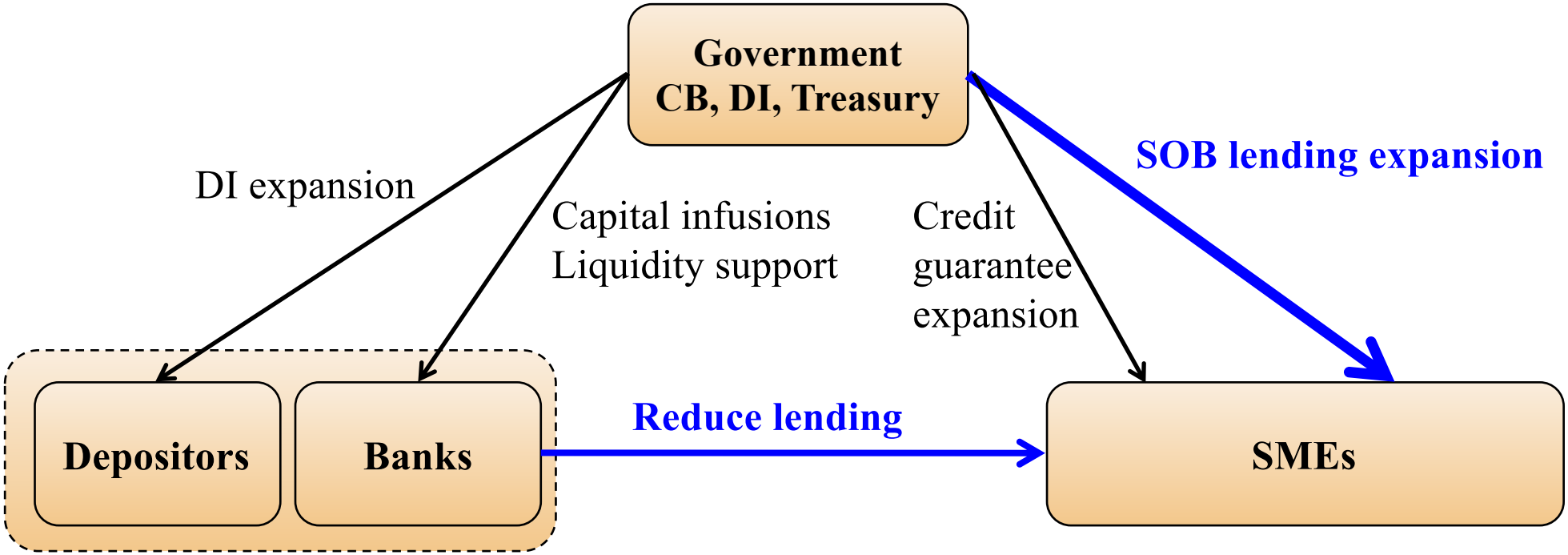
Policy Options Available to the Government Facing the Credit Crunch



Policy Options Available to the Government Facing the Credit Crunch

Policy responses to the credit crunch

- Public capital infusions into banks aimed at recovering banks' lending capabilities（Allen et al., 2011, Li, 2013）
- Government guarantees of bank's debts including deposits（Laeven and Valencia, 2008）
- Expanding public credit（Uesugi, et al., 2010）
- **Expanding lending by government financial institutions** (GFIs, this paper)

Research Questions

- Did the Japan Finance Corporation for Small and Medium Enterprise (JASME) expand lending to the firms whose main banks reduced lending?
- How did firms that borrowed loans from the JASME as measures to mitigate the effects of the credit crunch perform ex-post?

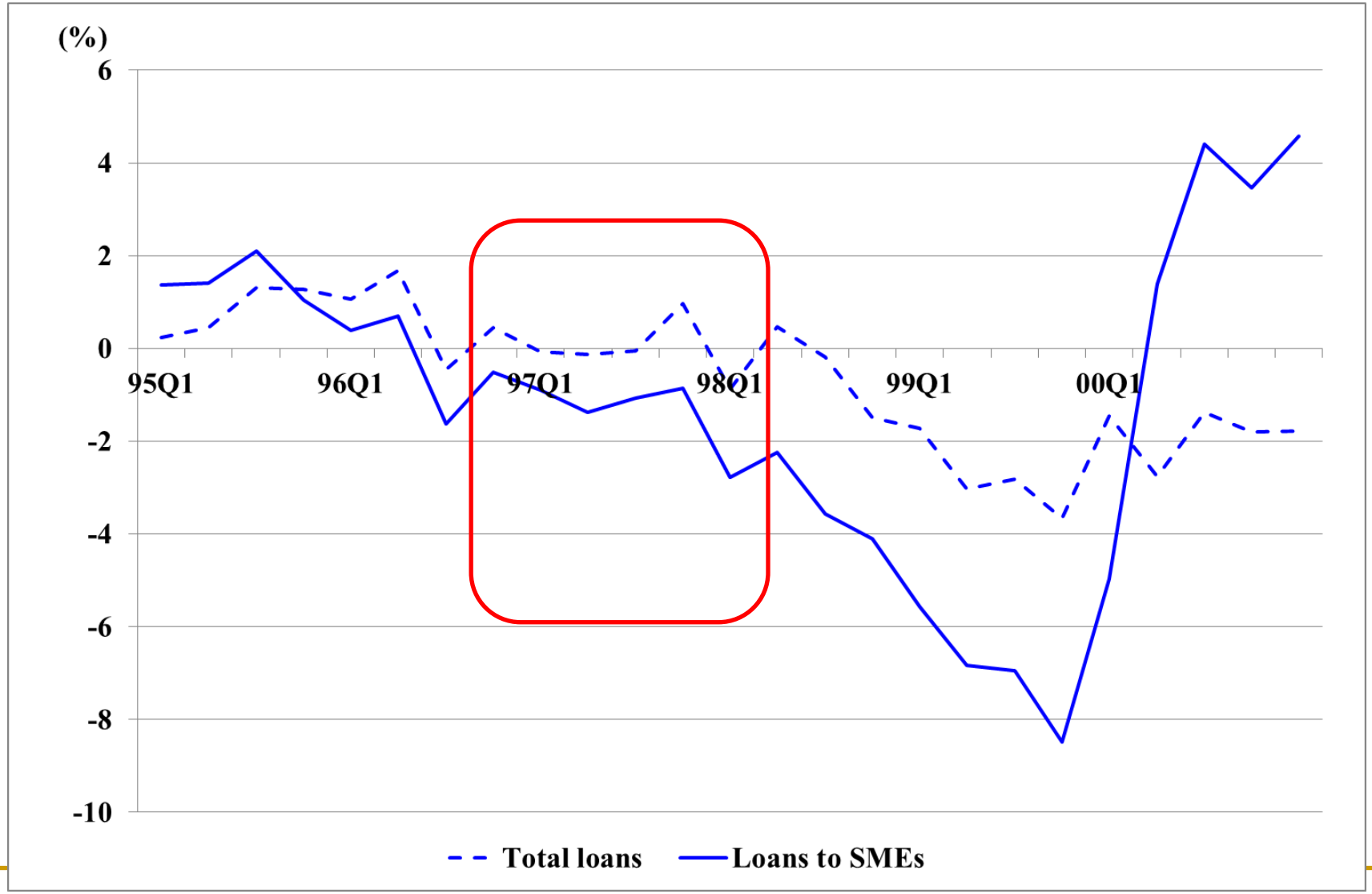
Main Results

- The JASME increased working capital loans to the firms whose main banks reduced lending more greatly.
- Evaluating the JASME's loans at means, a decrease in the growth of lending supply of a firm's main bank by one standard error (3.1%) is associated with an increase in the JASME's total loans by 3.4% (2.6 million yen)
- The JASME's lending mitigated a loss of a firm's borrowing from its main bank by 26.6%.

Main Results

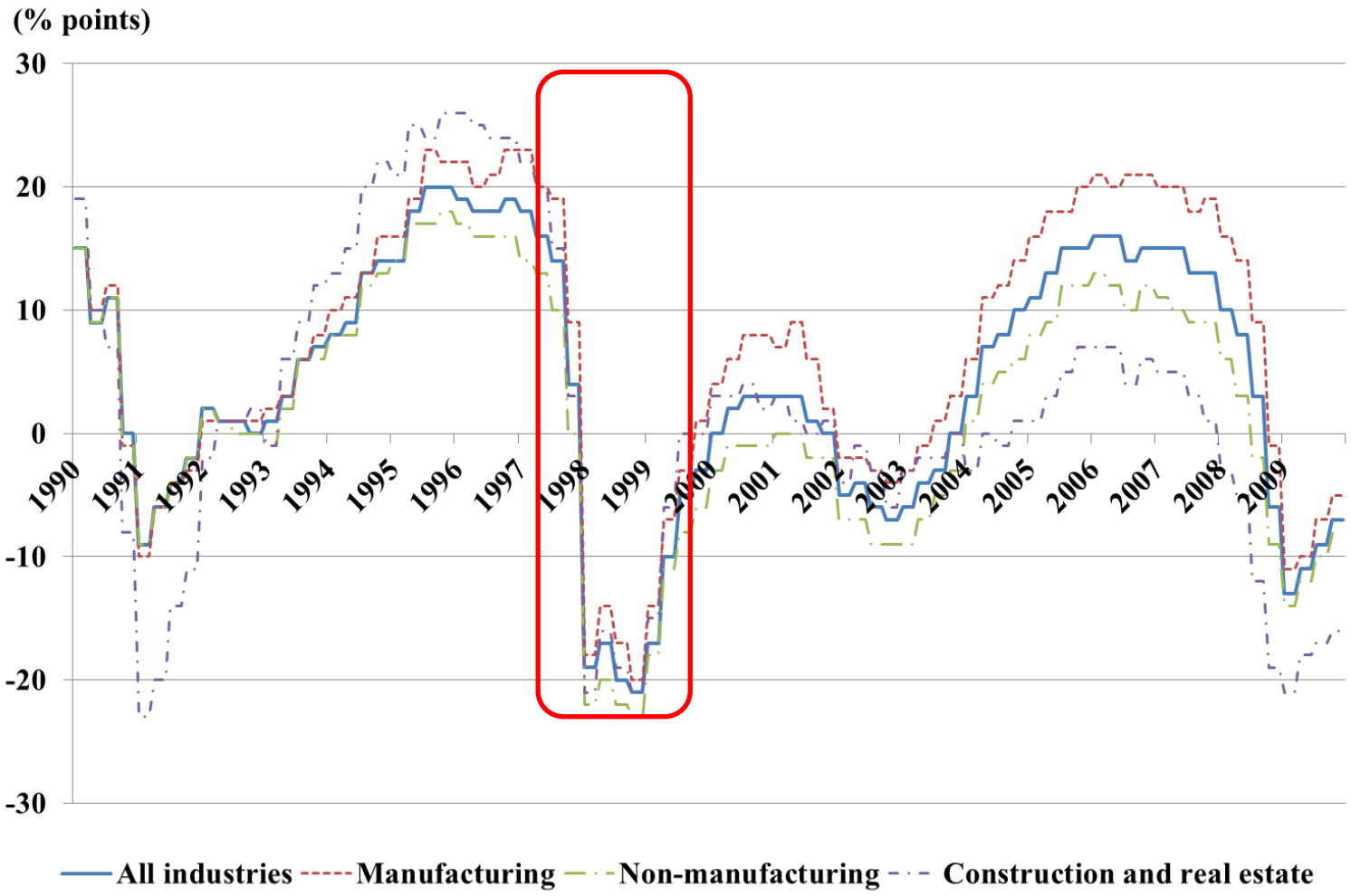
- The effect of the JASME's loans on a firm's performance as measured by ROA and EBITDA to total assets ratio is **negative and statistically significant for 4-5 years** after loans are made.
- ✓ An increase in the amount of JASME's loans by one standard error is associated with a decrease in ROA by 19% three years after the JASME's lending.

Aggregate Evidence of the Credit Crunch
The Growth of the Banks' SME Loans



Source: Bank of Japan

Aggregate Evidence of the Credit Crunch
The Lending Attitude DIs



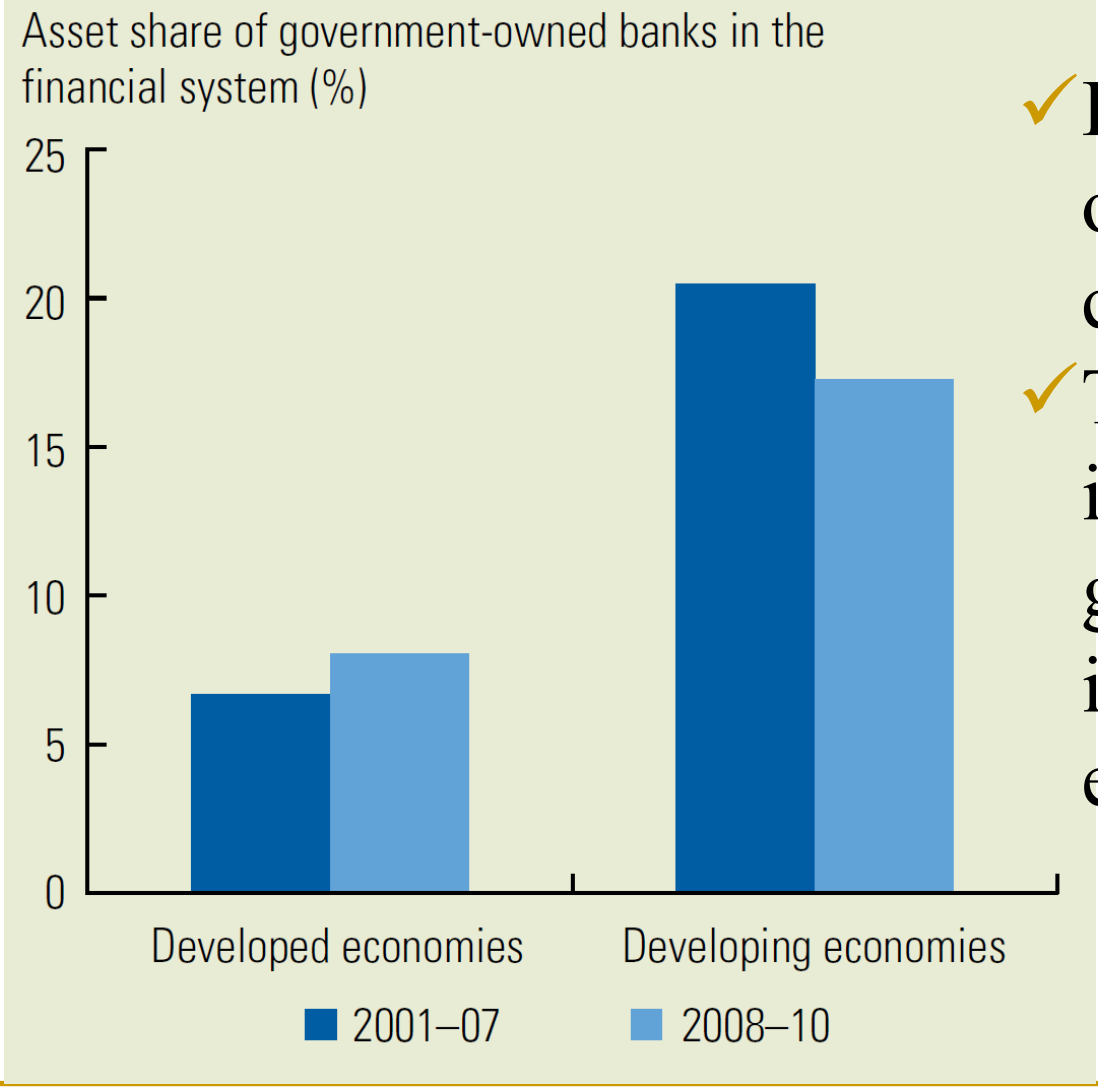
Source: Bank of Japan

Aggregate Evidence of the Credit Crunch Evidence from the Bank Level Data

	Non-troubled		
	Total	Manufacturing	Non-manufacturing
1997	-3.72***	-5.70***	-8.54***
1998	1.07**	1.43*	3.82**

- Watanabe (2007) finds that in FY 1997, the bank lending supply to the manufacturing industry and that to "healthy" non-manufacturing industries excl. industries to which the share of NPLs among loans is higher than the average, decreased by 5.7% and 8.5%, respectively.

The Counter-Cyclicality of SOBs' Lending



- ✓ Is lending by state owned banks (SOBs) counter-cyclical?
- ✓ The share of SOBs increased during the global financial crisis in developed economies .

Source: World Bank (2013)

The Counter-Cyclicality of State Owned Banks' Lending

- The literature has evolved about the SOBs' counter-cyclicality.
- ✓ The comprehensive survey: World Bank (2013)
- ✓ Iannotta et al. (2011), Cull & Peria (2013), Bertay et al. (2015)
- This study is the first to use the contract-firm level data.

Literature: The Performance of Firms Borrowing from State Owned Banks

Studies	Region	Performance Measure	Effect
Lin et al. (2015)	Japan	ROA	+
Carvalho (2014)	Brazil	Employment	No
Coleman & Feler (2015)	Brazil	Output employment and export (per firm)	No
Lazzarini et al. (2015)	Brazil	ROA、EBITSDA/Total assets	No
Eslava et al. (2014)	Colombia	Empoyment, investment, output	+
Ru (2015)	China	Employment	+ for publicly owned firms - for privately owned firms

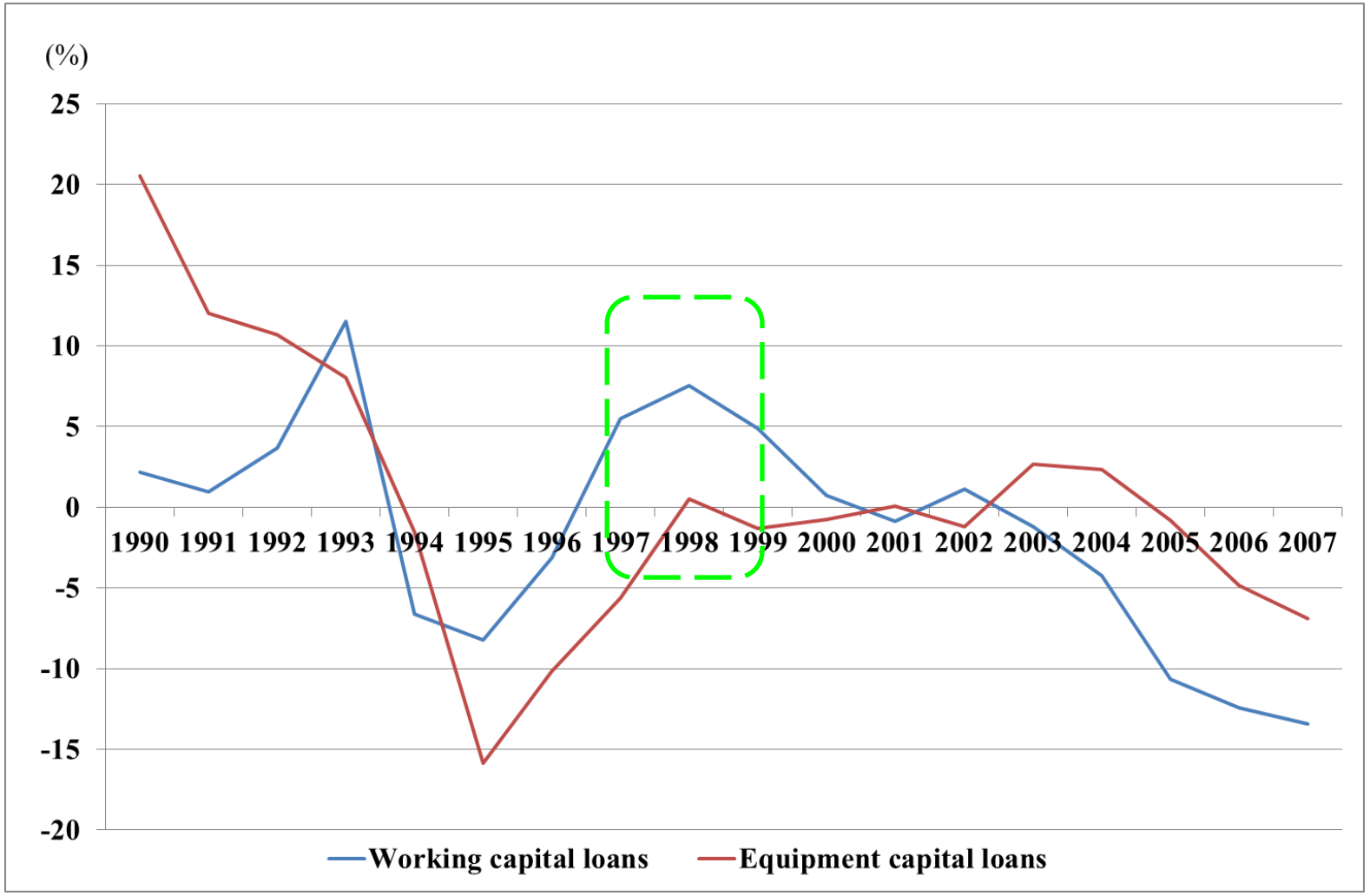
JASME

- The JASME is a government financial institution (GFI) **specializing on lending to SMEs**.
- ✓ Required to make **long-term loans** (a maturity no less than 1 year)
- ✓ Earlier the equipment loans outstanding exceeded the working capital loans outstanding.
- ✓ Since FY1998, the working capital loans have exceeded the equipment loans.
- ✓ Disestablished in October, 2008 when it was consolidated into the JFC, a newly established GFI, along with three other incumbent GFIs.
- ✓ Its operations are now taken over by the JFC's SME Unit.

The JASME's Counter Credit Crunch Measures: Establishing the Special Fund

- In response to the "Emergency Economic Measures to Clear a Path for the 21st Century" (経済対策閣僚会議　21世紀を切り開く緊急経済対策) released on Nov. 18, 1997, the JASME established the "**Fund to Respond to Changes in Financial Environments**" (金融環境変化対応資金 that specifically targeted working capital loans on Dec. 1, 1997.

Trends of the Loan Growth of the JASME: Equipment Loans and Working Capital Loans



Sources: annual reports of the JASME

Data

- The data provided by the Japan Finance Corporation (JFC)
  - ✓ The JFC contract data: loan amount, date of loan execution, etc.
  - ✓ The JFC financial statements data
  - ✓ The JFC financial institutions data: identifying a main bank
- The data about main banks
  - ✓ Nikkei NEEDS (originally processed for Watanabe, 2007)

Empirical Methodology

$$JASME_i = \alpha_0 + \boxed{\alpha_1 CAPSUR_i} + \alpha_2 X_i + \varepsilon_i$$

- ✓ *JASME*: the amount of the JASME's loans during the policy period in logarithm
- ✓ CAPSUR: the growth of total lending induced by "capital surplus" of a firm's main bank (if CAPSUR is negative, this measures a decrease in the lending growth induced by capital shortage)
- ✓ *X*: ln(total assets), ROA, leverage (= total debts / total assets)
- ✓ *X* is measured as of FY 1997 (1998) if the first JASME's loan was executed during FY 1997 (1998).

Estimating CAPSUR

- CAPSUR is an estimated third term of the following equation based on Watanabe (2007).

$$\Delta\, lnL_{j,97} = \beta_0 + \beta_1 \Delta lnL_{j,96} + \beta_2 \left\{ \frac{K_{j,97}}{A_{j,97}} - \left(\frac{K_j}{A_j}\right)^{target} \right\} + \beta_3 X_j + \epsilon_{i,97}$$

- ✓ $\left(\frac{K_j}{A_j}\right)^{target}$ is the average of $\frac{K_j}{A_j}$ over the period FY 1992 – FY 1994.
- ✓ X_j: bank type dummies (city, trust, regional, regional 2)
- ✓ The regression is run with a bank's share of lending to the real estate industry in FY 19890 as a primary IV to disentangle β_2 and a potential business cycle driven correlation between a dependent variable and "capital surplus" (a second variable on RHS)

Processing the Data for JASME Loans Regressions

- JASME loans made during "**the policy period**" Dec. 1, 1997 – Mar. 31, 1999 (N = 2061)
- Consolidating multiple JASME loans at firm level

Descriptive Statistics
Variables Used for JASME Regressions

Variable name	N	Mean	Median	Std. err.	Min	Max
Total loans (mil. yen)	2061	77.54	50	79.73	5	900
Working capital loans (mil. yen)	2061	61.35	40	66.13	0	520
Equipment loans (mil yen)	2061	16.19	0	56.08	0	900
Total loans / total assets	2061	0.254	0.059	7.27	0.002	330
Working capital loans / total assets	2061	0.067	0.048	0.10	0	3.42
Equipment loans / total assets	2061	0.187	0	7.27	0	330
CAPSUR	2061	-0.024	-0.032	0.031	-0.117	0.042
Total assets (mil. yen)	2061	1623	875	2528	0.1	41632
ROA	2061	-0.008	0.002	0.087	-2.219	0.609
Leverage	2061	0.880	0.894	0.219	0.144	2.594

Regression Results
JASME = ln(JASME loans)

	Total loans		Equipment loans		Working capital loans	
CAPSUR	-1.067	**	1.0292		-1.650	*
	(-2.20)		(0.90)		(-1.76)	
Ln(total assets)	0.482	***	0.025		0.513	***
	(24.29)		(0.66)		(17.49)	
ROA	-0.515	***	0.367		-0.933	***
	(-2.72)		(1.04)		(-2.68)	
Leverage	-0.014		-0.560	***	0.494	***
	(-0.18)		(-3.36)		(3.64)	
Constant	0.695	***	1.094	***	-0.473	**
	(4.41)		(3.63)		(-1.97)	
R-squared	0.378		0.008		0.116	
N	2061		2061		2033	

Interpreting the Results

- The coefficients of CAPSUR are negative and statistically significant for total loans and working capital loans but not for equipment loans.
- ✓ The JASME increased working capital loans to firms whose main banks reduced lending, reflecting the fact that the special "Fund" targeted working capital loans only.

Interpreting the Results

- When evaluating at means, a decrease in lending growth by a firm's main bank by one standard error (3.1%) is associated with,
- ✓ An increase in the JASME's total loans by 3.4% = **2.6 million yen**.
- ✓ An increase in the JASME's working capital loans by 5.2% = 3.2 million yen.

Interpreting the Results

- Evaluating JASME's total loans at the sample mean,
- A decrease in the lending growth by a firm's main bank by one standard error (3.1%) is associated with an increase in the JFC's loans by 2.60 mi. yen (3.4%), which offsets,
- ✓ **26.6%** (= 2.60/9.78) of a decrease in loans borrowed from a firm's main bank.
- ✓ 50.1% (= 2.60/5.19) of a decrease in long-term loans borrowed from a firm's main bank.

Interpreting the Results

- The coefficients of **ROA** are **negative and significant** for total loans and working capital loans.
- ✓ The JASME provided firms facing a liquidity constraint due to limited cash flow with working capital loans by utilizing the "Fund".

Interpreting the Results

- The effects of leverage are **positive and significant for working capital loans** and **negative and significant for equipment loans**.
- ✓ The JASME increased the working capital loans, which were targeted by the "Fund" to highly leveraged vulnerable firms, whereas it was reluctant to lend equipment loans, which were not targeted by the "Fund", to highly leveraged firms as private lenders would do.

Performance Regressions

$$PERFORMANCE_i = \delta_0 + \delta_1 JASME_i + \delta_3 TA_i + \nu_i$$

$PERFORMANCE_i$: firm i's ROA or $\frac{\text{EBITDA}}{\text{Total assets}}$ (FY 1999 through 2004)

$JASME_i$: the total new loans (sum of working capital and equipment loans) firm i borrowed from the JASME during the "policy period" (in logarithm)

TA_i: the lagged total assets

Performance Regressions

$$PERFORMANCE_i = \delta_0 + \delta_1 JASME_i + \delta_3 TA_i + \nu_i$$

- IVs are a set of independent variables used in the regression of $JASME_i$, $CAPSUR_i$ and control variables included in X_i (ROA and leverage as of FY in which the first JASME loan during the policy period was made)
- ✓ TA_i, which is measured after loans are borrowed from JASME, is excluded as an IV.
- ✓ Firms whose dependent variable is 99 percentile or larger and those whose dependent variable is 1 percentile or smaller are dropped.

Descriptive Statistics
Variables Used for Performance Regressions

FY	Variable name	N	Mean	Median	Std. err.	Min	Max
1999	ROA	1988	-0.008	0.002	0.052	-0.421	0.098
	EBITDA/total assets	1988	0.031	0.031	0.057	-0.262	0.205
2000	ROA	1862	-0.009	0.002	0.056	-0.365	0.115
	EBITDA/total assets	1862	0.031	0.031	0.060	-0.240	0.219
2001	ROA	1650	-0.016	0.001	0.079	-0.734	0.222
	EBITDA/total assets	1650	0.025	0.029	0.066	-0.352	0.227
2002	ROA	1425	-0.016	0.002	0.087	-0.707	0.352
	EBITDA/total assets	1425	0.027	0.029	0.064	-0.271	0.231
2003	ROA	1201	-0.019	0.002	0.106	-1.023	0.229
	EBITDA/total assets	1201	0.032	0.033	0.067	-0.295	0.248
2004	ROA	989	-0.019	0.002	0.106	-1.023	0.229
	EBITDA/total assets	989	0.032	0.033	0.067	-0.295	0.248

Year by Year Performance Regressions
A Dependent Variable = ROA
Coefficients of the Logarithm of JASME Total

Fiscal Year	coefficient		N	J statistic
1999	-0.223	***	1988	8.980
	(-3.05)			(0.110)
2000	-0.150	***	1862	8.265
	(-2.60)			(0.142)
2001	-0.177	**	1650	3.075
	(-2.333)			(0.688)
2002	-0.071	*	1425	1.133
	(-1.694)			(0.951)
2003	-0.121	*	1201	7.195
	(-1.755)			(0.207)
2004	-0.010		989	0.990
	(-0.130)			(0.963)

Year by Year Performance Regressions
A Dependent Variable = EBITDA/Total Assets
Coefficients of JASME Total Loans

Fiscal Year	coefficient		N	J statistic
1999	-0.289	**	1988	5.590
	(-2.473)			(0.348)
2000	-0.186	***	1862	4.534
	(-2.753)			(0.475)
2001	-0.182	**	1650	5.105
	(-2.277)			(0.403)
2002	-0.079	*	1425	4.871
	(-1.729)			(0.432)
2003	-0.008		1201	14.565
	(-0.180)			(0.012)
2004	-0.007		989	6.406
	(-0.145)			(0.269)

Interpreting Performance Regression Results Target Ex-Ante Underperforming Firms?

- Did the JASME make loans aiming at mitigating the adverse effects of the credit crunch to ex-ante (pre lending) underperforming firms with lower ROA?
- ✓ The (log of) JFC loans predicted by IVs excluding ROA and ex-ante ROA in FY 1998 are weakly negatively correlated.

Interpreting Performance Regression Results Longer Maturities for the JASME Loans?

- Does it take longer for the JASME loans to have positive effects on borrowing firms than for loans of private financial institutions to do so because the JASME's loans have longer maturities?
  - ✓ Based on the JFC contract data, the average maturity of JFC loans is 8.5 years.
  - ✓ The estimated average maturity of private financial institutions is 3.7 years.

The JFC Lending's Effect on a Change in Firm Performance from FY1998

A change until	Performance measure	coefficient		N	J statistic
2001	ROA	-0.045		1617	0.839
		(-0.515)			(0.975)
	EBITDA /Total Assets	0.024		1617	0.297
		(0.479)			(0.998)
2004	ROA	-0.073		970	3.566
		(-0.490)			(0.614)
	EBITDA /Total Assets	0.189		970	1.413
		(1.481)			(0.923)

The JFC lending has an effect neither on a change in ROA nor a change in EBITDA to total assets ratio, implying that the JASME loans did not raise a firm's ROA.

Some Thought Experiments

- When either ex-post ROA or CAPSUR is excluded as an IV, the coefficient of JASME loans remains to be negative for the initial several years.
- ✓ The ex-ante relatively underperforming firms borrowed the JASME's loans, and they remained to be relatively underperforming ex-post.
- ✓ The JASME's counter credit crunch loans to target firms that borrowed from a poorly capitalized main bank did produce ex-post more underperforming firms.

Conclusions

- **The more greatly a firm's main bank reduced lending, the larger amount of working capital loans the JASME made to the firm.**
- Evaluating the JASME's loans at means, a decrease in the growth of lending supply of a firm's main bank by one standard error (3.1%) is associated with an increase in the JASME's total loans by 3.4% (2.6 million yen)
- **The JASME's lending mitigated a loss of a firm's borrowing from its main bank by 26.6%.**

Conclusions

- **The effect of the JASME's loans on a firm's performance as measured by ROA and EBITDA to total assets ratio is negative and statistically significant for 4-5 years.**
- ✓ An increase in the amount of JASME's loans by one standard error is associated with a decrease in ROA by -19% three years after the JASME's lending.

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