Micro-aspects of Monetary Policy in Pre-war Japan: Lender of Last Resort and Selection of Banks

Tetsuji Okazaki
The University of Tokyo

Motivation and literature

- “The Classical view” on the Lender of Last Resort
  - The Central Bank should prevent illiquid but solvent banks from failing by lending money to them at a penalty rate (Bordo 1990, p.19)

- Effectiveness of the central banks in preventing financial crises
  - Bordo(1990); Butkiewics(1995); Miron(1986)

- Trade off between preventing financial crises and moral hazard of banks
  - Goodhart(1985); Codella and Yayati 2003

Motivation and literature (cont.)

- The BOJ as the LLR after the First World War
  - Ehiro(2000); Ito(2003)
- “Rational” selection of banks under the financial crisis
  - Yabushita and Inoue(1993); Okazaki(2002); Okazaki, Sawada and Yokoyama(2005)
- How did the BOJ select banks to be bailed out ?
  - Concentrating the LLR loans on the banks which had already had transaction relationships with the BOJ (Ishii 1980; Shiratori 2003)
- How did the BOJ select its transaction counterparts ?
- What was the implication of the BOJ’s selection policy ?
  - Was it useful to deal with potential moral hazard problem accompanying the LLR policy ?

Conjecture and the issues to be addressed

- The BOJ selected the candidate banks to be bailed out in advance as the trasaction counterparts

  →Avoiding moral hazard as well as enhancing rationality of bank selection by the market

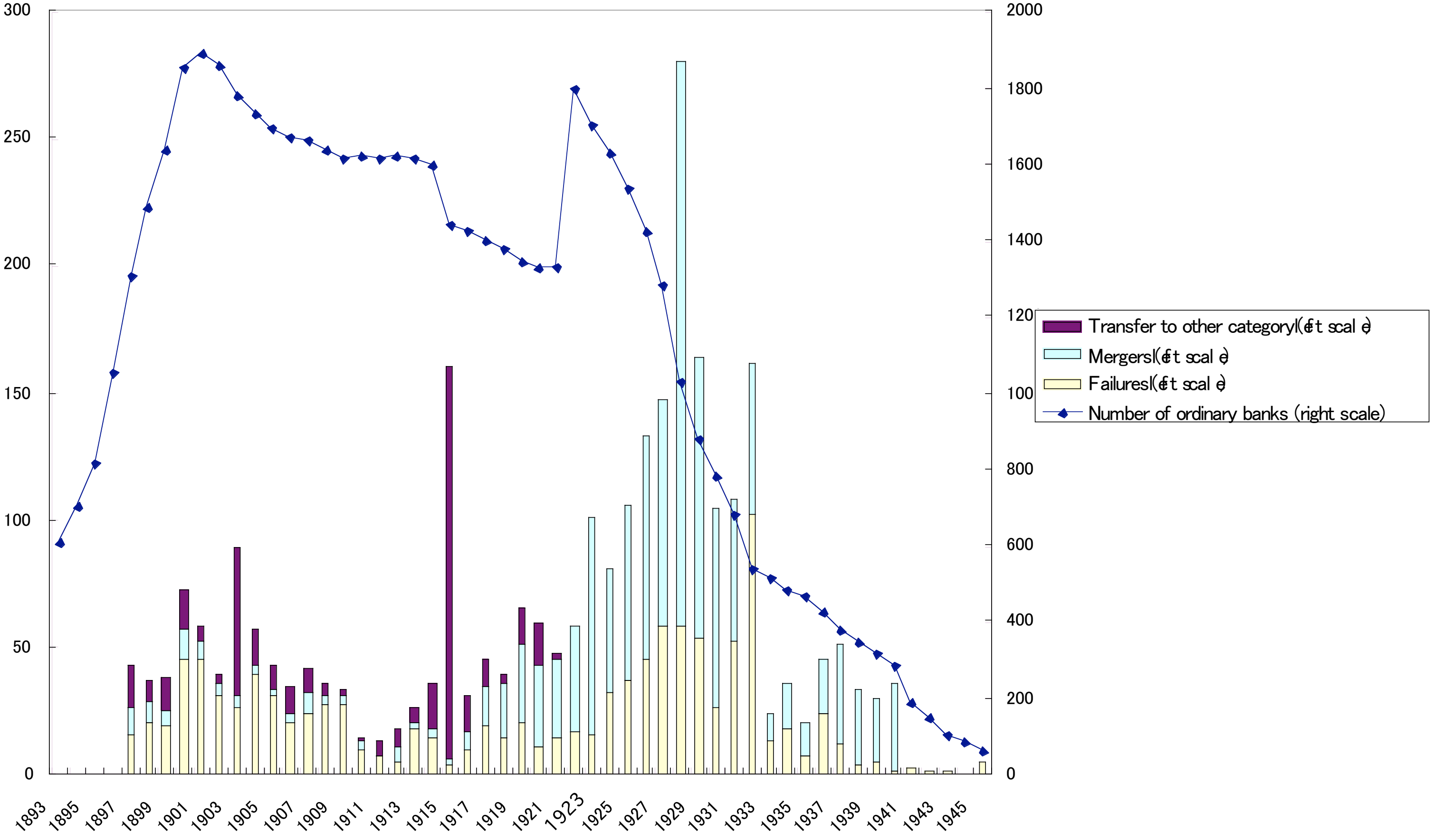
- What effects did the transaction with the BOJ really have ?
  - Effect on bank exits
  - Effect on bank management (moral hazard)

Outline of the paper

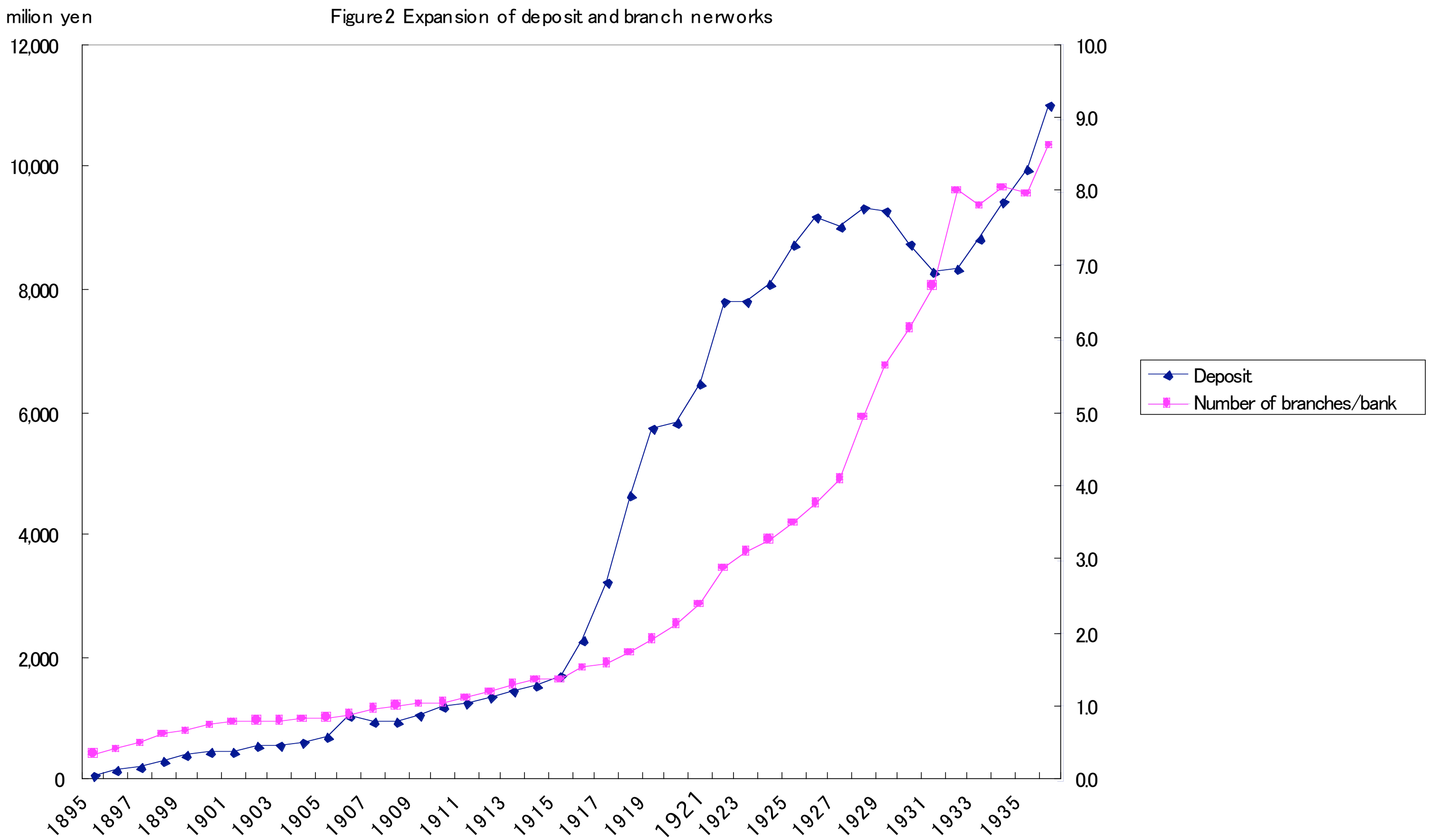
- Development of the financial system and the role of the BOJ
- The BOJ as the Lender of Last Resort
  - Transactions between the BOJ and Private Banks
  - Composition of the LLR loans
- The BOJ's policy in selecting transaction counterparts
- Effects of transactions between the BOJ and private banks
  - Portfolio effect
  - Moral hazard ?

Evolution of the structure of the banking industry

Figure1 Increase and shake out of ordinary banks

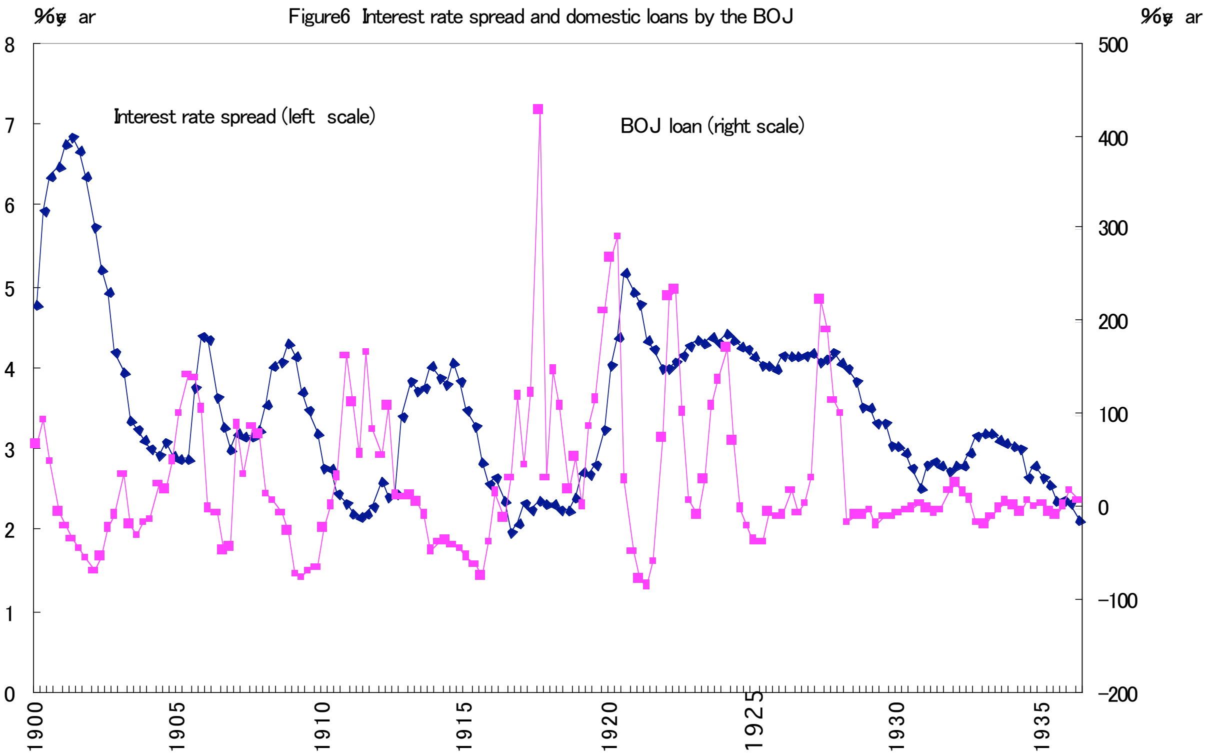


Expansion of deposits and branch networks



Changes in the balance sheets of ordinary banks

Interest rate spread and domestic loans by the BOJ



Source: Toyo Keizai Shinposha [1927]; Ministry of Finance, Handbook of Finance, various issues

Composition of the domestic loans by the BOJ

	Total (thousand yen)	Special loans (thousand yen)	Percentage
1923	641,336	133,530	20.8
1924	523,792	144,840	27.7
1925	463,964	148,091	31.9
1926	517,907	159,035	30.7
1927	815,297	402,983	49.4
1928	769,658	649,496	84.4
1929	649,655	598,180	92.1
1930	688,473	585,434	85.0
1931	882,718	575,742	65.2
1932	632,040	565,648	89.5
1933	707,013	552,430	78.1
1934	712,841	529,820	74.3
1935	661,658	498,176	75.3
1936	585,628	472,480	80.7

Composition of the BOJ’s Special Loans by Borrower

	Amount (1000 yen)	Percentage
Total	761,971	100.0
BOJ correspondents	723,859	95.0
Others	38,112	5.0

Summary

- The 1920s as an epoch in the Japanese financial history
  - Rapid change in the market structure (acceleration of shake out)
  - The causes of the change: What happened in the 1910s
    - Sharp increase of deposits (decline of equity-asset ratio)
    - Progress toward the branch banking system

      →Inter-regional competition of banks
    - Instability of the financial system

- Policy measures by the financial authorities
  - Structural policy (promotion of bank mergers): MOF
  - Setting up supervising system: MOF and BOJ
  - LLR loans: BOJ

Number of the BOJ correspondents banks

	Total	BOJ correspondent banks	Share(%)
1925	1,532	253	16.5
1926	1,416	246	17.4
1927	1,279	225	17.6
1928	1,026	197	19.2
1929	877	180	20.5
1930	777	173	22.3
1931	678	167	24.6

Source: See the text.

Note: Banks in the colonies are not included.

Openings and closures of transaction relationships with the BOJ

	Openings	Closures		
			Survive	Exit
Total	10	96	19	77
1926	2	9	4	5
1927	1	22	2	20
1928	2	30	8	22
1929	1	18	2	16
1930	2	9	1	8
1931	2	8	2	6

Share of the BOJ correspondent banks in term of bank number by scale

		Total	BOJ correspondent banks	Share(%)
1925	100 million yen≦deposit	16	16	100.0
	10 million yen≦deposit＜100 million yen	106	93	87.7
	5 million yen≦deposit＜10 million yen	88	46	52.3
	1 million yen≦deposit＜5 million yen	464	78	16.8
	deposit＜1 million yen	858	20	2.3
1931	100 million yen≦deposit	13	13	100.0
	10 million yen≦deposit＜100 million yen	85	73	85.9
	5 million yen≦deposit＜10 million yen	55	29	52.7
	1 million yen≦deposit＜5 million yen	234	40	17.1
	deposit＜1 million yen	291	12	4.1

Share of the BOJ correspondent banks by area

		Total	BOJ correspondent banks	Share (%)
1925	Urban	478	83	17.4
	Non-urban	1,054	170	16.1
1931	Urban	208	56	26.9
	Non-urban	470	111	23.6

Share of the BOJ correspondent banks by proximity to the BOJ’s headquarters or branch

		Total	BOJ correrspondent banks	Share (%)
1925	With the BOJ headquarters or a branch	597	139	23.3
	Without the BOJ headquarters or a branch	935	114	12.2
1931	With the BOJ headquarters or a branch	313	95	30.4
	Without the BOJ headquarters or a branch	365	72	19.7

How did the BOJ select the banks to transact with ?

- Sources
  - Documents on opening and closing transaction relationships (The BOJ Archives)
- Procedure
  - The bank which would like to have a transaction relationship with the BOJ applied to the business section of the headquarters or the BOJ branches
  - The business section examined the application, and if it judged the bank was eligible, it recommend the bank to the Examination Department of the BOJ
  - The Examination Department examined the application, and if it judged the bank was eligible, it recommended the bank to the Governor of the BOJ
  - The Governor proposed to open the transaction with the bank at the Director Meeting

How did the BOJ select the banks to transact with ? (cont.)

- The issues examined by the BOJ
  - Soundness of the financial condition of the applicant bank
    - Profitability, liquidity, quality of the assets
  - Composition of the management, large shareholders and their assets
  - Scale of the bank and its position in the local financial market
  - Availability of alternative sources of fund other than the BOJ

Determinants of the transaction relationship with the BOJ

Dependent variable: BOJT	Coeffieient		∂ Pr/ ∂ x
Const.	−45.139	***	
$LNASSET_{t-1}$	2.761	***	$0.972*10^{-3}$
$ASSETRANK_{t-1}$	0.007		$0.260*10^{-5}$
$BRANCH_{t-1}$	−0.055		$-0.195*10^{-4}$
ROA_{t-1}	5.980	***	0.002
LDR_{t-1}	0.001		$0.466*10^{-6}$
$RESERVE_{t-1}$	−0.419		$-0..148*10^{-3}$
$EQUITY_{t-1}$	4.045	***	0.001
$URBAN_{t-1}$	−5.396		−0.018
$BOJBRANCH_{t-1}$	1.789	***	0.003
$LNASSET_{t-1}*URBAN_{t-1}$	0.237		$0.834*10^{-4}$
Log likelihood	−631.03		
Pseudo-R^2	0.452		
ρ	0.821		
	(0.009)		
Number of obs.	5925		

Determinants of the opening of the transaction relationship with the BOJ

Dependent variable：BOJTO	Coefficient		∂ Pr/ ∂ x
Const.	−9.621	*	
$LNASSET_{t-1}$	0.535		$0.293*10^{-10}$
$ASSETRANK_{t-1}$	−0.130	*	$-0.711*10^{-11}$
$BRANCH_{t-1}$	−0.056	*	$-0.309*10^{-11}$
ROA_{t-1}	5.070		$0.278*10^{-9}$
LDR_{t-1}	−0.320		$-0.175*10^{-10}$
$RESERVE_{t-1}$	0.303		$0.166*10^{-10}$
$EQUITY_{t-1}$	−1.970		$-0.108*10^{-9}$
$URBAN_{t-1}$	−5.898		$-0.334*10^{-6}$
$LNASSET_{t-1}*URBAN_{t-1}$	0.367		$0.201*10^{-10}$
$BOJBRANCH_{t-1}$	0.886	**	$0.259*10^{-9}$
Log likelihood	−34.945		
Pseudo-R^2	0.408		
ρ	$0.306*10^{-6}$		
	(0.002)		
Number of observations	4731		

Determinants of the closure of the transaction relationship with the BOJ

Dependent variable : BOJTC	Coefficient		$\partial Pr / \partial x$
Const.	4.363	*	
$LNASSET_{t-1}$	−0.349	**	−0.009
$ASSETRANK_{t-1}$	−0.019		$-0.511*10^{-3}$
$BRANCH_{t-1}$	−0.022		$-0.578*10^{-3}$
ROA_{t-1}	−9.818	*	−0.263
LDR_{t-1}	0.015		$0.391*10^{-3}$
$RESERVE_{t-1}$	−3.543	**	−0.095
$EQUITY_{t-1}$	0.203		0.005
$URBAN_{t-1}{}^{\#}$	−4.822	*	−0.229
$LNASSET_{t-1}*URBAN_{t-1}$	0.325	*	0.009
$BOJBRANCH_{t-1}{}^{\#}$	−0.124		−0.003
Log likelihood	−107.47		
Pseudo-R^2	0.112		
ρ	$0.306*10^{-6}$		
	$(0.0570*10^{-3})$		
Number of obs.	1189		

Summary on the determinants of the transaction relationship

- Transaction relationship
  - Proximity to the BOJ branch was positively associated with the probability of transaction relationship
  - Scale and profitability and liquidity were positively associated with the probability of transaction relationship

- Opening transaction
  - Liquidity was positively associated with the probability of opening transaction

- Closing transaction
  - Profitability was negatively associated with the probability of closing transaction

→The BOJ did not support the banks which failed to maintain profitability, even if they had transaction relationships

Determinants of the special loan recipient bank

Dependent variable：BOJTC	Coefficient		∂Pr/∂x
Const.	−7.040	***	
$LNASSET_{t-1}$	0.522	***	0.190
ROA_{t-1}	6.476	**	2.360
LDR_{t-1}	−0.011		−0.004
$RESERVE_{t-1}$	−0.095		−0.035
$EQUITY_{t-1}$	−0.684		−0.249
$URBAN_{t-1}^{\#}$	−0.346	*	−0.129
$BOJ_{t-1}^{\#}$	0.483		0.166
$BOJ*ROA_{t-1}$	40.327	*	14.700
$BOJ*LDR_{t-1}$	0.176		0.064
$BOJ*RESERVE_{t-1}$	0.255		0.093
$BOJ*EQUITY_{t-1}$	−5.818	*	−2.121
Log likelihood	−126.565		
Pseudo-R^2	0.330		
Number of obs.	288		
Number of positive obs.	193		

Effects of a transction relationship with the BOJ on bank exit

	Failure			Merger		
	Coefficient		∂Pr/∂x	Coefficient		∂Pr/∂x
Const.	2.583	***		−0.171		
LNASSET	−0.388	***	−0.017	−0.120	***	−0.010
BRANCH	0.016	**	$0.787*10^{-3}$	−0.006		$-0.853*10^{-3}$
ROA	−6.384	***	−0.293	−0.828		−0.039
LDR	$-0.117*10^{-3}$		$-0.117*10^{-4}$	$0.691*10^{-3}$		$0.807*10^{-4}$
RESERVE	−0.003		$-0.399*10^{-4}$	−0.012		−0.001
EQUITY	1.296	***	0.064	−0.374	*	−0.055
AGE	0.007	*	$0.268*10^{-3}$	0.007	**	$0.729*10^{-3}$
FORM#	0.138	*	0.007	−0.064		−0.009
CRITERION#	−0.196		−0.011	0.177	*	0.022
URBAN#	0.130		0.008	−0.143	**	−0.017
EQ#	0.486	***	0.029	0.052		$0.532*10^{-3}$
BOJ#	0.289		0.016	−0.064		−0.010
BOJ*ROA	−22.116	***	−0.959	−8.933		−0.832
BOJ*LDR	0.039	***	0.003	−0.123		−0.015
BOJ*RESERVE	1.269	*	0.055	0.498		0.046
BOJ*EQUITY	−0.124		−0.014	0.910		0.106
Loglikelihood	−3054.054					

Summary on the bank exit

- Transaction with the BOJ did not have the effect to raise the over all survivability of a bank

→The BOJ did not support the banks which failed to maintain profitability, even if they had transaction relationships

- The transaction with the BOJ enhanced the effect of profitability and liquidity on the bank survivability
  - The survivability of the banks with high profitability and high liquidity was selectively improved

Effects of a transaction relationship with the BOJ on bank management: The model to be estimated (treatment effect model)

- $\Pi_{it}=\boldsymbol{\gamma}'\mathbf{W}_{\mathbf{it}}+\delta BOJT_{it}+e_{it}$
  $BOJ_{it}^{*}=\boldsymbol{\beta}'(\mathbf{X}_{\mathbf{it-1}}, \mathbf{Z}_{\mathbf{it-1}})+u_{it}$

- Definition of the variables
  - Π_{it} : Vector of the performance indices of bank i in year t
  - $\mathbf{W}_{\mathbf{it}}$: Vector of exogenous variables affecting on the bank performance
  - BOJ_{it}: Dummy variable which equals 1, if bank i had a transaction relationship with the BOJ in year t
  - BOJ_{it}^{*}: Latent variable which determines the transaction relationship with the BOJ
  - $\mathbf{X}_{\mathbf{it-1}}$: Vector of the variables indicating the attributes of bank i in year t
  - $\mathbf{Z}_{\mathbf{it-1}}$: Vector of the variables indicating the attributes of the region where bank i was located in year t

Effects of a transaction relationship with the BOJ on bank's portfolio: Treatment effect model

A.Portfolio effect

	(a) Dependent variable: LOAN		(b) Dependent variable: SECURITIES		(c) Dependent variable: LOAN+SECURITIES		(d) Dependent variable: RESERVE	
Const.	−0.344		−0.246	***	−0.589	**	−17.57	***
LNASSET	0.069	***	0.024	***	0.093	***	1.076	***
BRANCH	−0.002		−0.002	**	−0.003		−0.034	
EQUITY	0.849	***	0.006		0.856	***	8.566	***
LOAN							−0.151	
SECURITIES							4.308	***
BOJ	−0.217	**	0.096	***	−0.122		−3.253	***
Wald χ^2	132.60		150.69		96.13		145.75	
Number of obs.	5920		5920		5920		5920	

Effects of a transaction relationshp with the BOJ on bank's risk-taking: Treatment effect model

A. Risk taking effect

	(a) Dependent variable: RISK		(b) Dependent variable: SAFE
Const.	1.123	**	−0.384
LNASSET	−0.031		0.038
BRANCH	0.002		−0.002
LOAN	0.005		0.002
SECURITIES	−0.511	***	0.519
RESERVE	0.053		0.034
EQUITY	−0.109		−0.113
URBAN	0.082	**	0.037
BOJ	−0.086		−0.214
Wald $\chi^2(9)$	46.63		64.59
Number of obs.	153		153

Effects of a transaction relationshp with the BOJ on bank's risk-taking: Fixed effect model

	(a) Dependent variable: RISK		(b) Dependent variable: SAFE	
Const.	1.886	***	0.077	
LNASSET	−0.101	**	−0.003	
LOAN	0.127	*	−0.020	**
SECURITIES	−0.009		0.029	
RESERVE	0.268	**	0.004	
EQUITY	0.101		0.001	
BOJ_{t-1}	−0.017		−0.007	
Ad-R^2	0.834		0.196	
Number of obs.	239		239	

Summary on the effect of the transaction with the BOJ on bank management

- Portfolio effect
  - The transaction with the BOJ enabled a bank to raise the assets with high return in the portfolio

    ←Potential liquidity

- Moral hazard
  - The transaction with the BOJ did not increase bank's risk-taking

  -

Concluding remarks

- Role of the BOJ under the financial crisis after the WWI
  - Active intervention as the LLR
  - Stabilization of interest rate spread
- Characteristics of LLR loan policy
  - Concentrating LLR loans on the correspondent banks
  - Selection policy of the correspondent banks
    - Based on profitability, liquidity and quality of assets
    - Closing transaction relationship with the banks whose performamce declined

Concluding remarks (cont.)

- Effects of a transaction relationship with the BOJ on bank exit
  - Probability of exit did *not* generally decrease
  - Probability of exit decreased selectively for the banks with high profitability

- Effects of a transaction relationship with the BOJ on bank management
  - A transaction relationship with the BOJ enabled a bank to reduce the reserve ratio
  - A transaction relationship with the BOJ did not increase a bank's risk-taking

- Role of the LLR loans of the BOJ
  - Enhancing the rationality of bank selection by the market
  - Resolving the trade-off between stabilization of the financial system and moral hazard

Share of the BOJ correspondent banks in terms of deposit and loan amount

		Deposit	Loan
BOJ correspondent banks	1925	6,992	7,315
(million yen)	1931	7,333	5,741
Total	1925	8,666	9,198
(million yen)	1931	8,203	6,691
Percentage	1925	80.7	79.5
	1931	89.4	85.8