Japan's Banking Crisis: Who has the Most to Lose?

Hideaki Miyajima

(Waseda University)

and

Yishay Yafeh

(Hebrew University and CEPR)

- Much has been said and written about Japan's "lost decade" and prolonged banking crisis.

- But is everyone equally affected? What type of firms have the most to lose from the banks' malaise?

- This paper: attempt to answer this question using stock price data and abnormal returns around dates in which something happened in the banking system.

Figure 1: Co-movement of Industry-specific Stock Price Indexes and Bank Stock Prices, 1995-2002

Stock Price Indices (1995 March =100)
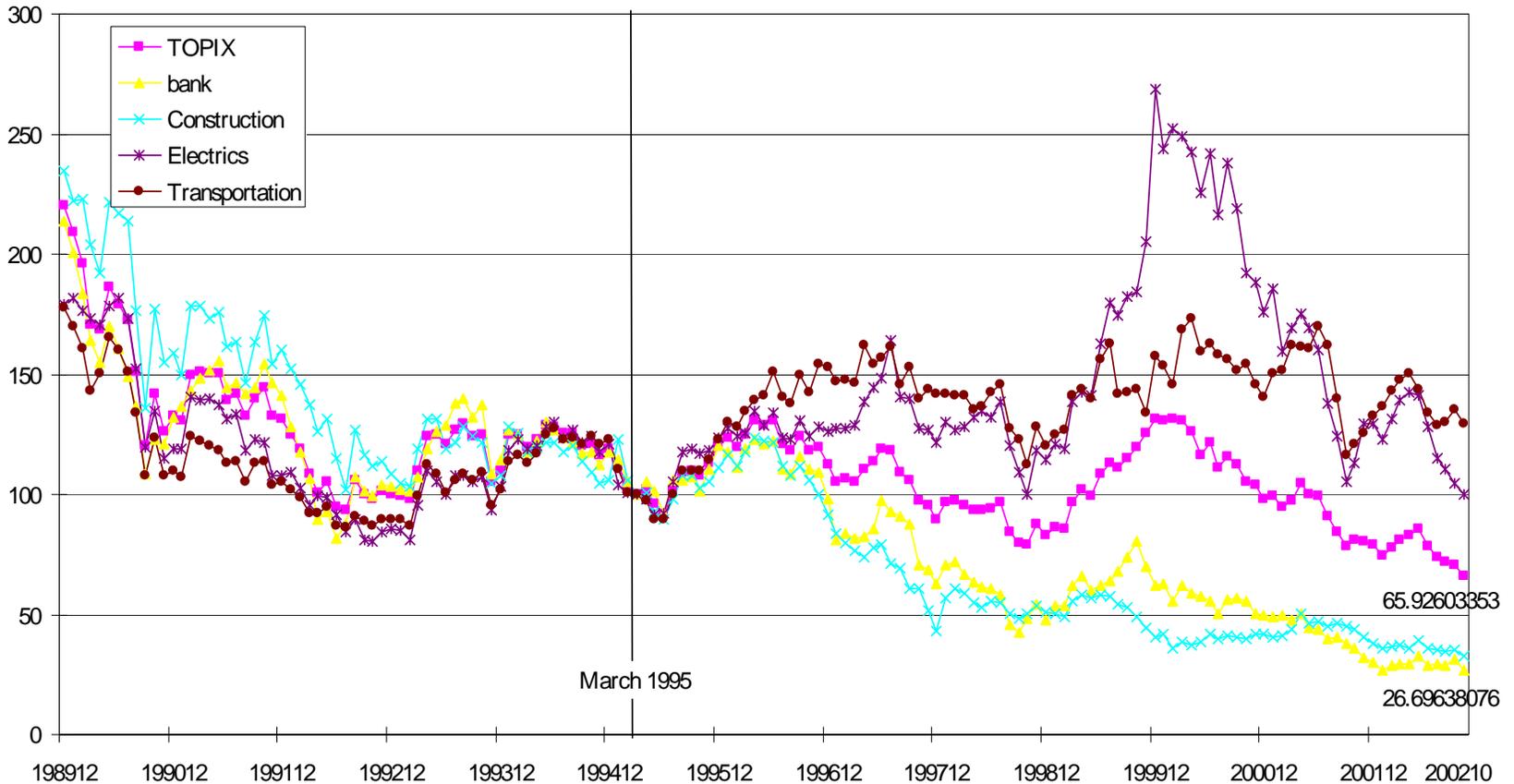
Note: Based on the Tokyo Stock Exchange industry-specific indices

3

Background about the Banking Crisis in Japan

- How severe is it? Estimates vary (about 13% of all loans in the late 1990s were non-performing).

- This is not unheard of in developed economies (e.g. Scandinavia), but the duration of the crisis is unusual.

- Other measures: fiscal costs (unknown), lost output (hard to calculate counterfactual).

Reasons for the Crisis

- Many; conventional wisdom (Hoshi and Kashyap MIT book) emphasize the uneven pace of deregulation in financial markets.
- Other stories: Moral hazard ("convoy system"); Bad luck and the real estate bubble (or how the Imperial Palace was worth more than all of Canada/California).

Why should the effect differ across firms?

- Macro literature and "credit crunch" suggests that some firms are more sensitive to changes in the availability of bank credit (due to monetary policy): small firms with limited access to K markets (e.g. Gertler and Gilchrist, 1994; Kashyap, Stein and Wilcox, AER 1993).

Why should the effect differ across firms? - Contd.

- Financial Economics literature: bank finance is used to finance only certain kinds of economic activities (e.g., not R&D, Carlin and Mayer, JFE; Allen and Gale book).

- Literature on relationship banking and bank distress: client firms are sensitive to the fate of their banks.

Why should the effect differ across firms? (III)

- Documentation of this phenomenon around the world often using stock price data/event study methodology (Bae et al for Korea, JFE 2002; Ongena et al., Norwegian data, JFE forthcoming; Brewer et al., JJIE; Yamori and Murkami, Ec. Letters, for one Japanese bank etc.).
- (Debate on credit crunch in Japan)

Why should the effect differ across firms? (IV)

- "Zombies" - virtually bankrupt companies artificially kept alive by virtually bankrupt banks.

- [A note on how the interpretation of data on bankruptcy in Japan has changed…].

- Are zombies the most affected by the crisis? (note welfare implications).

This paper:

- Examine a relatively large number of good and bad events related to the health of the banking system (not just bank distress).

- Focus on the differential impact on different types of firms (Brewer et al. do some of this, but only for a few cases of bank distress).

Data and Empirical Approach

- Examine abnormal stock returns of non-financial companies listed on the 1st section of the TSE around dates in which "something happened" in the banking system.

- Sample: around 800 manufacturing firms plus construction, real estate and retail sector.

Methodology

- Identify an event date (t=0); see type of events later.

- Estimate a "market model" using individual firm-level observations for dates -60 through -20: $R_{it} = \alpha_i + \beta_i R_{mt}$

- Calculate CAR for days (-5, +5) as the difference between actual and expected returns (use CAR instead of AR on date 0).

Methodology - Contd.

- Regress the CAR calculated above on:
- Measures of each firm's access to K mkts: Bond rating, size, profitability (mkt to book).
- R&D intensity: industry dummy for high-tech sectors (no good firm-specific data).
- Bank dependence: leverage, MB variables.

A note on definitions

- Bond rating is the most conservative available rating of any major agency. Coded on a scale from 1 (highest) to 4 (lowest).

- A variety of MB definitions weighing debt and equity ties over time do not affect empirical results that follow.

Digression: relation between this paper and my previous research (I)

- Much work about Japan's financial system, bank-firm relations and corporate groups: Japan as a financial system with very different characteristics from that of the US (especially bank-firm relationships). Good or Bad? [Weinstein and Yafeh (JF 1998); Khanna and Yafeh (J of Business)].

- ==> Bank-firm ties and the crisis.

Digression: relation between this paper and my previous research (II)

- Financial history - Globalization "then" and now - international capital flows in the 1870-1914 period and today (e.g. crises, co-movement and contagion).

- Sussman and Yafeh, (JEH, 2000); Mauro, Sussman and Yafeh (QJE, 2002 and OUP book) all use asset prices to evaluate the perception of news.

Digression: relation between this paper and my previous research (III)

- Comparisons of financial systems around the world [universal banking (Ber, Yafeh and Yosha, JME, 2001); VC in Germany, Japan, Israel and the UK (Mayer, Schoors and Yafeh, JCF); banks and corporate governance (Yafeh and Yosha, Economic Journal 2003)].

- Related to the main question here: Who are the most bank-dependent companies?

Events

- Government actions to alleviate the crisis: Jusen-related actions (2); injections of K (4); improved supervision (5).

- Downgrading of banks by major rating agencies (S&P, Moody's) (5).

- Major consolidation wave ==> Announcements of 3 largest mergers (Mizuho, SMBC, UFJ).

Events

- Note: we choose the events on the basis of our reading of the crisis history. But, it is possible to check if these events were important by looking at Bank Stock Prices (relative to the TOPIX).

- The events which turn out to be important for bank clients mattered for the banks too.

Table 2: Data Sources and Variable Definitions

Variable	Source	Definition	Mean UFJ Merger Sample	Std. Deviation UFJ Merger Sample
Assets	Waseda-Nissei Corporate Governance Database	Total assets in (trillion yen)	269,778	550,926
Tobin's q	Waseda-Nissei Corporate Governance Database	Ratio of market value to book value	1.09	1.27
Leverage	Waseda-Nissei Corporate Governance Database	Total liabilities (borrowing and bonds) to assets	0.26	0.20
R&D-intensive Industries	Waseda-Nissei Corporate Governance Database	Chemicals, pharmaceuticals, machinery, electronics, transportation equipment, and precision instruments.	0.49	N/A
Bond rating	See text	On a range from 4 (lowest, no rating) to 1 (rated A or higher)	2.95	1.12
Main bank loans, shareholding, etc.	Waseda-Nissei Corporate Governance Database	Several definitions used to identify the main bank, see text	Depending on the definition used	N/A

Table 3: The Effects of Government Actions to Address the Banking Crisis on Cumulative Abnormal Returns of Non-Financial Firms on Days (-5, +5)

	Actions related to the Jusen Problem	Injections of Capital	Improved Banking Supervision
Constant	Event-specific	Event-specific	Event-specific
Assets	0.001	0.002	-0.014***
	(0.002)	(0.003)	(0.003)
Tobin's q	-0.000	0.001	-0.013***
	(0.004)	(0.005)	(0.004)
Leverage	-0.001	0.079***	0.036**
	(0.009)	(0.013)	(0.017)
High-R&D sector dummy	-0.009***	-0.023***	-0.007**
	(0.003)	(0.004)	(0.003)
Bond rating	-0.001	0.009***	0.006***
	(0.001)	(0.002)	(0.001)
N	1603	3340	4307
R^2	0.01	0.05	0.04

- Some government actions mattered: K injections and measures to improve banking supervision constituted "good news" for some firms: leveraged, with low bond rating operating in low-tech industries (e.g. firms with leverage 2 std above the mean would have a CAR of 3% relative to a sample avg of 1%; A shift from the highest to the lowest credit rating would raise CAR by about the same; 2% points lower CAR for firms in R&D intensive industries).

- The results for measures to improve government supervision of the banking sector are qualitatively similar (here mkt to book and size are also negatively correlated with CAR).

Table 4: The Effects of Bank Downgrading on Cumulative Abnormal Returns of Non-Financial Firms on Days (-5+5)

	All	DG –1995	DG-1996	DG-1997	DG-3/98	DG-12/98
Constant	Event-specific	0.008	0.013	-0.007	-0.060	0.025
		(0.010)	(0.008)	(0.019)	(0.019)	(0.008)
Assets	0.009***	-0.002	-0.001	0.012*	0.020***	0.002
	(0.002)	(0.002)	(0.003)	(0.007)	(0.006)	(0.003)
Tobin's q	0.021***	-0.007	-0.004	0.033**	0.063***	0.003
	(0.003)	(0.007)	(0.005)	(0.011)	(0.012)	(0.004)
Leverage	-0.104***	0.000	0.013	-0.249***	-0.156***	-0.097***
	(0.009)	(0.015)	(0.013)	(0.028)	(0.025)	(0.014)
High-R&D sector dummy	0.012***	-0.009**	0.008*	0.009	0.033***	0.013***
	(0.003)	(0.004)	(0.004)	(0.008)	(0.007)	(0.005)
Bond rating	-0.009***	0.003	-0.002	-0.011***	-0.024***	-0.009***
	(0.001)	(0.002)	(0.002)	(0.004)	(0.003)	(0.002)
MB involved dummy	0.000	-0.010**	-0.011*	0.011	0.006	0.003
	(0.003)	(0.004)	(0.007)	(0.012)	(0.009)	(0.005)
N	4016	790	801	820	829	776
R^2	0.22	0.02	0.01	0.17	0.28	0.12

- Downgrading is bad news on average (average CAR of -3.1%).
- Downgrading is especially bad for credit constrained firms: CAR more negative for small, low-q, leveraged with a low bond rating
- Downgrading is especially bad for low-R&D firms which are presumably more dependent on bank finance.
- No special effect on firms whose MB is the downgraded bank (more on this later).

Table 5: The Effects of Bank Mergers on Cumulative Abnormal Returns of Non-Financial Firms on Days (-5, +5)

	All Mergers	Mizuho	SMBC	UFJ
Constant	Event-specific	-0.036	-0.058	0.018
		(0.011)	(0.012)	(0.013)
Assets	-0.000	0.004	0.002	-0.008
	(0.003)	(0.005)	(0.006)	(0.007)
Tobin's q	0.003	0.014**	0.001	0.001
	(0.003)	(0.006)	(0.006)	(0.003)
Leverage	0.052***	0.037**	0.068***	0.057***
	(0.011)	(0.015)	(0.017)	(0.024)
High-R&D sector dummy	-0.012***	-0.024***	0.012***	-0.025***
	(0.004)	(0.006)	(0.006)	(0.007)
Bond rating	0.004**	0.000	0.005*	0.006*
	(0.002)	(0.003)	(0.003)	(0.003)
MB involved dummy	0.000	0.006	0.002	-0.006
	(0.004)	(0.006)	(0.007)	(0.012)
N	2606	862	862	882
R^2	0.10	0.04	0.03	0.04

- The effect of mergers is a priori ambiguous: Improved lending ability vs. damage to "relationship" and perhaps forced sale of shares held by merged bank (so as not to exceed the legal maximum).

- Average impact: insignificant, but good news for leveraged, low rated, low-tech companies. Improved lending effect dominant for them?

- Again no special effect on firms whose MB is one of the merging banks.

	Injections of Capital	All Downgrading Events	All Downgrading Events	All Mergers	All Mergers
Constant	Event-Specific	Event-Specific	Event-specific	Event-Specific	Event-specific
Assets	0.004	0.008***	0.009***	-0.000	-0.000
	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)
Tobin's q	-0.001	0.022***	0.021***	0.003	0.003
	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)
Leverage	0.026	-0.084***	-0.087***	0.046***	0.057***
	(0.016)	(0.014)	(0.014)	(0.012)	(0.016)
High-R&D sector dummy	-0.023***	0.012***	0.011***	-0.011***	-0.012***
	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)
Bond rating	0.005**	-0.008***	-0.006***	0.002	0.004**
	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)
MB involved dummy	N/A	0.000	0.001	0.000	-0.001
		(0.003)	(0.003)	(0.004)	(0.004)
MB loans to total assets	0.282***	-0.108**			-0.001
	(0.068)	(0.048)			(0.001)
MB shareholding	-0.001	0.000			0.001
	(0.001)	(0.001)			(0.001)
Bank loans to total assets			-0.014**	0.010*	
			(0.005)	(0.006)	
N	3340	4016	4016	2606	2606
R^2	0.06	0.22	0.22	0.10	0.10

MB Effects

- Measures of bank-firm ties (debt and equity ties) and various MB proxies do not change the insignificance of the MB Involved dummy.

- Measures of bank debt (MB loans to assets, total loans to assets) tend to have the same sign as leverage.

MB Effects

- Events are viewed as having a systemic effect? (Brewer et al. report a similar result on bank distress).

- Perhaps "smaller" downgrading or merger events have a special effect on clients of the banks involved (we did not check).

- Shares of MB clients are less liquid?

Robustness: Results are unchanged if:

- CAR is measured using a shorter event window, between days –1 and +1 (rather than between days –5 and +5).

- The market model in the CAR calculation is estimated using days –140 to –20 instead of using a shorter 40-day period.

Robustness - Contd.

- Raw stock returns between days –5 and +5 are used instead of abnormal returns.

- ROA (return on assets) is used as a measure of firm profitability (or "quality") instead of Tobin's q.

Robustness - III

- Four dummy variables corresponding to different positions on the rating "scale" are used.

- Incomplete 1994 firm-level R&D intensity (R&D to sales; data not available for many firms) are used instead of a dummy variable for firms belonging to R&D intensive sectors.

And Robustness IV

- Industry-level R&D is used instead of a dummy variable for firms belonging to R&D intensive sectors.

- The ratio of foreign sales to total sales is included in the regression. This variable is positive in the DG regressions - good firms? Less dependent on domestic mkt?

Related Thoughts

- Events not related to the banking crisis do not produce similar results.

- No clear relation between bank ER and client firm ER.

- Reverse causality in the case of downgrading unlikely (regressions with clients on non-downgraded banks).

Summary so far:

- Differential effect of Japan's banking crisis: sensitive companies are the ones described as bank dependent in the macro literature, plus the ones described as bank dependent in the financial economics literature.

- Where are the zombies? Do they "rejoice" when others suffer? Or do they suffer more than others?

Crisis and Welfare

- The crisis may be good if credit-constrained firms are "zombies" which should be left to die.

- The crisis is bad if these firms are positive NPV and cannot get capital to finance investments because of the banking troubles (combined with misallocation of K).

Looking for the (missing) Zombies...

- Attempts to define "zombies" and estimate whether or not they are particularly affected have not succeeded.

- Zombie definition according to Caballero et al.: firms whose actual interest payments are lower than the risk-free rate. Problematic...

- Zombies according to this definition are not particularly sensitive to banking events.

Looking for the (missing) Zombies - Contd.

- Attempts to define "zombies" according to some combination of low performance, increased debt during the 1990s, interest coverage ratio, and size.

- No consistent results, perhaps because zombies do not necessarily have these characteristics, or because there aren't so many? ("Saving the Sun" by G. Tett).

Some success after all...

- Defining zombies according to Caballero et al. and upper size quartile: A mixed bag, but the same 5-6 construction/real estate companies always come up with unusually high CAR's with the "correct" sign (not necessarily bad in other dimensions).

- Attempts to identify "promising good firms" also not very successful.

Conclusion

- It is not so easy to find the bank-dependent zombies ==> not as many of them as is recently fashionable to claim?

- Not so easy to find cash-constrained superstars either.

- The most affected companies are "middle Japan"- relatively small companies (not superstars) in relatively low-tech sectors.