



ELSEVIER

Contents lists available at ScienceDirect

Finance Research Letters

www.elsevier.com/locate/frl



Is the information produced in the stock market useful for depositors?

Katsutoshi Shimizu

Graduate School of Economics, Nagoya University, Furo-cho, Chikusa-ku, Nagoya, Aichi 464-8601, Japan

ARTICLE INFO

Article history:

Received 27 October 2008

Accepted 11 November 2008

Available online 17 November 2008

JEL classification:

G21

G01

G14

G24

G28

D8

Keywords:

Bank failure

Contagion

Informational asymmetry

Depositor discipline

ABSTRACT

The information produced by sophisticated investors in the stock market may be useful for uninformed depositors. Since much information is not produced for *Shinkin* banks (cooperatives) in Japan, relying on the information from the stock market may be an efficient decision for these depositors. This paper provides empirical evidence that *Shinkin* depositors seemed to withdraw funds after observing a fall in the stock prices of other banks.

© 2008 Elsevier Inc. All rights reserved.

1. Introduction

Although banks disclose a variety of financial conditions in statements, considerable informational asymmetries still exist. Depositors do not know which firms the bank lends to, what amount of credit is provided to each borrower, how much of the interest rate is contracted, or how high the probability of the failure of each borrower is. Stock market investors and security analysts have more information on each bank borrower than depositors. Since investors and security analysts usually collect information on borrower firms, they know the current financial condition of the bank, which is not disclosed in a financial statement, and of which uninformed depositors are not aware. In other

E-mail address: shimizu@soec.nagoya-u.ac.jp.

words, the expected returns of individual loans to each borrower, the current failure probabilities, etc. are latent variables to depositors. If there was no informational asymmetry, depositors could use this information to calculate the probability of bank failure.

This paper empirically examines whether the information produced in the stock market is useful to uninformed depositors. Two types of financial institution operate in the regional economies in Japan: Regional banks and *Shinkin* banks.¹ The former are typically corporations that issue publicly traded stocks, while the latter are non-profit cooperatives. The above argument predicts that informational asymmetries exist more for *Shinkin* banks than for Regional banks, and that the stock prices of Regional banks may be useful to depositors of *Shinkin* banks which operate in the same geographical (prefecture) area. The uninformed *Shinkin* depositors might decide to withdraw their funds after observing a fall in the stock prices of neighboring Regional banks. This prediction is based on the following two assumptions. First, the performance of borrowers of *Shinkin* banks and Regional banks is positively correlated because both operate in the same geographical area, and typically have similar loan portfolios.² Second, since decision-making by analyzing disclosed information is costly and time-consuming, relying on the information by others, i.e., sophisticated traders in the stock market, may result in efficient decisions by uninformed *Shinkin* depositors.³

This paper found evidence for the presence of regional contagion from the stock price to the quantity of deposits. In the year when the *Shinkin* industry faced serious distress, *Shinkin* depositors withdrew funds after observing a fall in the stock prices of neighboring Regional banks. Of course, the stock price may be merely a proxy for the performance of borrowers in the locality. We cannot distinguish whether *Shinkin* depositors actually observed the stock price of regional banks, or whether the stock prices of regional banks were a representative proxy of the most important variables that depositors observed. More precisely, we suggest that it seemed as if *Shinkin* depositors withdrew funds after observing a fall in the stock prices of neighboring Regional banks.

This paper is related to two strands of earlier literature. First, many authors have found evidence that bank depositors provide market discipline.⁴ Typically, they argue that depositor discipline exists because depositors withdraw their funds when the financial condition of banks becomes relatively riskier. However, since disclosed information on financial conditions may matter most to depositors, but is not quite sufficient, contagion may be observed.⁵ The second strand of the existing literature investigates the importance of the contagious nature of bank runs.⁶ Bank contagion is of particular concern because the failure of one bank is sometimes transmitted by a domino effect, not only to other banks but also to the entire financial system. Many authors report that a bank failure spills over to other banks, in the sense that the stock price of the latter falls after the failure of the former is announced. In particular, Saunders and Wilson (1996) found empirical evidence for the contagion of the flow of deposits.⁷

In Section 2, I explain the data and hypotheses on the withdrawal behavior of depositors. In Section 3, I provide the empirical results of the regression analysis, and in Section 4, I provide the conclusions.

¹ Regional banks are formally member banks of the Regional Banks Association of Japan and the Second Association of Regional Banks.

² One can safely assume that, in Japan, Regional banks and *Shinkin* banks usually operate in the prefectures in which their head offices are located. In particular, the operating area of *Shinkin* banks is restricted by law.

³ Bikhchandani et al. (1998) argue for such learning from others. Note that it may require higher costs for *Shinkin* depositors to produce information because they are small- and medium-sized companies or individuals by the legal restriction.

⁴ See Hannan and Hanweck (1988), Gorton and Santomero (1990), Ellis and Flannery (1992), Cook and Spellman (1994), Martinez Peria and Schmukler (2001).

⁵ *Shinkin* banks disclosed financial statements only annually before 2002. This information became old and insufficient for depositors as soon as it was disclosed.

⁶ See Kaufman (1994), Aharony and Swary (1983), Swary (1986), Gorton (1988), Saunders and Wilson (1996), Yamori (1999), Spiegel and Yamori (2004).

⁷ They argue that the deposit flow of a solvent bank reacts positively to that of a failed bank, as well as to the bank failure rate. Since there were no panic runs in the financial crisis of the early 2000s in Japan, none of the depositors observed that other people withdrew funds from other banks in a line. This is why we analyze contagion from stock prices, rather than the outflow of deposits.

2. Data and hypotheses

It is very interesting to analyze the withdrawal behavior of *Shinkin* depositors in FY 2001. These depositors had to decide urgently whether to withdraw funds from their banks for two reasons. First, the number of failures of *Shinkin* banks was tending to increase. Although there were no failures before 1998, two, ten, and seven *Shinkin* banks failed in 1999, 2000, and 2001, respectively. Second, the Japanese government lifted the blanket guarantee for time deposits on April 1, 2002 (Imai, 2006; Fueda and Konishi, 2007). Thus, *Shinkin* depositors had to withdraw funds because they expected to lose their money otherwise.

This paper hypothesizes depositor withdrawal behavior using the following equation:

$$(\Delta D/D)_i = b_0 + b_1 X_i^F + b_2 X_i^C + b_3 X_i^M + u_i \quad (1)$$

where i is the bank ID. The dependent variable $\Delta D/D$ is the growth rate of deposits from the beginning to the end of the fiscal year. X_i^F is a vector of bank fundamental variables, X_i^C is a vector of contagion variables, and X_i^M is a vector of regional-macro variables. As in the market discipline literature, depositors withdraw funds as the bank fundamental variables become riskier.⁸ X_i^F consists of capital/asset ratio, non-performing loan ratio, the ratio of noninterest expenditures to total assets, return on assets, liquid asset ratio, and the market share of deposit relative to the aggregate deposit in the prefecture.

As contagion variables, it is interesting to investigate whether the failure of other *Shinkin* banks in the same prefecture affects withdrawal behavior. To test this hypothesis, we include the failure dummy, which takes 1 if there was a failure of *Shinkin* banks in the same prefecture. In comparison to the number of failures of *Shinkin* banks, there were only two failures of Regional banks in FY 2001. Thus, it seems meaningless to examine the effect of the failure of Regional banks on *Shinkin* deposits. Instead, this paper examines the effect of a fall in the stock prices of Regional banks operating in the same prefecture. Since a fall in the stock price (or bank capital) implies an increase in failure probability, it is predicted that the stock price of neighboring Regional banks may trigger the withdrawal behavior of *Shinkin* depositors. To test this hypothesis, we include the growth rate of the averaged stock price of neighboring Regional banks as an explanatory variable.⁹

It is important to control the relevant regional-macro variables, because the stock prices of Regional banks may reflect the macro condition of the prefecture. The most important variables that we consider are the growth rate of prefectural GDP, the ratio of bankrupt firms, the change rate of the price index, and the growth rate of land prices. The data on *Shinkin* banks are obtained from *Financial Statements of Shinkin Banks in Japan (Kin'yu Toshō Kōsarutanto Sha)* and those of stock prices are from the *Nikkei Financial Quest* database.¹⁰

Table 1 reports descriptive statistics of the variables. As the dependent variable ($\Delta D/D$) in Eq. (1), we examine the growth rates of total deposits, demand deposits, and time deposits. Since the blanket guarantee was not lifted for demand deposits, its growth rate was positive and high while that of time deposits was negative. The mean of the growth rate of stock prices of Regional banks is -0.832 . In 2001, the average stock price of regional banks fell in eighteen of the forty-seven prefectures, which implies that the depositors of 146 *Shinkin* banks observed a fall in the stock prices of Regional banks in the prefecture. The mean of the *Shinkin* failure dummy is 0.066, which means that the depositors

⁸ Following the econometric method used in the previous literature (e.g., Martinez Peria and Schmukler, 2001), we do not include the deposit interest rate as an explanatory variable. Eq. (1) is considered as the reduced form. In addition, it should be remembered that deposit interest rates were almost zero during the sample period.

⁹ Since there are one or more Regional banks in the prefecture whose stocks are publicly traded, the stock price is averaged.

¹⁰ The failed *Shinkin* banks were Utsunomiya (in Tochigi prefecture), Usuki (Oita), Okinawa (Okinawa), Osaka Daiichi (Osaka), Kansai Nishinomiya (Hyogo), Nakatsu (Oita), and Saganoseki (Oita). The merged *Shinkin* banks were Douou, Hokkai, and Yubari (in Hokkaido), Hurano and Asahikawa (Hokkaido), Ota and Isezaki (Gunma), Kisarazu, Narita, and Chiba (Chiba), Douei and Minato (Tokyo), Asahi, Edogawa, Bunkyo, and Kyoseki (Tokyo), Sabae, Fukui Chuo, and Fukui (Fukui), Senshu and Sen'yo (Osaka), Kurashiki and Tamashima (Okayama), and Wakamatsu and Kitakyushu Yahata (Fukuoka).

Table 1
Descriptive statistics of variables.

Variables	Mean	Standard deviation
<i>Growth rate of deposit</i>		
$\Delta D/D$ (total deposit)	0.216	3.657
$\Delta D/D$ (demand deposit)	28.628	13.072
$\Delta D/D$ (time deposit)	-6.973	5.232
<i>Fundamental variables</i>		
Capital/asset ratio	11.059	3.953
Non-performing loan ratio	4.097	2.338
Ratio of noninterest expenditures to total asset	1.538	0.223
Return on assets	0.078	0.483
Liquid asset ratio	19.905	6.452
Market share of deposit	2.972	3.787
<i>Contagion variables</i>		
Growth rate of stock prices of Regional banks	-0.832	12.406
Shinkin failure dummy	0.066	0.248
<i>Regional-macro variables</i>		
Prefectural GDP	-2.533	1.711
Ratio of bankrupt firms	0.286	0.087
Change rate of price index	-1.285	0.335
Change rate of land price	-6.225	3.003
Number of negative $\Delta D/D$ (total)	138	
Number of negative $\Delta D/D$ (demand)	0	
Number of negative $\Delta D/D$ (time)	304	
Number of negative stock price growth	146	

Note: Sample period is FY 2001. Growth rate is calculated as one from March 2001 to March 2002. Source: Prefectural GDP (Cabinet Office), Ratio of bankrupt firms (Tokyo Shoko Research), Change rate of price index (Ministry of Internal Affairs and Communications), Change rate of land price (Ministry of Internal Affairs and Communications).

of 21 *Shinkin* banks observed a failure in the prefecture. The last four rows report the number of *Shinkin* banks whose growth rate of deposits and stock price is negative.

3. Regression analysis

Table 2 reports the estimated results of the regression equation (1).¹¹ The dependent variable is the $\Delta D/D$ of total deposits in the left column, that of demand deposits in the middle column, and that of time deposits in the right column. Among bank fundamental variables, the capital/asset ratio and the return on assets have significantly positive coefficients in the left and right columns, which is theoretically consistent. Also the coefficient of non-performing loan ratio is significantly negative. As has been shown in the existing work on depositor discipline, depositors withdrew their funds from riskier *Shinkin* banks. Since the blanket guarantee of demand deposits remained in force, depositors behaved differently. The coefficients of capital/asset ratio and liquid asset ratio show us that depositors of riskier banks switched their funds from time deposits to demand deposits.

The coefficients of the growth rate of stock price are positively significant in the left and the right columns. *Shinkin* depositors withdrew funds when they observed a fall in the stock prices of neighboring Regional banks in the same prefecture. Other things being equal, the growth rate of deposits was 0.0325% ($= 0.832 \times 0.039$) less in the prefecture where the stock price fell on average. On the other hand, the failure dummy has a significant coefficient in the middle column only. The sign of the coefficient is positive because of the switching effect from time to demand deposits.

¹¹ To correct the problem that the error terms are correlated within the prefecture, we used clustering-robust covariance matrix.

Table 2
Results of regression analysis.

Dependent var. $\Delta D/D$	Total deposit		Demand deposit		Time deposit	
Mean of dep. var.	0.216		28.628			–6.973
S.D. of dep. var.	3.657		13.072			5.232
Number of obs.	319		319			319
RSS	3230.208		37292.680			5821.755
S.E of residuals	3.249		11.040			4.362
R ²	0.240		0.314			0.331
Adjusted R ²	0.210		0.287			0.305
Variables	Coefficient (t-ratio)	p-value	Coefficient (t-ratio)	p-value	Coefficient (t-ratio)	p-value
Constant	–0.103 (0.052)	0.958	49.510 (5.489)	0.000***	–8.965 (2.821)	0.005***
<i>Fundamental variables</i>						
Capital/asset ratio	0.246 (3.134)	0.002***	–0.791 (5.393)	0.000***	0.505 (3.657)	0.000***
Non-performing loan ratio	–0.184 (2.392)	0.017**	0.055 (0.158)	0.875	–0.300 (2.918)	0.004***
Noninterest expenditure ratio	–0.438 (0.524)	0.601	–7.021 (1.56)	0.120	0.349 (0.265)	0.792
Return on asset	1.266 (2.271)	0.024**	–1.803 (1.469)	0.143	1.711 (2.33)	0.021**
Liquid asset ratio	–0.036 (1.33)	0.184	–0.304 (3.594)	0.000***	–0.015 (0.399)	0.690
Market share of deposit	0.037 (0.861)	0.390	0.607 (3.205)	0.002***	–0.077 (0.966)	0.335
<i>Contagion variables</i>						
Growth rate of stock price	0.039 (1.921)	0.056*	0.003 (0.06)	0.953	0.058 (1.838)	0.067**
Failure dummy	0.141 (0.146)	0.884	7.175 (3.229)	0.001***	–0.011 (0.007)	0.995
<i>Control variables</i>						
Prefectural GDP	0.451 (3.733)	0.000***	1.578 (3.082)	0.002***	0.229 (0.98)	0.328
Ratio of bankrupt firms	1.859 (0.639)	0.523	18.110 (2.389)	0.018**	–7.084 (1.643)	0.101
Change rate of prefectural price index	0.223 (0.355)	0.723	1.969 (0.742)	0.459	0.218 (0.228)	0.820
Change rate of land price	–0.073 (0.84)	0.402	–0.596 (2.147)	0.033**	–0.067 (0.453)	0.651

Note: The OLS estimation. Sample year is FY 2001. Dependent variable is the growth rate of deposit.

* Significance at 10% level.

** Idem, 5% level.

*** Idem, 1% level.

4. Conclusions

When an economy moved from full deposit insurance coverage to partial one, the shocks of one bank seem to have spilled over to other banks. Since the stock price of a bank falls dramatically before its failure, a falling stock price may become a warning sign of bank failure. The contribution of this paper is its provision of empirical evidence that it seems as if depositors may withdraw funds after observing such a symptom, when they believe that the expected loss from deposits is increasing, and they have an urgent need to decide whether to withdraw.

Acknowledgment

The author has benefited from the comments of Masaru Konishi, Kazuki Yokoyama, Hideaki Murase, and Yoshiaki Ogura on an earlier draft of this paper. I am also grateful to the referee for useful and suggestive comments. This work was supported by a Grant-in-Aid for Scientific Research.

References

- Aharony, J., Swary, I., 1983. Contagion effects of bank failures: Evidence from capital markets. *Journal of Business* 56, 305–322.
- Bikhchandani, S., Hirshleifer, D., Welch, I., 1998. Learning from the behavior of others: Conformity, fads, and informational cascades. *Journal of Economic Perspectives* 12, 151–170.
- Cook, D., Spellman, L., 1994. Repudiation risk and restitution costs: Toward understanding premiums on insured deposits. *Journal of Money, Credit and Banking* 26, 439–459.
- Ellis, D., Flannery, M., 1992. Does the debt market assess large banks' risk? Time series evidence from money center CDs. *Journal of Monetary Economics* 30, 181–502.
- Fueda, I., Konishi, M., 2007. Depositors' response to deposit insurance reforms: Evidence from Japan, 1990–2005. *Journal of Financial Services Research* 31, 101–122.

- Gorton, G., 1988. Banking panics and business cycles. *Oxford Economic Papers* 40, 751–781.
- Gorton, G., Santomero, A., 1990. Market discipline and bank subordinated debt. *Journal of Money, Credit, and Banking* 22, 119–128.
- Hannan, T., Hanweck, G., 1988. Bank insolvency risk and the market for large certificates of deposit. *Journal of Money, Credit, and Banking* 20, 203–211.
- Imai, M., 2006. Market discipline and deposit insurance reform in Japan. *Journal of Banking & Finance* 30, 3433–3452.
- Kaufman, G., 1994. Bank contagion: A review of the theory and evidence. *Journal of Financial Services Research* 8, 123–150.
- Martinez Peria, M., Schmukler, S., 2001. Do depositors punish banks for bad behavior? Market discipline, deposit insurance, and banking crises. *Journal of Finance* LVI, 1029–1051.
- Saunders, A., Wilson, B., 1996. Contagious bank runs: Evidence from the 1929–1933 period. *Journal of Financial Intermediation* 5, 409–423.
- Spiegel, M., Yamori, N., 2004. The evolution of bank resolution policies in Japan: Evidence from market equity values. *Journal of Financial Research* XXVII, 115–132.
- Swary, I., 1986. Stock market reaction to regulatory action in the Continental Illinois Crisis. *Journal of Business* 59, 451–473.
- Yamori, N., 1999. Stock market reaction to the bank liquidation in Japan: A case for the informational effect hypothesis. *Journal of Financial Services Research* 15, 57–68.