

Comments of “Natural Disasters, Damage to
Banks, and Firm Investment”
by Hosono, Miyakawa, Uchino, Hazama, Ono,
Uchida, and Uesugi

Michio Suzuki

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Summary of the Paper

Question This Paper Asks

Do changes in bank lending capacity affect corporate investment?

To Identify Causal Effect

Exploit exogenous variation in bank lending capacity caused by Great Hanshin-Awaji earthquake

Great Hanshin-Awaji Earthquake

- ▶ January 17, 1995.
- ▶ Hyogo (Kobe, Nishinomiya, Ashiya, etc), Osaka (Toyonaka)
 - ▶ Japanese Government's Act Concerning Special Financial Support to Deal with a Designated Disaster of Extreme Severity
- ▶ Casualties & damages to housing units in the region (Table 1)
 - ▶ # of deaths: 6405, Death rate: 0.17%
 - ▶ Rate of housing units completely/partly destroyed: 38.73%

Measures of Damages to Firms and Banks

Damage to Firms

- ▶ Firms located in the earthquake-affected area
- ▶ $F_DAMAGED$: dummy for damaged firms

Two Measures of Damage to Bank Lending Capacity

1. Headquarters damage ($B_HQDAMAGED$)
 - ▶ 1 if bank's HQ located in earthquake-affected area.
2. Branch damage ($B_BRDAMAGED$)
 - ▶ share of bank's branches located in affected area.

Note: measurement error may put downward bias.

Unique Firm-Bank Dataset

Basic Survey of Business Structure and Activities (BSBSA)

- ▶ Firm's balance sheet information

Nikkei NEEDS Financial Quest

- ▶ Bank's balance sheet information

Teikoku Databank LTD. (TDB)

- ▶ Firm-level data
- ▶ List of banks with which each firm transacts
- ▶ Main bank: bank listed at top of the list

Empirical Model of Corporate Investment

$$\begin{aligned} \frac{I_{it}}{K_{it-1}} = & \beta_0 + \beta_1 F_SALESGROWTH_{it-1} + \beta_2 F_DAMAGED_i \\ & + \beta_3 \mathbf{B_DAMAGED}_i + \beta_4 F_DAMAGED_i * B_DAMAGED_i \\ & + \beta_5 F_CONSTRAINTS_{it-1} + \beta_6 B_CAPACITY_{it-1} \\ & + \beta_7 Industry_i + \epsilon_{it} \end{aligned}$$

- ▶ β_3 : effect of bank damage on investment of undamaged firms.
- ▶ $F_CONSTRAINTS_{it-1}$: firm's balance sheet variables
 - ▶ Main determinants of financing costs
- ▶ $B_CAPACITY_{it-1}$: bank's balance sheet variables

Results (Table 8): Effects of Headquarter Damage

$$\frac{I_{it}}{K_{it-1}} = \beta_0 + \beta_1 F_SALESGROWTH_{it-1} + \beta_2 F_DAMAGED_i \\ + \beta_3 B_HQDAMAGED_i + \beta_4 F_DAMAGED_i * B_HQDAMAGED_i \\ + \beta_5 F_CONSTRAINTS_{it-1} + \beta_6 B_CAPACITY_{it-1} \\ + \beta_7 Industry_i + \epsilon_{it}$$

- ▶ β_3 is **negative** (-0.081 (0.023)) in FY1995.
 - ▶ Not in FY1996, FY1997.
- ▶ $\beta_3 + \beta_4$ is **positive** (0.276) in FY1995
 - ▶ (Weak) evidence for loan shifting to damaged firms
 - ▶ Not significant in FY1996, FY1997

Results (Table 8): Effects of Branch Damage

$$\begin{aligned} \frac{I_{it}}{K_{it-1}} = & \beta_0 + \beta_1 F_SALESGROWTH_{it-1} + \beta_2 F_DAMAGED_i \\ & + \beta_3 B_BRDAMAGED_i + \beta_4 F_DAMAGED_i * B_BRDAMAGED_i \\ & + \beta_5 F_CONSTRAINTS_{it-1} + \beta_6 B_CAPACITY_{it-1} \\ & + \beta_7 Industry_i + \epsilon_{it} \end{aligned}$$

- ▶ β_3 is **negative** (-0.127 (0.059)) in FY1996.
 - ▶ Not significant in FY1995, 1997.
- ▶ β_4 is not significantly different from zero.

Results (Table 8): Effects of Other Variables

$$\begin{aligned} \frac{I_{it}}{K_{it-1}} = & \beta_0 + \beta_1 F_SALESGROWTH_{it-1} + \beta_2 F_DAMAGED_i \\ & + \beta_3 B_DAMAGED_i + \beta_4 F_DAMAGED_i * B_DAMAGED_i \\ & + \beta_5 F_CONSTRAINTS_{it-1} + \beta_6 B_CAPACITY_{it-1} \\ & + \beta_7 Industry_i + \epsilon_{it} \end{aligned}$$

- ▶ Coef. on sales growth (β_1): positive as expected.
- ▶ Coef. on damage to the firm (β_2): positive as expected.
- ▶ Coef. on leverage, profitability, liquidity have expected signs.
- ▶ Bank's balance sheet variables do not have significant effect.

Comment 1: *B_HQDAMAGED* Picks Up Small Banks

Damage-to-headquarter dummy picks up only small banks

- ▶ Regional bank 2, shinkin banks, credit cooperatives

Assortative matching in firm-bank relationship?

- ▶ If observables do not fully account for matching pattern, there may be bias.
- ▶ Measurement error in observed data.

Small banks may charge higher interest rate?

Robustness checks 1 and 2 in the paper are important.

- ▶ Robustness check 1: Bank size
- ▶ Robustness check 2: Firm fixed effect

Robustness Check 1: Accounting for Bank Size

Small Bank Dummy

- ▶ 1 if main bank is either Shinkin bank or credit cooperative

Assumed: damage to regional banks has **no** impact

Why?

- ▶ Why not using full set of dummies?

$$\beta_2 F_DAMAGED_i + \beta_3 B_DAMAGED_i + \beta_4 F_DAMAGED_i * B_DAMAGED_i + \beta_5 SMALL_i + \beta_6 F_DAMAGED_i * SMALL_i + \beta_7 B_DAMAGED_i * SMALL_i + \beta_8 F_DAMAGED_i * B_DAMAGED_i * SMALL_i$$

Robustness Check 2: Accounting for Firm Fixed Effects

First difference of investment rates but not of regressors

- ▶ Because BSBSA data for **FY1993** are not available.
- ▶ BSBSA data for **FY1991** are available.
 - ▶ Use this data to construct first differences?
- ▶ Taking difference between 1995 and **1996 (or 1997)**?
 - ▶ Year-specific effect of 'damage' (& industry) dummies
 - ▶ Possible to use level in FY1991 as IV
- ▶ Any data available in TDB dataset?
 - ▶ Footnote 19 says sales in FY1993 available in TDB data.
 - ▶ What about other regressors?

Comment 2: Shocks to Undamaged Firms

Earthquake \Rightarrow Disruptions through supply linkages

- ▶ **Shocks to firms outside of affected area**
- ▶ e.g. # of direct vs indirect bankruptcies (1995): 78 vs 66
 - ▶ 62% of indirect bankruptcies in Kinki area
 - ▶ Source: Tokyo Shoko Research
- ▶ Error term ϵ_{it} may contain this shock

Comment 2 Cont'd

Error term ϵ_{it} may be correlated with $B_DAMAGED$?

- ▶ If proximity matters in business,

Firms w/ damaged banks more likely linked w damaged firms?

Any data in TDB to control for this (network) effect?

Comment 3: Alternative Measure of Bank Damage

Question:

- ▶ Did banks with large outstanding loans to damaged firms restrict lending to **undamaged firms**?
 - ▶ If damaged firms failed to recover, bank's capital would fall.
 - ▶ Loan shifting to damaged firms
- ▶ If so, how much did it affect firm's investment?
- ▶ Maybe possible to examine effect of this 'bank damage' on corporate investment, too?

Comment 3 Cont'd

Another B_DAMAGED Variable

- ▶ Dummy for banks lending 'large' amount to damaged firms

Development Bank of Japan Corporate Finance Data

- ▶ Outstanding loans by bank available for each listed firm
- ▶ Use the data to identify 'damaged' banks?
- ▶ Need location of each firm...

Other Comments

1. Stock returns as a proxy for bank's financial health?
(Peek and Rosengren (2005), Amiti and Weinstein (2011))
2. More detailed industry dummies?
3. Data period in BSBSA
 - ▶ Until 2007, BSBSA survey conducted on June 1st.
 - ▶ Year t survey collects following data.
 - ▶ Firms w/ fiscal year ending before June: data for FY $t - 1$
 - ▶ Firms w/ fiscal year ending after June: data for FY $t - 2$.