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

Michio Suzuki

November 30, 2012

HIT-TDB-RIETI Int’l WS on the Economics of Interfirm Networks
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

- 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

\[
\frac{l_{it}}{K_{it-1}} = \beta_0 + \beta_1 F\_SALESGROWTH_{it-1} + \beta_2 F\_DAMAGED_i + \beta_3 B\_DAMAGED_i + \beta_4 F\_DAMAGED_i \ast B\_DAMAGED_i + \beta_5 F\_CONSTRAINTS_{it-1} + \beta_6 B\_CAPACITY_{it-1} + \beta_7 Industry_i + \epsilon_{it}
\]

- \(\beta_3\): 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

\[
\frac{I_{it}}{K_{it-1}} = \beta_0 + \beta_1 F_{SALESGROWTH_{it-1}} + \beta_2 F_{DAMAGED_i} \\
+ \beta_3 B_{HQDAMAGED_i} + \beta_4 F_{DAMAGED_i} \times B_{HQDAMAGED_i} \\
+ \beta_5 F_{CONSTRAINTS_{it-1}} + \beta_6 B_{CAPACITY_{it-1}} \\
+ \beta_7 Industry_i + \epsilon_{it}
\]

- \( \beta_3 \) is negative \((-0.081 (0.023))\) in FY1995.

- \( \beta_3 + \beta_4 \) 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

\[
\frac{I_{it}}{K_{it-1}} = \beta_0 + \beta_1 F_{SALESGROWTH_{it-1}} + \beta_2 F_{DAMAGED_i} \\
+ \beta_3 B_{BRDAMAGED_i} + \beta_4 F_{DAMAGED_i} \ast B_{BRDAMAGED_i} \\
+ \beta_5 F_{CONSTRAINTS_{it-1}} + \beta_6 B_{CAPACITY_{it-1}} \\
+ \beta_7 Industry_i + \epsilon_{it}
\]

- \( \beta_3 \) is negative (-0.127 (0.059)) in FY1996.
- \( \beta_4 \) is not significantly different from zero.
Results (Table 8): Effects of Other Variables

\[
\frac{I_{it}}{K_{it-1}} = \beta_0 + \beta_1 F\_SALESGROWTH_{it-1} + \beta_2 F\_DAMAGED_i \\
+ \beta_3 B\_DAMAGED_i + \beta_4 F\_DAMAGED_i \times B\_DAMAGED_i \\
+ \beta_5 F\_CONSTRAINTS_{it-1} + \beta_6 B\_CAPACITY_{it-1} \\
+ \beta_7 Industry_i + \epsilon_{it}
\]

- Coef. on sales growth ($\beta_1$): positive as expected.
- Coef. on damage to the firm ($\beta_2$): positive as expected.
- Coef. on leverage, profitability, liquidity have expected signs.
- Bank’s balance sheet variables do not have significant effect.
Comment 1: \textit{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?

\[
\begin{align*}
\beta_2 F\_DAMAGED_i & + \beta_3 B\_DAMAGED_i + \beta_4 F\_DAMAGED_i \ast B\_DAMAGED_i \\
& + \beta_5 SMALL_i + \beta_6 F\_DAMAGED_i \ast SMALL_i + \\
& \beta_7 B\_DAMAGED_i \ast SMALL_i + \beta_8 F\_DAMAGED_i \ast B\_DAMAGED_i \ast SMALL_i
\end{align*}
\]
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 ⇒ 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 $\epsilon_{it}$ may contain this shock
Comment 2 Cont’d

Error term $\epsilon_{it}$ 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 $t - 2$. 