LECTURE 11
The Effects of Credit Contraction and Financial Crises: Credit Market Disruptions

November 28, 2018

I. Overview and General Issues

Effects of Credit

- Balance-sheet and cash-flow effects.

- The effects of financial crises (using mainly aggregate time-series evidence).

- The effects of credit disruptions (using mainly micro cross-section evidence).

II. PEEK AND ROSENGREN, "COLLATERAL DAMAGE: EFFECTS OF THE JAPANESE BANK CRISIS ON REAL ACTIVITY IN THE UNITED STATES"

Peek and Rosengren's Natural Experiment

- Financial crisis in Japan caused trouble for banks in U.S. related to Japanese banks (such as U.S. branches of Japanese banks).

- Look at difference in lending behavior between American banks and U.S. branches of Japanese banks.

Evaluation of the Natural Experiment

- What is their key assumption?

    - Japan's troubles didn't affect loan supply of American banks.

- What is the importance of the fact that there is large regional variation in the commercial real estate market?

- Other things going on in the U.S. at the same time. Could this cause problems?
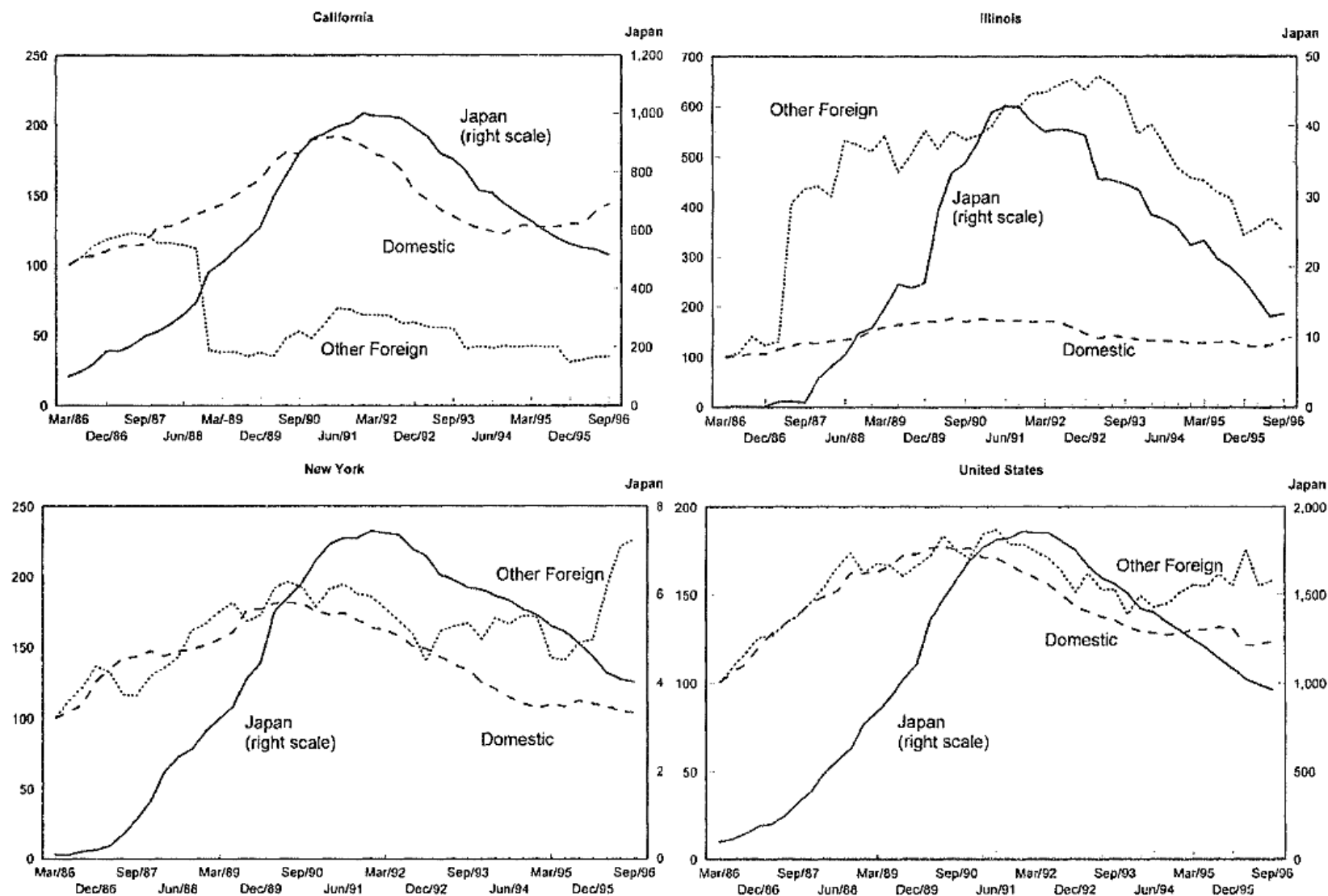
FIGURE 1. COMMERCIAL REAL ESTATE LOANS

Notes: Data are indexed, with March 1986 = 100. For Illinois and New York, the right-hand-side scale is in thousands.

Transmission of Japanese Shocks to U.S. Commercial Real Estate Lending

- Panel data on all domestically-owned commercial banks headquartered in one of the three states and Japanese bank branches.

- Data are semiannual.

- Dependent variable is change in total commercial real estate loans/beginning period assets held by bank in that state.

Testing Whether Conditions at a Japanese Parent Bank Affect Lending

$$(1) \quad \frac{\Delta Loans_{i,j,t}}{Assets_{i,j,t-1}} = \beta_0 + \beta_1 \mathbf{JPARENT}_{i,j,t-1}$$

$$+ \beta_2 \mathbf{JAPAN}_{i,j,t-1}$$

$$+ \beta_3 \mathbf{US}_{i,j,t-1} + \varepsilon_{i,j,t}.$$

where i indexes individual banks; j indexes states; and t indexes time.

TABLE 1—COMMERCIAL REAL ESTATE LENDING BY U.S. COMMERCIAL BANKS AND U.S. BRANCHES OF JAPANESE BANKS,
SEMIANNUAL OBSERVATIONS, 1989:1 TO 1996:2
ESTIMATION METHOD: VARIANCE COMPONENTS

	Combined states[a]	New York[b]	California[b]	Illinois[b]
Risk-based capital ratio at Japanese parent	0.335**	0.302*	0.168	0.617*
	(0.113)	(0.120)	(0.235)	(0.251)
Nonperforming loan ratio at Japanese parent	−0.840**	−0.489**	−1.437**	−0.456
	(0.132)	(0.141)	(0.274)	(0.252)
Nonperforming loans availability dummy	−0.432	−0.539	0.144	−1.012
	(0.529)	(0.622)	(1.130)	(0.852)
Japanese dummy	−1.593	−2.087	0.898	−5.209*
	(1.117)	(1.236)	(2.314)	(2.285)
Japanese foreign direct investment growth	0.025**	0.017*	0.026*	0.038**
	(0.006)	(0.008)	(0.013)	(0.009)
U.S. risk-based capital ratio	0.007	−0.046	0.045	−0.029
	(0.020)	(0.031)	(0.032)	(0.034)
U.S. nonperforming commercial real estate loan ratio	−0.414**	−0.438**	−0.476**	−0.266**
	(0.047)	(0.075)	(0.087)	(0.063)
Log (assets)	−0.142	−0.055	−0.334*	−0.132
	(0.082)	(0.095)	(0.169)	(0.104)
U.S. loans-to-assets ratio	0.007	0.002	0.019	0.009
	(0.006)	(0.008)	(0.015)	(0.009)
Sum of squared residuals	16,108	2,671	10,704	2,495
Standard error of the regression	2.991	2.241	3.970	2.092
R^2	0.309	0.310	0.348	0.174
Hausman test p-value	1.000	1.000	0.999	0.265
Number of observations	2,026	607	764	655

Note: Coefficient standard errors are in parentheses.

Real Effects of Declines in Japanese Commercial Real Estate Lending

- Data are now state level (but have expanded to 25 states).

- Data are still semiannual.

- Dependent variable is semiannual change in construction in the state.

Testing Whether Lending Shocks Affect Real Construction Activity

$$(2) \quad CONSTR_j = \alpha_0 + \alpha_1 \mathbf{BANK}_j$$

$$+ \alpha_2 \mathbf{STATE}_j + \alpha_3 \mathbf{NATIONAL} + \eta_j.$$

Bank includes two variables:

- Contemporaneous change in CRE loans held by branches of Japanese banks

- NPL for all banks in the state

Methodology

- 2SLS

- Instrument for change in commercial real estate loans by Japanese banks with state-level measure of health of parent banks.

- Also use change in land prices in Japan as instrument.

TABLE 3—COMMERCIAL REAL ESTATE LENDING BY
JAPANESE AND NON-JAPANESE BANKS
ESTIMATION METHOD: ORDINARY LEAST SQUARES,
1989:2 TO 1996:2

	Japanese lending	Non-Japanese lending
Excluded exogenous variables		
Risk-based capital ratio		
Japanese parent$_{-1}$	81.882*	117.631
	(32.783)	(67.489)
Risk-based capital ratio		
Japanese parent$_{-2}$	99.297**	−103.071
	(29.363)	(66.242)
Nonperforming loan ratio at		
Japanese parent$_{-1}$	17.170	−177.435
	(30.247)	(169.992)
Nonperforming loan ratio at		
Japanese parent$_{-2}$	−33.842	247.687
	(25.599)	(194.375)
Nonperforming loans		
availability dummy$_{-1}$	−14.081	603.579
	(63.272)	(424.340)
Nonperforming loans		
availability dummy$_{-2}$	−86.744	−660.400
	(57.784)	(468.004)
Change in land prices$_{-1}$	−4.921	−3.554
	(2.647)	(7.565)
Change in land prices$_{-2}$	9.114**	7.029
	(2.773)	(8.295)

TABLE 3—*Continued.*

	Japanese lending	Non-Japanese lending
Growth in real personal income		
per capita$_{-1}$	−2.764	13.956
	(2.102)	(9.145)
Growth in real personal income		
per capita$_{-2}$	−4.930*	14.276
	(2.047)	(7.588)
Mortgage rate$_{-1}$	2.115	86.885
	(11.180)	(70.030)
Mortgage rate$_{-2}$	11.546	−65.487
	(10.606)	(45.082)
Inflation rate$_{-1}$	2.218	−38.043
	(5.513)	(34.576)
Inflation rate$_{-2}$	−11.236	−2.430
	(7.435)	(34.574)
Consumer confidence index$_{-1}$	−3.452**	2.474
	(0.933)	(5.120)
Consumer confidence index$_{-2}$	−3.419**	1.733
	(1.004)	(5.019)
R^2	0.648	0.431
Sum of squared residuals	2,186,730	55,789,200
Standard error of the regression	81.901	413.682
Partial R^2 for excluded		
exogenous variables	0.368	0.056
F-statistic for set of excluded		
exogenous variables	41.75**	1.09
n	375	375

TABLE 4—THE DETERMINANTS OF REAL ESTATE CONSTRUCTION CONTRACTS AND EMPLOYMENT GROWTH
ESTIMATION METHOD: TWO-STAGE LEAST SQUARES, 1989:2 TO 1996:2

	Number of construction projects	Square feet of construction projects	Real value of construction projects	State construction employment growth
Change in commercial real estate loans by Japanese banks	0.005** (0.002)	0.015** (0.005)	1.113** (0.365)	0.007** (0.002)
Nonperforming commercial real estate loan ratio$_{-1}$	0.048 (0.124)	0.148 (0.368)	28.254 (22.278)	−0.316 (0.165)
Nonperforming commercial real estate loan ratio$_{-2}$	−0.077 (0.118)	−0.321 (0.355)	−38.976 (24.017)	0.331 (0.172)
Vacancy rate$_{-1}$	0.013 (0.072)	−0.035 (0.248)	−1.186 (16.776)	0.076 (0.084)
Vacancy rate$_{-2}$	−0.126 (0.075)	−0.387 (0.233)	−28.328 (18.492)	0.118 (0.082)
Unemployment rate$_{-1}$	0.576* (0.257)	1.776* (0.707)	61.486 (53.028)	−0.190 (0.327)
Unemployment rate$_{-2}$	0.003 (0.218)	−0.450 (0.593)	−48.808 (46.296)	1.171** (0.275)
...				

TABLE 4—THE DETERMINANTS OF REAL ESTATE CONSTRUCTION CONTRACTS AND EMPLOYMENT GROWTH
ESTIMATION METHOD: TWO-STAGE LEAST SQUARES, 1989:2 TO 1996:2

	Number of construction projects	Square feet of construction projects	Real value of construction projects	State construction employment growth
Change in commercial real estate loans by Japanese banks	0.005** (0.002)	0.015** (0.005)	1.113** (0.365)	0.007** (0.002)

Interpreting the coefficient:

The 1.113 in column (3) implies that a decline in loans by Japanese banks in a state of $100 lowers the real value of construction projects in that state by $111.30.

Evaluation

III. Chodorow-Reich, "The Effect of Credit Market Disruptions: Firm-Level Evidence from the 2008-09 Financial Crisis"

Big Picture

- Measuring the impact of credit disruption on employment.

- 2008-09 financial crisis is used (somewhat) as a natural experiment.

- What sets the paper apart is firm-level data on credit and employment.

- Finds substantial effects of credit disruption on both lending and employment.

Relation to Literature

- Similar in spirit to Peek and Rosengren, but looking at firm-level outcomes (not state employment outcomes).

- Ivashina and Scharfstein look at lending outcomes by banks (so only about 40 observations), not firms. Nothing on employment effects.

- Greenstone, Mas, and Nguyen look at employment and small business lending at the county level.

Relationship Lending

- Important starting point is that firms tend to be attached to particular financial institutions.

- Syndicated loan market.

- Testing for a relationship:

$$Lead_{b,i} = \alpha_b + \gamma_1[Previous\ lead_{b,i}]$$
$$+ \gamma_2[Previous\ participant_{b,i}]$$
$$+ \gamma_3[Previous\ lead_{b,i} \times Public\ (Unrated)]$$
$$(1) \qquad + \gamma_4[Previous\ lead_{b,i} \times Rated] + \epsilon_{b,i},$$

where $Lead_{b,i} = 1$ if bank b serves as the lead bank for borrower i, and $Previous\ lead_{b,i} = 1$ if bank b served as the lead bank for i's previous loan. The estimated value of γ_1 is 0.71.

TABLE I
BANKING RELATIONSHIP REGRESSIONS

	(1)	(2)	(3)	(4)
	Lender chosen as lead		Lender chosen as participant	
Explanatory variables				
Previous lead	0.71**	0.67**	0.022**	-0.023**
	(0.011)	(0.012)	(0.0040)	(0.0045)
Previous participant	0.029**	0.020**	0.50**	0.46**
	(0.0014)	(0.0015)	(0.011)	(0.011)
Previous lead × Public (Unrated)	−0.052**	−0.043*		
	(0.016)	(0.017)		
Previous lead × Public (Rated)	−0.058**	−0.086**		
	(0.014)	(0.016)		
Previous participant × Public (Unrated)			0.039*	0.033+
			(0.018)	(0.018)
Previous participant × Public (Rated)			0.012	−0.038*
			(0.014)	(0.015)
Lender FE	Yes	Yes	Yes	Yes
2-digit SIC × lender FE	No	Yes	No	Yes
State × lender FE	No	Yes	No	Yes
Year × lender FE	No	Yes	No	Yes
Public/private × lender FE	No	Yes	No	Yes
All in drawn quartile × lender FE	No	Yes	No	Yes
Sales quartile × lender FE	No	Yes	No	Yes
R^2	0.480	0.504	0.285	0.334
Borrower clusters	3,253	3,253	3,253	3,253
Observations	349,008	349,008	349,008	349,008

Notes. The dependent variable is an indicator for whether the lender serves in the role indicated in the table header. For each loan in which the borrower has previous accessed the syndicated market, the

From: Chodorow-Reich, "The Employment Effects of Credit Market Disruptions"

Data

- Individual loan data from Dealscan.

- Bank characteristics from Federal Reserve reports, Bankscope (for foreign lenders), and CRSP (stock prices).

- Individual firm employment data from BLS Longitudinal Database (LDB).

- Merge loan and employment data (hard!).

TABLE II
Sample Summary Statistics

	N	Mean	Std. Dev.	p10	p50	p90
			Panel A: Firm variables			
Loan size (millions of 2005 dollars)						
All lenders	4,791	287	530	23	119	693
Top 43 lenders	4,391	302	542	26	129	720
Merged Dealscan-LDB	2,040	305	544	27	131	703
Sales at close (millions of 2005 dollars)						
All lenders	3,954	1,836	4,059	53	433	4,661
Top 43 lenders	3,623	1,928	4,149	60	478	4,869
Merged Dealscan-LDB	1,721	2,024	4,310	68	551	4,813
Employment growth rate, 2008:3–2009:3	2,040	−0.09	0.23	−0.29	−0.06	0.08
2008 employment level	2,040	2,985	9,993	77	620	6,128
			Panel B: Bank variables			
%Δ number of loans	43	−52.4	29.3	−87.4	−58.8	−7.5
Lehman cosyndication exposure (%)	42	1.15	1.20	0.34	0.72	1.91
ABX exposure	40	1.16	0.46	0.71	1.07	1.77
2007–8 trading revenue/assets (%)	42	−0.08	0.62	−0.72	0.01	0.39
2007–8 real estate net charge-offs/assets (%)	21	0.24	0.23	0.04	0.18	0.49
2007 deposits/assets (%)	43	42.2	25.4	3.0	47.4	68.2

From: Chodorow-Reich, "The Employment Effects of Credit Market Disruptions"

Identification

$$g^y_{i,s} = f\left(L_{i,s}, X_i, U_i, \epsilon_i\right).\tag{2}$$

$g^y_{i,s}$ is employment growth at firm i, related to bank s

$L_{i,s}$ is an indicator for whether firm i receives a loan from bank s

X_i are observable firm characteristics

U_i are unobservable firm characteristics

$$L_{i,s} = h\left(R_s, X_i, U_i, \eta_i\right).\tag{3}$$

R_s is the internal cost of funds at bank s

If we knew R_s we could regress employment growth on whether the firm got a loan, instrumenting with R_s.

For this to work, it is essential that R_s be uncorrelated with U_i.

Problems with this Approach

- Don't observe R_S.

- Other characteristics of loans besides whether firm got one matter (for example, the interest rate and other terms).

- So Chodorow-Reich considers the reduced form:

$$g_{i,s}^{y} = g\left(M_s, X_i, U_i, \epsilon_i, \eta_i\right). \tag{4}$$

  where M_S is a measure of loan supply.

How does the idea of the financial crisis as a natural experiment enter the analysis?

- In that period, it is likely that M_s and U_i are relatively uncorrelated.

- Problems leading to the crisis did not involve the corporate loan portfolio.

- So unobserved firm characteristics are unlikely to explain bank health or behavior.

What is Chodorow-Reich's measure of M_S?

- Percent change in the number of loans to other firms between the periods October 2005 to June 2007 and October 2008 and June 2009.

- Using (roughly) the quantity of loans to proxy for the internal cost of funds at financial institutions.

- Identifying assumption is that the cross-section variation in lending reflects only supply factors or observed characteristics of the borrowers.

To deal with the possibility that the identifying assumption is violated, he instruments with supply-side factors:

- Exposure to Lehman Brothers

- ABX Exposure

- Bank statement items (2007-08 trading revenue/assets; real estate charge-offs flag, etc.)

TABLE III
DETERMINANTS OF BANK LENDING

	(1)	(2)	(3)
	Change in lending during the crisis		
Explanatory variables			
Lehman cosyndication exposure	−0.14**		
	(0.049)		
ABX exposure		−0.11*	
		(0.041)	
2007–8 trading revenue/assets			0.046
			(0.040)
Real estate charge-offs flag			0.012
			(0.050)
2007–8 real estate net charge-offs/assets			−0.092[+]
			(0.051)
2007 Bank Deposits/Assets			0.19**
			(0.059)
Joint test p-value	0.008	0.013	0.002
R^2	0.16	0.15	0.35
Observations	42	40	42

Notes. The dependent variable is the change in the annualized number of loans made by the bank between the periods October 2005 to June 2007 and October 2008 to June 2009, with each loan scaled by the importance of the lender in the loan syndicate as described in Section IV.C of the text. Observations

From: Chodorow-Reich, "The Employment Effects of Credit Market Disruptions"

Also include firm characteristics:

- Industry

- State

- Employment change in county

- Interest rate spread over Libor charged on last pre-crisis loan

- Nonpublic; public w/o access to bond market; public with access to bond market

Testing Whether Measure of Lender Health is Uncorrelated with Unobserved Firm Characteristics:

- Khwaja and Mian (2008)

- Limit sample to firms that got a loan during the crisis and had multiple lenders before crisis.

- Regress change in lending in each borrower-lender pair during the crisis on the bank health measure and a full set of borrower fixed effects.

- See if results are different from same regression leaving out the borrower fixed effects.

TABLE V

Testing for Unobserved Characteristics of Borrowers

	(1)	(2)
	Δ Log (lending in borrower-lender pair)	
Explanatory variables		
%Δ loans to other borrowers ($\Delta \tilde{L}_i$)	1.05**	1.07**
	(0.33)	(0.32)
1-digit SIC, loan year FE	No	Yes
Bond market access/public/private FE	No	Yes
Additional Dealscan controls	No	Yes
Borrower FE	Yes	No
R^2	0.423	0.088
Borrowers	432	432
Banks	43	43
Observations	2,005	2,005

Notes. The sample contains only borrowers that signed a new loan between October 2008 and June 2009. The sample contains one observation per member of the borrower's last precrisis syndicate. The dependent variable is the log change in the dollar amount of lending from that lender to the borrower. The variable $\Delta \tilde{L}_i$ equals the change in the annualized number of loans made by the bank between the periods October 2005 to June 2007 and October 2008 to June 2009, and has been normalized to have unit variance. Estimation is via OLS. Standard errors in parentheses and clustered by the precrisis lender (column

From: Chodorow-Reich, "The Employment Effects of Credit Market Disruptions"
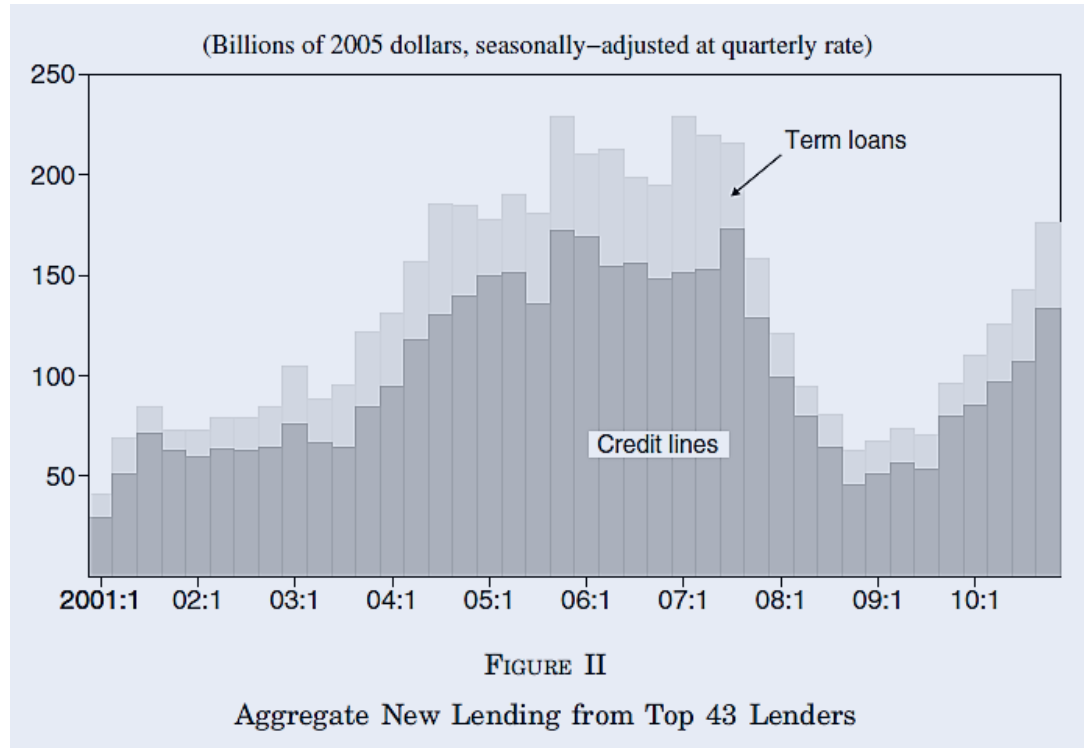
Loan Market Outcomes

- Specification:

$$P\left(Borrow_{i,s} = 1\right) \;=\; G\left(\pi_0 + \pi_1 \Delta \tilde{L}_{i,s} + \gamma X_i + \eta_{i,s}\right), \tag{7}$$

- Can think of this as a 1st stage (but it's not).

- Estimate via probit.

Loan Market Outcomes

- Sample Period: October 2008-June 2009

(Billions of 2005 dollars, seasonally-adjusted at quarterly rate)

Term loans

Credit lines

FIGURE II

Aggregate New Lending from Top 43 Lenders

- Uses full Dealscan sample (4000+ observations)

TABLE VI
THE EFFECT OF BANK HEALTH ON THE LIKELIHOOD OF OBTAINING A LOAN

	(1)	(2)	(3)	(4)	(5)	(6)
			Firm obtains a new loan or positive modification			
	Probit		$\Delta\tilde{L}_{i,s}$ instrumented using			
			Lehman exposure	ABX exposure	Bank statement items	All
Explanatory variables						
%Δ loans to other firms ($\Delta\tilde{L}_{i,s}$)	2.19**	2.00**	3.65**	2.33*	2.28**	2.32**
	(0.79)	(0.53)	(1.28)	(1.12)	(0.64)	(0.63)
2-digit SIC, state, loan year FE	No	Yes	Yes	Yes	Yes	Yes
Bond access/public/private FE	No	Yes	Yes	Yes	Yes	Yes
Additional Dealscan controls	No	Yes	Yes	Yes	Yes	Yes
First stage F-statistic			14.0	8.2	18.2	19.8
J-statistic p-value			.	.	.	0.206
$E[borrow]$	0.134	0.134	0.134	0.134	0.134	0.134
$E[\widehat{borrow:\Delta\tilde{L}_{p90} - \Delta\tilde{L}_{p10}}]$	0.052	0.048	0.087	0.055	0.054	0.055
Lead lender 1 clusters	43	43	43	40	43	40
Lead lender 2 clusters	43	43	43	40	43	40
Observations	4,391	4,391	4,391	4,354	4,391	4,354

From: Chodorow-Reich, "The Employment Effects of Credit Market Disruptions"

Employment Outcomes

- Specification:

$$g^y_{i,s,t-k,t} = \beta_0 + \beta_1 \Delta \tilde{L}_{i,s} + \gamma X_i + \epsilon_{i,s,t-k,t}. \tag{10}$$

- Estimating the reduced form.

- Now using just the matched sample (so that he knows what bank the firm is attached to).

Many More Firm-level Controls:

- Dependent variable for 2 yrs. before the crisis.

- Average change in employment in the county where the firm operates.

- Fixed effect for 3 size bins.

- Fixed effect for 3 bond access bins.

- Firm age.

TABLE IX
The Effect of Lender Credit Supply on Employment

	(1)	(2)	(3)	(4)	(5)	(6)
			Employment growth rate 2008:3–2009:3			
	OLS		$\Delta\tilde{L}_{i,s}$ instrumented using			
			Lehman exposure	ABX exposure	Bank statement items	All
Explanatory variables						
%Δ loans to other firms ($\Delta\tilde{L}_{i,s}$)	1.17*	1.67**	2.49*	3.17*	2.13*	2.38**
	(0.58)	(0.61)	(1.00)	(1.35)	(0.88)	(0.77)
Lagged employment growth		0.0033	0.0039	0.0045	0.0036	0.0039
		(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
Emp. change in firm's county		0.89*	0.85+	0.86+	0.87+	0.89+
		(0.43)	(0.46)	(0.48)	(0.45)	(0.46)
2-digit SIC, state, loan year FE	No	Yes	Yes	Yes	Yes	Yes
Firm size bin FE	No	Yes	Yes	Yes	Yes	Yes
Firm age bin FE	No	Yes	Yes	Yes	Yes	Yes
Bond access/public/private FE	No	Yes	Yes	Yes	Yes	Yes
Additional Dealscan controls	No	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic			15.5	8.5	18.5	23.1
J-statistic p-value			.	.	.	0.190
$E[g_j^y]$	−0.092	−0.092	−0.092	−0.093	−0.092	−0.093
$E[\hat{g}_j^y : \Delta\tilde{L}_{p_{90}} - \Delta\tilde{L}_{p_{10}}]$	0.027	0.039	0.058	0.074	0.050	0.055
Lead lender 1 clusters	43	43	43	40	43	40
Lead lender 2 clusters	43	43	43	40	43	40
Observations	2,040	2,040	2,040	2,015	2,040	2,015

From: Chodorow-Reich, "The Employment Effects of Credit Market Disruptions"

The employment effects are large.

- Borrowing from the 10th rather than the 90th percentile of lenders results in an additional decline in employment of 5.5 p.p.

- Average firm-level employment decline in the sample was 9.2%.

Heterogeneous Treatment Effects:

- Interact loan supply variable with size and bond-market access.

$$
\begin{aligned}
g^y_{i,s,t-k,t} &= \beta_0 + \beta_{1,small}\left[\Delta\tilde{L}_{i,s} * Small\right] + \beta_{1,med}\left[\Delta\tilde{L}_{i,s} * Medium\right] + \beta_{1,large}\left[\Delta\tilde{L}_{i,s} * Large\right] \\
&+ \gamma X_i + \epsilon_{i,s,t-k,t};
\end{aligned} \tag{11}
$$

$$
\begin{aligned}
g^y_{i,s,t-k,t} &= \beta_0 + \beta_{1,bond\,access}\left[\Delta\tilde{L}_{i,s} * bond\,market\,access\right] \\
&+ \beta_{1,no\,access}\left[\Delta\tilde{L}_{i,s} * no\,access\right] + \gamma X_i + \epsilon_{i,s,t-k,t}.
\end{aligned} \tag{12}
$$

TABLE X

THE EFFECT OF LENDER CREDIT SUPPLY ON EMPLOYMENT WITH HETEROGENEOUS TREATMENT EFFECTS

	(1)	(2)	(3)
	Employment growth rate 2008:3–2009:3		
Explanatory variables			
$\Delta \tilde{L}_{i,s}$ * Large	0.54		
	(0.97)		
$\Delta \tilde{L}_{i,s}$ * Medium	1.84+		
	(0.97)		
$\Delta \tilde{L}_{i,s}$ * Small	2.16**		
	(0.79)		
$\Delta \tilde{L}_{i,s}$ * Bond market access		1.04	
		(1.00)	
$\Delta \tilde{L}_{i,s}$ * No access		2.01**	
		(0.60)	
Lagged employment growth	Yes	Yes	Yes
Emp. change in firm's county	Yes	Yes	Yes
2-digit SIC, state, loan year FE	Yes	Yes	Yes
Firm size and age bin FE	Yes	Yes	Yes
Bond access/public/private FE	Yes	Yes	Yes
Additional Dealscan controls	Yes	Yes	Yes
Observations (Access & large)	483	483	483
Observations (Access & small/medium)	434	434	434
Observations (No access & large)	315	315	315
Observations (No access & small/medium)	808	808	808
Observations	2,040	2,040	2,040

From: Chodorow-Reich, "The Employment Effects of Credit Market Disruptions"

(Quarterly change in private sector employment, percent)

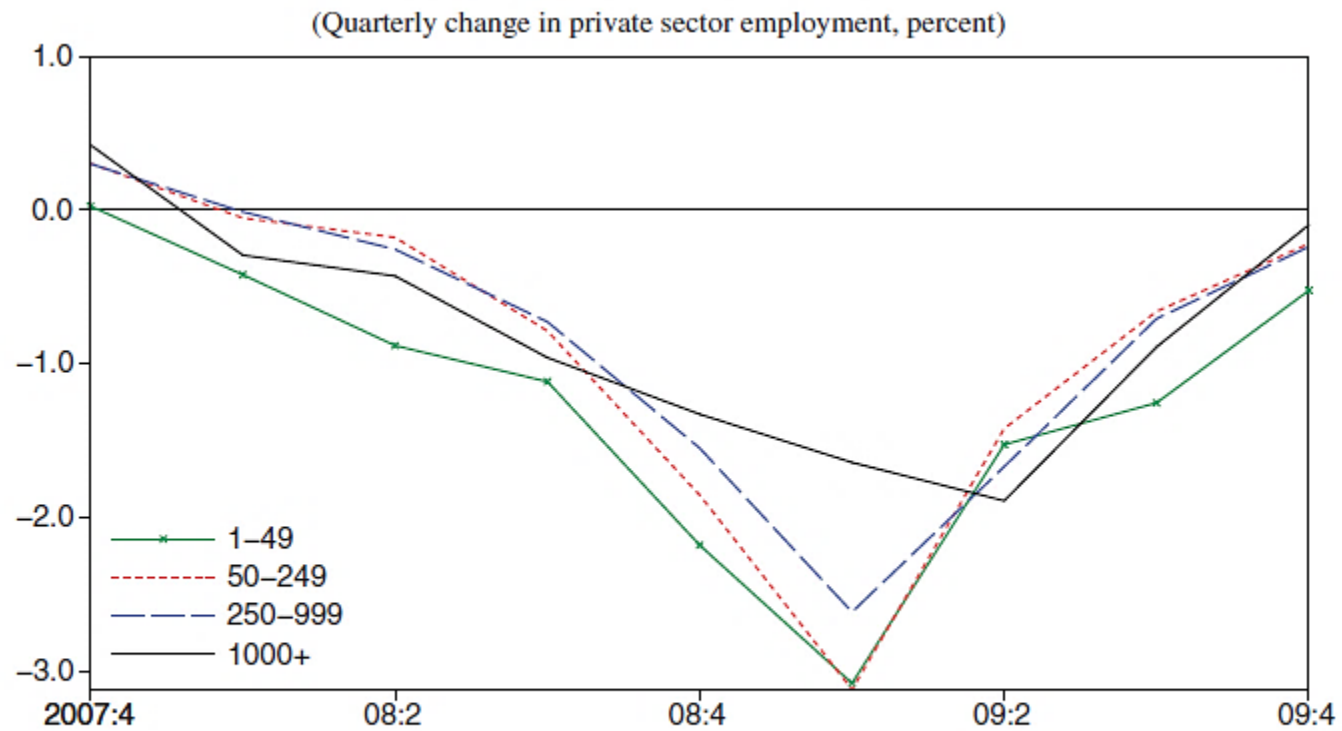|	
1–49	
50–249	
250–999	
1000+	

FIGURE III

Employment Losses by Firm Size

From: Chodorow-Reich, "The Employment Effects of Credit Market Disruptions"

What happens when C-R does 2SLS? (FN 46)

- That is, regress employment growth on whether a firm got a loan, instrumenting for loan outcome with a measure of bank health?

- Enormous effect.

- Possible explanations? Does this make you nervous?

Placebo Tests

- Use the same loan supply measure (that is from 2008-09)

- But change sample of dependent variable.

- Consider 2005Q2–2007Q2 and 2001Q3–2002Q3.

TABLE XII
The Effect of Lender Credit Supply on Employment in Two Placebo Periods

	(1)	(2)	(3)	(4)	(5)
		Employment growth rate			
	OLS	$\Delta \tilde{L}_{i,s}$ instrumented using			
		Lehman exposure	ABX exposure	Bank statement items	All
		Panel A: 2005:2–2007:2			
Explanatory variables					
%Δ loans to other firms ($\Delta \tilde{L}_{i,s}$)	−0.19	−0.67	−1.57	1.63	0.92
	(0.74)	(1.63)	(1.72)	(1.24)	(1.15)
Lagged employment growth	0.028+	0.027+	0.028+	0.028+	0.028+
	(0.014)	(0.014)	(0.014)	(0.015)	(0.015)
Emp. change in firm's county	0.80	0.80	0.78	0.79	0.77
	(0.49)	(0.49)	(0.50)	(0.48)	(0.49)
First-stage F-statistic		15.6	8.8	18.9	23.8
Observations	1,879	1,879	1,854	1,879	1,854
		Panel B: 2001:3–2002:3			
Explanatory variables					
%Δ loans to other firms ($\Delta \tilde{L}_{i,s}$)	−0.80	−0.74	1.30	−0.93	−0.72
	(0.59)	(1.44)	(1.89)	(0.93)	(0.85)
Lagged employment growth	0.024	0.024	0.024	0.024	0.024
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
Emp. change in firm's county	1.53**	1.53**	1.62**	1.53**	1.59**
	(0.51)	(0.50)	(0.51)	(0.51)	(0.50)
First-stage F-statistic		16.5	7.7	17.8	26.3
Observations	1,675	1,675	1,653	1,675	1,653

Aggregating the Effects

- First, consider within sample.

- Assume every firm faced the bank health of the lender in the τ'th percentile.

TABLE XIII

TOTAL EFFECT OF CREDIT AVAILABILITY AT SMALL AND MEDIUM FIRMS IN THE SAMPLE

	2008:3–2009:3 (%)
Total employment decline	7.0
Share of losses due to credit availability, $\tau = 90$	34.4
Share of losses due to credit availability, $\tau = 95$	47.3

Notes. The table reports the fraction of employment losses due to credit availability at small and medium firms, as described in the text. τ refers to the percentile of the lending syndicate identified as the most liberal syndicate.

Aggregating the Effects (Continued)

- To move to the population, need to consider that only 2/3 of employment decline came from firms with fewer than 1000 employees. So that decreases contribution of credit disruption.

- Also need to consider general equilibrium effects. Chodorow-Reich has a model to spell out the issues in an appendix.
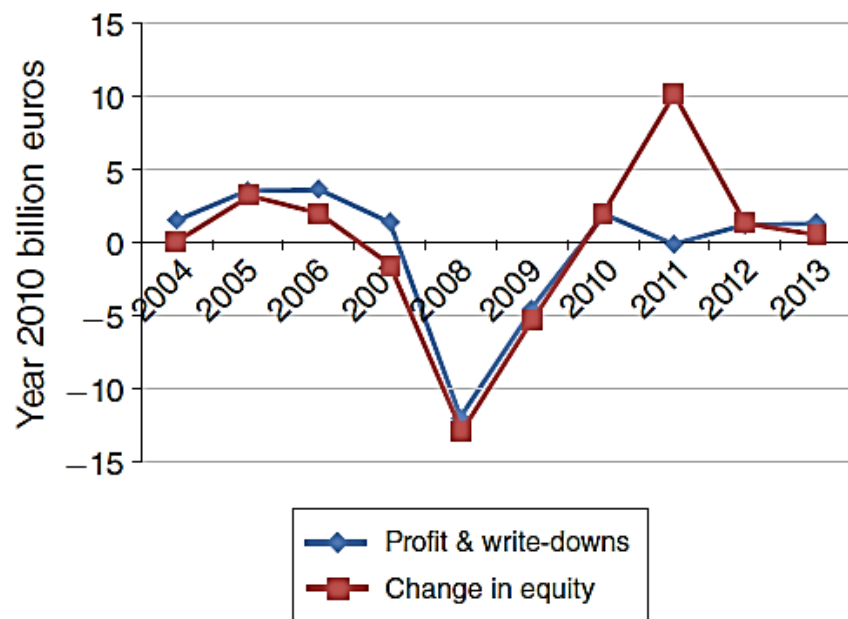
Evaluation

IV. HUBER, "DISENTANGLING THE EFFECTS OF A BANKING CRISIS: EVIDENCE FROM GERMAN FIRMS AND COUNTIES"

Huber's Natural Experiment

- A major German bank, Commerzbank, suffered large losses on its international asset holdings for reasons unrelated to its domestic loans.

- Huber argues that as a result, Commerzbank cut its lending to German firms.
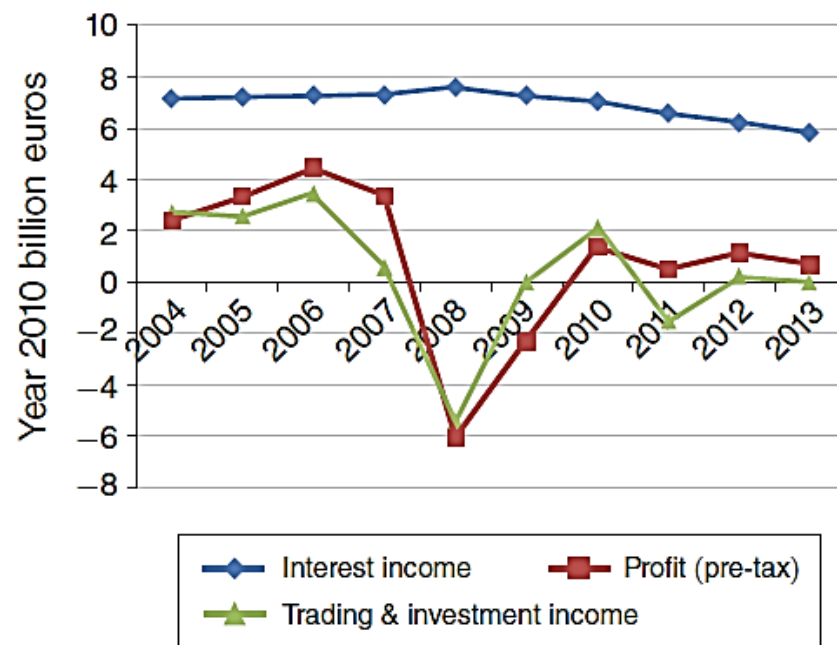
Panel A

Panel B

FIGURE 2. COMMERZBANK'S EQUITY CAPITAL, WRITE-DOWNS, AND PROFITS

Notes: The left panel shows Commerzbank's profits and write-downs and equity capital. Write-downs arise from changes in revaluation reserves, cash flow hedges, and currency reserves. Panel B shows the composition of Commerzbank's profits. Interest income is interest received from loans and securities minus interest paid on deposits. Trading and investment income is the sum of net trading income, net income on hedge accounting, and net investment income. Pre-tax profit is interest income plus trading and investment income minus costs. The values are in year 2010 billions of euros. I aggregate the positions of Commerzbank and Dresdner Bank for the years before the 2009 take-over. The data are from the annual bank reports.

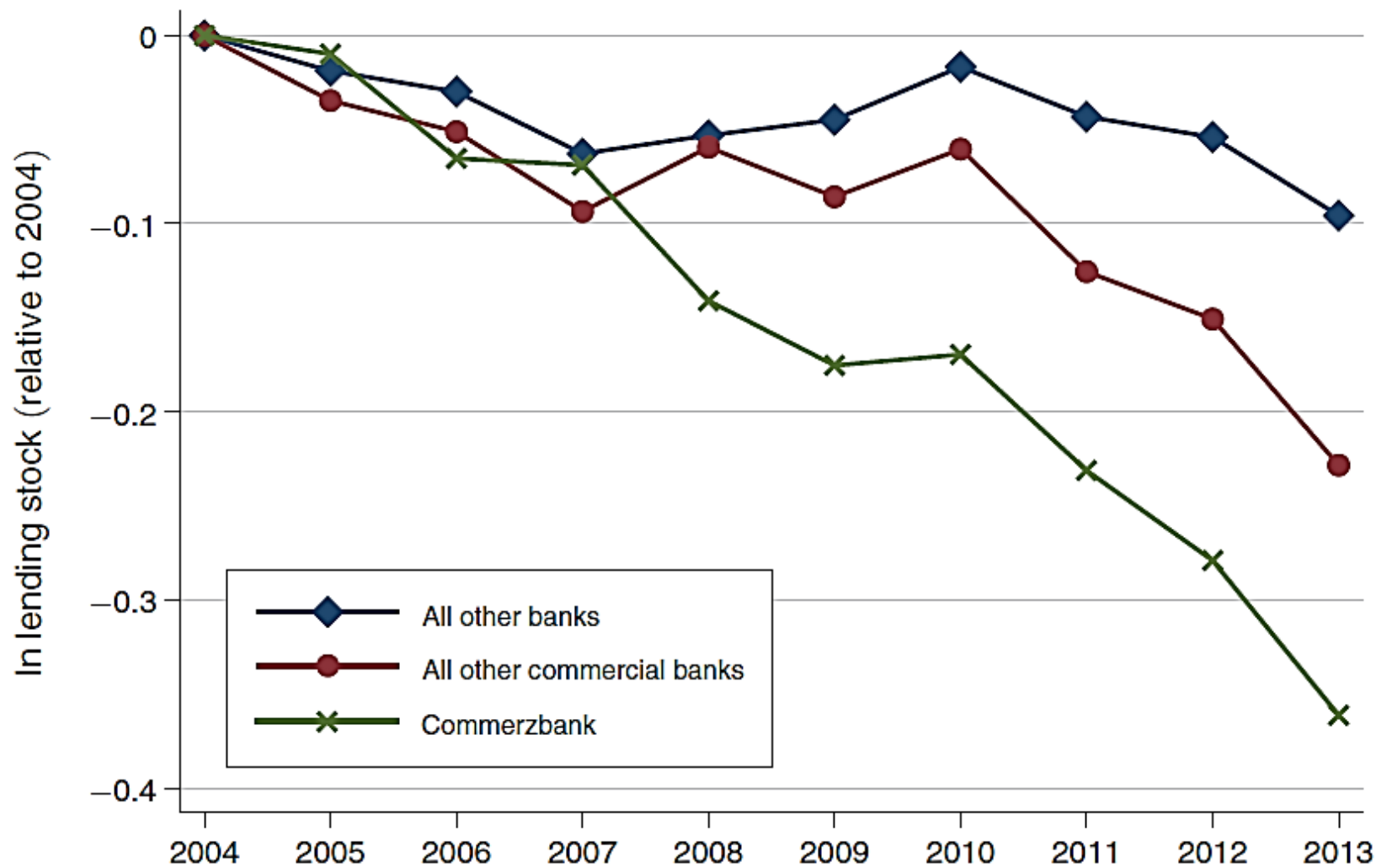From: Huber, "Disentangling the Effects of a Banking Crisis"

FIGURE 1. THE LENDING STOCK OF GERMAN BANKS

From: Huber, "Disentangling the Effects of a Banking Crisis"

Possible Concerns with Huber's Natural Experiment

- Did other banks suffer similar trading losses?

- Were Commerzbank's loans more problematic than those of other banks?

Table A.VIII: Insights from the research reports

Question	Number of relevant reports	Answer yes	Answer no	Answer unclear
1) Was the trading income more volatile than at other German banks from 2004 to 2007?				
- at Commerzbank	11	0	2	9
- at Dresdner Bank	4	0	0	4
2) Was the loan portfolio to German firms and households riskier than at other German banks from 2004 to 2007?				
- at Commerzbank	11	0	11	0
- at Dresdner Bank	5	0	5	0
3) Does the report mention that the trading and lending divisions cross-hedged risk from 2004 to 2009?				
- at Commerzbank	85	0	85	0
- at Dresdner Bank	42	0	42	0
4) Does the report mention that the German loan portfolio contributed to Commerzbank's losses from 2008 to 2009?	83	0	83	0
5) Does the report mention that exposure to Iceland contributed to Commerzbank's losses from 2008 to 2009?	83	8	75	0
6) Does the report mention that exposure to asset-backed securities or the subprime mortgage crisis contributed to Commerzbank's losses from 2008 to 2009?	83	72	11	0
7) Does the report mention that exposure to Lehman Brothers contributed to Commerzbank's losses in 2009?	83	8	75	0
8) Judging in 2008, is Commerzbank's acquistion of Dresdner Bank a strategically sound move?	11	9	1	1
9) Did Commerzbank stabilise after 2010?	10	8	0	2

From: Online appendix to Huber, "Disentangling the Effects of a Banking Crisis"

Possible Concerns with Huber's Natural Experiment (continued)

- The possibility that "unobserved shocks affected counties dependent on Commerzbank at the same time as the lending cut" (p. 875).

- Later in the paper (p. 889), Huber offers two more concrete reasons we might need IV:

  - Measurement error in the measure of dependence on Commerzbank.

  - "Commerzbank may have selectively expanded into counties that are less affected in recessions."

Partial Equilibrium Effects on Firms

TABLE 3—FIRM SURVEY ON BANKS' WILLINGNESS TO GRANT LOANS

	2007 (1)	2008 (2)	2009 (3)	2010 (4)	2011 (5)	2012 (6)
Firm *CB dep*	−0.111 (0.157)	−0.095 (0.140)	−0.473 (0.190)	−0.316 (0.182)	0.059 (0.197)	0.379 (0.184)
Dep. var. from 2006	0.631 (0.041)	0.522 (0.047)	0.380 (0.051)	0.365 (0.055)	0.335 (0.055)	0.206 (0.050)
Observations	856	988	1,032	946	898	503
R^2	0.460	0.371	0.204	0.213	0.207	0.199
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Size bin fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
ln age	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports estimates from cross-sectional firm regressions for different years. The outcome variable is the answer to the question: "How do you evaluate the current willingness of banks to grant loans to businesses: cooperative (coded as 1), normal (0), or restrictive (−1)?" It is standardized to have zero mean and unit variance. The coefficients are interpreted as the standard deviation increase in banks' willingness to grant loans from increasing Commerzbank dependence by one. The control variables include fixed effects for 36 industries, 16 federal states, 4 size bins (1–49, 50–249, 250–999, and over 1,000 employees in the year 2006), and the ln of firm age. Standard errors are clustered at the level of the county.

From: Huber, "Disentangling the Effects of a Banking Crisis"

Partial Equilibrium Effects on Firms

TABLE 4—FIRM BANK LOANS AND COMMERZBANK DEPENDENCE

	(1)	(2)	(3)
Firm *CB dep* × *d*	−0.101	−0.166	−0.205
	(0.079)	(0.080)	(0.078)
Observations	12,066	12,066	12,066
R^2	0.009	0.078	0.094
Number of firms	2,011	2,011	2,011
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
County fixed effects × *d*	No	Yes	Yes
ln age × *d*	No	Yes	Yes
Size bin fixed effects × *d*	No	Yes	Yes
Industry fixed effects × *d*	No	No	Yes
Import and export share × *d*	No	No	Yes

From: Huber, "Disentangling the Effects of a Banking Crisis"

Partial Equilibrium Effects on Firms

TABLE 6—FIRM EMPLOYMENT AND COMMERZBANK DEPENDENCE

	(1)	(2)	(3)	(4)	(5)
Firm *CB dep* × *d*	−0.044	−0.047	−0.053		
	(0.021)	(0.016)	(0.015)		
Low bank debt dep. × firm *CB dep* × *d*				−0.035	
				(0.032)	
High bank debt dep. × firm *CB dep* × *d*				−0.071	
				(0.020)	
$(0 < $ firm *CB dep* $\leq 0.25) \times d$					0.007
					(0.016)
$(0.25 < $ firm *CB dep* $\leq 0.5) \times d$					−0.017
					(0.008)
$(0.5 < $ firm *CB dep* $\leq 1) \times d$					−0.065
					(0.018)
Observations	12,066	12,066	12,066	12,066	12,066
R^2	0.026	0.098	0.124	0.125	0.125
Number of firms	2,011	2,011	2,011	2,011	2,011
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
County fixed effects × *d*	No	Yes	Yes	Yes	Yes
Size bin fixed effects × *d*	No	Yes	Yes	Yes	Yes
ln age × *d*	No	Yes	Yes	Yes	Yes
Industry fixed effects × *d*	No	No	Yes	Yes	Yes
Import and export share × *d*	No	No	Yes	Yes	Yes

From: Huber, "Disentangling the Effects of a Banking Crisis"
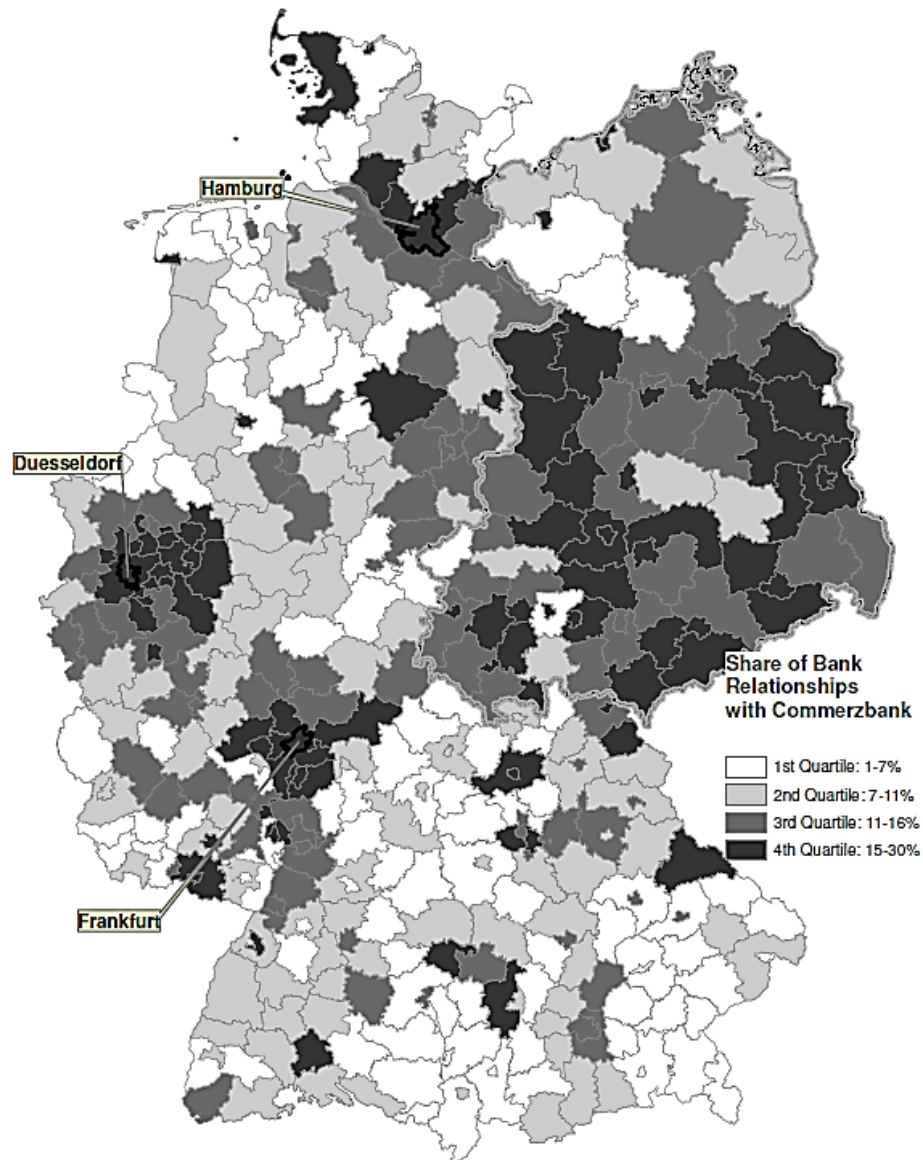
General Equilibrium Effects on Counties

Figure A.I: Commerzbank dependence across German counties in 2006

General Equilibrium Effects on Counties

TABLE 8—COUNTY OUTCOMES AND COMMERZBANK DEPENDENCE (OLS)

Outcome:	GDP (1)	GDP (2)	GDP (3)	Empl. (4)	Net migr. (5)
County $CB\ dep \times d$	−0.132	−0.165	−0.141	−0.138	0.003
	(0.063)	(0.066)	(0.077)	(0.042)	(0.006)
Observations	5,005	5,005	5,005	5,005	1,925
R^2	0.301	0.341	0.350	0.494	0.592
Number of counties	385	385	385	385	385
County fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Former GDR fixed effects $\times d$	No	Yes	Yes	Yes	Yes
Industry shares $\times d$	No	Yes	Yes	Yes	Yes
Export and import shares $\times d$	No	Yes	Yes	Yes	Yes
Landesbank in crisis $\times d$	No	Yes	Yes	Yes	Yes
Population $\times d$	No	No	Yes	No	No
Population density $\times d$	No	No	Yes	No	No
GDP per capita $\times d$	No	No	Yes	No	No
Debt index $\times d$	No	No	Yes	No	No
Estimator	OLS	OLS	OLS	OLS	OLS

From: Huber, "Disentangling the Effects of a Banking Crisis"

General Equilibrium Effects on Counties

TABLE 9—COUNTY OUTCOMES AND COMMERZBANK DEPENDENCE (IV)

Outcome:	CB dep (1)	CB dep (2)	GDP (3)	GDP (4)	GDP (5)	Empl (6)	Net migr (7)
Distance instrument $\times$ d	0.028 (0.005)	0.042 (0.006)					
County CB dep $\times$ d			−0.335 (0.118)	−0.367 (0.182)	−0.345 (0.173)	−0.208 (0.113)	0.026 (0.020)
Observations	5,005	5,005	5,005	5,005	5,005	5,005	1,925
R^2	0.876	0.941	0.322	0.348	0.355	0.504	0.590
Number of counties	385	385	385	385	385	385	385
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Former GDR fixed effects $\times$ d	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Linear distances $\times$ d	No	Yes	Yes	Yes	Yes	Yes	Yes
Industry shares $\times$ d	No	Yes	No	Yes	Yes	Yes	Yes
Export and import shares $\times$ d	No	Yes	No	Yes	Yes	Yes	Yes
Landesbank in crisis $\times$ d	No	Yes	No	Yes	Yes	Yes	Yes
Population $\times$ d	No	Yes	No	No	Yes	No	No
Population density $\times$ d	No	Yes	No	No	Yes	No	No
GDP per capita $\times$ d	No	Yes	No	No	Yes	No	No
Debt index $\times$ d	No	Yes	No	No	Yes	No	No
Estimator	OLS	OLS	IV	IV	IV	IV	IV

From: Huber, "Disentangling the Effects of a Banking Crisis"

General Equilibrium Effects on Counties

TABLE 10—THE DIRECT AND INDIRECT EFFECTS ON FIRM EMPLOYMENT GROWTH

	(1)	(2)
Firm *CB dep*	−0.030	−0.036
	(0.009)	(0.009)
CB dep of other firms in county	−0.166	−0.170
	(0.076)	(0.082)
Observations	48,101	48,101
R^2	0.012	0.017
Firm controls	Yes	Yes
County controls	No	Yes

From: Huber, "Disentangling the Effects of a Banking Crisis"

Discussion

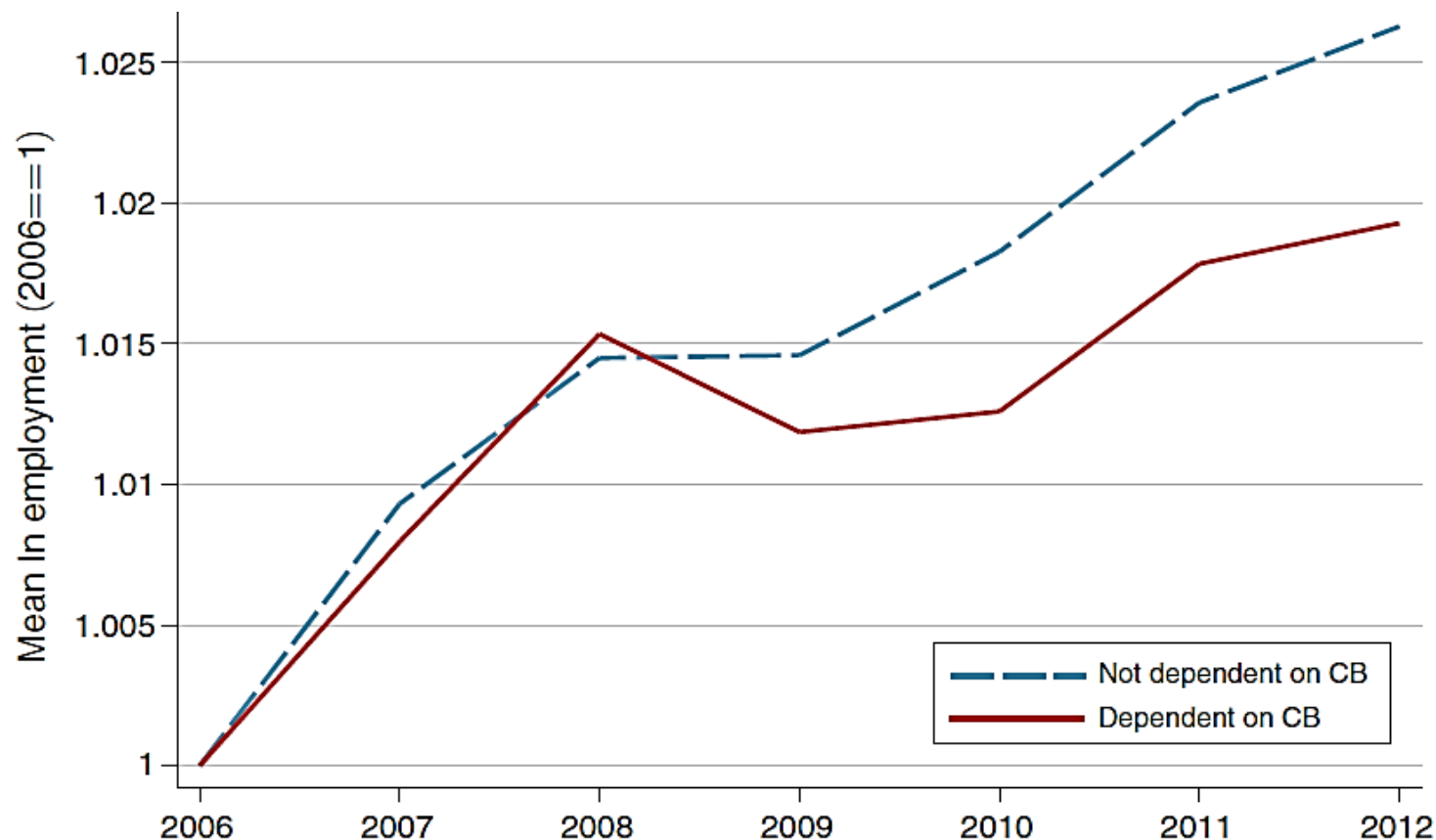# Final Issues: Mechanisms and Persistence

FIGURE 4. FIRM EMPLOYMENT EFFECTS

Notes: This figure plots the time series of the mean ln employment of firms with and without Commerzbank as one of their relationship banks. The time series are divided by their 2006 value. The data are from the firm panel.

From: Huber, "Disentangling the Effects of a Banking Crisis"