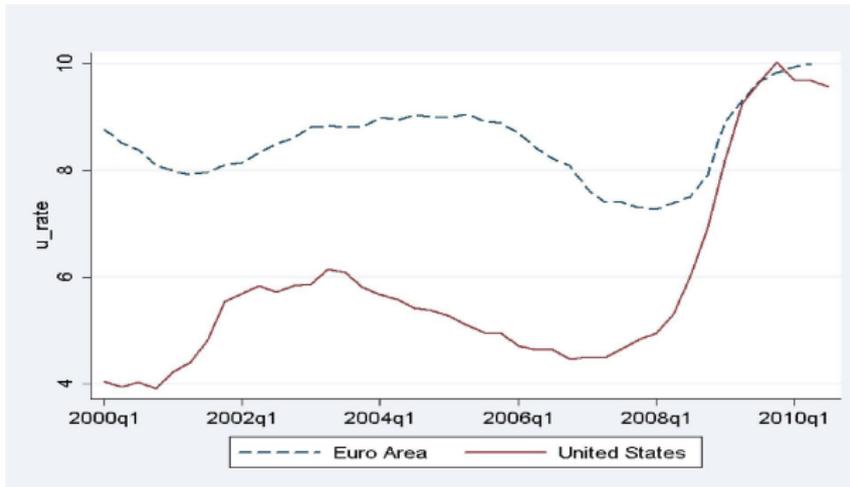


# The Labor Market Consequences of Adverse Financial Shocks

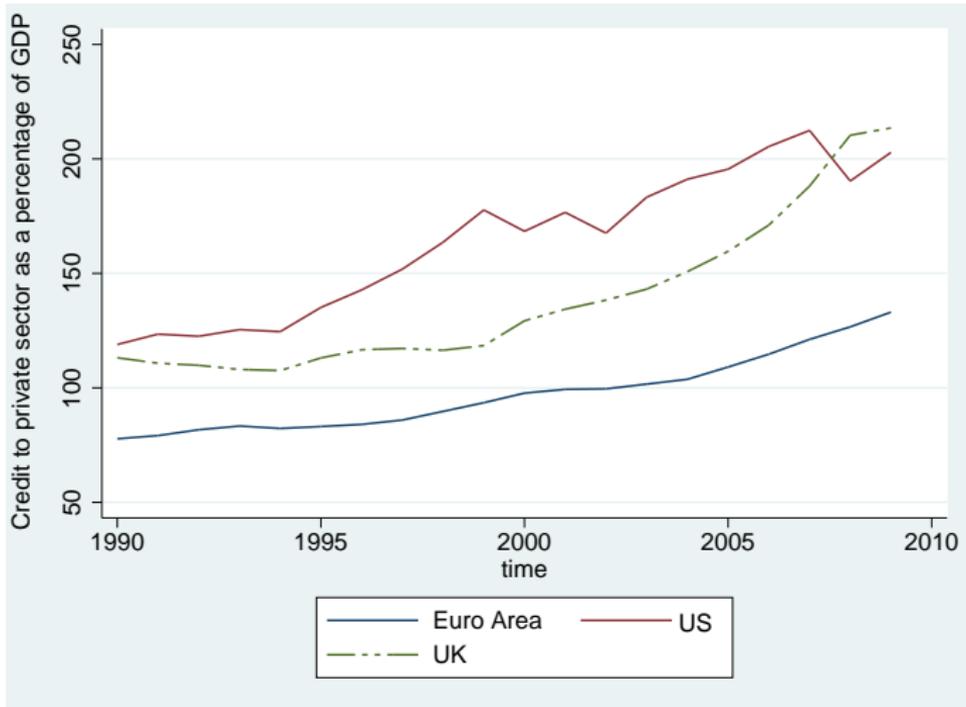
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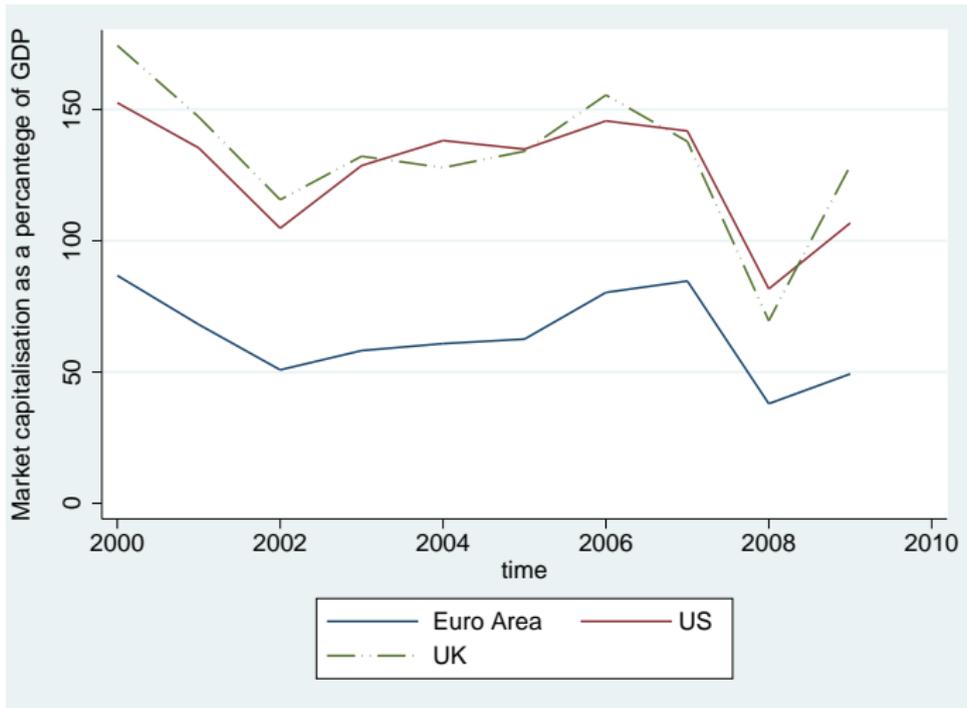
# Unemployment rate on the two sides of the Atlantic



# Credit to the private sector over GDP



# Stock Market Capitalization over GDP



# Financial Recessions are Different: 1. Unemployment

Country	Type of recession	du	du/u	dy/y
France	Financial rec	1.40	19%	-4%
	Other rec	1.00	11%	-1%
	<i>Difference</i>	<i>0.40</i>	<i>8%</i>	<i>-3%</i>
Germany	Financial rec	-0.40	-5%	-7%
	Other rec	0.54	8%	-1%
	<i>Difference</i>	<i>-0.94</i>	<i>-13%</i>	<i>-6%</i>
Italy	Financial rec	1.30	15%	-1%
	Other rec	0.43	6%	-2%
	<i>Difference</i>	<i>0.88</i>	<i>9%</i>	<i>1%</i>
UK	Financial rec	2.10	36%	-3%
	Other rec	0.50	7%	-3%
	<i>Difference</i>	<i>1.60</i>	<i>28%</i>	<i>0%</i>
US	Financial rec	2.65	50%	-3%
	Other rec	1.93	33%	-3%
	<i>Difference</i>	<i>0.72</i>	<i>17%</i>	<i>0%</i>

France: Unemployment data starting from Q1-1978; GDP from 1970;

Germany: Data starting from Q1-1991

Italy: Unemployment data starting from Q1-1983; GDP from 1970;

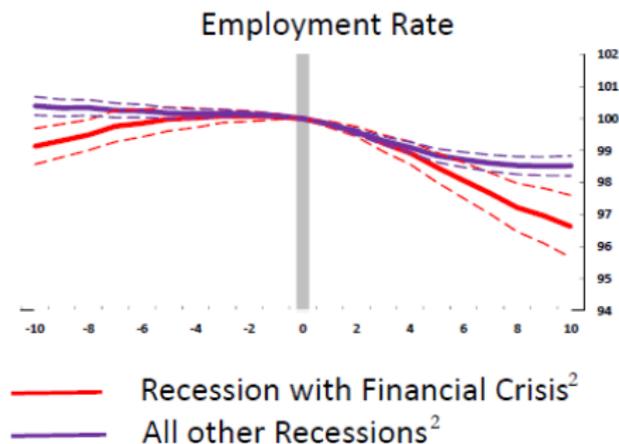
UK: Unemployment data starting from Q1-1983; GDP from 1970;

US: Unemployment data starting from Q1-1970; GDP from 1970

Episodes of recessions with financial crises: France 2008; Italy 1992;

Germany 2008; UK 1975, 1990, 2008; US 1990, 2008

# Financial Recessions are Different: 2. Employment



<sup>1</sup> All series are in levels indexed to 100 at the peak; quarters on x-axis; peak in output at = 0; solid line is the mean and dashed line the 95% CB.

<sup>2</sup> Episodes of recessions with financial crises: previous- Australia (1990), Germany (1980), Great Britain (1973), Great Britain (1990), Italy (1992), Japan (1993), Japan (1997), Norway (1988), Spain (1978), Sweden (1990); current- Belgium (2008), Great Britain (2008), Ireland (2008), Netherlands (2008), United States (2008).

# Open Issues

- During the Great Recession (2008-2009), initially larger labor market response in the US (and UK) than in the Euro area.
- Labour market institutions (usual suspects) not enough to understand these dynamics (WEO 2010, EmO 2010).
- As it was a (global) financial recession, the new suspect is finance, the links between financial shocks and labor market dynamics.
- Evidence that financial crises are particularly bad for employment.

# Research Questions

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- Which are the relevant links between financial shocks and labor market dynamics?
- Do they mainly operate along the job creation or the job destruction margin?
- Can finance be bad for employment during a (financial) crisis and be good instead in normal times?
- How does a credit crunch translate into job destruction and unemployment?

# Outline

- A reduced-form (toy) model of labor-finance interactions
- Micro evidence on leverage and employment adjustment during the Great Recession
- Macro evidence on employment and leverage under financial vs. non-financial recessions

# Key results: Theory

- ① Search model of endogenous leverage and job destruction predicts that
  - ① more finance means lower average unemployment, but more vulnerability to aggregate financial shocks
  - ② with heterogeneous costs of finance, coexistence of highly and low leveraged firms
  - ③ conditional on a financial shock, more leveraged segments of the economy destroy more jobs
  - ④ the effect operates along the job destruction margin
  - ⑤ labor market institutions operating on JD margin are relevant during a financial recession

## Key results: Data

Evidence from *micro data* that

- ① highly leveraged firms destroyed more jobs during the Great Recession
- ② no significant effects of leverage on job creation during the GR

and from *macro data* that:

- ① financial recessions are worse than other recessions for employment also conditioning on aggregate output
- ② they destroy more jobs in more leveraged countries-sectors
- ③ the same applies to financial *crises* (not necessarily recessions)

# A toy model

- 1 No frictions (just shocks) in financial markets.
- 2 (Matching) frictions in labor markets
- 3 Wages indexed to productivity, subject to participation constraint
- 4 Finance is endogenous

# How Finance is framed

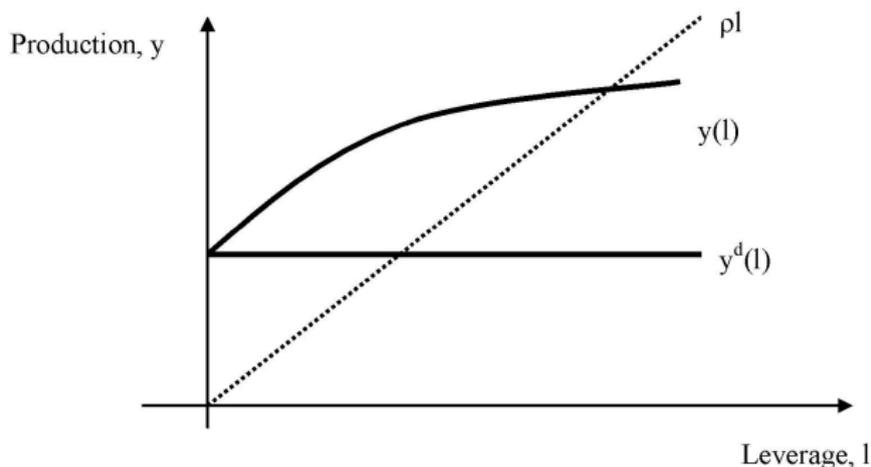
- Production requires an entrepreneur a worker and, *potentially*, finance or credit. Like Leontief with  $2+1$  inputs.
- In other words, finance or credit (used interchangeably) is akin to an input in production.
- Finance intensity is endogenous (leverage) at entry.
- Entrepreneur and labor indivisible.
- All agents are risk neutral and discount the future at rate  $r$

# Finance

- Entrepreneurs must choose *ex-ante* the finance intensity of their production
- Finance is readily available at the time of job creation, but it can be suddenly pulled back from the firm as a result of an idiosyncratic shock
- In *financial distress* (when credit disappears), production can still continue
- Firms in financial distress can get credit back at an exogenous probability

# Technological trade-off of finance

- More leverage increases production in normal times but it reduces production during financial distress.
- Consistent with work on liquidity (Holmstrom and Tirole, 2011).



# What we do

- We look at two different outcomes, depending on whether firms operate or not in financial distress
- In the *high credit* equilibrium, firms destroy jobs in financial distress and choose high leverage (low unemployment/high volatility)
- In the *low credit* equilibrium, firms operate in financial distress and choose lower leverage (high unemployment/low volatility)
- We characterize the two regimes in terms of the cost of credit (threshold level below which the high credit equilibrium prevails).

# Unemployment in the two regimes

In normal times unemployment is lower in the high-credit equilibrium because  $\theta^*$  is higher in the high credit equilibrium (job creation effect)

However, in the aftermath of a financial shock occurs

- Unemployment increases more in the high credit equilibrium than in the low credit one
- This is because in the high credit equilibrium there is not only a negative job creation effect (as in the low-credit equilibrium), but also a positive job destruction effect

# From Theory to the Data

- Cross-country variation can be explained by overall depth of financial markets
- Within country variation: we consider economies with a coexistence of high-credit and low-credit sectors and firms
- Assuming that cost of finance is firm-specific:
  - 1 high credit firms destroy more jobs at time of financial distress
  - 2 low credit firms should be less hit by the financial shock

# Firm-level response and leverage during the GR

## An EFIGE-Amadeus matched dataset

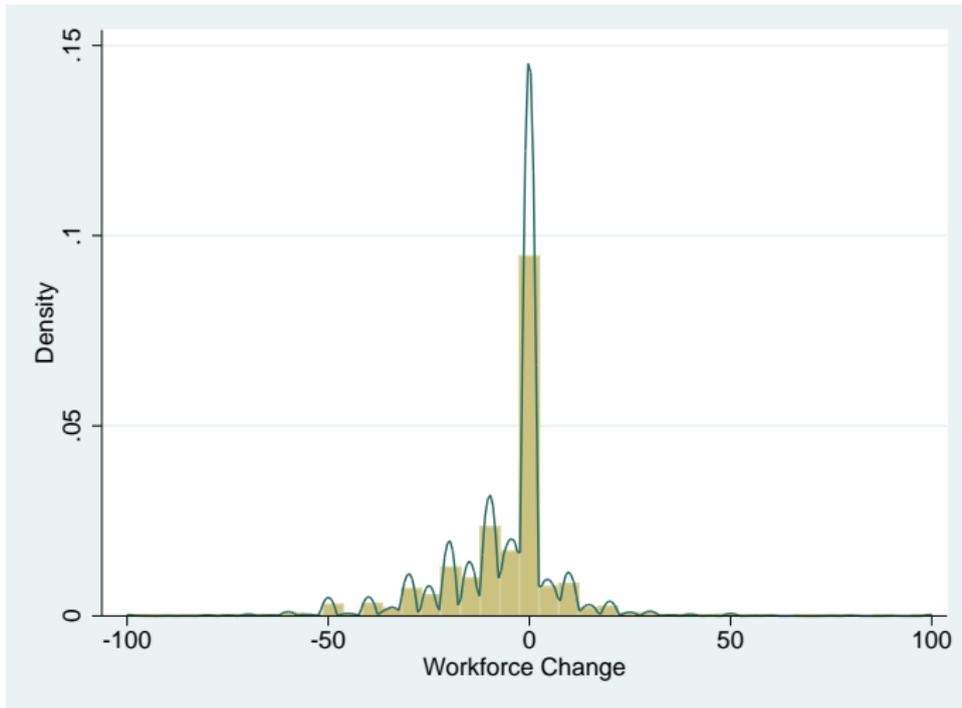
- Mainly a cross-section (some retrospective info, series limited to some variables)
- 14,759 firms, 7 countries, 11 sectors
- Variables covering the 2007-9 period
- Detailed info on firms' characteristics, employment and financial conditions

# Key variables

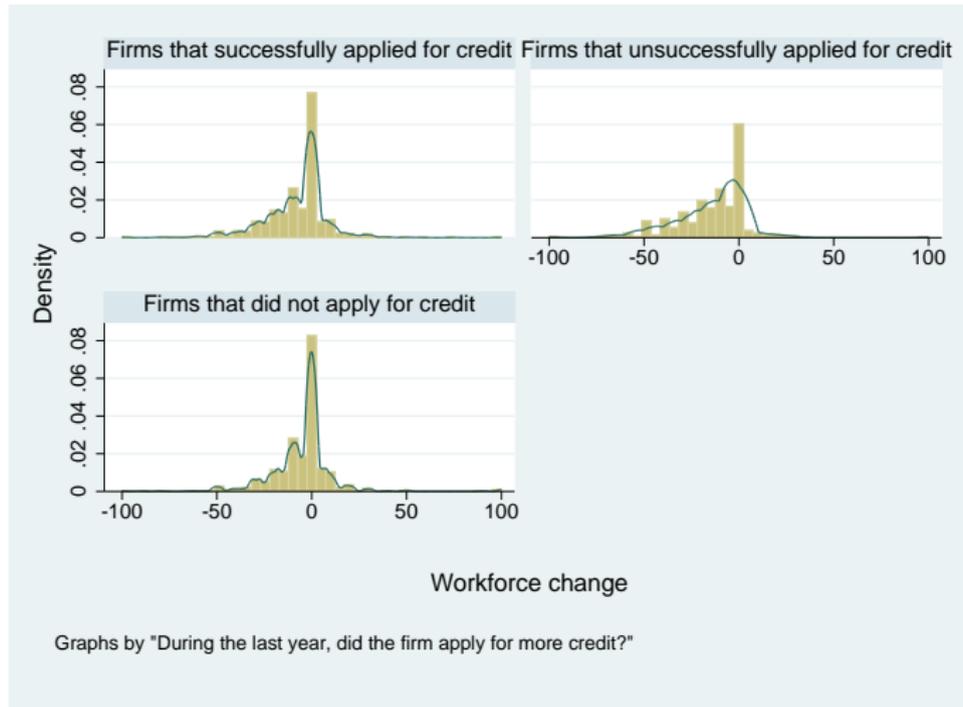
Employment variation during the Great Recession:

- $\Delta e$ : During the last year (2009) did you experience a reduction or an increase/decrease of your workforce in comparison with 2008?
- Those reporting a change are also requested to specify percentage variation
- we imputed value 0 of  $\Delta e$  to firms reporting no change
- $\Delta y$ : measured through operational revenue growth in 2008-2009

# Firm-level response during the GR



# Firm-level response and Leverage during the GR



## Measures of financial leverage

- **Gearing:** Debt to equity ratio (creditor's vs. owner's funds)
- **Solvency Ratio:** Ratio of after tax net profit (plus depreciation) over debt (company's ability to meet long-term obligations)
- **Long-term debt to assets ratio:** Loans and financial obligations lasting more than one year.

# Empirical Framework

We estimate the following equation

$$\Delta e_{ijc} = \alpha + \alpha_j + \alpha_c + \beta \Delta y_{jc} + \gamma Lev_{ijc} + \delta S_{ijc} + \epsilon_{ijc}$$

where  $\Delta e$  is employment growth *during* in the period 2008-9,  $i$  denotes the firm,  $j$  the sector and  $c$  the country,  $S$  is set of size dummies (employment or turnover) and  $Lev$  is Gearing Ratio, Solvency Ratio or Long-term debt to asset ratio *before* the Great Recession (2007 balance sheet data).

Simple OLS and 2SLS using age of the CEO as **instrument**. Identification assumption: age of CEO affects leverage in normal times (risk-aversion), but not directly employment adjustment during the crisis.

# $\Delta e$ , All Firms

Method	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	OLS $\Delta e\%$	IV $\Delta e\%$	OLS $\Delta e\%$	IV $\Delta e\%$	OLS $\Delta e\%$	IV $\Delta e\%$
$\Delta \bar{y}$	1.192* (0.640)	1.332* (0.703)	1.200* (0.639)	1.032 (0.671)	1.188* (0.638)	0.199 (2.055)
Gearing	-0.00430*** (0.000853)	-0.0398*** (0.0151)				
Solvency			0.0399*** (0.00637)	0.231*** (0.0731)		
LT DA					-0.152 (0.602)	-148.5 (130.9)
Constant	-6.158*** (1.417)	-3.382* (1.973)	-8.556*** (1.395)	-13.99*** (2.509)	-7.776*** (1.371)	-6.019 (4.314)
Country	YES	YES	YES	YES	YES	YES
Sector	YES	YES	YES	YES	YES	YES
Size	YES	YES	YES	YES	YES	YES
Observations	8,596	8,582	9,649	9,630	8,064	8,044
R-squared	0.069	-0.120	0.066	-0.022	0.052	-7.068
First stage		IV Gearing		IV Solvency		IV LT DA
Age of CEO		-10.381*** (1.816)		1.983*** (0.216)		-0.003 (0.003)

Standard errors in parentheses; \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

## $\Delta e$ , Only Firms Downsizing

Method	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	OLS $\Delta e\%$	IV $\Delta e\%$	OLS $\Delta e\%$	IV $\Delta e\%$	OLS $\Delta e\%$	IV $\Delta e\%$
$\Delta \bar{y}$	0.813 (0.936)	0.519 (1.106)	1.003 (0.915)	0.556 (0.984)	1.107 (0.936)	-0.395 (3.117)
Gearing	-0.003** (0.00119)	-0.050** (0.0226)				
Solvency			0.058*** (0.00914)	0.264*** (0.0959)		
LT DA					-2.495* (1.456)	-256.3 (249.2)
Constant	-19.72*** (2.090)	-14.68*** (3.440)	-23.10*** (2.060)	-27.83*** (3.075)	-21.80*** (2.052)	-21.52*** (6.032)
Country	YES	YES	YES	YES	YES	YES
Sector	YES	YES	YES	YES	YES	YES
Size	YES	YES	YES	YES	YES	YES
Observations	4,151	4,145	4,677	4,668	3,783	3,774
R-squared	0.061	-0.295	0.063	-0.041	0.045	-7.281
First stage		IV Gearing		IV Solvency		IV LT DA
Age of CEO		-10.806*** (2.721)		2.166*** (0.315)		-0.003 (0.002)

Standard errors in parentheses; \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

# $\Delta e$ , Only Firms Upsizing

Method	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	OLS $\Delta e\%$	IV $\Delta e\%$	OLS $\Delta e\%$	IV $\Delta e\%$	OLS $\Delta e\%$	IV $\Delta e\%$
$\Delta \bar{y}$	3.846*** (1.292)	4.474 (12.78)	3.859*** (1.309)	4.566** (1.933)	3.917*** (1.319)	3.667 (4.571)
Gearing	-0.004* (0.00223)	0.639 (5.822)				
Solvency			-0.009 (0.0163)	-0.405 (0.625)		
LT DA					0.034 (0.695)	-6.928 (118.1)
Constant	16.81*** (2.793)	-24.49 (373.0)	16.02*** (2.743)	26.33 (16.84)	15.85*** (2.740)	16.13** (8.034)
Country	YES	YES	YES	YES	YES	YES
Sector	YES	YES	YES	YES	YES	YES
Size	YES	YES	YES	YES	YES	YES
Observations	1,060	1,058	1,181	1,178	1,033	1,030
R-squared	0.061	-75.423	0.052	-0.430	0.054	-0.039
First stage		IV Gearing		IV Solvency		IV LT DA
Age of CEO		-0.575 ( 5.244 )		0.702 ( 0.654 )		0.003 (0.018)

Standard errors in parentheses; \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

# Macro Data

Three sources of variation (country, time, sector).

- Macro data from Oecd and IMF on the period 1965-2009 across 6 sectors.
- Estimation of employment equations, including labor market institutions (UB and EPL) and the following 2 measures of firms' leverage:
  - 1 debt to sales (DS)
  - 2 debt to assets (DA)

## Estimation procedure

We estimate the following equation

$$\Delta e_{ijt} = \alpha_j + \beta \Delta y_{jt} + \gamma Lev_{ijt} + \delta_1 FR_{jt} + \delta_2 FR_{jt} Lev_{ijt} + \delta X_{jt} + \epsilon_{ijt}$$

where  $\Delta e_{ijt}$  is log employment variation in sector  $i$ , country  $j$  at time  $t$ ,  $\alpha_j$  denotes the coefficients of sectoral dummies,  $\Delta y$  is the log variation of GDP,  $Lev$  is the leverage ratio (either debt-to-assets or debt-to-sales),  $FR$  denotes financial recessions,  $FC$  is financial crises and  $X$  a set of time-varying institutional variables potentially affecting the responsiveness of employment to output change.

# Regressions with Debt to Sales

VARIABLES	(1)OLS $\Delta e\%$	(2)IV $\Delta e\%$	(3)OLS $\Delta e\%$	(4)IV $\Delta e\%$
$\Delta \bar{y}$	0.428	0.293	0.504	0.361
Recession	-0.315 (-0.002)	-0.318 (-0.002)	-0.314	-0.317
FinCrisis	-0.005** (-0.003)	-0.005** (-0.003)		
FinRec			-0.015*** (-0.003)	-0.015*** (-0.003)
DS	2.59E-06 (-3.01E-06)	4.19E-06 (-3.33E-06)	2.61E-06 (-3.01E-06)	4.21E-06 (-3.33E-06)
FinCrisis*DS	-7.56E-06 (-2.62E-05)	-4.18E-06 (-2.64E-05)		
FinRec *DS			-7.40E-06 (-2.62E-05)	-4.02E-06 (-2.65E-05)
Sector, EPL, UB	YES	YES	YES	YES
Observations	2,912	2,846	2,912	2,846
R-squared	0.044	0.043	0.042	0.041

First Stage	(2) FinCrisis*DS	DS	(4) FinRec*DS	DS
DS (-1)	-0.000 (-0.000)	0.916*** (-0.008)	-0.000 (-0.000)	0.916*** (0.008)
FinRec* DS (-1)			1.029*** (-0.003)	-0.017 (-0.072)
FinCrisis*DS (-1)	1.029*** (-0.003)	-0.0176 (-0.071)		

# Regressions with Debt to Assets

VARIABLES	(1)OLS $\Delta e\%$	(2)IV $\Delta e\%$	(3)OLS $\Delta e\%$	(4)IV $\Delta e\%$	
$\Delta \bar{y}$	0.436	0.307	0.512	0.375	
Recession	(-0.316) -0.005**	(-0.319) -0.005**	(-0.315)	(-0.318)	
FinCrisis	(-0.002) -0.001 (-0.006)	(-0.002) -0.002 (-0.006)			
FinRec			-0.006 (-0.005)	-0.006 (-0.006)	
DA	-3.99E-07 (-1.17E-06)	-4.19E-07 (-1.23E-06)	-4.69E-07 (-1.17E-06)	-4.67E-07 (-1.23E-06)	
FinCrisis*DA	-0.0004** (-0.000)	-0.0004* (-0.000)			
FinRec *DA			-0.0004** (-0.000)	-0.0004* (-0.000)	
Sector, EPL, UB	YES	YES	YES	YES	
Observations	2,912	2,846	2,912	2,846	
R-squared	0.045	0.044	0.043	0.043	
First Stage		(2)		(4)	
		FinCrisis*DA	DA	FinRec*DA	DA
DA (-1)		3.02E-06 (-0.000)	0.963*** (-0.006)	3.06E-06 (-0.000)	0.963*** (-0.006)
FinRec* DA (-1)				1.004*** (-0.002)	0.268 (-0.969)
FinCrisis*DA (-1)		1.004*** (-0.002)	0.260 (-0.969)		

# Robustness Checks

## Micro data

- $\Delta e$  categorical to deal with heaping
- Control for  $\Delta y_i$
- Sector-level leverage

## Macro data

- time-invariant High-Leverage (top 40%)
- defined in terms of deviation from the Us

## Conclusions: not only LM institutions

- Toy search model with endogenous leverage
- Highlights mechanism linking financial *shocks* to labor adjustments
- Deep financial markets good for employment in normal times
- but adverse financial shocks lead to job destruction in highly leveraged environments

## Conclusions + Extensions

- Empirically, conditional on a financial shock,
- More leveraged *firms* destroy more jobs
- The effect is non-negligible: 100 basis points more of Gearing Ratio mean JD of 5 per cent
- 10 basis points of solvency ratio mean less JD of 2.5 per cent
- More leveraged *sector/countries* experience larger employment adjustment during FC than non-financial recessions
- Causal effect of leverage on job destruction
- More work on microfoundations: refinancing shocks
- Firms can have a war chest of cash. If so, they are less efficient, but less vulnerable to financial shocks