The Labor Market Consequences of Adverse Financial Shocks

Tito Boeri, Pietro Garibaldi and Espen R. Moen

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Unemployment rate on the two sides of the Atlantic

Basic Facts
A toy model
Low credit equilibrium
High Credit Equilibrium
Heterogeneous costs of finance
Empirical analysis: Micro
Empirical analysis: Macro

Same side of the Atlantic

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Credit to the private sector over GDP

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Stock Market Capitalization over GDP

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Financial Recessions are Different:1.Unemployment

Country	Type of recession	du	du/u	dHW	dHW/HW	dy/y
France	Financial rec	1.40	19%	-225240	-2.2%	-4%
	Other rec	1.00	11%	-180796	-1.9%	-1%
	Difference	*0.40*	*8%*	*-44444*	*-0.4%*	*-3%*
Germany	Financial rec	-0.40	-5%	-306000	-2.1%	-7%
	Other rec	0.54	8%	-240200	-1.5%	-1%
	Difference	*-0.94*	*-13%*	*-65800*	*-0.6%*	*-6%*
Italy	Financial rec	1.30	15%	-539909	-5.2%	-1%
	Other rec	0.43	6%	-15992	0.0%	-2%
	Difference	*0.88*	*9%*	*-523917*	*-5.2%*	*1%*
UK	Financial rec	2.10	36%	-26	-1.4%	-3%
	Other rec	0.50	7%	-34	-1.8%	-3%
	Difference	*1.60*	*28%*	*7*	*0.4%*	*0%*
US	Financial rec	2.65	50%	-29	-1.7%	-3%
	Other rec	1.93	33%	-20.12	-1.1%	-3%
	Difference	*0.72*	*17%*	*-9*	*-0.6%*	*0%*

France: data starting from Q1-1978; GDP data starting from 1970; Germany: data starting from Q1-1991
Italy: unemployment data starting from Q1-1983; Working Hours Q1-1992;GDP data starting from 1970;
UK: Unemployment data starting from Q1-1983; GDP and Working Hours yearly data starting from 1970;

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Financial Recessions are Different:2.Employment

Employment Rate

Recession with Financial Crisis[2]
All other Recessions[2]

1 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.
2 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).

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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.

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Research Questions

- Which are the relevant links between financial shocks and labor market dynamics?

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Research Questions

- 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?

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Research Questions

- 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?

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Outline

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

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Key results

1. Search model of endogenous leverage and job destruction predicts that

   1. more finance means lower average unemployment
   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

2. Empirically, 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

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Key results (cont.)

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)

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The mechanism: the job destruction effect

- More leveraged firms and more financial deepening increase productivity over the medium term
- Yet, what happens when a more leveraged sector experiences a financial shock and liquidity is suddenly pulled back?
- The lack of liquidity/credit can force firms to liquidate projects as well as jobs, thus enhancing job destruction.
- This is a labor demand effect

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Previous Work

- Wasmer and Weil (2004): double frictions,no shocks
- Pagano Piga (2010) no labor market frictions
- Gatti et al. (2010), Monacelli, Quadrini and Trigari (2010): finance and collective bargaining
- Aghion Hart and Moore (1994) and Wruck (1990): financial distress in Chapter 11 can lead to excessive destruction

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Previous Work (cont.)

- Some work on effects of financial market imperfections on employment adjustment to productivity shocks
- Access to financial markets as a substitute to labour market flexibility (Rendon, 2000; Belke and Fehn, 2002)
- Labor market deregulation goes hand-in-hand with financial market liberalization (Bertola and Rogerson, 1997 ; Wasmer and Weil, 2004; Koskela and Stenbacka, 2002)

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Technology

- Production requires an entrepreneur a worker and, *potentially*, finance or credit.
- In other words, finance or credit (used interchangeably) is akin to an input in production.
- All agents are risk neutral and discount the future at rate r

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Finance

- Entrepreneurs must choose ex-ante the finance intensity of their production, the *leverage of the firm l*

- Finance is readily available at the time of job creation (unlike Wasmer and Weil), but it can be suddenly pulled back from the firm as a result of an idiosyncratic shock λ_o

- In *financial distress* (when credit disappears), production can still continue

- Firms in financial distress can get credit back at an exogenous rate λ_1

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Technological trade-off of finance

- The production level y is

$$y(l) = \begin{cases} y(l) = \Delta + l^\alpha & \text{if finance is available} \\ y^d(l) = \Delta & \text{if the firm is in financial distress} \end{cases}$$

- More leverage increases production in normal times but it reduces production during financial distress.

- Consistent with work on liquidity (Holmstrom and Tirole, 2011).

- The cost function $c(l)$ is proportional to leverage and we simply assume that

$$c(l) = \rho l$$

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Micro-foundations

- Holmstron and Tirole (2011) meet Mortensen and Pissarides
- Problems of financing and refinancing
- Parts of output cannot be pledged to investors
- Firms need refinancing to keep target size
- Refinancing shocks
- Firms can have a war chest of cash
- If so, they are less efficient, but less vulnerable to financial shocks

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Labor market and wages

- A standard search unemployment model
- Search is random
- matching function $x(u, v)$ where u is the unemployment rate and and v is the stock of vacancies.
- $\theta = \frac{v}{u}$ is the vacancy unemployment rate; $q(\theta)$ is the firm arrival rate while $\theta q(\theta)$ is the worker meeting rate of vacancies.
- With respect to a purely standard search unemployment model, the key novel economic decisions of the model are job destruction decision conditional on a financial shock λ_0 and optimal leverage

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Wage determination

- Wages are the outcome of a *sharing rule* between workers and firms.
- Entrepreneurs post vacancies at a marginal cost c and there is free entry of firms
- Jobs are exogenously destroyed at rate s

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Value functions

- Conditional on a leverage value l, the value of a vacancy $V(l)$ reads

$$rV(l) = -c + q(\theta)[J(l) - V(l)]$$

- The value of production where $J(l)$ is

$$
\begin{aligned}
rJ(l) &= y(l) - \rho l - w + \lambda_o \left\{ Max[J^d(l); V(l)] - J(l) \right\} \\
&\quad + s[V(l) - J(l)]
\end{aligned}
$$

- The value of the firm in financial distress reads

$$
\begin{aligned}
rJ^d(l) &= y^d(l) - \rho l - w^d + \lambda_1 \left\{ J(l) - J^d(l) \right\} \\
&\quad + s[V(l) - J^d(l)]
\end{aligned}
$$

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Job destruction

- What happens when credit is pulled back?
- Is it optimal to continue production in financial distress?
- Optimal job destruction in distress is

$$Max[J^d(l); V(l)] \qquad \text{JOB DESTRUCTION} \qquad (1)$$

- The solution to the max will determine two outcomes of the model

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Job creation

Free entry on the entrepreneur

$$V(l) = 0 \Longrightarrow J(l) = \frac{c}{q(\theta)} \qquad \text{JOB CREATION} \qquad (2)$$

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Optimal leverage

The optimal leverage l^* is chosen by the entrepreneur before entering the market and is set so as to maximize the value of a vacancy.

$$
\begin{aligned}
l^* &= \arg\max_l V(l) \\
l^* &= \arg\max_l \frac{-c + q(\theta)J^h(l)}{r + q(\theta)} \qquad \text{OPTIMAL LEVERAGE (3)}
\end{aligned}
$$

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Wage determination

- Unemployment income equal to b

$$rU = b + \theta q(\theta)[W(I) - U]$$

- Wages are obtained as a fraction of the output produced as long as the worker participation's constraint is binding.

$$w^i(I) = \max\left\{\beta y^i(I); rU\right\} \qquad \text{WAGE DETERMINATION}$$
$$(4)$$

- consistent with Hall (2005) and Acemoglu (1999)

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Equilibrium Unemployment

Φ is an indicator function that takes the value 1 $J^d(l) < 0$. The unemployment rate is

$$u = \frac{s + \Phi\lambda_0}{s + \Phi\lambda_0 + \theta q(\theta)} \qquad \text{EQUILIBRIUM UNEMPLOYMENT}$$

(5)

Definition

The equilibrium is a set of value functions $[J(l), J^d(l), V(l), W(l), W^d(l), U.]$, unemployment stock $[u]$, market tightness θ and leverage l satisfying i) Optimal Job destruction (equation 1, ii) Job creation (equation 2) iii) Wage determination (equation 4)iv) Optimal leverage (equation 3) v) Equilibrium unemployment (equation 5)

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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)

- Characterization of the regimes in terms of the cost of credit ρ (high ρ low credit equilibrium; low ρ high credit equilibrium).

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The Two Regimes in terms of surplus

We define two types of equilibria depending on whether the firm operates or not in financial distress. In let

$$
\begin{aligned}
J^d(I) &= Max[0; J^d(I)] \qquad \text{Low credit equilibrium} \\
0 &= Max[0; J^d(I)] \qquad \text{High credit equilibrium}
\end{aligned}
$$

and the characterization of the two equilibria will be determined in terms of ρ, the cost of credit.

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Optimal leverage

The optimal leverage in the low credit equilibrium is

$$l^* = \left(\frac{\alpha \phi}{\rho} \right)^{\frac{1}{1-\alpha}}$$

where $\phi = \frac{r+s+\lambda_1}{r+s+\lambda_o+\lambda_1}$. Two simple propositions immediately follow

Proposition

For a given set of parameters, leverage in the low credit equilibrium is lower than in the high credit equilibrium

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Low credit equilibrium (cont.)

Proposition

Financial parameters affect optimal leverage in the low credit equilibrium. In particular, a higher arrival rate of financial shocks reduces leverage ($\frac{\partial l^*}{\partial \lambda_o} \leq 0$) while a shorter duration of distress increases leverage $\frac{\partial l^*}{\partial \lambda_1} \geq 0$

The condition for optimal job creation is

$$\frac{c}{q(\theta)} = \left[\frac{(1-\beta)(\Delta + l^\alpha) - \rho l - \bar{\lambda}_o l^\alpha}{r + s + \lambda_0} \right]$$

where $\bar{\lambda}_0 = \frac{\lambda_o}{r+s+\lambda_1+\lambda_o}$

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Simple comparative statics

Proposition

In a low credit equilibrium, an increase in the arrival rate of financial shocks reduces optimal leverage: $\frac{\partial l^*}{\partial \lambda_0} < 0$

Proposition

In a low credit equilibrium, a reduction in the duration of financial distress increases leverage : $\frac{\partial l^*}{\partial \lambda_1} > 0$

Proposition

In a low credit equilibrium, a larger financial shock and a longer financial distress reduce job creation: $\frac{\partial \theta}{\partial \lambda_o} < 0$; *and* $\frac{\partial \theta}{\partial \lambda_1} > 0$

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Unemployment in the low credit equilibrium

It is given by

$$u = \frac{s}{s + \theta q(\theta)}$$

Proposition

An increase in the frequency of the financial crisis λ_o has no direct impact on unemployment, since it only operates through job creation

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Characterizing the low credit equilibrium

To characterize a low credit equilibrium the key condition is

$$J^d(I) > 0$$

In terms of ρ we can show that the formal condition on the cost of credit is Low credit equilibrium if

$$\frac{(1-\beta)\Delta - \rho I^* + \bar{\lambda}_o I^{*\alpha}}{r + s + \lambda_o} \;\; > \;\; 0$$

where $I^* = \left(\frac{\alpha \phi (1-\beta)}{\rho}\right)^{\frac{1}{1-\alpha}}$.

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Characterizing the low credit equilibrium (cont.)

Substituting optimal leverage in the above, and solving for ρ

$$\rho > \rho^*$$

where

$$\rho^* = \Gamma^{-\frac{\alpha}{1-\alpha}}$$

and

$$\Gamma = \frac{(1-\beta)\Delta}{[(1-\beta)\alpha\phi]^{\frac{1}{1-\alpha}} \left\{1 + \bar{\lambda}_o[(1-\beta)\phi\alpha]^{\alpha}\right\}}$$

Hence we are in a low credit equilibrium if the marginal cost of credit is sufficiently large.

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High Credit Equilibrium $(J)^d(I) < 0$

Optimal leverage is simply

$$I^* = \left(\frac{\alpha}{\rho}\right)^{\frac{1}{1-\alpha}}$$

Proposition

Optimal leverage is independent of the arrival rate of financial shocks and it depends only on its marginal cost and its marginal impact on productivity.

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Job Creation in High Credit Equilibrium

The optimal job creation is

$$\frac{c}{q(\theta)} = (1-\beta)J(l)$$

$$\frac{c(r+\lambda_o+s)}{q(\theta)} + c\theta\beta = (1-\beta)[\Delta + l^\alpha - \rho l] \qquad ; \frac{\partial\theta}{\partial\lambda_o} \leq 0$$

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Unemployment in High Credit Equilibrium

The unemployment rate is

$$u = \frac{s + \lambda_o}{s + \lambda_o + \theta q(\theta)}$$

Proposition

In the high credit equilibrium an increase in λ_0 has an adverse direct impact on unemployment (through increase in job destruction) and an adverse indirect impact through job creation (through the reduction in market tightness)

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Characterizing the high credit equilibrium

To characterize a high credit equilibrium the key condition is

$$J^d(l) < 0$$

In terms of ρ we can show that

High credit equilibrium if $\dfrac{(1-\beta)\Delta - \rho l^* + \bar{\lambda}_o l^{*\alpha}}{r + s + \lambda_o} < 0$

where the optimal leverage to be considered is the leverage in the low credit equilibriun, which is the first best alternative to the firm.

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Characterizing the high credit equilibrium (cont.)

Substituting for $l^* = \left(\frac{\alpha \phi(1-\beta)}{\rho}\right)^{\frac{1}{1-\alpha}}$ the condition for the high credit equilibrium is

$$\rho < \rho^*$$

Proposition

For a given set of parameters, there is a unique marginal cost of credit ρ^* such that for values $\rho > \rho^*$ (or $\rho < \rho^*$) the economy is in the low (high) credit equilibrium.

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Implications: Unemployment response to financial shocks

- We think of an increase in λ_0 as a worsening in financial conditions
- In the high credit equilibrium an increase in λ_0 has an adverse *direct* impact on unemployment (through increase in job destruction) and an adverse *indirect* impact trhough job creation (through the reduction in market tightness)
- Hence in the high credit market equilibrium unemployment responds more to an adverse financial shock

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Unemployment response to financial shocks

In the high credit market equilibrium unemployment responds more
to an increase in λ_0

$$\left. \frac{\partial u}{\partial \lambda_o} \right|_{High\ Credit} = \frac{\theta q(\theta)}{[s + \lambda_o + \theta q(\theta)]^2} \qquad [\text{Increase JD}]$$

$$+ \qquad \frac{-\frac{\partial \theta q(\theta)}{\partial \lambda_o}}{[s + \lambda_o + \theta q(\theta)]^2} > 0 + [\text{Decrease JC}]$$

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While in the Low Credit Equilibrium only JC effect

$$\left.\frac{\partial u}{\partial \lambda_o}\right|_{Low\ Credit} = \frac{-\frac{\partial \theta q(\theta)}{\partial \lambda_o}}{[s + \theta q(\theta)]^2} > 0$$

$$= [\text{Decrease Job Creation}]$$

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Unemployment in the two regimes

In normal times unemployment is lower in the high-credit
equilibrium because θ^* is higher in the high credit equilibrium (job
creation effect)
However, when a financial shock occurs

- Unemployment increases more in the high credit equilibrium
  then 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

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Bringing the Model to the Data

- Firms *ex-post* heterogenous: $\rho_i \in [\rho_{min}, ...\rho_{max}]$. The value of ρ is learnt by the firm after match and before access to credit.
- Workers do not observe the ρ specific to the firm.
- Let ρ^* be the cut-off point of the two equilibria and $G(.)$ the weighted function providing the contribution of each ρ type of firm to the aggregate value of a job for employers

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Key aggregate conditions (appr.)

- Value of vacancies

$$rV = -c + q(\theta)[\int_{\rho_{min}}^{\rho^*} J(\rho)dG(\rho) + \int_{\rho^*}^{\rho_{max}} J(\rho)dG(\rho)] \quad (6)$$

- and by free entry

$$\frac{c}{q(\theta)} = \int_{\rho_{min}}^{\rho^*} J(\rho)dG(\rho) + \int_{\rho^*}^{\rho_{max}} J(\rho)dG(\rho) \quad (7)$$

- Normalization rule

$$1 = u + e^{hc} + e^{lc} \quad (8)$$

where e^{hc} and e^{lc} are employment in high and low credit respectively.

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Unemployment with heterogeneous firms

The additional flows conditions are

- Outflows from unemployment

$$
\begin{aligned}
\theta q(\theta) u [1 - G(\rho^*)] &= s e^{lc} \\
\theta q(\theta) G(\rho^*) u &= (s + \lambda_o) e^{hc}
\end{aligned}
$$

- Aggregate Unemployment is then

$$
u = \frac{s + \lambda_o}{s + \lambda_o + \theta q(\theta)[G(\rho^*) + (1 - G(\rho^*))\frac{(s+\lambda_o)}{s}]} \quad (9)
$$

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Firm-level response and leverage during the GR

An EFIGE-Amadeus matched database

- 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

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Key variables

Employment variation during the Great Recession:

- Δe: 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 change
- we imputed value 0 of Δe to firms reporting no change
- Δy: measured through operational revenue growth in 2008-2009

Firm-level response during the GR

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Firm-level response and Leverage during the GR

Firms that successfully applied for credit Firms that unsuccessfully applied for credit

Firms that did not apply for credit

Density

Workforce change

Graphs by "During the last year, did the firm apply for more credit?"

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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.

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Descriptive statistics

Country	N of Firms	Average Size of Firms	St Dev	Gearing R 2007 (%)	St Dev	Solvency R 2007 (%)	St Dev	LT DA 2007 (%)
AUT	443	100	33	84.29	6.85	30.22	1.61	.
FRA	2,973	50	8	68.56	2.27	37.44	0.45	6.48
GER	2,935	96	11	172.41	5.80	28.89	0.60	31.81
HUN	488	68	9	51.28	4.74	48.65	1.27	2.78
ITA	3,021	40	2	224.82	4.48	24.02	0.37	7.40
SPA	2,832	45	3	92.29	2.84	37.54	0.46	11.11
UK	2,067	180	20	71.72	3.21	39.73	0.72	6.89

Sector	N of Firms	Average Size of Firms	St Dev	Gearing R 2007 (%)	St Dev	Solvency R 2007 (%)	St Dev	LT DA 2007 (%)
1	3,430	40	2	139.17	3.65	31.93	0.43	13.29
2	1,520	57	7	153.48	6.14	29.98	0.75	22.56
3	937	90	27	132.07	6.82	32.98	0.91	13.38
4	1,966	47	4	145.43	5.23	30.47	0.64	15.11
5	1,038	43	5	162.84	7.58	31.13	0.82	11.25
6	563	100	9	125.23	8.01	35.41	1.15	11.25
7	424	130	32	127.16	9.31	31.31	1.33	11.38
8	705	36	3	131.23	7.22	30.81	1.00	16.31
9	21	96	59	110.53	36.12	41.24	5.49	10.53
10	2,353	70	9	135.50	4.45	33.30	0.57	14.37
11	1,802	67	6	131.92	5.06	31.82	0.63	1.01

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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 Δe 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 either the Gearing Ratio, the Solvency Ratio or the Long-term debt to asset ratio all measured *before* the Great Recession (according to 2007 balance sheet data). We also include country and sector dummies.

Simple OLS using age of the CEO as **instrument**. Identification assumption: age of CEO affects leverage in normal times, but not directly employment adjustment during the crisis.

Δe continuous, All Firms

First stage		IV		IV		IV
		Gearing R		Solvency R		LT DA
Age of CEO		-10.38095***		1.982744***		-0.0032705
		(1.816268)		(0.2163267)		(0.0027128)
	(1)	(2)	(3)	(4)	(5)	(6)
Method	OLS	IV	OLS	IV	OLS	IV
VARIABLES	Δe%	Δe%	Δe%	Δe%	Δe%	Δe%
Δȳ	1.192*	1.332*	1.200*	1.032	1.188*	0.199
	(0.640)	(0.703)	(0.639)	(0.671)	(0.638)	(2.055)
Gearing R	-0.00430***	-0.0398***				
	(0.000853)	(0.0151)				
Solvency R			0.0399***	0.231***		
			(0.00637)	(0.0731)		
LT DA					-0.152	-148.5
					(0.602)	(130.9)
Constant	-6.158***	-3.382*	-8.556***	-13.99***	-7.776***	-6.019
	(1.417)	(1.973)	(1.395)	(2.509)	(1.371)	(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

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Δe continuous, Only Firms Downsizing

First stage	IV		IV		IV	
	Gearing R		Solvency R		LT DA	
Age of CEO	-10.80607***		2.166254***		-0.0026206	
	(2.720889)		(0.3149594)		(0.002428)	
	(1)	(2)	(3)	(4)	(5)	(6)
Method	OLS	IV	OLS	IV	OLS	IV
VARIABLES	$\Delta e\%$	$\Delta e\%$	$\Delta e\%$	$\Delta e\%$	$\Delta e\%$	$\Delta e\%$
$\Delta \bar{y}$	0.813	0.519	1.004	0.556	1.107	-0.395
	(0.936)	(1.106)	(0.915)	(0.984)	(0.936)	(3.117)
Gearing R	-0.00305**	-0.0502**				
	(0.00119)	(0.0226)				
Solvency R			0.0578***	0.264***		
			(0.00914)	(0.0959)		
LT DA					-2.495*	-256.3
					(1.456)	(249.2)
Constant	-19.72***	-14.68***	-23.10***	-27.83***	-21.80***	-21.52***
	(2.090)	(3.440)	(2.060)	(3.075)	(2.052)	(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

Standard errors in parentheses

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Δe continuous, Only Firms Upsizing

First stage		IV		IV		IV
		Gearing R		Solvency R		LT DA
Age of CEO		-0.5751268		0.7021634		0.0033848
		(5.244327)		(0.6536459)		(0.0175636)
	(1)	(2)	(3)	(4)	(5)	(6)
Method	OLS	IV	OLS	IV	OLS	IV
VARIABLES	$\Delta e\%$	$\Delta e\%$	$\Delta e\%$	$\Delta e\%$	$\Delta e\%$	$\Delta e\%$
$\Delta \bar{y}$	3.846***	4.474	3.859***	4.566**	3.917***	3.667
	(1.292)	(12.78)	(1.309)	(1.933)	(1.319)	(4.571)
Gearing R	-0.00386*	0.639				
	(0.00223)	(5.822)				
Solvency R			-0.00891	-0.405		
			(0.0163)	(0.625)		
LT DA					0.0344	-6.928
					(0.695)	(118.1)
Constant	16.81***	-24.49	16.02***	26.33	15.85***	16.13**
	(2.793)	(373.0)	(2.743)	(16.84)	(2.740)	(8.034)
Country	YES	YES	YES	YES	YES	YES
Sector	YES	YES	YES	YES	YES	YES
Seize	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

Standard errors in parentheses

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Robustness Check: Δe categorical, all Firms,

First stage		(2)iv		(4)iv		(6)iv
		Gearing R		Solvency R		LT DA
Age of CEO		-10.23189***		1.982963***		-.0031821
		(1.809991)		(0.216324)		(0.00268)
	(1)	(2)iv	(3)	(4)iv	(5)	(6)iv
VARIABLES	Δe	Δe	Δe	Δe	Δe	Δe
$\Delta \bar{y}$	0.00952	0.0138	0.00119	-0.00400	-0.00219	-0.0291
	(0.0298)	(0.0312)	(0.0294)	(0.0301)	(0.0301)	(0.0625)
Gearing R	-0.000163***	-0.00128*				
	(3.95e-05)	(0.000679)				
Solvency R			0.00103***	0.00689**		
			(0.000292)	(0.00327)		
LT DA					0.0223	-4.053
					(0.0284)	(4.058)
Constant	0.724***	0.810***	0.688***	0.520***	0.694***	0.741***
	(0.0653)	(0.0871)	(0.0636)	(0.112)	(0.0641)	(0.130)
Country	YES	YES	YES	YES	YES	YES
Sector	YES	YES	YES	YES	YES	YES
Size	YES	YES	YES	YES	YES	YES
Observations	8,693	8,679	9,757	9,738	8,161	8,142
R-squared	0.067	-0.020	0.027	0.062	-2.304

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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Robustness Check: Control for Δy_i, all Firms,

First stage		IV		IV		IV
		Gearing R		Solvency R		LT DA
Age of CEO		-9.244168***		2.122875***		-0.002206
		(2.536106)		(0.2227416)		(0.0046271)
	(1)	(2)	(3)	(4)	(5)	(6)
Method	OLS	IV	OLS	IV	OLS	IV
VARIABLES	Δe%	Δe%	Δe%	Δe%	Δe%	Δe%
Δy	4.511***	4.441***	4.797***	4.813***	4.088***	3.903***
	(0.313)	(0.339)	(0.307)	(0.320)	(0.312)	(0.964)
Gearing R	-0.00423***	-0.0361***				
	(0.000889)	(0.0140)				
Solvency R			0.0417***	0.227***		
			(0.00689)	(0.0701)		
LT DA					0.361	-151.8
					(0.633)	(124.2)
Constant	-6.468***	-3.392	-9.278***	-14.14***	-8.491***	-6.809
	(1.675)	(2.272)	(1.634)	(2.489)	(1.605)	(5.117)
Country	YES	YES	YES	YES	YES	YES
Sector	YES	YES	YES	YES	YES	YES
Employees classes	YES	YES	YES	YES	YES	YES
Observations	7,571	7,561	8,375	8,363	6,882	6,869
R-squared	0.094	-0.061	0.092	0.014	0.074	-7.659

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Macro: FC vs non-financial crises

Country	Financial Recessions av. Lenght (qrt)	Financial Recessions nr. Of Episodes	Financial Crises nr. Of Episodes	Other Recessions av. Lenght (qrt)	Other Recessions nr. Of Episodes
Australia	5	1	1		
Austria			1	2.5	2
Belgium	3	1	1	2.7	3
Canada				3	1
Denmark			1	3.6	3
Finland	13	1	1	2.5	2
France			1	3.5	2
Germany			1	4.5	3
Italy	6	1	1	3	5
Netherlands	3	1	-		
Norway			-	3.5	2
Portugal			-	3.5	2
Spain			-	4	1
Sweden			-	4	1
UK	4.5	2	4		
US	4	1	2	3.5	6

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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) as well as measures of firms' leverage.

- Two measures of firm leverage: debt to sales (DS) and dent to assets (DA). The former is better because hard to measure assets in firms that are not quoted and evidence that assets are strongly correlated with debt (targeted DA ratios).

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Table: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Debt to Sales	3332	93.998	125.466	0.000	540.120
Debt to Assets	3332	23.431	10.169	0.000	62.160
Δ employment	5270	0.002	0.023	-0.178	0.197
Δ GDP	5270	0.005	0.028	-0.341	0.403
EPL index	4708	1.927	1.052	0.210	3.670
UB	4000	0.306	0.190	0.005	0.650

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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 $\Delta eijt$ is log employment variation in sector i, country j at time t, α_j denotes the coefficients of sectoral dummies, Δy 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.

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Regressions with Debt to Sales

First Stage		(3)		(7)	
		FinCrisis*DS	DS	FinRec*DS	DS
DS (-1)		-0.000069	0.9160637***	-0.000069	0.9160598***
		-0.0003186	-0.0079824	-0.0003186	(0 .0079811)
FinRec* DS (-1)				1.02885***	-0.0167802
				-0.0028404	-0.0711631
FinCrisis*DS (-1)		1.028851***	-0.0167296		
		-0.0028409	-0.071175		

VARIABLES	(1)OLS $\Delta e\%$	(3)IV $\Delta e\%$	(5)OLS $\Delta e\%$	(7)IV $\Delta e\%$
$\Delta \bar{y}$	0.428	0.293	0.504	0.361
	-0.315	-0.318	-0.314	-0.317
Recession	-0.00500**	-0.00472**		
	-0.00196	-0.00199		
FinCrisis	-0.0106***	-0.0110***		
	-0.00339	-0.00341		
FinRec			-0.0153***	-0.0154***
			-0.00285	-0.00286
DS	2.59E-06	4.19E-06	2.61E-06	4.21E-06
	-3.01E-06	-3.33E-06	-3.01E-06	-3.33E-06
FinCrisis*DS	-7.56E-06	-4.18E-06		
	-2.62E-05	-2.64E-05		
FinRec *DS			-7.40E-06	4.02E-06
			-2.62E-05	2.65E-05

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Regressions with Debt to Assets

First Stage		(4)		(8)	
		FinCrisis*DA	DA	FinRec*DA	DA
DA (-1)		3.02E-06	0.96311***	3.06E-06	0.9632424***
		-0.0000138	-0.0055427	-0.0000138	-0.005543
FinRec* DA (-1)				1.00426***	0.2684884
				-0.0024084	-0.9693732
FinCrisis*DA (-1)		1.004258***	0.2601286		
		-0.0024089	-0.9692058		

	(2)OLS	(4)IV	(6)OLS	(8)IV
VARIABLES	Δe%	Δe%	Δe%	Δe%
$\Delta \bar{y}$	0.436	0.307	0.512	0.375
	-0.316	-0.319	-0.315	-0.318
Recession	-0.00496**	-0.00468**		
	-0.00196	-0.00198		
FinCrisis	-0.00114	-0.00192		
	-0.00576	-0.00579		
FinRec			-0.0057	-0.00624
			-0.00547	-0.0055
DA	-3.99E-07	-4.19E-07	-4.69E-07	-4.67E-07
	-1.17E-06	-1.23E-06	-1.17E-06	-1.23E-06
FinCrisis*DA	-0.000412**	-0.000392*		
	-0.000204	-0.000206		
FinRec *DA			-0.000416**	-0.000395*
			-0.000205	-0.000206
Sector EPL UB	YES	YES	YES	YES

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Robustness: Time-invariant High-Leverage top 40%

VARIABLES	(1) $\Delta e\%$	(2) $\Delta e\%$
$\Delta \bar{y}$	0.380	0.459*
	(0.266)	(0.265)
Recession	-0.00474***	
	(0.00168)	
Financial Crisis	-0.00904***	
	(0.00247)	
Financial Crisis*LEV	-0.00610	
	(0.00463)	
LEV	0.00308**	0.00307**
	(0.00134)	(0.00134)
FinancialRecession		-0.0135***
		(0.00188)
FinancialRecession*LEV		-0.00608
		(0.00464)
Constant	-0.00638***	-0.00703***
	(0.00208)	(0.00207)
Sector, EPL, UB	YES	YES
Observations	3,738	3,738
R-squared	0.055	0.053

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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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

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Conclusions (cont.)

- 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 than low-leveraged ones during non-financial recessions
- It is a causal effect of leverage on job destruction