

Short-time Work and Employment in the Great Recession in France

Pierre Cahuc¹ Francis Kramarz² Sandra Nevoux³

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¹CREST-ENSAE Ecole Polytechnique

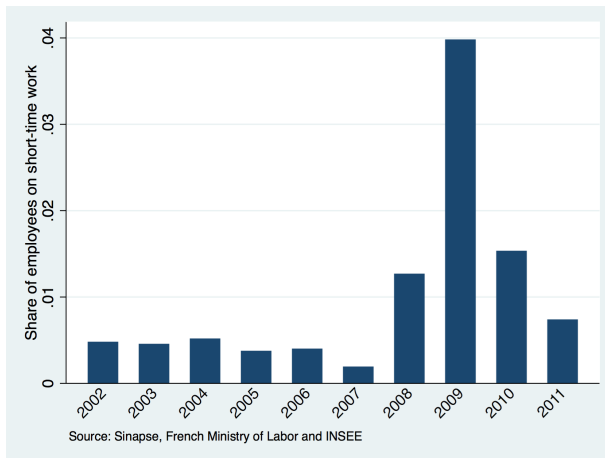
²CREST-ENSAE Ecole Polytechnique

³CREST-ENSAE

Introduction

- ▶ Short-time work enables establishments, under adverse economic circumstances and specific conditions:
 - ▶ to decrease the number of hours worked of their employees
 - ▶ to maintain a payment for these unworked hours while keeping workers in the firm
 - ▶ to receive subsidies for these hours
- ▶ In 2008 and 2009 France was severely hit by the economic crisis
- ▶ In response to the Great Recession, short-time work has dramatically expanded

Introduction



Share of employees on short-time work in the market non agricultural sectors

Introduction

- ▶ Investigate the impact of short-time work on employment and survival of single establishment firms in 2009
- ▶ Theoretical model:
 - ▶ short-time work saves jobs if the drop in the revenue of the firm is large
 - ▶ short-time work decreases hours of work without saving jobs if the drop in the revenue of the firm is moderate
 - ▶ short-time work more effective at saving jobs than wage subsidies or hiring subsidies (lower cost per job saved)

Deep reason: short-time work allows the government to target subsidies toward jobs hit by large negative shocks

→ small windfall effects

Introduction

▶ Empirical part:

- ▶ short-time work reduced job losses **only** in firms for which the drop in revenue was large
- ▶ short-time work reduced hours of work with not significant impact on employment in about 50% of firms which used short-time work
- ▶ Nevertheless, the cost per job saved is **very low** compared with wage subsidies or hiring subsidies

→ Short-time work was an effective policy to save jobs at low cost during the great recession

→ But the scheme could have been more effective

Introduction

- ▶ Novelty
 - ▶ heterogeneous effects depending on the size of the drop in revenue
 - ▶ create jobs at low cost because targets jobs hit by negative shocks
 - ▶ data cover all the universe of establishments
 - ▶ identification strategy

Presentation plan

1. What is short-time work?
2. Model
3. Data
4. Empirical strategy
5. Results

1. What is short-time work?

- ▶ Rules prevailing from 2009 to 2011
- ▶ All private establishments and all their employees, located in France, are eligible to short-time work.
- ▶ An establishment can apply to short-time work for 6 motives: (i) economic situation; (ii) modernization, restructuring and transformation; (iii) problems in the provision of raw materials; (iv) accident; (v) exceptionally adverse weather conditions; (vi) other exceptional circumstances
- ▶ Our paper is focused on the first only (80% of short-time work)
- ▶ When using short-time work, an establishment must specify its domain of application, which can be either a part or the totality of the establishment or a temporary suspension of activity

1. What is short-time work?

- ▶ Short-time work applies only to the unworked hours below the weekly legal duration of 35 hours or below the weekly collectively-agreed or contractual duration if it is below 35 hours.
- ▶ The yearly number of subsidized hours per employee per year cannot exceed 1000 hours
- ▶ Under short-time work, each hour worked is still paid at the previous gross hourly wage and each subsidized hour is paid at 60% of the previous gross hourly wage, with a lower limit of 6.84€ (78% min wage).
- ▶ The establishment is then reimbursed by the state 3.84€ for establishments belonging to firms with 250 employees or less and 3.33€ for establishments belonging to firms with 251 employees or more

1. What is short-time work?

- ▶ The procedure
 1. Applications from the establishment to the *départemental* labor relations directions (consultation of staff representatives, documents proving its economic difficulties)
 2. Reply of the departmental directions of work
 3. In case of authorization, the establishment can use short-time work within the limits set by the local authority.
- ▶ Refusal rates are low (below 5% in 2009)

2. The model

- ▶ Static directed search and matching model with one final output produced with labor only
- ▶ Large number of workers and of multi-worker firms
- ▶ Each firm has a labor pool in which unemployed workers and vacant jobs are matched together by a constant returns to scale matching function
- ▶ Workers are perfectly mobile across labor pools
- ▶ Each firm posts v job vacancies, at cost $C(v)$, increasing and convex

2. The model

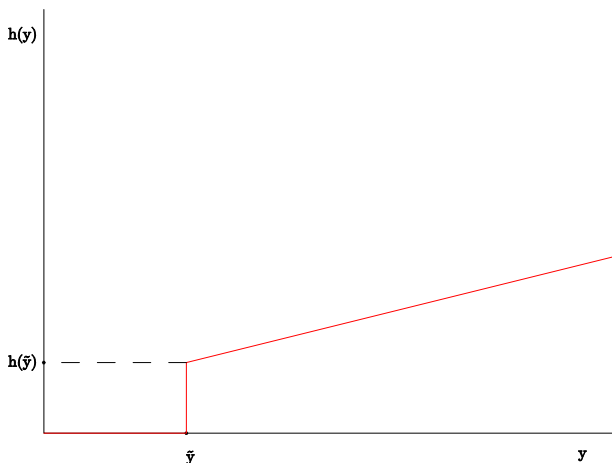
- ▶ Preferences of workers: $c - \phi(h)$
 - ▶ c consumption of final output
 - ▶ h : hours worked
 - ▶ ϕ is increasing and convex
- ▶ The production per hour worked on each job $y = z \times \varepsilon$
 - ▶ z firm specific random variable
 - ▶ ε job specific random variable independent of z
 - ▶ z and ε are revealed to the firm and to the worker once the worker has been hired

2. The model

- ▶ Each job vacancy is associated with a non-renegotiable labor contract posted by the firm:
 - ▶ wage $w(y)$
 - ▶ hours worked $h(y)$
 - ▶ productivity threshold below which jobs are destroyed \tilde{y}
- ▶ The government provides short-time compensation:
 $\sigma \max(\bar{h} - h, 0)$, funded by lump-sum taxes

2. The model

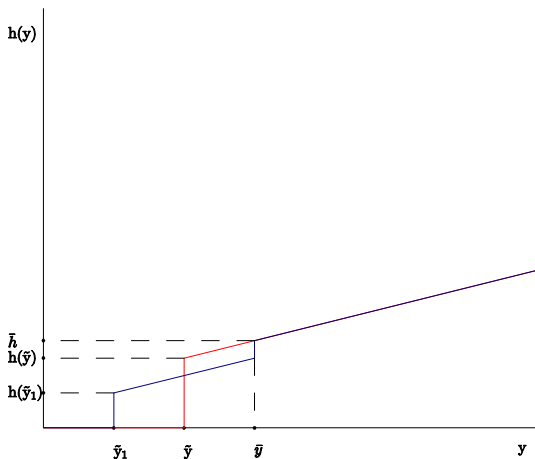
Optimal labor contract without short-time work



Productivity y and hours worked $h(y)$ absent short-time work. \tilde{y} is the threshold value of productivity below which jobs are destroyed.

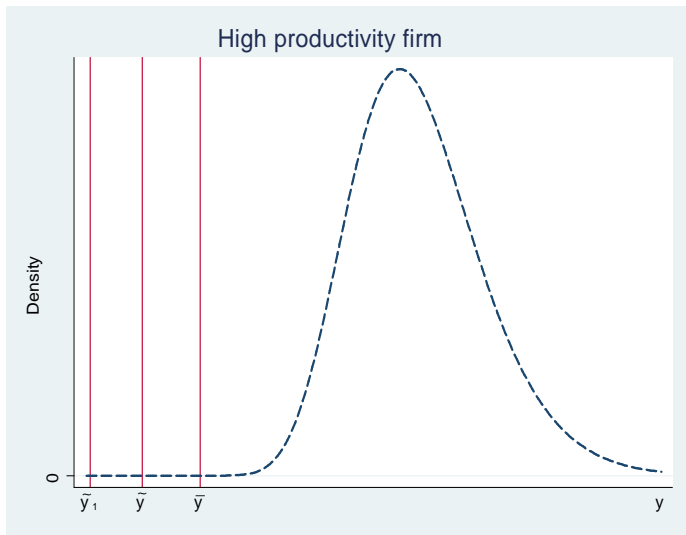
2. The model

Optimal labor contract with short-time work



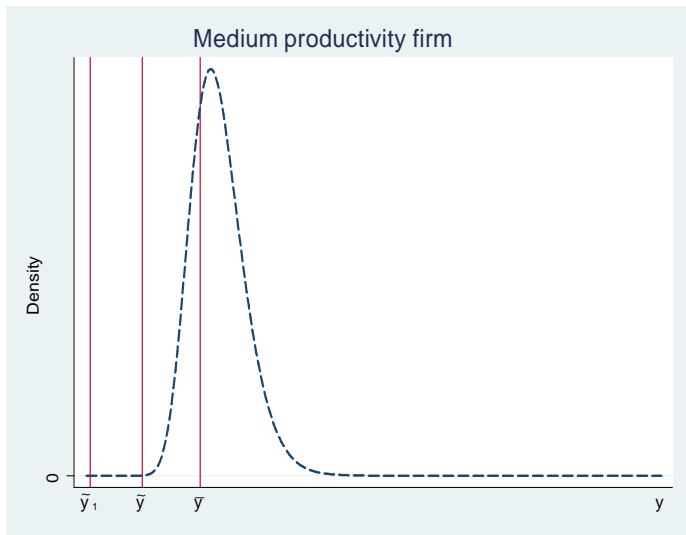
Productivity y and hours worked $h(y)$ with short-time work (blue line)

2. The model



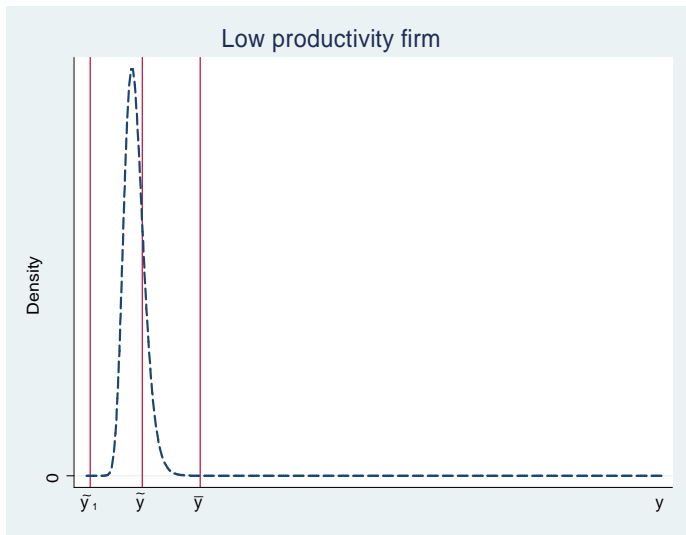
$$y = z \times \varepsilon, \quad z : \text{firm specific}, \quad \varepsilon : \text{job specific}$$

2. The model



$$y = z \times \varepsilon, z : \text{firm specific}, \varepsilon : \text{job specific}$$

2. The model



$$y = z \times \varepsilon, z : \text{firm specific}, \varepsilon : \text{job specific}$$

2. The model

- ▶ Short-time work implies
 - ▶ drops in hours of work and no employment effects in firms hit by moderate drop in revenue
 - ▶ positive employment effect in firms hit by large drop in revenue only
- ▶ Short-time work is more effective than job subsidies to sustain employment: allows the government to target low productivity jobs

2. The model

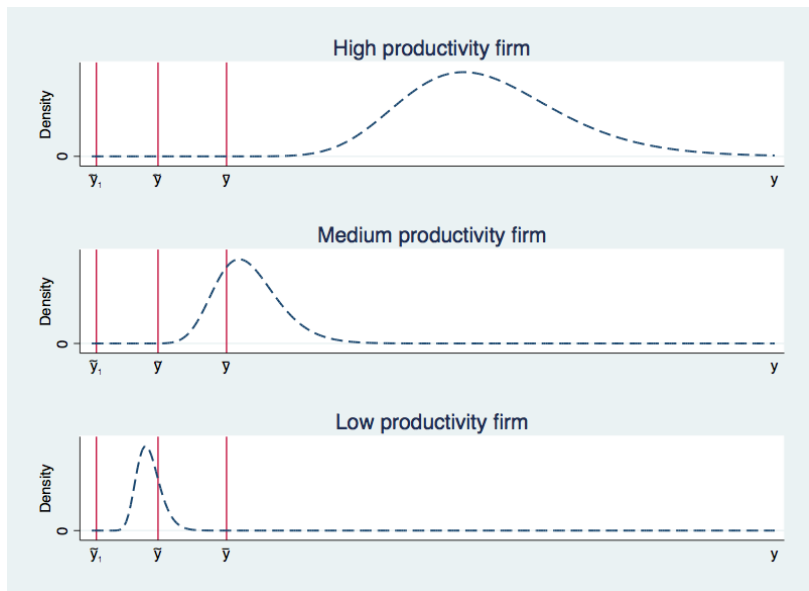
- ▶ Identical expenditure on job subsidies to all jobs and on short-time work

$$\frac{\text{Nb jobs created by short-time work}}{\text{Nb jobs created by job subsidies}} > \frac{\text{Nb subsidized jobs}}{\text{Nb jobs using short-time work}}$$

4% of workers using short-time work → short-time work creates 25 times more jobs at given expenditure

- ▶ Also show that short-time work can increase the total number of hours worked
 - ▶ Sufficient condition: the mode of the distribution of productivity is located to the left of the reservation productivity in the absence of short-time work

2. The model



$$y = z \times \varepsilon, \quad z : \text{firm specific}, \quad \varepsilon : \text{job specific}$$

3. Data

- ▶ Short-time work for each establishment: *Sinapse-Chômage Partiel* (number of hours, amount of subsidy, date of demand, acceptance, refusal, consumption...)
- ▶ The Annual Declaration of Social Data (*DADS*, administrative data), establishment identification number, sector, municipality, commuting zone, the total number of employees over the year, on 1st January, on 31 December, the number of employees disaggregated by contract type, the net and gross wage, the number of paid hours and the level of turnover
- ▶ *FICUS* and *FARE* (annual tax returns and surveys), financial information on firms levels of turnover and debt

→ Focus on firms with single establishment **which did not use short-time work in 2007-2008**

3. Data

| Firm | Short-time work | No short-time work |
|--------------------------------|---------------------|---------------------|
| Nb employees | 24.31 (80.33) | 6.84 (27.92) |
| Employment growth rate | -.14 (.30) | -.08 (.46) |
| Revenue growth rate | -.17 (.39) | .04 (.52) |
| Hourly wage | 14.27 (5.17) | 13.79 (62.83) |
| Hours worked per employee/year | 1570.97 (320.33) | 1591.22 (411.52) |
| Worker turnover | 1.32 (0.62) | 1.60 (1.14) |
| Share of temporary jobs | .04 (0.12) | .09 (0.21) |
| Firm leverage | .22 (0.24) | .22 (0.26) |
| Nb. of obs. | 13,826 | 869,274 |

Characteristics of firms in 2009

4. Empirical strategy

- ▶ Estimate the relation for year 2009:

$$L_i = \alpha_0 + STW_i\alpha_1 + Y_i\alpha_2 + X_i\alpha_3 + \varepsilon_i$$

- ▶ L_i : employment growth rate in the benchmark specification.
- ▶ STW_i : indicator variable equal to one if the firm uses short-time work
- ▶ Y_i : revenue growth rate
- ▶ X_i : control variables, past share of temporary jobs, past mean hourly wage, past number of hours worked per employee, past labor turnover, (728) sector fixed effects, past size of the firm (10, 50, 250 and 1000 employees), past firm leverage, firm age
- ▶ ε_i : error term

4. Empirical strategy

- ▶ The revenue growth rate Y_i may be impacted by short-time work use:

$$Y_i = b_0 + STW_i b_1 + \bar{Y}_i b_2 + X_i b_3 + \varepsilon_i$$

- ▶ \bar{Y}_i : leave one out mean revenue growth rate of the (88) industries interacted with the revenue growth rate of the (328) commuting zone of firm i .

4. Empirical strategy

$$L_i = \alpha_0 + STW_i\alpha_1 + Y_i\alpha_2 + X_i\alpha_3 + \varepsilon_i$$

- ▶ Short-time work use is potentially correlated with the error term ε_i even if the revenue growth rate is controlled for:
 - ▶ Firms with more intensive short-time work use are also those which are more likely to adjust hours of work and employment downwards when their revenue drops
 - ▶ Technological factors, quality of management, of labor relations, distribution of jobs tenure within the firm may influence the adjustment costs of employment and short-time work use for a given drop in revenue

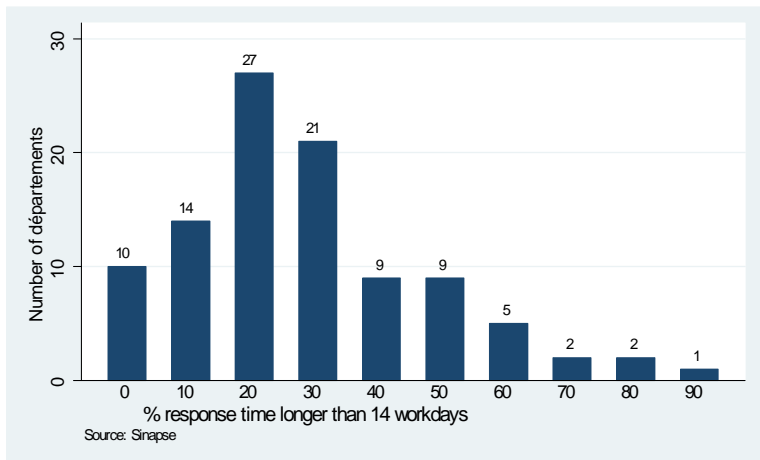
→ OLS short-time work estimate biased downwards

4. Empirical strategy

- ▶ Instrumental variable for short-time work take-up
- ▶ Departmental directions of labor relations play a key role in the implementation of short-time work

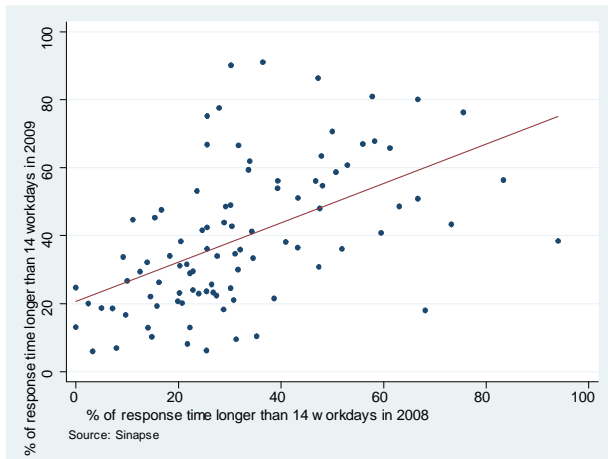
→ response time to short-time work applications across départements

4. Empirical strategy



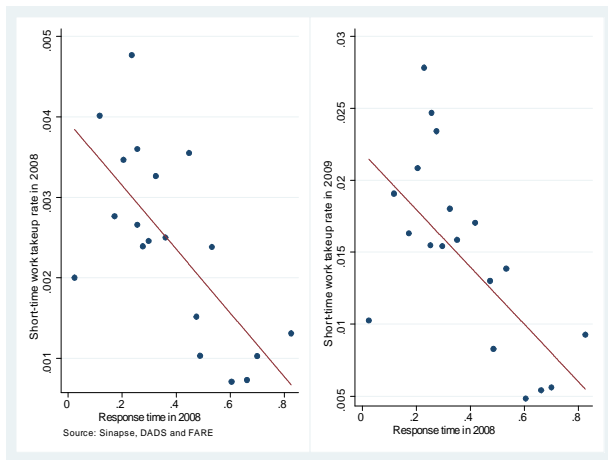
Response time by département in 2008

4. Empirical strategy



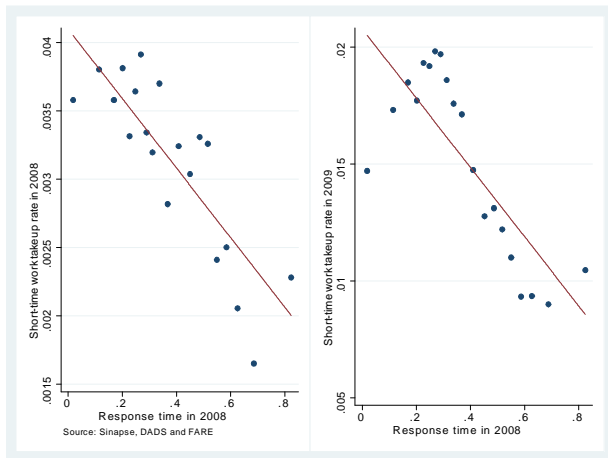
Proportion of short-time work applications whose response time is longer than 14 days in 2009 (vertical axis) and in 2008 (horizontal axis)

4. Empirical strategy



Departmental share of response time > 14 workdays in 2008 and short-time work take-up rate in 2008 (left) and in 2009 (right). Binscatters without covariate

4. Empirical strategy



Departmental share of response time > 14 workdays in 2008 and short-time work take-up rate in 2008 (left) and in 2009 (right). Binscatters with covariates

4. Empirical strategy

- ▶ The response time of the departmental administration is also related to the choice of multi-establishment firms.
- ▶ Multi-establishment firms used short-time work more frequently in 2008, before the recession, in their establishments located in the départements where the response time was shorter in 2008

4. Empirical strategy: multi-establishment firms

| | Dep variable: STW take-up in 2008 |
|---------------------------------------|-----------------------------------|
| Share of reponse time > 14 workdays | -.222*** (.048) |
| Ctg Zone revenue growth rate | -3.34*** (.810) |
| Hours worked per employee/year | .000 (.000) |
| Hourly wage | -.001 (.001) |
| Share of temporary jobs | -.07*** (.003) |
| Sector fixed effect for establishment | yes |
| Firm fixed effect | yes |
| Nb observations | 322,517 |

4. Empirical strategy

- ▶ The behavior of single establishment firms in 2009 is influenced
 - ▶ by the past response time of the administration,
 - ▶ but also by the proximity, in previous year, of short-time work establishments belonging to multi-establishment firms

4. Empirical strategy: Single establishment firms

| | Dep variable: STW take-up |
|--|---------------------------|
| Dept time response to STW applications | -.917*** (0.113) |
| Distance to STW user in previous year | -.007*** (.001) |
| Adj- R^2 | .090 |
| Prob $F > 0$ | .000 |
| Nb observations | 768,343 |

4. Empirical strategy: Single establishment firms

- ▶ Diffusion of short-time work from multi-establishment firms:
 - ▶ Firms located closer to establishments belonging to multi-establishment firms which used short-time work in 2008 use short-time work more frequently in the first quarter of 2009 than later in the same year

| | No control | Controls | + Q. emp growth |
|--|-------------------|-------------------|-------------------|
| Dep variable: Short-time work use in first quarter of 2009 | | | |
| First quartile distance | .042*** (.012) | .053*** (.012) | .053*** (.012) |
| Adj- R^2 | 0.001 | 0.014 | 0.014 |
| Observations | 12,304 | 12,304 | 12,304 |

4. Empirical strategy

- ▶ Short-time work use in firm i in 2009 explained by:

$$STW_i = a_0 + RP_i a_1 + DM_i a_2 + Y_i a_3 + X_i a_4 + \varepsilon_{1i}$$

- ▶ RP_i share of response time to STW applications > 14 workdays in the département of firm i in 2008;
- ▶ DM_i distance to the closest establishment, belonging to a multi-establishment firm, which used STW in 2008

4. Empirical strategy

- ▶ Finally, we estimate

$$L_i = \alpha_0 + STW_i\alpha_1 + Y_i\alpha_2 + X_i\alpha_3 + \varepsilon_i$$

where:

$$\begin{aligned} STW_i &= \beta_0 + RP_i\beta_1 + DM_i\beta_2 + \bar{Y}_i\beta_3 + X_i\beta_4 + \eta_i \\ Y_i &= \gamma_0 + RP_i\gamma_1 + DM_i\gamma_2 + \bar{Y}_i\gamma_3 + X_i\gamma_4 + \zeta_i \end{aligned}$$

- ▶ Assuming: $\mathbb{E}(\varepsilon_i|RP_i) = \mathbb{E}(\varepsilon_i|DM_i) = \mathbb{E}(\varepsilon_i|\bar{Y}_i) = 0$
 - ▶ RP_i share of response time to STW applications > 15 days in the département of firm i in 2008;
 - ▶ DM_i distance to the closest establishment, belonging to a multi-establishment firm, which used STW in 2008

5. Empirical results

Global effects of short-time work in 2009

| | OLS | IV |
|--------------------|---------------------|--------------------|
| For all firms | | |
| Employment growth | −.028*** (.003) | .051 (.069) |
| Share of perm jobs | 0.025*** (.002) | .098 ** (.047) |
| Death rate | −0.030*** (.002) | −.0216 (0.0432) |
| Nb. Observations | 768, 343 | 768, 343 |

Note: Death = zero employee on 31 December 2009; Robust standard errors, clustered at industry \times département level

5. Empirical results

Heterogeneous effects

- ▶ Model \Rightarrow Heterogeneous effects of short-time work
 - ▶ reduction in job losses when large negative drop in revenue
 - ▶ no impact on job losses otherwise
- ▶ Stratification of firms according to their predicted revenue growth (first stage of the IV strategy)

5. Empirical results

Heterogeneous effects

| Quintile | Nb firms | STW rate (%) | g_y STW=1 | g_y STW=0 |
|----------|----------|--------------|---------------|---------------|
| 1 | 153,669 | 3.92 | -.26 (.26) | -.12 (.23) |
| 2 | 153,669 | 1.27 | -.17 (.29) | -.04 (.30) |
| 3 | 153,668 | 0.9 | -.14 (.32) | -.01 (.29) |
| 4 | 153,669 | 0.7 | .09 (.38) | .04 (.41) |
| 5 | 153,668 | 0.6 | .31 (.96) | .38 (.88) |

STW take-up and revenue growth rate (g_Y) by quintile of firms stratified by predicted revenue growth rate in 2009

5. Empirical results

Heterogeneous effects in 2009: First stage IV estimation

| Quintile | 1 | 2 | 3 | 4 | 5 |
|------------|----------------------|--------------------|----------------------|----------------------|----------------------|
| R. time | -1.854*** (0.348) | -.968*** (.178) | -.832 *** (.0149) | -.552 *** (.0124) | -.412 *** (.0117) |
| D. STW | -.020*** (.004) | -.001 (.002) | -.007*** (.002) | -.006*** (.002) | -.001 (.002) |
| Pr $F > 0$ | .000 | .000 | .000 | .000 | .000 |
| Nb obs | 153,669 | 153,669 | 153,668 | 153,669 | 153,668 |

R. time: response time of départemental administration; D. STW: Distance to multi-establishment STW user in previous year

5. Empirical results

Heterogeneous effects in 2009: Second stage IV estimation

| Quintile | 1 | 2 | 3 | 4 | 5 |
|-----------------|---------------------|-----------------|-----------------|-----------------|-----------------|
| Emp growth | .158*** (.051) | .108 (.140) | .058 (.167) | -.129 (.201) | -.309 (.273) |
| Share perm jobs | .068** (.032) | .145 (.090) | .199* (.167) | -.013 (.149) | .235 (.173) |
| Gr perm jobs | .176*** (.053) | -.221 (.137) | .193 (.164) | -.237 (.207) | -.187 (.280) |
| Gr temp jobs | .007 (.039) | -.082 (.110) | .145 (.144) | .001 (.176) | -.154 (.228) |
| Death rate | -.0876*** (.033) | -.040 (.087) | .029 (.096) | .237* (.127) | .226 (.155) |
| Nb. Obs | 153,669 | 153,669 | 153,668 | 153,669 | 153,668 |

IV estimations. Robust standard errors, clustered at industry \times département level

5. Empirical results

Heterogeneous effects in 2009: stratification by tercile

| Tercile | 1 | 2 | 3 |
|-----------------|-------------------|-----------------|-----------------|
| Emp growth | .125** (.054) | -.135 (.158) | -.173 (.247) |
| Share perm jobs | .084** (.033) | .139 (.118) | .225 (.158) |
| Gr perm jobs | .176*** (.056) | -.197 (.166) | .001 (.271) |
| Gr temp jobs | -.018 (.041) | -.154 (.141) | -.238 (.202) |
| Death rate | -.057 (.035) | .009 (.096) | .218 (.141) |
| Nb. Obs | 256,115 | 256,114 | 256,114 |

IV estimations. Robust standard errors, clustered at industry \times département level

5. Empirical results

Lasting heterogeneous effects in 2010

| Quintile | 1 | 2 | 3 | 4 | 5 |
|------------|------------------|-----------------|-----------------|-----------------|-----------------|
| Emp growth | .146** (.066) | -.134 (.171) | -.246 (.203) | -.028 (.240) | -.215 (.255) |
| Death | -.045 (.039) | .131 (.112) | -.124 (.120) | -.046 (.141) | -.073 (.163) |
| Nb. Obs | 130,331 | 133,147 | 131,899 | 126,307 | 116,822 |

Impact of STW in 2009 on employment growth and firms survival in 2010
IV estimations. Robust standard errors, clustered at industry \times département
level

5. Empirical results

Cost per job saved in 2009

- ▶ On average, each worker on short-time work in 2009 reduced her/his working time by 123 hours
- ▶ Employers got 3.7 euros per subsidized non-worked hour, or 460 euros per worker on short-time work.
- ▶ This amount is small compared to the average annual labor cost in the firms which used short-time work, which is equal to 38,600 euros.
- ▶ Cost per job created: $\text{Number of jobs saved} / \text{total cost} = 2,619 \text{ euros}$
- ▶ Equal to 6.8% of the average annual labor costs in our set of firms, 95% confidence interval [4.2%, 18.4%].

5. Empirical results

Cost per job saved in 2009

- ▶ Very small compared with
 - ▶ hiring subsidies (25% of annual labor cost)
 - ▶ wage subsidies (100% to 200% of annual labor cost)
- ▶ Explanation: short-time work targets workers who are at risk of losing their job because their marginal productivity falls below the marginal labor cost, whereas
 - ▶ wage subsidies are usually given to all workers
 - ▶ hiring subsidies are usually given to all hires

5. Empirical results

Effect on global amount of hours of work

- ▶ Workers on short-time work in 2009 reduced their hours of work by 8% of the average annual number of hours of work per job.
- ▶ A worker on short-time work saves 0.17 job, 95% confidence interval [0.06, 0.29]
- ▶ Every worker on short-time work in 2009 induced an increase in the total volume of hours of work equal to 10% of the average number of hours per job, 95% confidence interval [-1%, 21%]
- ▶ All in all, short-time work did not only save jobs, also limited the drop in the total number of hours

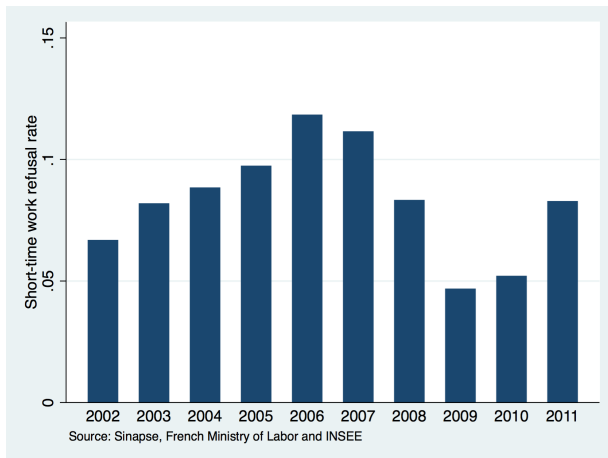
Conclusion

- ▶ Short-time work in 2009 has been an effective policy to save jobs: low cost compared with other policies (employment subsidies, creation of public jobs)
- ▶ Short-time work
 - ▶ deteriorates allocative efficiency → Cooper, Meyer, Schott, (2017)
 - ▶ induces windfalls for firms and workers
- ▶ Possible to reduce these windfalls
 - ▶ target at firms with large drop in revenue
 - ▶ lower the threshold of hours below which unworked hours are subsidized
- ▶ Important to introduce experience rating
 - ▶ Justification of short-time work: imperfect financial markets
 - ▶ Recurrent short-time work is inefficient (Cahuc, Nevoux, 2017)

A.1. Hike in short-time work

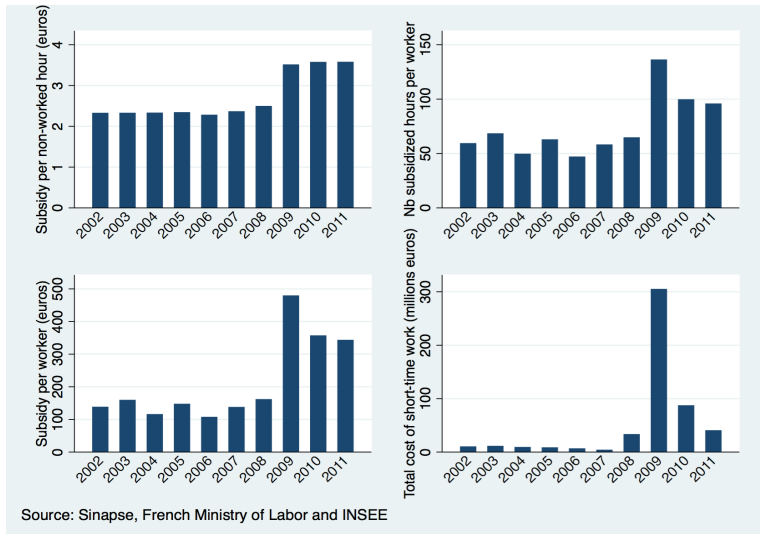
- ▶ The strong hike in short-time work has been boosted by the public authorities:
 - ▶ December 2008: compensated short time hours increased from a maximum of 600 to 800 with a duration increasing from 4 to 6 weeks
 - ▶ January 2009: the allocation increased from 50 to 60% of the previous gross hourly wage and the subsidy received by the establishment has been expanded
 - ▶ May 2009: creation of long-term short-time work which can be implemented during a period of at least 3 months up to 12 months. The allocation is set to 75% of the previous gross hourly wage. The establishment receives an additional subsidy.
 - ▶ Furthermore, several ministerial circulars and directives have been sent to the local authorities in charge of short-time work, calling for an easier access to this scheme.

A.1. Hike in short-time work



Short-time work refusal rate

A.1. Hike in short-time work



A.2. Short-time work use (1)

| | Dep variable: STW take-up |
|--|---------------------------|
| STW in dept \times sector cell (2008) | 83.85*** (3.28) |
| Ctg zone revenue growth rate | -10.10*** (1.08) |
| Ctg zone \times sector revenue growth rate | 127.2*** (22.38) |
| Past workers turnover rate | -.10*** (.01) |
| Past hours worked per employee/year | -.01*** (.00) |
| Past hourly wage | -.29*** (.03) |
| Past share of temporary jobs | -.40*** (.04) |
| Nb observations | 779,367 |

A.2. Short-time work use (2)

| | Dep variable: STW take-up |
|--|---------------------------|
| Past firm size (ref: 1 to 9 employees) | |
| from 10 to 49 employees | 11.60*** (.10) |
| from 50 to 249 | 14.88*** (.32) |
| from 250 to 999 | 18.01*** (.95) |
| 1000 and more | 18.26*** (4.23) |
| Past leverage | 10.15*** (.03) |
| Adj- R^2 | 0.10 |
| Nb observations | 779,367 |

A.3. Related literature

▶ Theoretical literature

- ▶ Burdett and Wright, 1989, Van Audenrode, 1994 → short-time work is favorable to employment but distorts downwards the number of hours worked per employee
- ▶ Braun and Brügemann, 2012 → short-time work can be welfare improving if firms have limited access to financial markets.
- ▶ Our paper → short-time work can save jobs in firms that face large drop in revenue, but reduces hours worked without saving any job in firms which face moderated drop in revenue

A.3. Related literature

- ▶ Empirical literature
 - ▶ Macro data: Abraham and Houseman, 1994, 2014, Boeri and Bruecker, 2012, Brey and Hertweck, 2015, Cahuc and Carcillo, 2011, Hijzen and Venn, 2011, Hijzen and Martin, 2012, van Audenrode, 1994 → positive employment effects
 - ▶ Micro data: Balleer, Gehrke, Lechthaler, and Merkl, 2016, Bellman, Gerner, Upward, 2012, Boeri and Bruecker, 2011, Kruppe and Scholz, 2014, Niedermayer and Tilly, 2015, Calavrezo, Duhautois and Walkowiak (2010) → mixed effects
 - ▶ Our paper → rich information on all firms, allow us to implement IV strategy, show heterogeneous effects, compute cost per job saved