Incidence of Social Security Contributions: Evidence from France

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Institut des politiques publiques (IPP)

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Motivation

- **Social Security contributions (SSCs)**
  - compulsory payments paid to general government that confer *entitlement* to receive a future social benefit
  - taxation of earnings (not capital income)
  - nominally split between employee and employers
  - usually capped at threshold

Large share of tax revenues

- 26% of tax revenues in OECD in 2013
- France: 17% of GDP
- Japan: 12% of GDP
- OECD average: 9% of GDP

- substantial variation in employer/employee split
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    - France: 17% of GDP
    - Japan: 12% of GDP
    - OECD average: 9% of GDP
  - substantial variation in employer/employee split
Social Security Contributions as a % of GDP, 2013

Source: OECD.Stat
Employer SSCs as a % of GDP, 2013

Source: OECD.Stat
Motivation

- **Research question: what is the incidence of SSCs?**
  - is short-run incidence different from long-run?
  - does tax-benefit linkage matter for incidence?

- Textbook view
  - “knowledge of statutory incidence tells us essentially nothing about who really pays the tax” (Rosen, 2002)
  - “payroll taxes are borne fully by workers” (Gruber, 2007)

- But empirical evidence is mixed
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- But empirical evidence is mixed
Literature

• Macro evidence
  – Labor income shares fairly stable

• Early micro studies
  – Hamermesh (1979); Neubig (1981); Holmlund (1983)

• Quasi-experimental studies
  – Gruber (1994): Mandated maternity benefits
  – Bennmarker et al. (2009), Korkeam¨ aki (2011); Lehmann et al (2013): reductions in SSCs
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Literature

- Recent evidence (Saez et al. QJE 2012)
  - Greek reform affecting adjacent cohorts
  - Economic incidence aligned with statutory incidence

- Even more recent evidence (Saez et al. 2017)
  - Swedish reform reducing employer SSCs for under 25
  - No impact on gross wages, but impact on employment

- Limited evidence on tax-benefit linkage
  - Original motivation for SSCs is the efficiency gain from tax-benefit linkage (Musgrave, 1959; Summers, 1989; Gruber, 1997)
  - Workers should incorporate future entitlement into their labor supply response
  ⇒ full incidence on workers

- No direct empirical evidence
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    ⇒ full incidence on workers
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Paper’s Contribution

• Contributions
  – Consider more typical SSC variations than previous literature
  – Estimate long-run vs. short-run incidence
  – Provide evidence on how tax-benefit linkage matters for incidence

• What we do
  – Exploit three large employer SSC reforms in France over the period 1976–2010
  – One reform with tax-benefit linkage, two without
  – DiD analysis based on administrative panel data on earnings
Preview of Results

- **SSCs increases with little or no tax-benefit linkage**
  - Evidence of increased labor cost, i.e., the absence of full tax shifting to workers
  - Estimated employer share of the tax burden between 55% and 88%
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- **SSCs increases with strong and salient tax-benefit linkage**
  - Evidence of full shifting of increases in employer SSCs
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- **SSCs increases with strong and salient tax-benefit linkage**
  - Evidence of full shifting of increases in employer SSCs

- **Interpretation**
  - Evidence that the tax-benefit linkage matters for incidence
  - We discuss possible explanations for the non-standard result of long-term incidence of SSCs on employers
Outline

1. Introduction
2. Conceptual framework
3. SSC reforms in France
4. Empirical strategy and data
5. Results
6. Conclusion
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Definitions

- **Wage concepts**
  - Gross hourly wage or posted wage $w$
  - Hourly labor cost $z$: gross wage + employer SSCs
  - Labor cost is similar to total compensation

- **Earnings’ notations**
  - $h$: hours of work
  - $zh$: labor cost
  - $wh$: gross earnings
Conceptual framework

- **Employer SSC taxation**
  - Consider a flat-rate employer SSC $\tau$
  - SSC schedule in France is based on gross hourly wage
  - $q$: tax-benefit linkage = extent to which employees value employer contributions (Gruber, 1997)

- **Labor demand/supply equations**

\[
\begin{align*}
D & = D(z) \\
S & = S(z \ast (1 - (1 - q)\tau))
\end{align*}
\]
Incidence Formula

- Incidence formula with possible linkage

\[ \varepsilon_{z|1-\tau} = -(1 - q) \frac{\varepsilon_S}{\varepsilon_D + \varepsilon_S} \] (1)
Incidence Formula

● Incidence formula with possible linkage

\[ \varepsilon_{z|1-\tau} = -(1 - q) \frac{\varepsilon^S}{\varepsilon^D + \varepsilon^S} \]  

(1)

● Three polar cases:

(1) \( \varepsilon^D \gg \varepsilon^S \) \( \Rightarrow \) full incidence on workers \( (\varepsilon_{z|1-\tau} \approx 0) \)

(Usual assumptions in the labor supply/elasticity of taxable income literature)
Incidence Formula

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    (Usual assumptions in the labor supply/elasticity of taxable income literature)

  (2) Full linkage \( (q = 1) \) \( \Rightarrow \) full incidence on workers
    
    \( (\varepsilon_{z|1-\tau} \approx 0) \)
Incidence Formula

- Incidence formula with possible linkage

\[
\varepsilon_{z|1-\tau} = -(1 - q) \frac{\varepsilon^S}{\varepsilon^D + \varepsilon^S}
\]  

(1)

- Three polar cases:
  1. \(\varepsilon^D \gg \varepsilon^S\) \(
\Rightarrow\) full incidence on workers (\(\varepsilon_{z|1-\tau} \approx 0\))
     (Usual assumptions in the labor supply/elasticity of taxable income literature)
  2. Full linkage (\(q = 1\)) \(
\Rightarrow\) full incidence on workers (\(\varepsilon_{z|1-\tau} \approx 0\))
  3. No linkage (\(q = 0\)) and \(\varepsilon^S \gg \varepsilon^D\) \(
\Rightarrow\) full incidence on employers (\(\varepsilon_{z|1-\tau} \approx -1\))
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SSC Reforms in France

- **SSCs in France**
  - Many different SSCs
    - contributory: pensions, unemployment insurance
    - non-contributory: family, health care
  - Different SSC schedule for public/private wage earners and executives/non-executives
SSC Reforms in France

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• SSC schedule
  - SSC schedule applied to gross (posted) hourly wage
  - Social Security Threshold (SST) is around P70
  - SSC schedule applied to different earnings brackets:
    0–1 SST (≈P70), 1–4 SST (≈P98)
  - We exploit employer SSCs increases above the SST
Marginal Employer SSC Rates, Non-Executives, 1976–2010

Sources: IPP Tax and Benefit Tables (April 2016); TAXIPP 0.4.
Marginal Employer SSC Rates, Non-Executives, 1976–2010

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Reform 1
Uncapping of health SSCs

Reform 2
Uncapping of family SSCs

Reform 3
Increase in pensions SSCs

Year

Sources: IPP Tax and Benefit Tables (April 2016) ; TAXIPP 0.4.
SSC Reforms in France

- Reform 1: Uncapping of Health Care SSCs
  - Health care employer SSCs capped at the SST until 1980
  - Uncapped in 2 years (Nov. 1981 and Jan. 1984)
  - Employer SSC rate above the SST: +9.5 ppts
  - No change in employee SSC rate
SSC Reforms in France

● Reform 1: Uncapping of Health Care SSCs
  – Health care employer SSCs capped at the SST until 1980
  – Employer SSC rate above the SST: +9.5 ppts
  – No change in employee SSC rate

● Health Care SSCs: no tax-benefit linkage
  – Health care insurance covers almost all French residents
  – No change in benefits when increases in SSC rate
  – Health care SSCs are decided unilaterally by the French government
SSC Reforms in France

- **Reform 2: Uncapping of Family SSCs**
  - Family employers SSCs capped at the SST until 1988
  - Uncapped in 2 years (1989-90)
  - Employer SSCs above the SST: +8.2 ppts
  - Small reduction in employer SSC rate below the SST
  - No employee SSCs
SSC Reforms in France

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  - Family employers SSCs capped at the SST until 1988
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  - Small reduction in employer SSC rate below the SST
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- **Family SSCs: no tax-benefit linkage**
  - Family SSCs fund child benefit: universal benefit to all French families
  - No tax-benefit linkage
  - Family SSCs are decided unilaterally by the French government
## Marginal SSC rates before/after reforms

<table>
<thead>
<tr>
<th></th>
<th>Employer SSCs</th>
<th>Employee SSCs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Under SST</td>
<td>1 to 3 SST</td>
</tr>
<tr>
<td>Reform 1: Uncapping of health care SSCs (1981 and 1984)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>38.1</td>
<td>10.2</td>
</tr>
<tr>
<td>1984</td>
<td>39.0</td>
<td>19.7</td>
</tr>
<tr>
<td>Difference</td>
<td>0.9</td>
<td>9.5</td>
</tr>
<tr>
<td>Reform 2: Uncapping of family SSCs (1989 and 1990)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1988</td>
<td>39.2</td>
<td>20.2</td>
</tr>
<tr>
<td>1991</td>
<td>36.3</td>
<td>28.4</td>
</tr>
<tr>
<td>Difference</td>
<td>−2.9</td>
<td>8.2</td>
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*Sources: IPP Tax and Benefit Tables (April 2016); TAXIPP 0.4.*
SSC Reforms in France

- **Reform 3: Non-executives Pensions SSCs**
  - Reform decided in April 1996
  - Gradual increase (2000–2005) in SSC rates for earnings between 1 and 3 SST
  - Employer SSCs: +7.8 ppts
  - Employee SSCs: +4.5 ppts
  - New firms created from 1997 onwards experienced faster phasing-in

- **Complementary pension schemes**
  - Mandatory private pay-as-you-go pension scheme
  - Managed by employee and employer unions
  - Little oversight from French government
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SSC Reforms in France

- **Strong tax-benefit linkage**
  - Point-based system (similar to NDC system)
  - Pension $P_R$ is computed from past contributions (with shadow prices $p_{b,t}$, $p_{s,R}$)

\[
P_R = \sum_{t=t_0}^{R-1} \frac{\tau_t \cdot w_t}{p_{b,t}} \times p_{s,R}
\]

- Additional SSC paid led to increased pension benefit for individuals affected

\[
\Delta P_R = \left( \sum_{t=t_0}^{R-1} \frac{w_t}{p_{b,t}} \times p_{s,R} \right) \Delta \tau
\]
SSC Reforms in France

- **Salient tax-benefit linkage**
  - Anecdotal evidence suggesting that the increase in pension benefit was understood
  - Newspaper reported the increase in pension benefits:

  "*the agreement also entails that wage earners whose wage is above the Social Security threshold would be able to constitute themselves a better pension: the contribution rate will be raised to 16 percent by 2005 for workers of existing firms, and as soon as 2000 for firms created after January 1st 1997*"

Marginal SSCs before/after reforms

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<td>1 to 3 SST</td>
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<tr>
<td>1999</td>
<td>38.9</td>
<td>30.8</td>
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<tr>
<td>2005</td>
<td>39.1</td>
<td>38.5</td>
</tr>
<tr>
<td>Difference</td>
<td>0.2</td>
<td>7.7</td>
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Sources: IPP Tax and Benefit Tables (April 2016); TAXIPP 0.4.
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Empirical strategy

- **Difference-in-differences estimation**
  - Treated: workers with gross earnings > SST before reform
  - Control: workers with gross earnings < SST before reform
  - Before/after comparisons: up to 9 years after reforms

- **First stage**: relative change in average employer SSCs for treated vs. control

- **Reduced-form outcomes**: relative changes in
  - labor cost and gross earnings (all reforms)
  - hourly labor cost and hourly wage (reform 3)

- **2SLS**: Share of employer SSCs borne by employers
Empirical strategy

Average SSC rate vs. Social Security Threshold rate

CONTROL GROUP

TREATMENT GROUP

Before reform

After reform

Gross earnings

- Before reform
- After reform
Data

- **DADS panel 2010**
  - Employer-employee administrative data reported by employers to SS schemes
  - 1/25 sample for years 1976-2001, 1/12 from 2002 onwards
  - 1.1 million workers each year (2.2 million in recent years)
Data

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- **Available information**
  - Start and end of job spell, firm size, sector, occupation
  - Net taxable earnings available throughout the period
  - Hours available from 1993 onwards
Data

- **Microsimulation model TAXIPP**
  - Model developed at the Institute of Public Policy (IPP)
  - Very detailed simulations of SSCs (over 50 schedules!)

- **Simulating SSCs using TAXIPP**
  - Compute gross earnings from net taxable earnings
  - Obtain labor cost by adding employer SSCs to gross earnings
  - Before 1993 our simulations are accurate only for full-time, full-year wage earners (no information on hours for part-time wage earners)
Sample selection

- **Sample restrictions**
  - Full-time, full-year non-executive workers
  - Observed in reference year (i.e., last pre-reform year)
  - Construct unbalanced panel around reform years

- **Definition of treated/controls**
  - Trade-off: proximity to threshold vs. treatment intensity
  - Groups defined based on gross earnings in reference year
    - Treated: between SST and 1.4 SST
    - Controls: between 0.9 SST and SST
### Summary statistics

<table>
<thead>
<tr>
<th>Sample:</th>
<th>Control Group</th>
<th>Treatment Group</th>
</tr>
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<tbody>
<tr>
<td><strong>Reform 1: Uncapping of Health Care SSCs (1981 and 1983)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rank in the earnings distribution</td>
<td>[P56–P65]</td>
<td>[P65–P85]</td>
</tr>
<tr>
<td>Mean gross earnings (euros)</td>
<td>22,418</td>
<td>27,452</td>
</tr>
<tr>
<td>Number of individuals</td>
<td>35,044</td>
<td>73,297</td>
</tr>
<tr>
<td><strong>Reform 2: Uncapping of Family SSCs (1989 and 1990)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rank in the earnings distribution</td>
<td>[P58–P67]</td>
<td>[P67–P85]</td>
</tr>
<tr>
<td>Mean gross earnings (euros)</td>
<td>26,073</td>
<td>31,767</td>
</tr>
<tr>
<td>Number of individuals</td>
<td>26,134</td>
<td>49,337</td>
</tr>
<tr>
<td>Rank in the earnings distribution</td>
<td>[P62–P70]</td>
<td>[P70–P87]</td>
</tr>
<tr>
<td>Mean gross earnings (euros)</td>
<td>30,324</td>
<td>36,710</td>
</tr>
<tr>
<td>Number of individuals</td>
<td>21,808</td>
<td>37,326</td>
</tr>
</tbody>
</table>

*Sources: Panel DADS 2010; TAXIPP 0.4.*
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Reform 1 (Uncapping of Health care SSCs): Gross Earnings

Sources: DADS Panel 2010; TAXIPP 0.4.
Reform 1 (Uncapping of Health care SSCs): Labor Cost

Sources: DADS Panel 2010; TAXIPP 0.4.
Reform 2 (Uncapping of Family SSCs): Gross Earnings

![Graph showing Gross Earnings over years with Treatment and Control groups.]

**Sources:** DADS Panel 2010; TAXIPP 0.4.
Reform 2 (Uncapping of Family SSCs): Labor Cost

Sources: DADS Panel 2010; TAXIPP 0.4.
Reform 3 (increase in Pensions SSCs): Gross Hourly Wage

Sources: DADS Panel 2010; TAXIPP 0.4.
Reform 3 (increase in Pensions SSCs): Hourly Labor Cost

Sources: DADS Panel 2010; TAXIPP 0.4.
Reform 3 (increase in Pensions SSCs): Gross Earnings

Sources: DADS Panel 2010; TAXIPP 0.4.
Reform 3 (increase in Pensions SSCs): Labor Cost

Sources: DADS Panel 2010; TAXIPP 0.4.
Estimation

- **Specification 1: Reduced form**

\[
\log(1 - \tau_{it}) = \alpha + \theta_i + \theta_t + \sum_{k=1}^{K} \beta_k(T_i \times 1\{t = k\}) + \varepsilon_{it} \tag{2}
\]

\[
\log(z_{it}) = \bar{\alpha} + \bar{\theta}_i + \bar{\theta}_t + \sum_{k=1}^{K} \gamma_k(T_i \times 1\{t = k\}) + \tilde{\varepsilon}_{it} \tag{3}
\]

$\beta_k, \gamma_k$: reduced-form effects of reform after $k$ years

- **2SLS estimate of share of SSC borne by employers:**

  incidence after $k$ years $= \frac{\hat{\gamma}_k}{\hat{\beta}_k}$

- **Standard errors clustered at the individual level**
Reform 1: \( \log(zh) \) vs \( \log(wh) \)

Sources: DADS Panel 2010; TAXIPP 0.4.
Reform 1: Employer Share of Incidence (2SLS)

Sources: DADS Panel 2010; TAXIPP 0.4.
Reform 2: log(zh) vs log(wh)

Sources: DADS Panel 2010; TAXIPP 0.4.
Reform 2: Employer Share of Incidence (2SLS)

Sources: DADS Panel 2010; TAXIPP 0.4.
Reform 1: \( \log(z) \) vs \( \log(w) \)

Years since reference year

Gross hourly earnings
Hourly labour cost

Sources: DADS Panel 2010; TAXIPP 0.4.
Reform 3: 2SLS – z

Sources: DADS Panel 2010; TAXIPP 0.4.
Reform 3: \( \log(zh) \) vs \( \log(wh) \)

Sources: DADS Panel 2010; TAXIPP 0.4.
Reform 3: 2SLS – zh

Sources: DADS Panel 2010; TAXIPP 0.4.
Estimation

- **Specification 2**
  - relax common-trend assumption by including individual-specific linear time trends $\theta_i \cdot t$
  - individual trends are fitted based on up to 5 years of pre-reform data

- Standard errors clustered at the individual level
Reform 1: Employer Share of Incidence – zh – with trends

Sources: DADS Panel 2010; TAXIPP 0.4.
Reform 2: Employer Share of Incidence – zh – with trends

Sources: DADS Panel 2010; TAXIPP 0.4.
Reform 3: Employer Share of Incidence – z – with trends

Sources: DADS Panel 2010; TAXIPP 0.4.
Baseline estimates of employer share of incidence

<table>
<thead>
<tr>
<th>Reform:</th>
<th>Reform 1:</th>
<th>Reform 2:</th>
<th>Reform 3:</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Log(labor cost)</td>
<td>Log(labor cost)</td>
<td>Log(labor cost)</td>
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</tbody>
</table>

**Panel A. Without controlling for individual-specific trends**

<table>
<thead>
<tr>
<th></th>
<th>$t_{0+8}$</th>
<th>$t_{0+9}$</th>
<th>$t_{0+8}$</th>
<th>$t_{0+9}$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.561***</td>
<td>n/a</td>
<td>0.696***</td>
<td>0.546***</td>
</tr>
<tr>
<td></td>
<td>(0.154)</td>
<td>n/a</td>
<td>(0.181)</td>
<td>(0.189)</td>
</tr>
<tr>
<td></td>
<td>−0.014</td>
<td>−0.079</td>
<td>−0.054</td>
<td>n/a</td>
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<tr>
<td></td>
<td>(0.281)</td>
<td>(0.318)</td>
<td>(0.289)</td>
<td>n/a</td>
</tr>
</tbody>
</table>

**Panel B. Controlling for individual-specific trends**

<table>
<thead>
<tr>
<th></th>
<th>$t_{0+8}$</th>
<th>$t_{0+9}$</th>
<th>$t_{0+8}$</th>
<th>$t_{0+9}$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.875***</td>
<td>n/a</td>
<td>0.690***</td>
<td>0.695***</td>
</tr>
<tr>
<td></td>
<td>(0.122)</td>
<td>n/a</td>
<td>(0.236)</td>
<td>(0.243)</td>
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Summary

- **Markedly different estimates**
  - R1 and R2 not statistically different from one another
    ⇒ we reject full shifting to employee 6 years after the SSC increase
  - R3 statistically different from both R1 and R2
    ⇒ full shifting to employees very quickly
Summary

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- **Heterogeneity**
  - Men vs. women: no statistically significant difference
  - Same firm vs. other firms: inconclusive evidence
Robustness checks

- **Placebo reform in 1996**
  - Check common trend assumption
  - No reform between 1992 and 1999
  - Estimate pseudo reform in 1996 (reference year in 1995)
  - Compare evolution of labor cost/gross earnings for treated vs. control
Marginal Employer SSC Rates, non-executives

Reform 1
Uncapping of health SSCs

Reform 2
Uncapping of family SSCs

Reform 3
Increase in pensions SSCs

Sources: IPP Tax and Benefit Tables (April 2016); TAXIPP 0.4.
Placebo Reform (1996): Real Gross Earnings

Sources: DADS Panel 2010; TAXIPP 0.4.
Placebo Reform (1996): Labor Cost

Sources: DADS Panel 2010; TAXIPP 0.4.
Placebo Reform: differential log(labor cost) – no trends

Sources: DADS Panel 2010; TAXIPP 0.4.
Placebo Reform: differential log(labor cost) – w/ trends

Sources: DADS Panel 2010; TAXIPP 0.4.
Robustness checks

• **Sensitivity to definition of treatment group**
  - Closer group to SST: better identification, weak first stage
  - Further away from SST: stronger first stage, weaker identification

• **Robustness check**
  - Check sensitivity to upper bound of treatment group: variation from 1.2 to 1.6 SST
  - Check sensitivity to lower bound of control group: variation from 0.80 to 0.98 SST

[Graphs on lower bound]
Reform 1: sensitivity tests (t8)

Sources: DADS Panel 2010; TAXIPP 0.4.
Reform 2: sensitivity tests (t8)

High earnings (%SST) of the treatment group

Sources: DADS Panel 2010; TAXIPP 0.4.
Reform 3: sensitivity tests (t8)

High earnings (%SST) of the treatment group

Sources: DADS Panel 2010; TAXIPP 0.4.
Behavioral responses

- **Intensive margin responses**
  - We observe hours only for Reform 3
  - We can estimate labor supply responses at the intensive margin
  - We find no statistical effects on hours

- **Extensive margin responses**
  - We test for differential entry rate/exit rate out of treated/control groups
  - Little conclusive evidence
  - Weak evidence of small negative impact on entry into treatment group
Discussion: incidence vs. earnings responses

- **Incidence is a change in wage rate**
  - Hours not observed in the data before 1993
  - Not possible to distinguish incidence from behavioral response
  - Need to assume no behavioral response
Discussion: incidence vs. earnings responses

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- **Incidence or behavioral responses?**
  - We use only full-time employees
  - Substitution effects would lead to a reduction in hours, hence lower earnings (opposite for income effects)
  - We interpret our earnings responses as being a close approximation of incidence
Discussion: incidence on employers?

- **Standard view on SSC incidence called into question**
  - Evidence of mid term incidence of SSCs on employers
  - Confirms Saez et al. (2012) results with more typical reform
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  - Small $\varepsilon_S$ and $\varepsilon_D$ could rationalize the results
    $\iff$ incidence $=0.5$ is not rejected by our estimates
  - Evidence of small $\varepsilon_D$ for continental Europe (Lichter et al. 2015)
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    \[ \text{incidence} = 0.5 \text{ is not rejected by our estimates} \]
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- **Alternative model: fairness model**
  - Could explain nominal incidence (Saez et al., 2012)

- **Rejection of full shifting at the individual level**
  - But not necessarily at firm or market level
Discussion: tax-benefit linkage

• Candidate explanations for marked difference in SSC incidence between reforms 1/2 and 3
  – *Different time period*
    - First reforms in the 1980s, last one in the 1990s
    - Different labor demand/supply elasticities?

• Our interpretation
  – Tax-benefit linkage matters when it is salient and well understood by employees
  – Employer SSCs with little links with benefits are considered ‘firms’ taxes’
  – Rationalizes both Gruber (1997) and Saez et al. (2012)
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Conclusion

- **What have we found?**
  - Empirical evidence suggesting that tax-benefit linkage does matter for SSC incidence
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  – Institutional design of taxation is likely to matter a lot more than previously thought

• Future research
  – Incidence at firm level vs at individual level
Incidence of Social Security Contributions: Evidence from France

Antoine Bozio, Thomas Breda and Julien Grenet

Paris School of Economics (PSE)
Institut des politiques publiques (IPP)

RIETI – International Seminar
Tokyo, 27th November 2017
Earnings vs. hourly wage

From ETI to ETE

- ETI literature has emphasized the advantages of using taxable income (or taxable earnings) measures:
  
  (i) to incorporate other margins than physical hours
  
  (ii) to take advantage of administrative tax data (without hours information)

- We consider here elasticity of taxable earnings (ETE)
Earnings vs. hourly wage

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  – We consider here elasticity of taxable earnings (ETE)

• Incidence and behavioral responses
  – ETE \( (\varepsilon_{zh|1-\tau}) \) can be decomposed as:

\[
\varepsilon_{zh|1-\tau} = \varepsilon_{z|1-\tau} + (\varepsilon_{z|1-\tau} + 1)\varepsilon_{h|z(1-\tau)} \tag{4}
\]
  – Earnings’ responses are a mix of behavioral responses and incidence effects
Earnings vs. hourly wage

- **How to recover behavioral effects?**
  - Usual assumption is to assume incidence is fully on workers
    
    \[ \varepsilon_{z|1-\tau} = 0 \]
    
    \[ \Rightarrow \text{ETE provides a measure of behavioral responses only} \]
  - Assumption makes sense in the case of income tax changes
Earnings vs. hourly wage

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  - Assumption makes sense in the case of income tax changes

• **How to recover incidence?**
  - Either assume no behavioral responses
  - Otherwise, behavioral responses will be confused with incidence on employees (if substitution effects dominate)
  - ETE will be a lower bound on the share of employer SSC borne by employers
Reform 3: hours responses – no trends

Sources: DADS Panel 2010; TAXIPP 0.4.
**Behavioral responses**

**Impact of SSC Reforms on Probability of Entering Full-time Employment with Earnings above the SST**

<table>
<thead>
<tr>
<th>Reform:</th>
<th>Reform 1:</th>
<th>Reform 2:</th>
<th>Reform 3:</th>
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