Incidence of Social Security Contributions: Evidence from France

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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

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  - compulsory payments paid to general government that confer *entitlement* to receive a future social benefit
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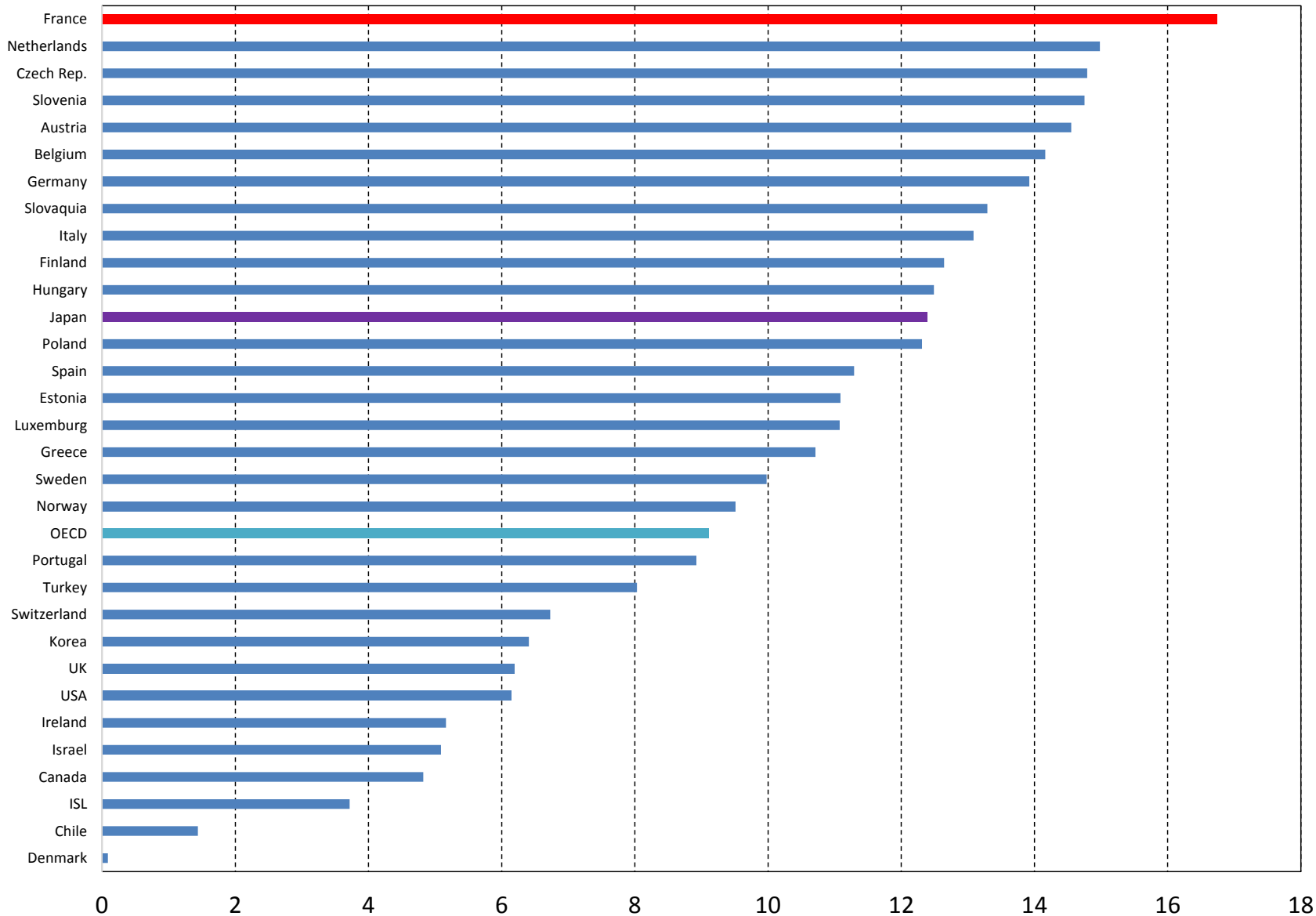
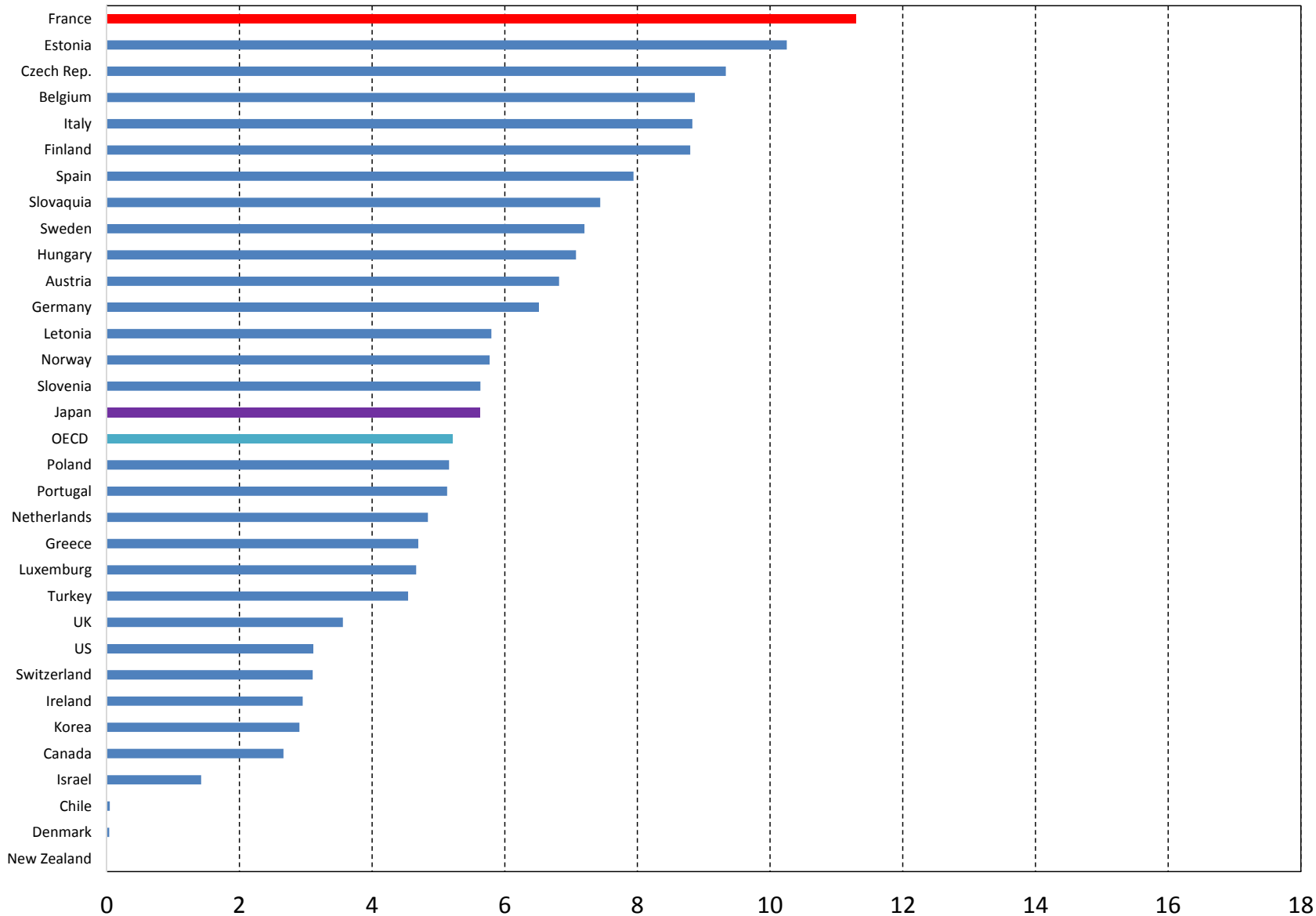
  - nominally split between employee and employers
  - usually capped at threshold
- **Large share of tax revenues**
  - 26% of tax revenues in OECD in 2013
    - France: 17% of GDP
    - Japan: 12% of GDP
    - OECD average: 9% of GDP
  - substantial variation in employer/employee split

Social Security Contributions as a % of GDP, 2013



Source: OECD.Stat

Employer SSCs as a % of GDP, 2013



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- **Research question: what is the incidence of SSCs?**
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  - *"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)

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- But empirical evidence is mixed

Literature

- **Macro evidence**
  - Labor income shares fairly stable
  - Cross-country studies (Brittain, 1971; OECD, 1990; Tyrvainen, 1995; Alesina and Perotti, 1997; Daveri and Tabellini, 2000; Nunziata, 2005; Ooghe et al, 2003)

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- **Early micro studies**
  - Hamermesh (1979); Neubig (1981); Holmlund (1983)

- **Quasi-experimental studies**
  - Gruber (1994): Mandated maternity benefits
  - Anderson and Meyer (1997, 2000): US UI
  - Bennmarker et al. (2009), Korkeamäki (2011); Lehmann et al (2013): reductions in SSCs
  - Gruber (1997): privatization of 1981 Chilean pension system

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- **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
    $\Rightarrow$ full incidence on workers
  - No direct empirical evidence

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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- **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

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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 τ
  - 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**

$$\begin{aligned} D &= D(z) \\ S &= S\big(z * (1 - (1 - q)\tau)\big) \end{aligned}$$

Incidence Formula

- **Incidence formula with possible linkage**

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

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  (2) Full linkage ($q = 1$) $\Rightarrow$ full incidence on workers ($\varepsilon_{z|1-\tau} \approx 0$)
  (3) No linkage ($q = 0$) and $\varepsilon^S >> \varepsilon^D \Rightarrow$ full incidence on employers ($\varepsilon_{z|1-\tau} \approx -1$)

▸ More on ETI vs ETE

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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

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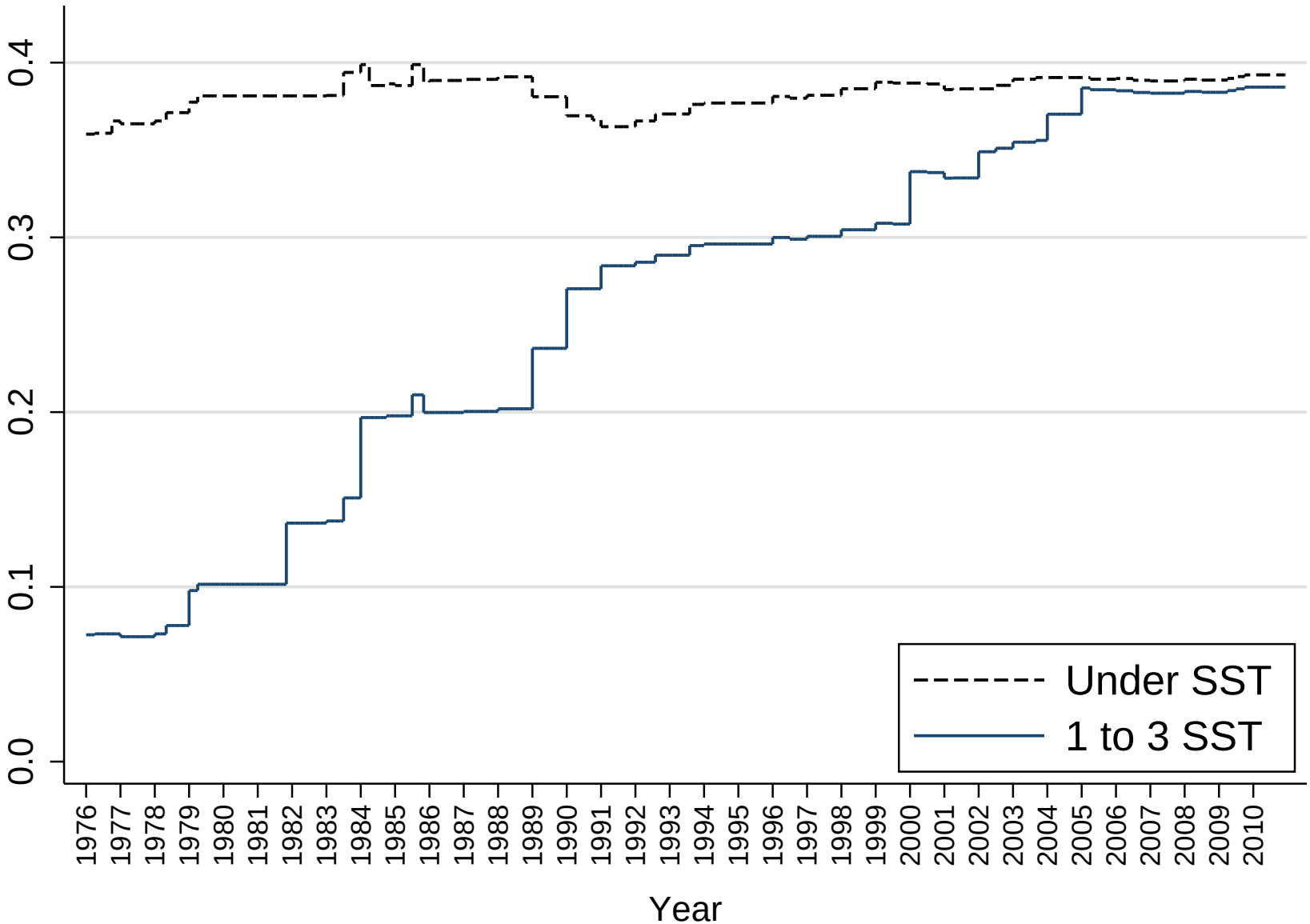
- **SSC schedule**
  - SSC schedule applied to gross (posted) hourly wage
  - Social Security Threshold (SST) is around P70
  - SSC schedule applied to different earnings brackets: 0–1 SST ($\sim$P70), 1–4 SST ($\sim$P98)
  - We exploit employer SSCs increases above the SST

Marginal Employer SSC Rates, Non-Executives, 1976–2010



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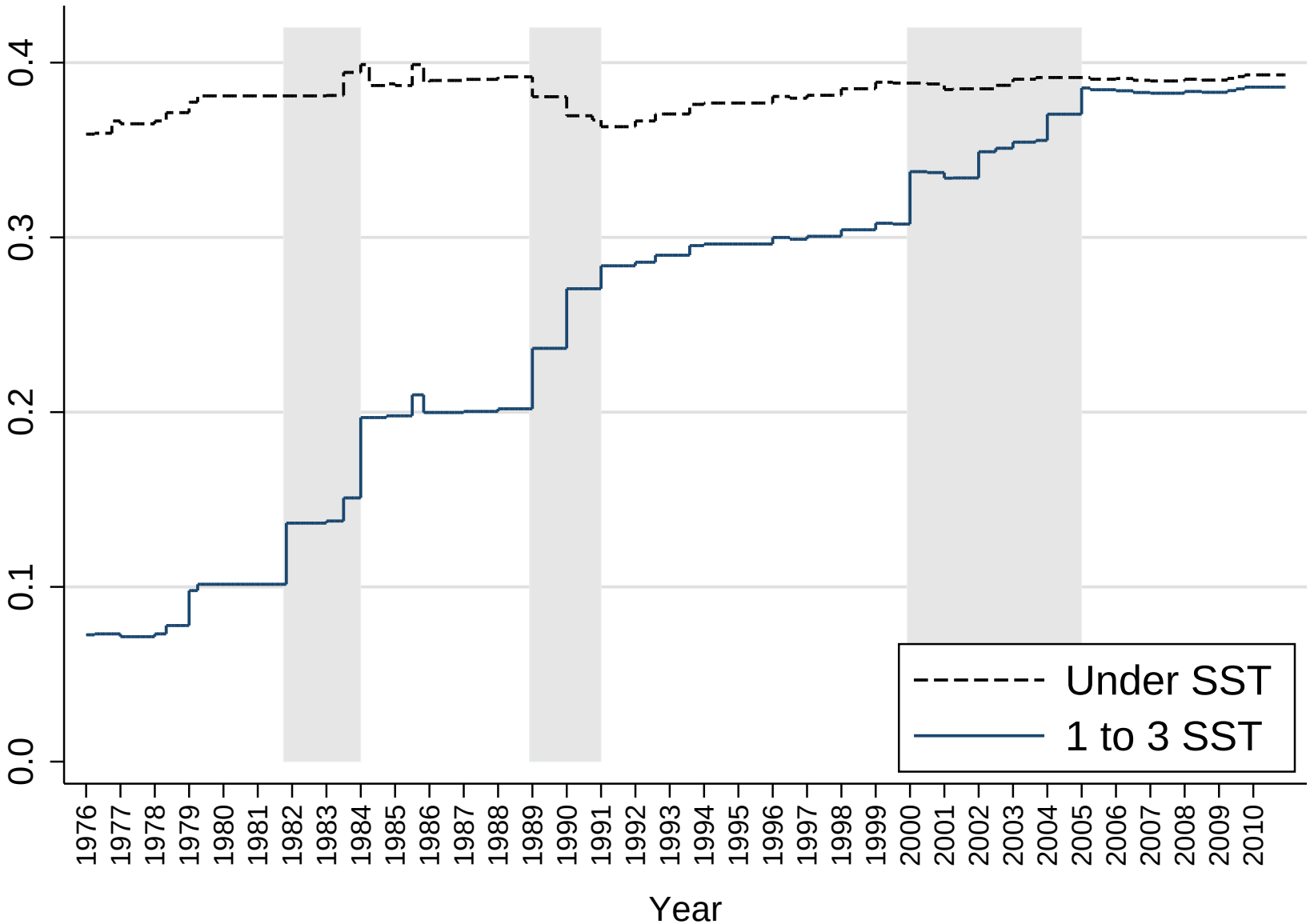

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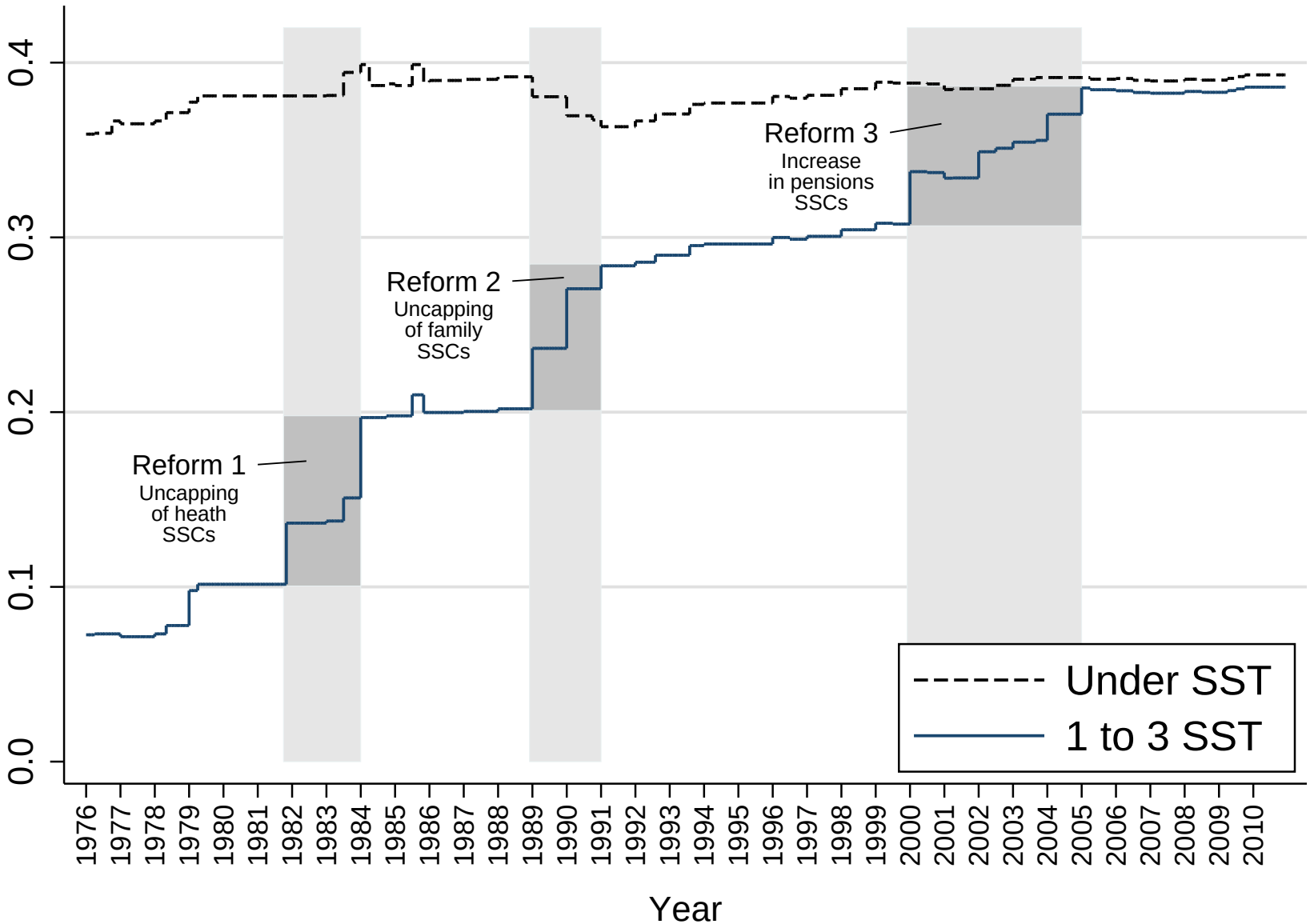

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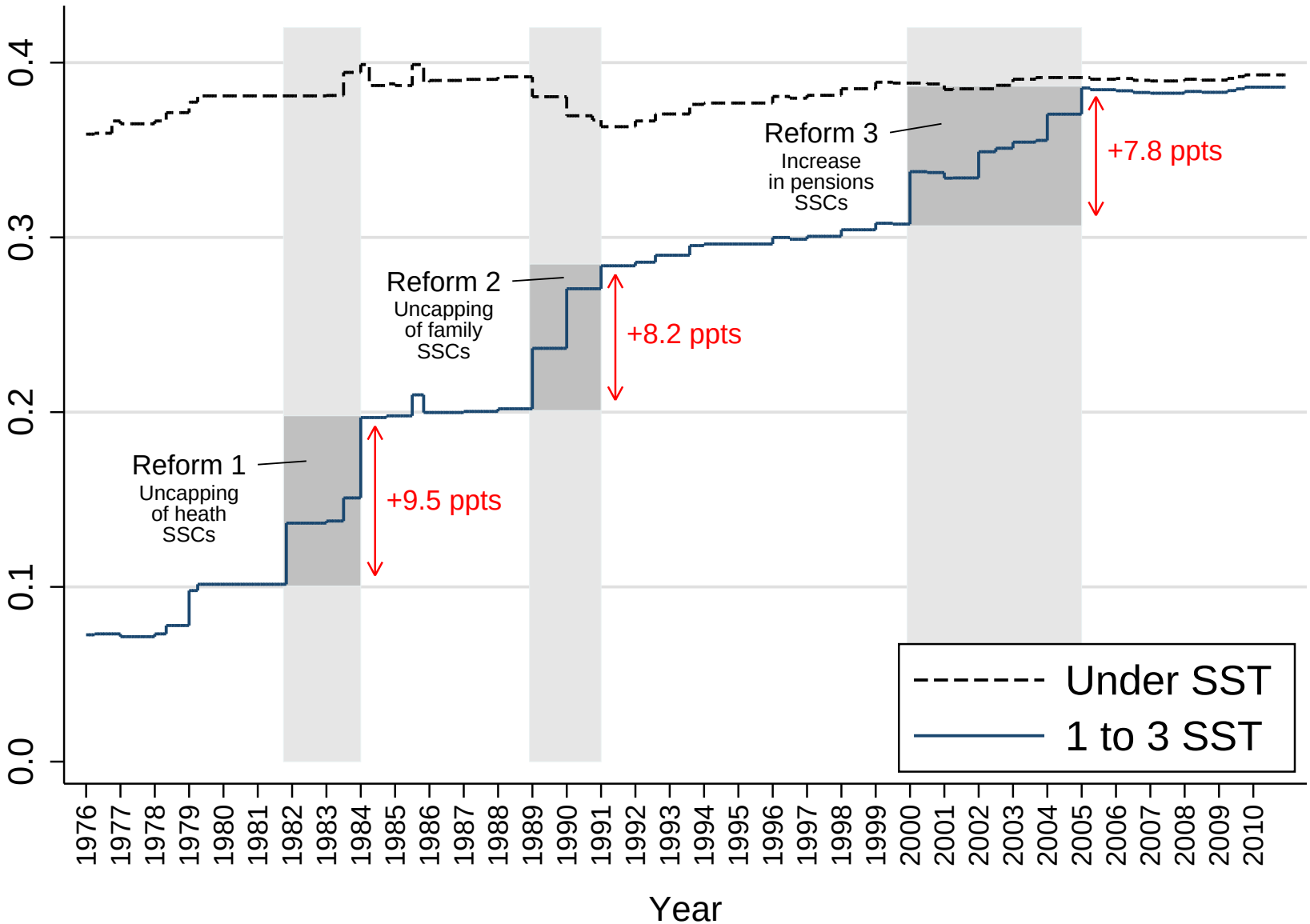

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SSC Reforms in France

- **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

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- **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)
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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

	Employer SSCs			Employee SSCs		
Reform 1: Uncapping of health care SSCs (1981 and 1984)						
	Under SST	1 to 3 SST	Difference	Under SST	1 to 3 SST	Difference
1980	38.1	10.2	−28.0	12.8	8.1	−4.7
1984	39.0	19.7	−19.3	15.2	9.7	−5.5
Difference	0.9	9.5	8.7	2.4	1.6	−0.8
Reform 2: Uncapping of family SSCs (1989 and 1990)						
	Under SST	1 to 3 SST	Difference	Under SST	1 to 3 SST	Difference
1988	39.2	20.2	−19.0	17.0	10.9	−6.1
1991	36.3	28.4	−8.0	17.3	11.3	−6.0
Difference	−2.9	8.2	11.0	0.3	0.4	0.1

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

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

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 $p_{b,t}$, $p_{s,R}$)

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

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

$$\Delta P_R = \left(\sum_{t=t_0}^{R-1} \frac{wh_t}{p_{b,t}} \times p_{s,R} \right) \Delta\tau$$

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*"

Jean-Michel Bezat, "La baisse des retraites complémentaires est programmée", *Le Monde*, 27 April 1996.

Marginal SSCs before/after reforms

	Employer SSCs			Employee SSCs		
Reform 3: Increase in contributory pension SSCs – non-executives (2000–2005)						
	Under SST	1 to 3 SST	Difference	Under SST	1 to 3 SST	Difference
1999	38.9	30.8	−8.1	13.4	7.5	−6.0
2005	39.1	38.5	−0.6	13.6	12.2	−1.5
Difference	0.2	7.7	7.5	0.2	4.7	4.5

Sources: IPP Tax and Benefit Tables (April 2016); TAXIPP 0.4.

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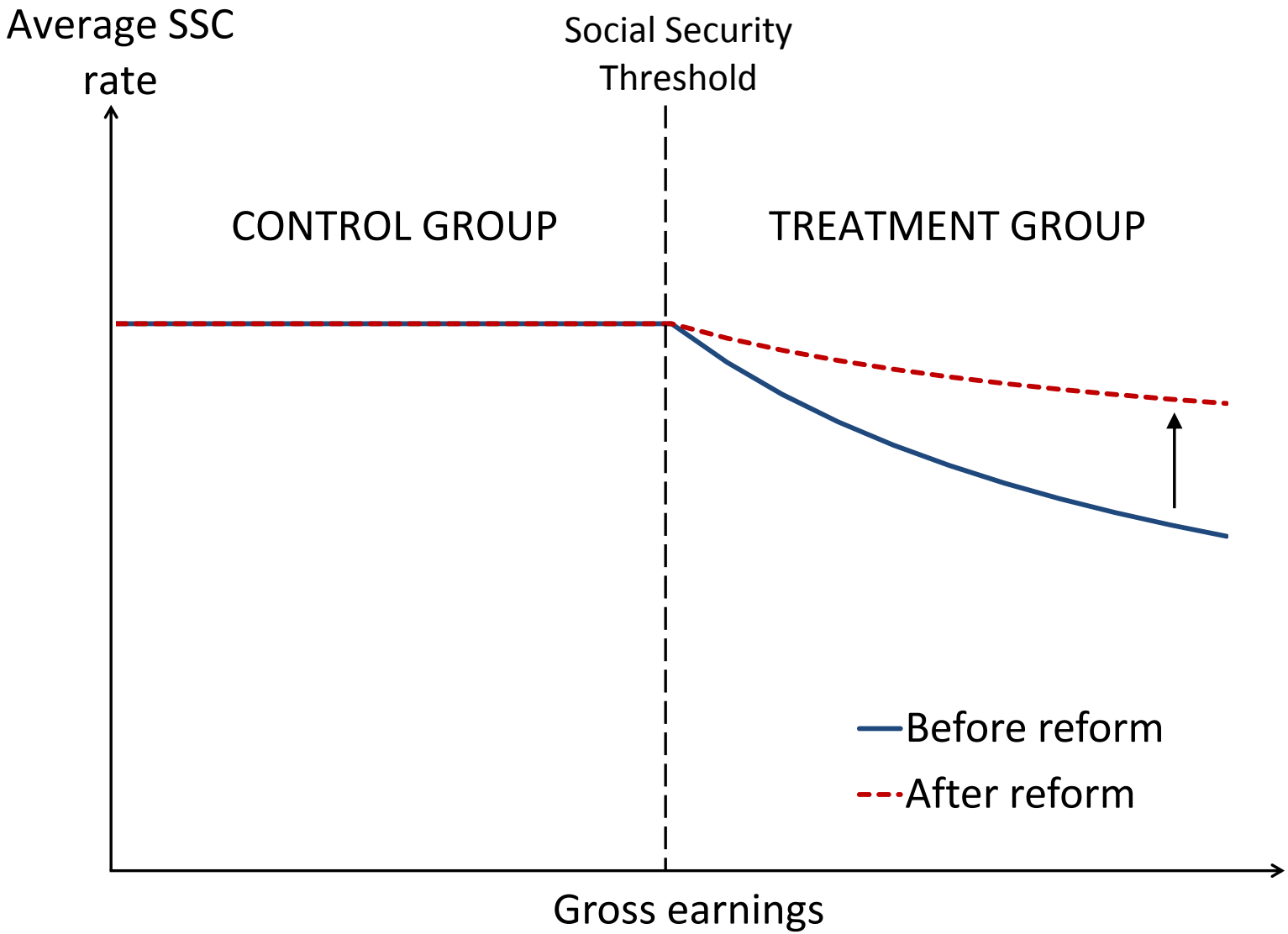
Empirical strategy

- **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



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)
  - Some missing years: 1981, 1983, 1990

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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

Sample:	Control Group	Treatment Group
Reform 1: Uncapping of Health Care SSCs (1981 and 1983)		
Rank in the earnings distribution	[P56–P65]	[P65–P85]
Mean gross earnings (euros)	22,418	27,452
Number of individuals	35,044	73,297
Reform 2: Uncapping of Family SSCs (1989 and 1990)		
Rank in the earnings distribution	[P58–P67]	[P67–P85]
Mean gross earnings (euros)	26,073	31,767
Number of individuals	26,134	49,337
Reform 3: Increase in Pensions SSCs (2000–2005)		
Rank in the earnings distribution	[P62–P70]	[P70–P87]
Mean gross earnings (euros)	30,324	36,710
Number of individuals	21,808	37,326

Sources: Panel DADS 2010; TAXIPP 0.4.

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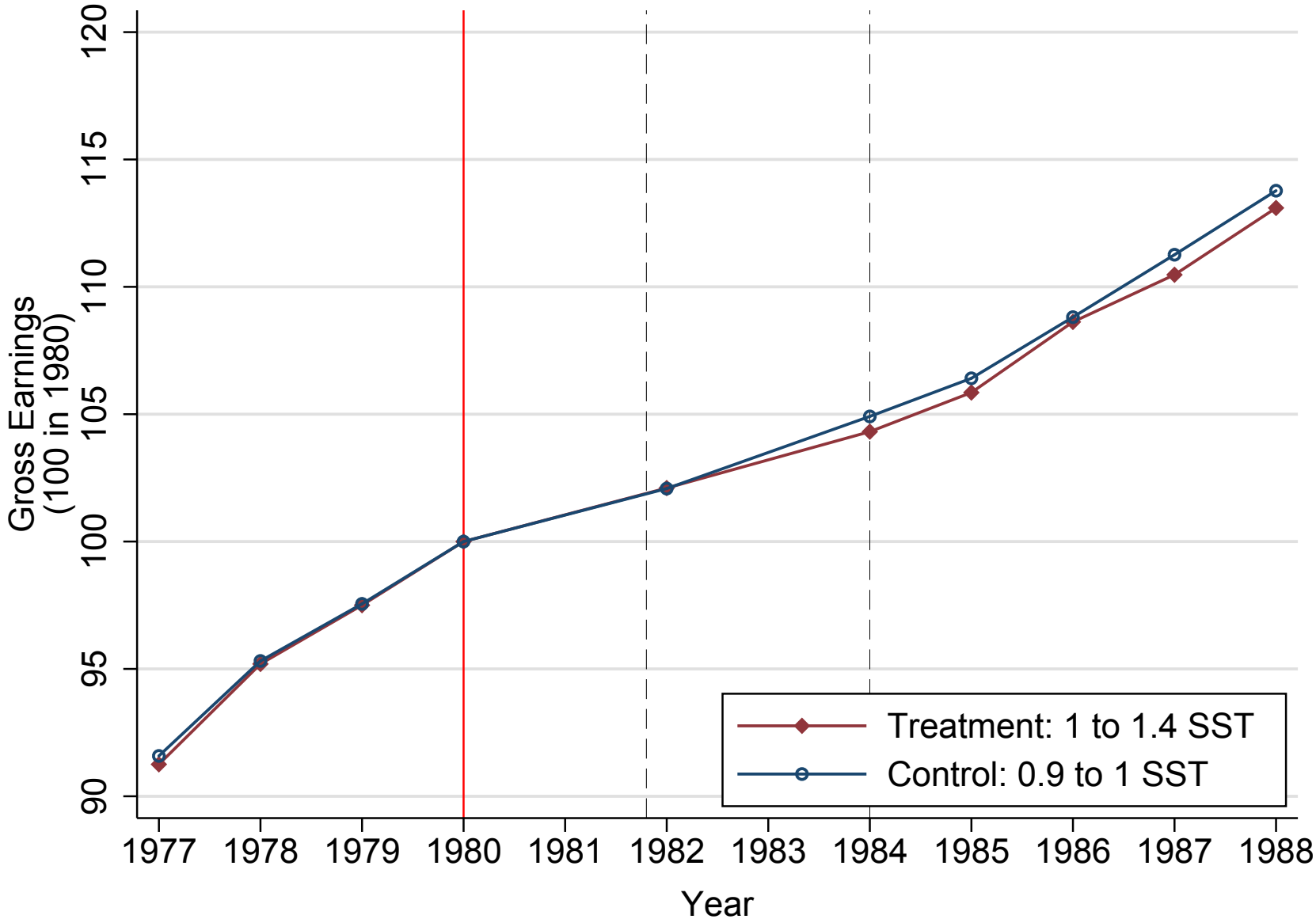
Reform 1 (Uncapping of Health care SSCs): Gross Earnings



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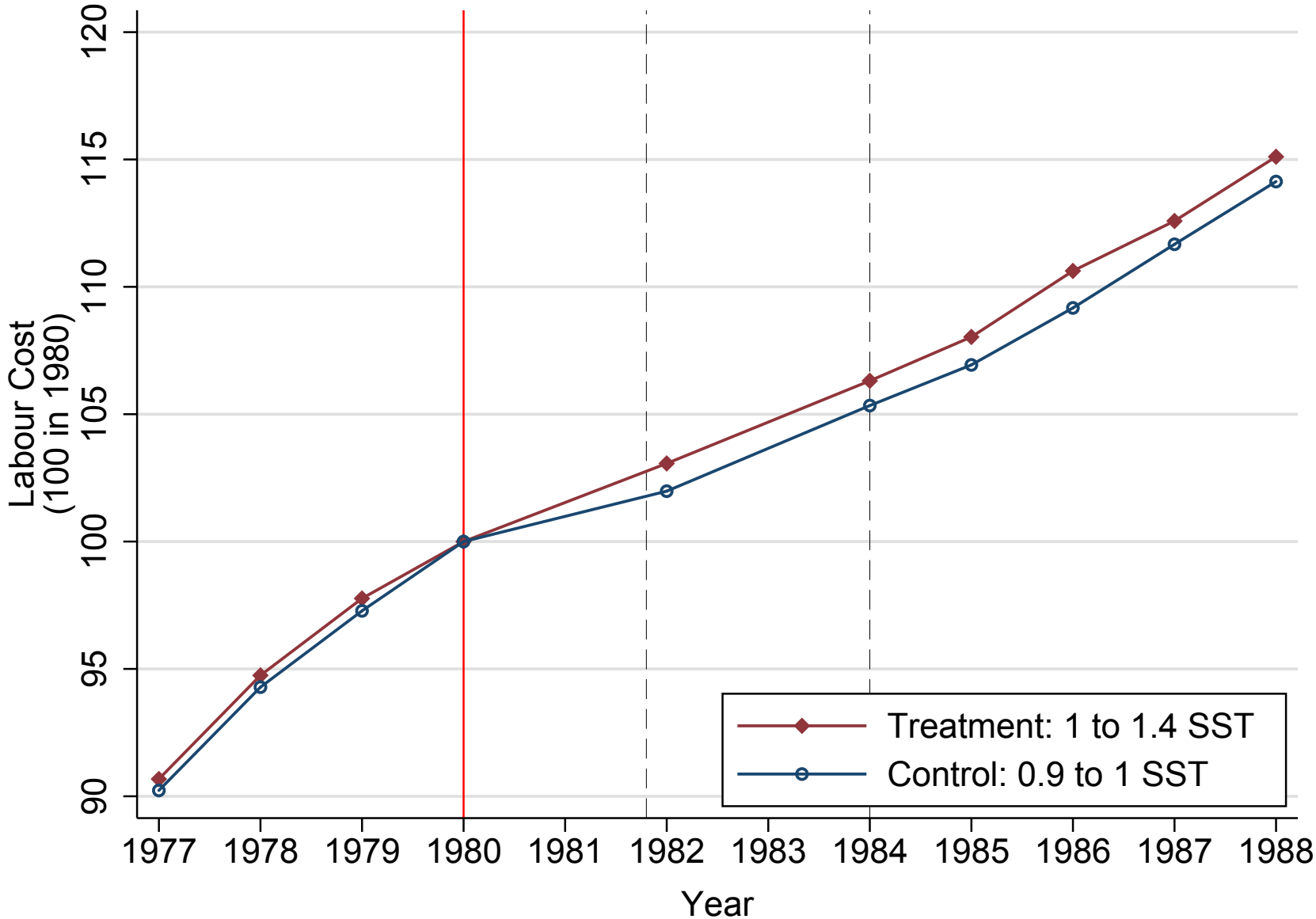
Reform 1 (Uncapping of Health care SSCs): Labor Cost



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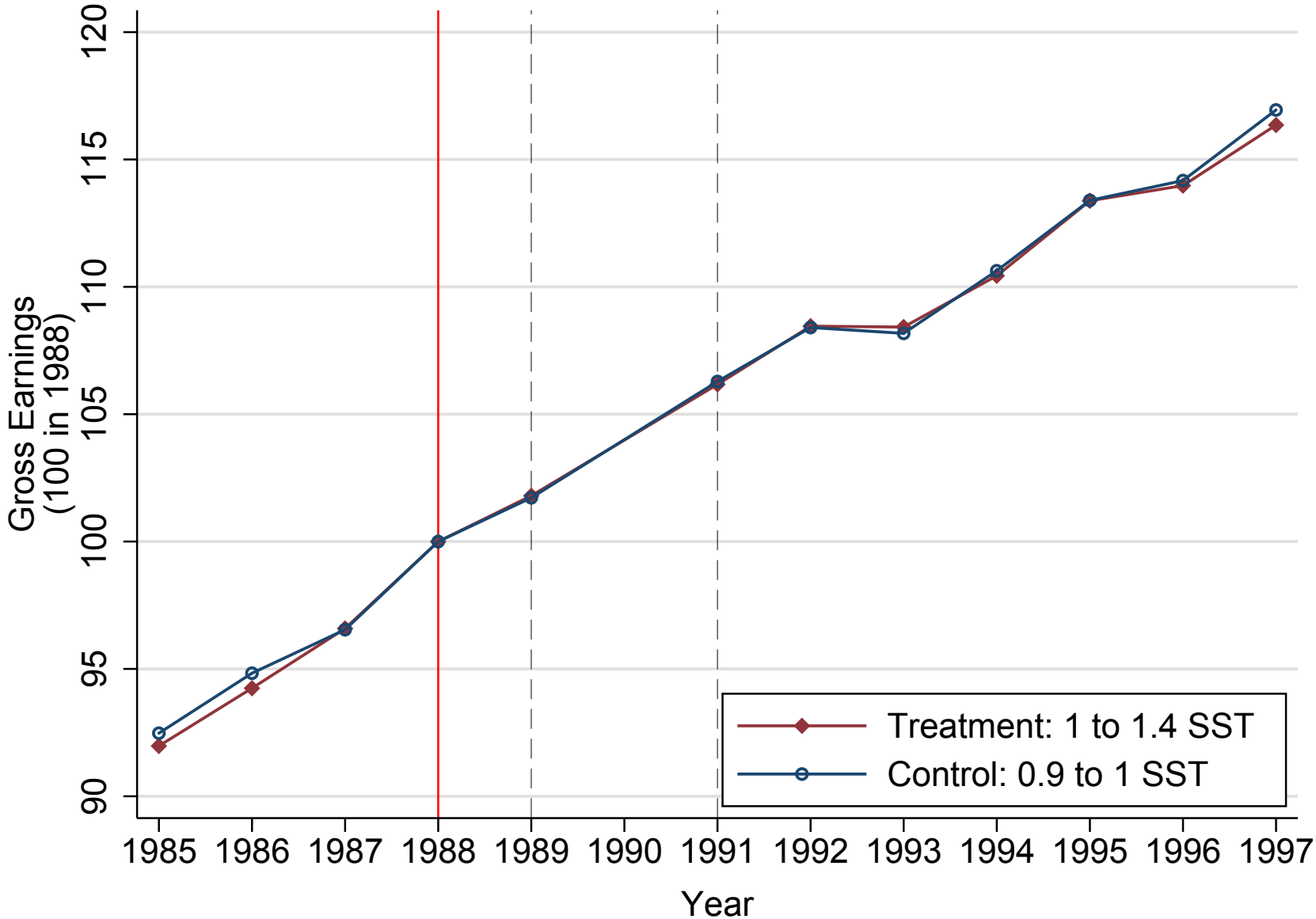
Reform 2 (Uncapping of Family SSCs): Gross Earnings



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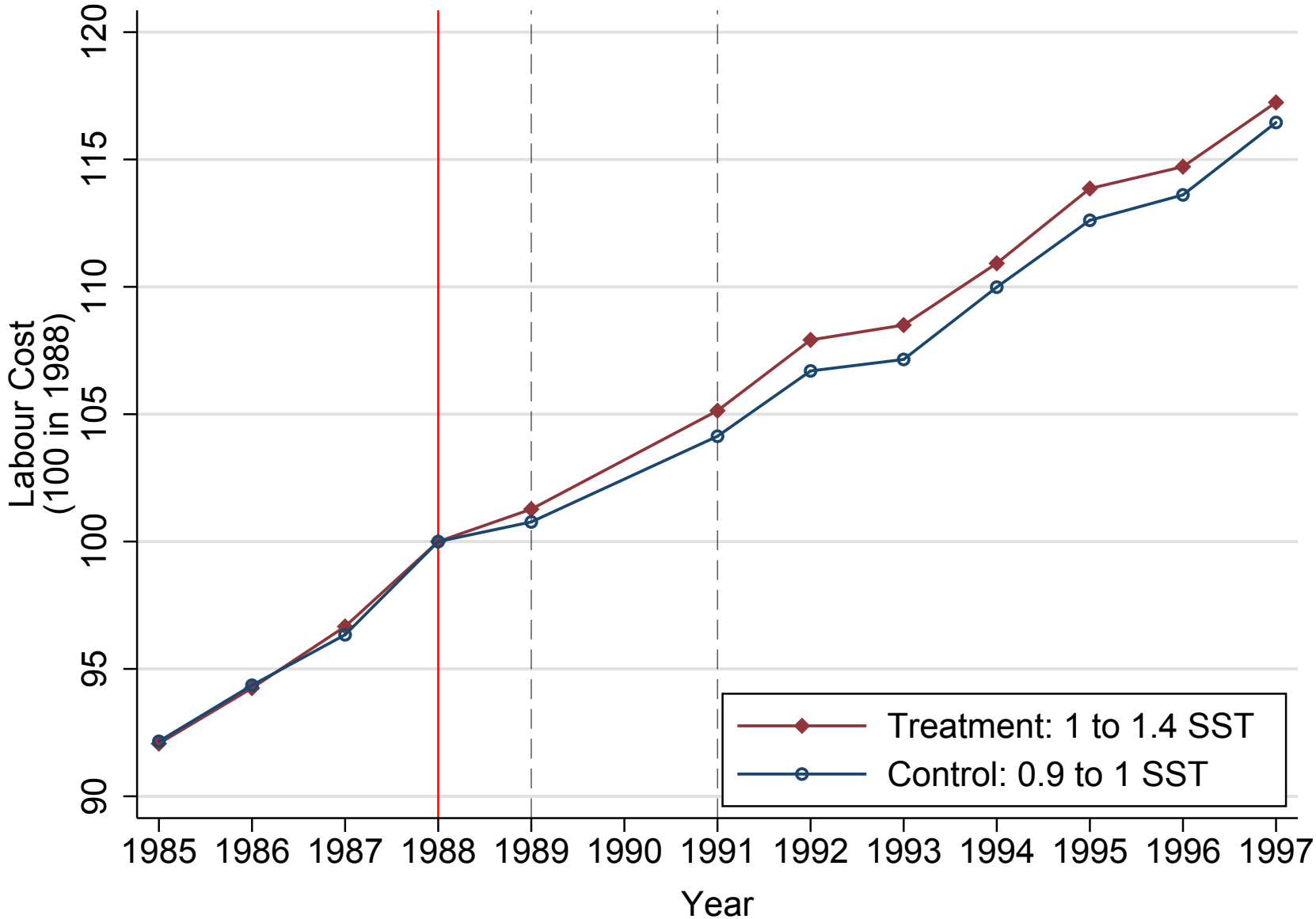

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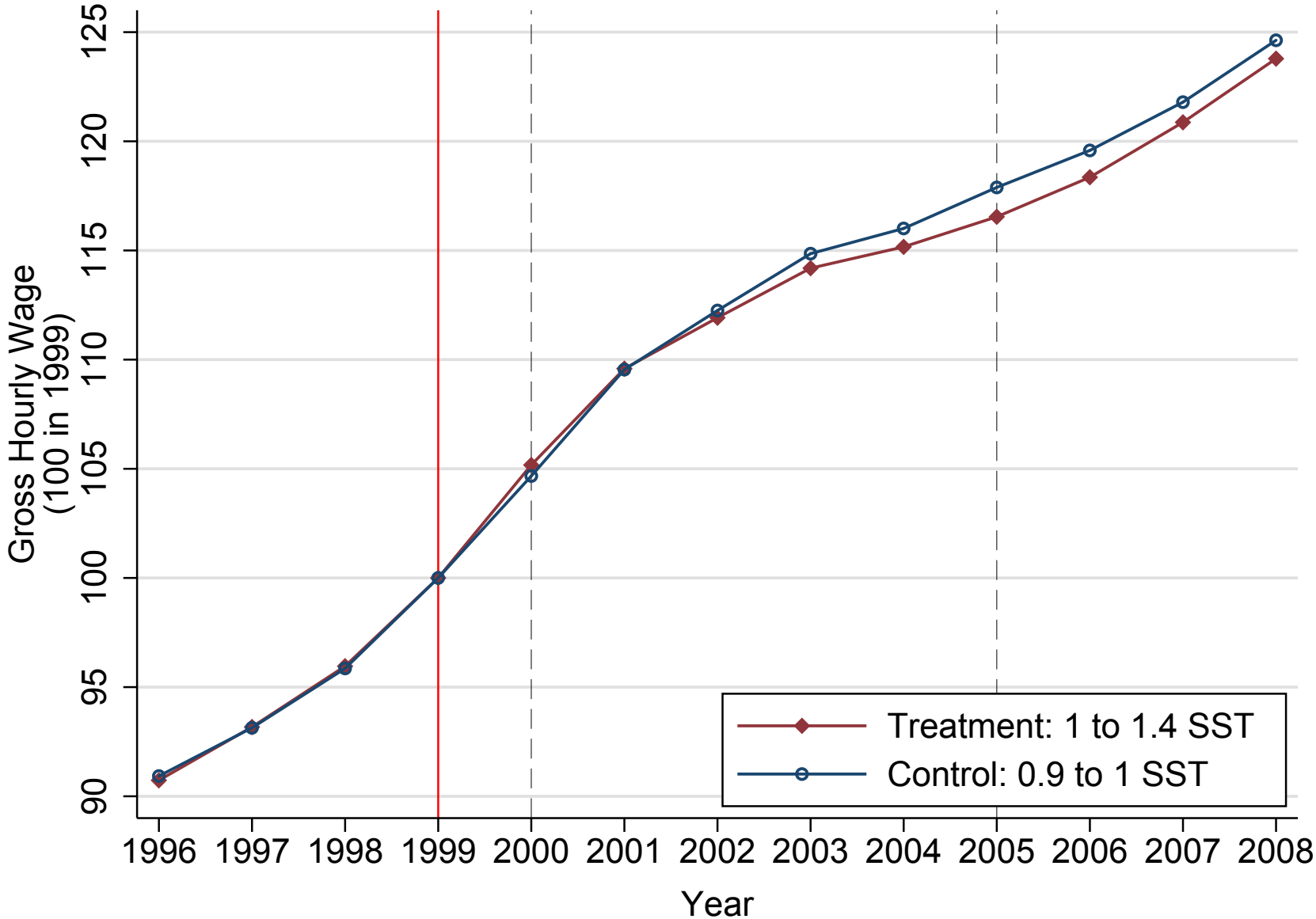
Reform 3 (increase in Pensions SSCs): Gross Hourly Wage



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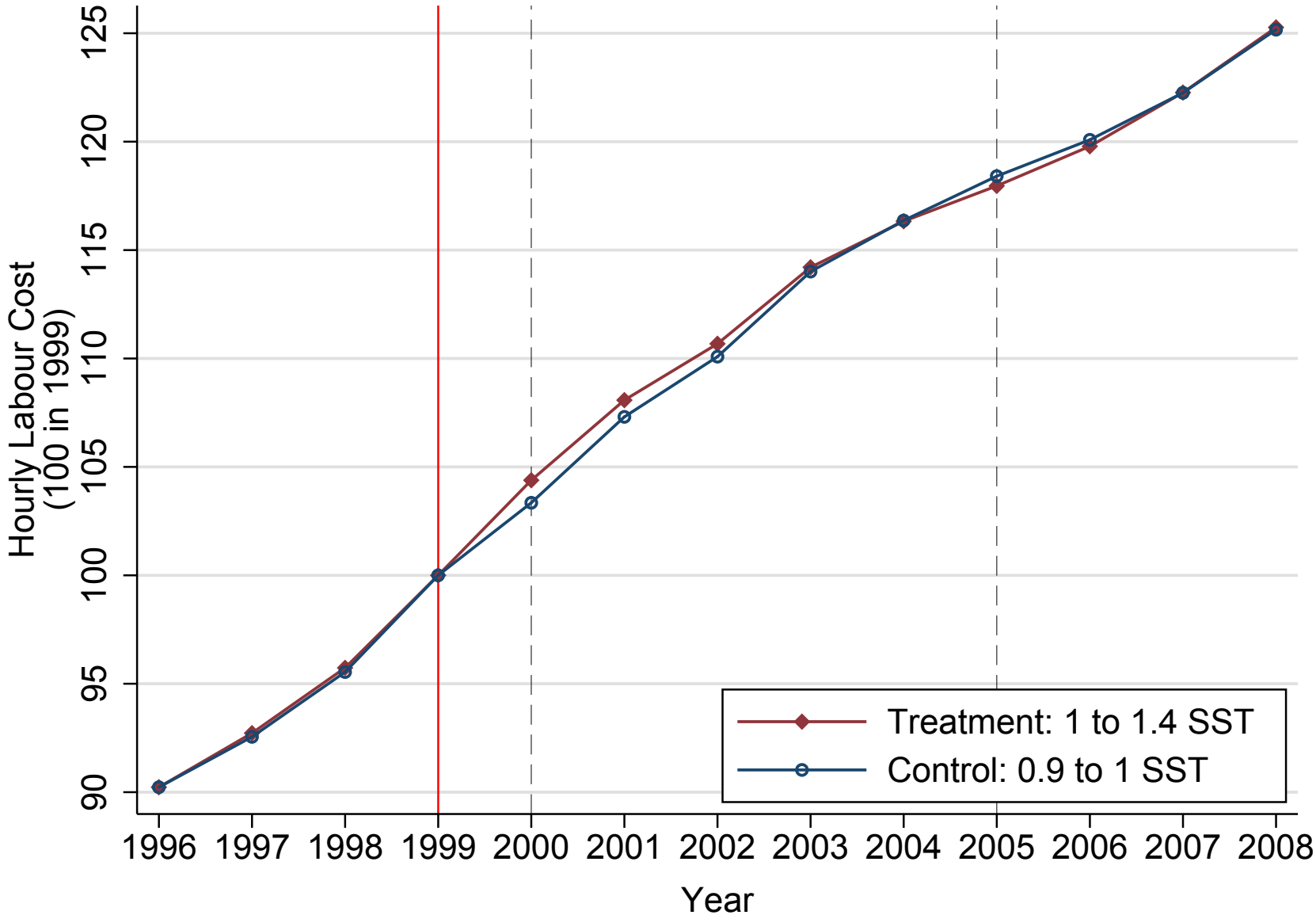
Reform 3 (increase in Pensions SSCs): Hourly Labor Cost



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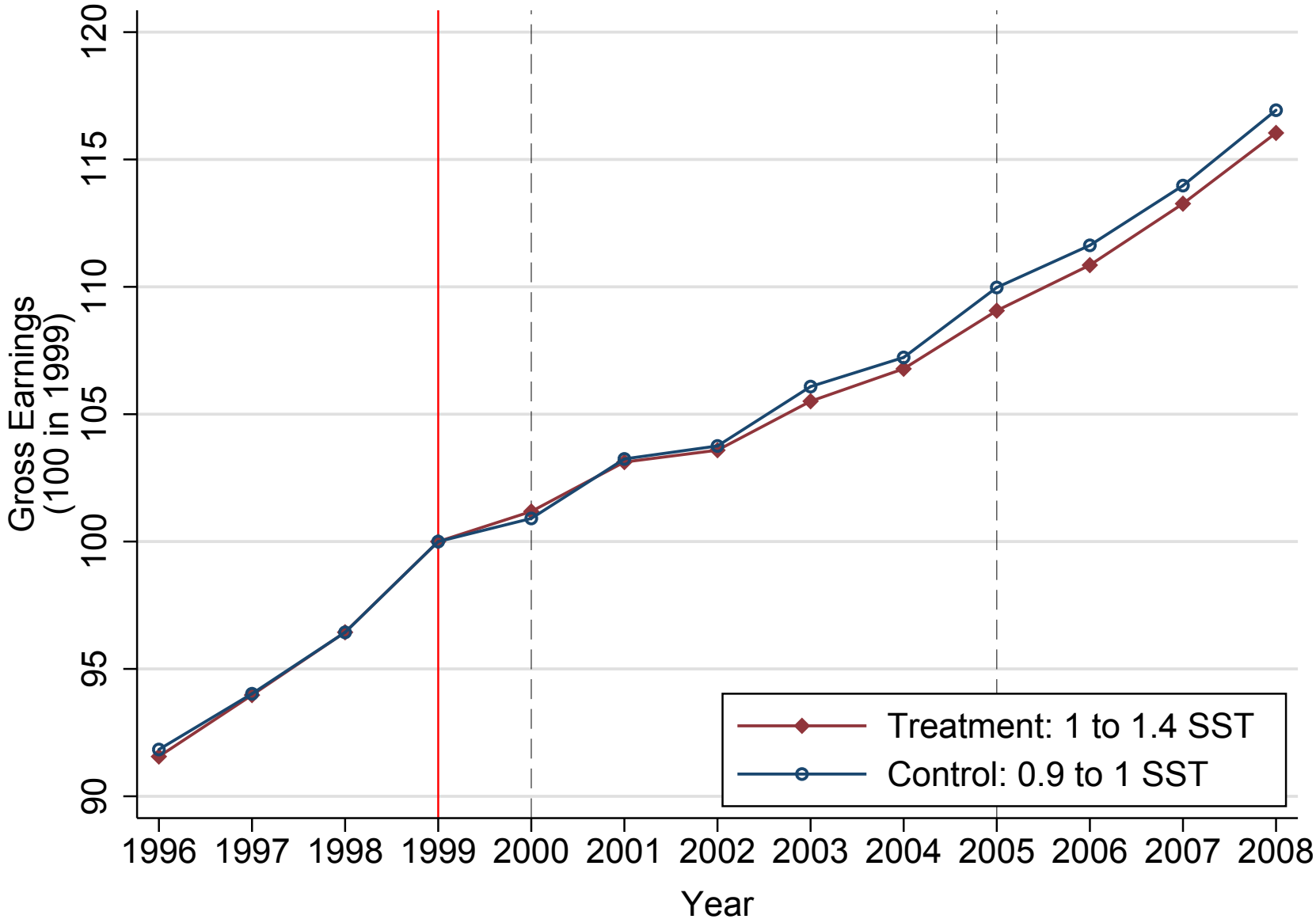

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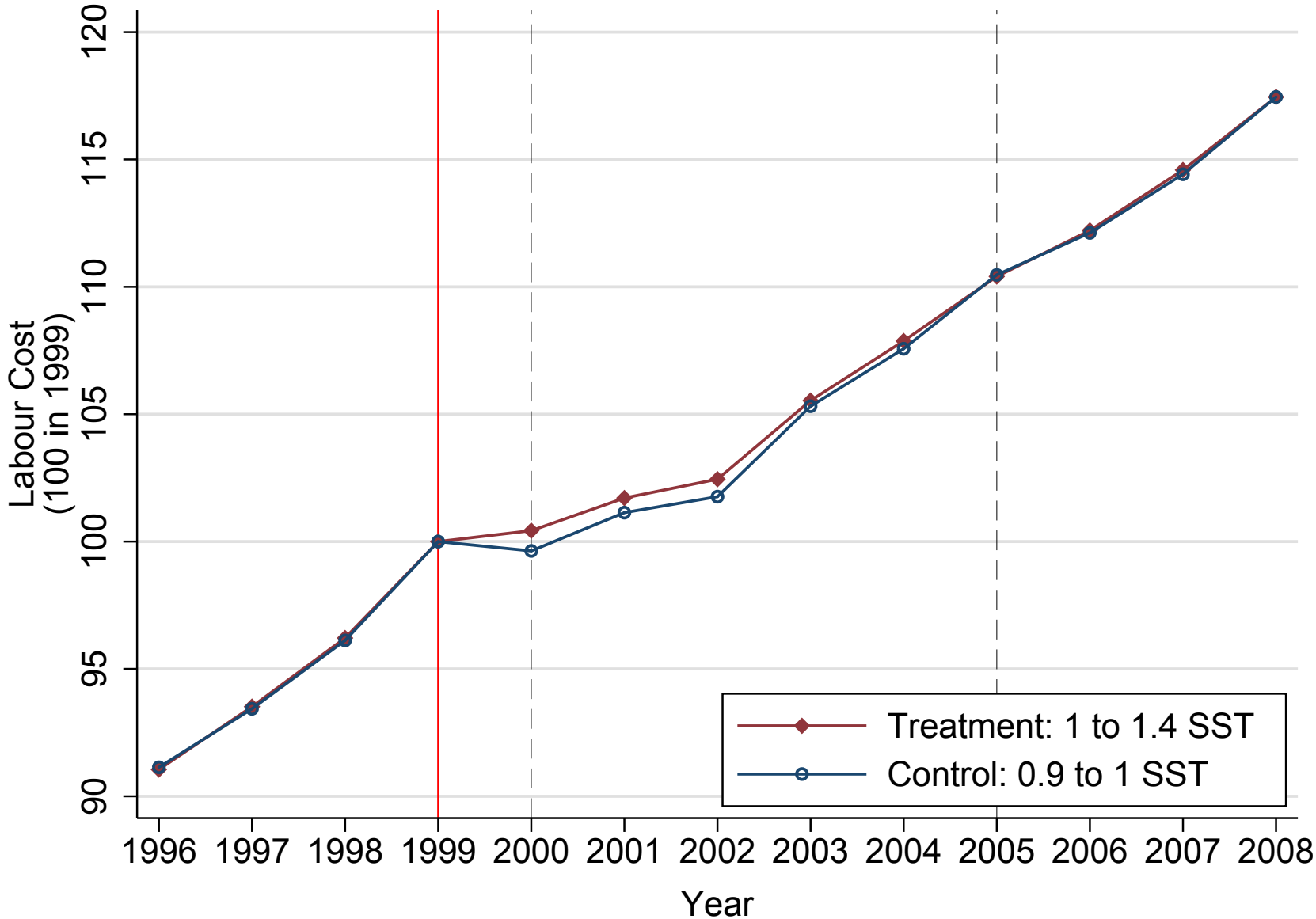

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Estimation

- **Specification 1: Reduced form**

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

$$\log(z_{it}) = \tilde{\alpha} + \tilde{\theta}_i + \tilde{\theta}_t + \sum_{k=1}^{K} \gamma_k (T_i \times \mathbb{1}\{t=k\}) + \tilde{\varepsilon}_{it} \quad (3)$$

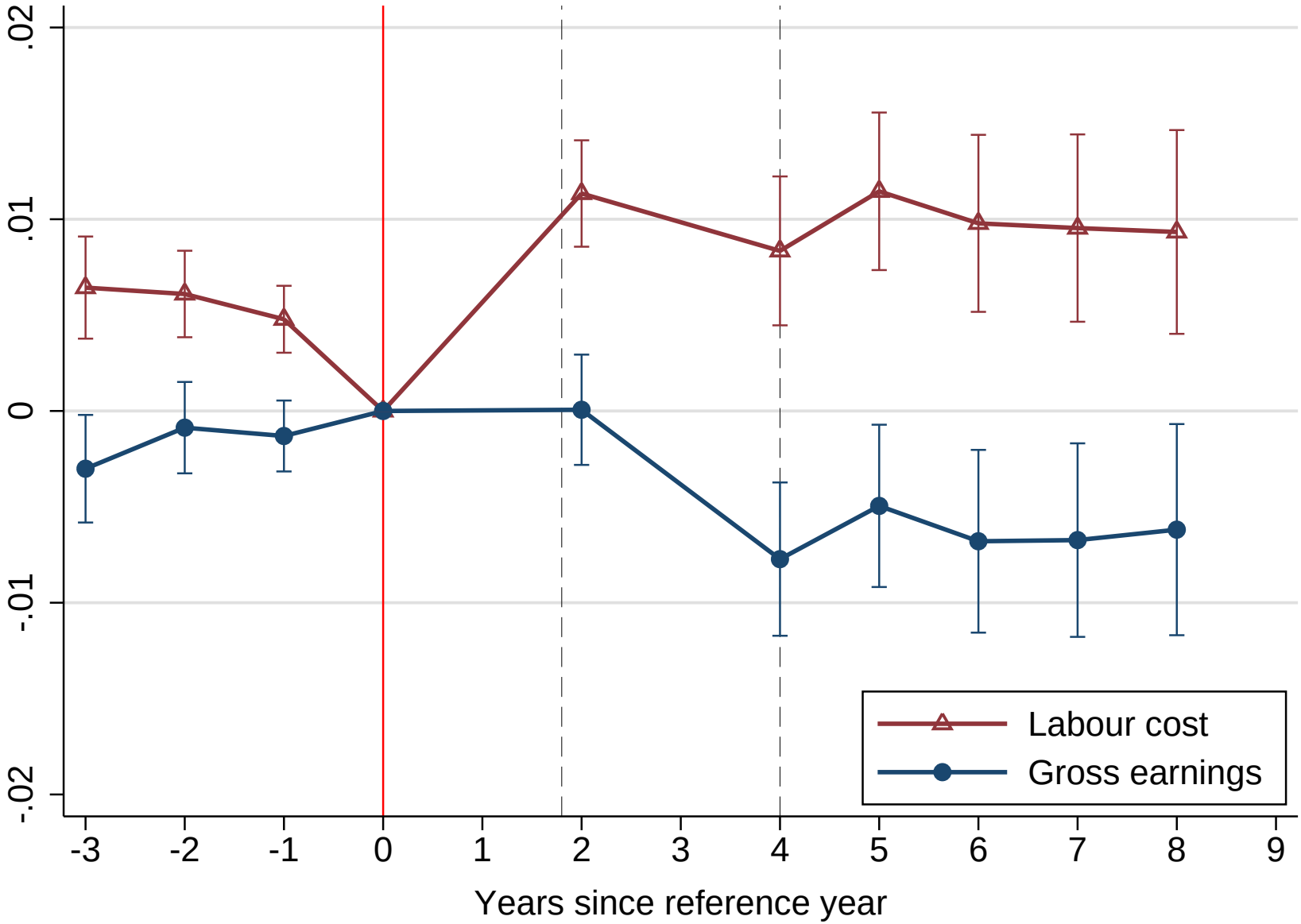
β_k, γ_k: reduced-form effects of reform after k years

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

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

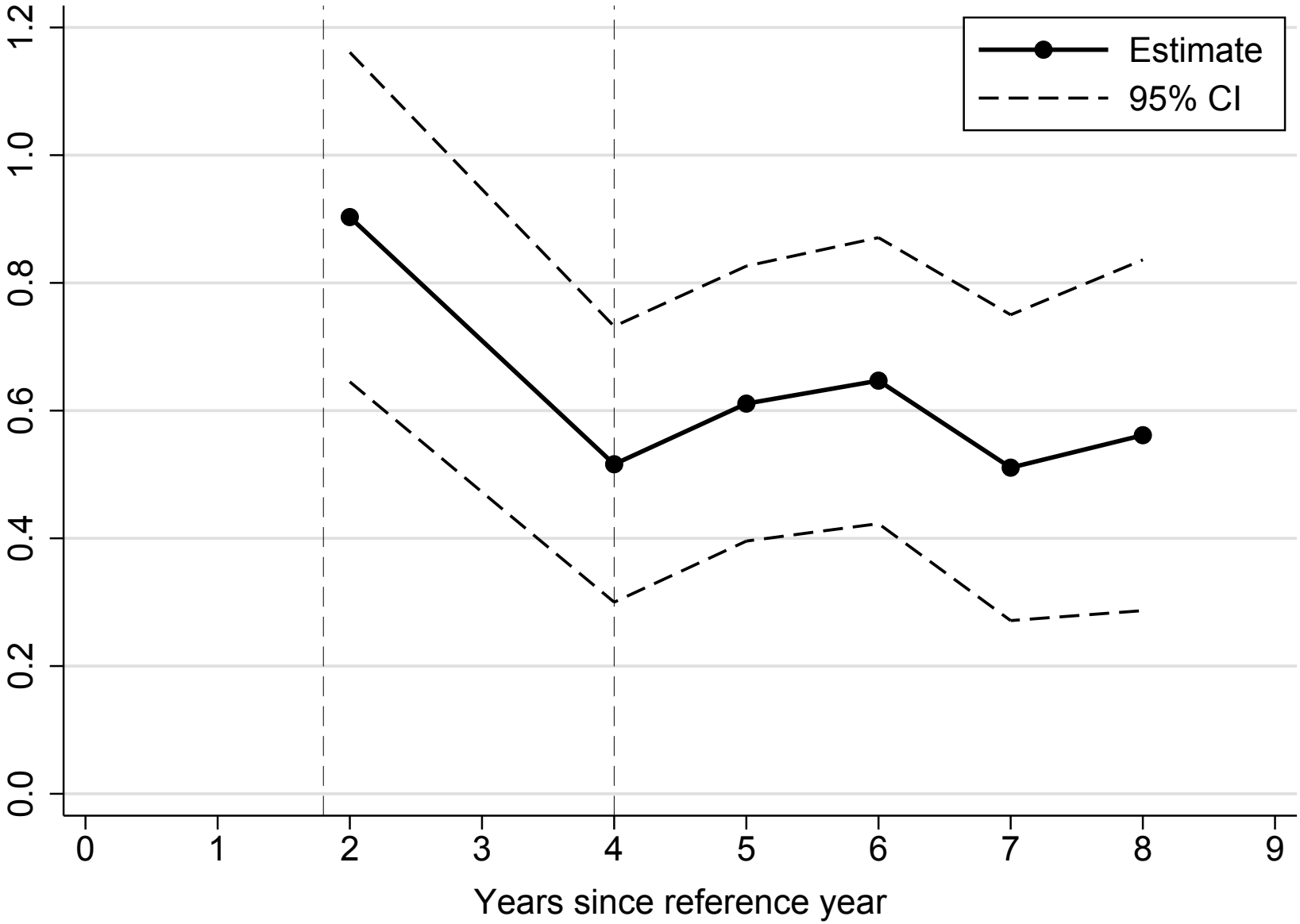
- Standard errors clustered at the individual level

Reform 1: log(zh) vs log(wh)



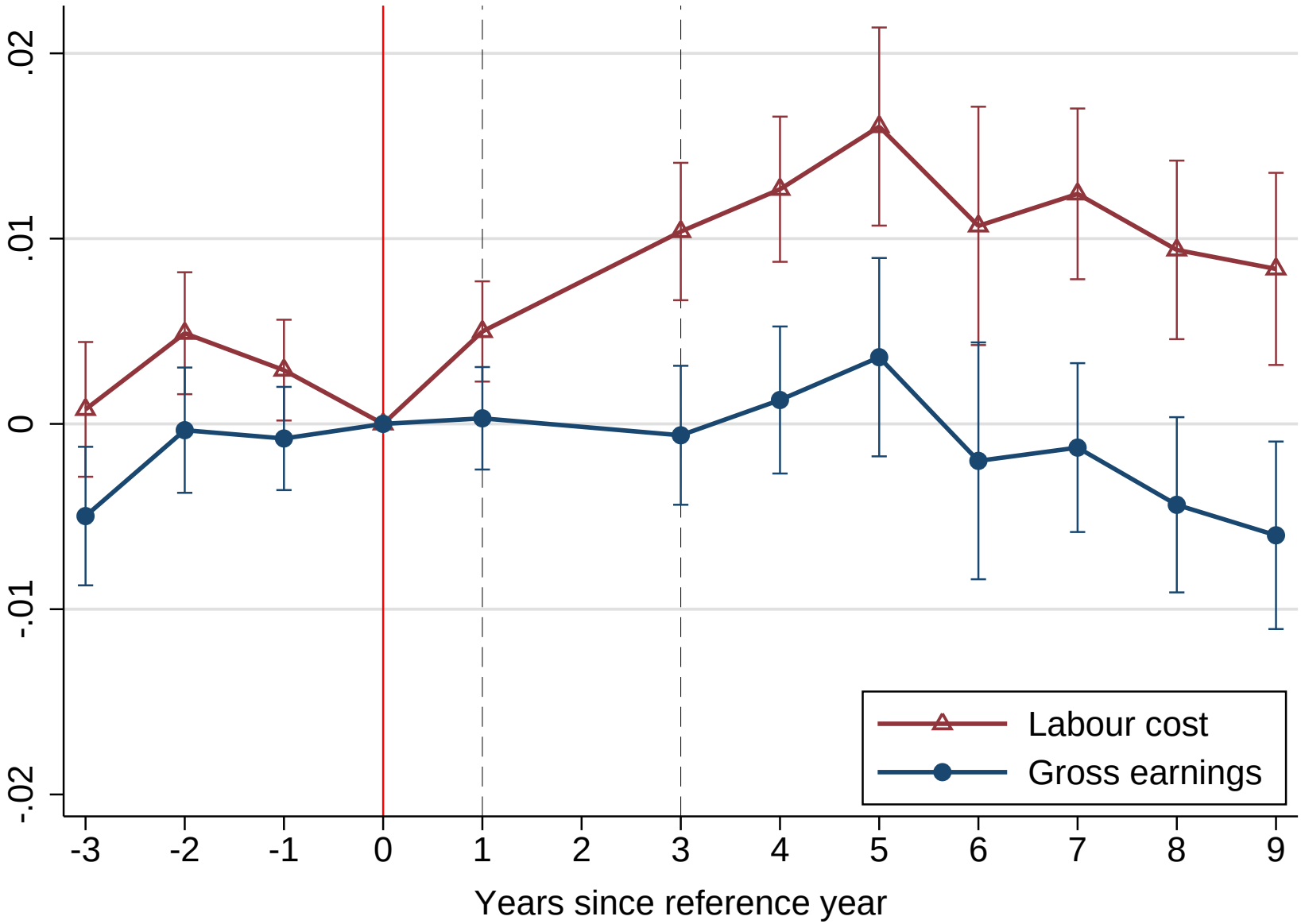
Sources: DADS Panel 2010; TAXIPP 0.4.

Reform 1: Employer Share of Incidence (2SLS)



Sources: DADS Panel 2010; TAXIPP 0.4.

Reform 2: log(zh) vs log(wh)



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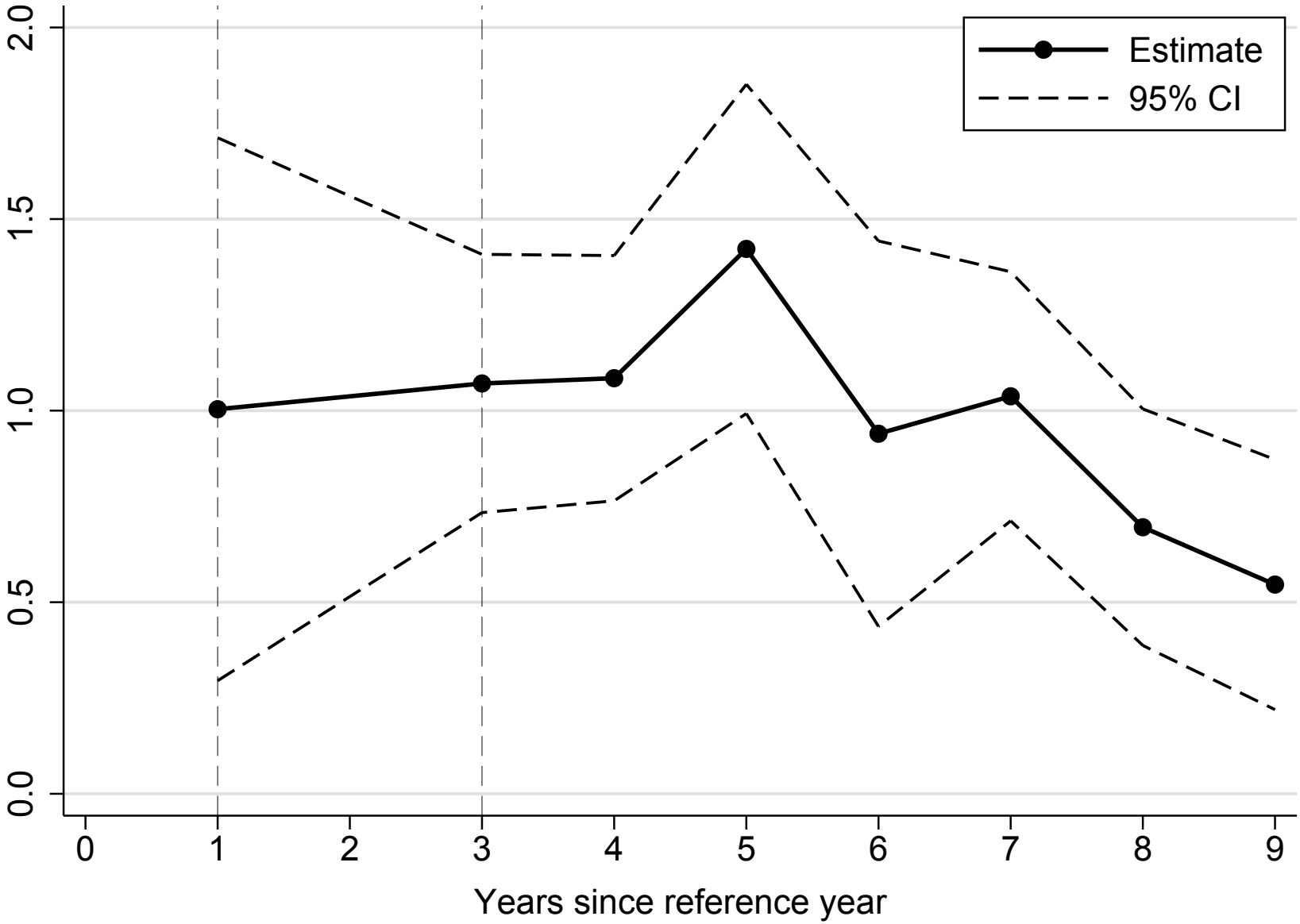
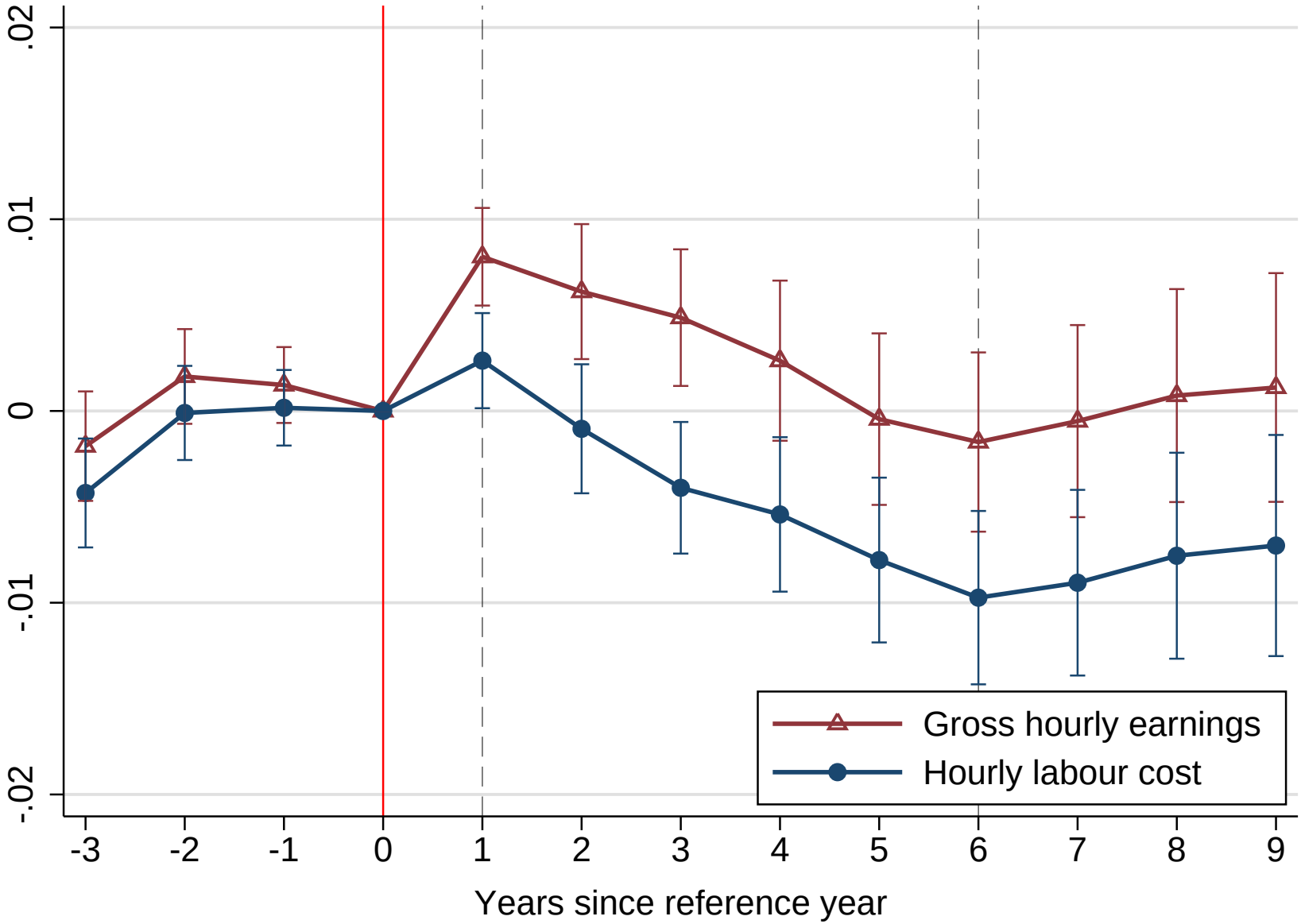


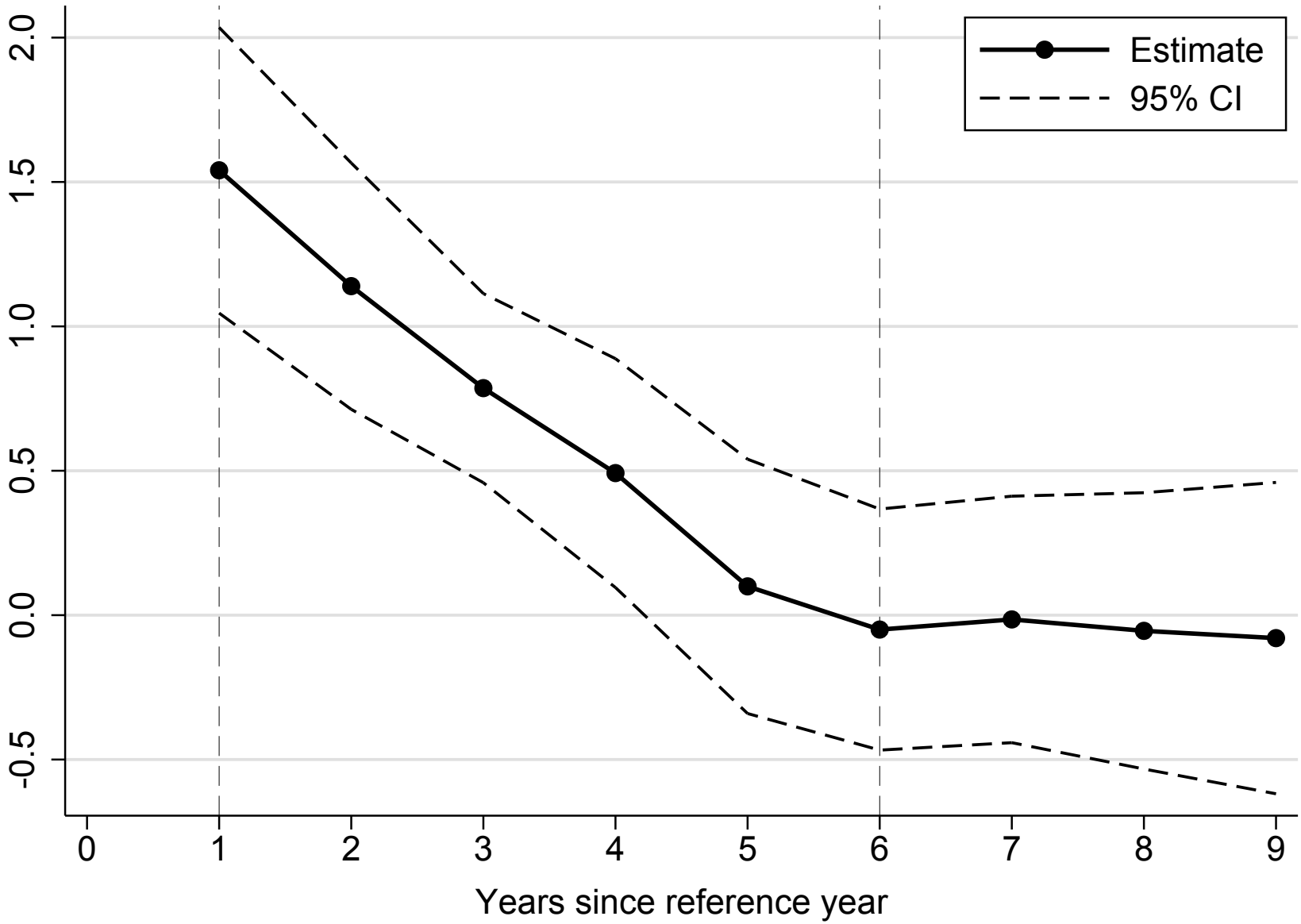
Sources: DADS Panel 2010; TAXIPP 0.4.

Reform 1: log(z) vs log(w)



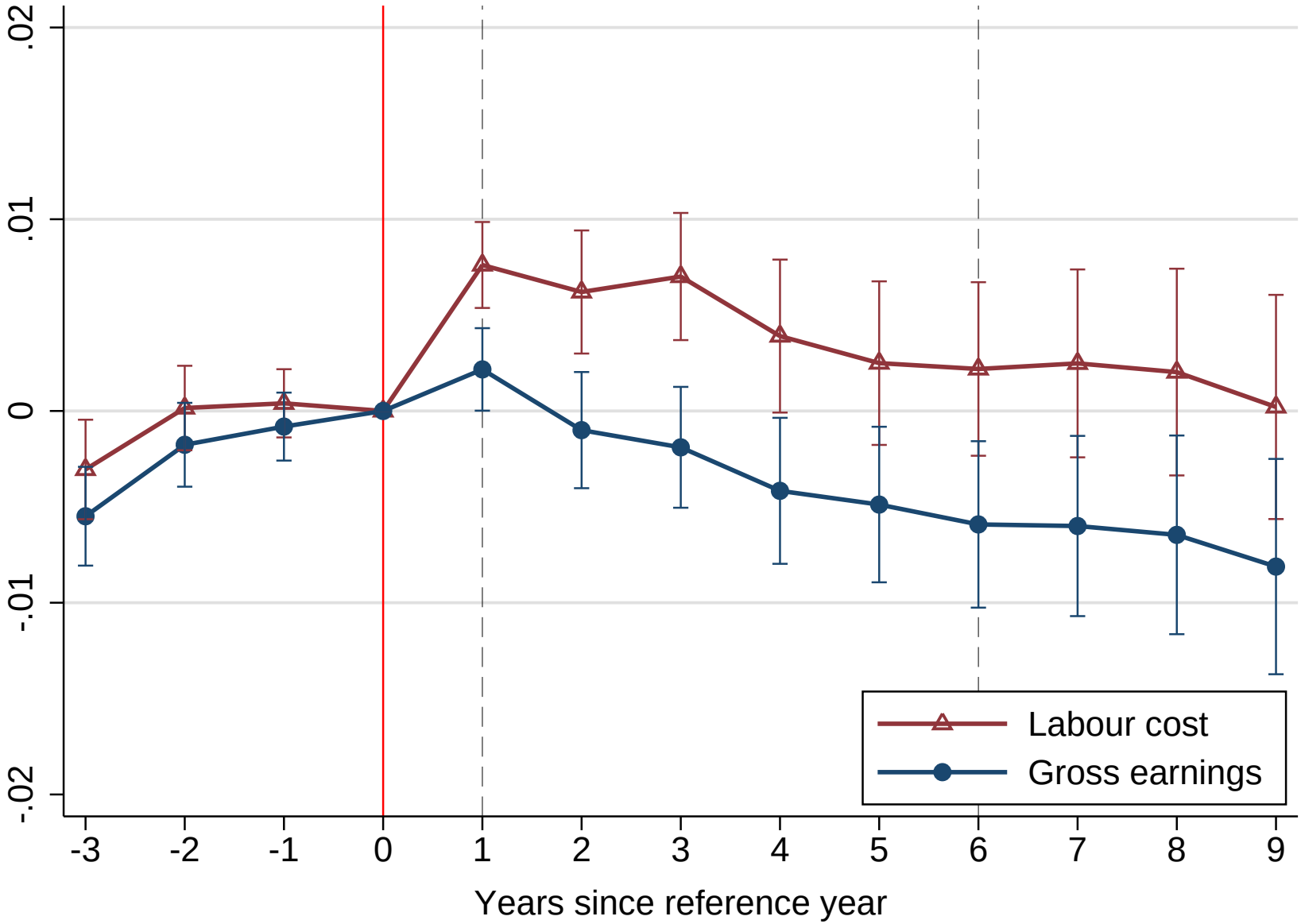
Sources: DADS Panel 2010; TAXIPP 0.4.

Reform 3: 2SLS – z



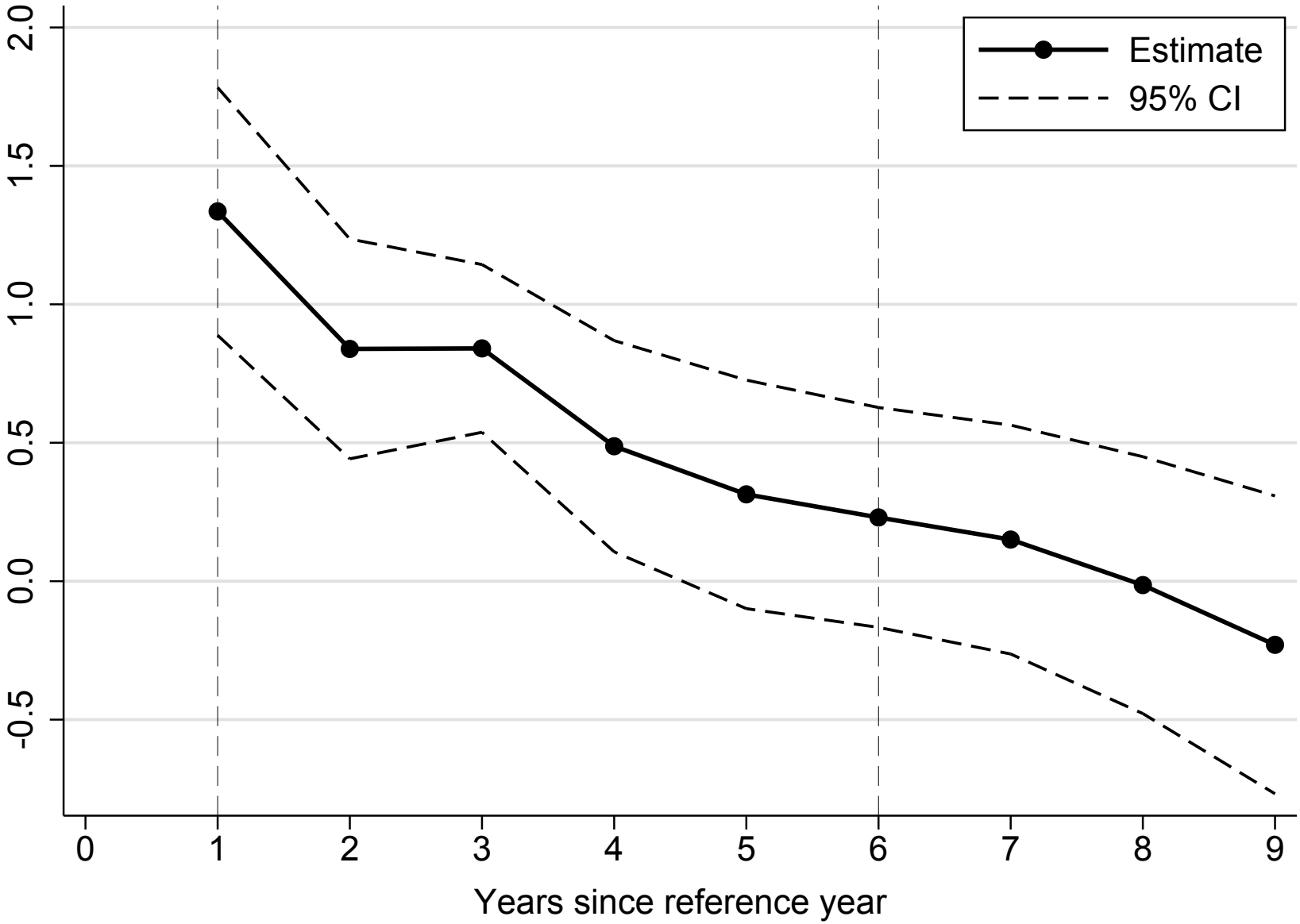
Sources: DADS Panel 2010; TAXIPP 0.4.

Reform 3: log(zh) vs log(wh)



Sources: DADS Panel 2010; TAXIPP 0.4.

Reform 3: 2SLS – zh



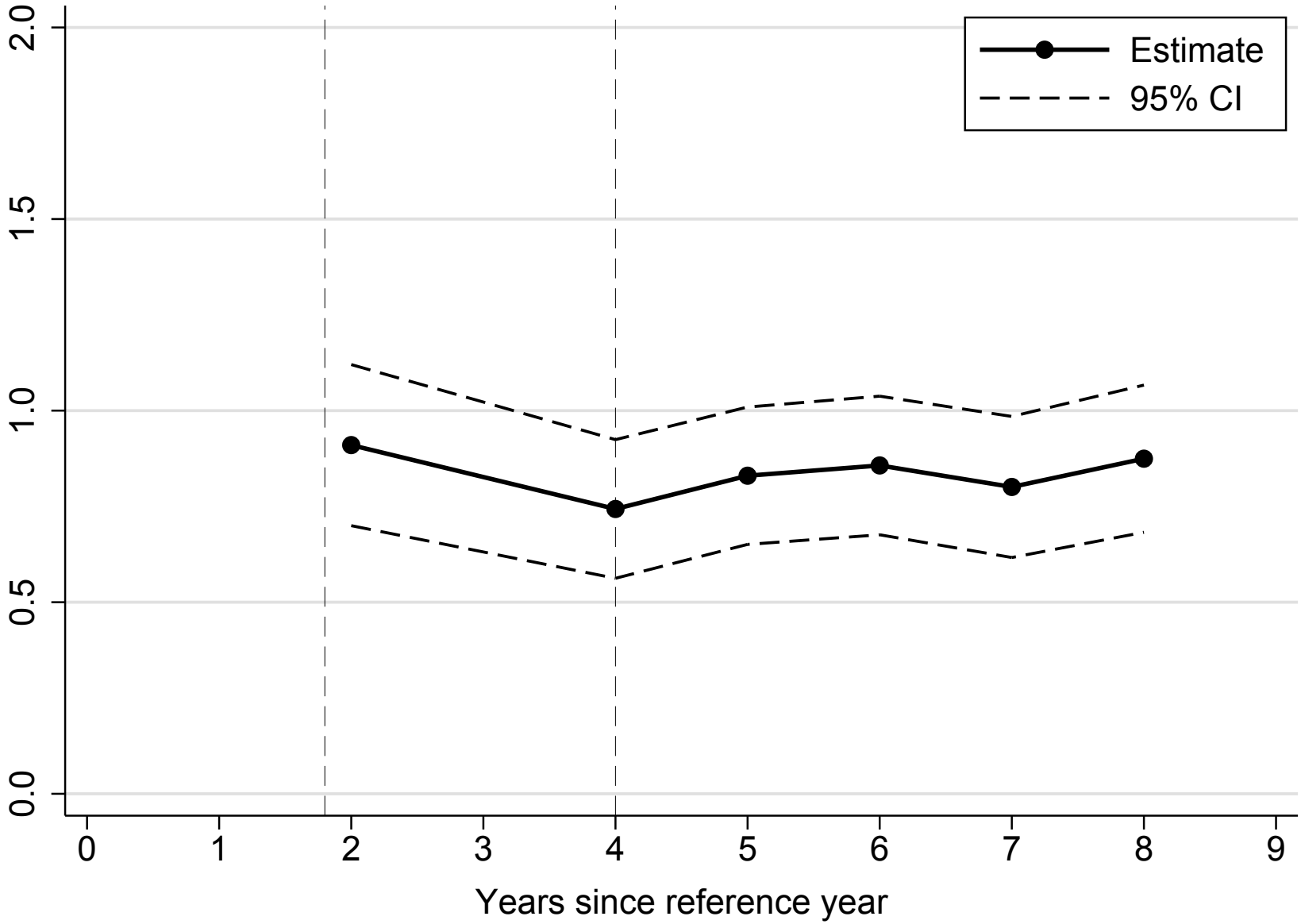
Sources: DADS Panel 2010; TAXIPP 0.4.

Estimation

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

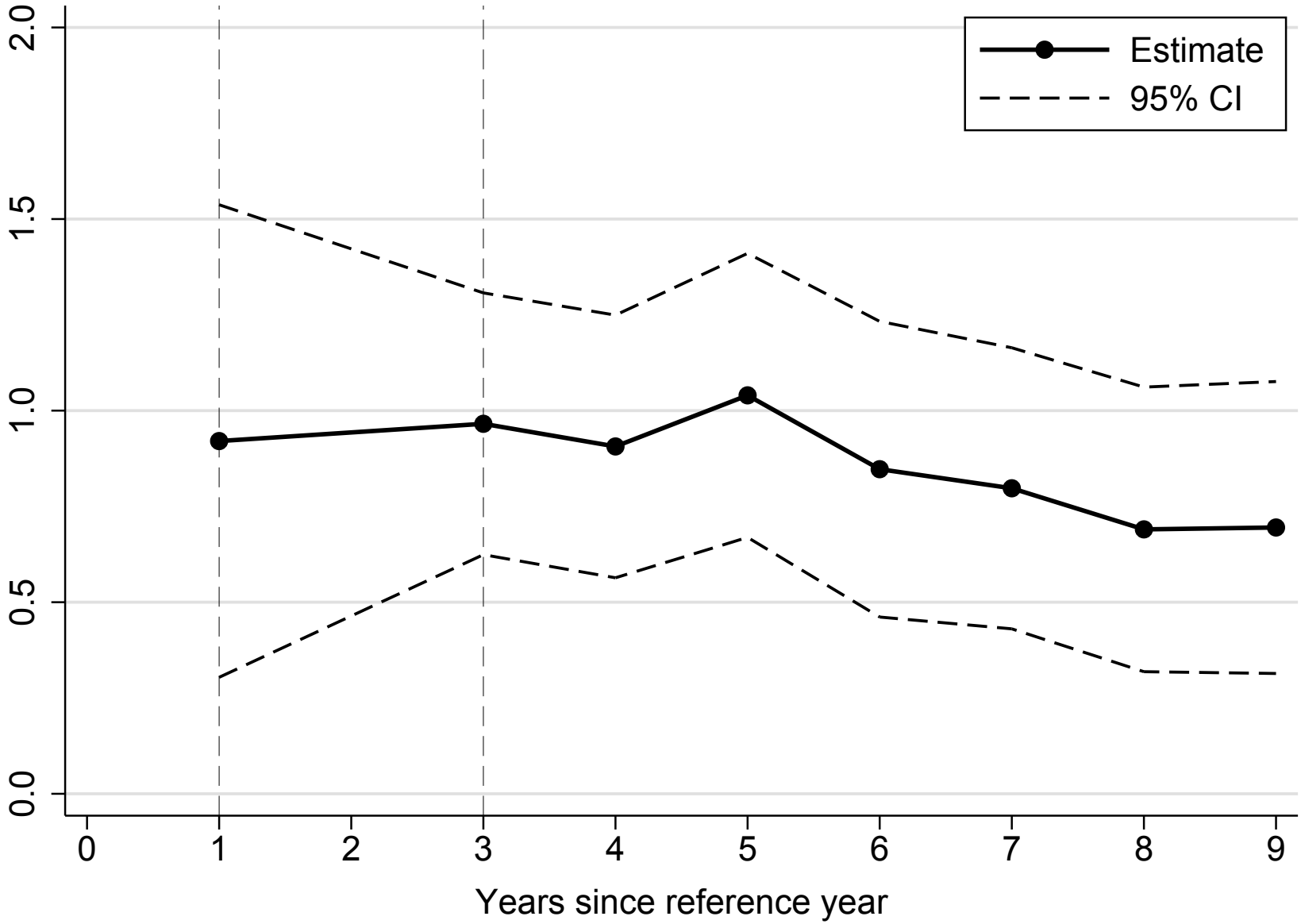
- Standard errors clustered at the individual level

Reform 1: Employer Share of Incidence – zh – with trends



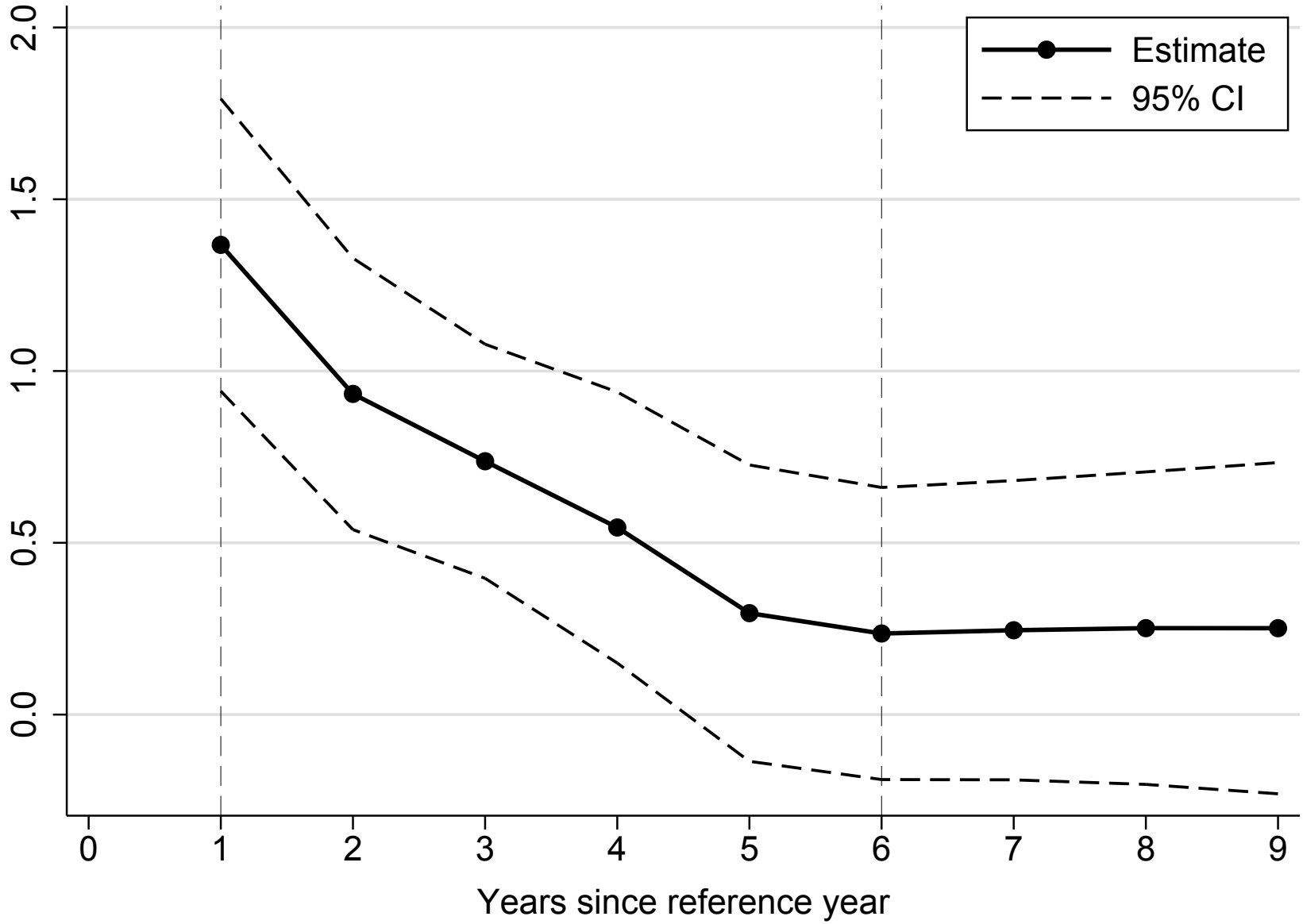
Sources: DADS Panel 2010; TAXIPP 0.4.

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.

Summary

Baseline estimates of employer share of incidence

Reform:	Reform 1:	Reform 2:	Reform 3:	
Dep. var.:	Log(labor cost)	Log(labor cost)	Log(labor cost)	Log(hourly labor cost)
	Panel A. Without controlling for individual-specific trends			
t_0+8	0.561***	0.696***	−0.014	−0.054
	(0.154)	(0.181)	(0.281)	(0.289)
t_0+9	n/a	0.546***	−0.230	−0.079
	n/a	(0.189)	(0.318)	(0.318)
	Panel B. Controlling for individual-specific trends			
t_0+8	0.875***	0.690***	0.290	0.252
	(0.122)	(0.236)	(0.263)	(0.287)
t_0+9	n/a	0.695***	0.233	0.252
	n/a	(0.243)	(0.280)	(0.303)

Summary

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

Summary

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  - R1 and R2 not statistically different from one another
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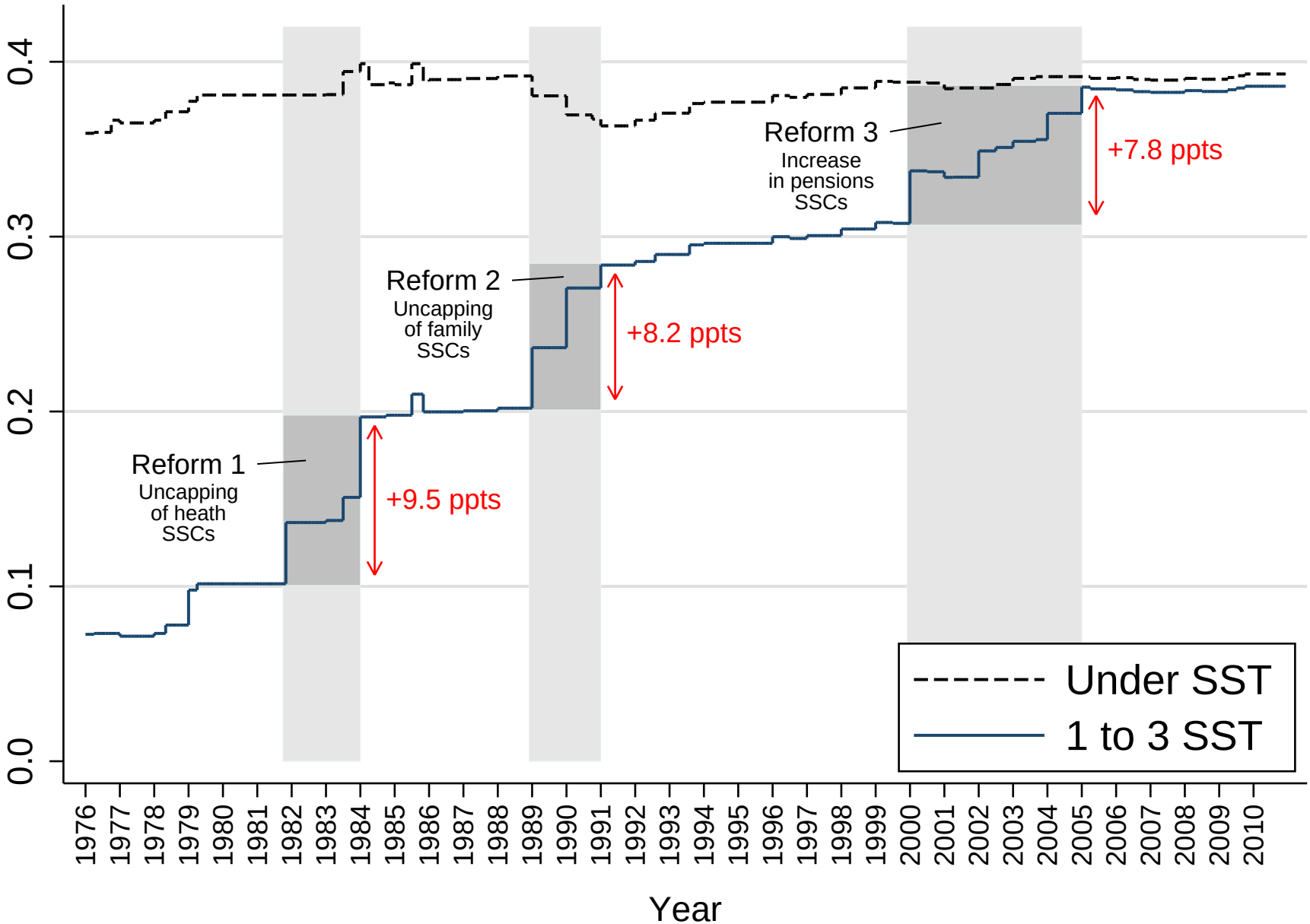
    $\Rightarrow$ full shifting to employees very quickly

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

Robustness checks

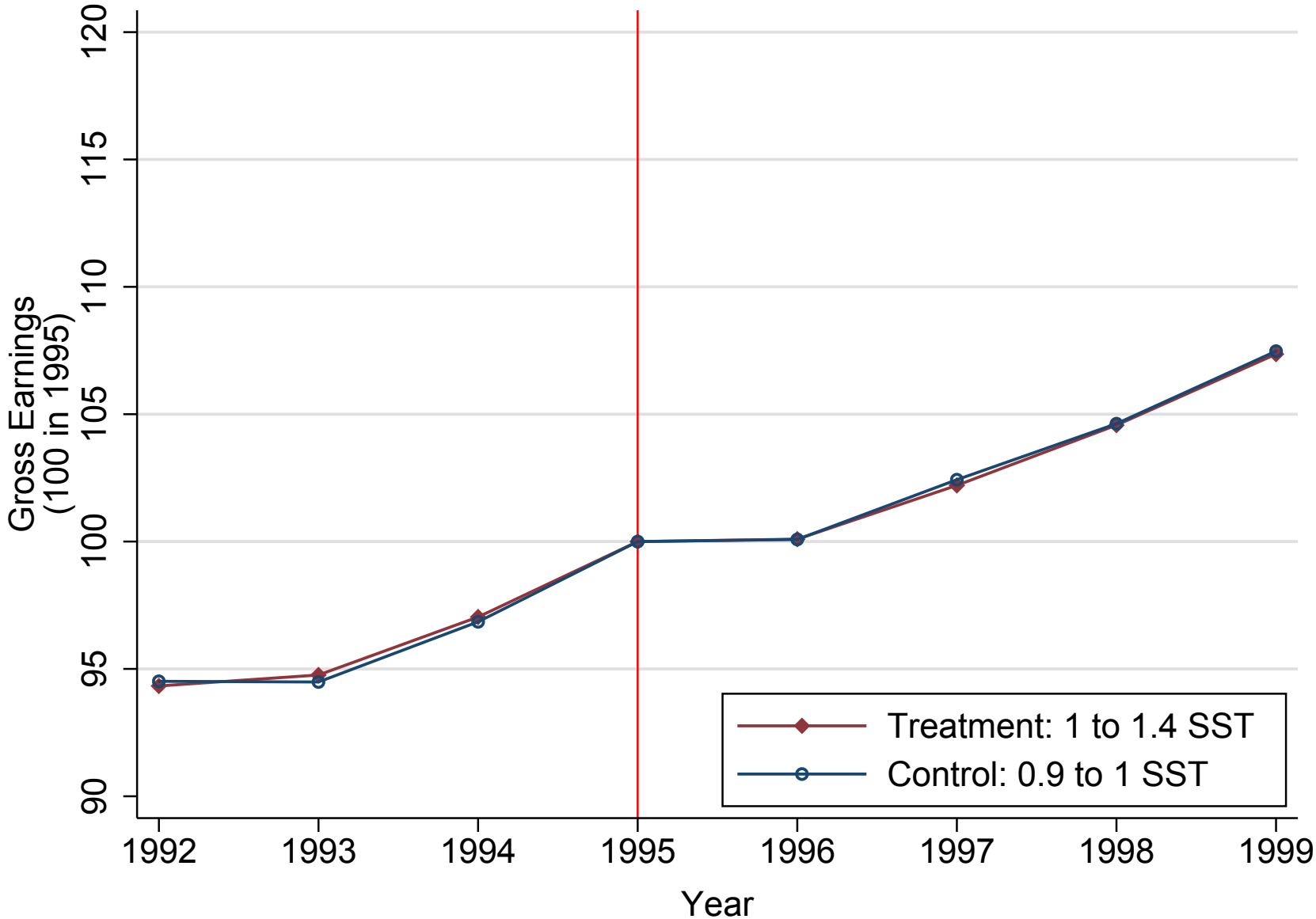
- **Placebo reform in 1996**
  - Check common trend assumption
  - No reform between 1992 and 1999
  - Estimate pseudo reform in 1996 (reference year in 1995)
  - Compare evolution of labor cost/gross earnings for treated vs. control

Marginal Employer SSC Rates, non-executives



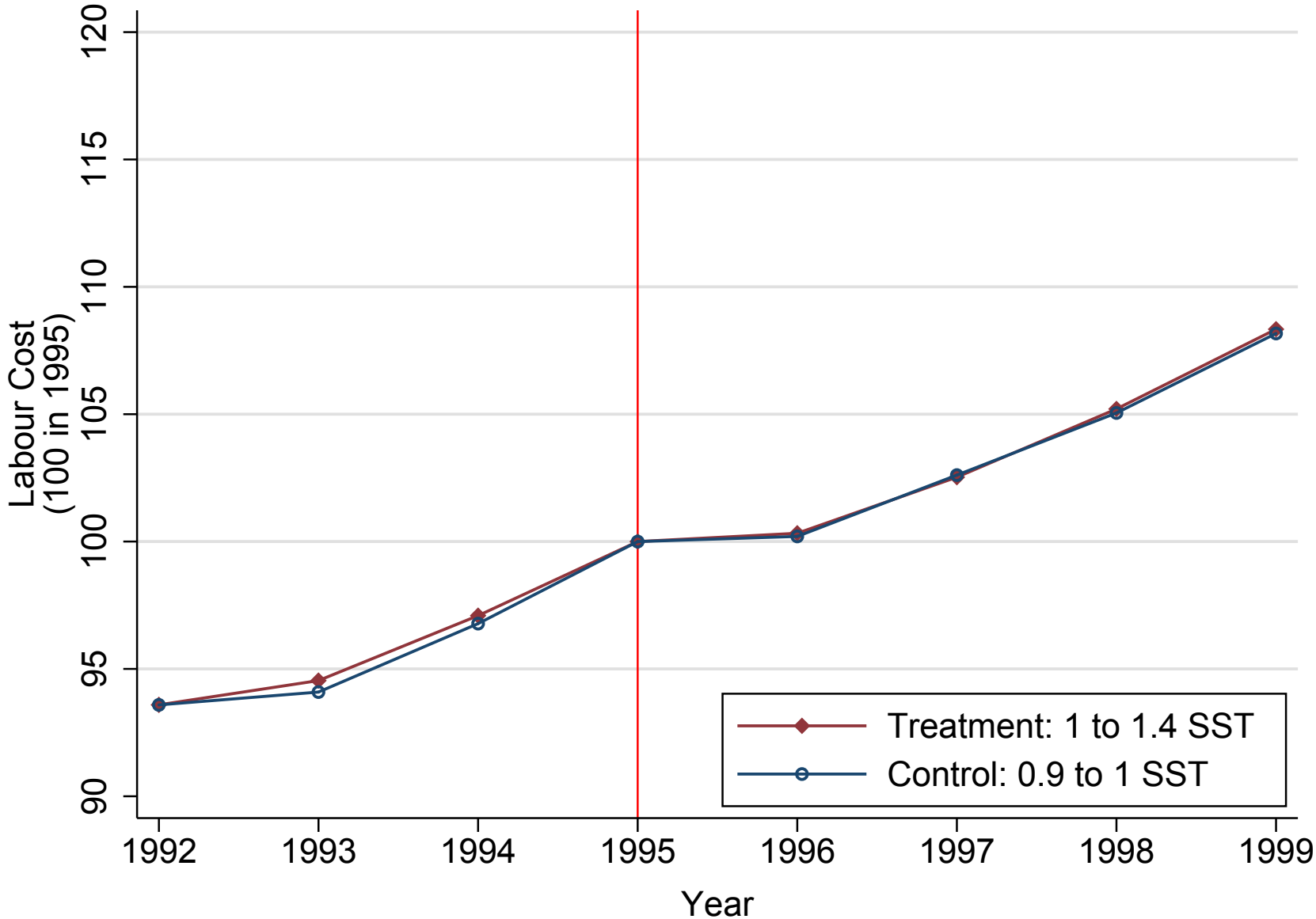
Sources: IPP Tax and Benefit Tables (April 2016) ; TAXIPP 0.4.

Placebo Reform (1996): Real Gross Earnings



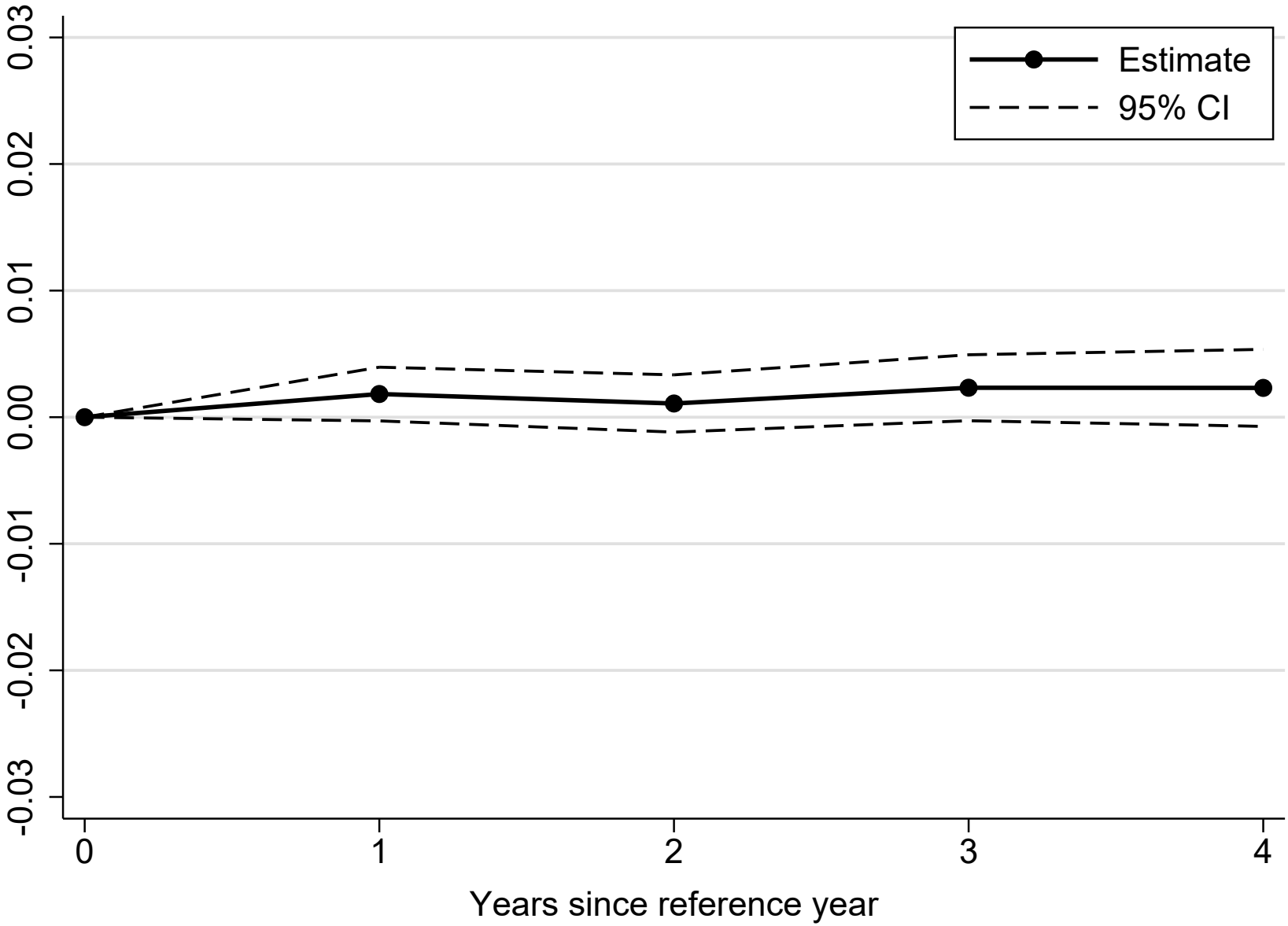
Sources: DADS Panel 2010; TAXIPP 0.4.

Placebo Reform (1996): Labor Cost



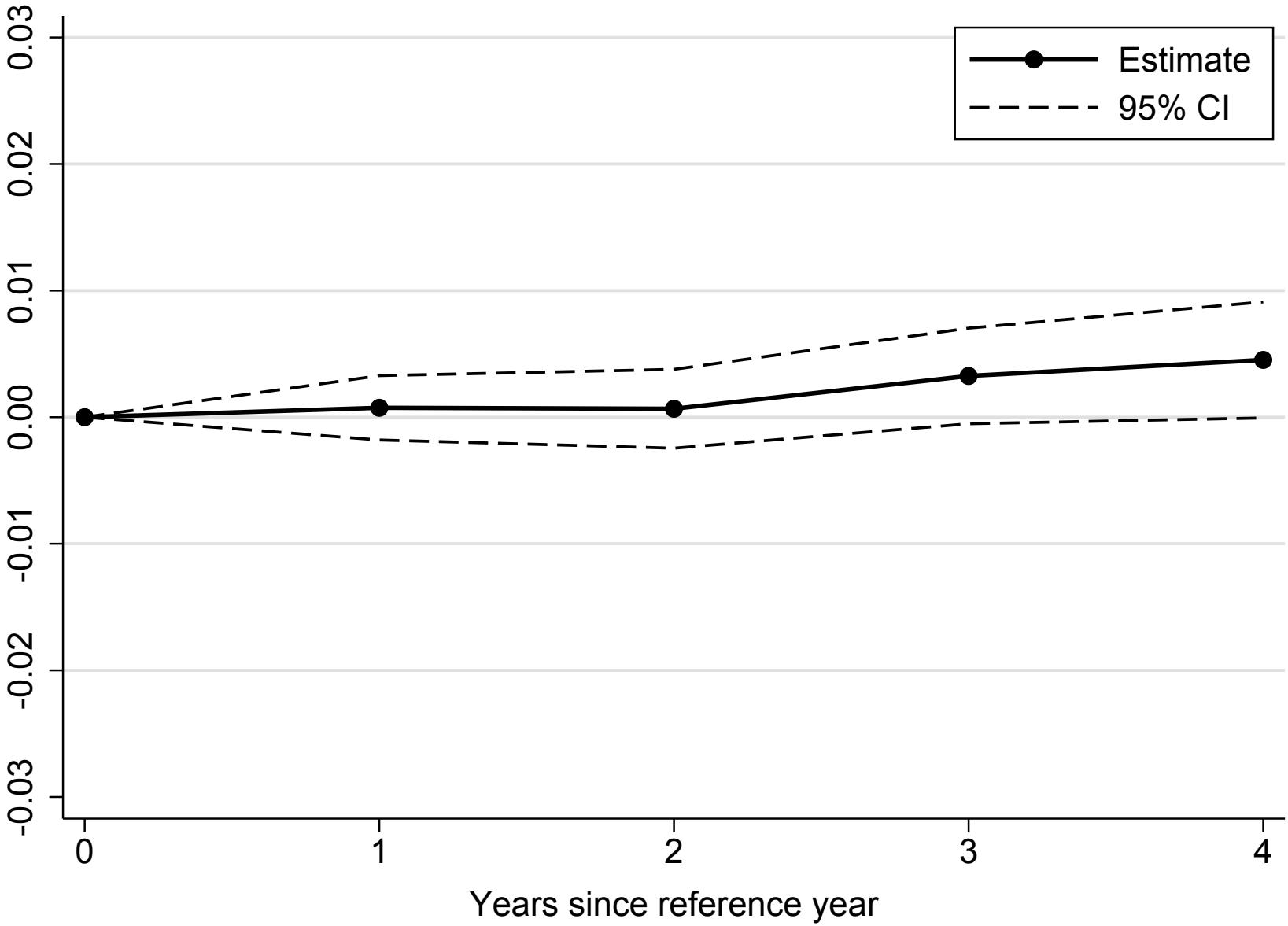
Sources: DADS Panel 2010; TAXIPP 0.4.

Placebo Reform: differential log(labor cost) – no trends



Sources: DADS Panel 2010; TAXIPP 0.4.

Placebo Reform: differential log(labor cost) – w/ trends



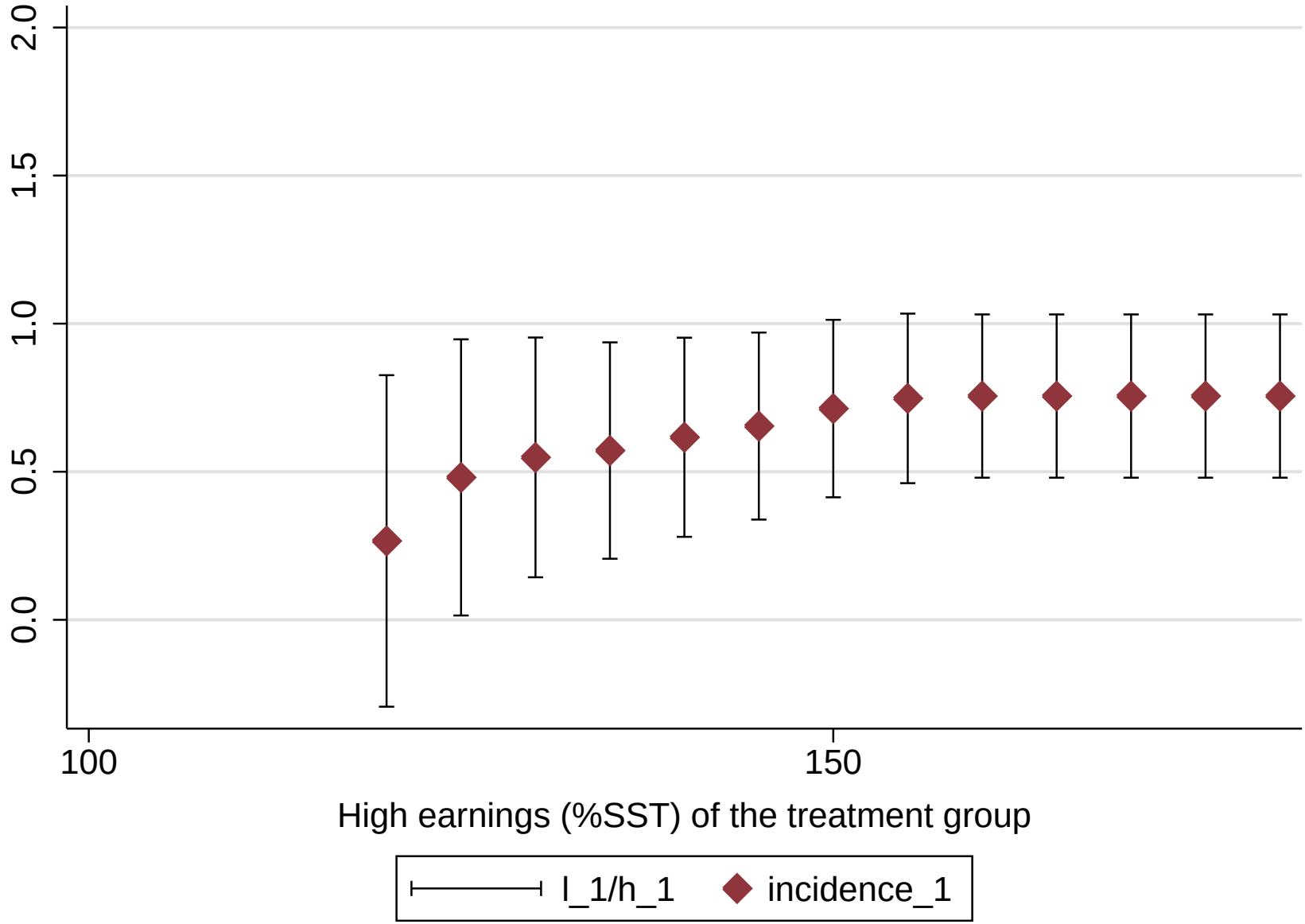
Sources: DADS Panel 2010; TAXIPP 0.4.

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

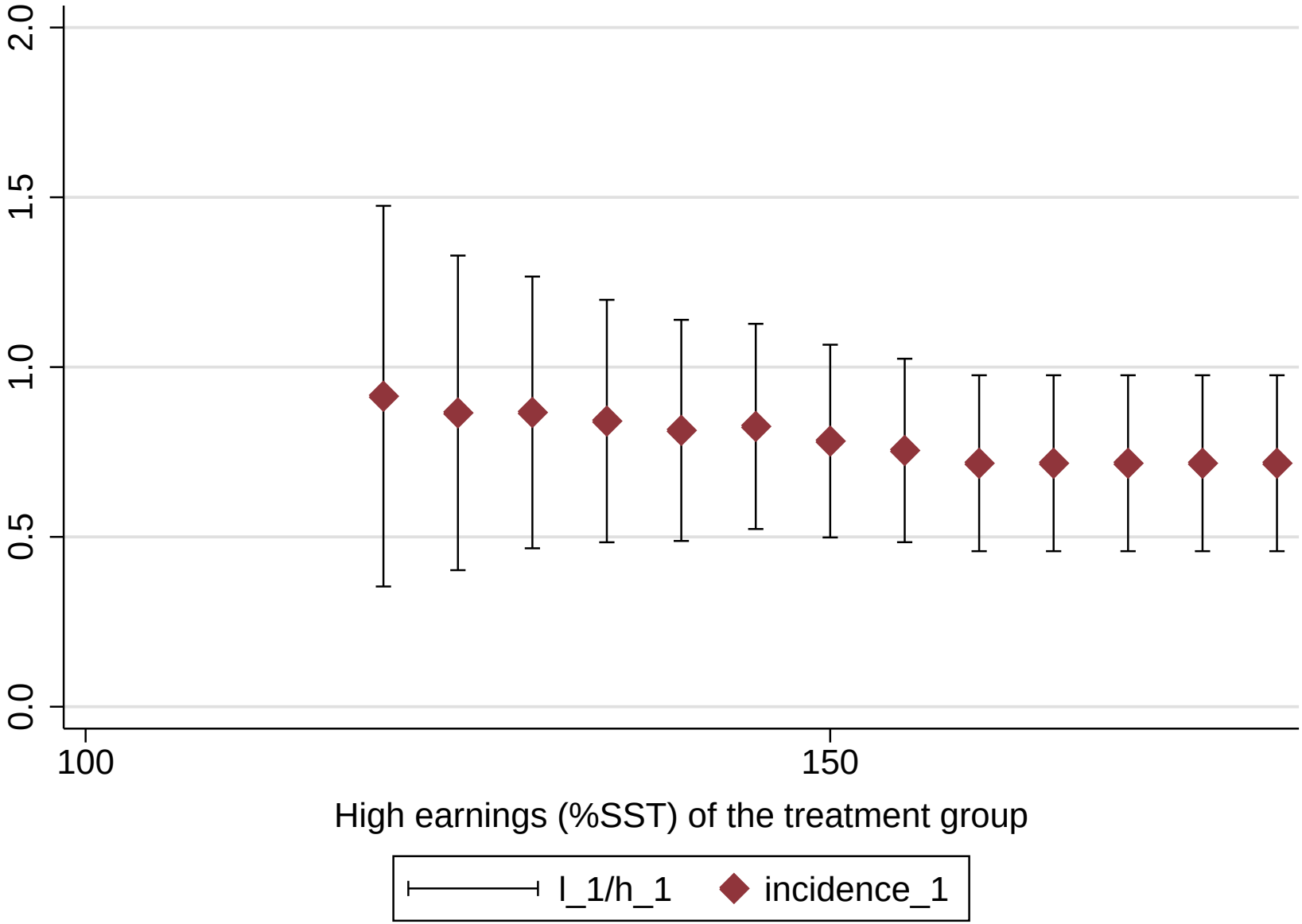
- **Robustness check**
  - Check sensitivity to upper bound of treatment group : variation from 1.2 ro 1.6 SST
  - Check sensitivity to lower bound of control group : variation from 0.80 ro 0.98 SST ▸ Graphs on lower bound

Reform 1: sensitivity tests (t8)



Sources: DADS Panel 2010; TAXIPP 0.4.

Reform 2: sensitivity tests (t8)



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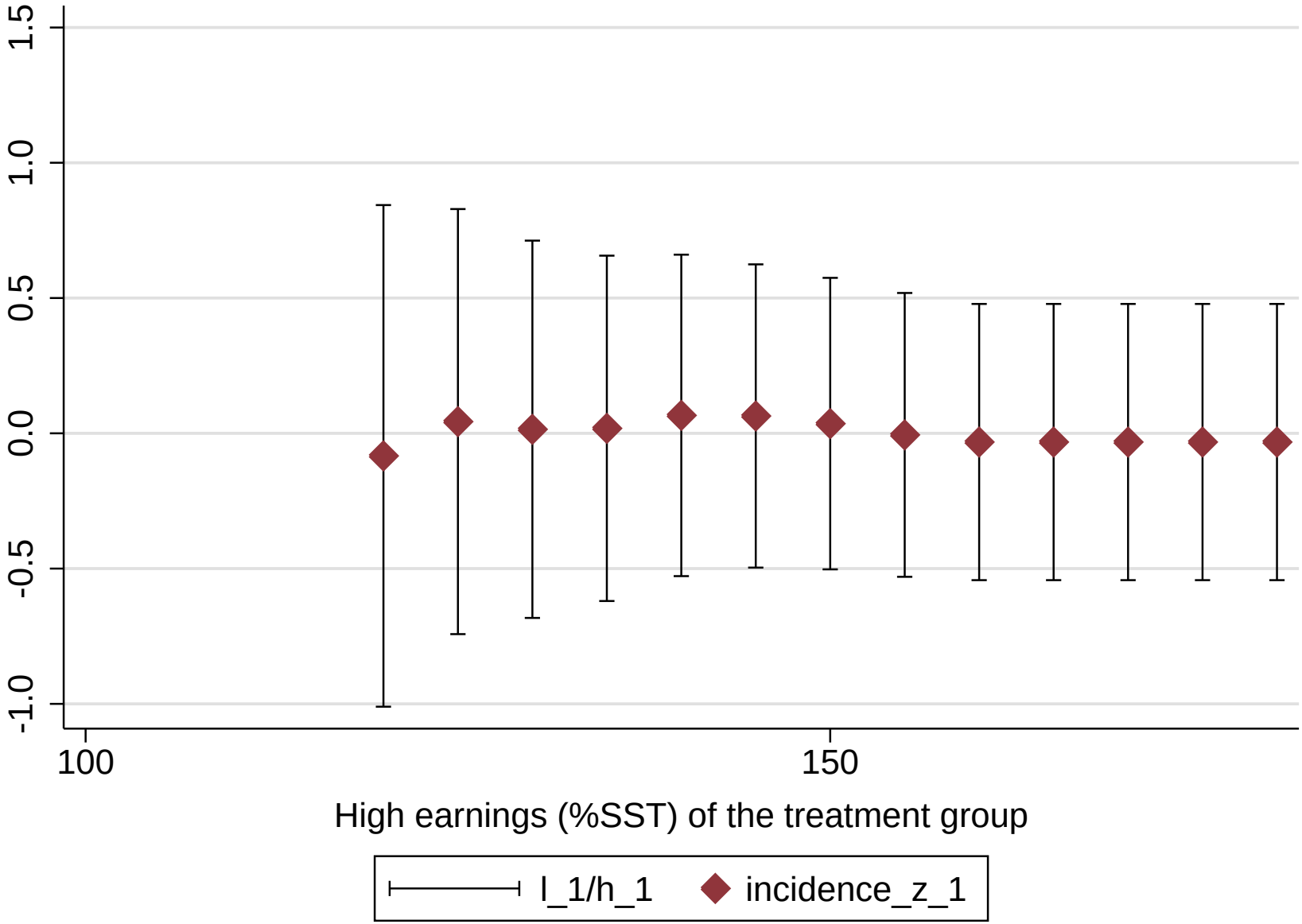
Reform 3: sensitivity tests (t8)



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 ▸ Graph on hours
- **Extensive margin responses**
  - We test for differential entry rate/exit rate out of treated/control groups
  - Little conclusive evidence ▸ Results
  - 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

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  - Not possible to distinguish incidence from behavioral response
  - Need to assume no behavioral response
- **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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- **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?

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- **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)

Conclusion

- **What have we found?**
  - Empirical evidence suggesting that tax-benefit linkage does matter for SSC incidence
  - The textbook view of SSC incidence (fully borne by employees) is likely to be inaccurate in the general case
  - Institutional design of taxation is likely to matter a lot more than previously thought

Conclusion

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  - 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)

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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
    $\varepsilon_{z|1-\tau} = 0$
    $\Rightarrow$ ETE provides a measure of behavioral responses only
  - Assumption makes sense in the case of income tax changes

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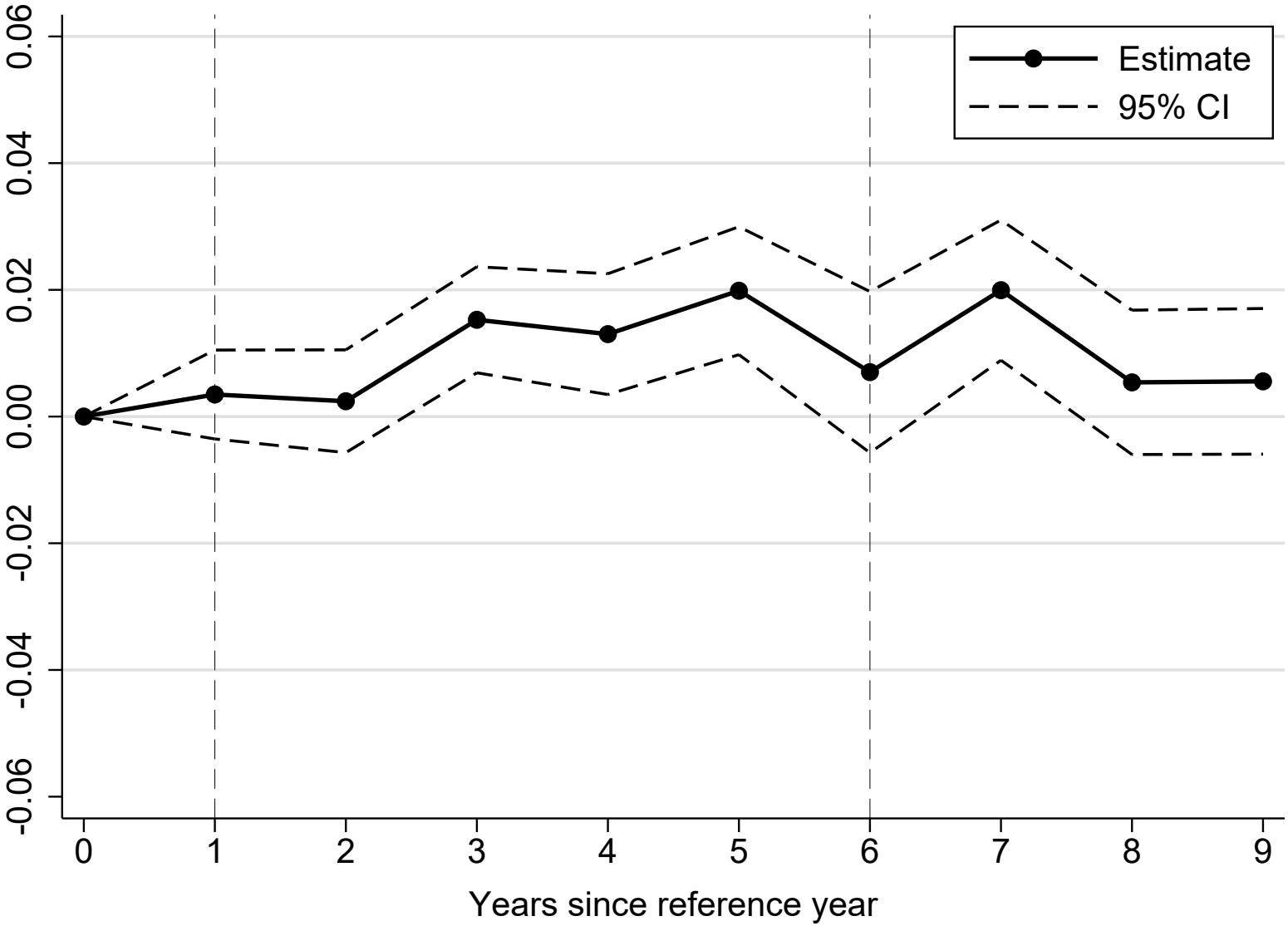
    $\varepsilon_{z|1-\tau} = 0$
    $\Rightarrow$ ETE provides a measure of behavioral responses only
  - Assumption makes sense in the case of income tax changes
- **How to recover incidence?**
  - Either assume no behavioral responses
  - Otherwise, behavioral responses will be confused with incidence on employees (if substitution effects dominate)
  - ETE will be a lower bound on the share of employer SSC borne by employers

back

Reform 3: hours responses – no trends



Sources: DADS Panel 2010; TAXIPP 0.4.

back

Behavioral responses

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

Reform:	Reform 1:	Reform 2:	Reform 3:
t_0+5	−0.007**	−0.002	0.005
	(0.003)	(0.003)	(0.002)
t_0+6	0.002	−0.003	0.000
	(0.003)	(0.004)	(0.002)
t_0+7	0.003	−0.017***	−0.002
	(0.003)	(0.004)	(0.002)
t_0+8	−0.010***	0.004	−0.003
	(0.003)	(0.004)	(0.002)
t_0+9	n/a	0.005	−0.003
	n/a	(0.003)	(0.002)

Behavioral responses

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Reform:	Reform 1:	Reform 2:	Reform 3:
t_0+5	−0.005	−0.004	0.007***
	(0.003)	(0.003)	(0.002)
t_0+6	−0.011***	−0.024***	0.004
	(0.003)	(0.004)	(0.002)
t_0+7	−0.002	−0.012**	0.005**
	(0.003)	(0.004)	(0.002)
t_0+8	0.000	−0.005*	0.006***
	(0.003)	(0.003)	(0.002)
t_0+9	n/a	−0.005*	0.004**
	n/a	(0.003)	(0.002)

◂ back