General Equilibrium Effects of Insurance Expansions: Evidence from Long-Term Care

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CIRANO-CIREQ-RSI-CREEi, April 2022

We gratefully acknowledge funding from the W.E. Upjohn Institute for Employment Research (18-156-12) and the National Institute on Aging (K01AG059843).

Motivation and contribution

- Textbook view of public health insurance programs is that they provide risk protection and may lead to moral hazard
- But HI is also effectively an *industrial policy*—a product market subsidy that channels substantial public spending into a particular sector of the economy—healthcare
- Little quasi-experimental evidence on aggregate effects of HI on healthcare markets (Exceptions: Finkelstein, 2007; Kondo and Shigeoka, 2013)
- Even less evidence on how these effects are mediated by frictions on input markets (Crew 1969; Gaynor et al 2000), even though theory of the second-best suggests that if supply-side is not frictionless, the net welfare effect of subsidizing demand is theoretically ambiguous

This paper: (i) quantify the reallocation of the key factor of healthcare production—labor— in response to a large HI expansion; (ii) offer a conceptual framework for normative analysis

Setting: Long-Term Care in Germany

Reform of 1995/1996:

- Rollout of universal LTC insurance
- Funded through earmarked payroll contributions
- Not means-tested, flat-rate benefit based on medical necessity level
- Implicit cost-sharing of 40% to 50%
- Public spending on LTC nearly instantaneously **tripled** from 5 to 15 bn EUR (ca 0.2% to 0.6% of GDP; US 1990 - 0.4% Medicare + Medicaid for HHC+SNF)

Prior to 1995 (important for research design):

- Means-tested public support for LTC - *Hilfe zur Pflege* (HzP)
- Providers predominantly public or Church-owned
  - Important, as public and Church-owned providers historically fell under cross-industry collective bargaining agreements (will come back to this point later)

Data

1. Linked employer-employee data (IEB)
   - Panel covering the universe of socially insured workers (excludes self-employed and public servants) for 1975-2008
   - Data on industry, occupations, earnings, full-/part-time, demographics
   - Focus on employment in Skilled Nursing Facilities (SNFs)
2. Data on pre-expansion "insurance" coverage through *Hilfe zur Pflege* at the regional level hand-collected from printed sources: statistical reports from late 1980s and early 1990s
3. Mortality data collected from states

	SNF Sample		Labor Market Sample
	All Spells	SNF Spells	All Spells
	1975-08	1975-08	1980-04
	(1)	(2)	(3)
No. of Individual-Year Observations	24,369,708	9,834,229	48,102,814
No. of Unique Individuals	1,589,014	1,589,014	3,818,780
Demographics			
Mean Age	37.7	41.0	41.1
% Female	77.3	80.6	41.3
% German	93.5	93.7	92.0
% High School Education (Abitur)	10.3	9.3	10.5
% in Healthcare Sector	61.0	100.0	6.3
% Unemployed	9.6	0.0	6.7
Mean 15-Year Labor Market Experience (yrs)	8.4	8.8	10.2
Mean 15-Year SNF Experience (yrs)	3.6	6.0	0.0
% Part-Time	27.3	32.7	13.0
Mean Daily Wage (EUR)			
All Observations	77.5	82.9	105.4
SNF Observations	82.9	82.9	80.1

Research Design

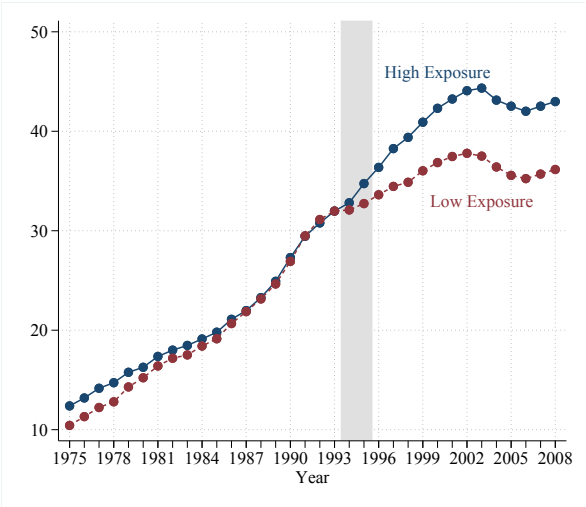
We exploit **variation in exposure** across regions r[1]. Idea: number of LTC-needing people that now gain insurance per capita of all LTC-needing people (similar in spirit to Finkelstein, 2007).

$$E_r = 100\% - \frac{HzP_{r,1993}}{g_{r,1993,1999} * LTCClaims_{r,1999}}$$

- Potential market = individuals claiming SNF benefits *after* insurance roll-out. g adjusts for population growth. That gives 100% of potential demand.
- $r = 15$ regions: 8 states + 7 sub-state districts of Bavaria.
- Exploit exposure in standard DiD research design

[1] Multiple variants of the measure in the appendix; results not sensitive

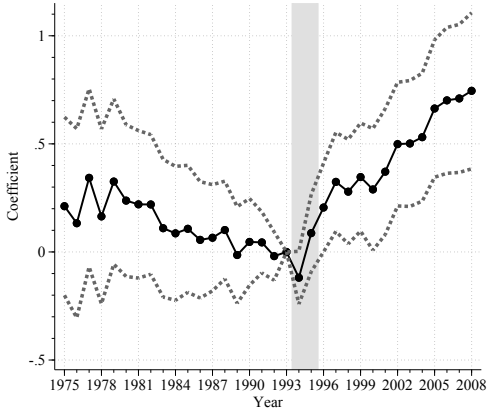
Raw Data - SNF Workers per 1,000 65+ Pop



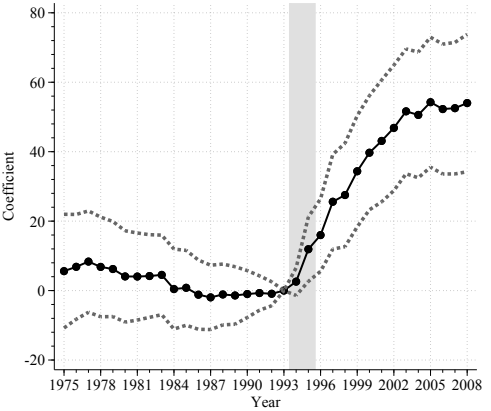
- County-level averages, normalized to 1993; 300K workers in 1992, 450K in 2005
- Observe stronger growth in more exposed counties

Impact of LTC insurance on SNF firms and workers

A) Event Study - SNF Firms

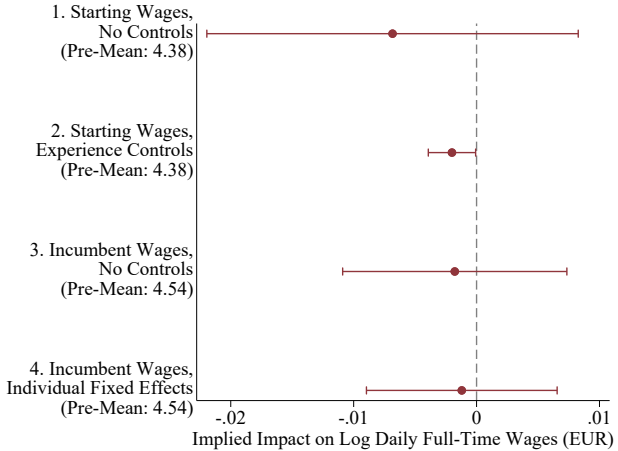


B) Event Study - SNF Workers



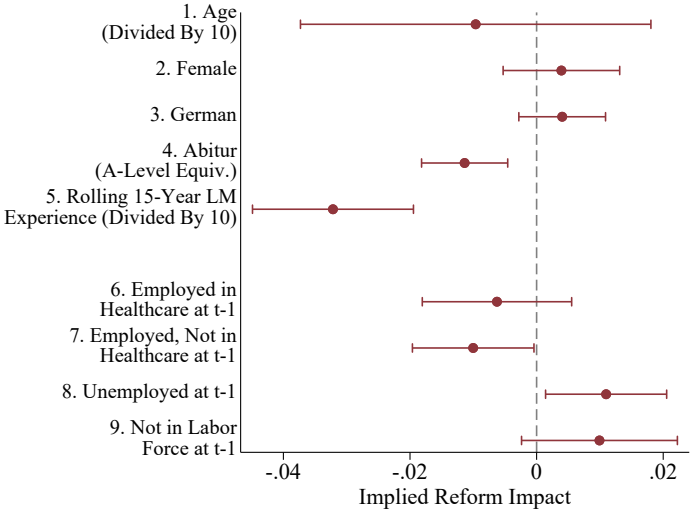
- 9pp exposure - 7% more firms + 13% more workers (x2 workforce if full exposure)
- Arc-elasticity of employment to OOP = 0.8—much higher than RAND and Oregon; cost of LR investment

Impact of LTC insurance on SNF wages



- No evidence of wage increases - despite lots of new hiring

Changes in the characteristics of new hires



- Hires less educated and experienced; more likely from non-employment (76% of all new hires)
- Expansion driven by new hires, not retention - need to understand their cntf careers for welfare

Counterfactual Career Outcomes for New Hires?

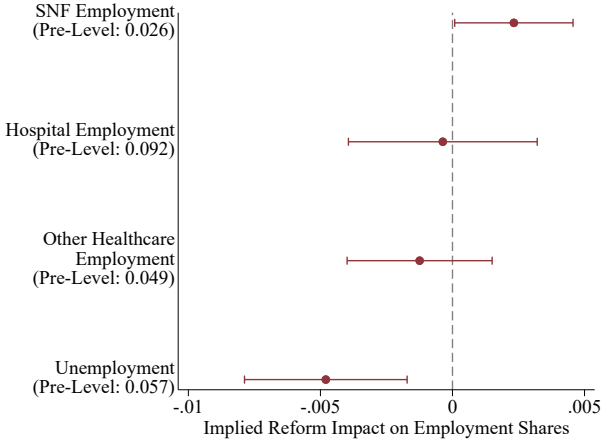
- Some of the new hires from unemployment might have found employment outside SNFs, what are the net employment gains of the reform?
  - Switch perspectives and study careers of workers not yet employed in SNFs
  - But, many workers not searching for jobs in SNFs?

- Solution: use machine learning techniques to identify individuals "at-risk" of entering the SNF sector
  - Train a CART model that aims to predict "starting work at a SNF" using 5-year-lagged demographic and labor market experience characteristics
  - Call those with a hiring probability of over 1% "at risk"
  - The "at risk" sample is skewed towards younger, female, German, and less educated individuals, more likely to have unemployment spells
- Then estimate our event study specification on these at-risk workers to measure the impact of insurance on worker allocation across sectors

Characteristics of Workers "At Risk" of Being a SNF Hire

Predicted Hiring Risk	Risk $\geq$ 0%	Risk $\geq$ 1%	SNF in t & Risk $\geq$ 1%
5-Year-Lagged Predictors			
Age (in year t-5)	36.13	33.29	34.18
% Female (in year t-5)	41.26	95.22	93.33
% German (in year t-5)	87.94	94.77	95.85
% University Education (in year t-5)	0.04	0.02	0.03
% High School Equivalent (in year t-5)	0.07	0.03	0.04
% Employed in Medical Sector (in year t-5)	5.72	17.20	24.83
% Unemployed (in year t-5)	4.30	14.06	17.70
Outcome			
% Employed in SNF (in year t)	0.56	2.66	100
No. of Observations	48,102,814	5,914,736	157,498

How did LTC insurance change career trajectories of "at risk" workers?



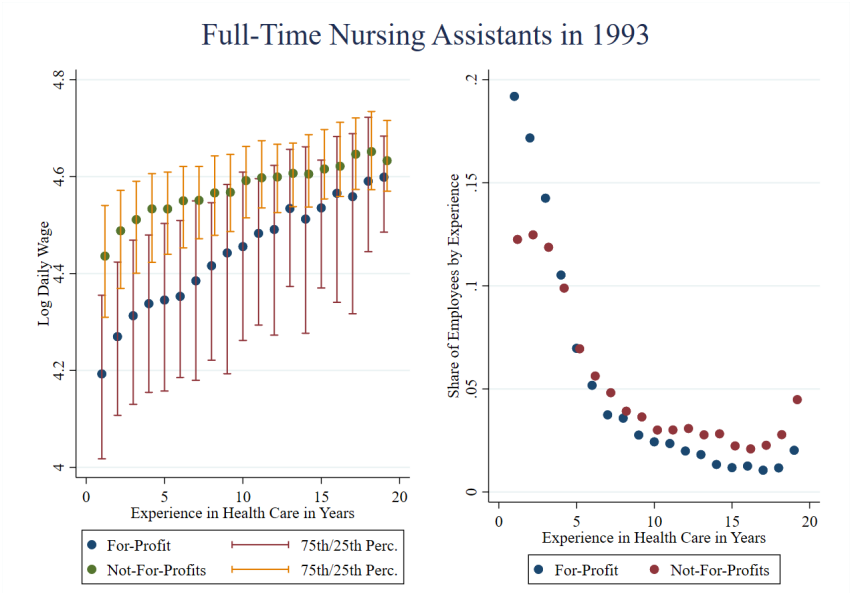
- No robust evidence for the reform poaching workers from other productive sectors
- Evidence for decline in unemployment - i.e. these were new jobs

Labor Market Frictions

1. Unemployment benefits:
   - Generous (long-term) unemployment benefits
   - Average Unemployment rate in West Germany >10% in 1990s
   - Hartz IV reform in 2005 reduced long-term benefit and intended to put the unemployed back to work (Price 2019)

2. Collective Bargaining:
   - Public employees paid based on salary scales, largely a function of age Table
   - Not-for-profits, largely church-owned follow similar structure
   - Pre-reform: public and not-for-profits account for 84% of inpatient beds
   - More generally, collective bargaining were common across sectors in the 1990s and an important contributor to high unemployment rates (Dustmann et al. 2014)

Collective Bargaining in Skilled Nursing Facilities (SNFs) Model



Summary and Conceptual Framework

Summary of Findings:

1. Sweeping LTC reform led to large SNF employment increase
2. Marginal workers are less skilled on average, no evidence for wage increases
3. Marginal workers hired from unemployment
4. Not-for-profits pay higher wages than for-profits particularly for lower skilled workers (due to wage compression)

Next: Directed Search and Matching framework with wage frictions:

- Reconciles coexistence of vacancies and unemployment
- Can reconcile stylized facts as equilibrium outcomes
- Provides framework for normative analysis of product subsidies
- Applicable to broad range of industrial or place-based policy questions with labor market frictions (Kline and Moretti 2013)

Search and Matching Framework for Labor Market

Directed search model of SNF (+outside) labor market:

- Search/matching frictions (by worker skill level s)
  - SNF labor force N_s
  - SNF Job seekers U_s and Vacancies V_s [$u_s = \frac{U_s}{N_s}$]
  - CRS Matching function $m(U_s, V_s)$
  - Labor market tightness: $\theta_s = \frac{V_s}{U_s}$
- Wage rigidities/ Labor Market Frictions:
  - Not-for-profits deviate from competitive equil. wages
  - Unemployment benefits affect worker's flow payoff from unemployment
- Production and Output Market:
  - Patient demand for total output Q: $P(Q)$
  - Worker produces s output units: $Q = \sum_s s \cdot N_s \cdot (1 - u_s)$
  - SNF is price-taker in output market (for now)

Worker Value Functions

- Value of unemployment:

$$r \times J_s^U = \xi + b + \theta_s \times q(\theta_s) \times (J_s^E - J_s^U) \tag{1}$$

r: interest rate
$\xi \sim F$: relative preference shock for SNF sector (relative to outside sector)
b: flow value of unempl. (home production, leisure, and benefits, UB)
$\theta_s \times q(\theta_s) = \frac{m(U_s, V_s)}{U_s}$: Worker job finding rate

- Value of employment:

$$r \times J_s^E = \xi + w_s + \lambda_s \times (J_s^U - J_s^E) \tag{2}$$

w_s: SNF wage
λ_s: exogenous separation rate

Firm Value Functions and Wage Setting:

- Value of a job vacancy:

$$r \times J_s^V = -c \times s + q(\theta_s) \times (J_s^F - J_s^V) \tag{3}$$

$c \times s$: flow cost of vacancy
$q(\theta_s) = \frac{m(U_s, V_s)}{V_s}$: Job filling rate

- Value of filled vacancy employment:

$$r \times J_s^F = p^f \times s - w_s + \lambda_s \times (J_s^V - J_s^F) \tag{4}$$

p^f: gross price per unit of output
$p^c = p^f \times (1 - \tau)$: price paid by patient (τ: price subsidy)

- Wage posting/setting (not-for-profits): figure

$$w_s = \Delta w + \beta \times p^f \times s \tag{5}$$

Steady State Equilibrium: Calibration

- Beveridge Curve:

$$u_s = \frac{\lambda_s}{\lambda_s + \theta_s \cdot q(\theta_s)} \tag{6}$$

- Job Creation Curve (free entry $r \cdot J_s^V = 0$):

$$p^f \times s - w_s - \frac{(r + \lambda_s) \cdot c \cdot s}{q(\theta_s)} = 0 \tag{7}$$

- Worker mobility cutoff (utility from outside sector z_s):

$$\underline{\xi}_s = z_s - \frac{\theta_s \cdot q(\theta_s) \cdot w_s + b \cdot (\lambda_s + r)}{\theta_s \cdot q(\theta_s) + \lambda_s + r} \tag{8}$$

- Product market clears ($p^f = p^c/(1-\tau)$; τ=subsidy):

$$Q^D(p^c) = \sum_s N_s \times (1 - u_s) \times s = Q^S(p^f) \tag{9}$$

Social Welfare and the Effect of the Subsidy:

- Social welfare

$$S = \underbrace{\int_0^{\sum_s N_s \times (1-u_s) \times s} P(Q)dQ}_{\text{Value of SNF Output}} - \underbrace{G}_{\text{Public Spending}}$$
$$+ \underbrace{\sum_s \Big((b - c \cdot \theta_s \cdot s) \times u_s - z_s \Big) \times N_s}_{\text{Value of unempl. net of hiring costs and outside utility}} + \underbrace{\int_{F^{-1}(1-N_s)}^{\infty} \xi dF}_{\text{Preferences for SNF}}$$

- Welfare effect of subsidy $\bar{\tau}$:

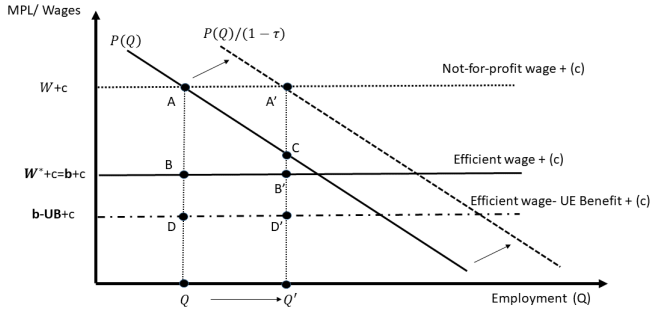
$$\Delta S = \int_0^{\bar{\tau}} \frac{\partial S}{\partial \tau}(\tau)d\tau = \int_0^{\bar{\tau}} (\sum_s \underbrace{\frac{\partial S}{\partial N_s} \times \frac{\partial N_s}{\partial \tau}}_{\text{Relocation Between Sectors}} + \underbrace{\frac{\partial S}{\partial \theta_s} \times \frac{\partial \theta_s}{\partial \tau}}_{\text{Relocation Within Sector}})d\tau$$

Welfare Effect of Subsidy $\bar{\tau}$:

$$\Delta S = \sum_s \int_0^{\bar{\tau}} \underbrace{-\tau \times p^f(\tau) \times s \times \frac{\partial N_s \times (1-u_s)}{\partial \tau}}_{\text{Traditional DWL}} \underbrace{- UB \times \frac{\partial N_s \times u_s}{\partial \tau}}_{\text{Fiscal Externalities}}$$
$$- \underbrace{N_s \times \frac{\partial u_s}{\partial \tau} \times \frac{1}{1-\alpha}\left(w_s - w_s^*\right)}_{\text{Labor Market Surplus}} d\tau$$

- Relocation between sectors:
  - Workforce size N_s efficient [envelope condition on worker mobility]
  - Relocation between sector only affects DWL and fiscal externalities
  - UB: Unemployment benefits
- Relocation within sector:
  - Market tightness θ inefficient when $w \neq w^*$ [Hosios (1990)]
  - $w_s^* = \alpha \cdot (p^f \cdot s + c \cdot \theta \cdot s) + (1-\alpha) \cdot b$ [competitive search equilibrium wage]
  - α: Elasticity of matching function
  - Labor market surplus only scales in $N_s \times \Delta u_s$ (DWL scales in $\Delta(N_s \times u_s)$)

Graphical Illustration: $\alpha = 0$; homog. skills; vacancy cost c



- Traditional DWL: -AA'C
- Labor Market Surplus +AA'BB'
- Fiscal externality: +BB'DD'

Measurement:

$$\Delta S \approx \underbrace{\frac{1}{2}\sum_s \bar{\tau} \times (p^f \times s) \times \Delta Employment_s}_{\text{Traditional DWL} \approx -440m/year}$$

$$+ \underbrace{\sum_s \Delta Employment_s^{NFP} \times \frac{1}{1-\alpha} \times \left(w_s^{NFP} - w_s^*\right)}_{\text{Labor Market Surplus} \approx +188m/year}$$

$$- \underbrace{\sum_s UB \times \Delta Unemployment_s}_{\text{Fiscal Externalities} \approx +439m/year} = \$189m$$

- Δ Employment: DID Estimates
- $p^f \times s = mc_s = w_s +$ hiring costs (hiring costs 15% of wage, Bueri and Burda 2008)
- w_s^*: Counterfactual competitive search equilibrium wage (w/out collec. bargain.)
  1. w_s^{FP}: Wages paid in for-profit SNFs (small independent providers with)
  2. Counterfactual avg. wage paid in other sectors among workers in risk sample
- $\alpha = 0$: Elasticity of matching function (provides lower bound if $w_s^{NFP} \geq w_s^*$)

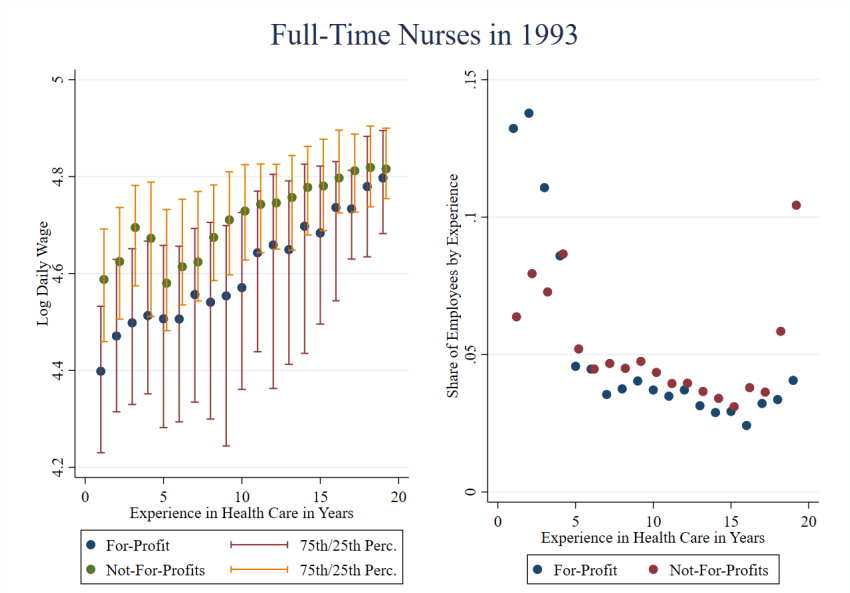
Conclusion and Discussion

1. LTCI rollout in Germany led to a large expansion in SNF employers and employees
2. Wages did not change much; new hires less & come from non-employment
3. Suggestive evidence for a small decline in elderly mortality (not shown today)

Frictions in Labor Markets and Welfare implications:

- Collective Bargaining: Not-for-profits (e.g. Church) pay supracompetitive wages
  - Wages compression: wage wedges larger for lower skilled workers
  - Employment (of lower skilled workers) inefficiently low
- Generous (long-term) unemployment benefits
- LTC subsidy can be efficient in second-best sense (Harberger 1971)
- Can generalize to any product-market subsidies: they may lead to reallocation of labor and net welfare effect is an empirical question

Labor Market Frictions: Collective Bargaining



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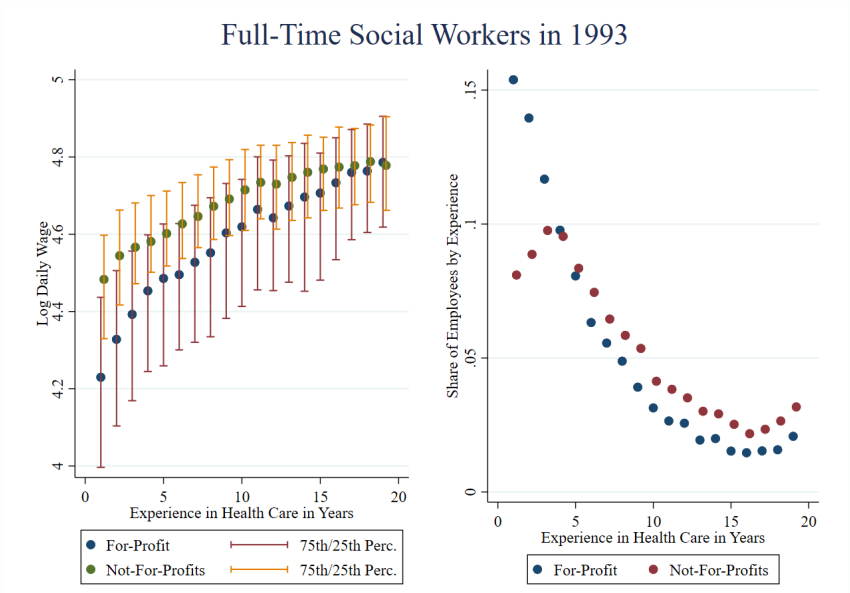
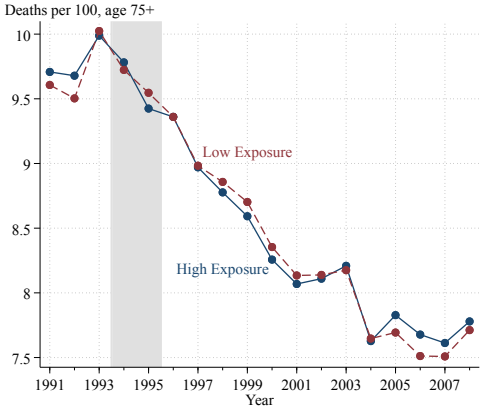
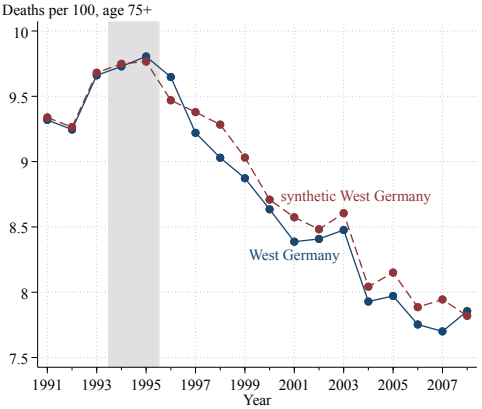


Impact of LTC insurance on mortality

A) Within-Germany Variation in



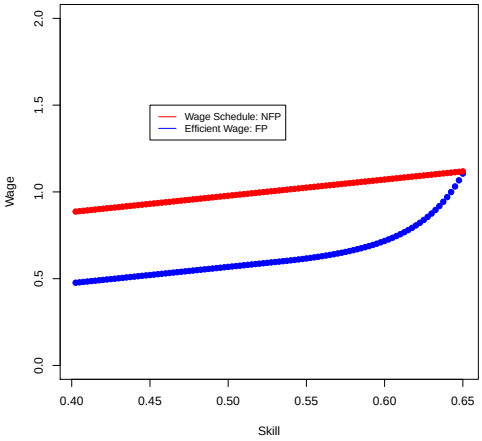
B) Synthetic Control

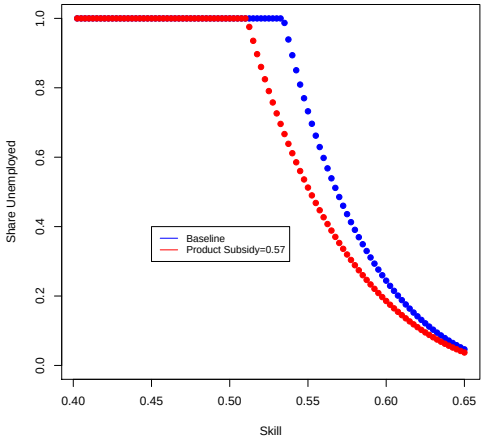


- Suggestive evidence of ca. 1% decline in mortality
- Will focus normative analysis on demand and workers, not health gains

Calibration: Wages (left) and Share Unemployed (right) by Skills

back





- λ=15%; CES demand: $\sigma = -0.8$ (arc elasticity)
- $c = 0.15 * w_s$ (Burda and Boeri 2008); Product subsidy =57%

Wage Scales in Public Providers by Age

back

Bundes Angestelltentarifvertrag, Vergütungstarifvertrag Nr. 28

Bereich Bund und Länder

Darstellung verändern:

Tageswerte

Gültigkeit der Tabelle: 01.01.1993 - 31.08.1994

Tagesentgelttabelle BAT 1993

DM	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49
I		161.27	170.02	178.76	187.50	196.25	204.99	213.73	222.48	231.22	239.97	248.71	257.45	266.20	
Ia		148.65	155.45	162.24	169.03	175.83	182.62	189.42	196.21	203.01	209.80	216.60	223.39	229.90	
Ib		132.15	138.68	145.22	151.75	158.28	164.81	171.34	177.88	184.41	190.94	197.47	204.00	210.52	
IIa		117.14	123.14	129.14	135.14	141.14	147.14	153.14	159.14	165.14	171.14	177.14	183.13		
IIb		109.22	114.69	120.16	125.63	131.10	136.57	142.04	147.51	152.97	158.44	163.91	166.30		
III	104.11	109.22	114.33	119.45	124.56	129.68	134.79	139.91	145.02	150.14	155.25	160.37	165.23		
IVa	94.37	99.05	103.73	108.41	113.09	117.77	122.45	127.13	131.81	136.49	141.17	145.85	150.47		
IVb	86.29	90.00	93.71	97.42	101.14	104.85	108.56	112.27	115.99	119.70	123.41	127.12	127.62		
Va	76.30	79.24	82.18	85.36	88.62	91.88	95.15	98.41	101.68	104.94	108.20	111.47	114.50		
Vb	76.30	79.24	82.18	85.36	88.62	91.88	95.15	98.41	101.68	104.94	108.20	111.47	111.69		
Vc	72.12	74.77	77.43	80.21	82.99	85.90	88.98	92.07	95.16	98.25	101.30				
VIa	68.30	70.35	72.39	74.44	76.49	78.60	80.75	82.90	85.09	87.48	89.86	92.25	94.64	97.03	99.07
VIb	68.30	70.35	72.39	74.44	76.49	78.60	80.75	82.90	85.09	87.48	89.86	91.73			
VII	63.27	64.94	66.60	68.26	69.93	71.59	73.25	74.92	76.58	78.29	80.04	81.30			
VIII	58.53	60.05	61.58	63.10	64.62	66.14	67.66	69.18	70.71	71.84					
IXa	56.62	58.13	59.64	61.16	62.67	64.18	65.69	67.21	68.71						
IXb	54.50	55.88	57.26	58.64	60.02	61.40	62.78	64.16	65.33						
X	50.60	51.98	53.37	54.75	56.13	57.51	58.89	60.27	61.65						

Entgelttabelle mit Tageswerten - 1/30 eines Monatswertes

Hinweis: durch Klick auf das jeweilige Tabellenfeld erhalten Sie eine detailierte Berechnung hierzu