Why Do Americans Work So Much More than Europeans? The Role of Employer-Sponsored Health Insurance and Uncertain Health Expenses

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The Goal

- This paper is about the well-known fact:
  - Americans work much more than Europeans. (Prescott (2004))
- The main goal of this paper: to provide a new explanation for this fact.
  - Specifically, we ask:
    can different health insurance systems account for the difference in aggregate labor supply between the US and Europe?

Background and Motivation

- **A well-known fact:** Americans work much more than Europeans.
  - Aggregate hours worked per person (age 15-64): one third more in the US. (e.g. Prescott (2004), Rogerson (2006)) (see Table 1)
- Important to understand this fact:
  - Aggregate labor supply plays a central role in macroeconomic analyses.
    - E.g. labor income share accounts for two thirds of total output.
  - This cross-country difference is *large* compared to:
    - Hours worked changes over the business cycle since WWII: deviations from the trend $< 5\%$. (Rogerson (2006))
- The main existing explanation: different tax rates on labor income.
  - Tax on labor income. US: 40%, Europe: 60%.
  - Prescott (2004), Rogerson (2006, 2007), Ohanian et al. (2008), etc.
- *However*, this explanation is often criticized for strict assumptions on
  - labor elasticity. (high elasticity)
  - how tax revenues are spent. (revenues paying back: no income effect)

Aggregate Labor Supply: US vs. Europe

Countries	Annual Hours Worked per person (age 15-64)	Compared to the US (US=1)
US	1360	1
France	940	0.69
Germany	965	0.71
Italy	980	0.72
UK	1227	0.90
Average (Major 4)	1028	0.76
Austria	1258	0.92
Belgium	941	0.69
Ireland	1119	0.82
Netherlands	1035	0.76
Spain	994	0.73
Switzerland	1323	0.97
Portugal	1223	0.90
Greece	1191	0.88
Norway	1133	0.83
Sweden	1220	0.90
Finland	1182	0.87
Denmark	1208	0.89
Averge (exclude Scan.)	1100	0.81
Average (all)	1121	0.82

Data source: OECD Labor Market Data (2000).

What We Do

- We propose a new explanation: different health insurance systems.
  - Europe: universal health insurance financed by government.
    - no link between health insurance and labor supply decision.
  - US: employer-based health insurance (EHI).
    - health insurance available only if you **work** and **work full-time**.
- EHI provides a strong incentive to work as it is extremely valuable in US.
  - Health expenses: large and extremely volatile.
  - No good substitute from the individual market.
  - Tax benefits: insurance premiums are exempted from taxation.
  - Risk-averse agents value it much more than its actuarially-fair value.

Motivation (continue)

- More motivating facts:
  - More working-age Americans are working.
  - More Americans workers are working full-time.

	Employment Rate	FT share	FT Employment Rate	Annual Hours Worked (relative to the US)
US	74.1%	88.1%	65.31% (1)	1
France	61.7%	85.9%	53.0% (0.81)	0.69
Germany	65.6%	82.8%	54.3% (0.83)	0.71
Italy	53.9%	87.9	47.4% (0.73)	0.72
UK	72.2%	77.8%	56.2% (0.86)	0.90
Average	63.4%	83.6%	53.0% (0.81)	0.76

Data source: OECD Labor Market Data (2000).

Motivation (continue)

- Empirical evidence:
  - Rust and Phelan (1997): health insurance is the reason why some workers postpone retirement.
  - Garthwaite, Gross and Notowidigdo (2014): some workers are employed primarily to secure health insurance.
  - Married women with spousal health insurance tend to work part-time or not work. (Buchmueller and Valletta (1999), Wellington and Cobb-Clark (2000), Olson (1998), etc.)
- To capture the aggregate effect of health insurance: a macro model of aggregate labor supply, general equilibrium.

Plan and Preview of the Results

- We develop an OLG, GE model with labor supply and health expenses
- Use it to quantitatively assess
  - to what extent different health insurance systems account for the aggregate hours worked between US and Europe.

    (Answer: account for over two thirds of the difference in hours worked)
- Implications for the cause of the difference in GDP per capita.
  - Are Americans richer than Europeans simply because they work more?

    (Answer: no)

The Model

- A 65-period OLG model with one period is one year.
  - Born in 21, retire in 65 and die in 85.
- Endogenous labor supply:
  - one unit of time endowed each period
  - choose full-time, part-time, or no work $l \in \{0, l_h, l_f\}$.
- The US health insurance structure:
  - working-age: partial coverage by employment-based health insurance.
  - old-age: universal coverage from Medicare
- Health expense (m): an exogenous expense shock.
- Other elements:
  - Social Security program
  - government-financed consumption floor
  - idiosyncratic income shock

The Individual's Problem

- The individual's state in each period: $s = \{j, a, m, e_h, h, \epsilon, e\}$
  - Age: j. Asset: a. Health expense: m. Idiosyncratic income shock: ϵ.
  - Education: e. EHI offer e_h: 0 (not offered), 1 (offered).
  - Health insurance status h: 1 (uninsured), 2(insured by EHI).
- Working-age individual's problem ($P1$)

$$V(s) = \max_{c,l,h'} u(c, l) + \beta E[V(s')] \tag{1}$$

subject to

$$\frac{a'}{1+r} + c + (1 - \kappa_h)m = w(l)e\epsilon l(1 - \tau) - ph' + ph'\tau + a + b_1 + b_2(s) \tag{2}$$

$$l \in \{0, l_h, l_f\}, c \geq 0, \text{ and } a' \geq 0$$

$$\begin{cases} h' \in \{0, 1\} & \text{if} \quad l = l_f \quad \text{and} \quad e_h = 1 \\ h' \in \{0\} & \text{otherwise} \end{cases} \tag{3}$$

The Individual's Problem (continue)

- Wage:

$$\begin{cases} w(l) = wl^{\theta} - c_e & \text{if} \quad e_h = 1 \\ w(l) = wl^{\theta} & \text{otherwise} \end{cases} \tag{4}$$

  - No-linear wage (e.g. Rogerson and Wallenius (2013)).

- Retiree's problem ($P2$)

$$V(s) = \max_{c} u(c, 0) + \beta P(s) E[V(s')] \tag{5}$$

subject to

$$\frac{a'}{1+r} + c + (1 - \kappa_m)m = SS(e) + a + b_1 + b_2(s) \tag{6}$$

$$c \geq 0, \text{ and } a' \geq 0$$

The Health Insurance System

- Employer-sponsored health insurance:
  - community rated: no pre-existing conditions, same price for all (p_h).
  - premiums are exempted from taxation.
  - insurance companies are competitive: prices are actuarially-fair values with a markup λ.
- Medicare
  - covers a κ_m fraction of health expense for the elderly.
  - financed by payroll taxes.

Other Public Programs and the Transfers

- Pay-as-you-go Social Security
  - SS payment to the elderly: $SS(e)$
  - financed by payroll taxes .
- Consumption floor: $\underline{c}$ (via b_2).

$$\begin{cases} b_2(s) = \max\{\underline{c} - (w(l(s))\epsilon l(s)(1-\tau) + a + b_1), 0\} & \text{if } \ j \leq R \\ b_2(s) = \max\{\underline{c} - (SS(e) + a + b_1), 0\} & \text{if } \ j > R \end{cases}$$

- Accidental Bequests: collected by the government, and redistributed back equally to everyone (b_1).
- Government tax revenues: from τ, used to finance Medicare, SS, and the welfare program.
  - The extra revenues are thrown away.

The Representative Firm

- **The firm's profit maximization problem:**

$$\max_{L,K} Y - wL - (r+\delta)K,$$

with

$$Y = K^{\alpha}(AL)^{1-\alpha}.$$

  - K: capital; L: labor; Y: output; δ: capital depreciation rate.
  - A: Labor-augmented technology.

- **Firm's FOCs imply,**

$$w = (1-\alpha)A(\frac{K}{AL})^{\alpha}$$

$$r = \alpha(\frac{K}{AL})^{\alpha-1} - \delta$$

Stationary Equilibrium (sketch)

Definition: A **stationary equilibrium** is given by a collection of value functions $V(s)$, individual policy rules $\{a', l, h'\}$, the distribution of individuals $\Phi(s)$; aggregate factors $\{K, L\}$; prices $\{r, w\}$; Social Security, Medicare, the social safety net; private health insurance contracts defined by pairs of price and coinsurance rate $\{p, \kappa_h, c_e\}$, such that,

1. *Given prices, government programs, and private health insurance contracts, the value function $V(s)$ and individual policy rules $\{a', l, h'\}$ solve the individual's dynamic programming problem (P1) and (P2).*
2. *Given prices, K and L solve the firm's profit maximization problem.*
3. *The capital and labor markets clear.*
4. *The government programs, Social Security, Medicare, and the transfer program are self-financing.*
5. *The health insurance companies are competitive.*
6. *The distribution $\Phi(s)$, evolves over time according to the equation $\Phi' = R_\Phi(\Phi)$, and satisfies the stationary equilibrium condition: $\Phi' = \Phi$.*
7. *The amount of bequest transfers is equal to the amount of accidental bequests from the last period.*

Quantitative Strategy

- The quantitative question:
  - To what extent can different health insurance systems account for the difference in aggregate hours worked between the US and Europe?

- Quantitative strategy: (steady-state comparison)
  - Calibrate the benchmark model to match the current US economy.
    - A key feature: employment-based health insurance.
  - Construct a counterfactual economy by
    - replacing the employment-based health insurance in the benchmark economy with a government-financed universal health insurance that mimics the European system.
  - Comparing: benchmark(US system) vs. counterfactual(European system)

Preliminary Calibration

- Health expense shock m.
  - Calibrated using Medical Expenditure Panel Survey (MEPS) dataset
  - Governed by a 6-state markov chain.
  - Categorize the distribution of total health expenditure into 6 bins $(25\%, 50\%, 75\%, 90\%, 95\%)$. (by each age group)
  - E.g. for age 46-55, $> 95\%$: \$33930; $25\% - 50\%$: \$684.
- Labor supply choices: $l_f = 0.4$, $l_h = 0.2$
  - Total time available: 5000 hours. Full-time job: 2000 hours
- Labor productivity ϵ: $ln\epsilon = a + y$.
  - a: age-specific deterministic component.
  - y: the shock, governed by 3-state Markov chain discretized from the AR(1) process.

$$y' = \rho y + u', u' \sim N(0, \sigma_u^2), \tag{7}$$

$\rho = 0.94$, $\sigma_u^2 = 0.205$. (Alonso-Ortiz and Rogerson (2010))
- Education: no high school, high school graduate, college graduate.
  - $e^1 = 0.7$, $e^2 = 1$, $e^3 = 1.7$

Preliminary Calibration (continue)

- Preference: $u(c,l) = log(c) + \zeta \frac{(1-l)^{1-\gamma}}{1-\gamma}$
- $\gamma = 2.0$, the census value (Chetty (2012)).
- $\zeta = 1.15$, to match the US employment rate, i.e. 74.1%.

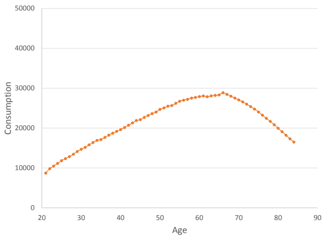
Parameter	Value	Source
α	0.36	Macro literature
δ	0.06	Macro literature
γ	2	Chetty(2012)
A	30000	US GDP per capita: \$36467
τ	40%	Prescott(2004)
τ_s	12.4%	US Social Security tax rate
κ_m	0.5	Attanasio et al.(2008)
κ_h	0.8	Data: 65-85%
β	0.96	Annual interest rate: 4.0%
π	0.15	Sommers(2002)
ζ	1.15	Employment rate: 74.1%
θ	0.1	Part-time worker share: 11.9%
ρ	0.94	Alonso-Ortiz and Rogerson (2010)
σ_μ^2	0.205	Alonso-Ortiz and Rogerson (2010)

Statistics of the Benchmark Economy

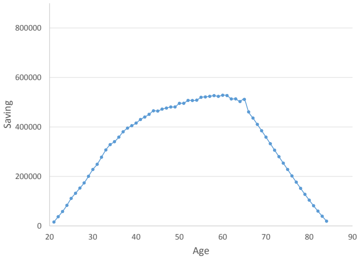
Key Statistics of the Benchmark Economy

Statistics	Model	Data
Output per person	\$38396	\$36467
Interest rate	4.3%	4.0%
Aggregate hours worked	0.282 (1410 hours)	1360 hours
Employment rate	74.3%	74.1%
Full-time worker share	90.0%	88.1%
Employment-sponsored HI (% of working-age popu.)	55.0%	59.4%
Take-up rate	87.7%	90.7%

Life-cycle Profiles in the Benchmark Economy



(a) Consumption profile



(b) Saving profile

(c) Employment rate

Benchmark (US) vs. Counterfactual(EUR)

- Construct a counterfactual economy with the European HI system.
  - European system: universal health insurance financed by lump-sum tax.

	Employment Rate	Full-time Share	Average Hours Worked
Model			
Benchmark (US system)	74.3%	90.0%	1
Counterfactual (EUR system)	62.4%	84.3%	81.5%
Data			
US	74.1%	88.1%	1
Europe (major 4)	63.4%	83.6%	75.6%

- We find: different health insurance systems account for 75.8% of the difference in aggregate hours worked between the US and Europe.
- Two channels: why US system increases labor supply?
  - The link between health insurance and job status
  - Americans have less insurance. Earnings: alternative insurance for health expenses.

Who Work More?: Decomposition

- By productivity shock.

Average hours worked by productivity	ϵ_1	ϵ_2	ϵ_3	total
Benchmark (US system)	0.144	0.302	0.392	0.282
Counterfactual (EUR system)	0.001 (0.4%)	0.281(93.0%)	0.387 (98.7%)	0.230 (81.5%)

- By whether employment-based health insurance is accessible.

Average hours worked by EHI offer e_h	$e_h = 0$	$e_h = 1$	total
Benchmark (US system)	0.264	0.283	0.282
Counterfactual (EUR system)	0.230 (87.1%)	0.230 (81.2%)	0.230 (81.5%)

Implications for the Difference in Output per capita

- While aggregate hours worked are much higher in the US, Americans are also much richer.
  - GDP per capita in Europe is much lower: 70.6% of US.
  - Recall: aggregate hours worked in Europe: 75.6% of US.
- Are Americans richer simply because they work more?
  - If yes, it implies: technology level is not lower in Europe.

	Average Hours Worked (relative to US)	Effective labor (relative to US)	Output per person (relative to US)
Benchmark (US HI)	0.282	0.629	\$38396
Counterfactual (European HI)	0.230 (81.5%)	0.601 (95.5%)	\$35989 (93.7%)

Labor Elasticity and the Main Results

- The main result: stable for a wide range of elasticities.

$\gamma =$	1 (log utility)	2 (benchmark)	4	10
Labor elasticity	1	0.5	0.25	0.1
Benchmark (US HI)	1	1	1	1
Counterfactual (European HI)	81.0%	81.5%	82.2%	83.6%

Conclusion

- The model provides an quantitative explanation for a puzzling fact: Americans work much more than Europeans.
  - Different health insurance systems account for *over two thirds* of the difference in aggregate hours worked.
  - The result is not sensitive to the labor elasticity
  - The cross-country difference in GDP per capita is *not* due to labor supply.
- Future research:
  - Understanding the different time trends in hours worked since 1950.

Life-cycle Profiles: Benchmark vs. Counterfactual