

Market Inefficiency, Insurance Mandate and Welfare: The U.S. Health Care Reform 2010

Juergen Jung
Towson University
Maryland

Chung Tran
Australian National University
Canberra

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Results are preliminary and incomplete

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The U.S. health insurance system

- Mixed system:
 - Private health insurance for working population
 - Public health insurance for poor (Medicaid) and old (Medicare)
- Main issues in the current system:
 - Low coverage: 47 million uninsured in 2006 (15%)
 - High cost: 16% of GDP on Health in 2006 and close to 20% by 2015
 - Health outcomes: questionable?

Medicare Prescription Drug, Improvement, and Modernization Act (2003)

- Health Savings Accounts
- Medicare Part D (2006) for prescription drugs
- Stop imports of generic drugs
- Restrict Medicare's ability to negotiate drug prices

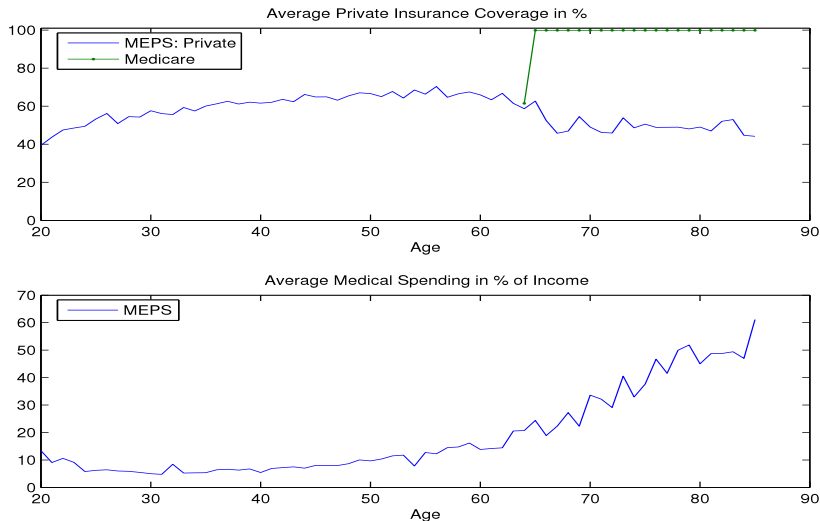
Affordable Care Act (2010)

- Private insurance:
 - Health insurance exchanges
 - Health insurance mandate with fines and subsidies
 - Restrictions on insurance companies
- Public insurance
 - Expansion of Medicaid
 - Cuts in Medicare
 - Financing
- Extension of government intervention with emphasis on the number of insured individuals

This paper

- A macro-economic analysis of the Obama health care reform:
 - ① we quantify the effects on market aggregates incl.
 - ② analyze the financing of the reform and
 - ③ calculate the effects on welfare of various socio-economic groups
- What type of model is suitable?

Health insurance and expenditure profiles (2004/05)



Main contributions

① A stochastic dynamic general equilibrium **overlapping generations model** with

- ① endogenous health expenditures and
- ② insurance choice to

that accounts for the life-cycle patterns of

- ① health expenditures and
- ② insurance take-up rates observed in the data

② Demonstrate the usefulness of the model by

- quantifying the short-run and long-run effects of the Patient Protection and Affordable Care Act (2010)
- incl. transitions and welfare analysis

Results preview

- Adverse selection ↓: → almost universal coverage
- Moral hazard ↑: → health care spending ↑ by almost 6%
- To finance reform:
 - ① 2.7% payroll tax on incomes > \$200,000
 - ② ↑ consumption tax by about 1.1%
 - ③ ↓ government spending by about 1% of GDP
- Reform ↑ health capital, labor supply
- ↓ capital stock and output by up to 2%
- Welfare ↑ for most generations along the transition: < 1% of Comp.Cons.
- Insurance take-up rate mainly driven by tax penalty and not subsidies

Related literature

- 1 Health microeconomics/econometrics
 - Grossman (1972a,1972b), Grossman (2000)
- 2 Quantitative macroeconomics/public finance
 - Ayagari (1994), Imrohoroglu et al (1995), Hugget (1996)
- 3 Macro-health economics:
 - Exogeneous health expenditure shocks: Attanasio, Kitao and Violante (2008), Jeske and Kitao (2009), Pashchenko and Porapakkarm (2010), Janicki (2011)
 - Endogenous health expenditures and insurance: Suen (2006), Feng (2009) and Jung and Tran (2008, 2010)

Outline

- 1 Model
- 2 Calibration
- 3 Policy experiments
- 4 Conclusion

MODEL

The Model: “Workhorse” macro model

Dynamic stochastic overlapping generations model with heterogeneous agents:

- Sectors: household, firm, and government
- Markets: consumption, labor and capital
- Households live for multiple-periods as workers and retirees
- Idiosyncratic labor productivity shocks
- Exogenous mortality shocks
- Incomplete financial markets

The Model: New features

- Health as a durable good: consumption and investment
- Idiosyncratic health shocks
- Endogenous health spending
- **The health insurance system incl. group insurance shock**
- Endogenous health insurance choice

The Model: Preferences and technology

- Preferences:

$$u(c_j, l_j, h_j)$$

- Health capital:

$$h_j = h(m_j, h_{j-1}, \varepsilon_j)$$

- Human capital (“labor”):

$$e_j = e(h_{j-1}, \epsilon_j)$$

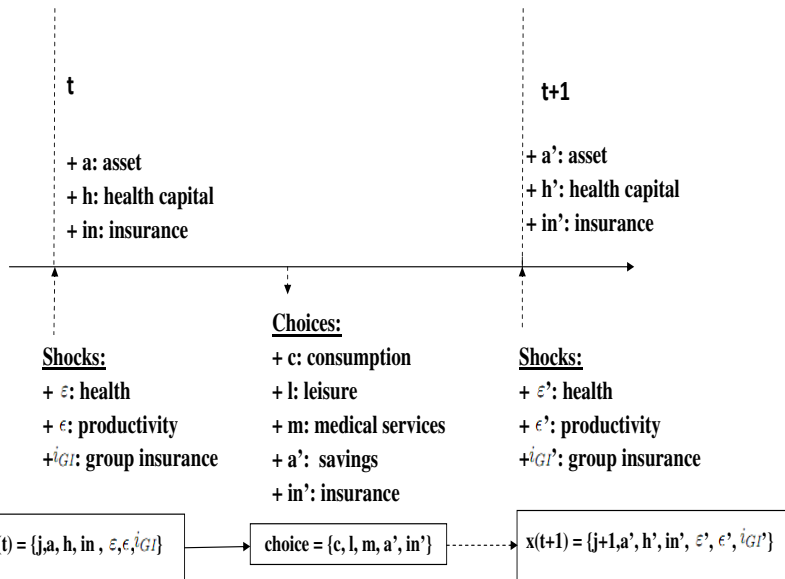
The Model: Health insurance

- A private health insurance market for workers
 - Individual and group plans
 - Group insurance offer depends on current insurance state and income
 - Health insurance choice:
 - 0: no insurance
 - 1: individual based insurance
 - 2: group based insurance (if offered by employer)
- Medicaid for poor working age population
- Medicare for retirees: no more insurance choice

The Model: Household health expenditures

- The total health expenditure without insurance: $p_m \times m$
- Worker's out-of-pocket health expenditures depend on insurance state
- Retiree's out-of-pocket health expenditures depend on Medicare generosity

The Model: Household problem - Summary



The Model: Households

- Working households solve their maximization problem:
 - Demand: C , M , health insurance
 - Supply: labor, capital
- Retired households solve their maximization problem:
 - Demand: C , M
 - Supply: capital

The Model: Insurance companies and firms

- Insurance companies solve a zero-profit condition
 - Determines insurance premiums
- Firms are competitive profit maximizers
 - Demand: labor, capital
 - Supply: final consumption good: C and M

Discussion: Supply-side model

Current limitations:

- No separate production function for medical services M
- Prices for M are therefore exogenous
- This model concentrates on the demand-side!
- To include supply side of health care services: $Y_m = F(K_m, L_m)$
- This would endogenize price for medical services: p_m

The Model: Government sector

- Spending:
 - Pension, Medicare, Medicaid, means-tested foodstamp program, general government consumption
- Revenue:
 - income tax, payroll taxes for Medicare and pensions, consumption tax
- Adjusts tax to balance budget every year!
- Pension system clears - Medicare clears - Medicaid clears
- Redistributes bequests

A competitive equilibrium

Given the transition probability matrices and the exogenous government policies, a competitive equilibrium is a collection of sequences of distributions of household decisions, aggregate capital stocks of physical and human capital, and market prices such that

- Agents solve the consumer problem
- The F.O.Cs of firms hold
- The budget constraints of insurances companies hold
- All markets clear
- All the government programs and the general budget clear
- The distribution is stationary

CALIBRATION

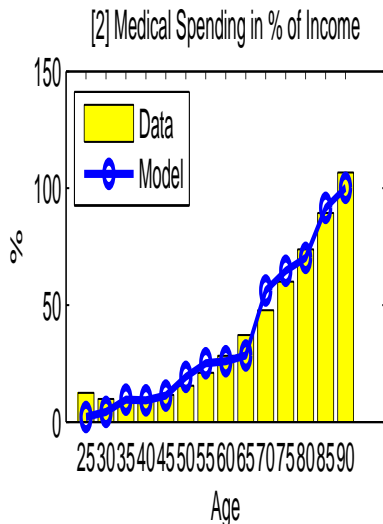
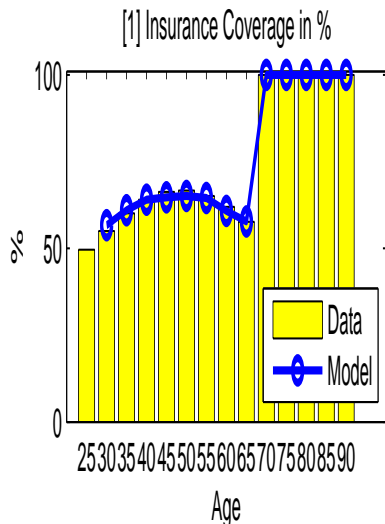
Parameterization and calibration

- Goal:
 - to match U.S. data 2008-2009
- MEPS data:
 - labor supply, income, labor shocks, health shocks, probabilities
- CENSUS/SIPP:
 - asset profiles, demographic profiles
- Previous studies (CBO etc.) for government budget

Computational issues

- Large state space due to endogenous health care demand (health capital)
- State space in 14 period model without health: 40,320 gridpoints
- State space with endogenous health: 483,840 gridpoints
- State space for transitions: 13,547,520 gridpoints
- High Performance Computing (HPC) system
- Intel Fortran using Open MP for parallel processing on 20 computational nodes
 - Steady state solution (roughly 50 iterations) : 5 minutes
 - Transition solution (roughly 50 iterations) : 1.5 hours
 - Without parallelization: days!

The model vs. the data



POLICY EXPERIMENTS

Policy experiments

- Goal
 - Evaluation of main features of the Affordable Care Act
- Evaluation criteria
 - Efficiency and welfare (compensating consumption) measures
- Analyze elements of reform separately (mandate vs. subsidy)
- Alternative taxes
 - Payroll tax vs. consumption tax vs. gov't spending cuts to finance reform
- Productive vs. unproductive health capital
- Pending: Partial vs. general equilibrium analysis

Elements of the “Obama reform” in the model

- ➊ **Mandate:** Agents who do not buy health insurance face a tax penalty of 2.5% of their income
- ➋ **Insurance Exchange:** Agents with income between 133% and 400% of the FPL get a subsidy to help them buy insurance
- ➌ **Expansion of Medicaid:** Agents with income $< 133\%$ of federal poverty level get free insurance
- ➍ **No screening** Insurance companies can't price discriminate
- ➎ **Financing:**
 - ➊ payroll tax on the rich (income $> 200k$)
 - ➋ consumption tax, or
 - ➌ fixed tax (let exogenous gov't consumption adjust)

Aggregate effects

	Benchmark	τ_V
Capital: K	100.000	99.256
Weekly hours worked:	39.673	39.799
Health capital: H	100.000	101.103
Human capital: Hk	100.000	100.145
Output: Y	100.000	99.850
Medical spending: $p_m * M$	100.000	106.423
Workers insured in %	61.777	92.864
Consumption: C	100.000	97.929
Consumption tax: τ^C	5.724	6.877
Payroll tax: τ^V	0.000	2.562
Wages: w	100.000	99.706
Welfare	-100.000	-99.813

Table: Steady state result with health as consumption good only $\theta = 0$.

The key channels of effects

- ① Savings effect: self-insurance vs. market insurance
- ② Moral hazard effect: lower effective price of health services
- ③ Tax effect: higher tax rates
- ④ General equilibrium effect: wage and interest rates

Aggregate efficiency effects: 4 key channels

	Benchmark	τ_V
1. Savings effect:		
Capital: K	100.000	99.256
2. Moral hazard effect:		
Medical spending: $p_m * M$	100.000	106.423
3. Tax/Redistribution effect:		
Consumption tax: τ^C	5.724	6.877
Payroll tax: τ^V	0.000	2.562
Subsidy in % of GDP:	0.000	0.261
4. General equilibrium effect:		
Wages: w	100.000	99.706

Table: Steady state result with health as consumption good only $\theta = 0$.

Welfare effects 1

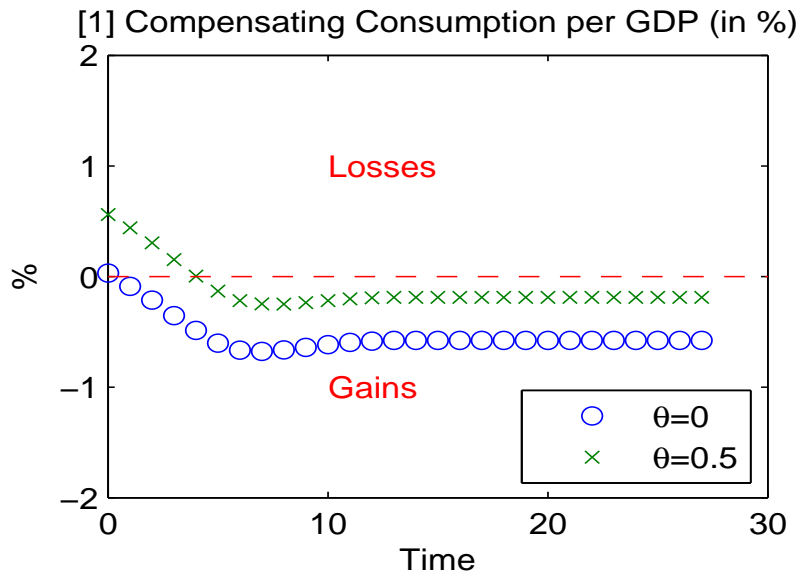
- Negative efficiency effects
 - Capital drops
 - Output drops
 - Household income drops (w decrease)
 - Consumption of C drops
- Positive insurance effects
 - More insured, improved risk sharing
 - Increases in medical spending
 - Increases in health capital H
 - If H is productive, it has a positive effect on output

Welfare effects 2

	Benchmark	τ_V
Negative welfare effects:		
1. Capital: K	100.000	99.256
2. Weekly hours worked:	39.673	39.799
3. Output/Income: Y	100.000	99.850
4. Consumption: C	100.000	97.929
Positive welfare effects:		
1. Workers insured in %	61.777	92.864
2. Medical spending: $p_m M$	100.000	106.423
3. Health capital: H	100.000	101.103
4. Human capital: Hk	100.000	100.145
Overall welfare effect:		
Welfare	-100.000	-99.813

Table: Steady state result with health as consumption good only $\theta = 0$.

Welfare effects over transitions 1: payroll tax

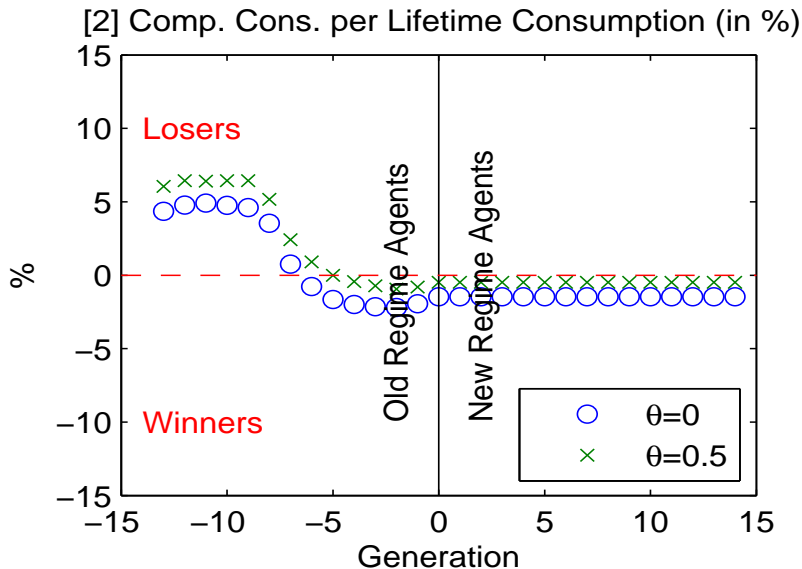


Welfare effects over transitions 2

Recent work using **exogenous** health expenditures:

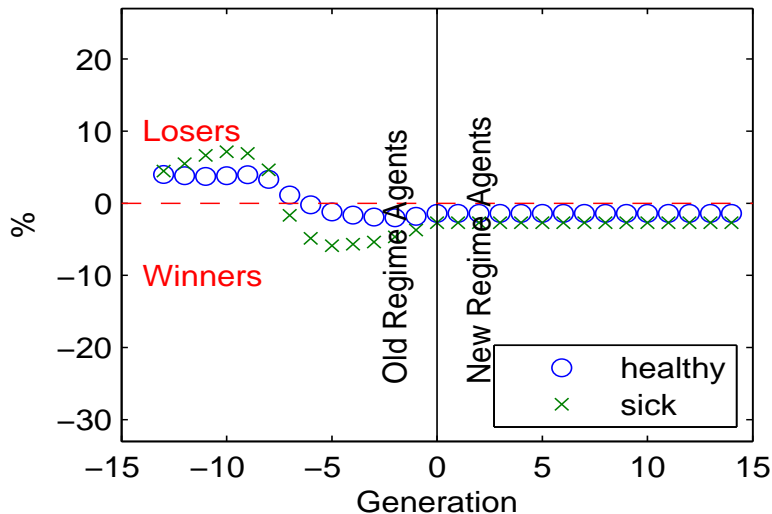
- Exogenous labor supply:
 - Pashchenko and Porapakarm (2010) welfare gain of up to 1%
- Endogenous labor supply:
 - Janicki (2011) welfare gain of up to 2.3%

Welfare effects over transitions: payroll tax



Welfare effects over transitions: payroll tax

[3] Comp. Cons. per Lifetime Consumption (in %)



Financing the reform 1

We distinguish between three possible taxes to finance the subsidies:

- 1 τ_V : payroll tax on the rich (income $> 200k$)
- 2 Δ_{Cg} : adjustment in residual government consumption (net of tax effect)
- 3 τ_C : consumption tax

Aggregate efficiency effects: Key channels

	Benchmark	[1] τ_V	[2] Δ_{Cg}	[3] τ_C
1. Savings effect:				
Capital: K	100.000	99.256	99.661	99.646
2. Moral hazard effect:				
Medical spending: $p_m * M$	100.000	106.423	106.776	106.708
3. Tax/Redistribution effect:				
Consumption tax: τ^C	5.724	6.877	5.724	7.198
Payroll tax: τ^V	0.000	2.562	0.000	0.000
4. General equilibrium effect:				
Wages: w	100.000	99.706	99.795	99.790

Table: Steady state result with health as consumption good only $\theta = 0$.

Welfare effects

	Benchmark	[1] τ_V	[2] Δ_{Cg}	[3] τ_C
Negative welfare effects:				
1. Capital: K	100.000	99.256	99.661	99.646
2. Weekly hours worked:	39.673	39.799	39.816	39.816
3. Output: Y	100.000	99.850	100.077	100.072
4. Consumption: C	100.000	97.929	99.650	98.300
Positive welfare effects:				
1. Workers insured in %	61.777	92.864	95.988	95.988
2. Medical spending: $p_m M$	100.000	106.423	106.776	106.708
3. Health capital: H	100.000	101.103	101.192	101.189
4. Human capital: Hk	100.000	100.145	100.283	100.282
Overall welfare effect:				
Welfare	-100.000	-99.813	-99.302	-99.698

Table: Steady state result with health as consumption good only $\theta = 0$.

No penalty

	Benchmark	[1] τ_V	[2] Δ_{Cg}	[3] τ_C
Medical spending: $p_m M$	100.000	103.326	105.205	105.197
Workers insured in %	61.777	60.124	65.678	65.677
Consumption tax: τ^C	5.724	6.178	5.724	6.678
Payroll tax: τ^V	0.000	3.199	0.000	0.000
Govt consumption in % of GDP:	16.500	16.500	16.123	16.500

Table: Steady state result with health as consumption good only $\theta = 0$.

No subsidy

	Benchmark	[1] τ_V	[2] Δ_{Cg}	[3] τ_C
Medical spending: $p_m M$	100.000	105.959	106.482	106.447
Workers insured in %	61.777	93.516	95.703	95.703
Consumption tax: τ^C	5.724	6.950	5.724	7.215
Payroll tax: τ^V	0.000	2.150	0.000	0.000
Govt consumption in % of GDP:	16.500	16.500	15.925	16.500

Table: Steady state result with health as consumption good only $\theta = 0$.

Health as investment good

	Benchmark	[1] τ_V	[2] Δ_{Cg}	[3] τ_C
Capital: K	100.000	98.901	98.973	98.945
Weekly hours worked:	39.684	39.776	39.802	39.798
Health capital: H	100.000	101.053	101.129	101.127
Human capital: Hk	100.000	99.931	100.268	100.262
Output: Y	100.000	99.590	99.839	99.825
Medical spending: $p_m M$	100.000	105.895	106.173	106.136
Workers insured in %	63.355	95.428	98.431	98.431
Consumption: C	100.000	97.811	99.701	98.124
Consumption tax: τ^C	5.507	6.690	5.414	7.111
Payroll tax: τ^V	0.000	3.752	0.000	0.000
Govt consumption in % of GDP:	16.500	16.500	15.833	16.500
Wages: w	100.000	99.659	99.572	99.565
Welfare	-100.000	-99.844	-99.335	-99.797

Table: Steady state result with health as investment good $\theta = 0.5$

Conclusion

- 1 Construct a heterogeneous agents macro-model with health as a durable good
- 2 Account for life-cycle patterns of health expenditures and private insurance take up rates
- 3 Assess the macroeconomic effects of the Obama health care reform 2010

Future work on macro-health economics

1 Immediate:

- Re-calibrate
- Sensitivity analysis
- Partial vs. general equilibrium results

2 Future work:

- Health capital and endogenous survival probabilities
- Production of health care services
- Optimal public health insurance with endogenous health capital
- Life-cycle consumption puzzle: the role of health
- Structural estimation of the health production function