Reducing medical spending of the publicly insured: the case for cash-out option

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Risk protection vs moral hazard in health insurance

- Empirical evidence shows that people adjust their medical spending in response to change in its price (e.g. RAND Health Insurance Experiment)
- Medical spending:
  - (1) Non-discretionary (risk)
  - (2) Discretionary (consumption)
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- Public health insurance for low-income people
- Low copayment => price of medical consumption is low
- Can this result in high spending?
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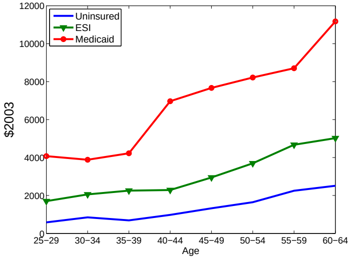

Total medical expenses by insurance status

This paper

- Constructs the model where:
  - Not all medical spending are necessary
  - Individuals choose discretionary medical spending given their insurance coverage
  - Insurance coverage is endogenous (selection)
- Studies how to improve public health insurance when:

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Theoretical analysis

- Individuals differ in their medical need: η_L and η_H, $\eta_L < \eta_H$
- Measure of L-type is π, measure of H-type is $1 - \pi$
- Individuals derive utility from

  regular consumption $u(c)$

  discretionary medical consumption $v(m - \eta)$, $m > \eta$
- Social planner maximizes social welfare by allocating resources B, $B < \eta_H$

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Medical need is private information

- Social planner's problem:

$$\pi\left[u(c_L)+v(m_L-\eta_L)\right]+(1-\pi)\left[u(c_H)+v(m_H-\eta_H)\right]\longrightarrow \max_{\{c_i,m_i\}_{i=L,H}}$$

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Properties of the solution

- Individuals reporting low medical need get rewarded with higher regular consumption: $c_L^* > c_H^*$, $m_L^* < m_H^*$
- Consumption of individuals with low medical need should be undistorted:
$$u'(c_L^*) = v'(m_L^* - \eta_L)$$
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The following transfer system implements the optimum.

- Individuals get a choice between two insurance plans
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Model: households

- Life-cycle model: 25-64→work, 65-99→retired
- Agents face productivity, health, medical need, and survival risks
- Two types of health insurance for working age households
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  2. Medicaid:

Eligibility:

- All retired households are insured by Medicare

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Model: households (working ages)

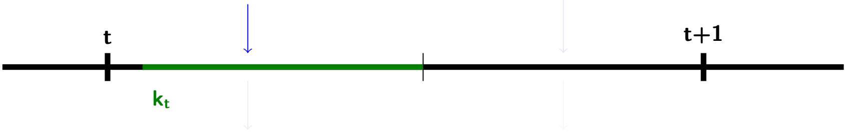
health condition (h_t)

medical need (η_t^h)

labor productivity (z_t^h)

ESI offer ($g_t^{h,z}$)

Medicaid eligibility is determined



labor supply: $l_t \in \{0, \bar{l}\}$

insurance (i_H)

- *uninsured*
- *ESI*

saving (k_{t+1})

consumption (c_t)

medical consumption (m_t)

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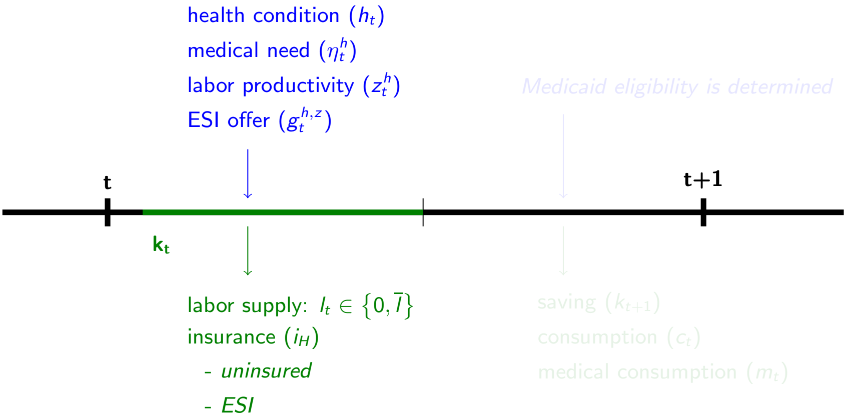

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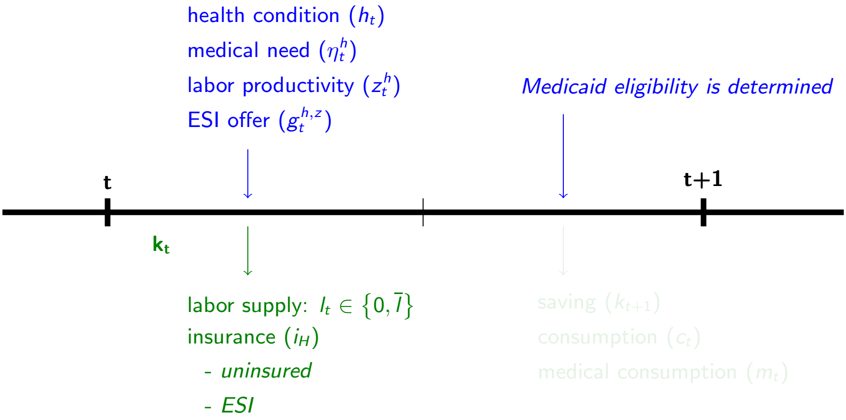

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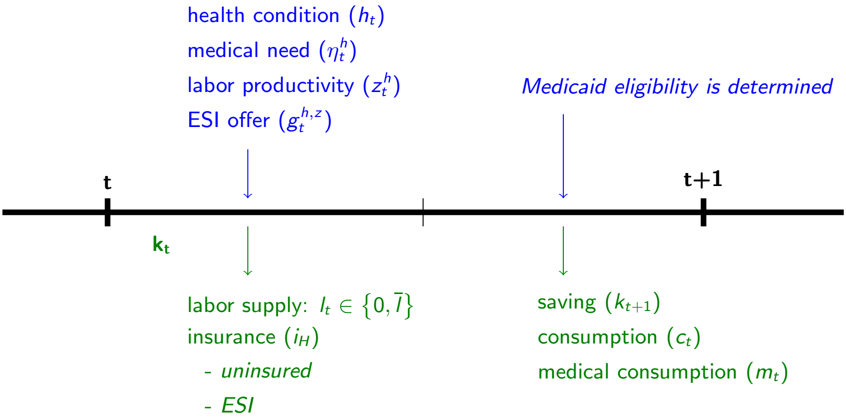

Parametrization

- Utility from medical consumption: $\dfrac{(m_t - \eta_t^h)^{1-\sigma^M}}{1-\sigma^M}$
- $v(m_t, \Delta)$ - quadratic function
- Δ - saturation point
- Total medical spending is in the range $(\eta_t^h, \eta_t^h + \Delta]$

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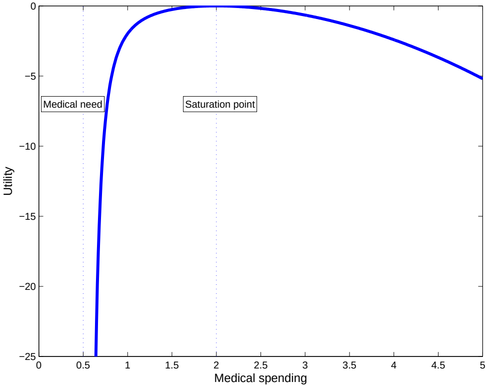
CL

Utility from medical consumption: illustration



Saturation point

- $\Delta -\!>$ difference in medical expenses between privately insured and uninsured
- Total medical spending (fixed) = Non-discretionary spending + Discretionary spending
- $\Delta \uparrow \Rightarrow$ Discretionary spending $\uparrow \Rightarrow$ Non-discretionary spending $\downarrow \Rightarrow$ insured spend more compared to uninsured

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Medical need shock

- Medical need shock has shifted lognormal distribution

$$\eta_t^h = \exp(\kappa_t^h) - \exp(b_t^h)$$

- $b_t^h -> $ fraction of people with zero medical expenses

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$$\kappa_t^h = \mu_t^h + \delta_t^h \zeta_t,$$

  $\mu_t^h -> $ mean of medical expenses

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$$\zeta_t = \rho_m \zeta_{t-1} + \varepsilon_t, \quad \varepsilon_t \sim N(0,1)$$

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▸ LabInc

▸ Param

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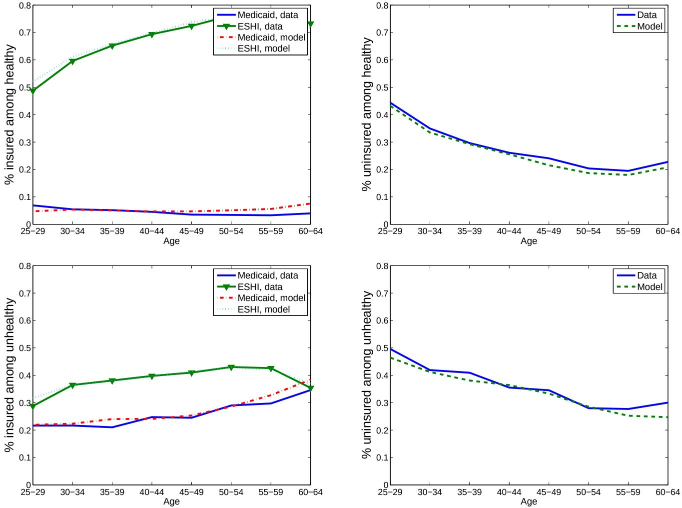
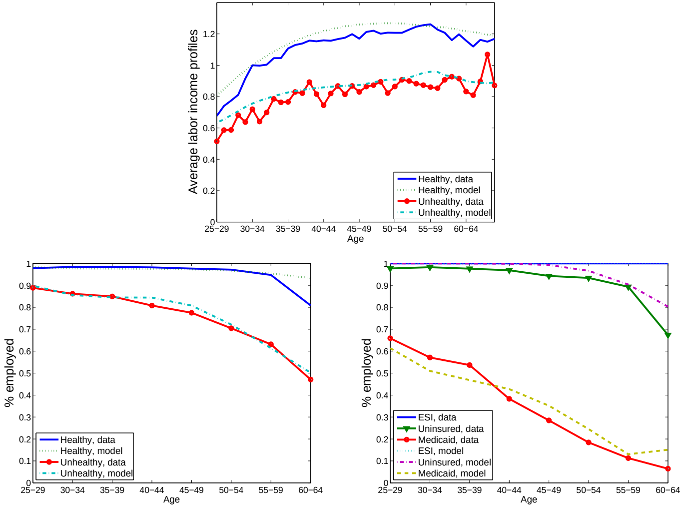
Insurance statistics



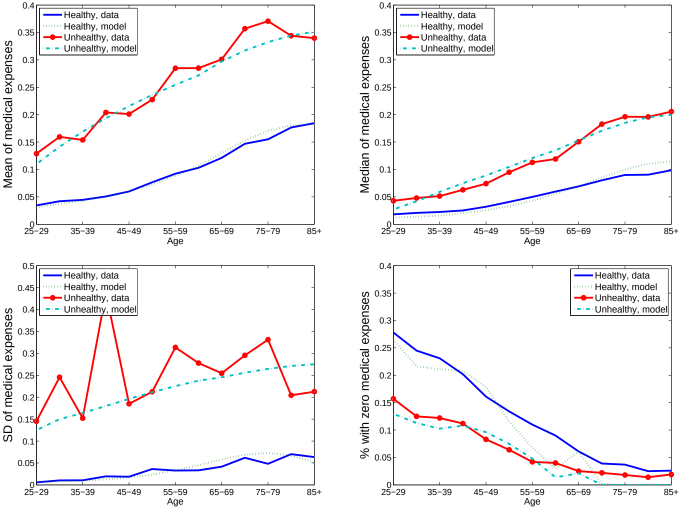
Selection of unhealthy into Medicaid

	Data			Baseline model		
	ESHI	uninsured	public	ESHI	uninsured	public
% unhealthy by insurance	10.3	18.9	52.6	9.0	17.2	51.3

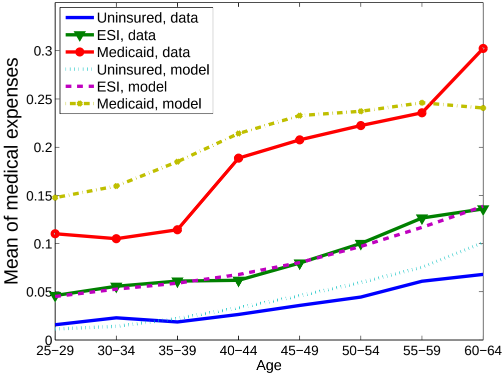
Employment and labor income



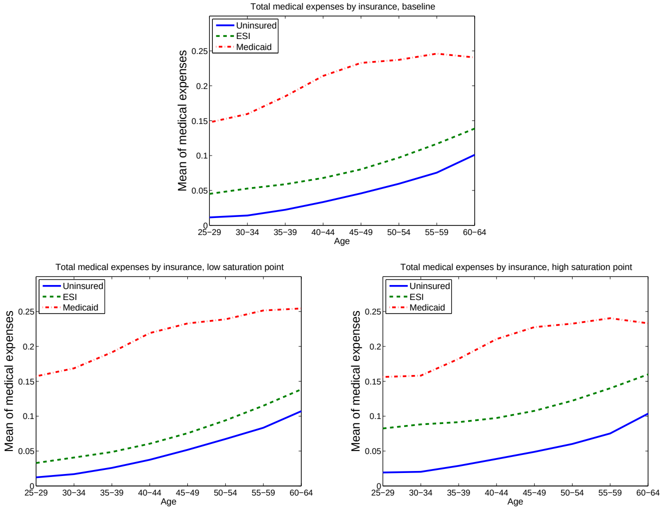
Medical expenses by health statistics



Medical expenses by insurance



The role of the saturation point



Full information benchmark

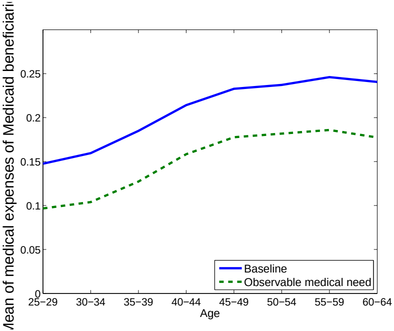
- Assume medical need η_t^h is observable
- The government (fully) covers non-discretionary medical spending
- The rest of welfare budget is allocated ass lump-sum transfers to Medicaid beneficiaries
- Thus individuals face full price of their discretionary medical consumption
- Consider one-time policy change: medical need is observable for only one period

Full information benchmark, one time policy change

	Med spending (% BS)	Lump sum transfers ($000)
Baseline	100	-
Observable need	94.1	5.3

Full information benchmark, one time policy change

Change in the life-cycle profile of medical spending of Medicaid enrollees:



Medical need is private information

- To fix the distribution of beneficiaries and illustrate the mechanism, consider first one-time policy change
- Start by using cost-sharing as the only instrument to decrease medical spending
- Consider gradual decrease in Medicaid generosity
- The saved budget is allocated as lump-sum cash transfers so that welfare budget is unchanged

Increasing cost-sharing, one-time policy change

	Med spending (% BS)	Lump sum transfers ($000)
Baseline	100	-
1. Observable need	94.4	5.3
Increasing MCD copay		
2. Medicaid covers 85%	98.5	1.8
3. Medicaid covers 80%	98.0	2.5
4. Medicaid covers 75%	97.4	2.9
5. Medicaid covers 70%	97.0	3.3
6. Medicaid covers 60%	96.2	3.9
7. Medicaid covers 50%	95.6	4.4
8. Medicaid covers 40%	95.1	4.9

Increasing cost-sharing, one-time policy change

	Med spending (% BS)	Lump sum transfers ($000)
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1. Observable need	94.4	5.3
Increasing MCD copay		
2. Medicaid covers 85%	98.5	1.8
3. Medicaid covers 80%	98.0	2.5
4. Medicaid covers 75%	97.4	2.9
5. Medicaid covers 70%	97.0	3.3
6. Medicaid covers 60%	96.2	3.9
7. Medicaid covers 50%	95.6	4.4
8. Medicaid covers 40%	95.1	4.9

Increasing cost-sharing, one-time policy change

	Med spending (% BS)	Lump sum transfers ($000)
Baseline	100	-
1. Observable need	94.4	5.3
Increasing MCD copay		
2. Medicaid covers 85%	98.5	1.8
3. Medicaid covers 80%	98.0	2.5
4. Medicaid covers 75%	97.4	2.9
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Increasing deductibles, one-time policy change

	Med spending (% BS)	Lump sum transfers ($000)
Baseline	100	-
1. Observable need	94.4	5.3
Increasing MCD deductibles		
2. Deductibles 1K	99.4	1.5
3. Deductibles 2K	98.4	2.1
4. Deductibles 3K	97.7	2.7
5. Deductibles 5K	96.9	3.6
6. Deductibles 7K	96.4	4.4
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Introducing cash-out option

- Based on our theoretical analysis: cash-out option
  - A choice between regular Medicaid benefits and lump-sum cash transfers
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	Med spending (% BS)	Lump sum transfers ($000)	% in cash plan ages 25-64
Baseline	100	-	-
1. Observable need	94.4	5.3	-
Increasing MCD copay			
2. BS (93%)	99.0	1.6	65-24
3. Medicaid covers 85%	96.3	3.9	74-71
4. Medicaid covers 80%	95.8	4.5	79-76
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	Med spending (% BS)	Lump sum transfers ($000)	% in cash plan ages 25-64	Welfare (% CEV)
Baseline	100	-	-	-
Observable need	94.1	3.5	-	1.14
Increasing MCD copay				
BS (93%)	99.1	1.6	68-29	0.73
Medicaid covers 85%	96.7	2.9	84-62	1.06
Medicaid covers 80%	95.9	3.2	88-74	0.89
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Improving target efficiency

- Cash option is important for reducing overconsumption of medical care
- But it reduces target efficiency: in-kind transfers are attractive for sick people while cash is attractive for everyone

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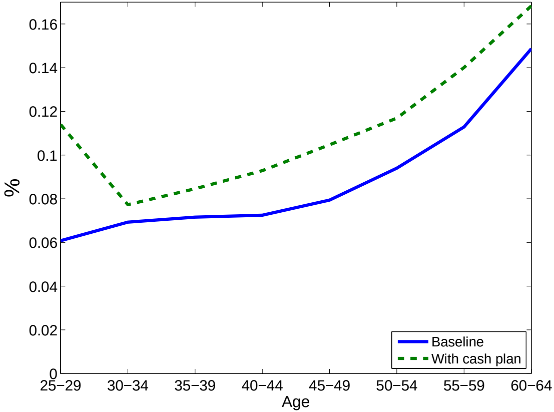
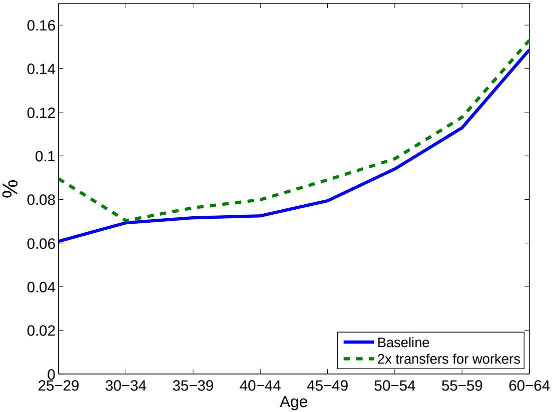
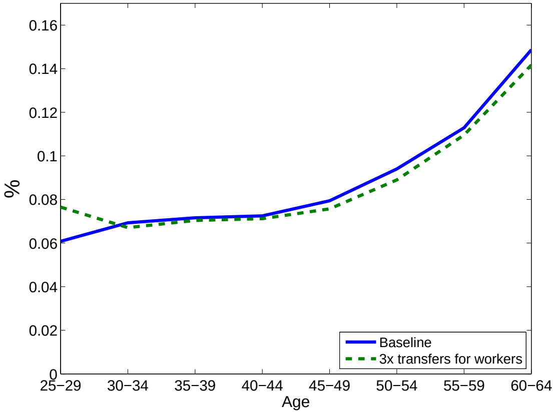
Work-independent cash transfers (cash plan + traditional Medicaid covers 85%)



Workers get 2 times higher transfers



Workers get 3 times higher transfers



Work-dependent cash transfers

	Med spending (% BS)	Transfers w/n-w ($000)	% MCD coverage	% in cash plan ages 25-64	Welfare (% CEV)
Baseline	100	-	8.7	-	-
Observable need	94.1	3.5	12.8	-	1.14
Observable need, work-dep transfers					
x2	94.8	6.0/3.0	10.7	-	1.79
x3	95.3	7.5/2.5	9.1	-	1.99
With cash plan					
Medicaid covers 85%	96.7	2.9/2.9	11.1	84-62	1.06
Cash transf work-dependent					
x2	97.3	4.4/2.2	9.5	82-57	1.48
x3	97.5	4.8/1.6	8.6	79-55	1.58

The effect of introducing work-dependent transfers into cash plans

Conclusion

- We consider a framework where medical spending are composed of necessary and discretionary components
- We show that in this framework the optimal policy is to introduce a trade-off between discretionary medical consumption and regular consumption good
- We construct rich structural model to evaluate the effect of this type of policies
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Properties of the solution

$$u'(c_L^*) = v'(m_L - \eta_L)$$

$$u'(c_H) = \frac{u'(c_L^*) + \frac{v'(m_H^* - \eta_L)}{u'(c_H^*)}\pi(u'(c_H^*) - u'(c_L^*))}{u'(c_L^*) + \pi(u'(c_H^*) - u'(c_L^*))} v'(m_H^* - \eta_H)$$

back

Implementation details

- Plan 1: cash transfers $T_L = c_L^* + m_L^*$
- Plan 2:
  - cash transfers $T_H = c_H^* + qm_H^*$ ($T_H < T_L$)
  - price of medical consumption $q < 1$ if $m \geq m_H$, where

$$q = \frac{u'(c_L^*) + \frac{v'(m_H^* - m_L)}{u'(c_H^*)}\pi(u'(c_H^*) - u'(c_L^*))}{u'(c_L^*) + \pi(u'(c_H^*) - u'(c_L^*))}$$

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back

Implementation

- (c_L^*, m_L^*) solve the problem of L-type:

$$u(c_L) + v(m_L - \eta_L) \longrightarrow \max_{c_L, m_L}$$

s.t.

$$c_L + m_L = T_L$$

- (c_H^*, m_H^*) solve the problem of H-type:

$$u(c_H) + v(m_H - \eta_H) \longrightarrow \max_{c_H, m_H}$$

s.t.

$c_H + m_H = T_H$ if $m_H < m_H^*$
$c_H + qm_H = T_H$ if $m_H \geq m_H^*$

- L-type does not deviate by solving the problem of H-type

back

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Parametrization

- $\nu(m_t) = -\frac{1}{2}m_t^2 + \gamma_{1,t}^h m_t + \gamma_{2,t}^h$
- $\frac{\partial v(m_t)}{\partial m_t}|_{m_t=\eta_t^h+\Delta} = 0$ implies:

  $\gamma_{1,t}^h = \eta_t^h + \Delta - \Delta^{-\sigma^M}$
- $v(\eta_t^h + \Delta) = 0$ implies

  $\gamma_{2,t}^h =$
  $-\left(\frac{\Delta^{1-\sigma^M}}{1-\sigma^M} - \frac{1}{2}(\eta_t^h + \Delta)^2 + (\eta_t^h + \Delta - \Delta^{-\sigma^M})(\eta_t^h + \Delta)\right)$

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back

Parametrization of utility from consumption and leisure

- Utility from consumption and leisure:
$$\frac{\left(c_t^{\chi}\left(1-l_t-\phi_w \mathbf{1}_{\{l_t>0\}}-\phi_{h,t}\right)^{1-\chi}\right)^{1-\sigma}}{1-\sigma}$$

back

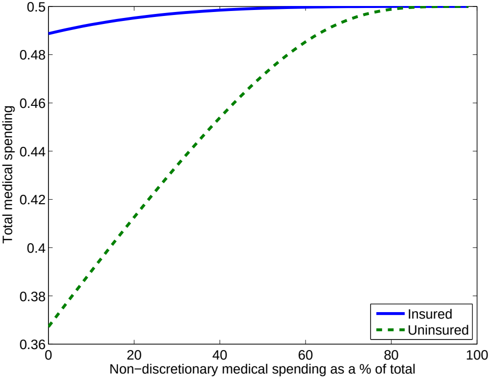
Simple illustration

$$\frac{c^{1-\sigma}}{1-\sigma} + \frac{(m-\eta)^{1-\sigma^M}}{1-\sigma^M} + v(m,\Delta) \rightarrow \max_{c,m}$$

s.t.

$$\begin{aligned} c + qm &= I \quad \text{(for insured)} \\ c + m &= I \quad \text{(for uninsured)} \end{aligned}$$

The effect of health insurance on medical spending



back

Saturation point vs risk aversion: identification

- Static problem of endowment I allocation between regular and medical consumption:

$$\frac{c^{1-\sigma}}{1-\sigma} + v(m-\eta) \to \max_{c,m}$$

s.t.

$$c + m = I$$

- FOC:

$$(I-m)^{-\sigma} = v'(m-\eta)$$

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Saturation point vs risk aversion: identification

- Case 1: $v(m-\eta)$ - just CRRA with the risk aversion σ_M

$$v'(m-\eta) = (m-\eta)^{-\sigma^M}$$

- How change in σ_M affects marginal utility from medical spending? Ambiguous:

$$\frac{\partial v'(m-\eta)}{\partial \sigma_M} = -(m-\eta)^{-\sigma^M} ln(m-\eta)$$

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Saturation point vs risk aversion: identification

- Case 2: $v(m-\eta)$ - CRRA +quadratic component

$$v'(m-\eta) = (m-\eta)^{-\sigma^M} - m + \eta + \Delta - \Delta^{-\sigma^M}$$

- Increase in Δ unambiguously increases MU from medical consumption => higher Δ - higher demand for medical care

back

Saturation point vs risk aversion: identification

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Labor productivity

- individual i 's labor productivity: $z_t^h = \lambda_t^h \times y_t^i$

  $\Rightarrow$ λ_t^h - deterministic function of age and health

  $\Rightarrow$ $y_t^i = \nu_t^i + \xi^i; \quad \nu_t^i = \rho\nu_{t-1}^i + \varepsilon_t^i$

- estimate λ_t^h together with ϕ_w,$\phi_{h,t}$ (French,2005)

$$u(c_t, l_t) = \frac{\left(c_t^{\chi}\left(1 - l_t - \phi_w \mathbf{1}_{\{l_t>0\}} - \phi_{h,t}\right)^{1-\chi}\right)^{1-\sigma}}{1-\sigma}$$

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Parameters

Parameter name	Notation	Value	Source
Consumption share	$\varkappa$	0.6	French (2005)
Labor supply	$\bar{l}$	0.4	
Risk aversion reg/med consumption	σ, σ_M	3	
Labor productivity			
- Persistence parameter	ρ	0.98	Storesletten, et al (2000)
- Variance of innovations	σ_ε^2	0.02	"
- Fixed effect	σ_ξ^2	0.24	"
Deductible and cost-sharing			
- ESHI	ded^G, q^G	\$182, 83%	MEPS
- Medicaid	ded^M, q^M	\$0, 93%	MEPS
- Medicare	ded^{MCR}, q^{MCR}	\$320, 87%	MEPS

Parameter name	Notation	Value	Source
Discount factor	β	0.976	Ratio of assets 60-64 to 35-39
Consumption floor	$\underline{c}$	\$2,500	% employment among public insurance
Medicaid			
- Income test	y^{CAT}	$0.95FPL$	% publicly insured
- Asset test	k^{CAT}	\$30,000	publicly insured profile
Fixed costs of work	ϕ_w	0.220	employment profiles (healthy)
Time loss due to unhealthy			
- age 25-40	ϕ_t^{UH}	0.010	employment profiles (unhealthy)
- age 64	ϕ_t^{UH}	0.295	"
Saturation point	Δ	0.328	difference in medical spending ESHI/uninsured

back

Full information benchmark: results

	Med spending (% BS)	Lump sum transfers ($000)	% MCD coverage	Welfare (% CEV)
Baseline	100	-	8.7	-
Observable need	94.1	3.5	12.81	1.14

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	Med spending (% BS)	Lump sum transfers ($000)	% MCD coverage	Welfare (% CEV)
Baseline (MCD covers 93%)	100	-	8.7	-
Observable need	94.1	3.5	12.81	1.14
Reducing MCD generosity				
Medicaid covers 85%	99.4	1.6	9.5	0.69
Medicaid covers 80%	98.8	2.0	10.1	0.74
Medicaid covers 75%	98.1	2.4	10.7	0.72
Medicaid covers 70%	97.5	2.7	11.1	0.63
Medicaid covers 60%	96.4	3.2	12.2	0.36
Medicaid covers 50%	95.6	3.5	12.8	-0.23
Medicaid covers 40%	94.8	3.8	12.2	-0.92

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Results of introducing cash-out option

	Med spending (% BS)	Lump sum transfers ($000)	% MCD coverage	% in cash plan ages 25-64	Welfare (% CEV)
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