# Capitation and provider choice

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# Introduction

# motivation

- bigger provider networks lead to higher health care expenditure
  - cross section studies
  - AWP laws
  - US: fee-for-service; narrow networks; broader networks
- both price effect and utilization effect of selective contracting/managed care
  - Cutler et al (2000): price
  - papers by Zwanziger and co-authors (1988, 1994, 1996): utilization and cost
  - Chernew et al. (2008): utilization
  - Chernew and Newhouse (2011): overview of effects on expenditure and costs
- we focus on the effect of network size on utilization and costs

# policy problem

- is it a problem that bigger networks lead to higher costs?
- why should more choice lead to higher utilization?
- people worry that narrow network leads to under-treatment (NYT, July 2014; LA Times Sept. 2013)

# private contracts

- with public contracts there is no effect of network size on utilization and costs
- cannot address concerns on under-treatment
- contracts are private in reality
    - confidentiality clauses (Muir et al., 2013)
    - only insurer and provider know the terms
    - other insurers and providers do not
    - consumers do not

# questions

- capitation fee as supply side cost sharing
  - how is this combined with provider choice?
  - why is demand side cost sharing used?

# literature

- health economics literature on selective contracting and managed care
- papers by McGuire and co-authors (1993, 1997, 2002) on physician agency
  - with public contracts demand and supply side cost sharing separated
  - optimal to have no demand side cost sharing
- I.O. literature on private contracts
  - Hart and Tirole (1990): upstream monopolist with two downstream firms cannot earn monopoly profit with two part tariff
  - $p > c$: oversupply because downstream firms expect U to oversell to competitor
  - in our case: $p < c$: provider expects too many patients

# main results

- with private contracts, supply side cost sharing decreases in network size
- strategic effect: given capitation fee, insurer sends too many patients to provider with lowest $p$
- needs to be compensated by higher capitation
- optimal network size trades off treatment efficiency against provider profits
- demand side cost sharing to reduce over-treatment

# Model

# insurers

- risk neutral
- risk averse consumers (mass 1)
- premium $\sigma$
- co-payment $\gamma$ in case of treatment
- network size $n$ of homogeneous providers
- fee-for-service $p \geq 0$, capitation $t$
- no other cost of insurance
- perfect competition

## providers

- homogeneous
- risk neutral
- $c$ cost of treatment
- $v \in [0, \bar{v}]$ value of treatment, $F$
- $v$ is observed by provider, not by insurer
- efficiency: treat iff $v \geq c$

## consumers

- same exogenous probability $\theta$ that treatment is needed
- copay $\gamma > 0$ inefficient due to risk aversion
- gets treatment iff $v \geq v(p, \gamma)$
    - efficiency: $v(p, \gamma) = c$
    - $v(p, \gamma) > c$: under-treatment
    - number of treatments $H(p, \gamma) = \theta(1 - F(v(p, \gamma)))$
    - with $H_p \geq 0, H_\gamma \leq 0$

# Public contracts

# efficiency

- contract $n$ providers
- fee-for-service: $p^*$ with $v(p^*, 0) = c$
- assume $p^* < c$
- capitation: $t = H(p^*, 0)(c - p^*)/n$
- network size has no effect on costs/utilization
- can be an effect on distribution of rents via $t$

# other effects

- threat to exclude
- shifting volume
- taste for variety
- heterogeneous providers or agents
- risk averse providers

# Private contracts

# truthful revelation

- insurer can implicitly guide (some) patients to providers
- send patients (first) to provider $i$ with lowest $p_i$
- different from explicit/contractible steering
  - exclude provider from network
  - vary $\gamma_i$ with provider $P_i$
- even without steering:
  - number of patients treated by $P_i$ depends on prices of other providers
  - patients not treated by $P_j$ shop around hoping that $v(p_i, \gamma) < v < v(p_j, \gamma)$

# capitation

- how many patients can $P_i$ expect?
- insurer tells $P_i$ that $P_j$ has contract with $p_j = p_i - \varepsilon$
- $P_i$ can expect to treat only $\hat{x}_i = H(p_i, \gamma) - H(p_i - \varepsilon, \gamma)$ patients
- $t_i$ close to 0
- set of contracts $p, t$ where $x_i$ is truthfully revealed:

$$A_{\gamma,n} = \{(p, \hat{x}(c - p)) | \hat{x} \geq x\}$$

# proposition

- for each $(p, t) \in A_{\gamma,n}$, we have $t \geq H(p, \gamma)(c - p)$
  - each provider gets $t$ as if she has lowest $p$
  - any lower $t$ is not incentive compatible and rejected by providers
  - intuition: provider $P_i$ does not believe insurer's claim that there is $p_j < p_i$

# profits

- if two providers get offered the same $p < c$, insurer pays $t = H(p, \gamma)(c - p)$ to each
- providers make a profit
- reduce provider profits by raising fee-for-service $p$ and reduce capitation $t$
- $p = c$ implies $t = 0$: no provider profits
- hence bigger networks lead to less supply side cost sharing
- and thus to higher health care utilization and costs

# intuition

- as network size $n$ increases, supply side cost sharing becomes more expensive
- with $n = 1$, reduce treatment costs by setting $p = 0, t = H(0, \gamma)c$
  - insured cannot observe $p$
  - premium does not depend on $p$
- with $n \geq 2$, this becomes too expensive, as each provider requires $t = H(0, \gamma)c$
- raise $p$ to reduce $t$
- bigger network leads to more utilization and higher cost
- for $n$ big enough, $p = c$: indemnity insurance, all providers contracted
- size of the network signals probability of treatment
  - broader networks are more generous
  - premium depends on $n$

# results

- costs $C(n, \gamma)$ increase in $n$
- decrease in $\gamma$
- consumer is interested in highest price $p(n, \gamma)$
- determines probability that insured is treated (at all)
- probability of treatment increases with $n$

# Insurance market

# value of insurance

- Bertrand competition: $\sigma = C(n, \gamma)$
- consumer does not know $p_i$
- but does understand that bigger network leads to higher $p(n, \gamma)$
- values insurance at

$$V^i = \theta \int_{v(p(n,\gamma),\gamma)} (v - \gamma) f(v) dv - C(n, \gamma) - \theta\delta(p(n, \gamma), \gamma)$$

# efficiency

- due to competition, insurers choose $n, \gamma$ to maximize $V^i$
- network size is trade off between number of treatments and providers' profits
- inverse U between $n$ and profits
  - zero profits with $n = 1$
  - zero profits with $n$ high enough that $p = c$
- if optimal $n$ implies over-treatment, $\gamma > 0$ can be optimal
- unlike public contracts, here both demand and supply side cost sharing needed

# Policy implications

# AWP laws

- make it harder to exclude provider from the network
- with private contracts, providers have positive profits; want to be part of the network
- if AWP laws lead to higher $n$ they lead to higher health care utilization and costs
- if the insurance market is perfectly competitive, AWP laws tend to reduce welfare
- if there is no perfect competition, narrow networks can lead to low welfare and undertreatment