Risk Adjustment vs. Subsidies in the Design of Health Insurance Exchanges

Liran Einav, Stanford and NBER
Amy Finkelstein, MIT and NBER
Pietro Tebaldi, Chicago

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Motivation

- Health Insurance Exchanges are increasingly common
  - In the US: ACA, MA, Part D
  - Around the world: Netherlands, Switzerland, Chile

- Two key market design features:

  (0. Restrictions/Standardization/Regulation on insurance products)

  1. Subsidies to consumers, which make premiums more affordable
  2. Risk Adjustments to insurers, which reduce concerns about adverse selection and risk skimming

- Almost always studied in isolation, but probably shouldn't
  - Two market design instruments, often set by the same entity
  - One shifts the demand curve, the other shifts the cost curve, but ultimately we care about the equilibrium

This paper

- Set up a standard, stylized setting of an insurance exchange to derive theoretical results under different market primitives
  - Under perfect competition, subsidies and risk adjustments are perfect substitutes, but subsidies allow for a larger set of equilibrium allocations
  - Under imperfect competition, subsidies lead to lower equilibrium markups so tend to work better (Mahoney and Weyl, 2017)

- Subsidies seem "better"! Yet, risk adjustments play an increasingly important role in market design. Why?
  - One "political economy" conjecture: risk-based subsidies/vouchers may be difficult to implement/explain/sell to voters/market participants

- Use the setting and estimates from Tebaldi (2017) – for the ACA exchange in California – to provide some quantitative estimates of the impact

- **VERY** preliminary! Comments are **VERY** welcome!

Related literatures

- Subsidies:
  - Chan&Gruber (2010); Decarolis, Polyakova, Ryan (2017); Finkelstein, Hendren, Shepard (2017); Jaffe&Shepard (2017); Tebaldi (2017)

- Risk adjustment:
  - Glazer and McGuire (2000); Van de Ven and Ellis (2000); Ellis (2008); Newhouse et al. (2012); Brown et al. (2014); Einav et al. (2016); Layton et al. (2016); Layton&Geruso (2017)

- ACA exchanges:
  - Dickstein et al. (2015); Tebaldi (2017); Frean, Gruber, Sommers (2017); Sacks (2017)

- Health insurance market design:
  - Curto et al. (2014); Handel, Hendel, Whinston (2015); Azevedo&Gottlieb (2017)

Setting

- Start with a single coverage contract, offered by identical competing insurers, who each needs to set a *single* price *p*
  - Note: single price setting imposed throughout (as is often the case)

- Buyer *i* is defined by a triplet (*v,c,x*):
  - wtp *v*
  - (expected) cost (to the insurer) if insured *c*
  - vector of observables *x*

- Subsidy is defined as s(x):
  - if buyer buys insurance, she pays p-s(x), the market sponsor pays s(x), and the insurer's receives p. Buyer purchases iff v > p-s(x)

- Risk adjustment is defined as r(x):
  - if buyer is insured, insurer's profit is p-(c-r(x))

Perfect competition

Proposition:

- For any equilibrium allocation that is achievable with risk adjustments alone, there exists a subsidy that can achieve the same allocation

Proof:

- Assume that under the risk adjustment policy r(x) the resulting equilibrium price is p. This implies that buyers purchase coverage iff v>p, and that (given perfect competition) $p = E(c-r(x)|v>p)$
- Consider now a (uniform) subsidy $s^* = E(r(x)|v>p)$. It is easy to verify that under subsidy s^*, the equilibrium price would be $p+s^*$, allocations would be the same (buyers purchase iff v>p), and sponsor (e.g. government) spending would be the same

But the converse is not true …

Easy to see:

- Under risk adjustment, all buyers pay the same price, so any equilibrium allocation must imply that if a buyer with wtp v buys insurance then every buyer with v'>v also buys insurance

- Under subsidies, buyers who face different subsidies also face different prices (net of subsidies), so any non-flat subsidy schedule would lead to insurance allocation that violates the above condition

Imperfect competition

- Consider now a monopolist
  - The intuition for oligopoly is essentially the same

- Firm sets premium *p* to maximize expected profits, facing demand *q(p)* and adverse selection, denoted (as in Einav, Finkelstein, Cullen (2010)) by declining average cost *ac(p)* and declining marginal cost *mc(p)*

- Under subsidies s, firm solves

$$max_p q(p-s)(p-ac(p))$$

- Under risk adjustment r, firm solves

$$max_p q(p)(p-ac(p)+E(r|v>p))$$

Result: subsidies are "better"

Proposition:

- For any market with adverse selection, holding sponsor spending fixed, subsidies lead to lower markups and greater coverage

Intuition (abusing notation a lot!):

- Consider the optimal price under subsidy *s*:

$$p = ac(p) - \left(\frac{q(p-s)}{q'(p-s)}\right)(1 - mc(p))$$

- Consider now the optimal price under risk adjustment *r*:

$$p = ac(p) - ar(p) - \left(\frac{q(p)}{q'(p)}\right) + q\big(1 - mc(p) + \boldsymbol{mr}(\boldsymbol{p})\big)$$

- At the same effective price, risk adjustment makes cost less steep and reduces the incentive to lower prices
  - This is precisely the point made by Mahoney and Weyl (2017)

Summary: subsidies seem "better"

- Subsidies seem to dominate risk adjustments:
  - With both perfect and imperfect competition, they provide more options
  - With imperfect competition, they lead to lower markups and more coverage

- So why are risk adjustments so common? One conjecture is that offering subsidies as a function of health may be "politically" tricky
  - Another is that non-price firm instruments are first order

- The results above suggest that this "trickiness" is costly, but how much? This is the focus of the rest of the talk, which piggy backs on the setting, data, and estimates of Tebaldi (2017)
  - *Reminder: This part is **VERY** preliminary …*

Setting: California's ACA Exchange

- In 2014, first year of the exchange, had 1.3m enrollees (877k households), most of whom (90%) subsidized
- 19 regional markets, 3-6 insurers competing in each
- Products are (loosely) standardized, and each insurer must offer all four coverage options (Bronze, Silver, Gold, Platinum)
- Insurers can only set a single (base) price for each plan-region combination
- A fixed formula that is based on (income, age, household size) translates base prices to premiums paid by buyers and payments made to insurers

Data

- Enrollment file: person ID, household ID, age, income, gender, zip, choice, premium paid, coverage start/end (N=877k hh's)
- 490 plans: in each region observe base price for each insurer-tier pair
  - Plans differ in metal, premium, insurer brand, and provider network; coverage characteristics are standardized (by metal)
- Potential buyers (from 2013 ACS): consider uninsured or individually insured, match by micro-area, income, household size (N=3.4m hh's)
- Realized cost: plan-level average claims for almost all plans (480 plans; 99% of enrollment) from CMS rate review filings

Individual-level purchases and potential buyers

	(a): **Covered California 2014**			(b): **ACS potential buyers**		
Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Age	877,365	43.19	12.98	3,392,942	41.34	13.02
Household size	877,365	1.47	0.77	3,392,942	1.80	0.98
% of FPL (if subsidized)	826,484	215.20	63.17	2,231,013	231.65	80.76

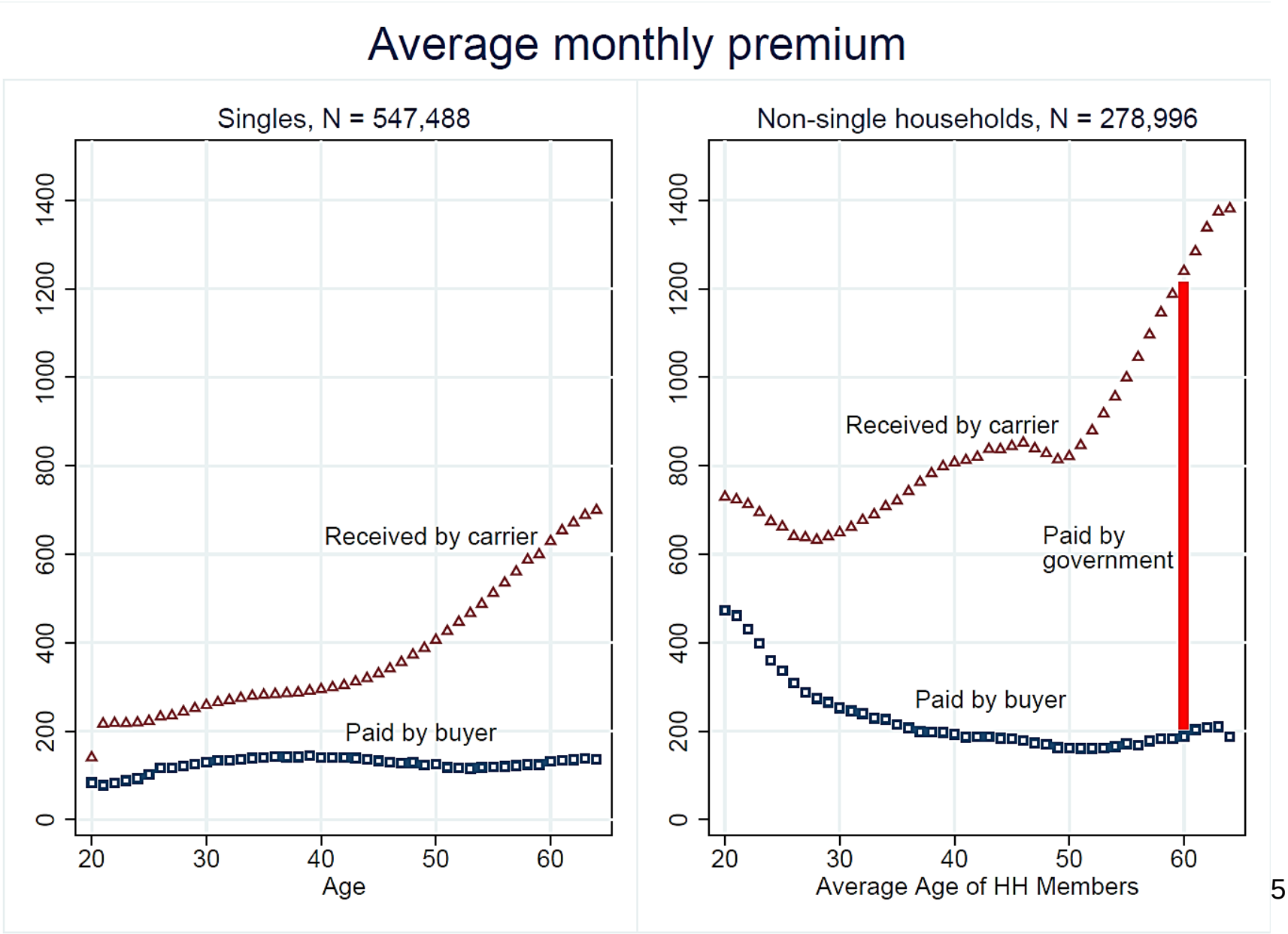
Plan-level enrollment and claims

	(c): **Enrollment in 2014 Covered CA**			(d): **2014 per-person claims**		
Coverage level	N. plans	Mean	Std. Dev.	N. plans	Mean	Std. Dev.
Catastr.	80	180	225	78	1.969	2.088
Bronze	140	2,427	2,907	138	2.303	1.411
Silver	90	10,303	12,477	88	3.415	1.386
Gold	90	988	1,265	88	4.514	1.855
Platinum	90	889	1,033	84	8.707	5.231

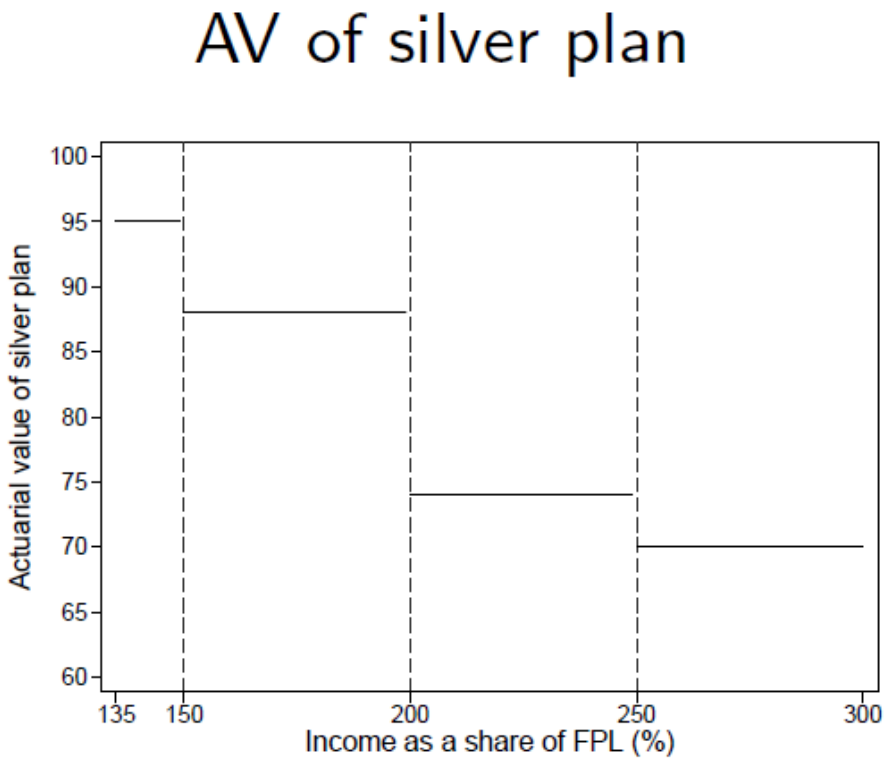
Demand for plans

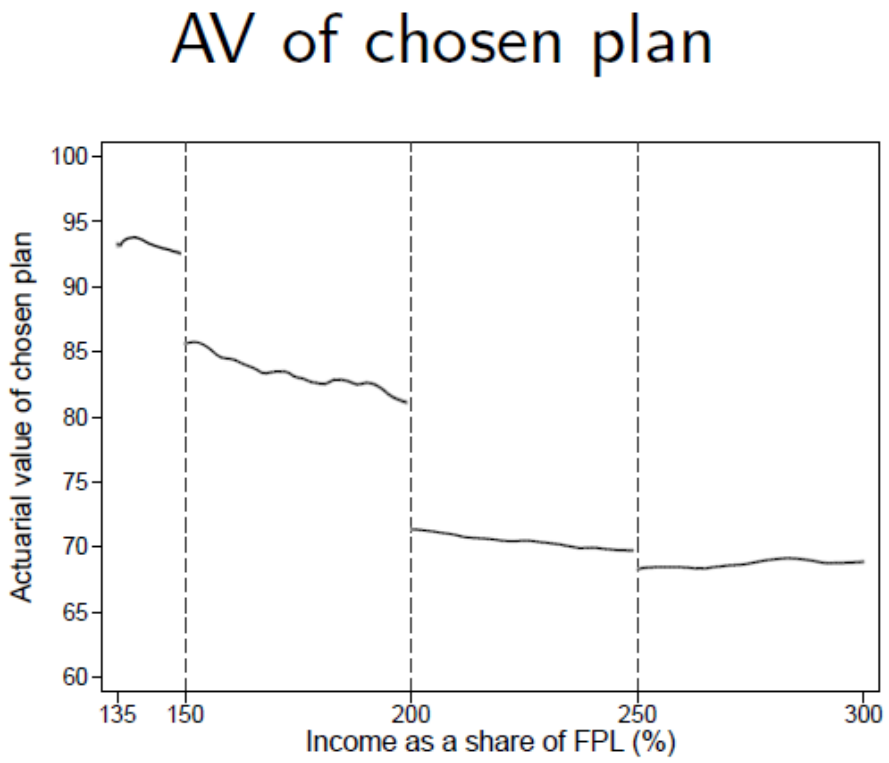
- Fairly standard random coefficients logit model, with some tweaks to make it fit the context and regulation
- Plan is a collection of three components: premium, coverage, and everything else (which is primarily brand name and provider network)
- Base premiums vary (endogenously) across plans, but vary exogenously (formulas) within plans by age, income, and hh size
- Coverage summarized by *AV*, which is the same across insurers, but varies across metals and, for Silver plans, across income groups
- Everything else will be captured by the error term, which we will model as random effect, but we will assume doesn't vary across metals

Premiums


Average monthly premium
Singles, N = 547,488
Non-single households, N = 278,996
Received by carrier
Paid by buyer
Paid by government
0
200
400
600
800
1000
1200
1400
20
30
40
50
60
Age
Average Age of HH Members

Actuarial Value (AV) for Silver plans





Specification

- Indirect utility of household *i* w/ characteristics $x(i)$ from purchasing plan tier *q* from insurer *j* in market *m*:

$$u_{jnr}^{i} = -\alpha^{i} p_{qjm}^{x(i)} + \beta^{i} AV_{q}^{x(i)} + \xi_{jm}^{i} + \epsilon_{qjm}^{i}$$

where $\left(\alpha^{i}, \beta^{i}, \xi^{i}\right) \sim F_{m} | x$ and $\epsilon_{qjm}^{i} \sim$ T1EV

- Key identifying variation is within markets:
  - "RD" for AV
  - "Shape restrictions" made by the subsidy and age premium formulas relative to how we allow (age, income, household size) enter preferences

- F_m less standard (discrete support, a-la Berry, Carnal, and Spiller) to facilitate "second stage" cost estimation

Expected cost

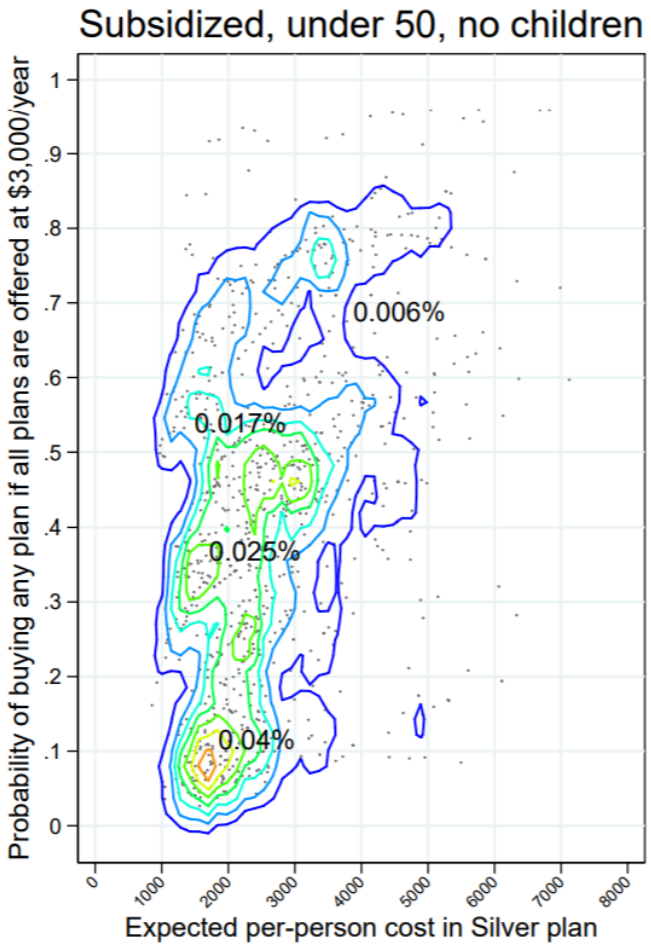
- Costs are estimated in a second stage
- Once we have the demand system estimated, we back out (expected) WTP for coverage for each i (essentially, $\mathrm{E}(\beta^i / \alpha^i | choice)$, based on observables and plan choice
- We then project plan-level costs on those covered by it:

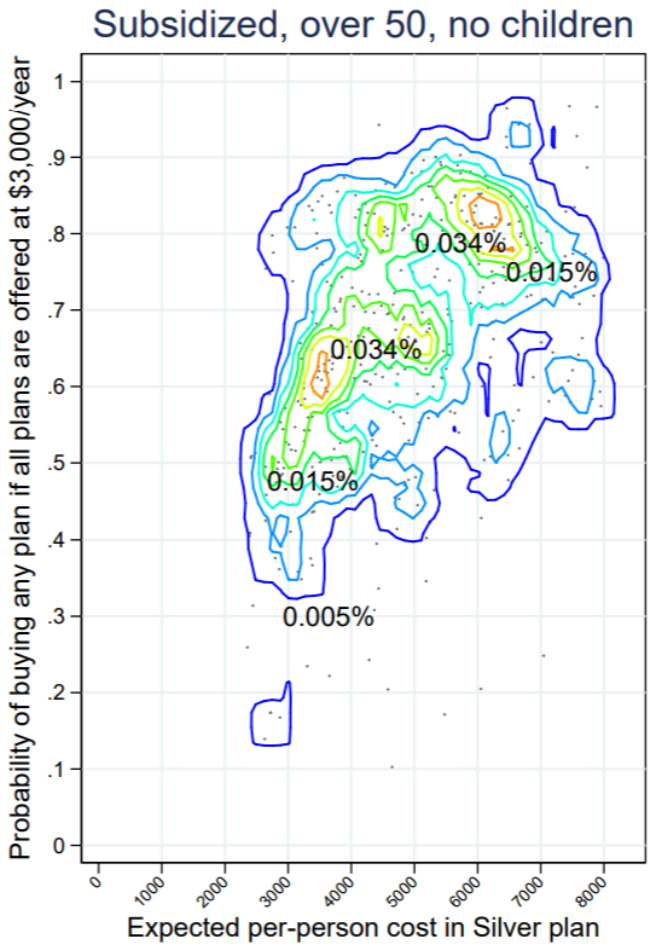
$$\ln(c_{qjm}) = \mu_q + \varphi_j + \delta_m + \gamma' \bar{x}_{qjm} + \rho \overline{WTP}_{qjm} + \omega_{qjm}$$

- We now can get a cost estimate and a WTP estimate for each person in the data
- Many more details in Tebaldi (2017)

Primitives to investigate risk adjustment - subsidies

- We now use the joint distribution *F(v,c,x)* as the primitives in the current paper





Simulations (for now … this will change)

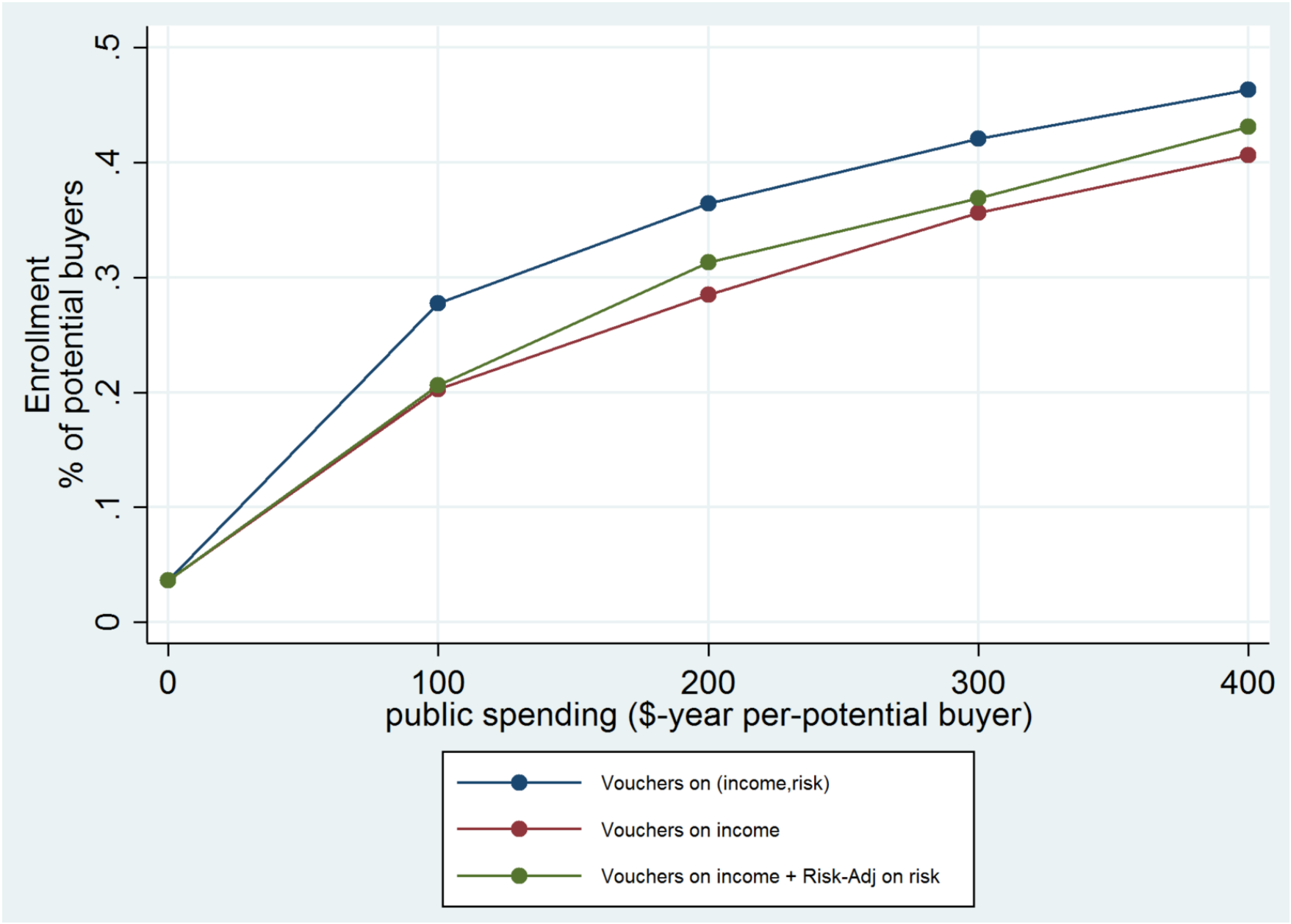
- Focus on single buyers with income in 138-300% of FPL

- Split everyone to 6 "observed" types:
  - 3 terciles of expected cost
  - high/low income (138-200% & 200-300% of FPL)

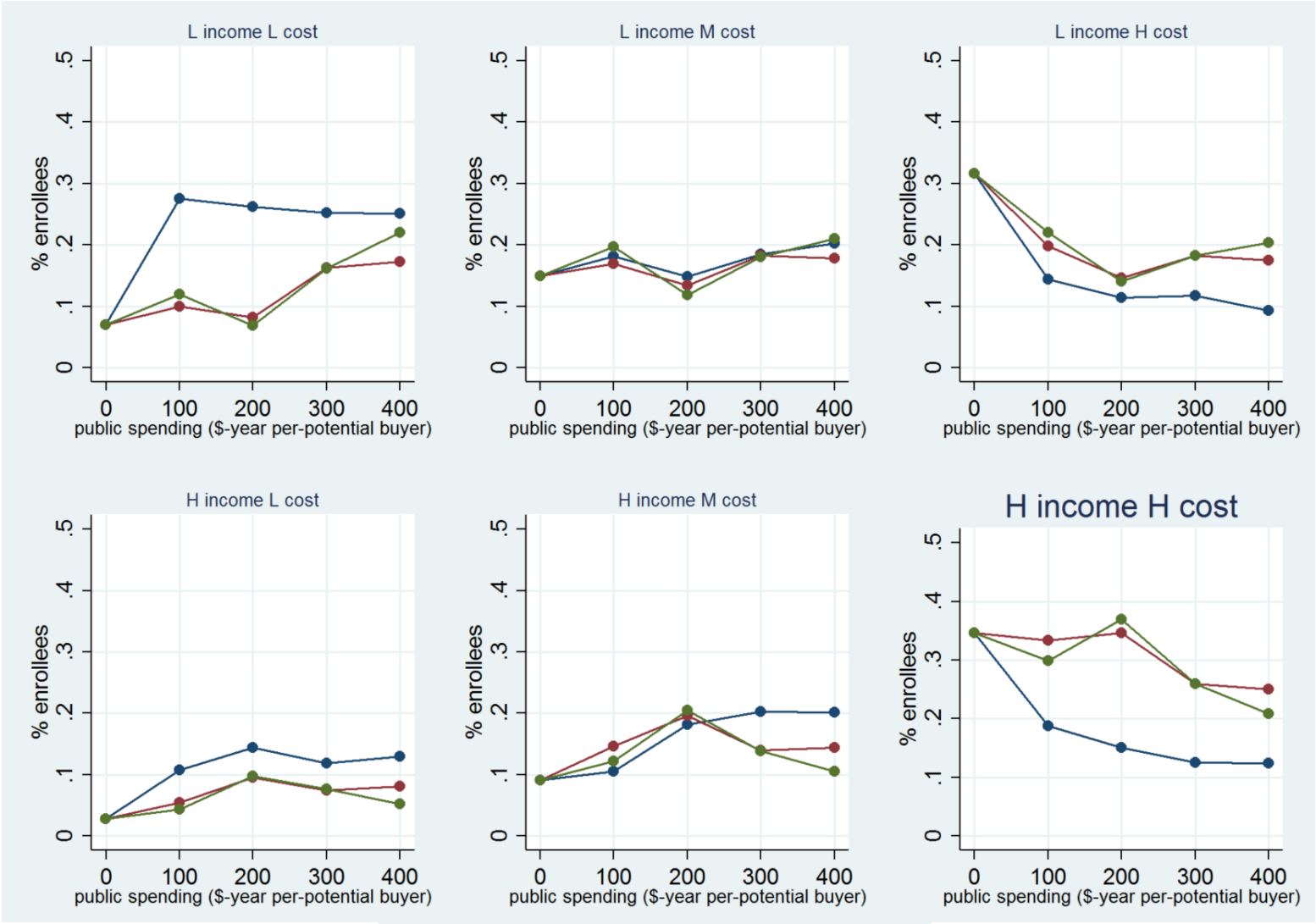
- For now, to simplify intuition, we "zoom in" on a single market (LA county), and two horizontally differentiated products
  - Two silver plans offered by Anthem and BCBS (and an outside option), assuming that costs are the same across products (for a given person) and that plan fixed effects are equal

- Calculate (Nash) equilibria under different scenarios
  - Subsidies can vary across 6 types
  - Subsidies can only vary with income
  - Subsidies vary with income; Risk adjustment vary with cost

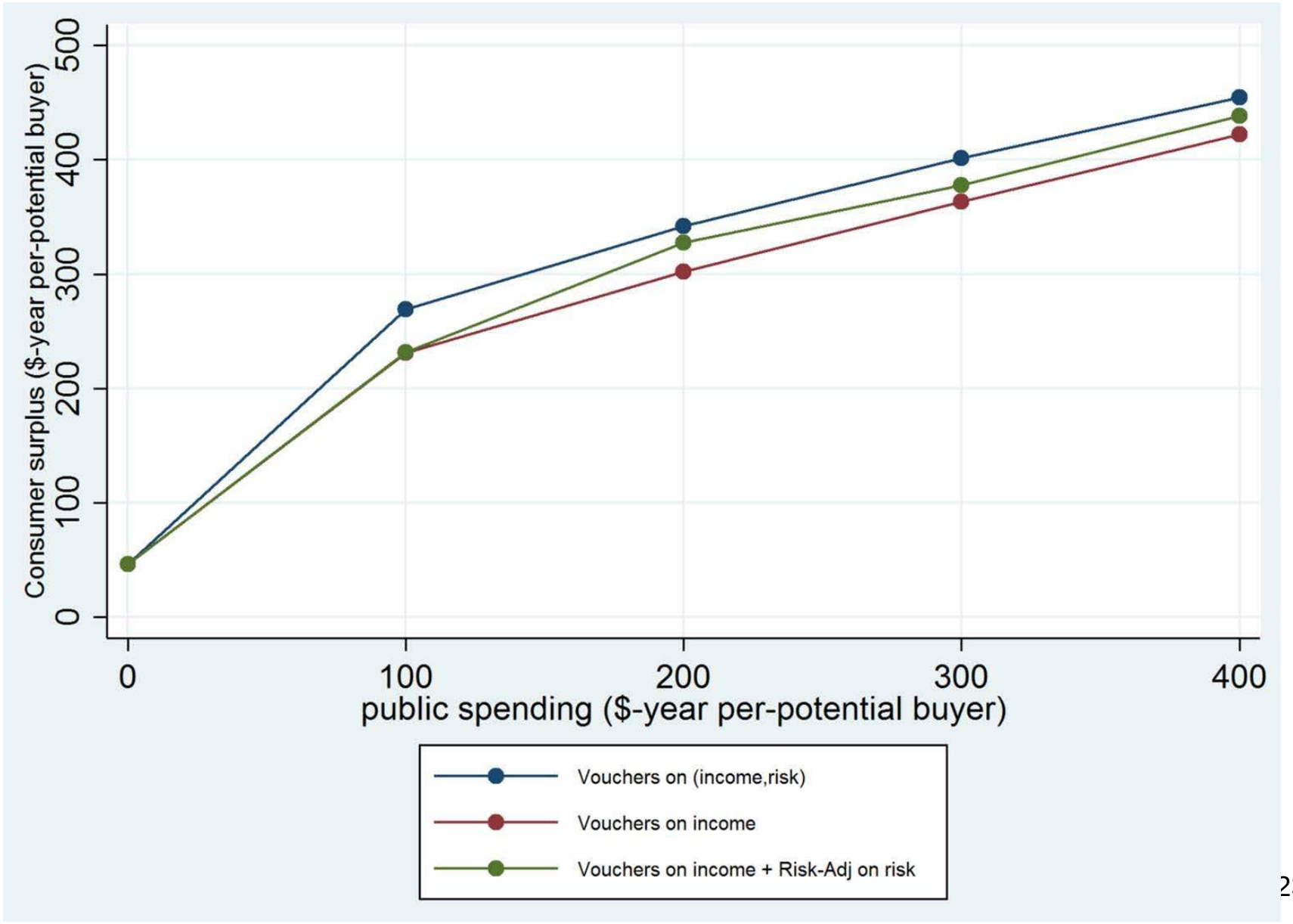
Max Enrollment s.t. Public Budget



Pool composition at Max Enrollment



Consumer Surplus at Max Enrollment



Conclusions

- Main point we try to make: subsidies and risk adjustments are both tightly related market design instruments, so it would make sense to think of them jointly, not in isolation

- Once we do, we realize that at least under very stylized assumptions, subsidies seem generally "better"

- Possible reason for still seeing a lot of risk adjustments is that it might be difficult to explain subsidies on health, and in particular generous subsidies to the healthy

- Using data and existing estimates from California's ACA exchange, we try to give a rough sense – and still **VERY** preliminary – of how quantitatively important this issue may be; it seems non-trivial