The effect of the Medicare Levy Surcharge on the Demand for Private Health Insurance in Australia

Olena Stavrunova (UTS)
Oleg Yerokhin (University of Wollongong)

February 2012

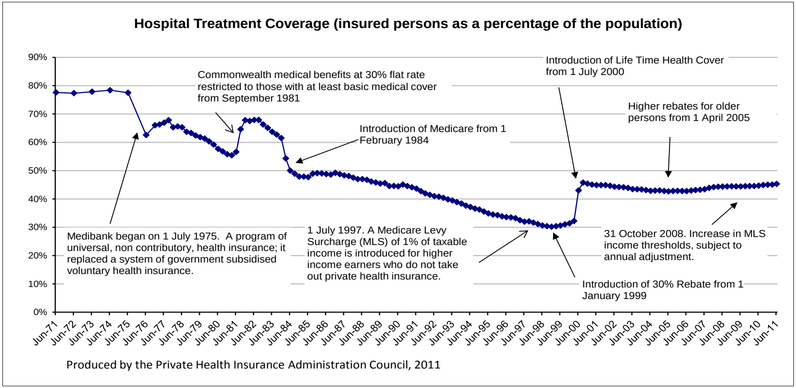
Background: Health care system in Australia

- Mixed public-private health care system
- All residents are entitled to free public hospital treatment
- Private patients can bypass waiting lists and choose a doctor
- Private patients have to pay fee for doctor services plus costs of hospital accommodation, drugs, diagnostics, etc.
- Health insurance can be purchased to (partially) cover cost of private treatment
- 43% are insured, 40% of elective surgery hospital admissions are private

Policies to Increase Private Health Insurance Coverage

- Since the end of 1990s several policies to increase PHI coverage were implemented:
  - 1997- Medicare Levy Surcharge (MLS) - supplemental 1% income tax on high income uninsured
  - 1999- 30% insurance premium rebate ($2.5 billion per year)
  - 2000- Life Time Health Cover (LHC)- a system of entry-age ratings: premium surcharge of 2 percent for every year that the initial purchase is delayed after age 30.
- After the introduction of Medicare in 1984, PHI coverage has been in decline. These policies increased PHI coverage from 31% to 45% (45% increase)
- In 2008 threshold increased
- Currently proposed changes (FPHII Bill): means-testing PHI subsidy and increasing MLS rate (three tier structure: 1%, 1.25% and 1.5%)

Trend in Private Health Insurance Coverage



Literature

Because the timing of these policies overlap, is difficult to isolate their contributions to the total increase in PHI coverage in 2000
Consensus in the literature: LHC had the strongest effect

- Butler (2002) and Frech et al. (2003): time series analysis on aggregate PHI coverage, attribute 11% increase to 30% premium rebate, the rest (34%) to LHC
- Palangkaraya and Yong (2007): individual-level data (NHS), attribute to LHC only 19%-33% increase
- No study attempted to isolate the effect of MLS (Small effect initially?)
  - The MLS could become more effective over time as fraction of people with incomes exceeding the MLS threshold increased

Literature

There is international literature which seeks to establish how the demand for PHI is affected by gov. incentives

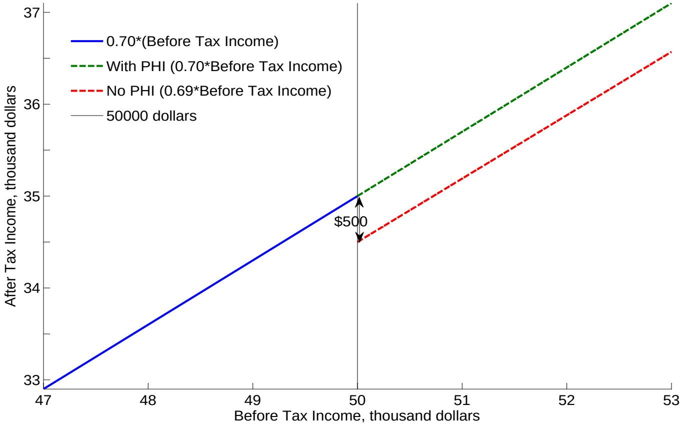
- Subsidies (tax deductible PHI costs)
  - Gruber and Poterba (1994, QJE) - tax subsidies on the demand for PHI by self-employed in US
  - Finkelstein (2002,JPubE) - reduction in tax subsidy for PHI in Quebec
  - Emerson et al. (2001)- removal of tax subsidy for PHI for elderly in UK
  - Rodriguez and Stoyanova (2004, HE) - tax reform affecting the incentives to purchase PHI in Spain
- Mandates

  Buchmueller et al. (2011, AEJ:Policy) - Employer Mandates in Hawaii

Medicare Levy Surcharge

- Imposed on high income earners without PHI hospital cover
- MLS income thresholds from 1997-1998 to 2007-2008
  - Singles: \$50,000
  - Families: \$100,000 + \$1500 per dependent child after the first
- MLS income thresholds since 2008-2009, with annual indexation
  - Singles: \$70,000
  - Families: \$140,000+ \$1500 per dependent child
- MLS rate: 1% of **total** taxable income
- High effective marginal tax rate at the threshold

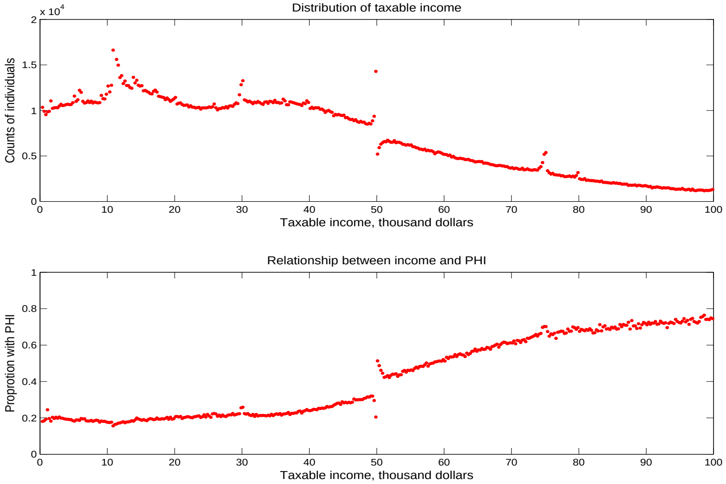
How the MLS works: Single individuals, no children, 2008



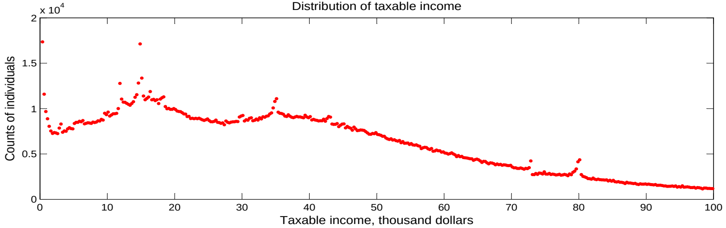
Our study

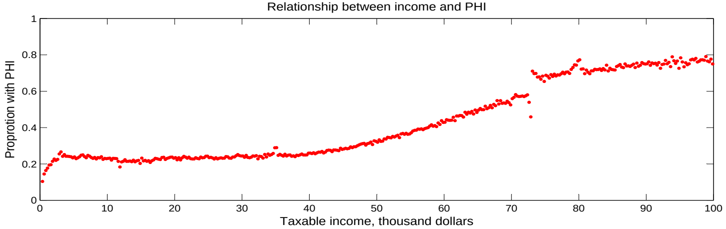
- New dataset - income tax returns of the entire Australian population (2008, 2010)
  - Counts of individuals with and without PHI within $250 bins
  - Demographics: age (3 year intervals), gender
  - Family status (single no kids/otherwise)
  - Can study the effect on single individuals with no children
- A large number of observations around the MLS threshold - can estimate the MLS effect precisely using the regression discontinuity type approach

Taxable income and PHI coverage (single, no kids), 2008



Taxable income and PHI coverage (single, no kids), 2010





MLS incentives: Insurance choice

- $m(c)$ utility from consumption
- $I \in 0, 1$ is private health insurance status (PHI)
- P is private insurance premium
- ξ is psychic cost of searching for PHI
- π is probability of illness
- τ_j is psychic cost of hospital treatment, $\tau_{pb} > 0, \tau_{pr} = 0$
- C_j is out-of-pocket cost of hospital treatment, $C_{pb} = 0, C_{pr} = L \cdot (1 - I) + 0 \cdot (I)$
- L is such that a person without PHI will always choose public hospital
- A person with PHI will always choose private hospital

MLS incentives: Reported Taxable Income

- Y is income
- E is the amount of tax avoidance
- Y_r is reported income: $Y_r = Y - E$
- T is MLS threshold ($50,000 in 2008)
- t is MLS tax (1%)
- a is per dollar cost of tax avoidance, $a > t$

Optimization

- Choose c, I and E to maximize expected utility $u(c, I)$:

$$u(c, I) = m(c) - \pi \cdot (1 - I) \cdot \tau_{pb} - I \cdot \xi$$

subject to the budget constraint:

$$c \leq Y - I \cdot P - (1 - I) \cdot t \cdot (Y - E) \cdot \iota(Y - E \geq T) - aE$$

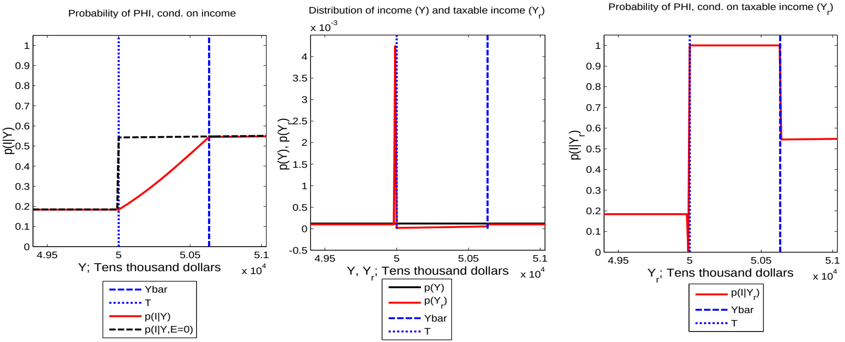
- Solution for E, conditional on $I = 0$:
  - $E = Y - T + \epsilon$ for $Y \in [T, \overline{Y})$
  - $E = 0$ for $Y \in [0, T - \epsilon] \bigcup [\overline{Y}, \infty]$ where $\overline{Y} = \frac{a(T-\epsilon)}{a-t}$

Table: Utilities $u|I$ and reported income Y_r

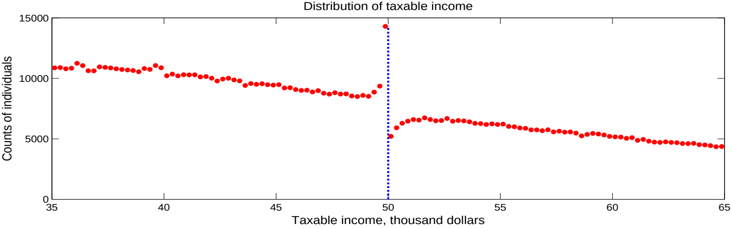
	$Y < T$	$T < Y < \overline{Y}$	$Y \geq \overline{Y}$
$u\|I = 0$	$m(Y)$	$m(Y - a(Y - T + \epsilon))$	$m(Y - t \cdot Y)$
$u\|I = 1$	$m(Y - P) + \eta$	$m(Y - P) + \eta$	$m(Y - P) + \eta$
$Y_r\|I = 0$	Y	$T - \epsilon$	Y
$Y_r\|I = 1$	Y	Y	Y

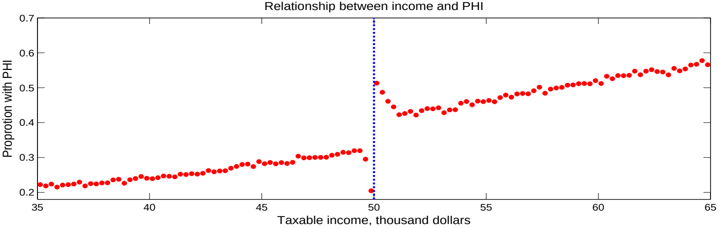
where $\eta \equiv \pi\tau_{pb} - \xi$. If $\eta \sim F(\eta) \Rightarrow Pr(I = 1|Y, P, T, t)$ and $Pr(I = 1|Y_r, P, T, t)$

Income, reported income and $Pr(I)$: $Y \sim U$, $\eta \sim N$, $Pr(I|t=0) = 0.19$

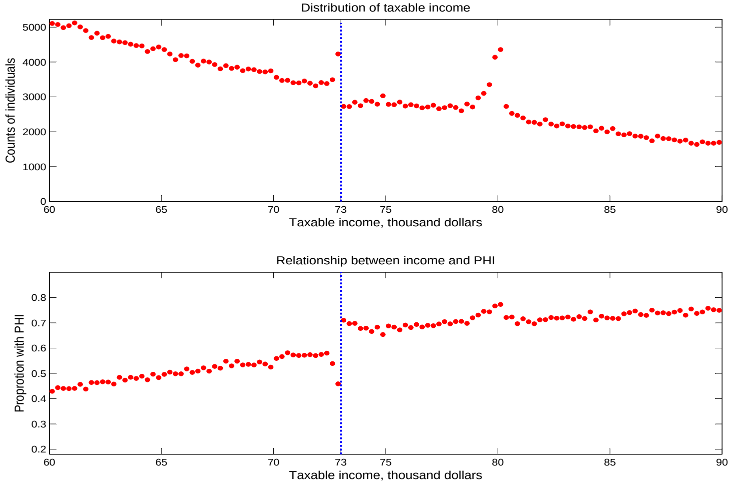


Taxable income and PHI coverage (single, no kids), 2008

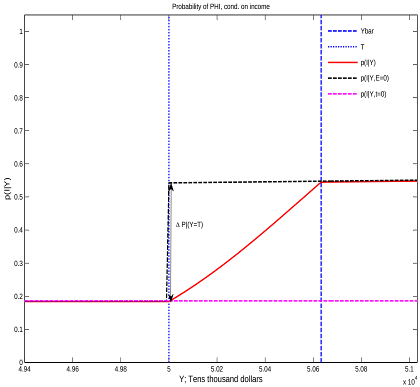




Taxable income and PHI coverage (single, no kids), 2010



Estimation



- Effect of interest: for all $Y > T$
  $Pr(I=1|Y, t=0.01) - Pr(I=1|Y, t=0)$
- $Pr(I=1|Y : Y \geq T, t=0)$ not observable
- Estimate $\Delta Pr|(Y=T)$:

$$\Delta Pr|(Y=T) \equiv Pr(I=1|Y=T, t=0.01, E=0)$$

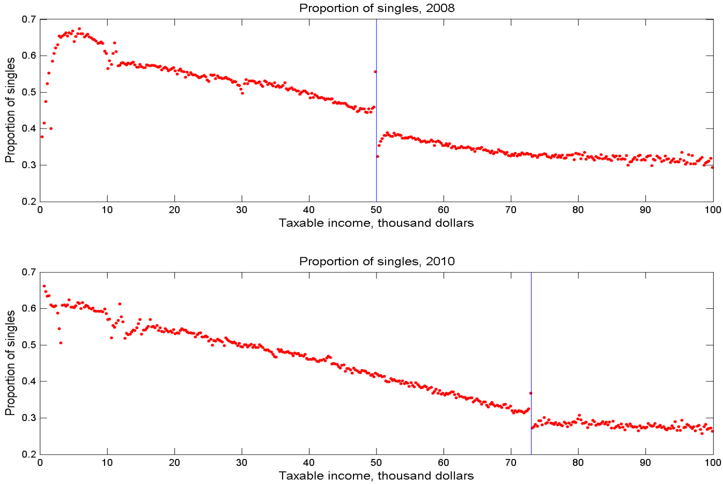
$$-Pr(I=1|Y=T, t=0, E=0)$$

- Discontinuity in PHI due to MLS at $Y = T$ in the situation when tax avoidance is not possible

Estimation

1. Estimate $\overline{Y}$ and $\underline{Y} \equiv T - 2\epsilon$ using taxable income distribution
2. Estimate $Pr(I = 1|Y = T, t = 0, E = 0)$ by extrapolating $Pr(I = 1|Y : Y < \underline{Y})$ to $Y = T$
3. Estimate $Pr(I = 1|Y = T, t = 0.01, E = 0)$ by extrapolating $Pr(I = 1|Y : Y > \overline{Y})$ to $Y = T$
4. Extrapolate $\Delta Pr|(Y = T)$ to $Y > T$ using various assumptions

Possible discontinuity in sample selection probability



Solution

1. Using the whole sample (single and married males) estimate $\Delta Pr^{All}|(Y = T)$
2. Assume that $\Delta Pr^{M}|(Y = T) = 0$
3. Therefore $\Delta Pr^{All}|(Y = T) = Pr(S|Y = T) \cdot \Delta Pr^{S}|(Y = T)$
4. Estimate $Pr(S|(Y = T))$
5. Compute $\Delta Pr^{S}|(Y = T) = \frac{\Delta Pr^{All}|(Y=T)}{Pr(S|(Y=T))}$

Estimation of $\underline{Y}$ and $\overline{Y}$

Using data on all males estimate

$$C_i = \sum_{j=0}^{3} \beta_j^0 Y_i^j + \sum_{k=1}^{5} \gamma_k \cdot \iota(T - 250 \cdot k < Y_i < T - 250 \cdot (k-1))$$

$$+ \sum_{k=1}^{15} \alpha_k \cdot \iota(T + 250 \cdot (k-1) < Y_i < T + 250 \cdot k) + \varepsilon_i$$

where C_i is counts of individuals in income bin i, Y_i is the mid-point of the taxable income bins, s.t.

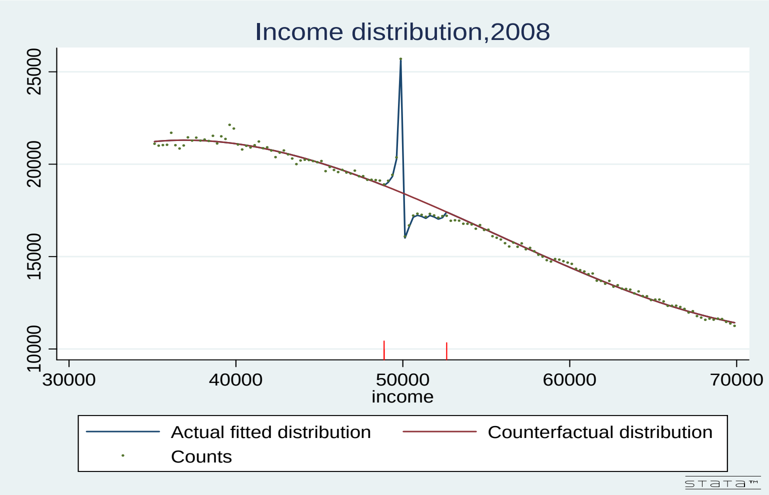
$$\sum_{k=1}^{5} \gamma_k + \sum_{k=1}^{15} \alpha_k = 0$$

$\underline{Y} \equiv T - (k^* + 1) \cdot 250$ where $k^* \equiv max\{k : \gamma_k > 0\}$
$\overline{Y} \equiv T + (k^* + 1) \cdot 250$ where $k^* \equiv max\{k : \alpha_k < 0\}$

Estimation of $\underline{Y}$ and $\overline{Y}$

Variable	Coefficient	P-value
Y	3163.9	0
Y^2	-640805.5	0
Y^3	382942.4	0
γ_1	7221.5	0
γ_2	1799.3	0
γ_3	762.1	0
γ_4	351.7	0.07
γ_5	66.3	0.731
α_1	-2295.3	0
α_2	-1602.6	0
α_3	-978.0	0
α_4	-779.6	0
α_5	-745.6	0
α_6	-751.8	0
α_7	-499.5	0.01
α_8	-483.5	0.013
α_9	-502.0	0.01
α_{10}	-323.9	0.094
α_{11}	-207.4	0.282
α_{12}	-376.4	0.052
α_{13}	-250.0	0.195
α_{14}	-169.2	0.38
α_{15}	-236.1	0.221
const	-27430.4	0
$\underline{Y}$	48875	
$\overline{Y}$	52625	

Income distribution, males (single and married)



Estimation of $\Delta Pr^{All}|(Y = T)$

- Using the data on all males estimate

$$I_i = (\beta_1^0 + \beta_2^0 Y_i)\iota(Y_i <= \underline{Y}) + (\beta_1^1 + \beta_2^1 Y_i)\iota(Y_i >= \overline{Y}) + \varepsilon_i$$

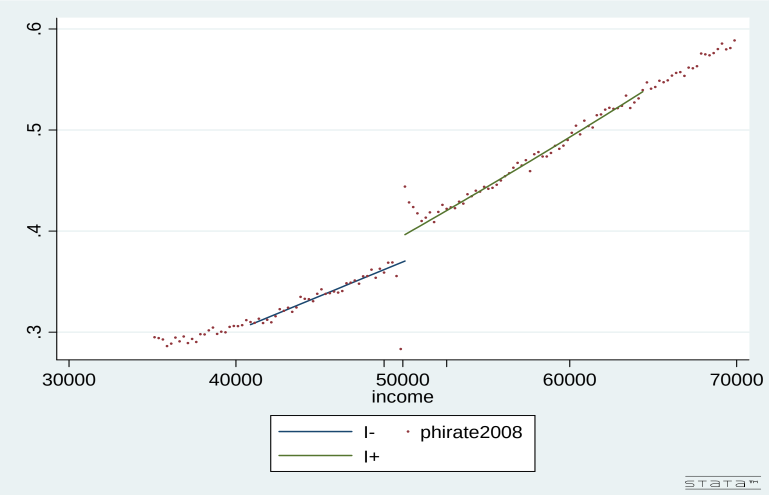
where I_i is proportion of individuals with PHI in income bin i, Y_i is the mid-point of the taxable income bins, and

$$Y_1 = 40,875 \;\; \underline{Y} = 48,875 \;\; \overline{Y} = 52,625 \;\; Y_N = 64,375$$

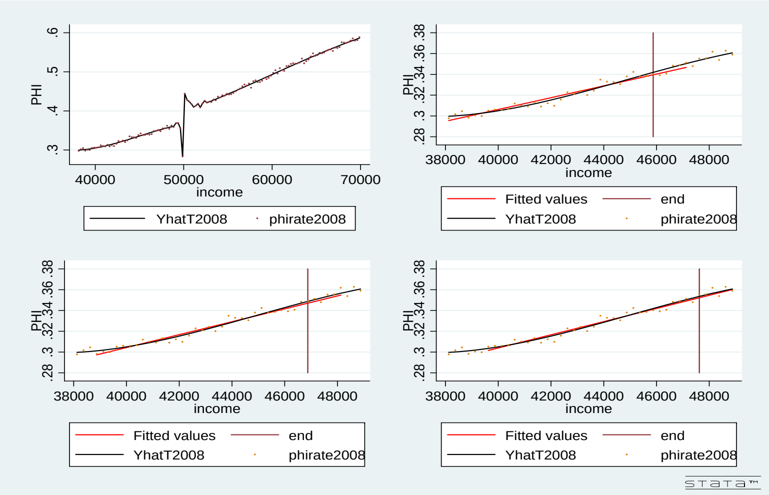
- Compute combined MLS effect:

$$\begin{aligned} \Delta Pr^{All}|(Y = T) &= (\beta_1^1 + \beta_2^1 \cdot 50125) - (\beta_1^0 + \beta_2^0 \cdot 50125) \\ &= 0.024^{***} \end{aligned}$$

Estimation of $\Delta Pr^{All}|(Y = T)$



Robustness


PHI
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income
YhatT2008
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Fitted values
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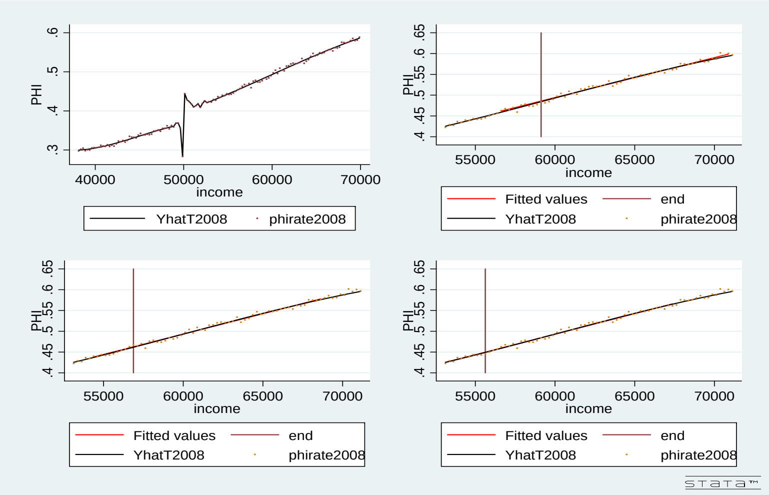
Stata™

Robustness


PHI
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income
YhatT2008
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PHI
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.5
.55
.6
.65
55000
60000
65000
70000
income
Fitted values
end
YhatT2008
phirate2008
Stata™

Robustness

1. The prediction error for $Pr(I = 1 | Y_{n_e+5}; Y_{n_b} : Y_{n_e}; Y_{n_e+5} \leq \underline{Y})$ is $(-0.004, -0.002)$ $N_{obs} = n_b - n_e + 1 = 33,\ N_p = 8$
2. The prediction error for $Pr(I = 1 | Y_{n_b-11}; Y_{n_b} : Y_{n_e}; Y_{n_b-11} \geq \overline{Y})$ is $(-0.002, 0.003)$ $(N_{obs} = n_b - n_e + 1 = 48,\ N_p = 17)$
3. The upper bound on the true effect is $0.024 + 0.002$
4. $\Delta Pr^S | (Y = T) = \frac{\Delta Pr^{All} | (Y=T)}{Pr(S | (Y=T))}$

Estimation of $Pr(S)$ and $Pr(I = 1|Y = T, t = 0.01, S)$

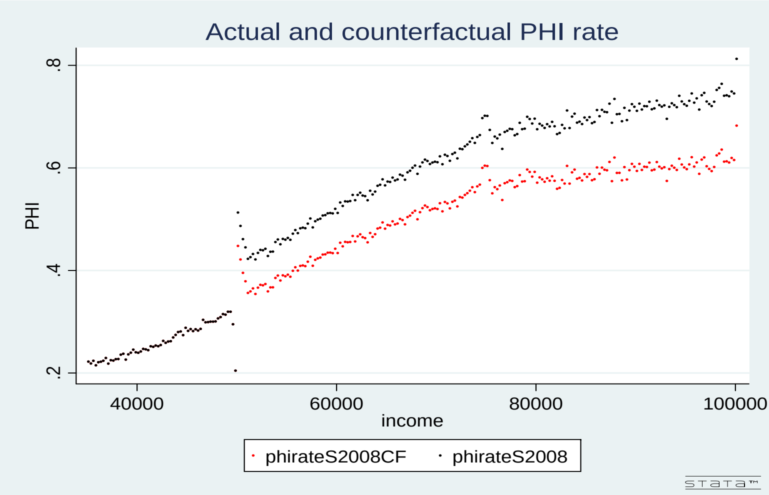
Estimation of $\Delta Pr^S|(Y = T)$ and $\Delta Pr^S|(Y > T)$

- $\Delta Pr^S|(Y = T) = \frac{\Delta Pr^{All}|(Y=T)}{P(S|(Y=T))} = \frac{0.026}{0.40} = 0.065$
- $Pr(I = 1|Y = T, t = 0.01, S) = 0.40 \Rightarrow$
  $Pr(I = 1|Y = T, t = 0, S) = 0.335$
- MLS increases PHI rate at $Y = T$ by 20%.
- Extrapolate for $i : Y_i > T$ assuming constant effect per dollar of MLS tax:

$$PHI_i^{CF} = C_i \cdot (Prop(I = 1|Y_i) - [0.01 \cdot Y_i] \cdot \frac{0.065}{500})$$

- Equivalent to assuming linear $m(c)$ and $\eta|Y \sim U(a_Y, b_Y)$ s.t. $a_Y - b_Y = c$

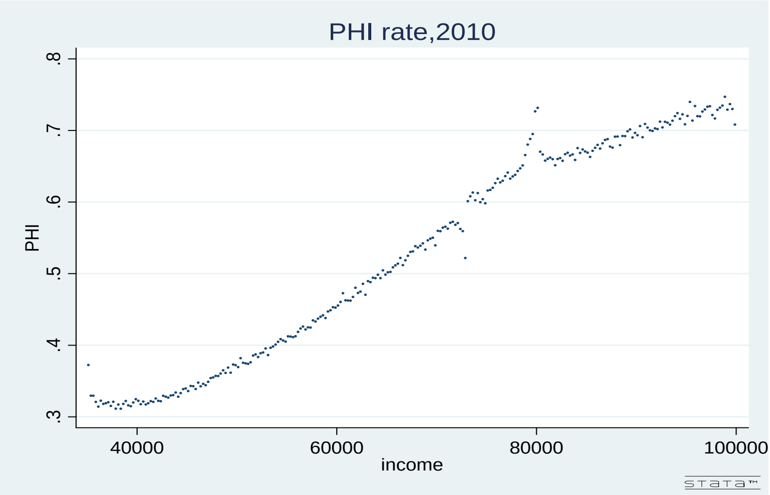
Extrapolating to $Y > T$



Extrapolating to $Y > T$

Total counts, single males	3,076,275
Total counts with PHI, actual	1,018,175
Total counts with PHI, counterfactual	933,758
Δ	84,417
Δ, percent	9%
Overall PHI rate, actual	33%
Overall PHI rate, counterfactual	30%
Budget revenue, mln.	222.6

PHI rate (total), 2010



Conclusion

- The effect of MLS in 2008 is relatively large at $Y = T$ (but not as large as expected)
- The total effect of MLS in 2008 is small
- The total MLS effect was probably even smaller when the policy was implemented in 1997
- The total MLS effect is probably even smaller when the threshold increased to 73000 in 2008
- Future work: heterogeneity of the MLS effect by age and gender

Counts of individuals with PHI (single, male), 2008