Does Insurance for Treatment Crowd Out Prevention? Evidence from Diabetics' Insulin Usage

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Motivation: Prevention

- *Ex ante* moral hazard: decrease efforts to avoid bad state if insured
- *Question:* how much does investment in health decrease if only treatment is covered?
- This paper: Evidence that insurance for treatment alone has large negative effects on prevention

Motivation: Setting

- Pre-2006:
  - U. S. over-65s covered for physicians and hospitals, but not medications
- Post-2006:
  - Medications covered for over-65s ("Medicare Part D")
- Diabetics: 12-15% of the U.S. population & fastest growing chronic illness globally
- High costs of care - $850 billion, ∼1% of global GDP (Bommer et al., 2017, Lancet)

This Paper

1. Regression discontinuity design: insurance for treatment alone

2. Difference-in-discontinuities design: allow effect to differ post-2006 - coverage for prevention added

3. Use life-cycle model to

    Reconcile results with literature and

    Derive results' relationship to compensated elasticity

    Key simplification: no cumulative effects of human capital investment

Preview of Findings

1. Pre-2006: Insulin usage falls by -8 pp from 26% to 18% at age 65
2. Post-2006: subsidies for insulin offset this more than one-for-one

   Post-2006 effect is a net increase of +7 pp
3. Model shows that compensated elasticity $\geq$ measured elasticity

Contribution

1. First evidence of large moral hazard effects in health behaviors due to provision of health insurance (cf. Card et al. 2008, AER; Finkelstein et al., 2012, QJE)
   - Consonant with literature on provision of treatment for AIDS & opioid overdoses (Goldman, Lakdawalla & Sood, 2006, QJE; Doleac & Mukherjee, 2019)
     Policy implication: underestimating extent of measures necessary to encourage prevention

2. First use of different life-cycle elasticities to analyse differences across studies of prevention (cf. Keane 2010, JEL, Ried 1998 JHE)

Structure of this Talk

- Background & Data
- Empirical Strategy
- Results
- Theoretical Framework
- Conclusion

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- Insulin is typically used once disease worsens
  - Usage can decline by 20% over a two-year period from initiation (Brown et al., 1999)

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- 200% of the federal poverty line in 1998 in 2018 dollars is \$33 500:
  - Nearly 10% of household income without insurance

Regression Discontinuity Design

- RDD, if individual i's age in months R_{it} exceeds eligibility threshold $\bar{R}$, $D_{it} = 1$ if person i is covered in period t, instrument for D_{it} with eligibility rule $1[R_{it} \geq \bar{R}]$,

$$Y_{it} = \beta_0 + \beta_1 D_{it} + \gamma_0 R_{it} + \gamma_1 1[R_{it} \geq \bar{R}] \times R_{it} + \delta X_{it} + \zeta t + \eta_i + v_{it} \text{ for } \left|R_{it} - \bar{R}\right| < h;$$

- Identifying assumption: no other discontinuities at cutoff

"Crowding Out" Pre-2006 & "Crowding In" Post-2006

- Intuition: behavior at the cutoff in 2006 different $\Longrightarrow$ policy changes net effect on behavior

$$Y_{it} = \beta_0 + \beta_1 D_{it} + \beta_2 1[t \geq 2006] + \beta_3 D_{it} \times 1[t \geq 2006] + \gamma_0 R_{it} + \gamma_1 1[R_{it} \geq \bar{R}] \times R_{it} + \delta X_{it} + \zeta t + \eta_i + v_{it}$$

- Assumption to id β_3: no other important differences at 65 between 2006 and previous years (i.e. cohort effects, simultaneous policy changes):

Retirement, Diabetic Women, 1998-2004

(1) Employed	(2) Retired	(3) Partly Retired	(4) Hours	(5) Earnings	(6) Social Security
0.03	-0.03	0.09	-0.31	731.71	-0.00
(0.76)	(-0.72)	(1.01)	(-0.13)	(0.87)	(-0.11)

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Other Health Outcomes, Diabetic Women, 1998-2004

(1)	(2)	(3)	(4)
Any Hospital Stay	Nights in Hospital	Any Doctor Visit	No. Doctor Visits
-0.04	3.09	0.14*	2.34
(-0.21)	(0.66)	(2.43)	(0.29)
Kidney Problems	Poor Health	Diabetes Diagnosis	BMI
0.25	-0.09	-0.02	3.80
(1.89)	(-0.46)	(-0.37)	(1.67)

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Difference-in-Discontinuities 1998-2008: Other Outcomes

	(1)	(2)	(3)	(4)
	Med. Adv.	Employed	Retired	Partly Ret.
Women				
	0.08	-0.03	-0.00	-0.04
	(1.37)	(-1.27)	(-0.00)	(-1.16)
Men				
	0.10	-0.03	0.06*	-0.06
	(1.56)	(-1.12)	(2.24)	(-1.79)
	Hours	Earnings	Soc. Sec.	Diagnosis
Women				
	-0.11	-574.21	0.05***	0.05**
	(-0.11)	(-0.63)	(4.54)	(2.69)
Men				
	-0.31	-2252.86	0.05***	0.05**
	(-0.27)	(-1.24)	(4.60)	(2.69)

Difference-in-Discontinuities: Insulin Usage, 1998-2008

▸ Absence of Credit Constraints

Insulin	(1)	(2)	(3)
$\widehat{D_{it}}$	-0.08*	-0.08**	-0.08**
	(-2.50)	(-2.62)	(-2.62)
$1[t \geq 2006]$	-0.14*	-0.14*	-0.12*
	(-2.53)	(-2.53)	(-2.38)
$D_{it} \times \widehat{1[t \geq 2006]}$	0.15*	0.15*	0.13*
	(2.41)	(2.42)	(2.28)

- By contrast, no effects on: oral medication use, exercise, or diet

Which Elasticity is Being Measured?

- I estimate the intertemporal substitution (Frisch) effect of a lower price for treatment, since the price change is anticipated:

$$\varepsilon^{F}_{\phi_2,P^M} \equiv \left(\frac{P^M}{\phi_2}\right)\left(\frac{\partial \phi_2}{\partial P^M}\right)\Bigg|_{\frac{\partial \mu}{\partial P^M}=0}$$
$$= -\left(\frac{P^M}{\phi_2}\right)\left(\frac{V_{\phi M}\left(\frac{\partial M_2}{\partial P^M}\right)}{V_{\phi\phi}}\right) > 0,$$

- Compensated elasticity at least as large
- Motivation: disparity between literatures on (i) specific interventions and (ii) health insurance expansions
  - Latter often include income effects that can offset *ex ante* moral hazard
- Abstracts from cumulative effects & dynamic effects of lifespan extension

Conclusion

- In 1998-2004, Medicare coverage decreased the proportion of female diabetics who use insulin by 8 pp
- Post-2006, this is cancelled out by coverage for insulin
  - Aggregate result: 4.6 p.p. in forgone heart disease among women & $487 million p.a.
- Theoretical model reconciles with the literature:
  - Income effects likely larger than believed
  - Estimates here are lower bounds for the compensated effects