L&S 39G

Health, Human Behavior, and Data

Prof. Ryan Edwards

Class 7

October 13, 2015

Today's agenda

- Reminder about deadlines

- Some quick i>clicker questions about the readings

- Kyle and Catherine on the reading

- More in depth on the reading

First draft deadline is in 2 weeks: Monday October 26

- Needs to be at least a mockup of your paper

- With sections that include complete sentences

- At least one table or figure produced and discussed

- Be sure that the 3 sentences from your topic appear in the draft, whether verbatim or updated

  1. Question you're asking
  2. Data
  3. Answer you expect

Sep 8	Bhattacharya chaps 1-2	Alastair & Catherine	Oct 27	Ashenfelter & Ziliak	
Sep 15	Cutler et al. and Wachter	Eric & Natalie	Nov 3	Ruhm	
Sep 22	Bhattacharya chap 3	Catherine & Kyle	Nov 10	Small & Rosenbaum	
Sep 29	Bhattacharya chap 4	Kyle	Nov 17	Buckles & Hungerman	
Oct 6	Sutton and Bartholomew		Nov 24	Carpenter & Dobkin	
Oct 13	Aron-Dine et al.	Kyle & Catherine	Dec 1	Edwards & Mason	
Oct 20	Oster				

Nobel in Economics Given to Angus Deaton for Studies of Consumption

By BINYAMIN APPELBAUM   OCT. 12, 2015

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HE NAMED ME

Prof. Angus Deaton, a British economist, was awarded the Nobel Memorial Prize in Economic Science on Monday for improving the accuracy of basic economic gauges, including measures of income, poverty and consumption.

Professor Deaton, 69, of Princeton, is best known for his insight that economic averages

Prof. Angus Deaton, winner of the 2015 Nobel Memorial Prize in Economic Science. Larry Levanti/Princeton University, European Pressphoto Agency

Among many things, Deaton has also written about randomized controlled trials

- *Journal of Economic Literature*, 2010: RCTs are excellent tools that also have limitations; theory matters

  - Experiments that measure $\partial y/\partial x$ without theoretical analysis sidestep heterogeneity in results & behavior

  - Heterogeneous behavior of humans raises questions whether experiments rigorously separate control from treatment

  - Study findings aren't automatically relevant to other contexts where circumstances may be different

What RCTs do and don't do

$$y = \alpha + \beta x + \varepsilon$$

- RCTs rigorously show the *average* treatment effect (β) of x on y between two groups

- But they don't tell us about differential β's within the treatment group: heterogeneity

- The FDA will only approve a drug based on results supporting ex ante analytical plans

- Famously, ISIS-2 showed aspirin helped after heart attacks, except if you were a Libra or a Gemini

Strong words for RCTs in development

- "[I]f the World Bank had indeed randomized all of its past projects, it is unlikely that the cumulated evidence would contain the key to economic development

- "For an RCT to produce useful knowledge beyond its local context, it must illustrate some general tendency, some effect that is the result of a mechanism that is likely to apply more broadly."

RCTs without theory are similar to "trial and error" that may not advance scientific knowledge

- Some see experimentation during Enlightenment as central for escaping poverty and disease, but

- "In the end, many problems were simply too hard to be solved without theoretical guidance

- "It took scientific understanding to overcome the heterogeneity of experience which ultimately defeats trial and error

- "We are unlikely to banish poverty in the modern world by trials alone, unless those trials are guided by and contribute to theoretical understanding."

RCTs in history: Ronald Fisher and the "Lady Tasting Tea" (1935)

- Based on a personal experience with biologist Muriel Bristol, English statistician Ronald Fisher proposed a randomized test of tasting tea

- Bristol said she could tell whether the milk or the tea had been poured into the cup first

- Fisher wanted to test the hypothesis that she couldn't

- He set up the test with 8 cups of tea randomly ordered, 4 with milk first, 4 with tea first

Null hypothesis: It's all guesswork

- With 8 cups of tea delivered at random order, what's the probability that you guess right?

- The number of different combinations of 8 items chosen 4 at a time is

8 choose 4 or $\dfrac{8!}{4!\,(8-4)!} = 70$

- Out of these 70 combinations, guessing all 4 correctly happens only once, and $1/70 = 0.014$

Deaton (2010) on Fisher and Lady Tasting Tea

- "As Ronald A. Fisher (1935) emphasized from the very beginning, in his famous discussion of the tea lady, randomization plays two separate roles.

- "The first is to guarantee that the probability law governing the selection of the control group is the same as the probability law governing the selection of the experimental group.

- "The second is to provide a probability law that enables us to judge whether a difference between the two groups is significant. "

i>clicker question 7.1

Why didn't Aron-Dine, Einav, and Finkelstein reexamine **health outcomes** in the RAND Health Insurance Experiment?

A. We are less interested in health outcomes

B. The RAND HIE never measured health outcomes

C. The RAND HIE measures of health outcomes are not publicly available

D. Health insurance doesn't affect health outcomes

i>clicker question 7.2

What does "moral hazard" mean?

A. Something that could change your morals

B. A deadly risk to life and limb

C. Insurance against bad events motivates more bad behavior

D. Lowering the price raises quantity demanded

i>clicker question 7.3

Why does it matter if people drop out of a study?
(This is called "attrition")

A. Attrition raises the cost of the study

B. Attrition means you can't see the treatment

C. Attrition means you can't see the outcomes

D. It doesn't matter

"The RAND Health Insurance Experiment, Three Decades Later"

- The punchlines:

    - The main result is that the demand curve for health care is downward sloping

    - This main result still holds up even after reexamining its robustness

    - The *quantitative* finding most often cited, that the price elasticity is –0.2, is less robust

    - We should all think about what we're measuring & how

FREE FOR ALL?

LESSONS FROM THE RAND HEALTH INSURANCE EXPERIMENT

Joseph P. Newhouse
and the Insurance Experiment Group

Economists love puns and double entendre

Setup of HIE

- Between 1974 and 1981, the HIE assigned 5,811 individuals in 1,985 families to one of 6 plans for 3-5 years

i. "Free care" with 0% coinsurance (32% of families)

ii. 25% coinsurance (11%)

iii. Mixed 25% coinsurance and 50% for dental & outpatient (9%)

iv. 50% coinsurance (7%)

v. "Individual deductible" 95% coinsurance, 0% for inpatient (22%)

vi. 95% coinsurance (19% of families)

Out-of-pocket maximums

- Within each plan, families were randomly assigned to different annual Maximum Dollar Expenditures

- Either 5%, 10%, or 15% of family income up to max of $3,000 or $4,000 in 2011 dollars

- On average, a third of individuals hit the maximum during the year

- But people assigned to groups with higher coinsurance rates hit it more often

	Plan	**Out-of-pocket spending**	**Claims to insurance**	**Remained in study?**
Tom	Platinum	$10,000	$80,000	yes
Dick	Platinum	$7,000	$50,000	yes
Harry	Paper	$1,000	$3,000	yes
Bud	Paper			no

Platinum = low copay

Paper = high copay

A reminder to scrutinize data!

	Plan	Out-of-pocket spending	Claims to insurance	Remained in study?
Tom	Platinum	$10,000	$80,000	yes
Dick	Platinum	$7,000	$50,000	yes
Harry	Paper	$1,000	$3,000	yes
Bud	Paper			no

People leave studies for all kinds of reasons

If pre-study randomization was sufficient, external reasons should be equally distributed across groups

But what if the <u>study design</u> prompts differential attrition?

	Plan	**Out-of-pocket spending**	**Claims to insurance**	**Remained in study?**
Tom	Platinum	$10,000	$80,000	yes
Dick	Platinum	$7,000	$50,000	yes
Harry	Paper	$1,000	$3,000	yes
Bud	Paper			no

Participants assigned to the Paper plan have to pay higher copayments for medical care

Maybe being assigned to the Paper plan is more likely to result in **attrition**, because it feels like a burden

	Plan	**Out-of-pocket spending**	**Claims to insurance**	**Remained in study?**
Tom	Platinum	$10,000	$80,000	yes
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Speaking of burdens: How are the data collected? Do incentives vary for participants to report the data?

If Paper respondents have higher copays, their incentives to bother claiming & reporting are less than for Platinum
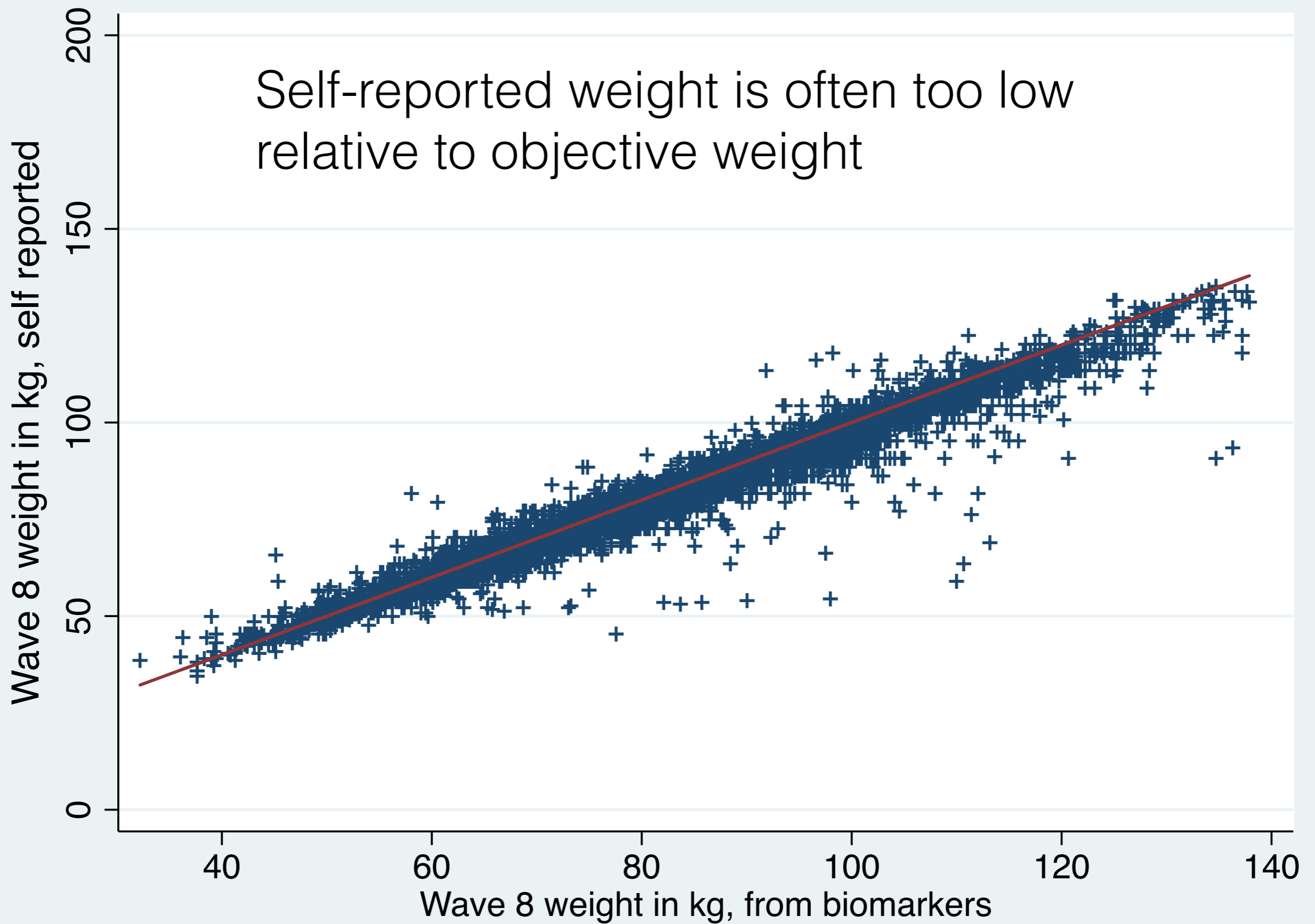
Differential reporting

- A key objective was to measure how health care spending may change across insurance plans

- But spending was only measured when individuals and providers filed claims for reimbursement

- And different plans created different incentives to actually report and thus claim reimbursement

  - People in the 95% coinsurance rate plan gain only 5% of the claim by reporting, unless maxed out

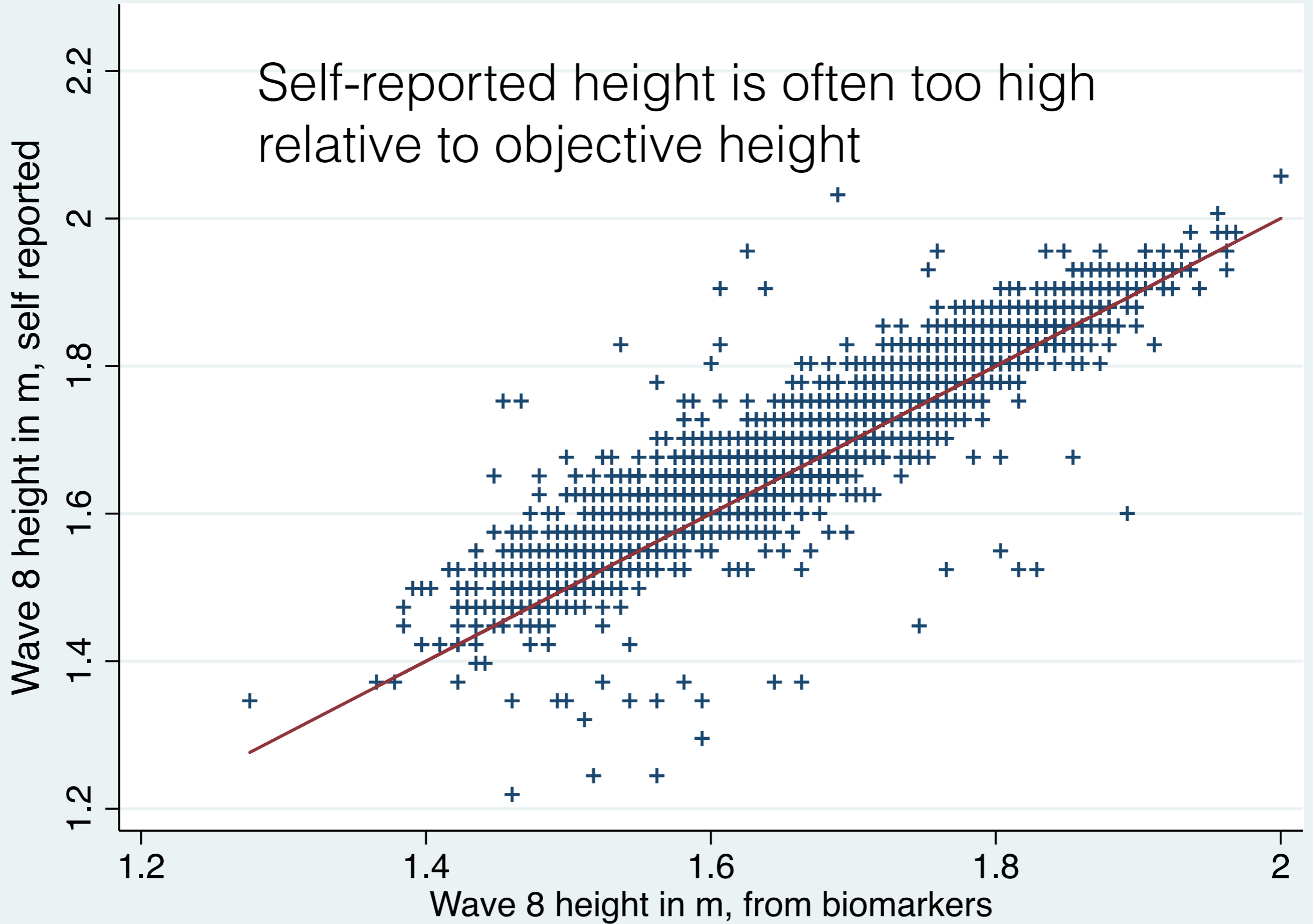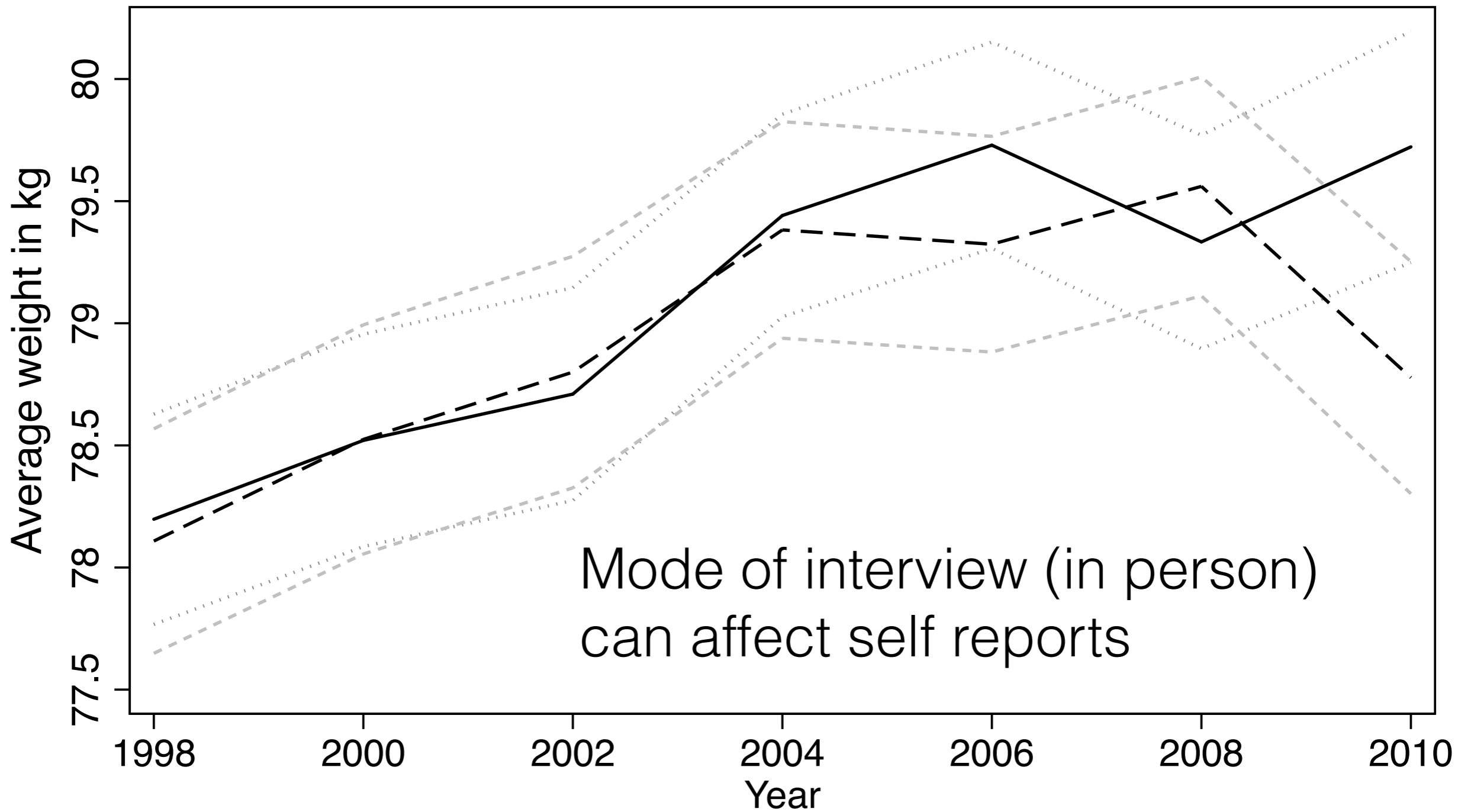 - People in 0% plan gained back all of the claim

Differential reporting

- Rogers and Newhouse (1985) examined billing records from providers, and they report:

  - Participants in the 0% coinsurance plan did not file claims for 4% of outpatient spending

  - Participants in the 95% coinsurance plan did not file claims for 12%

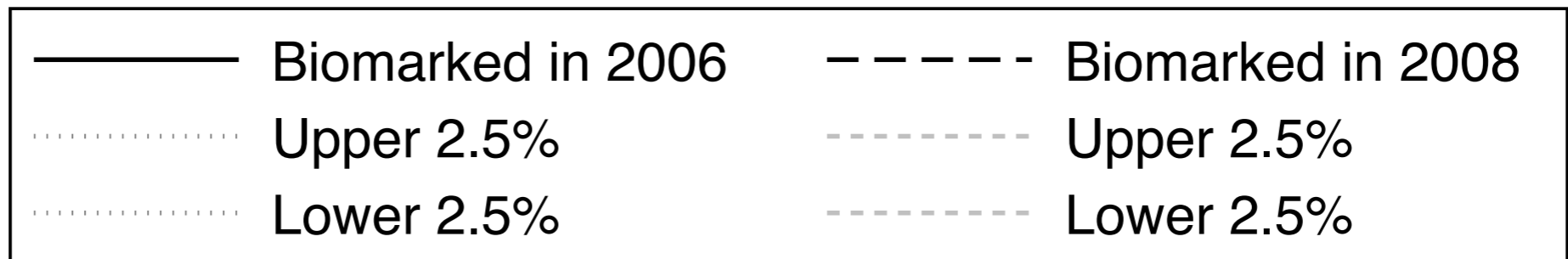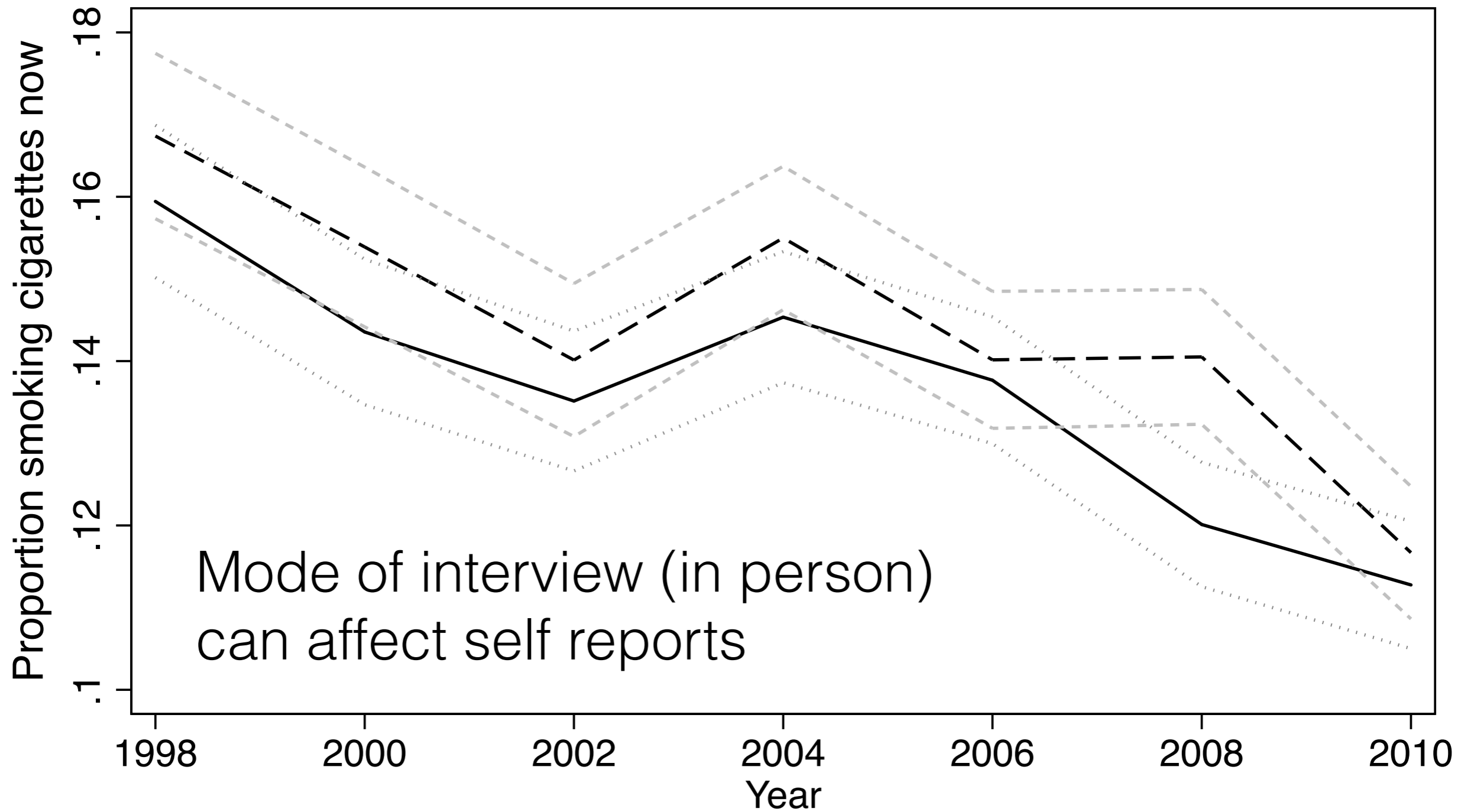 - Underreporting in other plans fell within this range

More differential reporting

- Auto insurance claims

  - Suppose you face a high copayment

  - Your net incentive to report a small incident is low, especially if you think it will raise your rates (i.e., premia)

- Crime statistics

  - High-crime precincts may face incentives either to [downgrade criminal complaints](#) or increase stops-and-frisks, to keep measures of crime low or crime-fighting high

- Test scores & administrative cheating

Self-reported weight is often too low relative to objective weight

Self-reported height is often too high relative to objective height

Mode of interview (in person)
can affect self reports

—— Biomarked in 2006	- - - Biomarked in 2008
······ Upper 2.5%	- - - Upper 2.5%
······ Lower 2.5%	- - - Lower 2.5%

Mode of interview (in person) can affect self reports

Differential attrition

- Overall, 76% of individuals completed the experiment

- Completion rates varied from 88% in the free plan to 63% in the 95% coinsurance plan

- Suppose participation represented a cost to people

  - Then people who expected to gain a lot — either those who expected lots of health care spending, or those in the free plan, or both — would remain, others might just leave the study

  - This would **bias** the effect of insurance coverage on utilization, making it look too large; because high spenders wouldn't stay in the 95% coinsurance plan

Methods to address differential reporting & attrition

- Aron-Dine et al. scale spending with the underreporting estimates gathered by Rogers and Newhouse (1985)

- They also run models that control for all observable characteristics

- And they use a "bounding procedure" (Lee, 2009) to see how bad the bias could be

  - They drop the top group of spenders in the lower cost-sharing plan, so as to equalize participation rates

Upshots

- These several robustness checks show that the qualitative result appears to be robust:

- An increasing price of health care reduces usage

- But:

  - No longer able to reject hypothesis that inpatient spending does not respond to price

  - The size of the price response is less clear

What's the right price?

- Ton of discussion here about price measurement

- Key takeaways:

  - Health insurance contracts have *nonlinear pricing*, price depends on how much you'll spend in a year

  - Do people *myopically* react to the current "spot" price or do they look ahead?

  - Modeling assumptions can change estimated responses by a factor of 2

Intermediate findings

- The RAND investigators found that insurance seemed to

  - Determine the **extensive margin** of whether or not to seek health care at all

  - <u>Not affect</u> the **intensive margin** of how much care to receive once care was sought