Interpreting Signals in the Labor Market: Evidence from Medical Referrals

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Motivation

Harvard Business Review

How HBR Has Covered Women and Business

Throughout the 1970s, HBR explored the consequences of the Equal Employment ... sought to pinpoint the causes of the gender pay gap,...
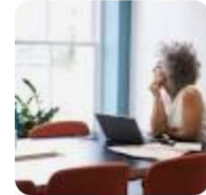
2 days ago

Suggest

Salary Expectations In The U.S. Are Up, But Only For Men— For Women They're Way Down

In other words, women study and enter into careers that generally pay lower salaries, which, in part, causes a reservation wage gap. But, when...

1 day ago

Modern Diplomacy

Closing gender pay gaps is more important than ever

While individual characteristics such as education, working time, occupational segregation, skills, or experience explain part of the gender pay...

2 days ago

Women's Agenda

Equal Pay Day is not just a pay inequality reminder, it's a call ...

Educate yourself on the causes of the gender pay gap. Learn what's a myth and what's

Research question

- Does a surgeon's gender influence how they are viewed and treated by other physicians?

- Following a bad (or unexpectedly good) outcome on a surgical patient, do physicians change their referral patterns to the surgeon and, if so, is that change affected by the surgeon's gender?

Contribution

- Large body of literature on gender gap, yet a large portion of the gap remains unexplained

- Relatively little focuses on interpretation of signals of actual performance (as opposed to perceived performance), especially good/positive signals

Preview of findings

- Following a bad outcome (patient death):
  - Referrals drop more to female surgeons than to male surgeons

- Following a good outcome (an unanticipated survival):
  - Referrals rise more to male surgeons than to female surgeons

Data

- Primary data source is Medicare Carrier file
  - 20% random sample of fee-for-service claims of all Medicare beneficiaries (2008-2012)
  - Referral (physician-surgeon) dyad is the unit of analysis

- Physician Compare National file

- Dartmouth Atlas of Health Care

What does this file include? (variable highlights)

- diagnosis (ICD diagnosis)
- procedure (CPT code)
- dates of service
- charges
- allowed amounts
- reimbursement amount
- provider NPI number

Program: Medicare
Category: Medicare Fee-For-Service Claims
Privacy Level: Research Identifiable Files

Matching procedure

- Initial data sample:
  - 265,000 physician-surgeon pairs with good events
  - 302,000 physician-surgeon pairs with bad events

- Match:
  - surgeon, physician, patient, procedure

?

- Final sample for analysis
  - 7,757 physician-surgeon pairs with good events
  - 6,979 physician-surgeon pairs with bad events

Event Study

$$R_{ijk} = \sum_{k=-4}^{6} \beta_k event_{ij,t-k} + \sum_{k=-4}^{6} \gamma_k \left(event_{ij,t-k} \times fem_i \right) + \theta_{ij} + \epsilon_{ijk} \quad (3)$$

- R_{ijk} = referrals sent per quarter
- γ_k = coefficient of interest
- θ_{ij} = physician-surgeon fixed effects

Why do the matching procedure? Why not just adjust for those variables in the estimating equation?

Event Study – Spillover effect

$$f_{ijgsk} = \sum_{k=-4}^{6} \beta_k event_{ij,t-k} + \sum_{k=-4}^{6} \gamma_k \left(event_{ij,t-k} \times fem_i \right) + \delta available_{js} + \theta_{ij} + \epsilon_{ijgsk} \quad (5)$$

- f_{ijgsk} = fraction of referrals going to male/female
- γ_k = coefficient of interest
- θ_{ij} = physician-surgeon fixed effects
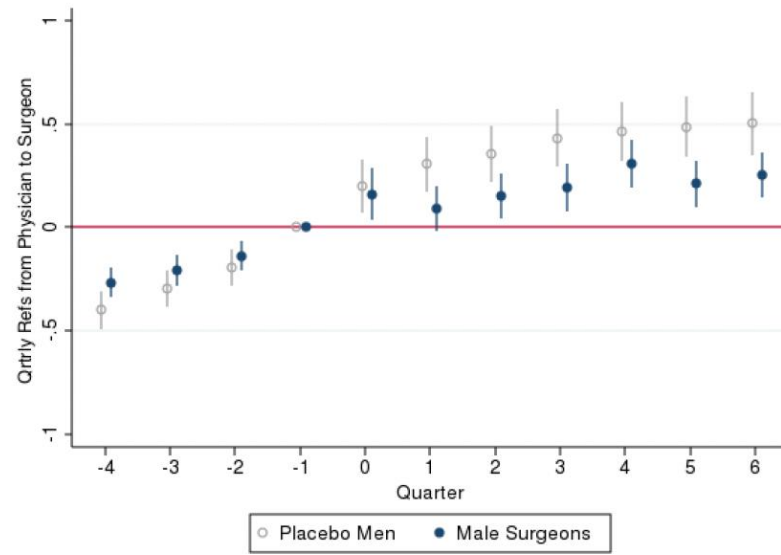- $\delta avail_{js}$ = fraction of available surgeons of same gender/specialty

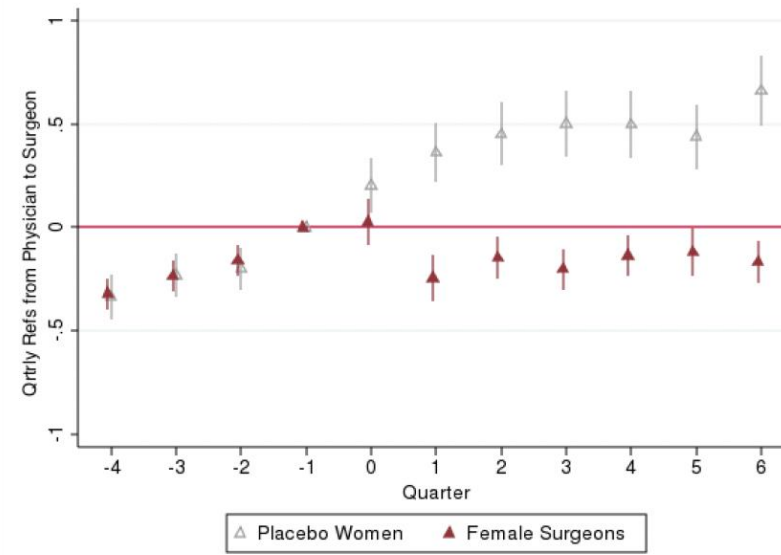FIGURE 3: QUARTERLY ESTIMATES OF PHYSICIAN'S REACTION TO DEATH
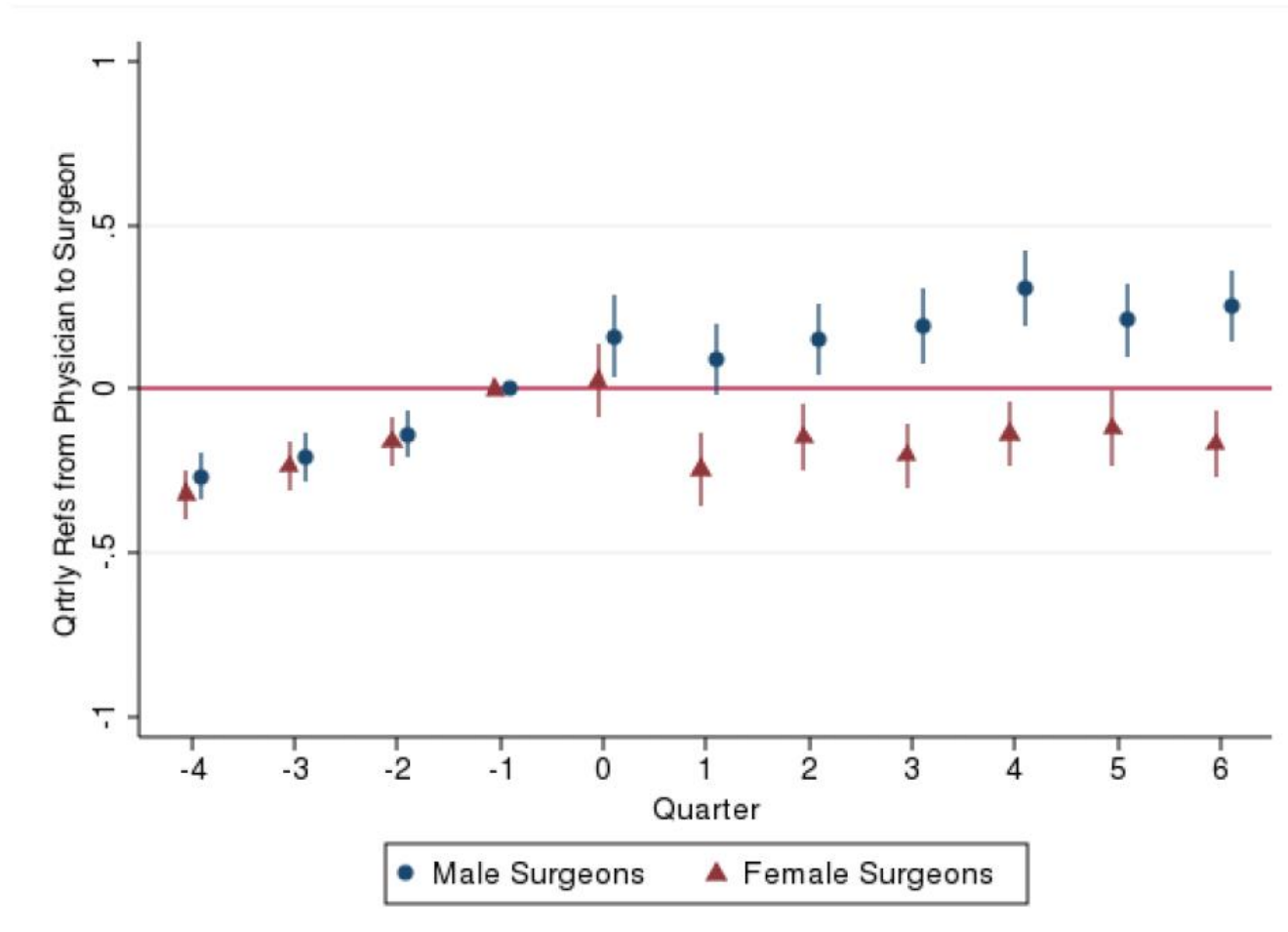
Why is there an increasing trend prior to the event (quarter 0)?

FIGURE 4: COMPARISON WITH PLACEBO SURGEONS

(a) Male Surgeons

(b) Female Surgeons
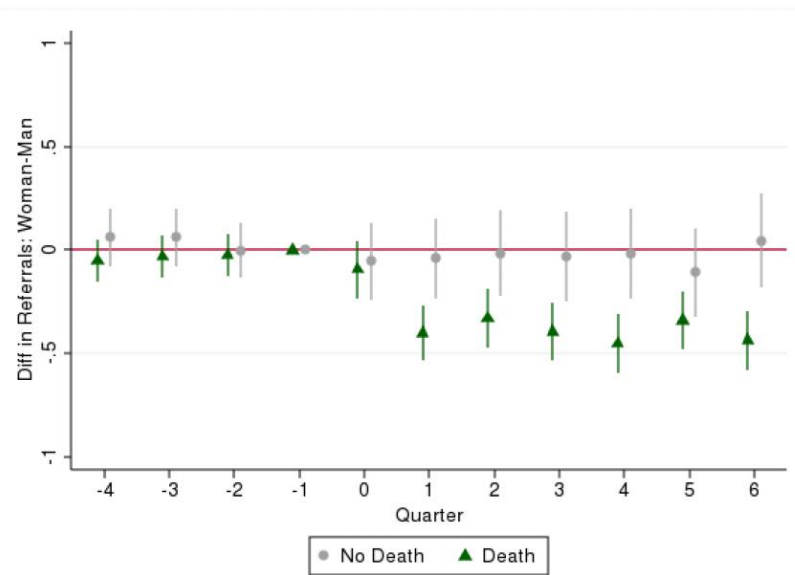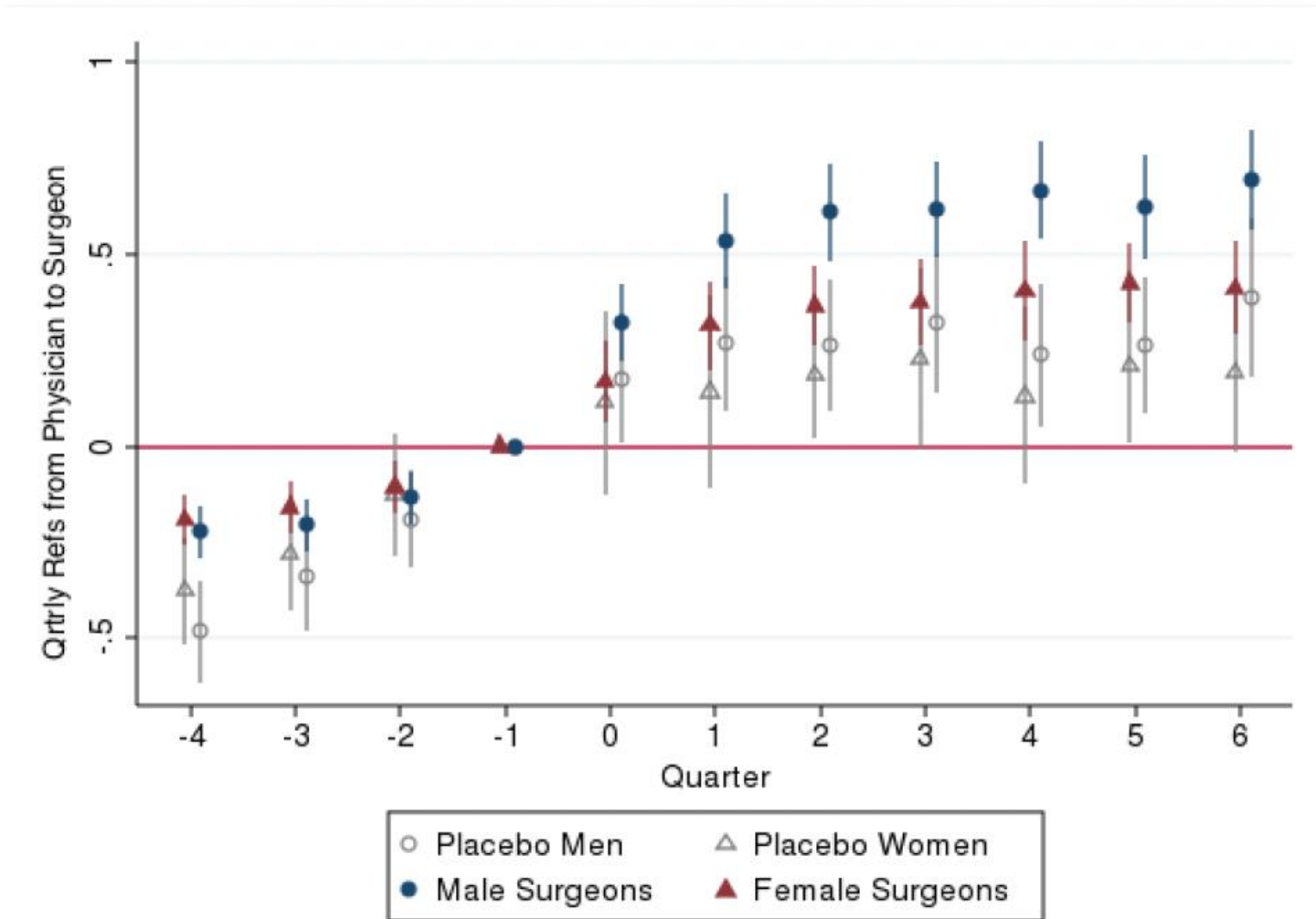

(c) Difference-in-Differences

FIGURE 6: QUARTERLY ESTIMATES FOR UNEXPECTEDLY GOOD OUTCOMES

(a) Treated and Placebo Surgeons

Summary of Main Findings

	Performing Surgeon		Other Surgeons	
	Male	Female	Male	Female
Bad Outcome	0.101	-0.222	∅	-0.079
Good Outcome	0.604	0.346	∅	∅

Limitations/Threats

- Are male surgeon's patients riskier in unobservables?
    - Would have to be 70pp riskier to account for difference

- Who is actually making the choice about referrals (in the physician's office)?

- There could be factors outside of the hospital/healthcare system not seen in the data that account for difference in referrals
    - For example, are male physicians and male surgeons more likely to be friends/have a relationship outside of work?
    - Are female physicians more likely to move than male physicians?

- Patient preference unaccounted for

- Why is this only a working paper?

Other directions

- How does surgeon race/ethnicity affect referrals?

- How do surgeon's referrals to other surgeons change following a bad outcome?
  - Does having 'insider knowledge' of the job affect these biases?

- How else is the healthcare system like a laboratory, where available information can be extrapolated elsewhere?

Miscellaneous notes

Overview of Elixhauser Comorbidity Indices Refined for ICD-10-CM

The Elixhauser Comorbidity Indices were originally developed using ICD-9-CM diagnosis codes and adult, nonmaternal inpatient discharge data.[2] The development of the ICD-10-CM version of the indices was consistent with the methodology used for the ICD-9-CM version of the tool but used more recent 2018 data.

The Elixhauser Comorbidity Indices Refined for ICD-10-CM is designed to predict two frequently reported health outcomes:
- Risk of in-hospital mortality
- Risk of 30-day, all-cause readmission

Each index is a separate composite score based on the 38 individual comorbidity measures. Using the indices can be preferable to the individual measures because they account for interaction between comorbidities and reduces the necessary degrees of freedom required for estimation—especially helpful when working with small sample sizes.