The Impact of Increased Access to Telemedicine

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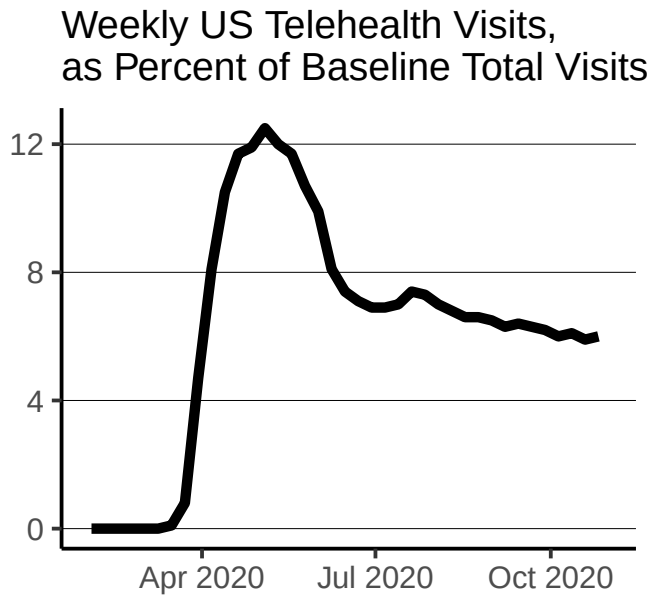
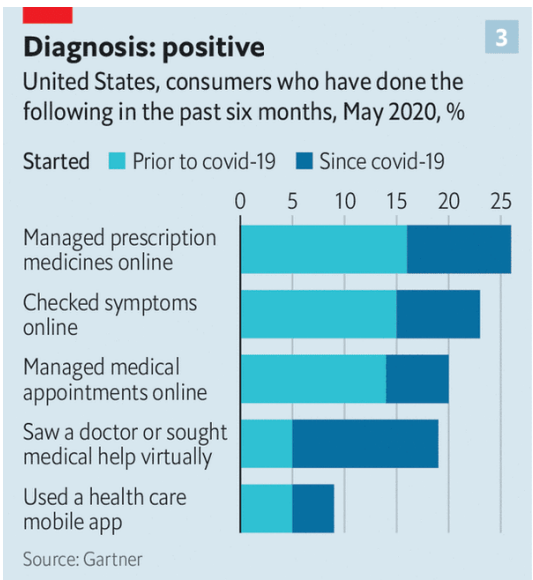
May 2023

Motivation

- For many years, telemedicine remained an unfulfilled promise, hampered by regulation, reimbursement, and licensing restrictions.
- The COVID-19 pandemic precipitated a sharp surge in adoption.



Source: Mehrotra et al. (2021)



The Economist

Policy Context

- In 2020 in the United States, there were 52.7 million telehealth visits, up from only 0.8 million in 2019 (Suran, JAMA 2022).
- In 2021, 37% of US adults used telemedicine (CDC).
- Remote patient monitoring is expanding.

But how does telemed affect healthcare provision?

Increased Access to Telemedicine: Pros and Cons

Pros are easy to see:

- Much more convenient
- Increased access (remote areas, after hours, etc.)
- Lower (fixed) cost

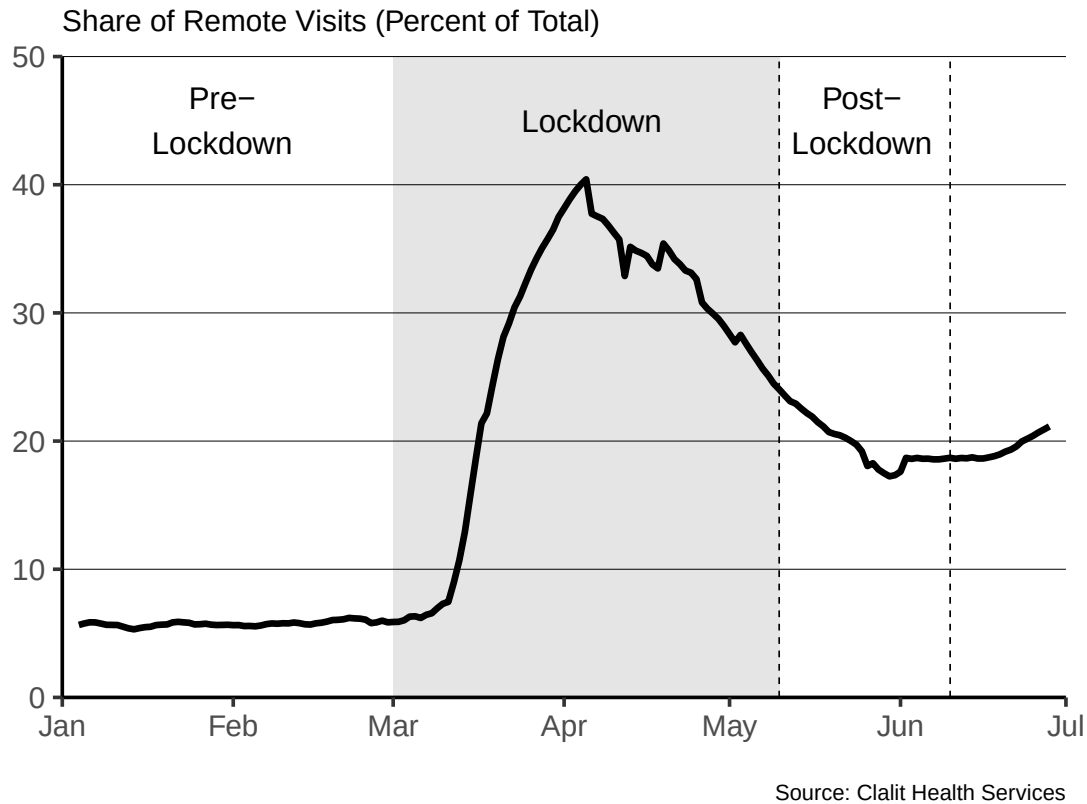
Main concerns:

- Unnecessary (tele)visits
- Overuse of downstream healthcare services
- Lower quality of care (e.g., misdiagnosis, over-prescribing)
- Discontinuity of care

Approach

We exploit a unique situation in Israel around the first COVID wave:

- Like everywhere else, COVID shifted much of healthcare provision to telemedicine (some video, mostly phone).
- Unlike most other places, there was a 4–6 week period where the country was "back to normal" (before things got worse).



*We get similar results analyzing 20201 post-vaccine reopening (in progress).

Approach

We exploit a unique situation in Israel around the first COVID wave:

- Like everywhere else, COVID shifted much of healthcare provision to telemedicine (some video, mostly phone).
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Simple strategy, rich data:

- Use the fact that there is large heterogeneity in the propensity to adopt telemedicine across primary care physicians.
- DD strategy, comparing patients of high-adopters to patients of low-adopters, differencing out pre-COVID care patterns.
- Looking at multiple granular outcomes.

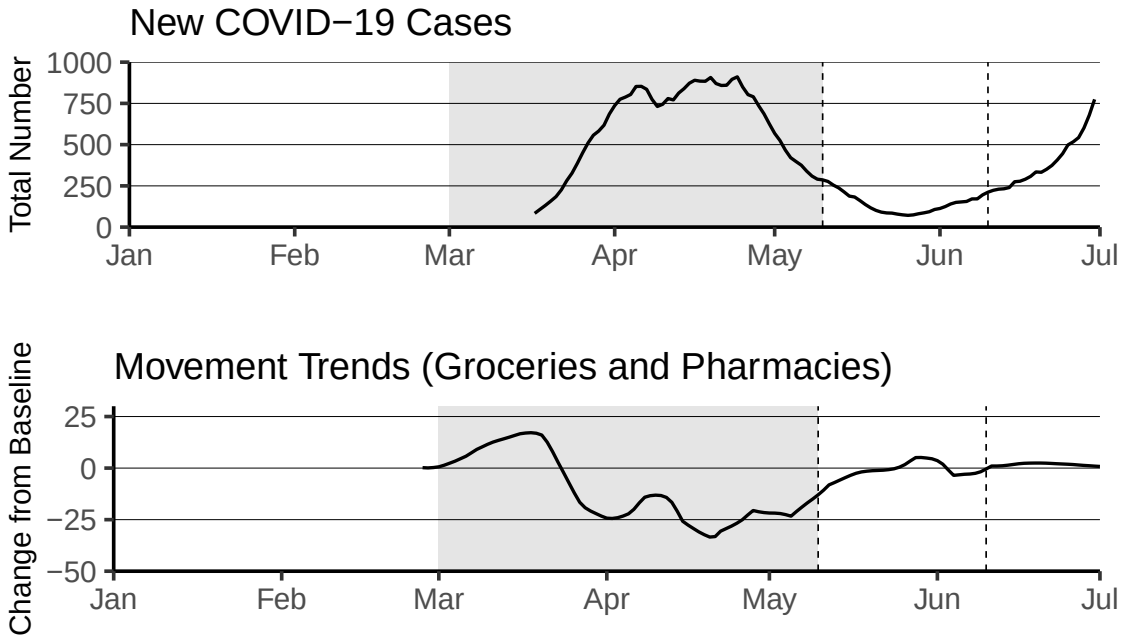
Results preview: Benefits seem to outweigh costs, as we cannot detect any obvious red flags (at least at current telemed levels)

Outline

- Context
- Data
- Empirical specification
- Results
- Policy implications

Context: COVID-19 and Telemedicine Adoption in Israel

First COVID-19 Lockdown in Israel, 2020



March–April (lockdown):

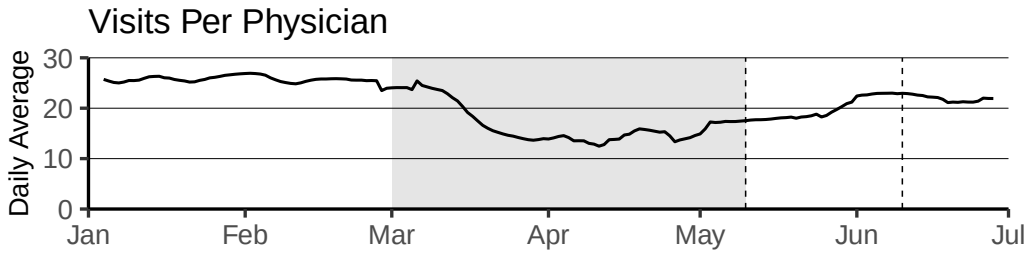
- full shutdown (commerce, retail, air traffic); severe mobility restrictions (100m perimeter).

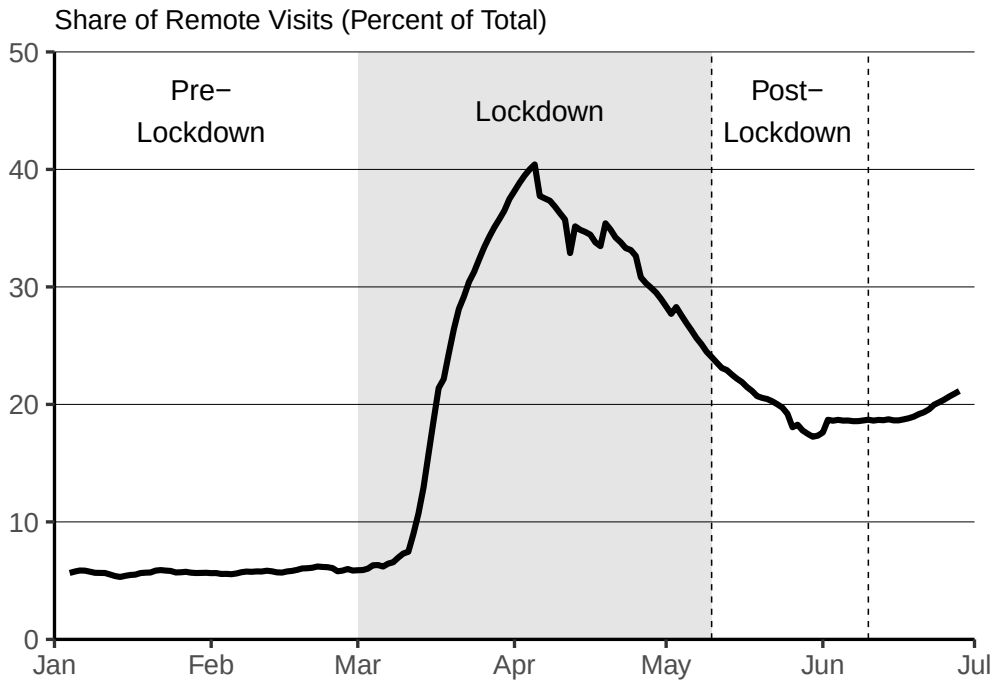
May (post-lockdown): ▸ COVID-19 in Israel

- < 200 total COVID-19 deaths, test positivity below 3%.
- schools, malls, indoor dining, gyms reopen.
- Netanyahu: "Get out, return to normalcy, . . . have fun."

Remote Primary Care During and Post Lockdown

(Remote visit = synchronous phone or video encounter)





Source: Clalit Health Services

Levels are still very similar in May 2021 (full post-vaccines reopening)

▸ telemed use through 2021

Data

Data

Data from Clalit Health Services

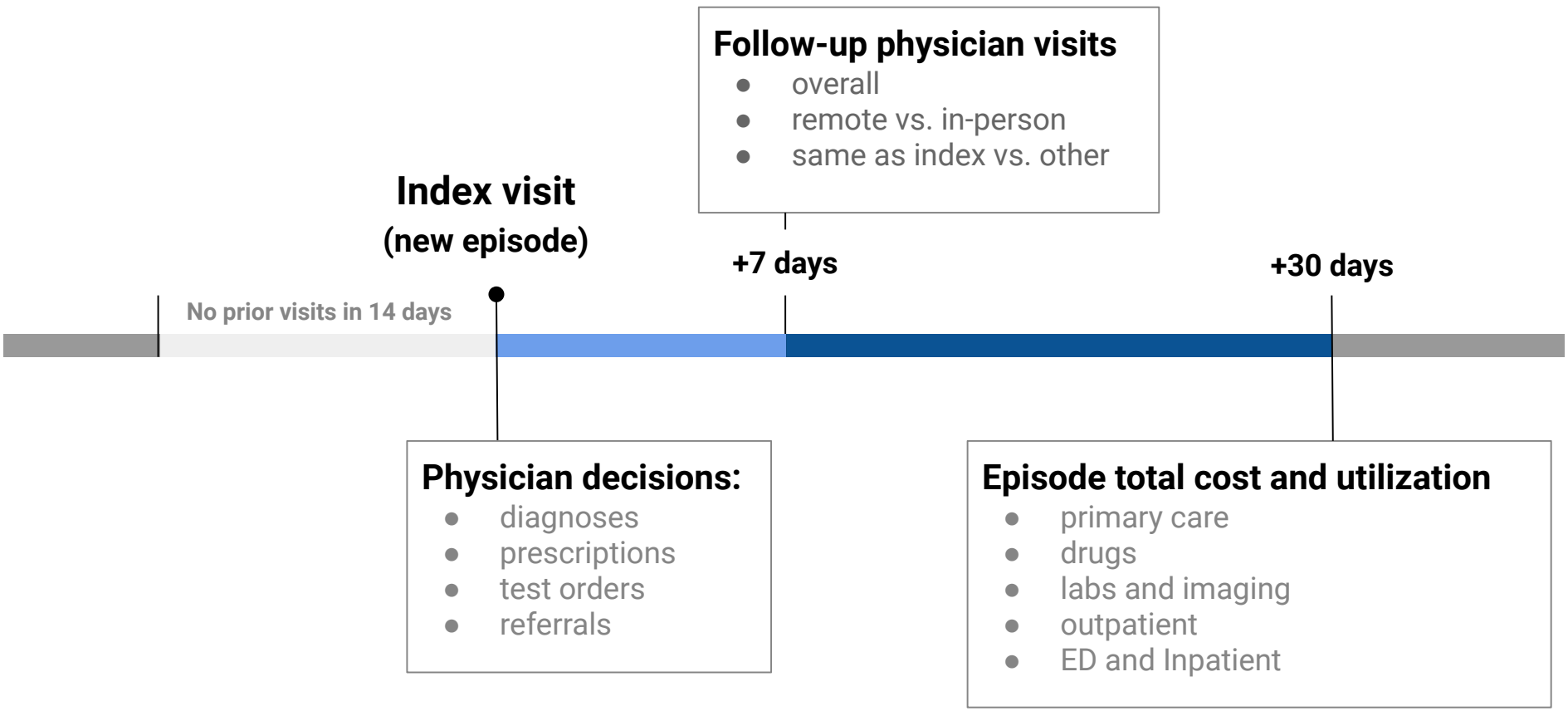
- the largest of four Israeli HMOs
- enrolls more than half of the Israeli population
- very low churn (about 1% per year)
- operates a large network of physicians, outpatient clinics, and 30% of hospitals (procures services from the other 70%)

Main Study Sample

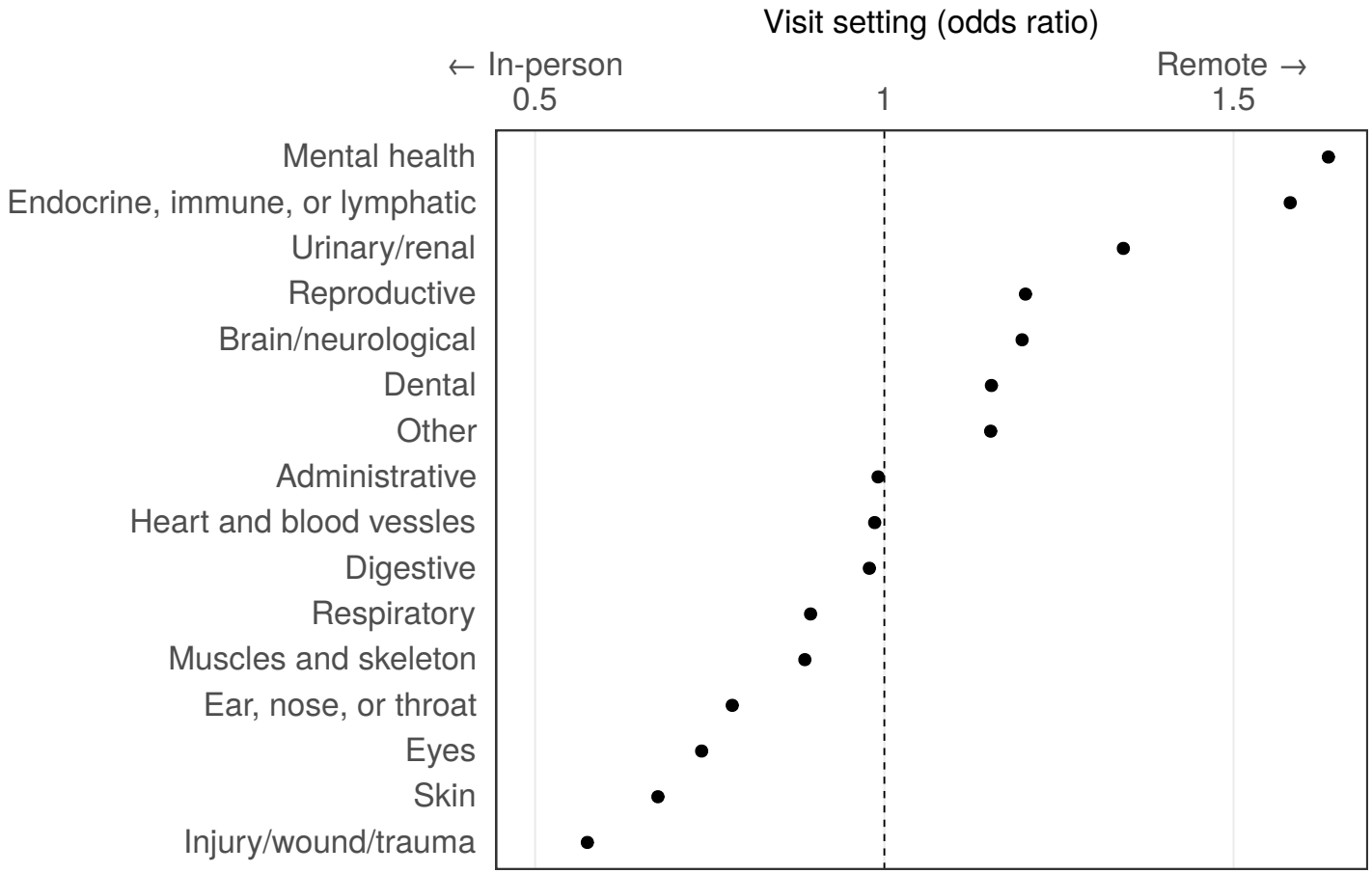
- covered members, all ages.
- 11 million visits with 4,200 active primary care physicians, January 2019–June 2020.
- observe rich claims and EMR data.

$\Rightarrow$Telemedicine reimbursed/incentivized the same as in-person: no financial incentives in either direction.

Unit of Observation: A Care Episode Starting with a Primary Care Visit



Post-Lockdown Telemed Relative Use, by Dx Category



Descriptive Statistics for Post-Lockdown Visits, by Setting

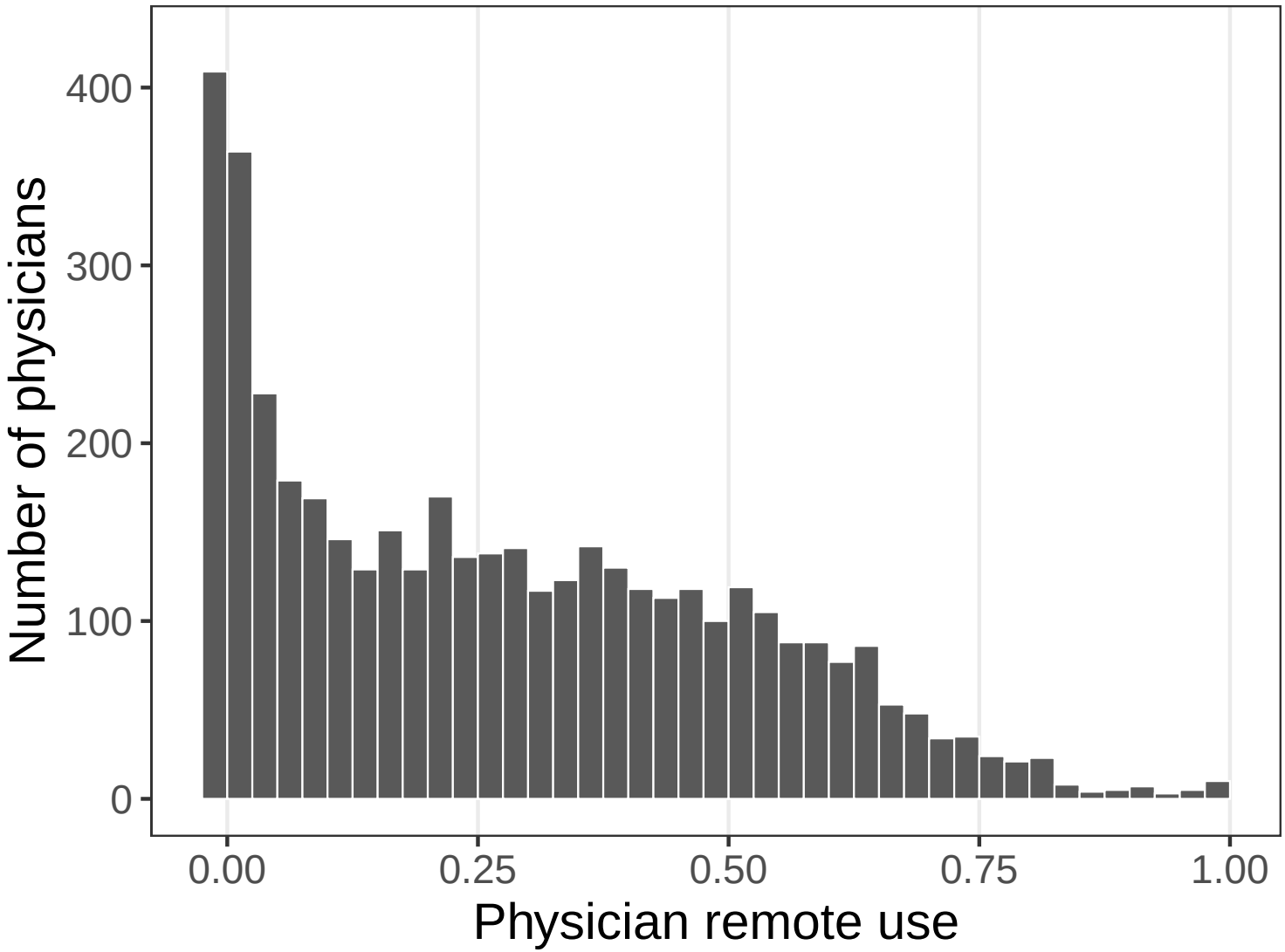
	In-Person	**Remote**
	(1)	(2)
Patient Characteristics		
Female	0.541	0.582
High SES	0.262	0.417
Age	36.8	40.2
ACG	1.032	1.159
Number of Chronic Conditions	2.564	2.949
Number of Visits	453,966	101,671

Among telemed users there are more female, high-SES patients.

Empirical Specifications

Physicians Telemedicine Adoption was Heterogeneous

Distribution of Physicians' Share of Visits Seen Remotely, Lockdown Period



Classifying PCP Telemed Adoption Propensity

Using data from the lockdown period, we estimate:

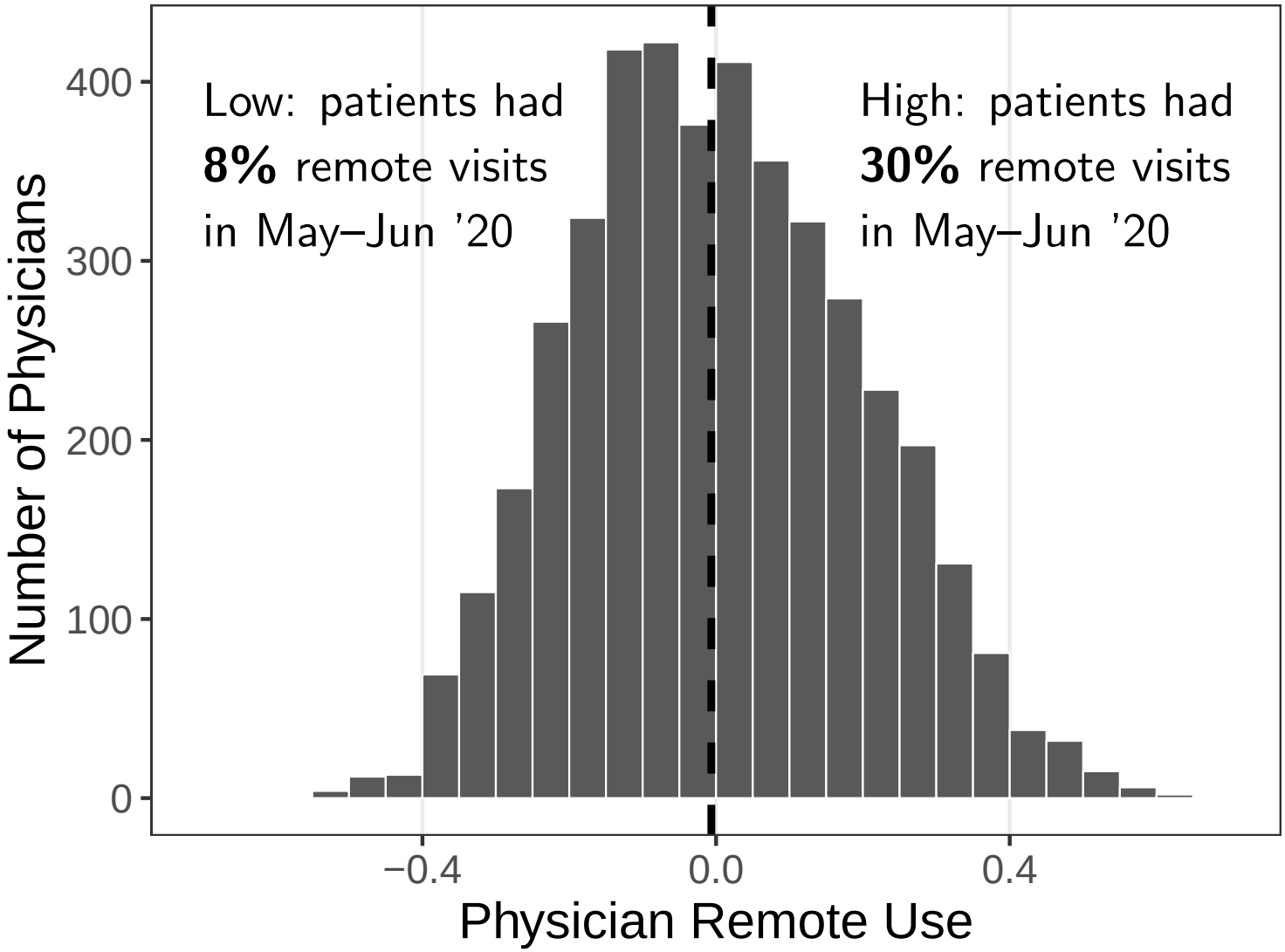
$$\overbrace{\text{Remote}_{ijtl}}^{\text{remote visit}} = \overbrace{\alpha_j}^{\text{physician FE}} + \underbrace{\gamma X_{itl}}_{\text{visit controls}} + \underbrace{\tau_t}_{\text{week FE}} + \underbrace{\eta_l}_{\text{subdistrict FE}} + \nu_{ijtl}$$

visit controls: patient age, gender, ACG score, and number of chronic conditions.

We then classify physicians as High or Low adopters,
relative to the median:

$$\text{High}_j = \begin{cases} 1 & \text{if } \alpha_j > \text{median}\, \alpha \\ 0 & \text{otherwise} \end{cases}$$

Distribution of Physician Fixed-Effects



Patients whose PCP adopted telemed during the lockdown were much more likely to use telemed post lockdown.

Main DD Specification

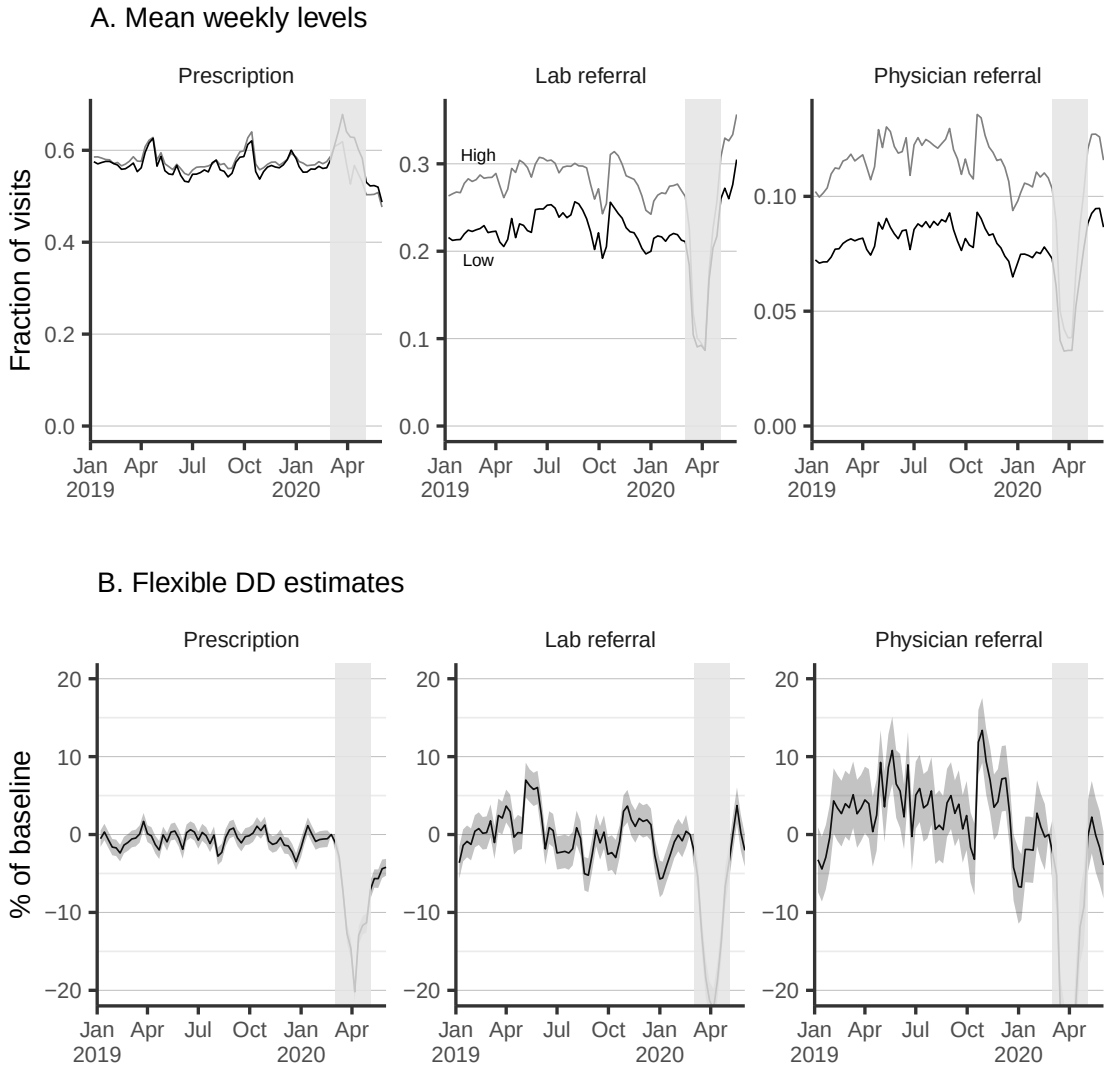
We compare outcomes of patients of high and low telemedicine adopters, pre and post lockdown:

$$\text{Outcome}_{it} = \boxed{\beta}\,\text{High}_{j(i)} \times \text{Post}_t + \underbrace{\mu_{j(i)}}_{\text{doc FE}} + \underbrace{\omega_{l(i)}}_{\text{subdistrict FE}} + \underbrace{\zeta_t}_{\text{week FE}} + \delta X_{it} + \varepsilon_{it}$$

Notes:

- Visit setting is (naturally) endogenous.
- Adoption status is based on $j(i)$, patient i's main PCP, but consider all i's visits (including other providers).
- Only adoption status is based on lockdown period behavior; we *exclude* it from the above DD specification.

Pretrends



- Pretrends look okay (but sometimes noisy).

Results: The Impact of Increased Access to Telemedicine

Results: Utilization and Total Cost of Care

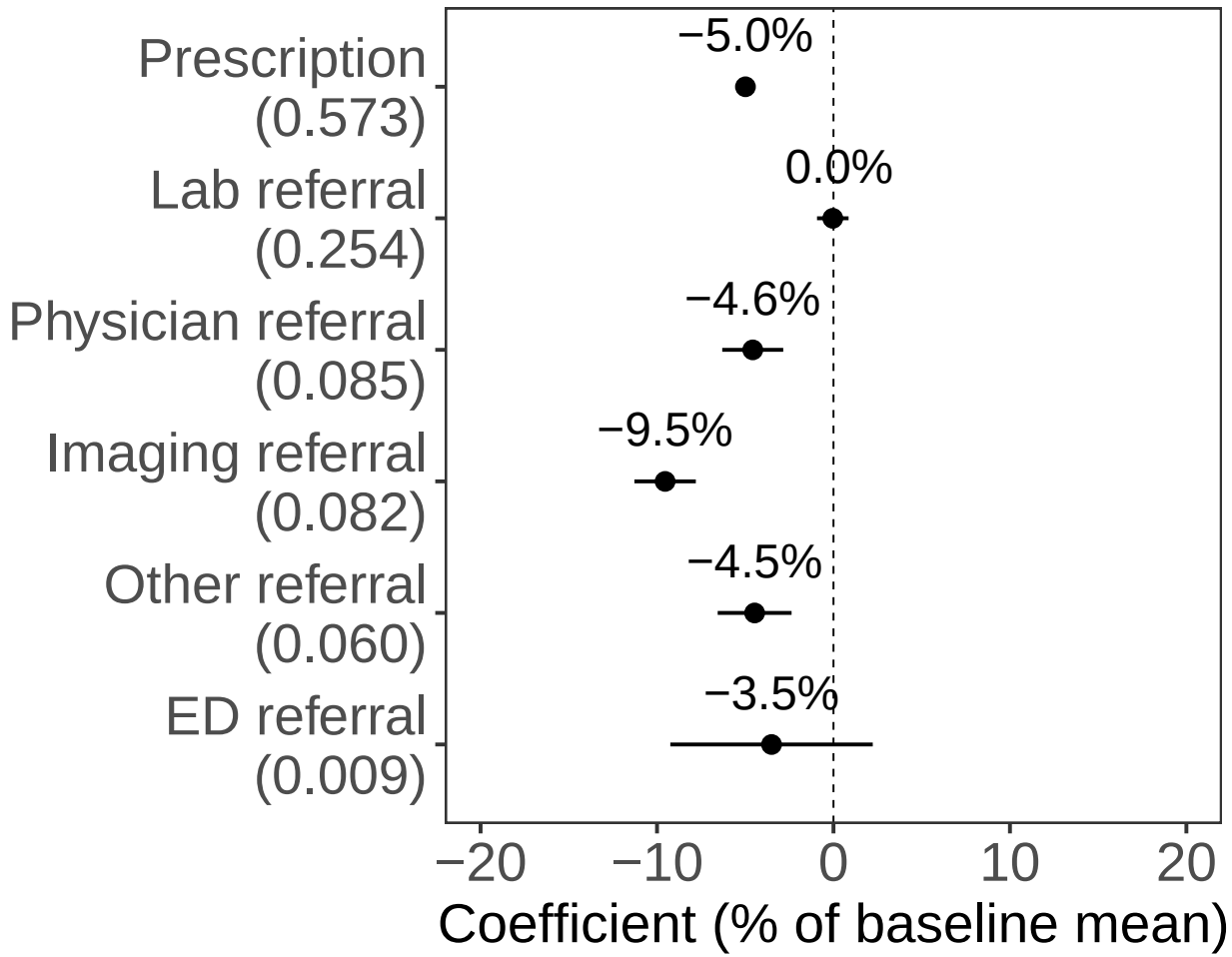
	Pre-Lockdown Mean	Estimated Impact	Percentage Impact
	(1)	(2)	(3)
A. Utilization			
Any Healthcare Utilization	0.511	0.0014	0.3%
		(0.0007)	
Any Primary Care Episodes	0.178	0.0063	3.5%
		(0.0005)	
B. Cost (NIS)			
Total Healthcare Cost	463	-14	-3.0%
		(7)	
Total Cost of Primary Care Episodes	105	-6	-5.7%
		(2)	

Notes: Regression is at the member level, including non-utilizers; The pre-period is May–June 2019.

- Regression is at the member level (including non-users).
- Results imply:
  - A small increase in primary care utilization;
  - A small *decrease* in overall cost of care.

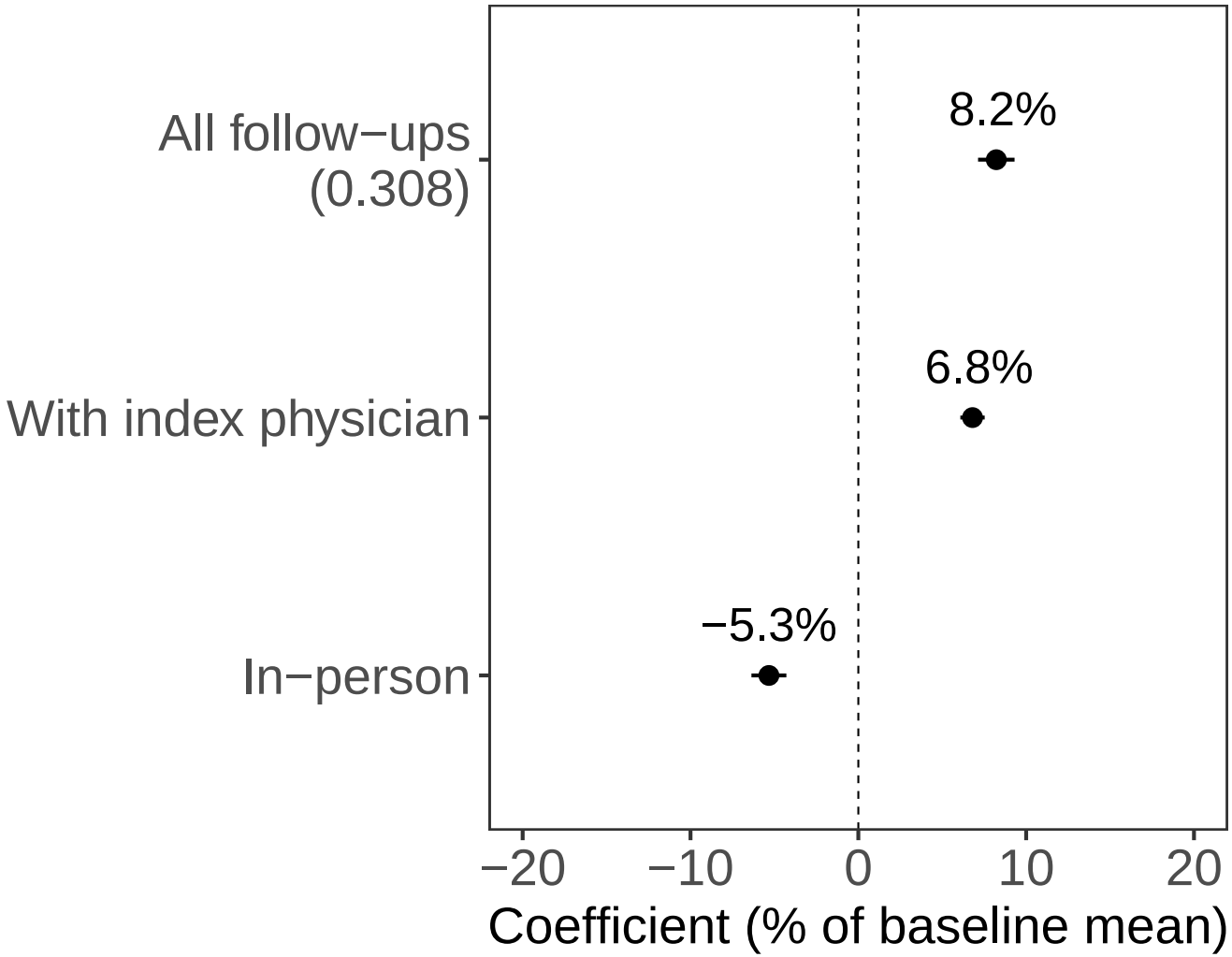
Results: Visit Outcomes

$$\text{Outcome}_{it} = \boxed{\beta}\,\text{High}_{j(i)} \times \text{Post}_t + \mu_{j(i)} + \zeta_t + \omega_{l(i)} + \delta X_{it} + \varepsilon_{it}$$



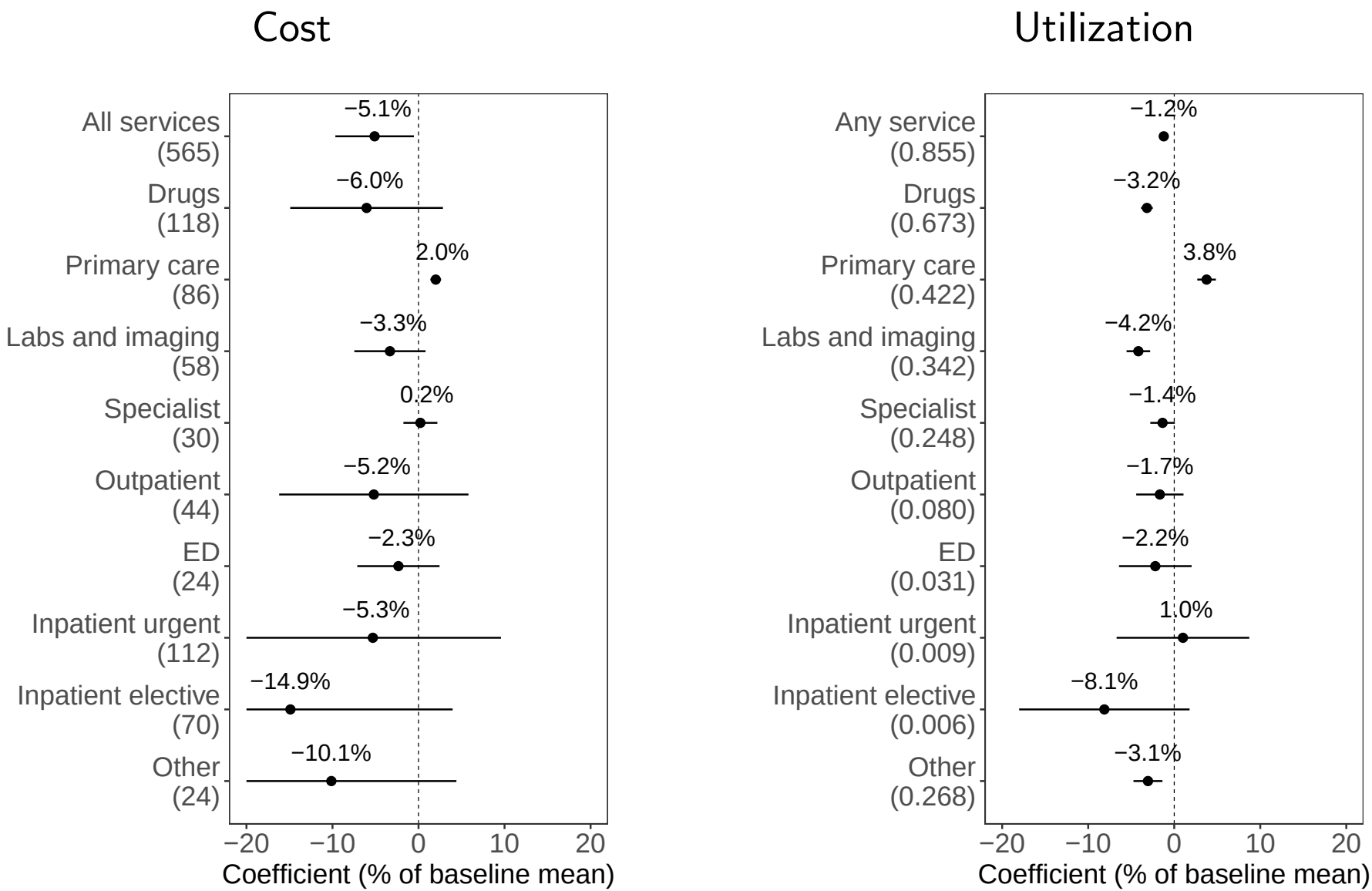
Telemed access is associated with *lower* care intensity.

Telemedicine Impact on 7-Day Followups



Telemed access is associated with more follow-ups, mostly with the same physician; many of them are done remotely.

Telemedicine Impact on 30-day cost and utilization



Telemedicine access is associated with *lower* care intensity.

Diagnosis and Treatment of Specific Conditions

Might utilization look similar but care quality be lower?

To assess diagnostic quality, we focus on three specific medical conditions:

1. urinary tract infection (UTI)
2. heart attacks (AMI)
3. bone fractures

These conditions were chosen because:

- They are reasonably common (power...)
- Unlikely to be affected much by COVID-19
- Seems likely we'd observe false negatives / missed diagnosis

For each condition, we constructed a subsample of episodes based on the index-visit diagnosis, including the target conditions and differential diagnoses.

UTI Sample

ICD9 code (1)	Diagnosis (2)	Number of visits (3)
A. Target conditions		
599.0	Urinary Tract Infection	5,532
595.0	Cystitis Acute	173
595	Cystitis	164
590.1	Pyelonephritis Acute	57
B. Differential diagnoses		
788.1	Dysuria	3,941
788.3	Urinary Incontinence	1,728
788.4	Urinary Frequency	1,068
600.0	Prostatic Enlargement	1,016
788.0	Renal Colic	714
616.1	Vaginitis	574
600.9	Prostatic Hyperplasia	415
788.2	Urine Retention	155
597	Urethritis	68
614	Pelvic Inflammatory Disease	39
597.8	Meatitis	17
616.3	Bartholins Abscess	15
All		15,727

AMI Sample

To account for endogeneity of diagnosis, we sample each target condition together with all diagnoses that share similar symptoms:

ICD9 Code	Diagnosis	Number of Visits
Target Conditions		
410.x	Acute Myocardial Infarction	364
Differential Diagnoses		
786.5	Chest Pain	8,264
530.1	Reflux Esophageal	3,708
486	Pneumonia	2,798
053.9	Herpes Zoster	1,196
413.9	Dyspnea Effort	971
485	Bronchopneumonia	520
511.8	Pleural Effusion NOS	103
162.3	Malignant Neoplasm Lung	98
415.1	Pulmonary Embolism	86
533	Peptic Ulcer Site Unspecified	71
420	Pericarditis	54
All		18,614

Condition-Specific Control Variables

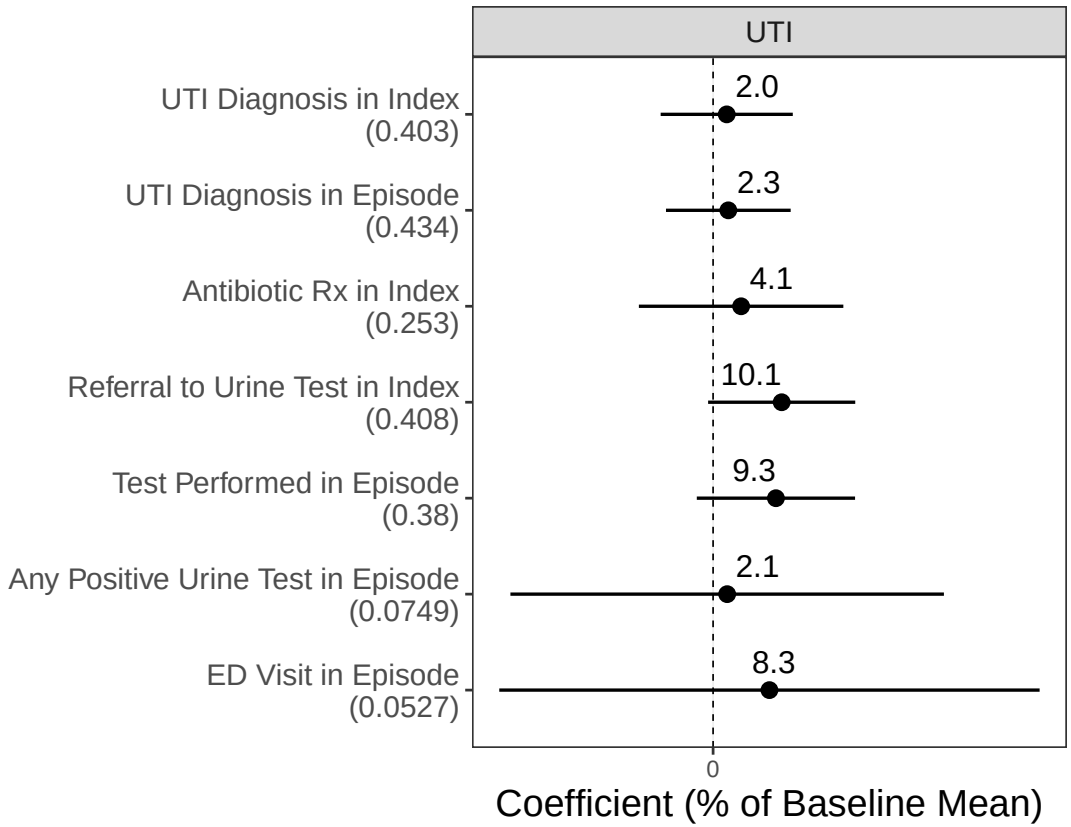
As before, we control for age, gender, ACG score, and number of chronic conditions.

We also add condition-specific controls:

- AMI: systolic BP, total cholesterol, HDL cholesterol, dummies for antihypertensives, diabetes, and smoking status.
- UTI: UTI in last year, quantile(5) of number of months with a UTI diag in last 5 years, dummies for top 50 chronic conditions.
- Bone fracture: history of osteoporosis, dummies for different body parts.

The Impact of Telemed Access on the Diagnosis of UTI

$$\text{Outcome}_{it} = \boxed{\beta}\text{High}_{j(i)} \times \text{Post}_t + \mu_{j(i)} + \zeta_t + \omega_{l(i)} + \delta X_{it} + \varepsilon_{it}$$



- No evidence for misdiagnosis.
- Slightly higher rate of testing.
- Power is becoming an issue (even worse for AMI and fractures)

Robustness

Results don't seem driven by post-lockdown pent-up demand

- If post lockdown, low telemedicine adopters have more pent-up demand than high adopters, our demand estimates would be downwardly biased.
- We explore this by classifying primary care conditions as more/less deferrable based on whether they saw an above- or below-median dip in utilization during the first lockdown (relative to the baseline).
- We then analyze heterogeneity in telemed impact by deferrability.

	Pre-Lockdown Mean	Estimated Impact	(S.E.)	Percentage Impact
	(1)	(2)	(3)	(4)
Primary Care Utilization				
Any Episode	0.178	0.0063	(0.0005)	3.6%
More Deferrable	0.111	-0.0003	(0.0004)	-0.3%
Less Deferrable	0.068	0.0066	(0.0003)	9.8%

Results suggest that telemedicine impacts demand for *less* deferrable conditions: the opposite of what would be expected from pent-up demand. This mitigates the concern that results are driven by pent-up demand.

Additional Robustness Checks

- Results are robust to using alternative definitions of high/low adopters (top/botton terciles instead of above/below median).
- Our main results reproduce using a later post period (in 2021), when most adults were already fully vaccinated.
- Placebo analysis also supports the design validity.

Summary: The Impact of Increased Access to Telemedicine

Increased access to telemedicine is associated with:

- A tiny increase in utilization.
- A small increase in followups, mostly with the same physician.
- No evidence for increased missed diagnosis or adverse outcomes.
- Total cost of care does not increase, and possibly decreases (even without accounting for the "cheaper" setting).
- Results reproduce in 2021, and don't seem to be driven by pent-up demand.

Policy Implications

The Risks and Opportunities of Telemedicine

- Telemedicine offers improved access to care, increased convenience, expanded geographic reach, and better continuity of care.
- However, it can also lead to excessive and low-value utilization and potential for lower quality diagnosis and treatment.
- Policy debates in the post-pandemic era aim to find the right balance between these risks and opportunities.

Telemedicine Payment Policies and Provider Incentives

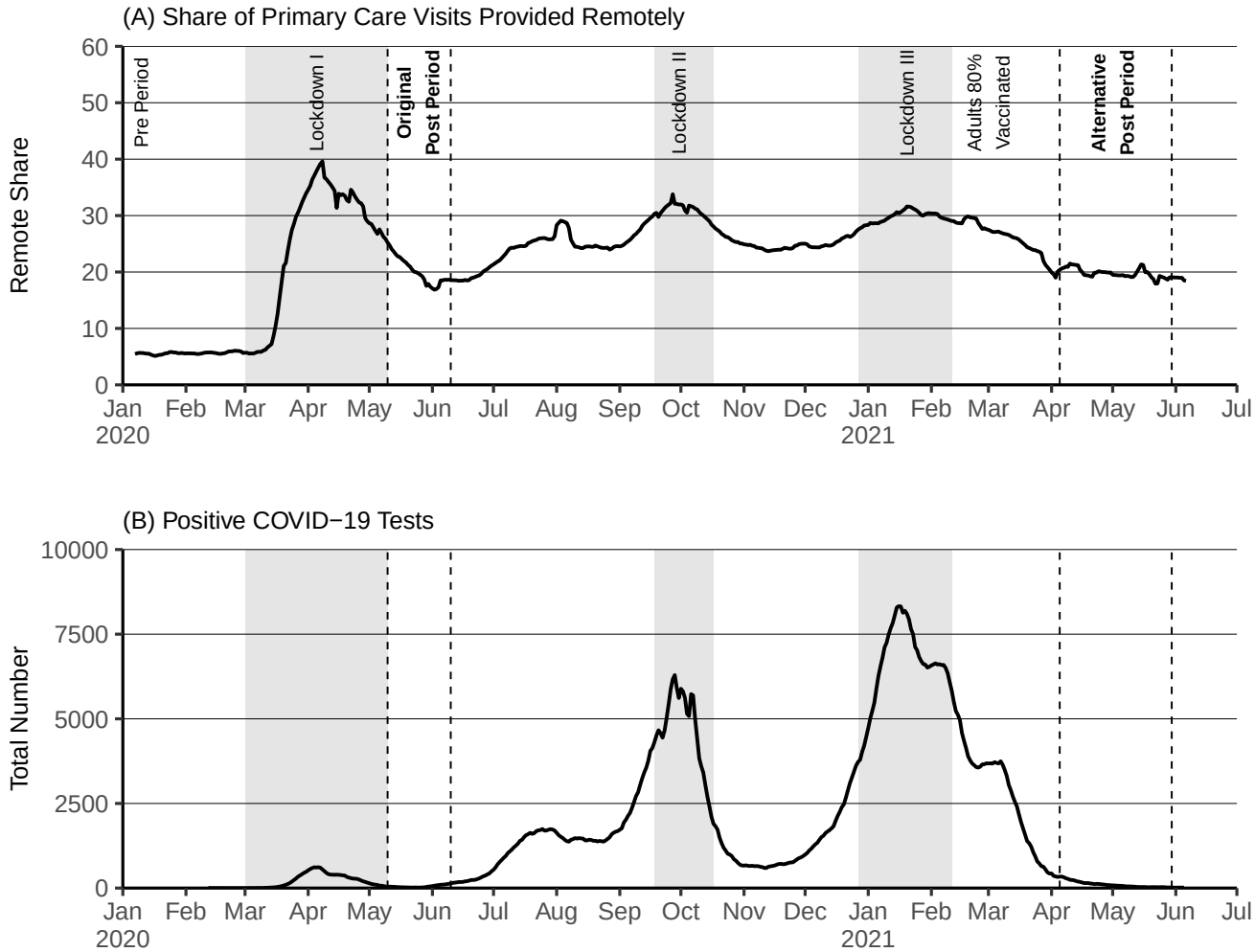
- Countries like the US, Australia, Belgium, Denmark, France, Germany, Netherlands, Canada, and Switzerland employ fee-for-service reimbursement, leading to debates about telemedicine payment parity and other regulations.
- Examples of policies to curb overuse:
  - Germany: cap of one telehealth visit per episode of care; up to 30% of each physician's visits.
  - Belgium: cat of five telehealth visits per physician-patient per month.
  - Australia: specialist video consults only for patients living more than fifteen kilometers away.
- In contrast, Israel, the UK, and Sweden have salaried physicians, making service-level payment parities less relevant and reducing provider-side incentives to overuse telemedicine.

Key Findings and Implications for Telemedicine

- Our findings suggest that telemedicine can be expanded without detectable adverse effects (at least in the short term).
- But it is crucial to manage physician incentives appropriately, suggesting a need for new payment models that focus on the overall mix of patient care, expediting the trend toward value-based medicine.
- New AI capabilities may lead to further changes, which could further strain fee-for-service payment models.

Additional Exhibits

COVID-19 and Remote Primary Care, 2020–2021



- Even with $\sim 80\%$ adults vaccinated, full reopening, telemedicine rates remain similar to our study period (20% or primary care).
- One year later, impacts are still very similar.

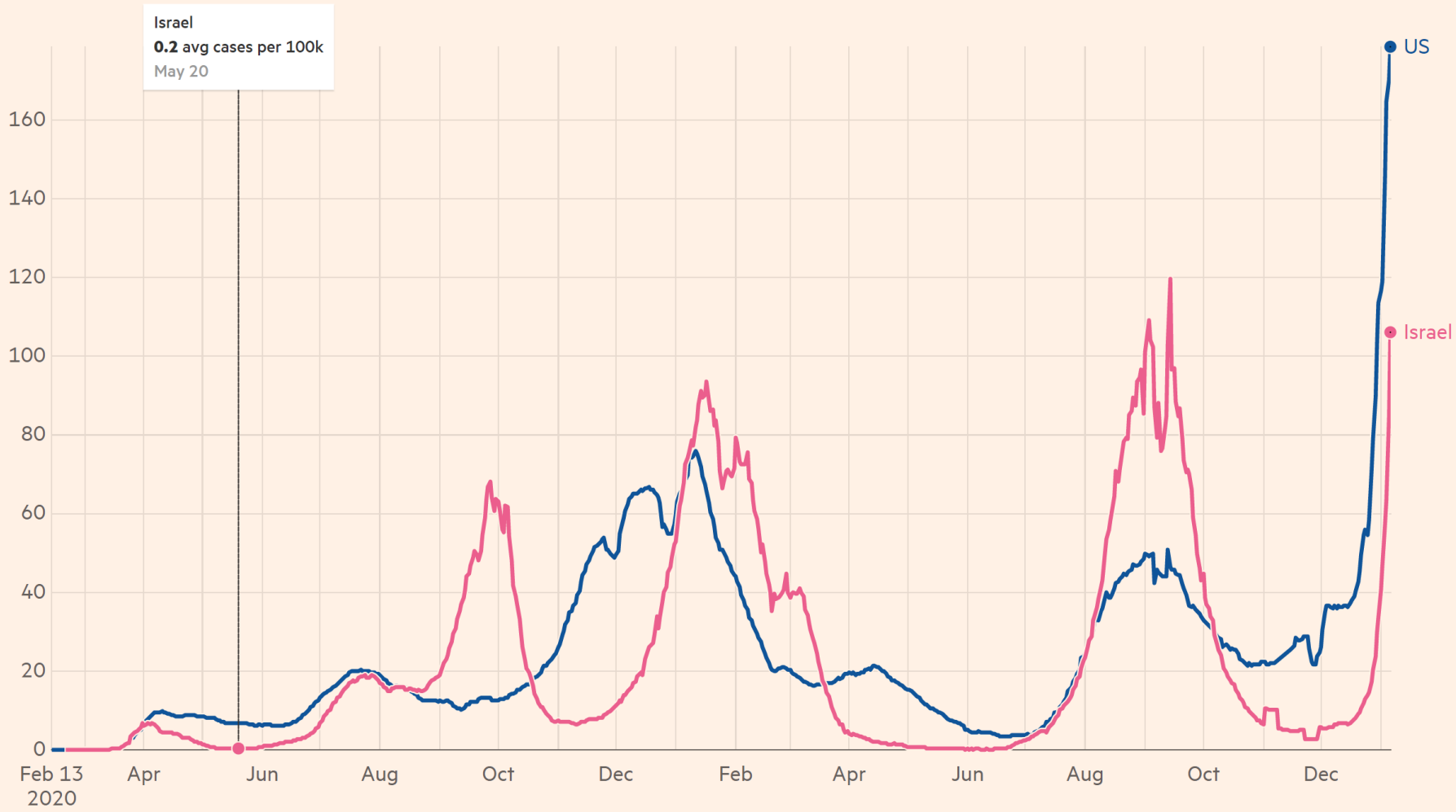
◂ Back

COVID19 in Israel

Back

New confirmed cases of Covid-19 in US and Israel

Seven-day rolling average of new cases (per 100k)



Source: Financial Times analysis of data from Johns Hopkins CSSE, World Health Organization, UK Government coronavirus dashboard, Government of Peru, Public Health France, Slovenian Ministry of Health and the Swedish Public Health Agency