Quality and Accountability in Health Care Delivery: Audit-Study Evidence from Primary Care Providers in India

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Introduction

Strong theoretical reasons for why unregulated market-based provision of health care may be sub-optimal

Medical care has many elements of a 'credence' good

- Widely believed to produce inefficiencies in the market (Wolinsky, 1993; Gruber and Owings, 1996; Dulleck and Kerschbamer, 2006)

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Health care markets may also over-respond to demand

- $U(socialplanner) \neq U(consumer)$ (Prendergast, 2003)
- Patient satisfaction among narcotic addicted patients not a good measure of how good the doctor is!

"It is the general social consensus, clearly, that the laissez-faire solution for medicine is intolerable." Arrow (1963)

Health care Policy in Low-Income Settings

Reflects this view to a large extent

Default policy approach is to have public clinics that provide free/highly-subsidized care for those who seek it

Widely followed WHO norms (including in India) on facilities and staffing (District hospitals, CHCs, PHCs, Sub-Centers)

- Staffed with qualified doctors/nurses on a fixed salary and no performance-based pay component (including case load)

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Policy discussions: Large emphasis on strengthening the system

India: National Rural Health Mission (NRHM) significantly increased public health expenditures during last decade

- Better infrastructure, more providers in public clinics

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What is going on?

- Lots of narratives (inadequate access to public facilities, unsophisticated patients, unaccountable public sector)
- But, no evidence to date on the actual quality of care received across public and private providers in low-income countries

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- 15 highly-trained local actors visit multiple providers presenting the same set of symptoms (consistent with multiple illnesses)
- Providers *do not know* that this is not a real patient, and quality measured by adherence to treatment protocols
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At least four advantages of an audit study

- Common set of patient and illness characteristics
- We *know the actual illness presented* and can objectively code the correctness of actions taken
- Can observe prices charged for *completed* transactions
- Address concern of Hawthorne effects and know-do gaps

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- Adherence to medically required checklists
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- Also provide the first estimates of correlation between wages and quality of care in the public sector

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Replicate results on observable measures of quality with real patients

Present a theoretical framework to interpret our results

Related Literature

Quality of health care in low-income settings

- Das et al. (2008); Leonard and Masatu (2007); Berendes et al. (2011), World Bank SDI Project

Policy literature on health care in low-income countries

- Lancet series on health in India, various WHO documents, for instance Crisp and Chen (2014)

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Audit studies

- Labor market and services, around issues of discrimination (Ayres and Siegelman, 1995; Goldberg, 1996; Bertrand and Mullainathan, 2004)
- Recent audit studies in health care (Currie et al., 2011, 2012)

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- Recent audit studies in health care (Currie et al., 2011, 2012)

Moral hazard in developing countries

- Shaban (1987); Foster and Rosenzweig (1994)

Agenda

Introduction

Sampling, Data and Measurement

Results

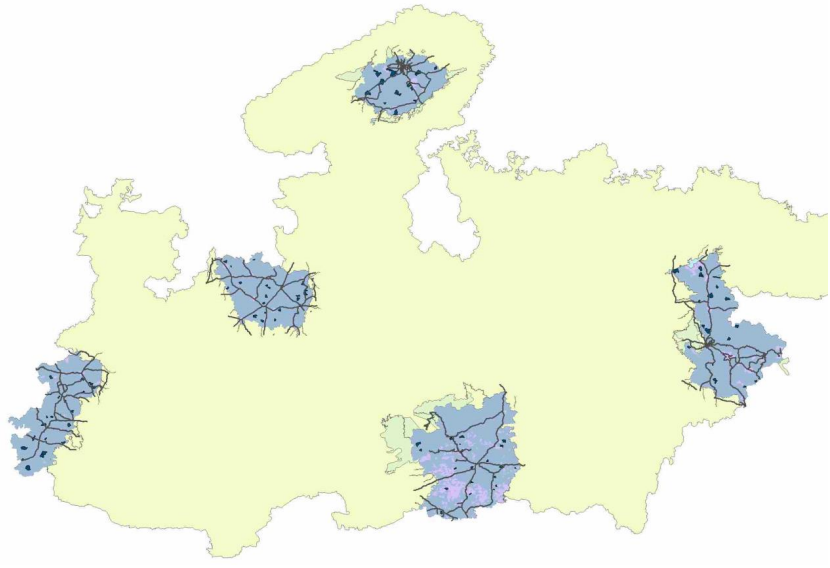
Robustness and Interpretation

Theoretical Framework

Conclusions and Policy Implications

Agenda

Study Location: Madhya Pradesh (MP)



- Large state (population: $\sim$ 70m); BIMARU but rapid recent growth
- State consists of 5 Socio-Cultural Regions (SCRs)
- One district randomly sampled from each SCR
- Aimed to create a representative sample of public and private rural health care providers in MP

Two Distinct Samples/Comparisons

First: Village Sample (Representative Sample)

- 20 villages randomly sampled in each district (PPS)
- Conducted a HH *census* to construct full frame of all medical providers not just in the village but even outside the village
- Lets us construct frame of public and private providers in the entire relevant market ("representative" sample)

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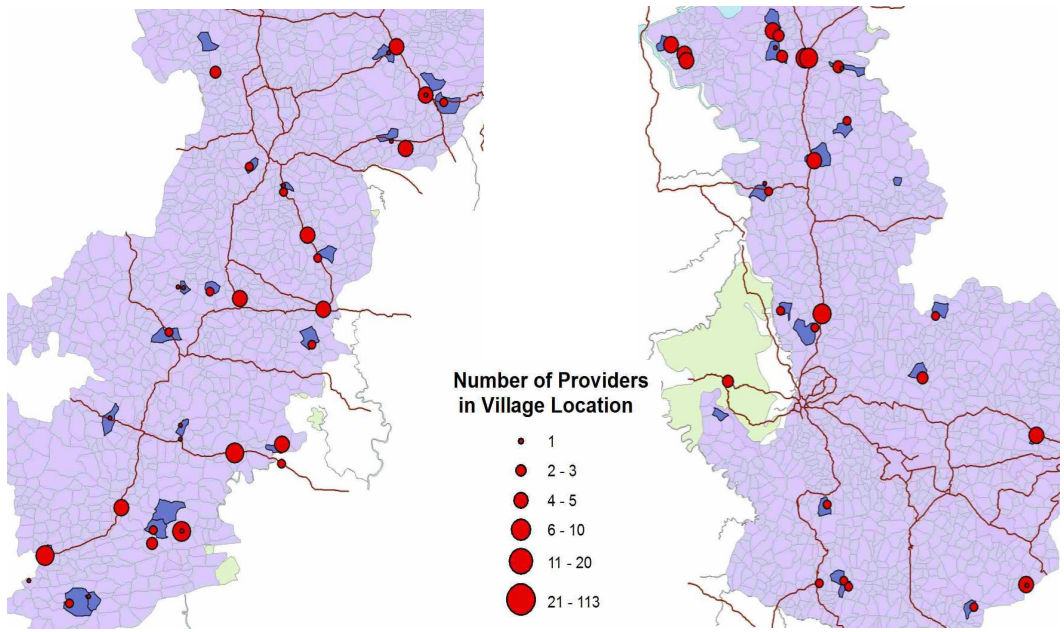
Second: Dual sample of public MBBS doctors

- Village sample has very few MBBS doctors
- So we also construct a representative sample of 103 public MBBS doctors (posted at CHCs and PHCs)
- Through extensive field-work, we also identify the private practices of over 60 percent of them ("dual" sample)

Villages vs. Markets

- 100 villages in MP, randomly selected in 5 districts - we located $>$ 1000 health care providers
- Snapshots of sample in two districts



Standardized patients sample

Construction of "representative" (village) sample

- Ruled out 2 remote districts entirely for private market
- Ruled out very remote locations in other 3 districts (mainly because SPs appearance had to be credible)
- Sampled public providers first (up to 2; included all MBBS)
- Sampled up to 6 private providers per market

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▸ Representative Sample

Construction of "dual" sample

- Representative sample of 103 public MBBS doctors (from all 5 districts)
- All private clinics (that we could find) of public doctors in all these districts

▸ Dual Sample

Basic Sample Descriptions

Table 1: Health market attributes

	(1)	(2)	(3)	(4)	(5)	(6)
	Madhya Pradesh (5 districts, 100 markets)			SP Sample Villages (3 districts, 46 markets)		
	Total	**Inside village**	**Outside village**	**Total**	**Inside village**	**Outside village**
Panel A: Composition of markets based on census of providers						
Total	11.68	3.97	7.71	16.02	4.65	11.37
	(12.06)	(4.49)	(12.17)	(15.81)	(5.41)	(16.42)
Public MBBS	0.45	0.05	0.40	0.50	0.02	0.48
	(0.97)	(0.22)	(0.93)	(1.11)	(0.15)	(1.11)
Public alternative qualification	0.22	0.07	0.15	0.24	0.07	0.17
	(0.48)	(0.29)	(0.39)	(0.52)	(0.33)	(0.44)
Public paramedical	1.58	1.13	0.45	1.98	1.30	0.67
	(1.90)	(1.46)	(1.33)	(2.12)	(1.49)	(1.59)
Public unqualified	1.71	0.68	1.03	2.07	0.67	1.39
	(1.75)	(1.04)	(1.54)	(2.05)	(1.12)	(1.94)
Total public	3.96	1.93	2.03	4.78	2.07	2.72
	(3.20)	(2.28)	(2.63)	(3.53)	(2.45)	(3.17)
Private MBBS	0.40	0.00	0.40	0.59	0.00	0.59
	(1.57)	(0.00)	(1.57)	(2.15)	(0.00)	(2.15)
Private alternative qualification	1.92	0.23	1.69	2.67	0.33	2.35
	(3.65)	(0.66)	(3.65)	(4.86)	(0.90)	(4.89)
Private unqualified	5.40	1.81	3.59	7.98	2.26	5.72
	(6.01)	(2.23)	(6.14)	(7.88)	(2.74)	(8.32)
Total private	7.72	2.04	5.68	11.24	2.59	8.65
	(10.54)	(2.69)	(10.81)	(14.31)	(3.38)	(14.87)

(continued)

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	Madhya Pradesh (5 districts, 100 markets)			SP Sample Villages (3 districts, 46 markets)		
	Total	Inside village	Outside village	Total	Inside village	Outside village
Panel B: Composition of demand from census of households in sampled villages						
Fraction of households that visited a provider in last 30 days	0.46			0.58		
	(0.50)			(0.49)		
Fraction provider visits inside/outside village		0.66	0.34		0.69	0.31
		(0.47)	(0.47)		(0.46)	(0.46)
Distance traveled to visited provider (km)	1.61	0.40	3.83	1.37	0.38	3.51
	(2.14)	(0.65)	(2.14)	(2.37)	(1.16)	(2.84)
Fraction of visits to MBBS doctor	0.04	0.01	0.09	0.02	0.00	0.06
	(0.19)	(0.09)	(0.29)	(0.13)	(0.00)	(0.23)
Fraction of visits to private sector	0.89	0.92	0.85	0.96	0.97	0.93
	(0.31)	(0.28)	(0.36)	(0.21)	(0.18)	(0.26)
Fraction of visits to private sector (conditional on public availability)	0.88	0.89	0.83	0.95	0.96	0.91
	(0.33)	(0.31)	(0.38)	(0.22)	(0.20)	(0.28)
Fraction of visits to private sector (conditional on public MBBS availability)	0.83	0.84	0.79	0.93	0.98	0.90
	(0.37)	(0.36)	(0.41)	(0.25)	(0.15)	(0.30)
Fraction of visits to unqualified providers	0.77	0.87	0.55	0.82	0.89	0.64
	(0.42)	(0.34)	(0.50)	(0.39)	(0.31)	(0.48)
Fraction of visits to unqualified providers (conditional on public availability)	0.74	0.82	0.54	0.81	0.86	0.64
	(0.44)	(0.38)	(0.50)	(0.39)	(0.35)	(0.48)
Fraction of visits to unqualified providers (conditional on public MBBS availability)	0.60	0.77	0.38	0.66	0.81	0.39
	(0.49)	(0.42)	(0.48)	(0.47)	(0.39)	(0.49)
Panel C: Sample Characteristics from household census of provider choice						
Number of villages	100			46		
Average village population	1,149			1,199		
Average number of households per village	233			239		
Number of reported provider visits	19,331			12,122		
Average number of visits per household per month	0.83			1.10		

▸ Provider characterstics

Provider Qualifications and Training

Table: Characteristics of Private Providers in the Representative Sample

	(1) Total	(2) MBBS	(3) Other recognized qualifications	(4) Other unrecognized qualifications	(5) No formal qualification
Number of Providers (eligible private providers from SP districts only)	575	28	117	152	258
Qualification details					
Year obtained medical degree	1992	1989	1992	1993	
Duration of degree (months)	41.2	58.2	48.3	33.4	
Did an internship as part of degree	0.23	0.86	0.65	0.17	
Duration of internship (months, conditional)	10.3	12.5	9.4	11.8	
Additional training					
Received additional training	0.768	0.250	0.579	0.750	0.911
Duration (months, conditional)	33.5	14.1	25.6	36.8	35.2
Trained by practising physician or learned by observation	0.179	0.036	0.263	0.204	0.140
Duration (months, conditional)	28.0	12.0	25.4	28.2	29.7
Trained as a compounder	0.228	0.036	0.079	0.303	0.280
Duration (months, conditional)	45.7	60.0	42.0	43.4	48.1
Trained at another institution of hospital	0.241	0.179	0.202	0.132	0.311
Duration (months, conditional)	21.3	5.4	20.2	33.6	19.7
Training other providers					
Has trained other providers	0.123	0.074	0.179	0.138	0.086

Notes: Providers in the "MBBS" category includes all providers with MBBS and MBBS + specialization. Providers in the "Other recognized qualifications" includes the following degrees: BAMS, BIMS, BUMS, BHMS/DHMS, DHB, BEHMS/BEMS, BSc/MSc Nursing. Providers in "Other unrecognized qualifications" includes RMP and providers with unverifiable degrees.

Standardized Patients: Training

15 Standardized Patients (SPs) recruited from the local community

- Important so that their appearance, manner, and speech conformed closely to providers' expectations
- Thoroughly trained to make plausible excuses to avoid invasive exams
- Trained to collect medicines but not take them on-site

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First tried in Delhi pilot

- No adverse events; < 1 percent detection rate

Standardized Patients: Cases

Three standardized cases

- Unstable Angina: "Doctor, this morning I had a pain in my chest" - *Ramlal*, Male, 45 years old
- Asthma: "Doctor, last night I had a lot of difficulty breathing" - *Rajesh*, Male or *Radha*, Female, 25 years old
- Proxy Dysentery: "Doctor, my 2-year old child has been suffering from diarrhea for 2 days" - *Shankarlal*, Male, 25 years old

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Cases are

- Relevant to the Indian context
  - Increasing incidence of cardiovascular and respiratory illness
  - Frequent diarrheal diseases (200,000 children die per year)
- No invasive treatment required: minimize any potential harm to SPs
- Difficult to self-triage: each of these could be relatively minor or may require medical attention (REACT study in the US)

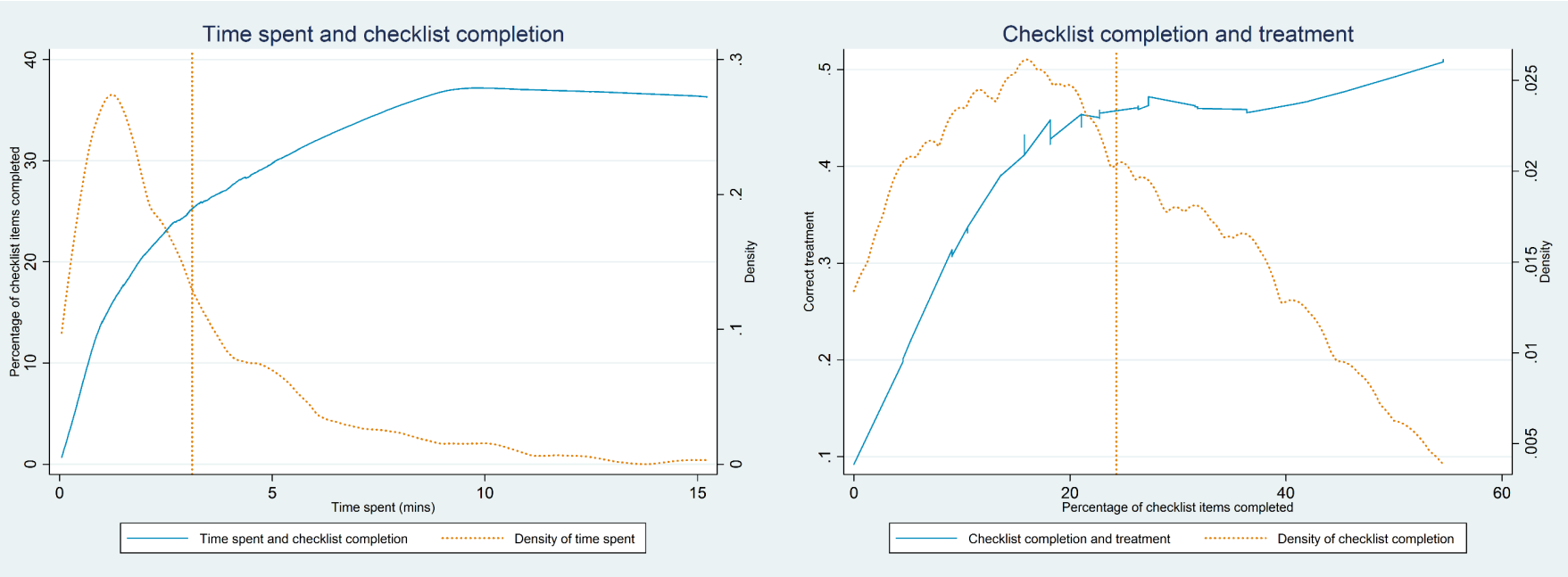
Standardized Patients: Measurement

What is measured

- **Direct effort**: time spent, total questions asked/examinations completed
- **Effort quality**: adherence to essential checklist of questions and examinations (percentage checklist; IRT scores)
  - Highly correlated with diagnosis/treatment
- **Diagnosis**: whether given, whether correct
  - Caveat: large censoring
- **Treatment**: correct, palliative, unnecessary (harmful), antibiotic use when not indicated, number of medicines
  - Two caveats: "referrals" and "bring the child (in dysentery)"
- **Prices**: for each completed interaction (wages in the public sector - through separate survey)

Agenda

Relation between Quality Measures



Worry: Doctors under-treat because they figured out that these were not "real patients"

More effort leads to better treatment through 90 percent of the distribution

Estimating Equations

For the representative sample, we estimate:

$$y_{ij} = \alpha + \beta \cdot \mathbf{1}(\text{Is a private provider}) + \theta + \lambda + \tau + \mathbf{X}'_{ij}\gamma + \epsilon_{ij}$$

where y_{ij} is the outcome of interest for provider i operating in market j. θ and λ represent case and SP fixed effects respectively. ϵ_{ij} is the error term which we cluster at the market-level. We present results without and with market fixed effects (τ) and provider controls for qualification, age, gender and patient-load during visit ($\mathbf{X}_{ij}$). The coefficient of interest is β

For the dual sample, we estimate:

$$y_{ij} = \alpha + \beta \cdot \mathbf{1}(\text{Is a private provider}) + \theta + \lambda + \xi + \mathbf{X}'_{ij}\gamma + \epsilon_{ij}$$

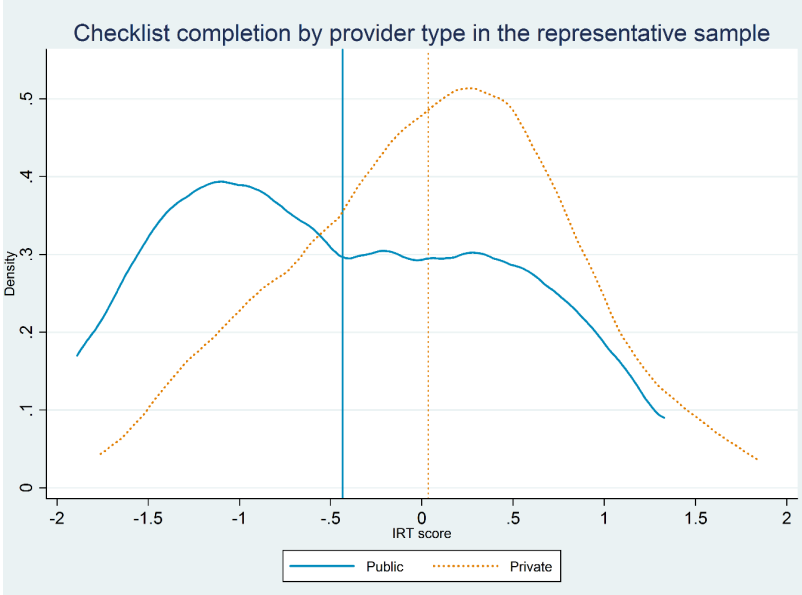
where y_{ij} is the outcome of interest for provider i attached to CHC/PHC j. θ and λ represent case and SP fixed effects respectively. ϵ_{ij} is the error term which we cluster at the CHC/PHC-level. ξ represents district fixed effects, and $\mathbf{X}_{ij}$ includes age, gender and patient-load during visit

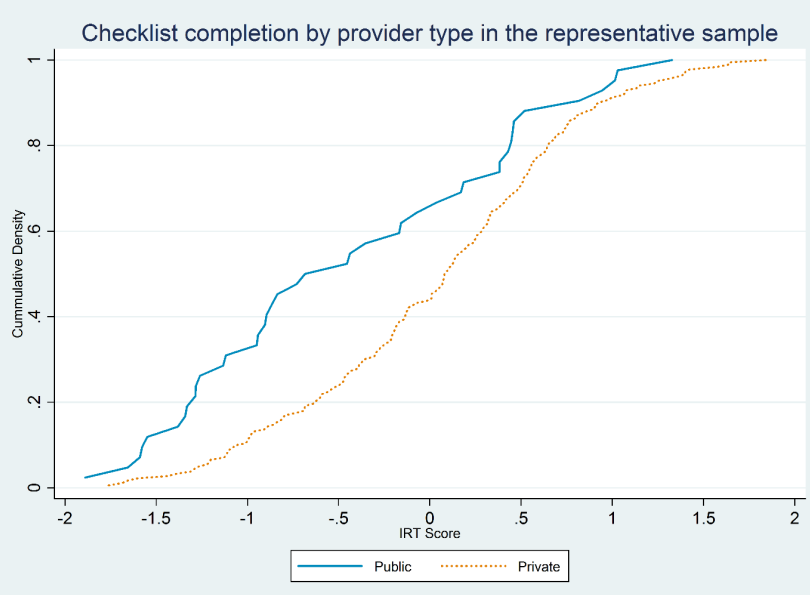
Effort: Public vs. Private

Table 3: Effort in the public and private sectors

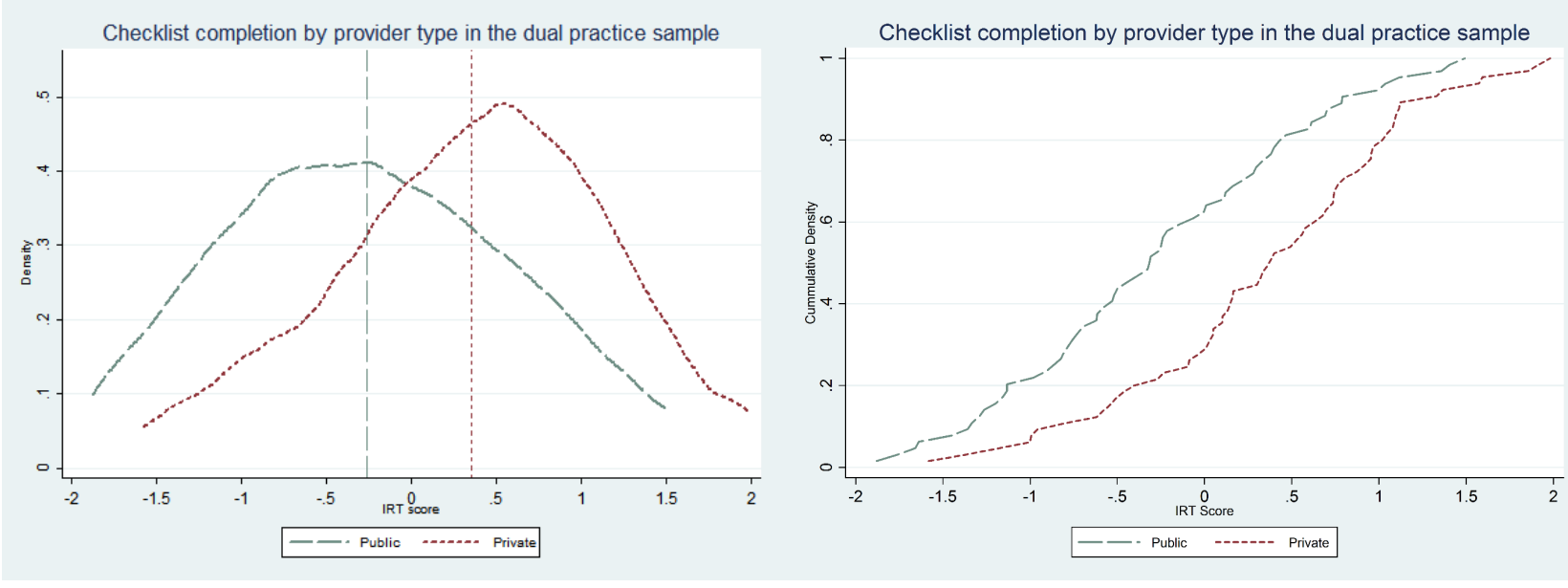
	(1)	(2)	(3)	(4)	(5)	(6)
	Representative sample			Dual practice sample		
	Time Spent (mins)	Percentage of checklist items	IRT score	Time Spent (mins)	Percentage of checklist items	IRT score
Panel A: SP and case fixed effects						
Is a private provider	1.222***	6.758***	0.551**	1.507***	8.977***	0.755***
	(0.250)	(2.488)	(0.212)	(0.271)	(1.767)	(0.207)
R-squared	0.305	0.160		0.241	0.220	
Number of observations	662	662	233	331	331	138
Mean of public	2.388	15.287		1.561	17.720	
Mean of private	3.703	22.302		2.983	28.308	
Mean of sample	3.603	21.764		2.274	23.030	
Panel B: SP, case and market/district fixed effects						
Is a private provider	1.486***	7.352***	0.668**	1.514***	8.977***	0.759***
	(0.244)	(1.948)	(0.277)	(0.258)	(1.762)	(0.207)
Panel C: SP, case and market/district fixed effects, and provider controls						
Is a private provider	1.246***	5.999**	0.611*	1.485***	9.504***	0.829***
	(0.319)	(2.338)	(0.327)	(0.267)	(1.828)	(0.205)

Checklist Adherence: Representative Sample





Checklist Adherence: Dual Sample



Diagnosis: Public vs. Private

Table 4: Diagnosis in the public and private sectors (unstable angina and asthma cases only)

	(1)	(2)	(3)	(4)	(5)	(6)
	Representative sample			Dual practice sample		
	Gave diagnosis	Correct diagnosis (conditional)	Correct diagnosis (unconditional)	Gave diagnosis	Correct diagnosis (conditional)	Correct diagnosis (unconditional)
Panel A: SP and case fixed effects						
Is a private provider	0.168***	-0.014	0.016	0.095	-0.041	0.023
	(0.052)	(0.057)	(0.022)	(0.068)	(0.105)	(0.053)
R-squared	0.130	0.121	0.075	0.130	0.113	0.055
Number of observations	440	178	440	201	88	201
Mean of public	0.263	0.150	0.039	0.382	0.385	0.147
Mean of private	0.431	0.135	0.058	0.495	0.388	0.192
Mean of sample	0.418	0.135	0.057	0.438	0.386	0.169
Panel B: SP, case and market/district fixed effects						
Is a private provider	0.188***	-0.019	0.023	0.092	-0.056	0.025
	(0.072)	(0.093)	(0.031)	(0.068)	(0.109)	(0.054)
Panel C: SP, case and market/district fixed effects, and provider controls						
Is a private provider	0.149*	-0.046	0.031	0.084	0.017	0.044
	(0.081)	(0.111)	(0.035)	(0.072)	(0.127)	(0.060)

Treatment: Representative Sample - Public vs. Private

Table 5: Treatment in the public and private sectors

(unstable angina and asthma cases only)

	(1)	(2)	(3)	(4)	(5)	(6)
	Representative sample					
	Correct treatment	Palliative treatment	Unnecessary treatment	Correct treatment only	Antibiotic	Number of medicines
Panel A: SP and case fixed effects						
Is a private provider	0.052	-0.038	0.061	-0.008	0.016	0.972***
	(0.045)	(0.056)	(0.072)	(0.023)	(0.062)	(0.279)
R-squared	0.260	0.215	0.066	0.044	0.079	0.087
Number of observations	440	440	440	440	440	440
Mean of public	0.211	0.526	0.737	0.026	0.263	2.092
Mean of private	0.270	0.496	0.808	0.017	0.279	3.097
Mean of sample	0.266	0.498	0.802	0.018	0.278	3.021
Panel B: SP, case and market/district fixed effects						
Is a private provider	0.051	0.040	0.095	-0.020	0.086	0.894***
	(0.059)	(0.068)	(0.070)	(0.026)	(0.069)	(0.234)
Panel C: SP, case and market/district fixed effects, and provider controls						
Is a private provider	0.101	0.060	0.066	-0.005	0.112	0.638**
	(0.071)	(0.080)	(0.075)	(0.027)	(0.080)	(0.284)

Treatment: Dual Sample - Public vs. Private

Table 5: Treatment in the public and private sectors

(unstable angina and asthma cases only)

	(7)	(8)	(9)	(10)	(11)	(12)
	Dual practice sample					
	Correct treatment	Palliative treatment	Unnecessary treatment	Correct treatment only	Antibiotic	Number of medicines
Panel A: SP and case fixed effects						
Is a private provider	0.151**	-0.126**	-0.021	0.019	-0.141**	0.002
	(0.064)	(0.061)	(0.051)	(0.025)	(0.068)	(0.182)
R-squared	0.274	0.309	0.108	0.025	0.120	0.127
Number of observations	201	201	201	201	201	201
Mean of public	0.373	0.637	0.833	0.020	0.490	2.833
Mean of private	0.566	0.465	0.838	0.040	0.374	2.919
Mean of sample	0.468	0.552	0.836	0.030	0.433	2.876
Panel B: SP, case and market/district fixed effects						
Is a private provider	0.156**	-0.127**	-0.022	0.018	-0.139**	-0.002
	(0.064)	(0.061)	(0.050)	(0.026)	(0.068)	(0.180)
Panel C: SP, case and market/district fixed effects, and provider controls						
Is a private provider	0.181***	-0.106	-0.021	0.018	-0.122*	-0.001
	(0.068)	(0.065)	(0.059)	(0.028)	(0.071)	(0.192)

Effort and Knowledge

Table A.6: Effort in the public and private sectors by checklist item discrimination terciles

	(1)	(2)	(3)	(4)	(5)	(6)
	Outcome variable: Percentage of recommended type of checklist items					
	Representative sample			**Dual practice sample**		
	Low discrimination	Medium discrimination	High discrimination	Low discrimination	Medium discrimination	High discrimination
Panel A: SP and case fixed effects						
Is a private provider	10.982***	7.085**	1.760	10.650***	11.728***	5.288***
	(3.281)	(2.875)	(2.143)	(2.407)	(2.370)	(1.754)
R-squared	0.144	0.175	0.238	0.280	0.235	0.319
Number of observations	662	662	662	330	330	330
Mean of public	21.770	13.975	10.197	28.225	14.690	10.072
Mean of private	32.966	21.322	12.235	41.288	28.874	15.245
Mean of sample	32.108	20.759	12.079	34.756	21.782	12.659
Panel B: SP, case and market/district fixed effects						
Is a private provider	11.290***	8.597***	1.594	10.705***	11.733***	5.226***
	(2.609)	(2.535)	(1.969)	(2.358)	(2.382)	(1.751)
Panel C: SP, case and market/district fixed effects						
Is a private provider	8.538***	7.317**	1.657	11.879***	12.550***	4.660***
	(3.030)	(3.092)	(2.381)	(2.483)	(2.469)	(1.795)

Robustness of Checklist and Treatment Results

Results by Case

▸ Results by Case

Robustness to Alternative Definitions of Correct Treatment

▸ Alternative Definitions

Robustness to Exclusion of Dysentery Cases

▸ Exclude Dysentery

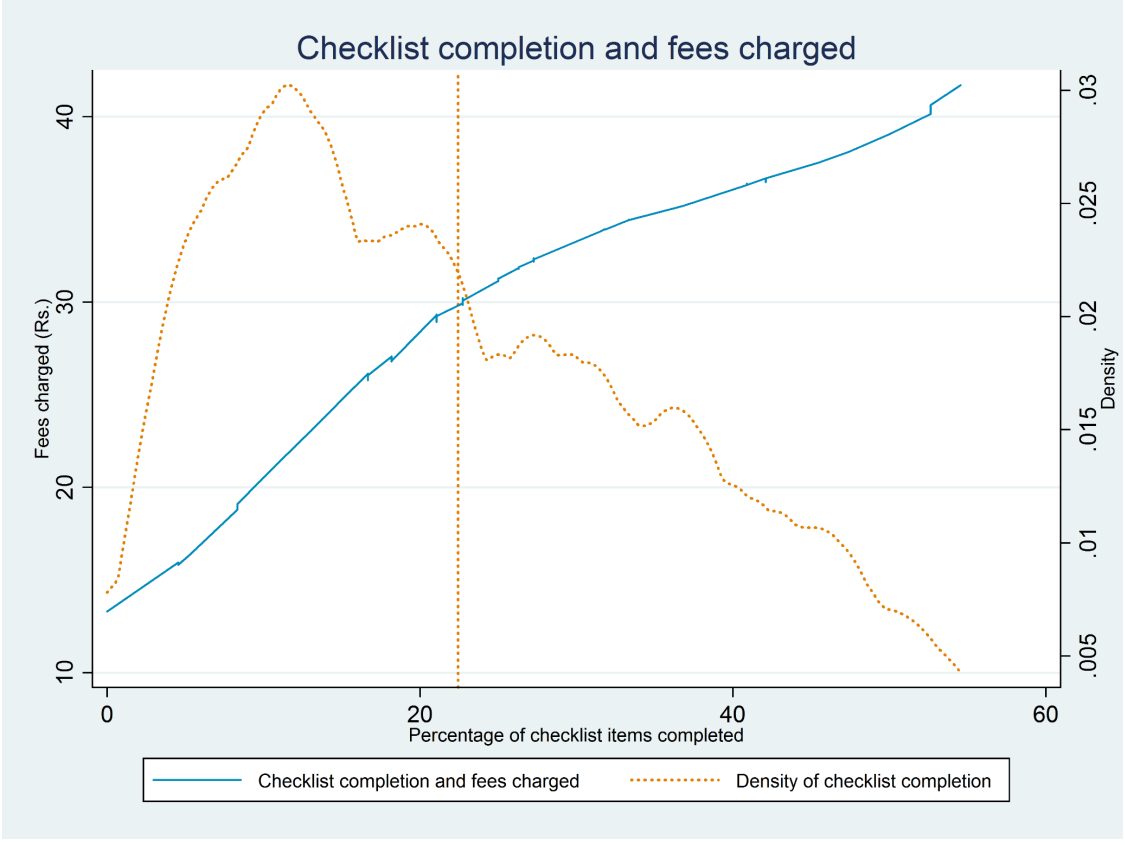
Robustness to Inclusion of Clinic-level Infrastructure and Facilities Controls

▸ Facilities Controls

Differential Completion Rates by Sector and Re-weighted Estimates

▸ Differential Completion Rates ▸ Re-weighted Estimates

Prices and Checklist Adherence



Prices in the Private Sector

Table 6: Correlates of price charged (private interactions)

	(1)	(2)	(3)	(4)	(5)	(6)
			Fees in Rs.			
	Representative sample		Dual practice sample		Pooled sample	
	Binary regressions	Multiple regression	Binary regressions	Multiple regression	Binary regressions	Multiple regression
Time spent with SP (minutes)	1.763***	0.771	2.498***	2.017***	1.502***	0.805**
	(0.454)	(0.475)	(0.587)	(0.679)	(0.361)	(0.390)
Percentage of checklist items	0.411***	0.368***	0.355***	0.061	0.394***	0.309***
	(0.091)	(0.101)	(0.100)	(0.124)	(0.073)	(0.093)
Correct diagnosis (unconditional)	-3.749	-2.137	6.353	5.459	2.674	2.803
	(4.212)	(2.122)	(9.363)	(9.076)	(4.670)	(4.175)
Correct treatment	7.065***	0.050	6.301	1.508	7.633***	1.458
	(1.789)	(2.892)	(4.016)	(4.754)	(1.872)	(2.305)
Palliative treatment	8.036***	5.581***	11.748***	7.798*	8.124***	6.252***
	(2.056)	(2.036)	(4.344)	(4.663)	(1.811)	(1.863)
Unnecessary treatment	14.039***	4.030	15.220***	3.145	14.355***	5.545*
	(2.395)	(3.341)	(5.056)	(6.233)	(2.129)	(2.864)
Number of medicines dispensed	4.774***	4.215***	9.247***	11.513***	4.080***	3.937***
	(1.656)	(1.379)	(2.997)	(3.765)	(1.371)	(1.409)
Number of medicines prescribed	-0.202	-1.188	3.650**	3.891	0.926	-1.020
	(1.129)	(0.881)	(1.845)	(2.672)	(0.861)	(1.067)
Referred/Asked to see child	-19.161***	-13.301***	-10.082**	-3.638	-16.857***	-14.151***
	(4.115)	(3.636)	(4.722)	(4.495)	(3.356)	(3.229)

(continued on next slide)

Prices in the Private Sector

Table 6: continued

	(1)	(2)	(3)	(4)	(5)	(6)
			Fees in Rs.			
	Representative sample		Dual practice sample		Pooled sample	
	Binary regressions	Multiple regression	Binary regressions	Multiple regression	Binary regressions	Multiple regression
Has MBBS	24.325***	28.416***			14.516***	22.133***
	(6.644)	(7.997)			(4.605)	(4.195)
Has some qualification	4.444	5.399**			2.313	6.022***
	(3.276)	(2.139)			(2.929)	(2.197)
Patient load during visit	0.736	0.441	0.276	0.029	0.503	0.149
	(0.665)	(0.333)	(0.863)	(0.876)	(0.602)	(0.510)
Age of provider	-0.150	-0.103	0.233	0.226	-0.095	-0.018
	(0.144)	(0.091)	(0.231)	(0.214)	(0.119)	(0.083)
Gender of provider (1=Male)	-8.164**	-4.923	-1.101	-3.713	-7.474**	-3.098
	(3.497)	(4.969)	(4.845)	(5.460)	(2.918)	(4.069)
Constant		10.526		-11.589		3.386
		(6.561)		(12.095)		(5.913)
R2		0.393		0.466		0.361
Number of observations		543		152		695
Mean price charged		27.327		33.125		28.699
SD		26.079		28.580		26.851

Prices and Quality in the Private Sector

Prices positively correlated with measures of quality

- Time spent, fraction of checklist items completed, correct treatment

Also correlated with unnecessary treatments

- In multiple regressions, 'correct treatment' not significant (highly correlated with checklist completion)
- Suggests that patients cannot discern the correctness of treatment beyond observable measures of effort and medicines given (but these are correlated with correct treatment)

Market rewards providers for quality, but unnecessary treatments also higher priced

- Concerns regarding credence goods may apply
  - But also consistent with market rewarding "doing more stuff" including the correct treatment

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Wages in the Public Sector

Table 7: Wages in the public sector (public observations only)

	(1)	(2)	(3)	(4)
	Log of Monthly Salary		**Desirability index**	
	(pooled sample)		(PHC/CHC sample)	
	Binary regressions	Multiple regression	Binary regressions	Multiple regression
Percentage of checklist items	0.002	-0.001	0.004	0.003
	(0.003)	(0.002)	(0.009)	(0.009)
Time spent with SP (minutes)	-0.051**	-0.012	-0.061	-0.080
	(0.026)	(0.014)	(0.074)	(0.077)
Correct Treatment	0.055	-0.090*	-0.304	-0.132
	(0.066)	(0.048)	(0.237)	(0.202)
Has MBBS	1.055***	1.283***		
	(0.168)	(0.175)		
Has some qualification	-0.092	0.849***		
	(0.367)	(0.300)		
Age of provider	0.012**	0.019***	0.052***	0.062**
	(0.006)	(0.006)	(0.019)	(0.024)
Gender of provider (1=Male)	0.112	0.126	-0.530	-0.846
	(0.189)	(0.106)	(0.509)	(0.739)
Born in same district	-0.389***	0.015	-0.180	0.101
	(0.147)	(0.081)	(0.449)	(0.432)
Is a dual provider	0.582***	0.149*	0.076	-0.135
	(0.136)	(0.086)	(0.402)	(0.527)
Constant		8.044***		-1.470
		(0.316)		(1.198)
R2		0.625		0.165
Number of observations		301		182

Comparison of Costs of Care

Table A.15: Cost in the public sector

	(1)	(2)
Panel A: Staff per facility	**N**	**Average monthly wage (Rs.)**
Medical Officer in Charge/Medical Officer	1.92	Rs.32,245
GNM/ANM/VHN/LHV	3.24	Rs.16,305
MPW/MNA/Assistant/Compounder	1.43	Rs.16,657
Pharmacist/Chemist/Lab Assistant/Technician	0.8	Rs.16,571
Paramedic/other	6.08	Rs.13,387
All	13.47	Rs.17,315
Number of facilities	115	
Panel B: Average number of visits per facility per month		
Year 2008	1,032	
Year 2009	1,054	
Year 2010	1,045	
Panel C: Average per patient cost		
Year 2008	Rs.301.20	
Year 2009	Rs.305.54	
Year 2010	Rs.313.89	

Notes: We use an extremely conservative measure of per patient cost in the public sector facility. We assume that salary costs are the only cost in running a public health facility. Furthermore, we assume that every patient that visits the public health facility visits for a primary care visit, while people also visit public health facilities for preventative services such as vaccination. Wage data were collected in the year 2010, which we use to compute cost per patient in 2008 and 2009. Wages in 2008 and 2009 could have been lower. Cost per patient figures have been winsorized at top 99 percent.

Agenda

Robustness and Interpretation

Four broad issues in interpretation

- First: how typical are the audit cases presented and how could they compare with more typical cases

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- Second: possibility that providers expect to see different patients across different sectors, and differences reflect statistical discrimination rather than market incentives
- Third: to what extent could the public-private difference for the same doctors reflect incentive effects *due* to the presence of private-sector clinic (Jayachandran, 2014)
- Fourth: is the market 'average' the correct way to think about quality given large heterogeneity among providers

Real Patients

Audit-studies have several advantages, but one key limitation is the small number of cases

Observing real patients solves this problem, but has other limitations

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Observing real patients solves this problem, but has other limitations

So we measure quality both ways, and show that the main results continue to hold with real patients

- Private providers spend more time, ask more questions, and perform more exams
- Not much difference in incidence of prescription
- They also dispense more medicines in the representative sample
- No evidence of more medicines in the dual sample

Effort and Treatment with Real Patients: Representative Sample

Table 8: Real patients in the public and private sectors

	(1)	(2)	(3)	(4)	(5)
	Representative sample				
	Time spent (mins)	Total questions	Physical examination	Dispensed/ prescribed medicines	Number of medicines
Panel A: no patient or provider controls, and no fixed effects					
Is a private provider	1.456***	0.799***	0.371***	-0.026**	0.500***
	(0.323)	(0.180)	(0.108)	(0.011)	(0.121)
R-squared	0.054	0.030	0.103	0.003	0.017
Number of observations	1,137	1,137	1,133	1,138	1,138
Mean of public	2.378	2.994	0.473	0.994	2.319
Mean of private	3.833	3.793	0.844	0.968	2.819
Mean of sample	3.621	3.676	0.790	0.972	2.746
Number of public providers	29	29	29	29	29
Number of private providers	169	169	169	169	169
Panel B: no patient or provider controls, and market/district fixed effects					
Is a private provider	1.626***	0.630***	0.503***	-0.016	0.674***
	(0.490)	(0.170)	(0.112)	(0.014)	(0.167)
Panel C: including patient and provider controls, and market/district fixed effects					
Is a private provider	1.190***	0.654***	0.522***	0.009	0.602***
	(0.313)	(0.246)	(0.085)	(0.014)	(0.145)

Effort and Treatment with Real Patients: Dual Sample

Table 8: Real patients in the public and private sectors

	(6)	(7)	(8)	(9)	(10)
	Dual sample				
	Time spent (mins)	Total questions	Physical examination	Dispensed/ prescribed medicines	Number of medicines
Panel A: no patient or provider controls, and no fixed effects					
Is a private provider	1.894***	1.154***	0.143**	-0.008	-0.021
	(0.569)	(0.318)	(0.063)	(0.009)	(0.134)
R-squared	0.115	0.082	0.017	0.001	0.000
Number of observations	1,085	1,083	1,082	1,090	1,090
Mean of public	1.499	3.284	0.678	0.991	3.190
Mean of private	3.393	4.439	0.821	0.983	3.169
Mean of sample	1.899	3.527	0.708	0.989	3.185
Number of public providers	51	51	51	51	51
Number of private providers	40	40	41	41	41
Panel B: no patient or provider controls, and market/district fixed effects					
Is a private provider	1.910***	1.155***	0.154**	-0.009	-0.016
	(0.560)	(0.314)	(0.061)	(0.009)	(0.139)
Panel C: including patient and provider controls, and market/district fixed effects					
Is a private provider	1.570***	0.561***	0.072*	-0.016	-0.016
	(0.311)	(0.132)	(0.039)	(0.012)	(0.098)

Robustness and Interpretation: Further Issues

Market incentives or statistical discrimination

- Latter if providers expect to see different patients across sectors
- But, exit interview data suggest not many significant differences in case characteristics across sectors

▸ Patient Characteristics 1 ▸ Patient Characteristics 2

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- *No* SP directed to private clinics, referral rate *similar* among dual and non-dual providers
- Correct treatment rate also similar, but non-dual exert higher effort in public clinics

▸ Dual vs. Non-Dual: Effort and Diagnosis ▸ Dual vs. Non-Dual: Treatment

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Comparing "best public" to the "best private"

- Public-private difference even starker when we compare the best public provider in a market to the best private provider
- Caveat: Not clear what makes a provider the "best"

▸ Best vs. Best: Effort and Diagnosis ▸ Best vs. Best: Treatment

Summary of Results

In the representative sample private providers do better than public providers on most measures of quality:

- Spent more time with patients, and completed more checklist items
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Model: Consultation Stage

Doctor is endowed with level of medical knowledge K

Patient enters doctor's clinic and presents symptoms

Doctor forms a prior belief about the underlying disease that caused the symptoms:

$$n^{prior} \sim N\left(\nu, \frac{1}{\alpha}\right)$$

Doctor exerts effort e to further down the true cause and draws a signal:

$$s \sim N\left(n^{true}, \frac{1}{\beta}\right) \text{ where } \beta = eK$$

And forms a posterior belief:

$$n^{post} \sim N\Bigg(\underbrace{\frac{\alpha+\nu}{\alpha+\beta} + \frac{\beta s}{\alpha+\beta}}_{\mu}, \frac{1}{\alpha+\beta}\Bigg)$$

Note that $n^{post} \to n^{true}$ as $\beta \to \infty$

Model: Treatment Stage

Doctor decides the types of treatment he will offer based on the posterior belief about the true state

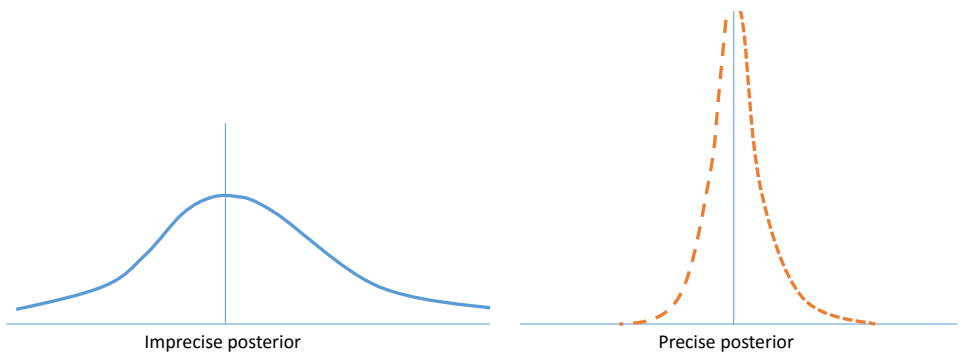
Treatment is expressed as an interval $[\mu - n, \mu + n]$

The probability of covering the true state is given by:

$$F(\mu + n) - F(\mu - n) = 2F(\mu + n) - 1$$

Too much "n" is harmful. There is a health cost of "n" given by "n^2"

Health outcome is defined by: $2F(\mu + n) - 1 - n^2$



Model: Incentives

Doing the right thing for the patient (Hippocratic Oath):

- $\phi = f(\text{intrinsic motivation, monitoring, liability,...})$: $\phi \uparrow \rightarrow e \uparrow$

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Fee for private sector:

- Consultation: $e \times \tau_i \rightarrow e \uparrow$
- Treatment: $n \times p \rightarrow n \uparrow$

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Accumulate reputation in market:

- Patients value e and $H^o \rightarrow e \uparrow$
- Patients value H^o rather than $n^2 \rightarrow n \uparrow$
- Reputation increases future $\tau_i \rightarrow n \uparrow$

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- Patients value e and $H^o \rightarrow e \uparrow$
- Patients value H^o rather than $n^2 \rightarrow n \uparrow$
- Reputation increases future $\tau_i \rightarrow n \uparrow$

Patient expectations:

- Satisfy patients' demand: $\bar{n} \rightarrow n \uparrow$

Model: Predictions

Without market incentives and patient-induced demand

$$V_1 = \max_e \{-c(e) + V_2(e)\} \tag{1}$$

$$V_2(e) = \max_n \{\phi H(e, n)\} \tag{2}$$

- No marginal incentive for either e or n, optimal choices depend on ϕ and cost of effort
- Providers choose n to maximize $H(e, n)$

With market incentives

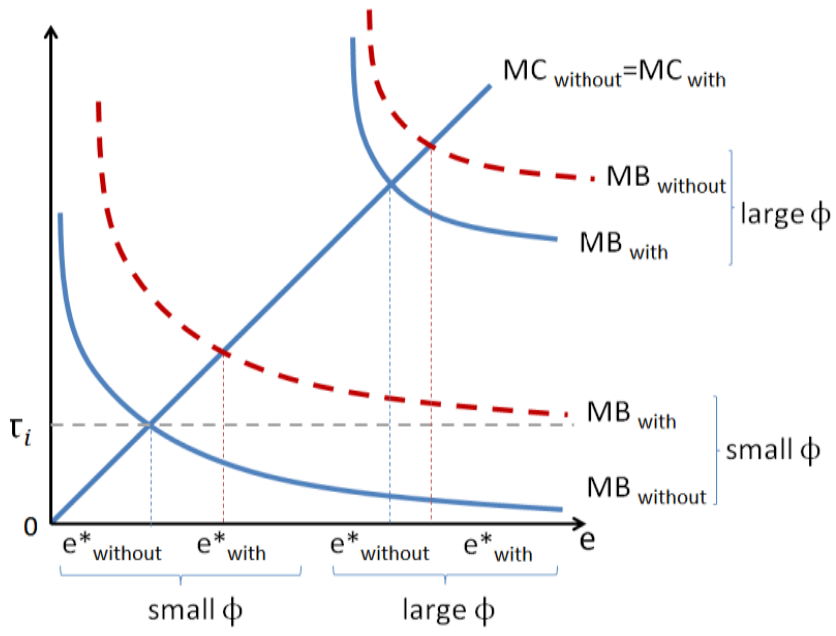
$$V_1 = \max_e \{-c(e) + \tau e + V_2(e)\} \tag{3}$$

$$V_2(e) = \max_n \{\phi H(e, n) + \delta H^o(e, n) + np\} \tag{4}$$

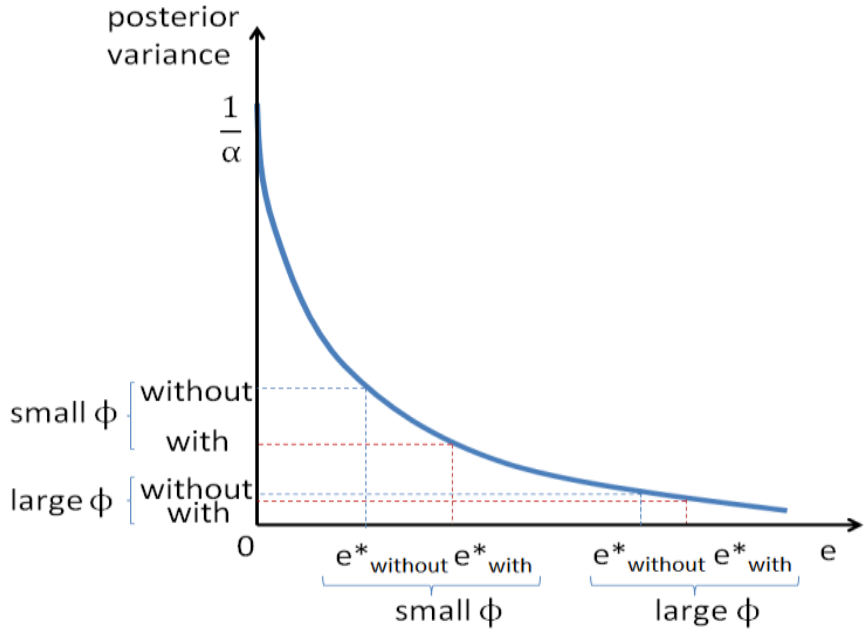
- Providers have incentives to choose excessive n, where $H(e, n)$ is decreasing in n
- Compensation for effort ($\tau_i e$) and reputation concerns induce higher e, yielding more accurate posterior (and thus a smaller n)

Predictions: Effort

Consultation stage: public and private



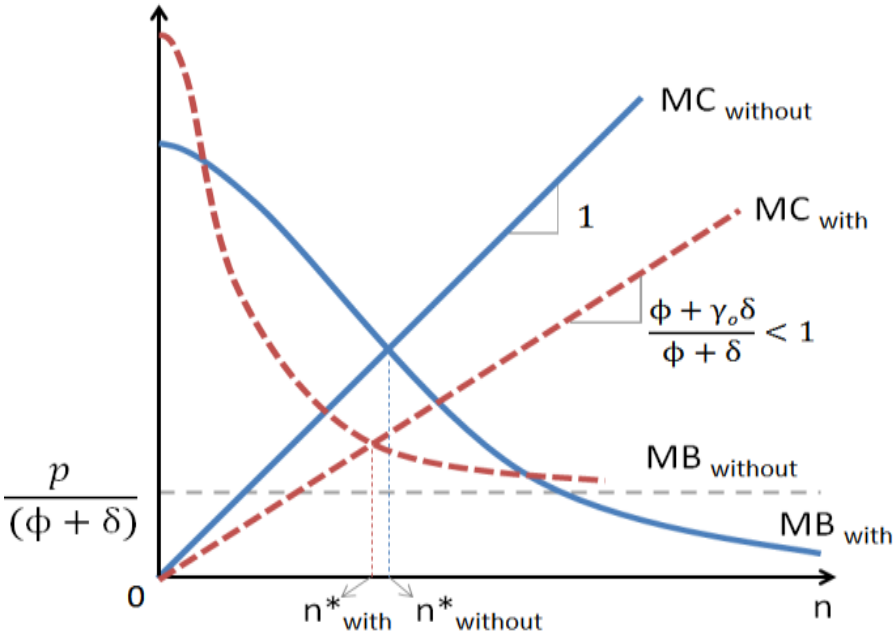
Private providers are rewarded through higher future demand and piece rate consultation fee



At sufficiently high level of effort, the marginal effect of exerting more effort on the precision of posterior belief is small

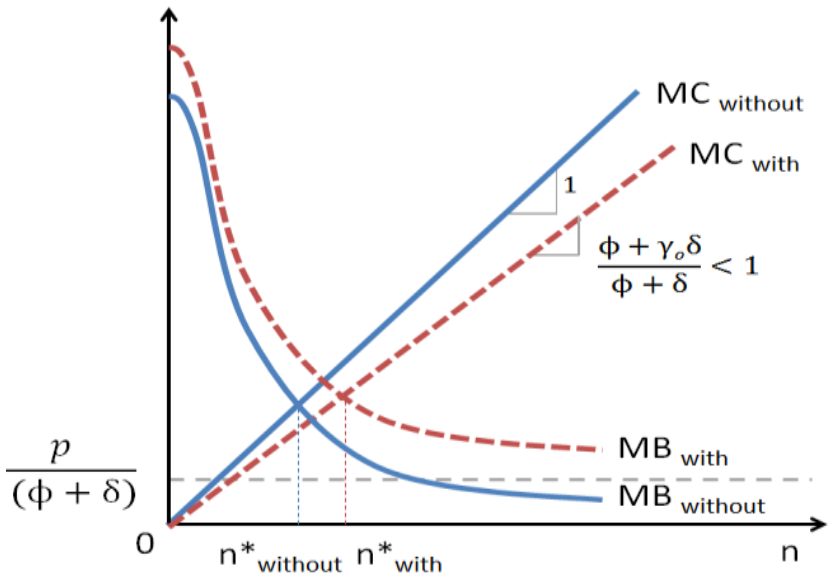
Predictions: Number of Medicines Given

Low ϕ



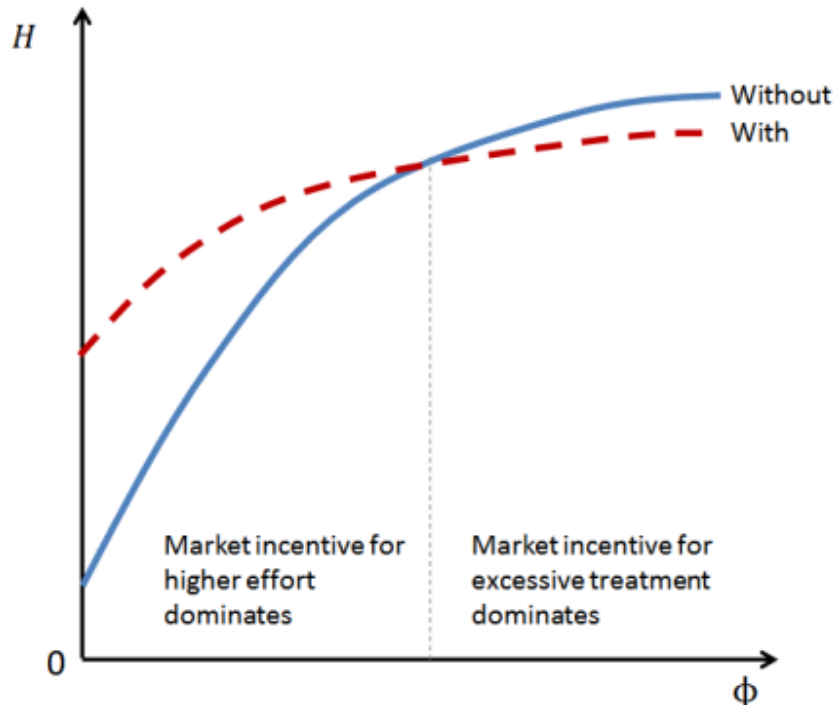
Market incentive gives larger MB and smaller MC of giving more n; However, market incentive also leads to higher effort, which may lead to private doctors prescribing smaller n than public doctors.

High ϕ



The result changes when ϕ is large and both posteriors are precise

Health Outcomes (by ϕ and practice type)



Agenda

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- Credentials and Peer-monitoring (administrative accountability) in public systems sufficient to ensure quality

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- Customer (market) accountability does better in two ways
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  - Prices reward effort, providing incentives for effort
  - But, prices do not penalize unnecessary medications, which may lead to over-treatment (but we cannot rule out that this may be demanded by patients)

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Overall, results consistent with the theoretical sketch and suggest that in "low ϕ" environments, the effort advantage of the private sector may outweigh the credence good costs of privately-provided health care

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Results do not mean that the state does not have an important role

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- Lots of attention paid to training public providers

Attempts to improve equity in access to quality health-care may be more effective if they retain elements of customer accountability in health care markets

- Can also try to improve ϕ in the public sector, but this is not easy (Banerjee et al. 2008)

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Sample Description

Table 2: Characteristics of providers and practices where SPs were administered

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Representative Sample (3 districts)			Representative sample of Public MBBS providers (5 districts)				Dual Practice sample (5 districts)		
	Public	Private	p-value of (1)-(2)	All public	Public without dual practice	Public with dual practice	p-value of (5)-(6)	Public	Private	p-value of (8)-(9)
Panel A: Provider characteristics										
Age of Provider	46.92	43.51	0.10	44.52	44.74	44.43	0.89			
Is male	0.86	0.96	0.02	0.87	0.96	0.84	0.10	0.84	0.85	0.87
More than 12 years of basic education	0.58	0.52	0.48	0.64	0.52	0.69	0.09			
Has MBBS degree	0.25	0.07	0.00	1.00	1.00	1.00				
Has alternative medical degree	0.11	0.21	0.18	0.00	0.00	0.00				
No medical training	0.61	0.68	0.42	0.00	0.00	0.00				
Number of practices	1.14	1.07	0.21	1.83	1.16	2.13	0.00			
Tenure in years at current location	15.22	13.70	0.42	6.15	5.11	6.56	0.28			
Panel B: Clinic characteristics										
Dispense medicine	1.00	0.81	0.00							
Consultation fee (Rs.)	3.65	51.24	0.00	3.75	3.15	3.92	0.00	3.92	57.93	0.00
Number of patients per day (self reported in census)	28.06	15.74	0.00	31.85	31.30	35.00	0.74	35.00	17.59	0.07
Number of patients per day (from physician observations)	5.72	5.75	0.98	16.04	13.72	16.86	0.31	16.86	5.63	0.00
Electricity	0.94	0.95	0.93	1.00	1.00	1.00		1.00	1.00	
Stethoscope	0.97	0.94	0.47	1.00	1.00	1.00		1.00	1.00	
Blood pressure cuff	0.83	0.75	0.34	1.00	1.00	1.00		1.00	1.00	
Thermometer	0.94	0.92	0.64	0.97	0.94	0.98	0.20	0.98	0.97	0.63
Weighing Scale	0.86	0.52	0.00	0.94	0.94	0.94	0.96	0.94	0.82	0.04
Handwash facility	0.89	0.81	0.30	0.84	0.84	0.85	0.93	0.85	0.81	0.56
Number of providers	36	188		103	31	72		72	84	

▸ Health market attributes

Sampling I

Table A1: Sampling and completion of SPs in the representative sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Markets	Number of providers			Number of MBBS providers		
		Total	Public	Private	Total	Public	Private
Panel A: Sampling and completion by market							
Total eligible	60	719	144	575	51	23	28
Markets selected for SP	46	649	130	519	50	23	27
Reasons for not sampling market							
Remote market	5						
No eligible provider	7						
Common cluster market, no provider within village	2						
Sampled for SPs		247	45	202	28	12	16
Not sampled for SPs	14	472	99	373	23	11	12
Completed SPs	46	224	36	188	23	9	14
Panel B: Sampling and completion by sector							
Public Sector		(Number of providers with whom SPs were completed)					
At least 1 public provider sampled	22	151	36	115	20	9	11
At least 1 public provider completed	20	141	36	105	20	9	11
At least 1 public MBBS provider sampled	10	98	21	77	18	8	10
At least 1 public MBBS provider completed	9	87	19	68	18	9	9
Private Sector							
At least 1 private provider sampled	44	218	30	188	22	8	14
At least 1 private provider completed	44	218	30	188	22	8	14
At least 1 private MBBS provider sampled	8	68	5	63	16	2	14
At least 1 private MBBS provider completed	7	67	5	62	16	2	14
Private and Public Sector							
Markets with at least 1 public and 1 private provider sampled	20	145	30	115	19	8	11
Markets with at least 1 public and 1 private provider completed	18	135	30	105	19	8	11

Notes: In the 5 markets where SP work was over completed, the SP saw a provider other than a sampled provider

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Sampling II

Table A.2: Mapping, sampling and completion in the dual practice sample

	(1)		(2)	(3)	(4)	(5)	(6)	(7)
	Number of Facilities		Providers			Cases		
			Number of providers	Percentage of total	Percentage of sampled	Number of cases	Percentage of total	Percentage of sampled
Panel A: Mapping								
Total	200	Total	216					
without doctors	40	without private clinics	84	38.9%				
with doctors	160	with private clinics	132	61.1%				
Panel B1: Sampling								
Total	139	Total	139			599		
		without private clinics	48	34.5%		144	24.0%	
		with private clinics	91	65.5%		455	76.0%	
Panel B2: Completion								
Total	116	Total*	116		83.5%	460		76.8%
		without private clinics*	32		66.7%	87		60.4%
		with private clinics*	84		92.3%	373		82.0%
Panel C1: Sampling in dual practice sample								
Total	81	Provider-clinics	182			455		
		in public clinics	91	50.0%		227	49.9%	
		in private clinics	91	50.0%		228	50.1%	
Panel C2: Completion in dual practice sample								
Total	81	Provider-clinics*	155		85.2%	373		82.0%
		in public clinics*	71		78.0%	168		74.0%
		in private clinics*	84		92.3%	205		89.9%

Notes: * counts all providers with whom at least one case was completed. Reasons for not completing SP surveys include transfer of provider or an inability to find the provider for an interview. In these cases our field staff typically made three (in some cases four) attempts to complete a case. During fieldwork we replaced five sampled providers with other providers. In two cases, it was because the provider was on sick leave, two cases because provider had been transferred and one case because provider had gone on training.

Back

Checklist Items, Diagnosis and Treatment

Table A3: Checklist items, diagnoses and treatments

	(1) Unstable angina	(2) Asthma	(3) Dysentery
Panel A: Checklist Items			
History questions	where is the pain, when started, severity of pain, radiation, previous similar, since when, shortness of breath, sweating, beedi-cigarette, family history	current breathing probes, cough, expectoration probes, previous breathing problems, since when problems, shortness constant of episodic, what triggers, fever, chest pain, weight loss, beedi-cigarette, family history	age of child, qualities of school, frequency, quantity of stool, urination, child active/playful, fever, abdominal pain, vomitting, source of water, what has child eaten, child taking fluids
Examinations	pulse, bp, auscultation (front or back), temperature attempt, ecg in/outside clinic	pulse, bp, auscultation (front or back), temperature attempt	
Panel B: Diagnosis			
Correct	Heart attack, angina, myocardial infarction, attack	Asthma, asthma attack	Dysentery, bacteria
Incorrect	Blood pressure problem, gastrointestinal problem, muscle problem, the weather, injury, nerve pull, lack of blood, swelling in chest, pain from drinking cold water, heavy work, bad blood, decaying lungs, chest congestion	Blood pressure problem, gastrointensinal problem, heart problem, the weather, cough in chest, thyroid problem, weakness, lack of blood, infection in windpipe, pregnancy, allergy	Weather, heat in liver, acidity, diarrhea
Panel C: Treatment			
Correct	Aspirin, clopidogrel/other anti-platelet agents, do an ECG.	Bronchodilators, theophylline, inhaled or oral corticosteroids, leukotriene inhibitors, cromones, inhaled anticholinergics	ORS, rehydration
Helpful	Nitroglycerin, blood thinners, betablockers, ACE inhibitors, vasodilators, other cardiac medication, morphine, other pain medication, referral or referral for an ECG.	Anti-allergy medication	Antibiotics,zinc
Unncessary or harmful	Antibiotics, oral rehydration salts, oral electrolyte solution, zinc, steroids, inhaler, bronchodilators, theophylline, inhaled corticosteroids, leukotriene inhibitors, cromones, inhaled anti-cholinergics, oral cortico-steroids, other anti-asthmatic medication, anti-allergy medication, psychiatric medication.	Aspirin, clopidogrel, anti-platelet agents, blood thinners, betablockers, ACE inhibitors, vasodilators, other cardiac medication, morphine, other pain medication, oral rehydration salts, oral electrolyte solution, zinc, antibiotics, anti-ulcer medication, psychiatric medication	Aspirin, clopidogrel, anti-platelet agents, blood thinners, betablockers, ACE inhibitors, vasodilators, other cardiac medication, morphine, other pain medication, steroids, inhaler, bronchodilators, theophylline, inhaled corticosteroids, leukotriene inhibitors, cromones, inhaled anti-cholinergics, oral cortico-steroids, other anti-asthmatic medication, anti-allergy medication, psychiatric medication

Notes:

Randomization Balance for Unstable Angina in Dual Sample

Table A4: Randomization balance for dual sample providers' assignment of Unstable Angina cases

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Asthma outcomes						Dysentery outcomes	
	Time spent (mins)	Percent checklist completed	Correct treatment	Helpful treatment	Gave diagnosis	Correct diagnosis	Time spent (mins)	Percent checklist completed
Is private	1.497***	13.190***	0.131	-0.045	0.181	0.077	0.302	9.109**
	(0.483)	(3.292)	(0.113)	(0.084)	(0.118)	(0.099)	(0.241)	(4.119)
Received Unstable Angina in private	0.433	5.441	-0.194	0.125	0.100	0.075	0.205	-0.862
	(0.518)	(3.534)	(0.121)	(0.091)	(0.127)	(0.106)	(0.255)	(4.356)
(Is private) x (Received Unstable Angina in private)	0.143	-2.996	0.061	-0.056	-0.214	-0.094	0.268	-0.604
	(0.719)	(4.898)	(0.169)	(0.125)	(0.176)	(0.147)	(0.354)	(6.053)
Constant	1.644***	13.687***	0.640***	0.843***	0.307***	0.150**	0.783***	17.088***
	(0.347)	(2.367)	(0.081)	(0.061)	(0.085)	(0.071)	(0.172)	(2.941)

Notes: *** Significant at 1%, ** Significant at 5%, * Significant at 10%. Robust standard errors are in parenthesis. All regressions include district fixed effects.

Checklist Items: Unstable Angina

Table A5: List of checklist items used in the treatment of SPs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Item discrimination tercile	Representative sample			Dual practice sample		
		Public	Private	Difference (3)-(2)	Public	Private	Difference (6)-(5)
Panel A: Unstable Angina							
History questions							
where is the pain	high	0.486	0.694	0.208***	0.528	0.645	0.117
when started	low	0.270	0.389	0.119*	0.167	0.129	-0.038
doing when began	high	0.054	0.078	0.024	0.083	0.161	0.078
severity of pain	low	0.162	0.278	0.116*	0.167	0.419	0.253**
radiation	high	0.108	0.150	0.042	0.222	0.387	0.165*
previous similar	medium	0.270	0.417	0.146**	0.278	0.387	0.109
since when	low	0.216	0.272	0.056	0.111	0.323	0.211**
quality of pain	high	0.108	0.117	0.009	0.111	0.258	0.147*
pain changes	low	0.054	0.061	0.007	0.056	0.161	0.106*
shortness of breath	medium	0.081	0.150	0.069	0.056	0.032	-0.023
nausea	medium	0.297	0.294	-0.003	0.056	0.387	0.332***
sweating	high	0.270	0.294	0.024	0.194	0.452	0.257**
beedi-cigarette	low	0.054	0.072	0.018	0.083	0.194	0.110*
family history	high	0.000	0.017	0.017	0.000	0.097	0.097**
Examination questions							
pulse	low	0.243	0.422	0.179**	0.417	0.677	0.261**
bp	medium	0.135	0.350	0.215***	0.222	0.548	0.326***
auscultation (either front or back)	low	0.189	0.500	0.311***	0.444	0.613	0.168*
temperature attempt	medium	0.108	0.139	0.031	0.028	0.258	0.230***
ecg in/outside clinic	medium	0.243	0.228	-0.015	0.278	0.355	0.077
Number of observations		37	180		36	31	

Checklist Items: Asthma

Table A5 continued

	(1) Item discrimination tercile	(2) Representative sample Public	(3) Representative sample Private	(4) Representative sample Difference (3)-(2)	(5) Dual practice sample Public	(6) Dual practice sample Private	(7) Dual practice sample Difference (6)-(5)
Panel B: Asthma							
History questions							
current breathing probes	medium	0.385	0.647	0.262***	0.422	0.671	0.250***
cough	low	0.590	0.696	0.106	0.453	0.686	0.233***
expectoration probes	low	0.077	0.163	0.086*	0.016	0.071	0.056*
previous breathing problems	high	0.333	0.462	0.129*	0.266	0.543	0.277***
previous episode probes	medium	0.128	0.196	0.067	0.109	0.286	0.176***
since when problems	medium	0.385	0.495	0.110	0.234	0.414	0.180**
how often happens	high	0.128	0.103	-0.025	0.047	0.086	0.039
shortness constant or episodic	low	0.051	0.114	0.063	0.047	0.129	0.082**
what triggers	medium	0.077	0.125	0.048	0.094	0.229	0.135**
how long lasts	high	0.077	0.065	-0.012	0.016	0.086	0.070**
childhood illness	medium	0.000	0.033	0.033	0.016	0.043	0.027
age	high	0.308	0.141	-0.166***	0.578	0.500	-0.078
fever	low	0.231	0.326	0.095	0.219	0.386	0.167**
chest pain	low	0.154	0.375	0.221***	0.172	0.286	0.114*
weight loss	high	0.000	0.000	0.000	0.016	0.014	-0.001
night sweats	high	0.051	0.054	0.003	0.047	0.086	0.039
beedi-cigarette	high	0.026	0.016	-0.009	0.016	0.071	0.056*
family history	medium	0.000	0.027	0.027	0.031	0.043	0.012
Examination questions							
pulse	low	0.256	0.554	0.298***	0.313	0.457	0.145**
bp	medium	0.205	0.293	0.088	0.109	0.357	0.248***
auscultation (either front or back)	low	0.333	0.554	0.221***	0.484	0.800	0.316***
temp attempt	low	0.103	0.179	0.077	0.063	0.100	0.038
Number of observations		39	184		64	70	

(continued on next page)

Checklist Items: Dysentery

Table A5 continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Item discrimination tercile	**Representative sample**			**Dual practice sample**		
		Public	Private	Difference (3)-(2)	Public	Private	Difference (6)-(5)
Panel C: Dysentery							
History questions							
age of child	low	0.795	0.945	0.150***	0.921	0.939	0.019
qualities of stool	low	0.077	0.186	0.109**	0.159	0.379	0.220***
frequency	medium	0.179	0.311	0.132**	0.270	0.470	0.200***
quantity of stool	high	0.000	0.060	0.060*	0.016	0.045	0.030
urination	high	0.000	0.022	0.022	0.016	0.000	-0.016
active/playful	high	0.026	0.033	0.007	0.000	0.000	0.000
fever	medium	0.077	0.191	0.114**	0.222	0.364	0.141**
abdominal pain	low	0.077	0.120	0.043	0.222	0.288	0.066
vomiting	low	0.077	0.246	0.169***	0.254	0.333	0.079
source of water	high	0.000	0.027	0.027	0.000	0.030	0.030*
what has eaten	medium	0.000	0.060	0.060*	0.032	0.152	0.120***
taking fluids	medium	0.000	0.027	0.027	0.048	0.076	0.028
Number of observations		39	183		63	67	

Notes:

Results by Case

Table A.7: Effort, diagnosis and treatment by case

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Effort		Diagnosis			Treatment					
	Time spent	Checklist	Gave diagnosis	Correct diagnosis (conditional)	Correct diagnosis (unconditional)	Correct treatment	Palliative treatment	Unnecessary treatment	Correct treatment Only	Antibiotic	Number of medicines
Panel A1: Unstable angina, representative sample, with SP fixed effects											
Is a private provider	1.101***	7.890**	0.112	0.033	0.011	0.021	-0.070	0.083	-0.026	0.024	0.782***
	(0.303)	(3.418)	(0.093)	(0.074)	(0.030)	(0.034)	(0.081)	(0.083)	(0.028)	(0.062)	(0.286)
Mean of public	2.592	17.354	0.378	0.071	0.027	0.027	0.784	0.730	0.027	0.135	2.054
Panel A2: Unstable angina, dual practice sample, with SP fixed effects											
Is a private provider	3.370***	13.640**	0.184*	0.186	0.144*	0.286***	-0.007	0.052		-0.053	0.447
	(1.027)	(5.380)	(0.109)	(0.183)	(0.076)	(0.094)	(0.081)	(0.130)		(0.110)	(0.362)
Mean of public	1.954	18.341	0.394	0.077	0.030	0.030	0.909	0.667	0.000	0.273	2.242
Panel B1: Asthma, representative sample, with SP fixed effects											
Is a private provider	1.952***	6.015**	0.224***	-0.123	0.021	0.082	-0.008	0.040	0.010	0.009	1.158***
	(0.475)	(2.940)	(0.071)	(0.201)	(0.043)	(0.094)	(0.081)	(0.085)	(0.034)	(0.094)	(0.301)
Mean of public	3.301	17.716	0.154	0.333	0.051	0.385	0.282	0.744	0.026	0.385	2.128
Panel B2: Asthma, dual practice sample, with SP fixed effects											
Is a private provider	1.431***	11.970***	0.044	-0.078	-0.009	0.128	-0.151*	-0.054	0.025	-0.165*	-0.224
	(0.380)	(2.584)	(0.093)	(0.158)	(0.081)	(0.089)	(0.089)	(0.056)	(0.043)	(0.092)	(0.222)
Mean of public	1.875	16.102	0.373	0.545	0.203	0.525	0.458	0.915	0.034	0.593	3.119
Panel C1: Dysentery, representative sample, with SP fixed effects											
Is a private provider	0.846***	7.088***									
	(0.231)	(2.052)									
Mean of public	1.281	10.897									
Panel C2: Dysentery, dual practice sample, with SP fixed effects											
Is a private provider	0.395**	5.279**									
	(0.181)	(2.569)									
Mean of public	0.879	16.228									

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Robustness to Alternative Definitions of Correct Treatment

Table A.9: Robustness of treatment results with alternative definition for correct treatment for unstable angina

	(1)	(2)	(3)	(4)
	All (compare with table 4)		Unstable angina only (compare with table A8)	
	Representative sample	Dual practice sample	Representative sample	Dual practice sample
	Correct treatment	Correct treatment	Correct treatment	Correct treatment
Panel A: SP fixed effects				
Is a private provider	-0.014	0.138**	-0.112	0.232*
	(0.063)	(0.069)	(0.088)	(0.120)
R-squared	0.075	0.091	0.092	0.081
Number of observations	440	201	217	67
Mean of public	0.421	0.510	0.459	0.405
Mean of private	0.421	0.667	0.360	0.633
Mean of sample	0.421	0.587	0.367	0.507
Panel B: SP and market/district fixed effects				
Is a private provider	0.001	0.142**	-0.065	0.210*
	(0.069)	(0.070)	(0.118)	(0.118)
Panel C: SP and market/district fixed effects, and provider controls				
Is a private provider	-0.009	0.150**	-0.203	0.197
	(0.070)	(0.075)	(0.141)	(0.125)

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Robustness to Excluding Dysentery Cases

Table A.10: Robustness of provider effort results to exclusion of dysentery cases

	(1)	(2)	(3)	(4)	(5)	(6)
	Representative sample			Dual practice sample		
	Time Spent (mins)	Percentage of checklist items	IRT score	Time Spent (mins)	Percentage of checklist items	IRT score
Panel A: SP and case fixed effects						
Is a private provider	1.531***	6.942**	0.551**	2.261***	12.421***	0.755***
	(0.306)	(3.307)	(0.212)	(0.425)	(2.386)	(0.207)
R-squared	0.225	0.152		0.177	0.157	
Number of observations	440	440	233	201	201	138
Mean of public	2.956	17.540		1.960	17.553	
Mean of private	4.548	24.335		4.094	30.378	
Mean of sample	4.427	23.820		3.011	23.870	
Panel B: SP, case and market/district fixed effects						
Is a private provider	1.907***	7.593***	0.668**	2.269***	12.361***	0.759***
	(0.367)	(2.727)	(0.277)	(0.404)	(2.391)	(0.207)
Panel C: SP, case and market/district fixed effects, and provider controls						
Is a private provider	1.654***	6.087*	0.611*	2.132***	12.433***	0.829***
	(0.481)	(3.354)	(0.327)	(0.423)	(2.530)	(0.205)

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Robustness to Inclusion of Clinic-level Infrastructure and Facilities Controls

Table A.11: Robustness of results to inclusion of facilties controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Effort			Diagnosis			Treatment					
	Time spent	Checklist	IRT Score	Gave diagnosis	Correct diagnosis (conditional)	Correct diagnosis (unconditional)	Correct treatment	Palliative treatment	Unnecessary treatment	Correct treatment only	Antibiotic	Number medicin
Panel A: Representative sample, with SP, case and market fixed effects												
Is a private provider	1.207***	7.826***	0.731**	0.197**	-0.023	0.039	0.143*	0.082	0.115	-0.009	0.153*	0.861**
	(0.363)	(2.494)	(0.333)	(0.085)	(0.126)	(0.038)	(0.073)	(0.085)	(0.076)	(0.027)	(0.081)	(0.285)
Facilities index	0.012	1.679***	0.120	0.051**	0.014	0.010	0.034*	0.026	0.038**	-0.001	0.029	0.203**
	(0.112)	(0.600)	(0.078)	(0.023)	(0.033)	(0.011)	(0.018)	(0.022)	(0.018)	(0.004)	(0.021)	(0.078)
R-squared	0.356	0.265		0.233	0.362	0.161	0.410	0.379	0.267	0.280	0.275	0.313
Number of observations	634	634	220	420	171	420	420	420	420	420	420	420
Panel B: Dual practice sample, with SP, case and district fixed effects												
Is a private provider	1.233***	9.087***	0.875***	0.039	-0.035	0.001	0.183**	-0.134*	-0.014	0.023	-0.154*	-0.108
	(0.259)	(1.925)	(0.224)	(0.080)	(0.135)	(0.069)	(0.071)	(0.075)	(0.058)	(0.028)	(0.080)	(0.205)
Facilities index	-0.205	-0.963	0.029	-0.038	-0.029	-0.028	-0.063*	-0.017	0.001	0.001	-0.039	-0.256**
	(0.157)	(1.147)	(0.121)	(0.041)	(0.079)	(0.037)	(0.038)	(0.040)	(0.033)	(0.014)	(0.045)	(0.115)
R-squared	0.322	0.243	0.081	0.220	0.199	0.091	0.320	0.306	0.158	0.052	0.146	0.198
Number of observations	272	272	272	164	73	164	164	164	164	164	164	164

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Differential Case Completion in the Dual Practice Sample

Table A.12: Differential case completion in the dual practice sample

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
			Effort				Treatment					
		Fraction of cases	Time spent	Checklist	IRT Score	*Fraction of cases*	Correct treatment	Palliative treatment	Unnecessary treatment	Correct treatment only	Antibiotic	Number of medicines
Panel A: Summary Statistics												
Is a public provider	Completed in first attempt	0.586	1.574	18.291	-0.361	0.574	0.423	0.615	0.833	0.026	0.423	2.782
	Completed in later attempt	0.154	1.509	15.347	-0.758	0.191	0.208	0.708	0.833	0.000	0.708	3.000
	Not completed	0.260				0.235						
	Difference (first - later)		0.065	2.944	0.397*		0.215**	-0.093	0.000	0.026	-0.29***	-0.218
Is a private provider	Completed in first attempt	0.719	3.000	28.804	0.362	0.417	0.553	0.421	0.803	0.053	0.355	2.803
	Completed in later attempt	0.180	2.919	26.383	0.550	0.123	0.609	0.609	0.957	0.000	0.435	3.304
	Not completed	0.101				0.061						
	Difference (first - later)		0.081	2.421	-0.187		-0.056	-0.188*	-0.154**	0.053	-0.080	-0.502**
Panel B: Differential completion												
Is a public provider			-1.583***	-10.97***	-2.211***		-0.381***	0.072	-0.107	0.002	0.305**	-0.212
			(0.576)	(3.913)	(0.374)		(0.127)	(0.123)	(0.106)	(0.050)	(0.137)	(0.374)
Completed in first attempt			0.165	0.862	-0.315		-0.095	-0.146	-0.155*	0.049	-0.074	-0.474
			(0.453)	(3.077)	(0.294)		(0.104)	(0.101)	(0.086)	(0.041)	(0.112)	(0.306)
Is a public provider x Completed in first attempt			0.081	2.172	0.907**		0.291**	0.067	0.152	-0.028	-0.222	0.202
			(0.646)	(4.387)	(0.419)		(0.145)	(0.141)	(0.121)	(0.058)	(0.158)	(0.429)
R-squared			0.239	0.215	0.244		0.281	0.316	0.093	0.033	0.145	0.105
Number of observations			331	331	331		201	201	201	201	201	201

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Re-weighted Estimates for Differential Case Completion in the Dual Practice Sample

Table A.13: Reweighted estimates for differential case completion in the dual sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Effort			Treatment					
	Time spent	Checklist	IRT Score	Correct treatment	Palliative treatment	Unnecessary treatment	Correct treatment only	Antibiotic	Number of medicines
Panel A: Original estimates									
Is a private provider	1.507***	8.977***	0.755***	0.151**	-0.126**	-0.021	0.019	-0.141**	0.002
	(0.271)	(1.767)	(0.207)	(0.064)	(0.061)	(0.051)	(0.025)	(0.068)	(0.182)
R-squared	0.241	0.220		0.274	0.309	0.108	0.025	0.120	0.127
Number of observations	331	331	138	201	201	201	201	201	201
Panel B: Reweighted estimates									
Is a private provider	1.575***	10.236***	0.894***	0.203***	-0.135***	0.041	0.015	-0.126**	0.149
	(0.212)	(1.356)	(0.163)	(0.049)	(0.048)	(0.039)	(0.018)	(0.054)	(0.142)
R-squared	0.250	0.207		0.239	0.276	0.052	0.018	0.100	0.063
Number of observations	455	455	182	273	273	273	273	273	273

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Market Incentives or Statistical Discrimination

Table A.16: Real patients' characteristics in the public and private sectors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Representative sample				Dual practice sample			
	Public	Private	Difference (coeff. on private) no fixed effects	Difference (coeff. on private) market fixed effects	Public	Private	Difference (coeff. on private) no fixed effects	Difference (coeff. on private) district fixed effects
Patient/Case Characteristics								
Number of symptoms	1.446	1.568	0.122**	0.092	2.075	2.113	0.038	0.026
			(0.057)	(0.081)			(0.095)	(0.101)
Fever	0.309	0.445	0.136***	0.135**	0.550	0.548	-0.002	0.012
			(0.034)	(0.054)			(0.043)	(0.043)
Cold	0.272	0.195	-0.077	-0.015	0.476	0.434	-0.042	-0.047
			(0.049)	(0.062)			(0.054)	(0.050)
Diarrhea	0.105	0.151	0.046	0.008	0.066	0.075	0.009	0.006
			(0.033)	(0.040)			(0.014)	(0.015)
Weakness	0.148	0.209	0.061*	0.047	0.182	0.176	-0.006	-0.016
			(0.034)	(0.047)			(0.029)	(0.031)
Injury	0.093	0.069	-0.023	-0.045	0.061	0.070	0.010	0.011
			(0.023)	(0.030)			(0.016)	(0.017)
Vomitting	0.031	0.116	0.085***	0.046*	0.056	0.057	0.001	0.001
			(0.019)	(0.025)			(0.018)	(0.018)
Dermatological	0.062	0.054	-0.007	0.016	0.086	0.070	-0.016	-0.017
			(0.024)	(0.023)			(0.021)	(0.022)
Pregnancy	0.037	0.010	-0.027	0.013	0.035	0.058	0.022	0.024
			(0.033)	(0.018)			(0.019)	(0.019)
Pain	0.426	0.346	-0.080	-0.127	0.648	0.659	0.011	-0.008
			(0.081)	(0.104)			(0.043)	(0.037)
Number of days sick	0.623	1.584	0.961	-2.264	1.570	1.742	0.172	-0.438
			(4.295)	(2.819)			(1.068)	(1.022)

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Market Incentives or Statistical Discrimination

Table A.16: Real patients' characteristics in the public and private sectors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Representative sample				Dual practice sample			
	Public	Private	Difference (coeff. on private)		Public	Private	Difference (coeff. on private)	
			no fixed effects	market fixed effects			no fixed effects	district fixed effects
Activities of Daily Living								
Can easily dress	1.000	0.983	-0.017***	-0.019*	0.957	0.938	-0.020	-0.018
			(0.006)	(0.009)			(0.023)	(0.023)
Can easily work	0.856	0.901	0.045	0.077	0.748	0.798	0.050	0.050
			(0.051)	(0.051)			(0.047)	(0.049)
Can easily lift	0.698	0.730	0.032	0.038	0.666	0.692	0.027	0.017
			(0.104)	(0.124)			(0.071)	(0.071)
Can easily walk	0.623	0.699	0.076	0.146	0.785	0.755	-0.030	-0.049
			(0.131)	(0.104)			(0.074)	(0.071)
Patient Background and Demographics								
New patient	0.944	0.850	-0.094**	-0.001	0.911	0.903	-0.008	-0.003
			(0.036)	(0.043)			(0.037)	(0.038)
Age	30.006	25.401	-4.605	-5.082	28.913	30.700	1.788	1.410
			(3.087)	(3.530)			(2.042)	(2.040)
Is Male	0.494	0.579	0.086	0.021	0.487	0.454	-0.033	-0.039
			(0.053)	(0.059)			(0.042)	(0.041)
Assets index	0.455	0.411	-0.044	-0.238	-0.077	1.006	1.084***	1.146***
			(0.423)	(0.442)			(0.220)	(0.211)
Has formal education	0.565	0.517	-0.048	-0.053	0.546	0.637	0.091**	0.087**
			(0.085)	(0.081)			(0.035)	(0.034)
No. of questions patient asked	0.369	0.478	0.109	0.387**	0.488	0.956	0.467***	0.472***
			(0.103)	(0.152)			(0.125)	(0.125)
Is from this village	0.759	0.529	-0.230***	-0.149**	0.538	0.582	0.045	0.036
			(0.060)	(0.063)			(0.049)	(0.051)
Came by foot	0.741	0.451	-0.290***	-0.158***	0.594	0.414	-0.180**	-0.186***
			(0.044)	(0.041)			(0.068)	(0.068)

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Strategic Effort Withdrawal in Dual Sample: Difference between Dual and Non-Dual

Table A.17: Difference between dual and non-dual providers' treatment of SPs (public sample only)

	(1)	(2)	(3)	(4)	(5)	(6)
	Effort			Diagnosis		
	Time spent	Checklist	IRT Score	Gave diagnosis	Correct diagnosis (conditional)	Correct diagnosis (unconditional)
Panel A: Dual practice sample, with SP, case and district fixed effects						
Is a dual provider	-0.950***	-5.673**	-0.281	-0.005	-0.001	0.002
	(0.309)	(2.721)	(0.247)	(0.078)	(0.118)	(0.055)
R-squared	0.161	0.048		0.120	0.273	0.061
Number of observations	163	163	102	163	63	163
Mean of non-dual observations	2.883	23.653		0.393	0.292	0.115
Mean of dual observations	1.960	17.553		0.382	0.385	0.147
Mean of sample	2.306	19.836		0.387	0.349	0.135
Panel B: Dual practice sample, with SP, case and district fixed effects						
Is a dual provider	-0.911**	-6.300**	-0.376	-0.078	-0.156	-0.057
	(0.366)	(2.860)	(0.251)	(0.095)	(0.176)	(0.070)

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Strategic Effort Withdrawal in Dual Sample: Difference between Dual and Non-Dual

Table A.17: Difference between dual and non-dual providers' treatment of SPs (public sample only)

	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	Treatment						
	Correct treatment	Palliative treatment	Unnecessary treatment	Correct treatment Only	Antibiotic	Number of medicines	Referred patient
Panel A: Dual practice sample, with SP, case and district fixed effects							
Is a dual provider	-0.021	-0.014	-0.022	-0.018	-0.106	-0.209	-0.021
	(0.064)	(0.072)	(0.062)	(0.026)	(0.077)	(0.209)	(0.049)
R-squared	0.337	0.212	0.099	0.044	0.139	0.157	0.162
Number of observations	163	163	163	163	163	163	163
Mean of non-dual observations	0.311	0.689	0.836	0.033	0.557	2.934	0.131
Mean of dual observations	0.373	0.637	0.833	0.020	0.490	2.833	0.078
Mean of sample	0.350	0.656	0.834	0.025	0.515	2.871	0.098
Panel B: Dual practice sample,							
Is a dual provider	-0.033	0.010	-0.061	-0.013	-0.156*	-0.286	-0.058
	(0.077)	(0.089)	(0.072)	(0.028)	(0.087)	(0.269)	(0.059)

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Comparing Best Public with Best Private: Representative Sample

Table A.18: Robustness to alternative metrics for public-private comparison

	(1)	(2)	(3)	(4)	(5)
	Effort		Diagnosis		
	Time spent	Checklist	Gave diagnosis	Correct diagnosis (conditional)	Correct diagnosis (unconditional)
Panel A: Best public vs. best private (by correct treatment)					
Is a private provider	1.632***	11.288***	0.235***	0.033	0.079
	(0.388)	(2.855)	(0.090)	(0.136)	(0.054)
R-squared	0.453	0.417	0.430	0.714	0.363
Number of observations	286	286	192	76	192
Mean of public	2.547	16.000	0.271	0.154	0.042
Mean of private	3.613	24.551	0.438	0.238	0.104
Mean of sample	3.352	22.458	0.396	0.224	0.089
Panel B: Best public vs. best private (by checklist items)					
Is a private provider	3.216***	16.987***	0.263**	0.119	0.079
	(0.916)	(5.003)	(0.116)	(0.160)	(0.056)
R-squared	0.586	0.501	0.610	0.823	0.487
Number of observations	191	191	129	63	129
Mean of public	2.481	18.832	0.333	0.133	0.044
Mean of private	4.708	30.269	0.571	0.146	0.083
Mean of sample	3.938	26.317	0.488	0.143	0.070

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Comparing Best Public with Best Private: Representative Sample

Table A.18: Robustness to alternative metrics for public-private comparison

	(6)	(7)	(8)	(9)	(10)	(11)
	Treatment					
	Correct treatment	Palliative treatment	Unnecessary treatment	Correct treatment only	Antibiotic	Number of medicines
Panel A: Best public vs. best private (by correct treatment)						
Is a private provider	0.162**	0.074	0.169	-0.014	0.143	1.147***
	(0.079)	(0.077)	(0.117)	(0.056)	(0.109)	(0.429)
R-squared	0.592	0.447	0.353	0.218	0.435	0.463
Number of observations	192	192	192	192	192	192
Mean of public	0.271	0.521	0.708	0.042	0.250	2.063
Mean of private	0.438	0.535	0.750	0.049	0.292	3.014
Mean of sample	0.396	0.531	0.740	0.047	0.281	2.776
Panel B: Best public vs. best private (by checklist items)						
Is a private provider	0.141	0.034	0.167	-0.027	0.222	1.581***
	(0.095)	(0.104)	(0.139)	(0.028)	(0.156)	(0.503)
R-squared	0.616	0.699	0.468	0.540	0.473	0.674
Number of observations	129	129	129	129	129	129
Mean of public	0.200	0.556	0.689	0.022	0.178	1.800
Mean of private	0.286	0.595	0.845	0.012	0.310	3.381
Mean of sample	0.256	0.581	0.791	0.016	0.264	2.829

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