



# Contracting for Health

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Fighting World Poverty  
New York University  
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# Collaborators

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- Many institutions, people involved
  - Indu Bhushan (ADB), Erik Bloom (ADB), David Clingingsmith (Harvard), Loraine Hawkins (World Bank), Rathavuth Hong (OCR Macro), Elizabeth King (World Bank), Michael Kremer (Harvard), Benjamin Loevinsohn (World Bank), Brad Schwartz (UNC-Chapel Hill)
- Keller and Schwartz 2001; Loevinsohn 2000, 2001; Schwartz and Bushan 2004



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# Overview

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- Background on project and context
- Empirical approach
- Results
  - Contracted outcomes
  - Non-contracted outcomes
  - Health facility management
  - Choice of provider, expenditure



# Background:

## Health care in developing countries

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- Government provision terrible
  - Weak provider incentives
  - 35% of health workers absent in surprise visits in six developing countries.
- Private provision terrible
  - Provider incentives distorted under asymmetric information
  - 30%-50% of prescriptions unnecessary or contraindicated in India (Phadke, 1998; Das and Sanchez 2000)
  - Providers may not consider infectious disease externalities
- Contracting: Afghanistan, Bangladesh, Estonia, Haiti, India, Burkina Faso
  - Stronger incentives than government providers
  - Less asymmetry of information
  - In rural context, limited mobility, limited adverse selection



# The project I

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- Management of district-level government health services turned over to NGOs through open tender
  - 12 districts in 3 provinces
  - Total population 1.3 million
  - District the right unit for competition
- Targeted improvement of child and maternal health service coverage levels. Prevention
- Fixed price per capita bids
- 4-year contracts with provision for monitoring and sanctions



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# The project II

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- Random assignment to tender
  - 8 treatment eligible districts, quasi-stratified by province; 4 comparison districts
- Two treatments
  - Contracting in (CI)
    - Work within government staff and procurement structure
    - Management authority, but can't hire/fire, procure outside
  - Contracting out (CO)
    - Full control of staffing--hire and fire
    - Full control of procurement
- Surveys: household 1997, 2003; facility 2003



# The project III

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- 10 NGOs submitted 16 bids for the 8 districts
  - Technical criteria and price
  - Bids scored by mixed committee; insiders and outsiders; 8 of 16 bids technically acceptable
  - 4 NGOs won; one got two districts
  - 3 districts got no technically acceptable bids
- Only international NGOs submitted bids
  - Expat staff: between 0.5 and 3.0 per contracted district.
- CO funds all flow from ADB, CI mixed
  - \$0.25 per capita budget supplement for CI, comparison; sorting out overall financing
  - Preintervention spending \$1-\$2 per capita



# Econometric Issues

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- Selection into treatment
  - CO: 4 districts tendered, 3 awarded
  - CI: 4 districts tendered, 2 awarded
  - Previous data collection, analysis based on actual treatment status, not initial assignment
  - Perhaps NGOs focused bids on districts where gains would be easiest
- Cluster-level intervention



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# Empirical method I

- District-level intervention with individual outcomes
- Randomly-assigned eligibility an instrument for actual treatment.
- TOT for outcome  $k$ :

$$\begin{aligned}y_{idptk} &= \beta_{0k} + \beta_{1k} I_d^{CI-T} + \beta_{2k} I_d^{CO-T} + \beta_{3k} I_t^{2003} \\ &\quad + \beta_{4k} I_d^{CI-T} \times I_t^{2003} + \beta_{5k} I_d^{CO-T} \times I_t^{2003} + p_{pt} + \varepsilon_{idptk} \\ &= W \theta_k + \varepsilon_{idptk}\end{aligned}$$

- Instruments:  $I_d^{CI-R}, I_d^{CO-R},$   
 $I_d^{CI-R} \times I_t^{2003}, I_d^{CO-R} \times I_t^{2003}$

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 $I_d^{CI-R} \times I_t^{2003}, I_d^{CO-R} \times I_t^{2003}$



# Empirical method II

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- District-level intervention with individual outcomes
  - Need to account for district level shocks
- Clustering may over-reject null with small number of clusters
- Randomization inference behaves better, but may have low power
  - Create full set placebo random assignments using actual randomization process. (Rosenbaum 2002)
  - Generate placebo treatment effect for each member of the set.
  - Use distribution of placebo treatment effects as test distribution.



# Empirical method III

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- Average effect size (AES) for family of  $K$  outcomes
  - Kling, Katz, Leibman, and Sonbanmatsu (2003), O'Brien (1984)
- For  $K$  TOT effects  $\pi_k$ , the AES is:

$$\tau = \frac{1}{K} \sum_{k=1}^K \frac{\pi_k}{\sigma_k}, \quad \sigma_k^2 = \text{Var}(\bar{y}_{vdtk} \mid t = \text{baseline}, d = \text{comp.})$$



# Results in a nutshell

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- Both CI and CO had large, positive and significant TOT effects on contracted outcomes, no effects were significantly negative
- Noncontracted outcomes showed gains or no effect. No average effect.
- Increased use of public facilities, mostly at expense of drug sellers
- Facility management improved

# TOT for changes in targeted outcomes

	Full Immuni- zation	Vitamin A	Antenatal Care	Trained Delivery	Delivery in Facility	Use Birth Spacing	Know Birth Spacing	Use Public Facilities
CI--Treated	-0.099 (0.08)	-0.021 (0.03)	-0.006 (0.03)	0.020 (0.12)	0.021 (0.03)	0.001 (0.04)	0.043 (0.08)	-0.007 (0.01)
CO--Treated	-0.101 (0.14)	-0.138** (0.06)	0.030 (0.10)	0.134 (0.17)	0.014 (0.03)	0.116 (0.12)	-0.070 (0.12)	-0.003 (0.03)
<b>CI--Treated X 2003</b>	<b>0.139</b> <b>(0.08)</b>	<b>0.091</b> <b>(0.06)</b>	<b>0.364***</b> <b>(0.08)</b>	<b>0.057</b> <b>(0.04)</b>	<b>0.118</b> <b>(0.07)</b>	<b>0.077</b> <b>(0.06)</b>	<b>-0.022</b> <b>(0.07)</b>	<b>0.176***</b> <b>(0.04)</b>
<b>CO--Treated X 2003</b>	<b>0.150</b> <b>(0.12)</b>	<b>0.417***</b> <b>(0.09)</b>	<b>0.263</b> <b>(0.16)</b>	<b>-0.123</b> <b>(0.11)</b>	<b>0.074</b> <b>(0.07)</b>	<b>-0.038</b> <b>(0.09)</b>	<b>0.073</b> <b>(0.13)</b>	<b>0.289***</b> <b>(0.05)</b>
Year 2003	0.297** (0.10)	0.153*** (0.04)	0.343*** (0.11)	0.203*** (0.04)	0.122 (0.07)	0.148** (0.05)	0.587*** (0.06)	0.143*** (0.02)
Constant	0.509*** (0.10)	0.475*** (0.03)	0.132*** (0.04)	0.285** (0.13)	0.055*** (0.01)	0.084 (0.06)	0.147** (0.06)	0.023 (0.01)
Observations	5,100	11,213	4,993	4,993	4,976	6,994	9,537	11,223
R-squared	0.27	0.13	0.25	0.03	0.05	0.02	0.34	0.12
Comparison mean 2003	0.81	0.61	0.35	0.34	0.10	0.23	0.80	0.13
Comparison mean 1997	0.34	0.43	0.09	0.24	0.03	0.13	0.22	0.04

Notes: IV regressions with provinceXyear effects. Standard errors corrected for clustering at the district level. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

# TOT for changes in targeted outcomes

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CO--Treated	-0.101 (0.14)	-0.138** (0.06)	0.030 (0.10)	0.134 (0.17)	0.014 (0.03)	0.116 (0.12)	-0.070 (0.12)	-0.003 (0.03)
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<b>CO--Treated X 2003</b>	<b>0.150</b> <b>(0.12)</b>	<b>0.417***</b> <b>(0.09)</b>	<b>0.263</b> <b>(0.16)</b>	<b>-0.123</b> <b>(0.11)</b>	<b>0.074</b> <b>(0.07)</b>	<b>-0.038</b> <b>(0.09)</b>	<b>0.073</b> <b>(0.13)</b>	<b>0.289***</b> <b>(0.05)</b>
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Observations	5,100	11,213	4,993	4,993	4,976	6,994	9,537	11,223
R-squared	0.27	0.13	0.25	0.03	0.05	0.02	0.34	0.12
Comparison mean 2003	0.81	0.61	0.35	0.34	0.10	0.23	0.80	0.13
Comparison mean 1997	0.34	0.43	0.09	0.24	0.03	0.13	0.22	0.04

Notes: IV regressions with provinceXyear effects. Standard errors corrected for clustering at the district level. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

# TOT effects for changes in targeted outcomes, randomization inference

	(1) Full Immun.	(2) Vitamin A	(3) Antenatal Care	(4) Trained Del.	(5) Del. in Facility	(6) Use Birth Spacing	(7) Know Birth Spacing	(8) Use Public Facilities
<b>Contracting In - Treated X 2003</b>	<b>0.139</b> (0.12)	<b>0.091</b> (0.15)	<b>0.364**</b> (0.18)	<b>0.057</b> (0.06)	<b>0.118</b> (0.08)	<b>0.077</b> (0.06)	<b>-0.022</b> (0.08)	<b>0.176*</b> (0.10)
<b>Contracting Out - Treated X 2003</b>	<b>0.150</b> (0.18)	<b>0.417**</b> (0.21)	<b>0.263</b> (0.27)	<b>-0.123</b> (0.12)	<b>0.074</b> (0.11)	<b>-0.038</b> (0.12)	<b>0.073</b> (0.16)	<b>0.289**</b> (0.14)
Observations	5,100	11,213	4,993	4,993	4,976	6,994	9,537	11,223

Notes: These are IV regressions for individual outcomes. The original random assignment of districts into two treatment groups and one control group are used as instruments for actual treatment status at the district level. Standard errors computed using

# AES for changes in eight targeted outcomes

Contracting In (CI)	0.995*** (0.17)
Contracting Out (CO)	1.093*** (0.26)
H <sub>0</sub> : CO=CI, p-value	0.69

Notes: Average differential increases caused by treatment in baseline comparison-group standard deviations. Joint estimation corrected for clustering at the district level. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

## AES for 8 non-contracted outcomes

Contracting In (CI)	0.181 (0.27)
Contracting Out (CO)	-0.115 (0.06)
$H_0: CO=CI$ , p-value	0.46

Notes: Joint estimation corrected for clustering at the district level. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

- Infant survival
- Diarrhea incidence
- Proper treatment diarrhea
- Number of antenatal services
- Village outreach last month
- Breastfeeding newborn <6h
- No water to infant
- Knowledge of HIV risks

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Contracting In (CI)	0.181 (0.27)
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- Infant survival
- Diarrhea incidence
- Proper treatment diarrhea
- Number of antenatal services
- Village outreach last month
- Breastfeeding newborn <6h
- No water to infant
- Knowledge of HIV risks

# AES for 11 health center management outcomes

Contracting In (CI)	0.599*** (0.12)
Contracting Out (CO)	1.128*** (0.23)
$H_0: CO=CI$ , p-value	<0.01

Notes: Joint estimation corrected for clustering at the district level.  
\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

- Permanent HC building
- HC open with patients
- 24h service available
- All scheduled staff present
- Child delivery service available
- User fees clearly posted
- Number of supervisor visits
- Number of outreach trips
- Index of equipment installed and functional
- Index of drugs and other supplies available
- All childhood immunizations available

# TOT for changes in care-seeking outcomes, all household members

	Reported ill during past month	Total spent curative care past month (2003 USD)	Was any provider consulted in the past month?				
			None	Traditional Healer	Drug Seller	Qualified Private Provider	Qualified Public Provider
CI--Treated	0.004 (0.04)	0.278 (0.53)	-0.010 (0.04)	-0.004 (0.00)	0.029 (0.02)	-0.016 (0.01)	0.000 (0.00)
CO--Treated	0.135 (0.10)	3.951** (1.35)	-0.120 (0.10)	0.006 (0.00)	0.075 (0.06)	0.041 (0.03)	0.014 (0.01)
<b>CI--Treated X 2003</b>	<b>0.001</b> <b>(0.03)</b>	<b>-0.304</b> <b>(0.40)</b>	<b>0.003</b> <b>(0.03)</b>	<b>0.003</b> <b>(0.00)</b>	<b>-0.046*</b> <b>(0.03)</b>	<b>0.007</b> <b>(0.01)</b>	<b>0.032***</b> <b>(0.01)</b>
<b>CO--Treated X 2003</b>	<b>-0.145</b> <b>(0.10)</b>	<b>-4.679***</b> <b>(1.34)</b>	<b>0.118</b> <b>(0.09)</b>	<b>-0.005</b> <b>(0.01)</b>	<b>-0.103</b> <b>(0.07)</b>	<b>-0.077*</b> <b>(0.04)</b>	<b>0.050***</b> <b>(0.01)</b>
Year 2003	0.077 (0.04)	0.228 (0.62)	-0.077* (0.04)	-0.003 (0.00)	0.052 (0.04)	0.006 (0.01)	0.047*** (0.01)
Constant	0.162** (0.06)	1.502* (0.80)	0.858*** (0.05)	0.012*** (0.00)	0.037 (0.03)	0.092*** (0.02)	0.003 (0.01)
Observations	54,062	54,062	54,062	54,062	54,062	54,062	54,062
R-squared	0.01	0.01	0.01	0.01	0.01	0.01	0.02
Comparison mean 2003	0.19	1.07	0.83	0.01	0.08	0.08	0.03
Comparison mean 1997	0.20	1.66	0.82	0.01	0.08	0.08	0.01

Notes: IV regressions with provinceXyear effects. Standard errors corrected for clustering at the district level. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

# Annual per-capita health spending (2003 USD)

	Mean Public			Mean Private			Mean Total			Median Private		
	1999	2003	Chng	1997	2003	Chng	1997/9	2003	Chng	1997	2003	Chng
Comparison	1.36	2.02	0.66	33.60	20.63	-12.98	34.97	22.65	-12.32	9.89	6.04	-3.85
CI-Treated	2.04	3.62	1.58	37.49	22.93	-14.56	39.53	26.55	-12.98	9.27	5.64	-3.64
CO-Treated	3.56	5.03	1.46	92.92	17.71	-75.21	96.48	22.73	-73.75	17.62	4.36	-13.26
Not Treated	0.94	2.10	1.17	43.73	17.57	-26.15	44.66	19.68	-24.99	11.13	5.03	-6.09

Notes: Public spending from Ministry of Health administrative records. Private from household survey.

# TOT for health spending per capita (2003 USD)

	Per Capita Health Spending in 2003 (2003 USD)			Change in Spending (2003 USD)		
	Total	Private	Public	Total 1997/9 -2003	Private, 97-03	Public, 99-03
<b>CI--Treated</b>	<b>1.355</b> (3.95)	<b>0.248</b> (4.23)	<b>1.107</b> (0.95)	<b>-2.55</b> (10.77)	<b>-2.980</b> (11.62)	<b>0.430</b> (1.15)
<b>CO--Treated</b>	<b>-5.603</b> (6.29)	<b>-9.293</b> (6.72)	<b>3.690**</b> (1.51)	<b>-57.026**</b> (17.14)	<b>-59.054**</b> (18.49)	<b>2.028</b> (1.83)
Constant	21.751*** (3.85)	19.887*** (4.12)	1.863* (0.93)	2.155 (10.51)	1.981 (11.34)	0.174 (1.12)
Observations	12	12	12	12	12	12
R-squared	0.65	0.63	0.68	0.67	0.64	0.64

Notes: IV regressions with provinceXyear fixed effects. Random assignment to treatment serves as an instrument for actual treatment. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%



# Conclusion

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- Contracting with NGOs improved health care service delivery
- CI vs. CO
- Total health spending flat or declined
- Channels?
- Generalizability?
  - Lancet Article