

Do Health Care Providers Respond to Demand-Side Incentives?

Evidence from Indonesia

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Motivation

- How do we improve human capital in low-resource settings?
 - Poverty reduction and human capital investment
- 'Broad' versus 'Targeted' interventions
 - Household Conditional Cash Transfer (CCT): Resources directly to poor, pure demand intervention
 - Community CCT: simpler alternative to HH CCT, can address demand and supply constraints
 - Focus on health requirements

Research Questions

- Effect of household CCT on
 - Utilization, Health care price, and Quality
 - Focus on delivery assistance and prenatal care
- Secondary question:
 - Which one is more effective in improving health seeking behavior and health outcomes?

Household CCT Effects

- Demand shock: increased utilization may increase price, lower quality (but MCH education mitigates this)
- Utilization and Price
 - Spillover in consumption among non-participants, no price increases in the goods market (Angelucci and DeGiorgi 2009)
 - No significant effect on local prices or wages (Fizbein et al. 2009)
- Quality of care as input to health outcomes
 - Better health seeking behavior, but mixed health outcomes (Fizbein et al. 2009)

Preview of Results

- Household CCT: Demand side
 - 40% increased use of midwives, increased fees paid to providers
 - Higher prenatal quality received
- Household CCT: Supply side
 - 10% increase in delivery fees
 - No significant change in quality provided
- Quality increase among participants driven by utilization
- Both programs change household behavior, but household CCT improves health outcomes

Outline

- 1 Background: Indonesia's Health Care System
- 2 Background: Indonesia's CCT Programs
- 3 Data
- 4 Empirical Strategy
- 5 Results
- 6 Comparison between household and community CCT
- 7 Conclusion

Background: Indonesia's Health Care System

- Clinics provided at the sub-district level
- Doctor, midwife, traditional attendant for delivery assistance
- CCT objective to reduce maternal and infant mortality
 - Require doctors or midwives
- Midwives: main health care providers in Indonesia

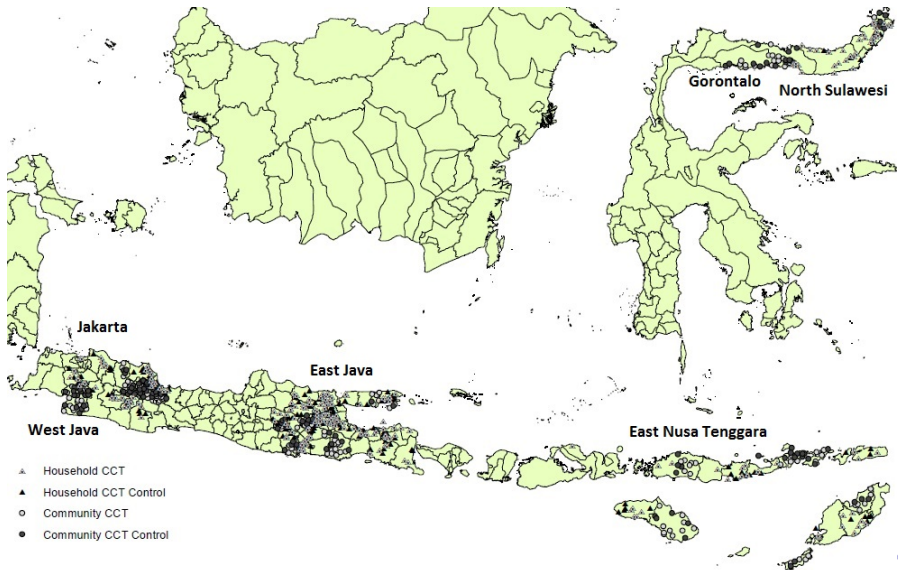
Background: Indonesia's Midwives

- Majority employed by the government
 - Sub-district clinic supervision
 - Midwives live in the village
 - Salary plus fee-for-service payment
- 90% have dual practice
 - 50% income from private practice
 - Public fees regulated

Background: Household and Community CCT Programs

- Both programs piloted in 2007, same requirements
- Randomized at the sub-district level, no overlap
- Household CCT: 259 control, 329 treatment
- 5 provinces in Java and off-Java

Background: Geographic Targeting



Background: Program Requirements

	No. of services	Total Cost
1. Prenatal care visit	4	36,000
2. Iron tablets (30 pill packet)	3	-
3. Childbirth assisted by trained professional	1	300,000
4. Postnatal care visit	2	60,000
5. Immunization	12	72,000
6. Monthly weighing	12	36,000
7. Vitamin A pill	2	-
8. Primary, middle school enrollment	1	300,000
9. Monthly attendance $\geq 85\%$	12	-
Total Costs to Meet Requirements		800,000

Source: World Bank, Ministry of Social Affairs. All prices in 2007 *Rupiah*, 1USD ~ 10,000 *Rupiah*.

Background: Targeting of Household CCT Participants

- Proxy-means test to enroll extremely poor households
 - Housing characteristics, education attainment, fuel sources, employment, and access to health care and education
 - Target expectant/lactating women and households with school-aged children
- Quarterly transfers to women
- Monthly verification from school attendance and patient lists

Background: Transfer Amounts

Fixed cash transfer	200,000
Cash transfer per household with:	
Child less than 6 years old	800,000
Pregnant or lactating mother	800,000
Child of primary school age (6-12)	400,000
Child of secondary school age	800,000
Minimum transfer per household:	600,000
Maximum transfer per household:	2,200,000

Transfers amount to 15 to 20% of total consumption

Source: World Bank, Ministry of Social Affairs. All prices in 2007 *Rupiah*, 1USD~10,000 *Rupiah*

Data: Impact Evaluation Survey

- Baseline in 2007; Follow up in 2009
- Household CCT: 2,718 panel villages
- 360 sub-district clinics
- 13,976 Near poor and poor panel households
 - 30% of households in treated sub-districts participate
 - Survey of ever married women
- 1,396 providers, 60% panel midwives

Data: Survey of ever married women

- Prenatal care, delivery assistance, fees, and birth outcomes
- Quality index: principal component analysis of prenatal care items
 - Weight, height, blood pressure, fundal height, fetal heartbeat, blood test, external and internal pelvic examinations, number of tetanus toxoid vaccinations, any iron pills, information on pregnancy complications

Baseline: Utilization

	Control	Treatment	Adjusted Difference
Trained Attendant	0.623 (0.485)	0.639 (0.480)	0.0129
Doctor	0.088 (0.283)	0.079 (0.269)	-0.0115
Midwives	0.562 (0.496)	0.588 (0.492)	0.0240
Traditional Attendant	0.431 (0.495)	0.419 (0.494)	-0.0084
Obs.	2,301	2,264	

Joint test p-value 0.29

Baseline: Delivery Fees Paid to Providers

	Control	Treatment	Adjusted Difference
Trained Attendant	256,255 (773,842)	243,838 (584,289)	-15,902
Doctor	102,722 (746,292)	82,113 (541,178)	-22,163
Midwife	176,276 (363,480)	178,389 (336,313)	-324.8
Traditional Attendant	40,711 (90,292)	39,192 (81,617)	-1,057
Obs.	2,301	2,264	

Joint test p-value 0.52. 1USD~10,000 *Rupiah* [▶ Conditional Fees](#)

Data: Midwife survey

- Public and private fees, income
- Self-reported prenatal care items
 - For every item: Always, Sometimes, or Never
 - Quality index: principal component analysis

Baseline: Midwife Characteristics

	Control	Treatment	Adjusted Difference
Total monthly income	3,036,459 (2,304,431)	3,079,905 (2,477,733)	226,836*
Share Private income	0.472 (0.282)	0.468 (0.281)	-0.006
Public fee	128,684 (146,333)	149,758 (201,070)	-18,554
Private fee	295,539 (141,156)	296,371 (139,032)	-2,887

Joint test p-value 0.37. 1USD~10,000 *Rupiah* ▶ Number of midwives

Empirical Strategy: Placement Effect

- Reduced Form Program Effect:

$$y_{mdst} = \beta CCT_{dst} + \mu \overline{y_{ds1}} + \alpha_d + \nu_{mdst}$$

y_{mdst} is the outcome of interest for woman (midwife) m at sub-district s , in district d , at time t .

$\overline{y_{ds1}}$ is the baseline value for the sub-district.

District FE included.

All standard errors clustered at the sub-district level.

Empirical Strategy: Participation Effect

- Effect of receiving cash transfer
 - Endogenous household participation
 - Sub-district randomization instrument for participation
- Baseline Covariates: Education, age group, log per capita expenditure, and asset ownership
- District FE included, all standard errors clustered at the sub-district level

Participation Effect: Utilization

	P(Use of Doctor) (1)	P(Use of Midwife) (2)	P(Use of Trad. Attendant) (3)
Ever Received CCT	0.082*** (0.025)	0.172*** (0.035)	-0.171*** (0.033)
Observations	6,628	6,628	6,628
Baseline Mean among Program Participants	0.025	0.375	0.600

Similar placement effects. Also increased use of midwives for prenatal care [▶ Prenatal](#)

Participation Effect: Birth Outcomes

	Infant mortality		Maternal mortality	Height-for-Age
	Alatas et al. (2011)	Replication by Triyana (2012)	(3)	(4)
	(1)	(2)		
Ever Received CCT	0.005 (0.00)	0.006 (0.008)	-0.001 (0.001)	-0.104 (0.273)
Observations	-	8,302	7,896	1,578
Baseline Mean	-	0.031	0.004	-1.443

Similar results with rare event correction

► Rare event logit

Similar placement effect

► Placement effect

► Reporting

Changes in Delivery Fees Paid by Program Participants

	Delivery Fees (1)	Fees Paid to Doctors (2)	Fees Paid to Midwives (3)	Fees Paid to Trad. Attendant (4)
Ever Received CCT	78,544* (43,305)	69,089* (39,820)	96,949*** (28,722)	-26,311*** (5,955)
Observations	6,544	6,546	6,544	6,247
Baseline Mean	114,032	0	62,359	49,407

30% of CCT spent on delivery fees (1USD~10,000 *Rupiah*)

► Placement effect

► Conditional change

► Zero fees

Supply Response: Number of Providers

	Community Report (Village Level)		
	Traditional		
	Doctors	Midwives	Attendants
	(1)	(2)	(3)
Treatment	-0.003 (0.056)	0.115*** (0.021)	0.047 (0.029)
Observations	5,426	5,434	5,429
Mean Dependent Variable	0.348	1.200	0.575

► Clinic Report

► Midwife Hours

Income and Fees Received by Midwives

	Total Income (1)	Fees for Normal Childbirth	
		Public fees (2)	Private fees (3)
Treatment	335,314*** (115,473)	-3,161 (10,554)	27,062*** (4,488)
Observations	2,790	2,181	2,556
Baseline Mean	3,036,459	128,684	295,539

All prices in 2007 *Rupiah*, 1USD~10,000 *Rupiah*

▶ [Alternative Midwife Sample](#)

Changes in Prenatal Quality

	Household Report		Midwife Report	
	Placement Effect	Participation Effect (IV)	Public Practice	Private Practice
	(1)	(2)	(3)	(4)
Treatment	0.080** (0.033)	0.167** (0.070)	-0.008 (0.050)	-0.021 (0.051)
Observations	8,302	8,302	1,396	1,396
Baseline Mean	0.000 (1.000)	-0.317 (1.122)	0.000 (1.000)	0.000 (1.000)

Similar results using alternative definitions

▸ Alternative quality

▸ Conditional

Comparison of Household and Community CCT Programs

- Use propensity score matching to select sub-districts with similar supply readiness
 - Household CCT as treated, community CCT as comparison
 - Estimate treatment on the treated

Matching Results: Behavioral Outcomes

	HH CCT Comm. Mean (1)	CCT Mean (2)	Weighted Difference (3)
Prenatal visits	7.103	6.570	0.603*** (0.168)
Iron	0.145	0.117	0.031 (0.014)
Delivery by professional	0.731	0.641	0.097*** (0.017)
Facility birth	0.567	0.437	0.129*** (0.018)
Postnatal visits	1.720	1.598	0.125 (0.119)

Matching Results: Birth Outcomes

	HH CCT	Comm. CCT	Weighted Difference
	Mean (1)	Mean (2)	(3)
Birth weight (grams)	3,171	3,171	-4.97 (24.91)
Low birth weight	0.086	0.082	0.010 (0.013)
Gestational age (weeks)	36.348	35.822	0.485 (0.270)
Preterm birth	0.363	0.600	-0.223*** (0.0261)
Height for age z-score	-1.117	-1.354	0.247** (0.116)

Conclusion and Policy Implications

- Household CCT lowers barrier to health care
 - Utilization increases by 40%
- Price increases in response to demand shock
 - Participants pay higher delivery fees, 0.15 SD quality improvements
 - Midwives charge 10% higher fees, no quality change

Conclusion and Policy Implications

- Supply response in demand-side intervention important
- Evidence suggests need to improve quality of care to translate utilization to health outcomes
- As program expands, consider quality of care and price increase

Additional Slides

Additional slides

- 1 ▶ Dual practice theory
- 2 ▶ Heterogeneity
- 3 ▶ Robustness
- 4 ▶ Additional health outcomes
- 5 ▶ Conditional Price Increase
- 6 ▶ Dual Practice Midwives: Price Increase
- 7 ▶ Alternative Quality

Heterogeneous Treatment Effects

- By per capita expenditure quintile [▶ Baseline Heterogeneity](#)
 - Poorer households report higher quality [▶ Figure](#)
- Java vs off-Java
 - Higher utilization increase in Java (**WorldBankJakarta2011**)
 - Households: Larger price increase off-Java, quality increase in Java [▶ Table](#)
 - Midwives: Larger price increase off-Java, No quality change [▶ Table](#)
- Better outcomes for high baseline quality [▶ Table](#)

Heterogeneous Treatment Effects

- Price increase among non-participants
 - No significant differential price effect on non-participants [▶ Figure](#) [▶ Table](#)
- Price discrimination among participants
 - No evidence of differential increase [▶ Table](#)

Robustness

- Midwife selection
 - More educated but inexperienced [▶ Table](#)
 - No evidence of control areas losing midwives
[▶ Table](#)
- Perverse incentive: program reduces birth spacing to receive transfers
 - No perverse incentive effect in the timing of birth [▶ Table](#)

Dual Practice Theory

- Providers choose private fees, level of inducement, and time in public practice

$$\max_{T, p_v, i} U(Y, L, I)$$

- CCT generates demand shock: q_{0p} or q_{0v}
- Assume T, i fixed: Ambiguous effect on private price

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Data: Baseline Number of Providers at the Sub-District Clinic

	Control	Treatment	Adjusted Difference
Doctors	1.637 (1.009)	1.583 (1.030)	0.018
Midwives	9.067 (5.844)	8.129 (5.320)	0.140
Nurses/Paramedics	9.339 (4.941)	9.433 (5.208)	0.213
Obs.	180	180	

Joint test p-value 0.68.

[▶ Village level](#)

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Additional Health outcomes

	Birth weight	Low birth weight	P(weighed at birth)
	(1)	(2)	(3)
Treatment	-0.570 (26.04)	0.021* (0.012)	0.062*** (0.015)
Observations	4,987	4,987	4,987
Baseline Mean	3,180	0.077	0.757

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Baseline Provider Availability in the Village

	Control	Treatment	Difference
Doctors	0.348 (0.831)	0.406 (0.988)	0.0628
Midwives	1.200 (1.539)	1.232 (1.548)	0.111
Nurses/Paramedics	0.917 (0.508)	0.940 (0.583)	0.0293
Traditional attendants	0.575 (0.971)	0.559 (0.966)	-0.0493
Obs.	1,351	1,358	

Joint test p-value 0.19

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Changes in Zero Payment

	P(Zero Paid to Doctor)	P(Zero Paid to Midwife)	P(Zero Paid to Trad. Attendant)	P(Midwife Receives Zero)
	(1)	(2)	(3)	(4)
Treatment	-0.026** (0.011)	-0.077*** (0.018)	0.090*** (0.016)	-0.008 (0.008)
Obs.	6,546	5,858	6,247	5,196
Baseline Mean	0.946	0.565	0.686	0.058

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Alternative Quality Measure: Exclude Iron Pills

	Household Report		Midwife Report	
	Placement Effect	Participation Effect	Public Practice	Private Practice
	OLS	IV	OLS	OLS
	(1)	(2)	(3)	(4)
Treatment	0.084** (0.034)	0.175** (0.0702)	-0.011 (0.050)	-0.024 (0.051)
Observations	8,302	8,302	1,396	1,396

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Alternative Quality Measure: P(Complete Check)

	Household Report		Midwife Report	
	Placement Effect	Participation Effect	Public Practice	Private Practice
	OLS	IV	OLS	OLS
	(1)	(2)	(3)	(4)
Treatment	0.065*** (0.015)	0.130*** (0.031)	-0.008 (0.025)	-0.004 (0.025)
Observations	8,302	8,302	1,396	1,396
Baseline Mean	0.248	0.174	0.213	0.194

Quality Changes Conditional on Prenatal Care from Midwife

	Placement Effect (1)	Participation Effect (2)
Treatment	0.040 (0.033)	0.080 (0.064)
Observations	6,270	6,270

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Changes in Prenatal Care Provider

	<u>P(Doctors)</u> (1)	<u>P(Midwives)</u> (2)	<u>P(Trad. Attendants)</u> (3)
Treatment	-0.001 (0.012)	0.045*** (0.013)	-0.005 (0.007)
Observations	8,302	8,302	8,302
Mean Dependent Variable	0.203	0.735	0.045

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Birth Outcomes: Rare Event Correction

	Infant mortality	Maternal mortality
	(1)	(2)
Treatment	0.367 (0.223)	-0.0005 (0.0008)
Observations	8,302	7,896

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Birth Outcomes: Placement Effect

	Infant mortality		Maternal mortality	Birth weight
	Alatas et al. (2011)	Replication by Triyana (2012)		
	(1)	(2)	(3)	(4)
Treatment	0.002 (0.00)	0.003 (0.003)	-0.0003 (0.0008)	-0.57 (26.04)
Observations	-	8,302	7,896	4,987
Baseline Mean	0.0102	0.011	0.001	3,180

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Changes in the Number of Providers

Clinic Report (Sub-District Level)

	Doctors (1)	Midwives (2)
Treatment	-0.029 (0.074)	0.748*** (0.190)
Observations	713	713
Baseline Mean	1.637	9.339

Changes in Utilization: Logit

	Ordered Logit (1)	P(Use of Doctor) (2)	P(Use of Midwife) (3)	P(Use of Trad. Attendant) (4)
Treatment	0.489*** (0.087)	0.476*** (0.123)	0.500*** (0.091)	-0.530*** (0.090)
Observations	6,628	6,628	6,628	6,628

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Conditional Baseline Delivery Fees

	Control	Treatment
Doctor	1,184,412 (2,273,117)	1,068,430 (1,664,739)
Midwife	312,694 (437,895)	303,600 (393,082)
Traditional Attendant	148,222 (166,606)	145,521 (144,436)

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Participation Effect: Birth Outcomes

	Infant mortality		Maternal mortality	Birth weight
	Alatas et al. (2011)	Replication by Triyana (2012)		
	(1)	(2)	(3)	(4)
Treatment	0.002 (0.00)	0.003 (0.003)	-0.0003 (0.0008)	-0.57 (26.04)
Observations	-	8,302	7,896	4,987
Baseline Mean	0.0102	0.011	0.001	3,180

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Changes in Delivery Fees Paid by Households in Treated Sub-districts

	Delivery Fees (1)	Fees Paid to Doctors (2)	Fees Paid to Midwives (3)	Fees Paid to Trad. Attendant (4)
Treatment	44,484** (20,968)	32,720* (18,850)	45,917*** (13,138)	-12,285*** (2,725)
Observations	6,544	6,546	6,544	6,247
Baseline	256,255	102,721	176,276	40,711
Mean				

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Changes in Conditional Fees Paid by Households in Treated Sub-districts

	Fees Paid to Doctors <hr/> (1)	Fees Paid to Midwives <hr/> (2)	Fees Paid to Trad. Attendant <hr/> (3)
Treatment	37,738 (148,169)	52,474** (23,886)	8,569 (5,910)
Observations	593	3,855	2,050
Baseline Mean	1,184,412	312,694	148,222

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Baseline Heterogeneity

	Delivery Fees	Midwife Fees	Prenatal Quality Index
	(1)	(2)	(3)
< 20th percentile	181,779	245,055	-0.172
20-40th percentile	252,029	275,428	-0.035
40-60th percentile	263,022	322,536	0.061
60-80th percentile	339,830	287,100	0.128
> 80th percentile	469,831	418,092	0.014

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Household Report: Heterogeneous Treatment Effects

	Fees paid to Midwife		Quality	
	Java (1)	off- Java (2)	Java (3)	off- Java (4)
Treatment	54,252*** (18,268)	67,390*** (20,874)	0.080** (0.037)	0.106 (0.073)
Observations	4,444	2,102	5,659	2,643
Baseline Mean	212,865	85,720	0.078	-0.194

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Midwife Report: Heterogeneous Treatment Effects

	Private fees		Private Quality	
	Java	off-Java	Java	off-Java
	(1)	(2)	(3)	(4)
Treatment	18,809*** (4,235)	54,823*** (11,313)	-0.027 (0.039)	-0.002 (0.165)
Observations	1,975	588	1,029	367
Baseline Mean	343,578	146,156	0.258	-0.729

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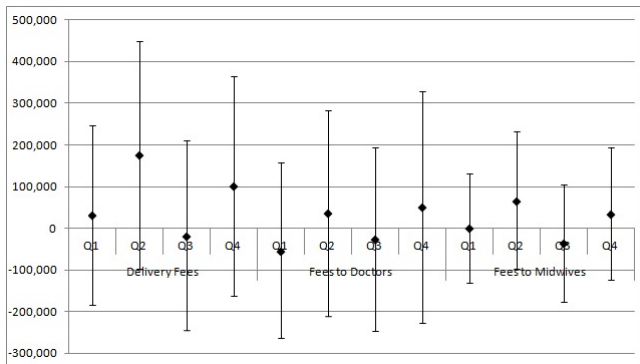
Heterogeneity: Price Changes among Non-participants

	All	Quintile 1-2
	(1)	(2)
Treatment	45,917*** (13,138)	46,981** (21,903)
Treatment x High Quintile	-	85,587 (84,062)
Observations	6,544	3,407

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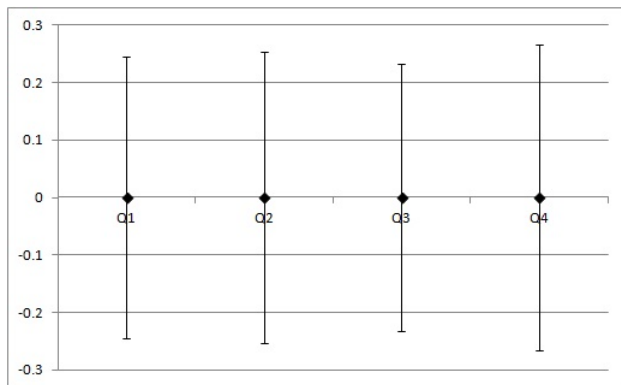
Heterogeneity: Price Changes among Non-participants



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Heterogeneity: Utilization Changes among Non-participants



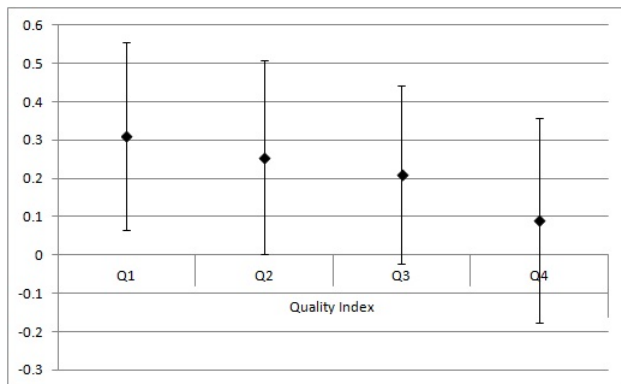
Heterogeneity: Price Discrimination among Participants

	First-time mothers	Second-time mothers
	(1)	(2)
Delivery fees	231,620 (551,875)	424,654 (1,119,932)
Observations	179	105
Adjusted Difference		98,229 (82,090)

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Heterogeneity: Quality Changes by Baseline Per Capita Expenditure



Heterogeneity: Birth Outcomes by Baseline Prenatal Quality

	Infant mortality (1)	Birth weight (gr.) (2)	Low birth weight (3)
Household CCT	-0.0003 (0.009)	-134.9 (82.04)	0.145*** (0.039)
High baseline quality	-0.003 (0.002)	-5.598 (11.65)	0.005 (0.006)
Treated x High baseline quality	0.010 (0.007)	115.2** (48.94)	-0.085*** (0.024)
Observations	8,302	4,987	4,987
Baseline Mean	0.011	3,180	0.077

Changes in Midwife Practice

	Midwife Report	
	Any Private Practice (1)	Total Hours (2)
Treatment	0.022 (0.015)	-0.681 (0.663)
Observations	2,785	2,790
Mean Dependent Variable	0.454	0.203

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Results: Income and Fees Received by Midwives

	Dual Practice		Panel	
	Public fees	Private fees	Public fees	Private fees
	(1)	(2)	(3)	(4)
Treatment	8,937 (13,121)	31,512*** (5,025)	10,082 (10,780)	32,244*** (4,900)
Observations	1,660	2,066	1,239	1,491
Baseline	118,980	295,459	118,980	295,459
Mean				

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Robustness: Midwife Selection

	Higher education (3-year diploma) (1)	Less Than 3 years of experience (2)	Years of experience (3)	Migration of experienced midwives (4)
Treatment	0.139*** (0.035)	0.053** (0.024)	-0.967* (0.559)	0.012 (0.023)
Observations	955	958	958	942
Baseline Mean	0.302	0.0848	11.88	0.002

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Robustness: Changes in the Number of Midwives in Control Areas

	Doctors (1)	Midwives (2)
Treatment	-0.001 (0.093)	0.965** (0.472)
Near Other Treated Sub-District	0.177* (0.096)	1.167** (0.521)
Near x Treatment	-0.120 (0.140)	-0.672 (0.610)
Observations	711	716

Near defined as less than median distance of 3.5mi.

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Robustness: Birth Spacing

	Placement Effect (1)	Participation Effect (2)	Hazard ratio (3)
Treatment	133.9*** (19.68)	289.5*** (46.58)	-0.957*** (0.267)
Observations	1,294	1,294	1,353
Baseline Mean		520.33 (145.42)	

Increased spacing, no information on completed fertility