

Factory Employment and Fertility Decisions: Field Experimental Evidence from Ethiopia

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Motivation

Industrialisation has potentially large impacts on several developmental goals:

- ▶ Economic growth and trade
- ▶ Job creation
- ▶ Poverty reduction
- ▶ Increased *female* labor force participation
 - ▶ Income (?)
 - ▶ Fertility decisions (?)
 - ▶ Women's empowerment (?)



Literature

Impacts of increased female labor force opportunities in manufacturing industries in developing countries

- ▶ Amin et al. (1998); Atkin (2009, 2016); Blattman and Dercon (2018); Heath (2014); Heath and Mobarak (2015); Kabeer (2002); Kagy (2017); Majlesi (2016); Sivasankaran (2014).

Impact of female employment on fertility and empowerment (household decision-making)

- ▶ Anderson and Eswaran (2009); Dharmalingam and Morgan (1996); Getahun and Villanger (2017); Jensen (2012); Van den Broeck and Maertens (2015).



Experiments

Studies using experimental design to investigate impacts of female employment



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- ▶ Jensen (2012)
 - ▶ Randomizes recruitment services for women in the BPO industry by villages in India.
 - ▶ He finds higher female labor supply and postschool training, higher age of marriage and first childbearing, increased aspirations for careers, and increased investment in younger girls.



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- ▶ Blattman and Dercon (2018)
 - ▶ Randomize entry-level applicants in the manufacturing industry into industrial job, entrepreneurship program, or control group in Ethiopia.
 - ▶ They find little impact of industrial jobs on employment and wages, and increases in serious health problems. The entrepreneurial program provided better outcomes by raising earnings and providing steady working hours.



Our Contribution

- ▶ The first paper to study employment effects on fertility by randomization on individual level.
 - ▶ Experimental design to circumvent the problems of endogeneity in the female employment - fertility relationship.
 - ▶ Survey all women in the study on an individual level including a large set of questions to investigate mechanisms.
- ▶ A different and larger geographical area than many of the earlier studies.
- ▶ A different sample, only including already married, but still young, women, which is an important group with regards to family planning policy.



The Female Labor Supply and Fertility Relationship

Female labor supply is expected to affect fertility through three channels:

- ▶ Income effect
 - ▶ Becker 1960, Becker and Lewis 1973, Willis 1973.
- ▶ Substitution effect
 - ▶ Mincer 1963, Becker 1965, Willis 1973.
- ▶ Empowerment effect
 - ▶ Chiappori and others on collective models.



The Female Labor Supply and Fertility Relationship

In a developing country context these channels may be weaker or stronger than in industrialized countries:

- ▶ Jobs may be more compatible with childcare.
- ▶ Closer networks allowing for more responsibility sharing of childcare.
- ▶ Preference for many children.
- ▶ Access to contraceptives may be limited.



The Context

Women's labor force participation and fertility

Figure 3.4 Employment status by residence

Percentage of women and men age 15-49 who are currently employed

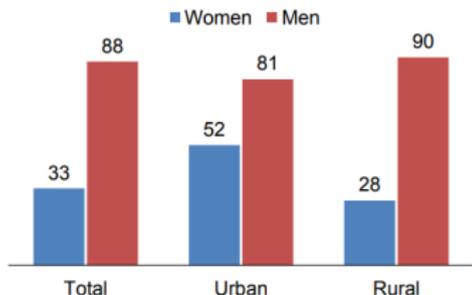
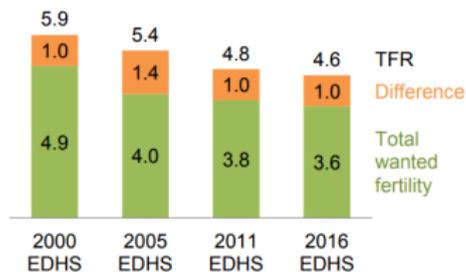


Figure 6.6 Trends in wanted and actual fertility

Wanted and actual number of children per woman



Source: Ethiopia DHS (2016)



The Context

The manufacturing industry in Ethiopia

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- ▶ Since 2004, Ethiopia has experienced high economic growth, averaging 10.6% GDP growth annually. The manufacturing sector's value added as share of GDP has remained relatively stable at 3.5 - 5.5%. (Source: World Bank national accounts data)



The Context

The manufacturing industry in Ethiopia

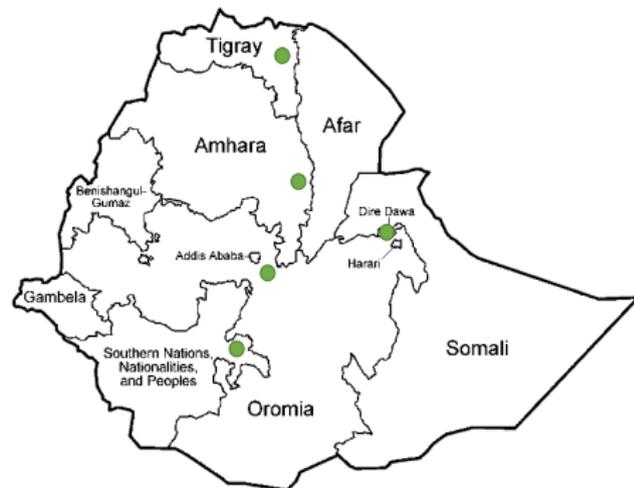
- ▶ The development of the manufacturing sector plays a considerable role for the implementation of Ethiopia's vision to become middle income country and top light manufacturing hub by 2025.
- ▶ Since 2004, Ethiopia has experienced high economic growth, averaging 10.6% GDP growth annually. The manufacturing sector's value added as share of GDP has remained relatively stable at 3.5 - 5.5%. (Source: World Bank national accounts data)
- ▶ During the 2016/2017 fiscal year, 1.7 million jobs were created in the Ethiopian manufacturing industry. (Source: Xinhua, 04/2018)



Experimental design

Job randomization

- ▶ 30 factories in five regions
- ▶ Job offer randomization to eligible married women
- ▶ Baseline + three follow-up surveys
- ▶ Sample size: 1460
 - ▶ Follow-up 1: 1228
 - ▶ Follow-up 2: 800 (not completed)
- ▶ Balanced sample
- ▶ Treatment not predictive of attrition



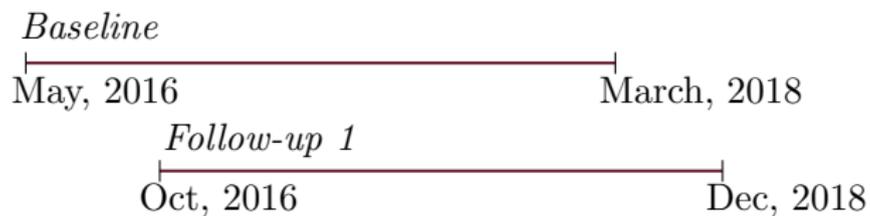
Experimental Design

Timeline



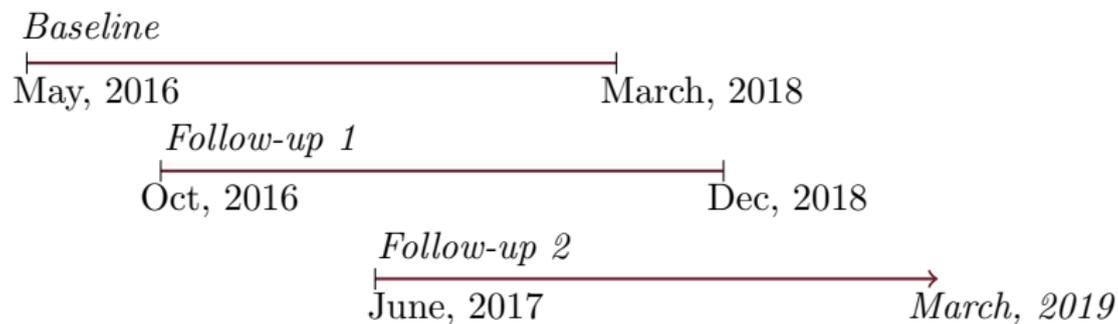
Experimental Design

Timeline



Experimental Design

Timeline



The Factories

- ▶ Medium and large factories
- ▶ Textiles, apparel, shoes, cosmetics, and plastics
- ▶ Starting monthly wage 600-680 ETB (70-80 International \$ at 2016 PPP terms)
- ▶ Women primarily work at the floor or as floor managers



Sample

Descriptives

- ▶ 24 years old
- ▶ 9.3 years of education
- ▶ 93% are married
- ▶ 67% have ever given birth
- ▶ 1.2 children on average
- ▶ Desired lifetime fertility is 4 children
- ▶ No difference in income by treatment group
 - ▶ Respondent's income last twelve months: 4 200 ETB (480 International \$ at 2016 PPP terms)
 - ▶ Husband/partner's income last twelve months: 30 500 ETB (3 500 International \$ at 2016 PPP terms)
- ▶ No difference in ever had a job before



Estimation Strategy

Intention-to-treat

$$Y_i = \beta_0 + \beta_1 T_i + \gamma X_i + b_l + \epsilon_i \quad (1)$$

Local Average Treatment Effect

$$Z_i = \beta_0 + \beta_1 T_i + \gamma X_i + b_l + \epsilon_i \quad (2)$$

$$Y_i = \beta_0 + \beta_1 \hat{Z}_i + \gamma X_i + b_l + \epsilon_i \quad (3)$$

Y_i = Currently pregnant or had a baby since baseline (0/1); Lifetime wanted number of children.

T_i = Treatment status by randomization.

X_i = Set of baseline control variables: *Pregnant at baseline, Age, religion, education, number of household members, total household income last six months, dummy indicating whether respondent had any wage job the last six months, lifetime wanted fertility.*

b_l = Block fixed effect based on randomization rounds.

Z_i = Having had any formal wage job since baseline.



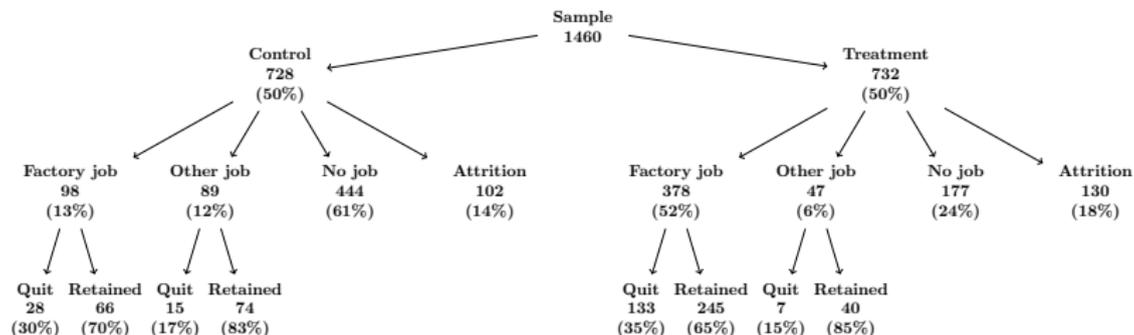
Employment and Income

	At first follow-up				At second follow-up		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Started working in the factory	Currently employed in the factory	Currently employed in any job	Total income last 6 months (ETB)	Currently employed in the factory	Currently employed in any job	Total income last 6 months (ETB)
Treatment	0.458*** (0.024)	0.280*** (0.023)	0.211*** (0.026)	1,164*** (219.045)	0.225*** (0.026)	0.109*** (0.033)	501* (287.610)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Block fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,228	1,228	1,228	1,228	800	800	800
Control mean	0.149	0.105	0.224	2798	0.0825	0.268	3872



Employment and Income

By first follow-up



Treatment Effect on Childbearing

	At first follow-up		At second follow-up					
	Currently pregnant or given birth since baseline		Currently pregnant or given birth since baseline		Currently pregnant		Have given birth since baseline	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Treatment	-0.015 (0.018)		0.021 (0.028)		0.051*** (0.020)		-0.025 (0.023)	
Any formal wage job since baseline		-0.039 (0.046)						
Any formal wage job since baseline				0.074 (0.100)		0.183** (0.073)		-0.088 (0.079)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Block	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,228	1,228	800	800	800	800	800	800
Control mean	0.155		0.191		0.059		0.131	
<i>First stage results</i>								
Treatment		0.377*** (0.023)		278*** (0.032)		278*** (0.032)		278*** (0.032)
p-value from F-test		0.000		0.000		0.000		0.000



Treatment Effect on Wanted Fertility

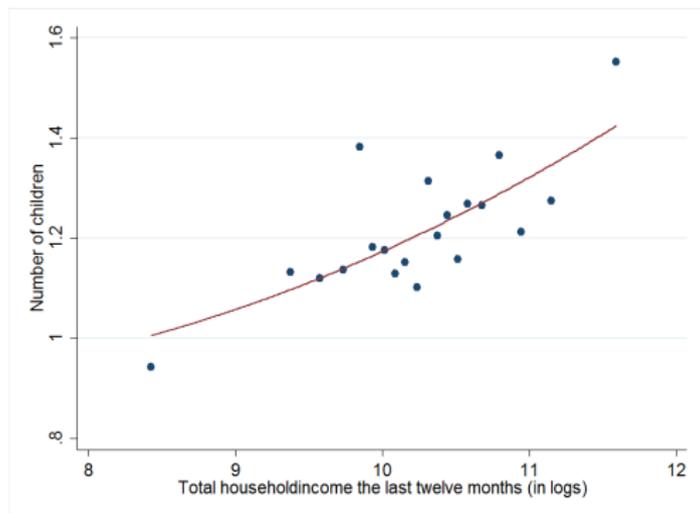
	At first follow-up		At second follow-up	
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
Treatment	0.043 (0.080)		0.110 (0.116)	
Any formal wage job since baseline		0.115 (0.209)		
Any formal wage job since baseline				0.396 (0.409)
Controls	Yes	Yes	Yes	Yes
Block fixed effects	Yes	Yes	Yes	Yes
Observations	1,226	1,226	799	799
Control mean	4.026		4.273	
<i>First stage results</i>				
Treatment		0.376*** (0.023)		0.277*** (0.032)
p-value from F-test		0.000		0.000



Income channel

Correlations between income and number of children at baseline

Figure 1: Total household income and number of children at baseline



Notes: Binscatter, quadratic fitted line, controlling for wife and husband's age and education.



Income channel

Correlations between income and number of children at baseline

Figure 2: Total wife's income and number of children

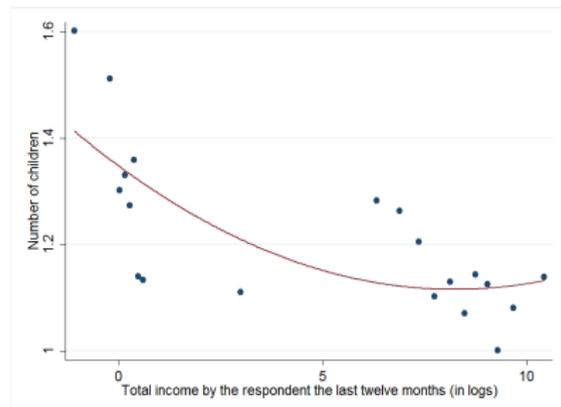
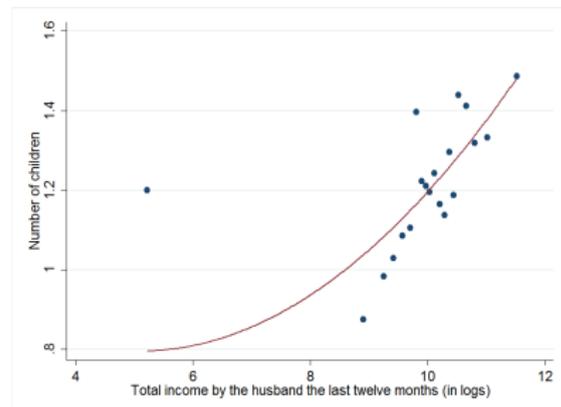


Figure 3: Total husband's income and number of children



Notes: Binscatter, quadratic fitted line, controlling for wife and husband's age and education.



Income channel

- ▶ Number of children is positively correlated with total household income and with husband's income.
- ▶ Number of children is, however, negatively correlated with wife's earned income.
- ▶ It is therefore uncertain whether we would expect a positive or negative effect from the treatment of receiving a job offer in the manufacturing industry.



Substitution channel

Employment opportunities increase women's *opportunity cost* of staying outside the labor market.

- ▶ Median monthly salary in the factories is ETB 1000 (115 International \$ at 2016 PPP terms).
- ▶ At baseline 1/3 had ever had a formal salaried job before.
- ▶ Total household monthly income (median) at baseline was ETB 2600, thus an income of ETB 1000 would be a considerable contribution.

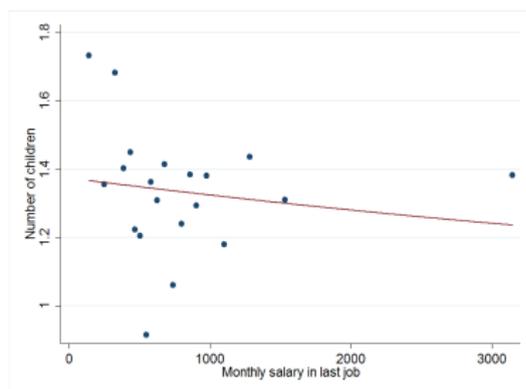


Substitution channel

Cont.

- ▶ The salary of the last job at baseline is however not correlated with number of children.

Figure 4: Respondent's wage per month in the last job and number of children



Notes: Binscatter, quadratic fitted line, controlling for wife and husband's age and education.



Substitution channel

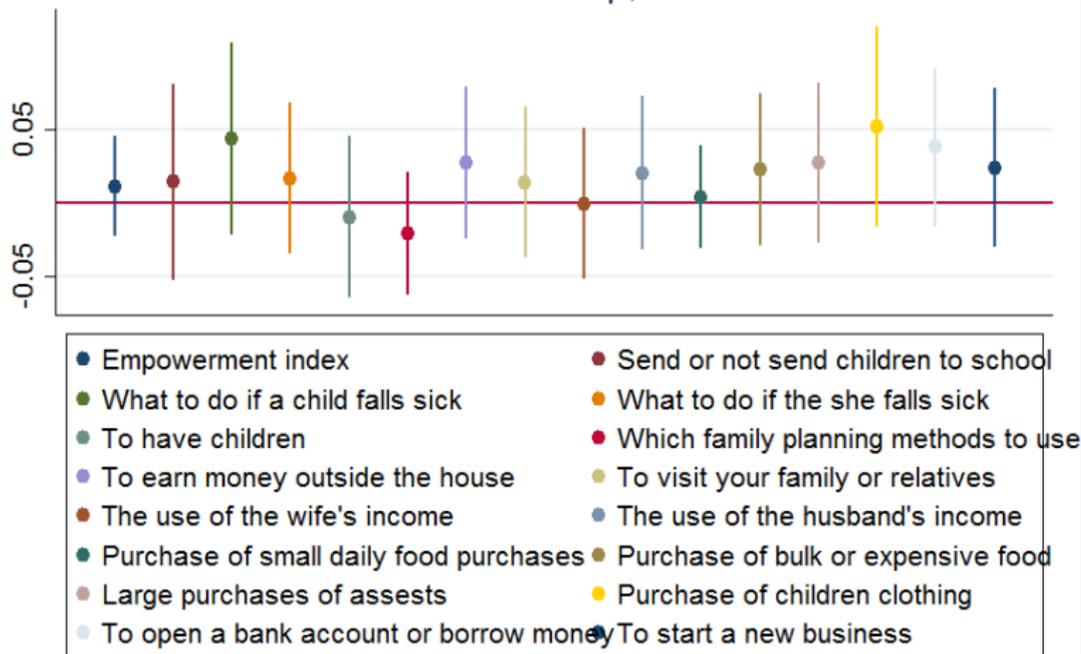
- ▶ Although low levels of salary, the potential earnings from accepting a job offer in the factory would make a considerable contribution to the household total income.
- ▶ Thus we would expect a *negative* effect from the treatment of receiving a job offer in the manufacturing industry.
- ▶ However, in our sample the number of children is not correlated with the respondents' previous salary at baseline.



Household decision-making power

Follow-up 1

Treatment effects on household decision-making First follow-up, OLS



OLS regressions, baseline control variables include: baseline outcome variable, age, religion, education, number of household members, total household income last six months, dummy indicating whether respondent had any wage job the last six months, and block fixed effects.

Household decision-making power

Follow-up 2

Treatment effects on household decision-making Second follow-up, OLS



- Empowerment index
- What to do if a child falls sick
- To have children
- To earn money outside the house
- The use of the wife's income
- Purchase of small daily food purchases
- Large purchases of assets
- To open a bank account or borrow money
- Send or not send children to school
- What to do if the she falls sick
- Which family planning methods to use
- To visit your family or relatives
- The use of the husband's income
- Purchase of bulk or expensive food
- Purchase of children clothing
- To start a new business

OLS regressions, baseline control variables include: baseline outcome variable, age, religion, education, number of household members, total household income last six months, dummy indicating whether respondent had any wage job the last six months, and block fixed effects.

Summary

- ▶ We find that female entry-level applicants who were randomly assigned to receive a job offer have on average 42% higher income after six months, and 13% higher income after one year.
- ▶ There are no differences in fertility by treatment group, however, the treatment group seems to postpone childbearing a few months.
- ▶ There is no difference by treatment on wanted lifetime fertility.
- ▶ The treatment did not affect household decision-making.
- ▶ Theoretically, and based on our descriptive data, it is not clear how employment will affect fertility in the long run.



Sample, Balance and Attrition

Variable	Baseline sample			First follow-up sample			Second follow-up sample		
	(1) Control Mean/SE	(2) Treatment Mean/SE	T-test Difference (1)-(2)	(1) Control Mean/SE	(2) Treatment Mean/SE	T-test Difference (1)-(2)	(1) Control Mean/SE	(2) Treatment Mean/SE	T-test Difference (1)-(2)
Household head	0.021 (0.006)	0.025 (0.007)	-0.004	0.022 (0.006)	0.025 (0.008)	-0.003	0.036 (0.009)	0.024 (0.009)	0.012
Age	24.034 (0.558)	24.406 (0.769)	-0.371	24.272 (0.601)	24.223 (0.810)	0.049	24.701 (0.822)	24.723 (1.027)	-0.022
Years of education	9.310 (0.583)	9.344 (0.637)	-0.034	9.324 (0.593)	9.505 (0.656)	-0.181*	8.820 (0.838)	9.150 (0.798)	-0.331**
Muslim	0.152 (0.073)	0.133 (0.057)	0.020	0.153 (0.070)	0.121 (0.059)	0.032*	0.216 (0.102)	0.158 (0.072)	0.059
Orthodox	0.617 (0.087)	0.642 (0.085)	-0.025	0.607 (0.087)	0.643 (0.090)	-0.036	0.670 (0.106)	0.667 (0.098)	0.003
Have ever given birth	0.669 (0.048)	0.663 (0.049)	0.006	0.711 (0.045)	0.669 (0.050)	0.041	0.691 (0.055)	0.680 (0.056)	0.011
Number of children in the household	1.184 (0.129)	1.157 (0.126)	0.027	1.259 (0.127)	1.146 (0.129)	0.113	1.211 (0.161)	1.201 (0.147)	0.010
Desired lifetime fertility	3.841 (0.167)	3.971 (0.200)	-0.131*	3.837 (0.172)	3.909 (0.197)	-0.072	3.933 (0.259)	3.983 (0.256)	-0.050
Ever had a formal salaried job with salary	0.294 (0.033)	0.318 (0.045)	-0.024	0.288 (0.033)	0.316 (0.050)	-0.028	0.312 (0.044)	0.325 (0.065)	-0.013
Respondent's income last 12 months	4238 (441)	4487 (668)	-249	4243 (496)	4104 (635)	139	4573 (691)	4336 (803)	236
Husband's income last 12 months	29793 (1548)	29224 (1844)	568	30045 (1732)	28987 (1869)	1058	29411 (1995)	30549 (2213)	-1138
N	728	732		626	602		388	412	
Clusters	45	48		44	44		29	33	
F-test of joint significance (F-stat)	1.327			F-test of joint significance (F-stat)			1.811*		
F-test, number of observations	1460			F-test, number of observations			1228		
	F-test of joint significance (F-stat)			F-test of joint significance (F-stat)			F-test of joint significance (F-stat)		
	1.383			1.811*			1.383		
	F-test, number of observations			F-test, number of observations			F-test, number of observations		
	800			1228			800		

Notes: The value displayed for t-tests are the differences in the means across the groups. The value displayed for F-tests are the F-statistics. Standard errors are clustered at variable block. The covariate variable block is included in all estimation regressions. All missing values in balance variables are treated as zero. All missing values in covariate variables are treated as zero. * indicate significance at the 1, 5, and 10 percent critical level.

Correlates of attrition on selected covariates

	Unable to reach at follow-up (6 months)	
	Coeff.	St.Error
Treatment	-0.006	(0.021)
Household head	-0.055	(0.039)
Age	-0.007	(0.002)**
Years of education	0.002	(0.004)
Muslim	0.036	(0.048)
Orthodox	0.047	(0.033)
Have ever given birth	-0.105	(0.022)***
Number of children in the household	0.004	(0.010)
Desired lifetime fertility	0.010	(0.005)
Ever had a formal salaried job	-0.022	(0.017)
Respondent's wage income last 12 months	0.000	(0.000)
Husband's wage income last 12 months	0.000	(0.000)
Dependent variable mean	0.159	
Observations	1460	

Notes: The table reports the estimates of an OLS regression of an indicator for attrition at first follow-up on baseline covariates. The regression also includes block fixed effects (no displayed). Standard errors are clustered at variable block. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.



Figure 5: Total wife's *earned* income and number of children

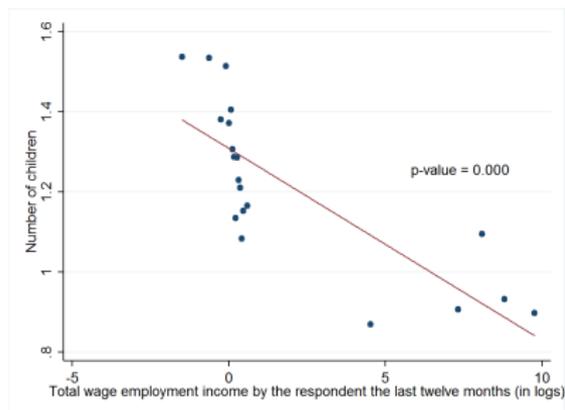


Figure 6: Total wife's *other* income and number of children

