

Child Marriage and Infant Mortality Evidence from Ethiopia

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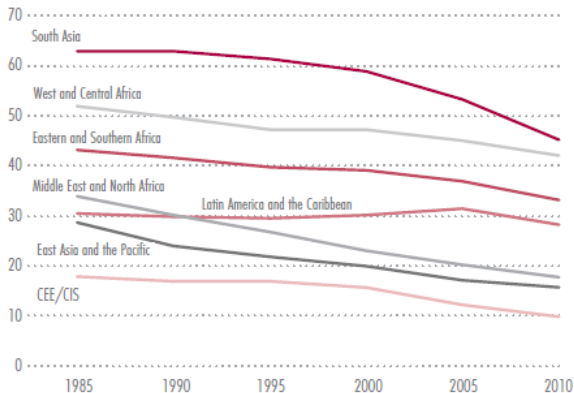
Child marriage across the world

- 700 million of women worldwide cohabited for first time before the age of 18 (UNICEF 2013).
- Highest prevalence in sub-Saharan Africa (48%) and South Asia (42%).
- A large amount of resources has been used in the last decades to fight child marriage:
 - ▶ International and regional agreements: CEDAW, CCMMAMRM, Maputo Protocol, etc
 - ▶ Integrated programmes targeting early cohabitation and laws increasing the legal age of marriage in most developing countries (e.g. Ethiopia, Congo, Benin, etc)

Figure: Child marriage over time (UNICEF 2013)

The Middle East and North Africa has made the fastest progress in reducing child marriage

Percentage of women aged 20 to 24 years who were married or in union before age 18, by region



What are the consequences of child marriage?

- Parsons et al. (2013): Child marriage is associated with
 - ▶ Lower levels of education, maternal health, empowerment and labour force participation for women.
 - ▶ Higher incidence of teenage pregnancy, fertility and infant mortality.
- Causal studies:
 - ▶ Rely on age at menarche as IV for age at marriage (Field & Ambrus 2008, Hicks & Hicks 2015, Chari et al. 2017, Asadullah et al. 2016, Abdullah & Wahhaj 2016 and Sekhri & Debnath 2016).
 - ▶ Delaying marriage improves education and health for women and their children.
 - ▶ No effect on labour force participation, earnings and marriage market outcomes for women.
 - ▶ Critique: IV used does not satisfy the exclusion restriction (Collin & Talbot 2016 and Barrios et al. 2015)

Research questions and contribution

- This study contributes to the thin literature that documents the negative effects of child marriage and provides an alternative identification strategy to expand the analysis to other outcomes.
- This study exploits age discontinuities in exposure to a law that raised the legal age of marriage for women in Ethiopia from 15 to 18 to:
 - ▶ Focusing on infant mortality, assess for the first time the socioeconomic effects of raising the legal age of marriage.
 - ▶ Using a RDD, provide the first causal evidence on the effect of the age at cohabitation during teenage years on infant mortality.

Child marriage in Ethiopia

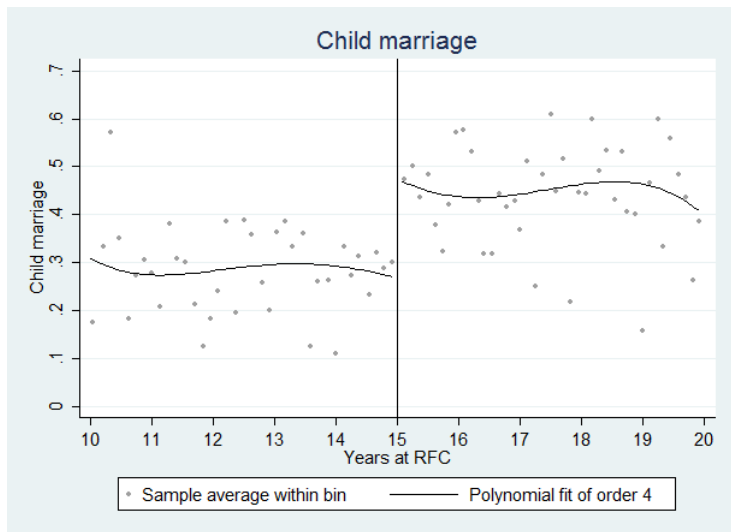
- 41% of women aged 20-24 first cohabited with a men before they turned 18 years old (DHS, 2011).
- 5th country in the world in terms of total child marriages (1,974,000).
- Large variation across regions (Addis Ababa vs Amhara)
- Key importance in the policy agenda: Revised Family Code 2000, National Alliance to End Child Marriage in 2013.

The Revised Family Code

- The Federal Government enacted the Revised Family Code (RFC) in July 2000.
 - ▶ Increased the legal age of civil, religious and customary marriage for women from 15 to 18 years old.
 - ▶ The legal age of marriage for men remained at 18 years old.
 - ▶ Introduced retroactive measures to improve women's bargaining power within marriage (e.g. facilitates divorce).
 - ▶ Did not forbid underage cohabitation.
- Revised Family Code was initially applied in Addis Ababa and Dire Dawa. Amhara approved it in 2003, SNNP in 2004 and Tigray in 2007.
- Did it work?

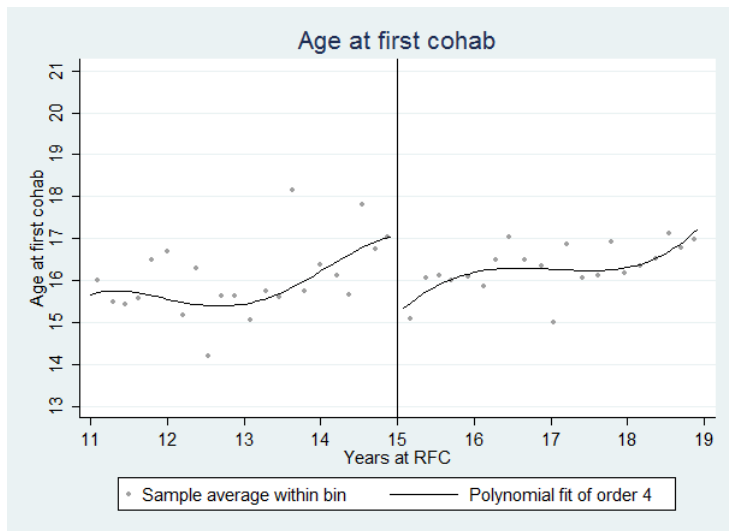
Did the policy work?

Figure: Early cohabitation and age at policy



Did the policy work?

Figure: Early cohabitation and age at policy



Regression Discontinuity Design

- Women aged < 15 at the policy only face an *effective* legal age of marriage at 18.
- Women aged ≥ 15 face an *effective* legal age of marriage at 15 (at least for some time after they turned 15).
- Compare women aged slightly above the age of 15 when the RFC was introduced in their region with women aged slightly below the age of 15 at the same time.
- The law did not end child marriage.
- Forcing variable: Age at policy measured in year-months, with cut-off at 15 years.
- Parametric and non-parametric techniques are used for the identification of the parameters of interest.

Regression Discontinuity Design

- Reduced form:

$$InfantMortality_i = \delta_0 + \delta_1(Age\ at\ RFC < 15_i) + \delta_2 F(Age\ at\ RFC_i) + \delta_3 X_i + \epsilon_i \quad (1)$$

- First stage:

$$Age\ at\ Cohab._i = \alpha_0 + \alpha_1(Age\ at\ RFC < 15_i) + \alpha_3 F(Age\ at\ RFC_i) + \alpha_4 X_i + \mu_i \quad (2)$$

- Second stage:

$$InfantMortality_i = \beta_0 + \beta_1(\widehat{Age\ at\ Cohab._i}) + \beta_2 F(Age\ at\ RFC_i) + \beta_3 X_i + u_i \quad (3)$$

Data: 2011 Ethiopian Demographic and Health Survey (DHS)

- Sample is restricted to the 5,078 women aged 18-49 when the survey was implemented that ever cohabited with a partner and gave birth more than one year before the survey.
- The effective sample size used in the analysis depends on the bandwidth or forcing variable window around the cut-off.

Results: Infant mortality

Figure: Infant mortality of the first born

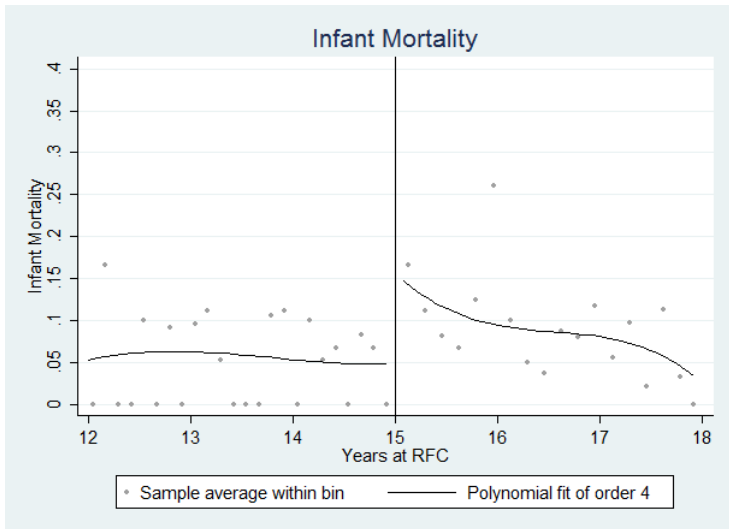


Table: Non-parametric estimates: Calonico et al. (2016)

Variance estimator proc.	Bias-adjusted		Robust	
	(1) FS Age at 1st cohab	(2) SS/RF Infant Mortality	(3) FS Age at 1st cohab	(4) SS/RF Infant Mortality
<i>Bandwith A</i>				
Age<15 at RFC	2.055*** (0.321)	-0.079** (0.034)	2.055*** (0.371)	-0.079* (0.041)
Age at 1st cohab.		-0.038** (0.019)		-0.038* (0.023)
N		5078		5078
N effect. obs.		990		990
<i>Bandwith B</i>				
Age<15 at RFC	1.584*** (0.289)	-0.082*** (0.027)	1.584*** (0.328)	-0.082*** (0.031)
Age at 1st cohab.		-0.052*** (0.019)		-0.052** (0.022)
N effect. obs.		1451		1451
<i>Bandwith C</i>				
Age<15 at RFC	2.081*** (0.341)	-0.082* (0.044)	2.081*** (0.392)	-0.082 (0.053)
Age at 1st cohab.		-0.039* (0.023)		-0.039 (0.029)
N effect. obs.		733		733

Table: Parametric estimates:

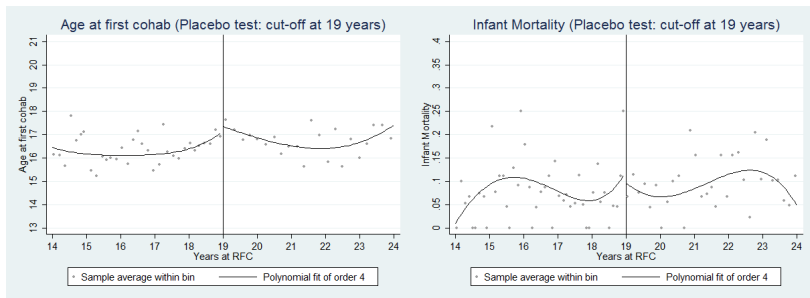
	2 years window (N=571)		3 years window (N=849)		4 years window (N=1164)		5 years window (N=1432)		6 years window (N=1646)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	FS Age at 1st cohab	SS/RF Infant mortality	FS Age at 1st cohab	SS/RF Infant mortality	FS Age at 1st cohab	SS/RF Infant mortality	FS Age at 1st cohab	SS/RF Infant mortality	FS Age at 1st cohab	SS/RF Infant mortality
<i>Pol. order 1</i>										
Age<15 at RFC	1.706*** (0.331)	-0.078** (0.034)	1.008*** (0.309)	-0.078** (0.030)	0.920*** (0.269)	-0.060** (0.027)	0.825*** (0.269)	-0.050 (0.024)	0.630** (0.241)	-0.046* (0.024)
Age at 1st cohab		-0.046** (0.019)		-0.077** (0.032)		-0.065** (0.031)		-0.061* (0.031)		-0.073* (0.044)
<i>Pol. order 2</i>										
Age<15 at RFC	1.707*** (0.332)	-0.077** (0.033)	1.066*** (0.312)	-0.069** (0.028)	0.913*** (0.276)	-0.056** (0.027)	0.860*** (0.266)	-0.051** (0.024)	0.837*** (0.251)	-0.044* (0.022)
Age at 1st cohab		-0.045** (0.018)		-0.065** (0.026)		-0.061** (0.030)		-0.059** (0.028)		-0.052** (0.026)
<i>Interacted pol. order 1</i>										
Age<15 at RFC	1.707*** (0.332)	-0.076** (0.032)	1.057*** (0.311)	-0.070** (0.028)	0.919*** (0.275)	-0.053** (0.026)	0.849*** (0.268)	-0.047** (0.022)	0.769*** (0.249)	-0.040* (0.021)
Age at 1st cohab		-0.045** (0.018)		-0.066** (0.026)		-0.058** (0.028)		-0.055** (0.027)		-0.052* (0.028)
<i>Interacted pol. order 2</i>										
Age<15 at RFC	1.744*** (0.454)	-0.068 (0.060)	2.045*** (0.384)	-0.085** (0.041)	1.494*** (0.360)	-0.091** (0.036)	1.326*** (0.339)	-0.085*** (0.031)	1.141*** (0.330)	-0.084*** (0.031)
Age at 1st cohab		-0.039 (0.034)		-0.041** (0.020)		-0.061** (0.024)		-0.064*** (0.024)		-0.074** (0.031)

Table: Robustness checks

Placebo outcomes	Ethnicity		Gender		Religion	
	(1) FS Age at 1st cohab	(2) SS/RF Ethnic. Oromo	(3) FS Age at 1st cohab	(4) SS/RF Male	(5) FS Age at 1st cohab	(6) SS/RF Muslim
Age<15 at RFC	1.984*** (0.399)	-0.015 (0.050)	2.068*** (0.392)	-0.039 (0.110)	1.999*** (0.407)	0.037 (0.070)
Age at 1st cohab.		-0.006 (0.031)		-0.018 (0.058)		0.017 (0.038)
N		5078		5078		5078
N effect. obs.		874		874		874
	Placebo: RFC 48 months before		Placebo: Other Ethiopian regions		Control year of birth	
	(7) FS Age at 1st cohab	(8) SS/RF Infant Mortality	(9) FS Age at 1st cohab	(10) SS/RF Infant Mortality	(11) FS Age at 1st cohab	(12) Infant Mortality
Age<15 at RFC	0.167 (0.386)	-0.001 (0.024)	-0.469 (0.377)	-0.007 (0.025)	1.107*** (0.286)	-0.074** (0.032)
Age at 1st cohab.		-0.007 (0.150)		0.015 (0.062)		-0.066* (0.034)
N		5078		2398		5078
N effect. obs.		2733		1458		1286

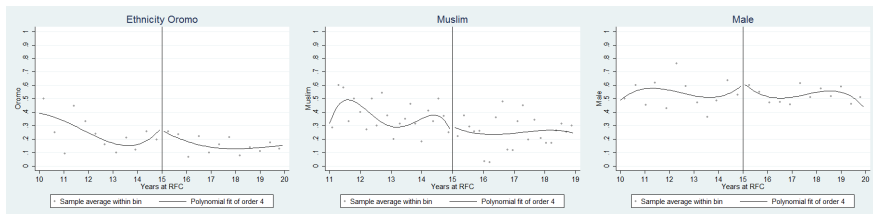
Robustness checks

Figure: Placebo test: Cut-off at 19 years



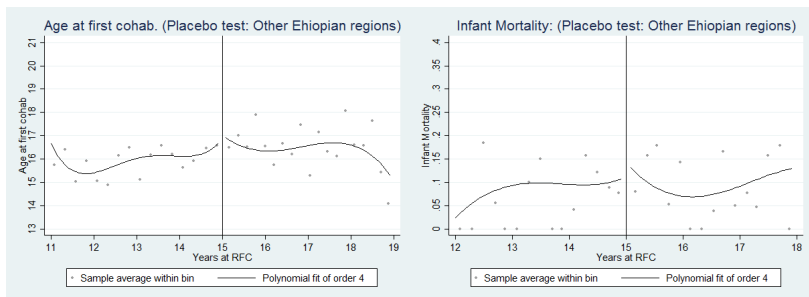
Robustness checks

Figure: Placebo variables: ethnicity, religion and gender



Robustness checks

Figure: Placebo test: Other Ethiopian regions



Robustness checks

Table: RFC and outcomes at the cut-off

	(1) Child marriage	(2) Age at cohabit.	(3) Paid work	(4) Empow. index	(5) Divorced
Women ever cohab. and given birth Age<15 at RFC	-0.200*** (0.058)	2.079*** (0.389)	0.098 (0.079)	-0.055 (0.064)	0.018 (0.046)
N	5078	5078	5077	4181	5078
N effect. obs.	935	787	1163	1035	958

Figure: Density of the forcing variable at the cut-off



Table: Analysis of mechanisms

	Age at birth		Months: F. Born -F. Cohab.		Years school		Infant mortality Non-first born		Empowerment index		Work	
	(1) FS	(2) RF/SS	(3) FS	(4) RF/SS	(5) FS	(6) RF/SS	(7) FS	(8) RF/SS	(9) FS	(10) RF/SS	(11) FS	(12) RF/SS
Age<15 at RFC	2.068*** (0.383)	1.011*** (0.372)	2.039*** (0.371)	-12.087** (4.686)	2.078*** (0.375)	-0.731 (0.485)	2.352*** (0.590)	0.008 (0.055)	1.948*** (0.389)	- 0.094 (0.072)	2.094*** (0.386)	0.035 (0.098)
Age at cohab.		0.490** (0.194)		-5.938* (2.188)		-0.357 (0.308)		0.004 (0.027)		-0.048 (0.039)		0.016 (0.054)
	Anemia		Years school partner		Age diff partner		Months breastfeed.		Birth weight		N vaccin.	
	(13) FS	(14) RF/SS	(15) FS	(16) RF/SS	(17) FS	(18) RF/SS	(19) FS	(20) RF/SS	(21) FS	(22) RF/SS	(23) FS	(24) RF/SS
Age<15 at RFC	1.809*** (0.386)	-0.066 (0.088)	2.050*** (0.378)	0.783 (0.859)	1.898*** (0.371)	-0.890 (0.932)	2.408*** (0.851)	-1.230 (5.927)	-1.619* (0.882)	-0.458 (0.308)	0.825 (0.513)	0.199 (0.645)
Age at cohab.		-0.037 (0.056)		0.383 (0.523)		-0.467 (0.562)		-0.453 (2.791)		0.227 (0.274)		0.268 (0.880)

Conclusions

- Even if not perfectly enforced, laws setting the legal age of marriage for women at 18 years can decrease the prevalence of infant mortality.
- The effect of one-year delay in cohabitation during teenage on the incidence of infant mortality of the first born is comparable to the effect on child mortality of the measles, BCG, DPT, Polio and Maternal Tetanus vaccinations (McGovern & David Canning, 2015).
- The effect seems to be driven by the positive effect of age at cohabitation on the age of the women at first birth.
- Estimates are consistent with those observed in studies conducting correlation analysis (Raj et al. 2010 and Adhikari, 2003) between age at marriage and infant mortality.
- Estimates provided in this study are local and the generalization of the results should be done with caution.

Descriptive statistics

Table: 2011 DHS Ethiopia: Women 18-49 that ever cohabited and born a child

	Aged 14-15 at RFC.		Full sample	
	N	Mean	N	Mean
<i>Women characteristics</i>				
Age (2011)	308	23.38	5,078	32.88
Age at 1st cohab	308	16.13	5,078	16.43
Child married (0/1)	308	0.66	5,078	0.65
Work (0/1)	308	0.33	5,077	0.36
Years school	308	2.89	5,078	2.16
Rural (0/1)	308	0.58	5,078	0.71
Muslim (0/1)	308	0.31	5,078	0.21
Divorced (0/1)	308	0.13	5,078	0.12
Empowerment index (0-2)	265	0.92	4,181	0.89
Age difference with partner	266	6.35	4,171	7.82
N children	308	1.85	5,078	4.22
<i>First born characteristics</i>				
Deceased 1st year (0/1)	308	0.09	5,078	0.10
Age at 1st birth	308	18.30	5,078	18.89
Years since born	308	4.96	5,078	13.94

Figure: Distribution of the age at marriage across cohorts

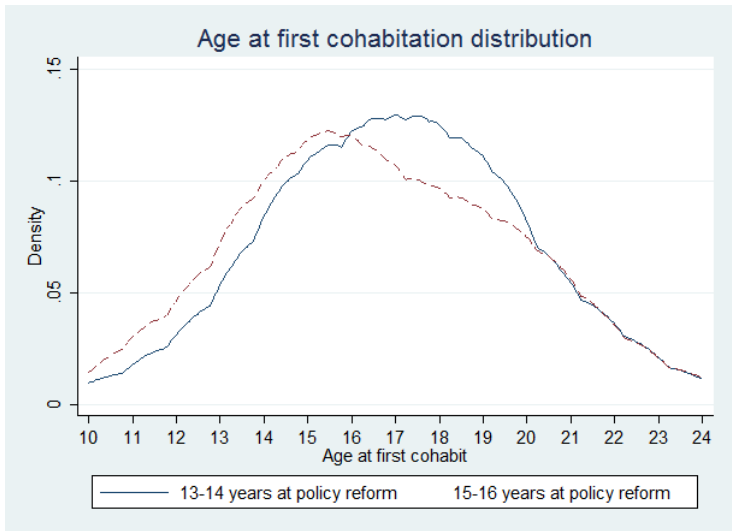
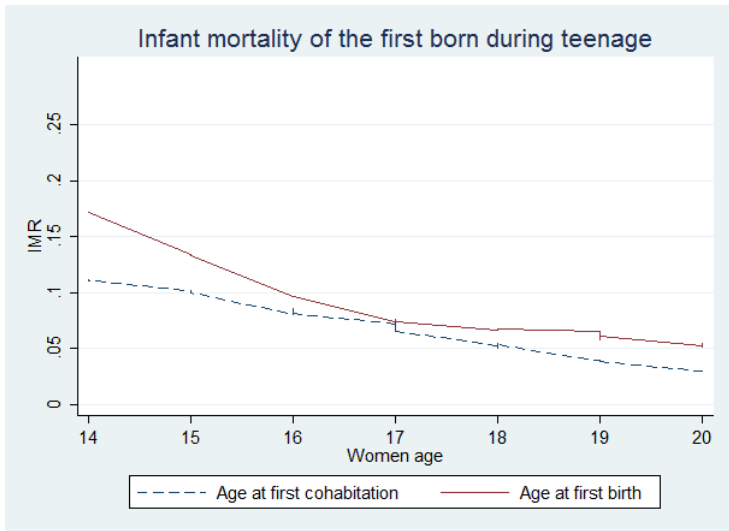
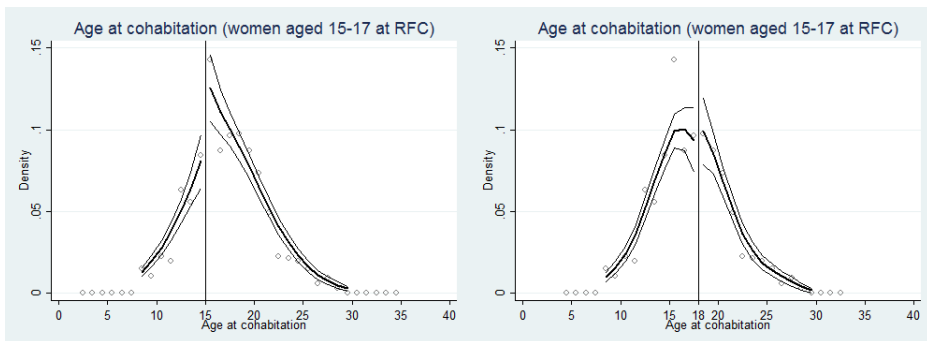


Figure: Age at cohabitation, age at first born and infant mortality of the first born



Did the policy work?

Figure: Age at cohabitation (cohorts 15-17 at policy): Discontinuities at 15 and 18



Did the policy work?

Figure: Age at cohabitation (cohorts 12-14 at policy): Discontinuities at 15 and 18

