Assessing Plan B: The Effect of the Morning After Pill on Children and Women

Andrea Bentancor[1] Damian Clarke[2]

[1]Universidad Adolfo Ibáñez [2]University of Oxford

June 2014

This Talk

1. There was quasi-experimental variation in fully-subsidised morning after pill availability in Chile.
2. Availability reduced teenage childbearing and (illegal) abortions by an important amount.
3. The control group may be partially treated via spillovers. Show how to recover consistent estimates.

Motivation

- Considerable evidence that the oral contraceptive pill improves outcomes for women and children
  - Delays in childbearing, marriage (Angrist and Evans, 1996)
  - Higher education, labour market participation (Goldin and Katz, 2002)
  - Reduction in gender wage differential (Bailey 2012)
- But, scarce evidence on the effects of post-coital birth control
- A small number of papers from expansions in USA, nothing outside USA, nor at national level
- Would like to know: how does the introduction of the "morning after pill" affect fertility/abortions?

Importance

- Oral contraceptive pill provided fundamental change in ability to control total fertility and timing (Bailey 2006)
- However, requires a costly, ongoing and regular investment
- The morning after pill however, is a once-off contraceptive (non-abortive) treatment
- In many situations it is much cheaper or fully subsidised
- Also, non-abortive, so present in circumstances even where abortion is illegal
- May operate at a different margin (younger women and women not regularly contracepting)

The Context

A finding by the Supreme Court of Chile making the morning after pill legal, but at the discretion of each mayor in local jurisdictions

- This is quite different to USA literature given that abortion is entirely outlawed in Chile
- Previously, any person in Chile wanting to post coitally contracept had to:
  - Risk illegal abortion which is prosecuted, dangerous and stigmatised; or
  - Have access to the information that high doses of the pill act similarly to the emergency contraceptive (EC) pill
- High rates of teen pregnancy (48.60 per 1000 women aged 15-19 in 2012)
- Low rates of contraceptive coverage (12.9% of 15-19 year olds using any form)

Methodology

$$birth_{ijt} = \alpha + \delta \cdot \mathbb{I}\{Pill_{jt-1}\} + \phi_t + \eta_j + \eta_j \cdot t + X_{jt-1}\gamma + \varepsilon_{ijt}.$$

- Flexible diff-in-diffs
- Woman i in municipality j and time t is 'treated' if public health centres report that the pill is freely available upon request
- Identifying assumption is parallel trends; pill placement is conditionally exogenous

Estimating Treatment Effects in The Presence of Treatment Spillovers

$$y_{ijct} = \alpha + \delta \cdot \mathbb{I}\{Pill_{jt-1}\} + \sum_{c=0}^{C} \zeta_c \cdot close_{cdjt-1} + \ldots + \varepsilon_{ijct}$$

where

$$close_{cdjt} = \begin{cases} 1 & \text{if } dist_{jt} > c \wedge dist_{jt} \leq c + d \\ 0 & \text{if } dist_{jt} \leq c \vee dist_{jt} > c + d. \end{cases}$$

- Test what happens if we exclude from the control group women 'close to' the pill
- Let the data determine who is 'close' and who isn't
- This loosens SUTVA, but still requires that this hold in non-close municipalities
- Cluster errors to allow for spatial correlation (Conley, 1999)

General Identification Challenges

Parallel trends assumption would be violated if pill and non-pill mayors simultaneously embark on other related policies

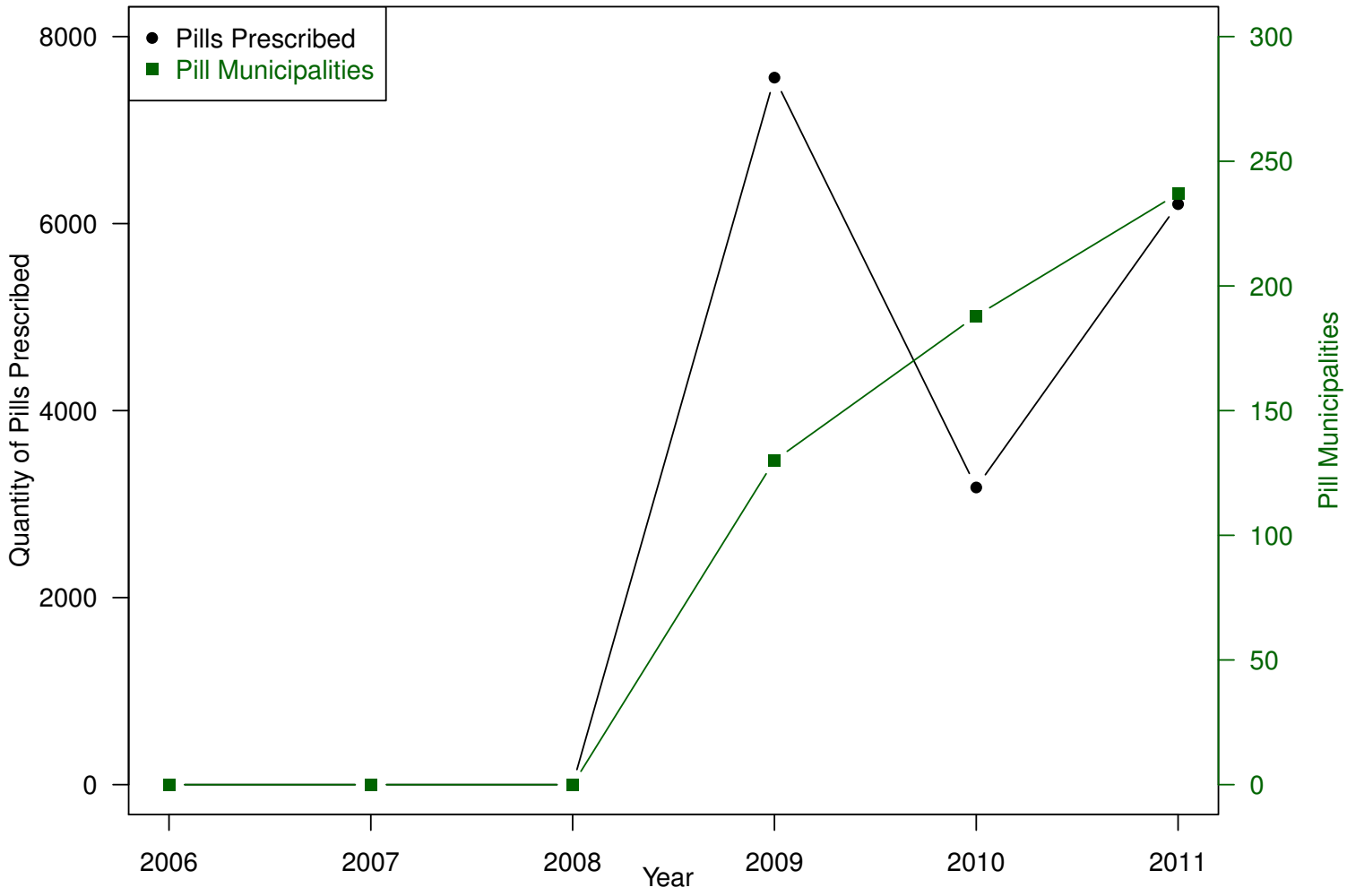
- Selection into prescribing the pill is largely based on mayor's ideology, however not necessarily along party lines
- Pill law was passed mid-electoral cycle
- Add a series of time-varying controls
- Undertake a series of robustness checks using false (lagged) treatments

The Reform

Constitutional finding of the Supreme Court in 2008 regarding "National Laws for the Regulation of Fertility" (Law 20.418)

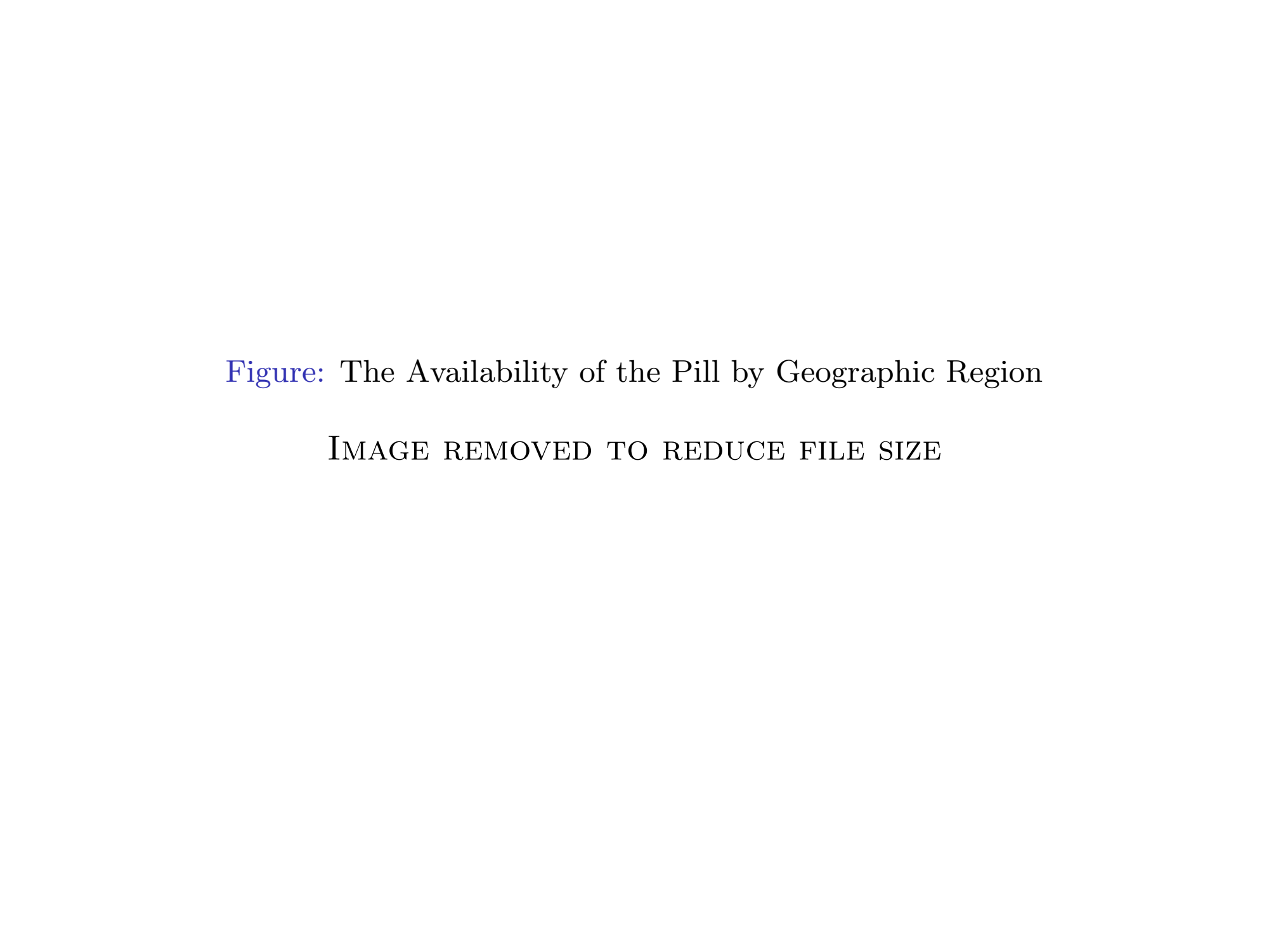
- Made it legal for all Municipal Health Centres to distribute the EC pill freely to women
- Of the 346 municipalities in Chile, approximately 150 immediately reported that they distribute the EC pill without restriction
- EC pill prescriptions jumped sharply, from 0 in 2007 to approximately 7,000 doses in 2008

Figure: Pill Prescriptions and Availability by Time



Note: Prescription data is from the Ministry of Health's administrative data on medications and medical attention. Municipality data is from an independent survey conducted by Dides et al, (2010;2011;2012).

Figure: The Availability of the Pill by Geographic Region

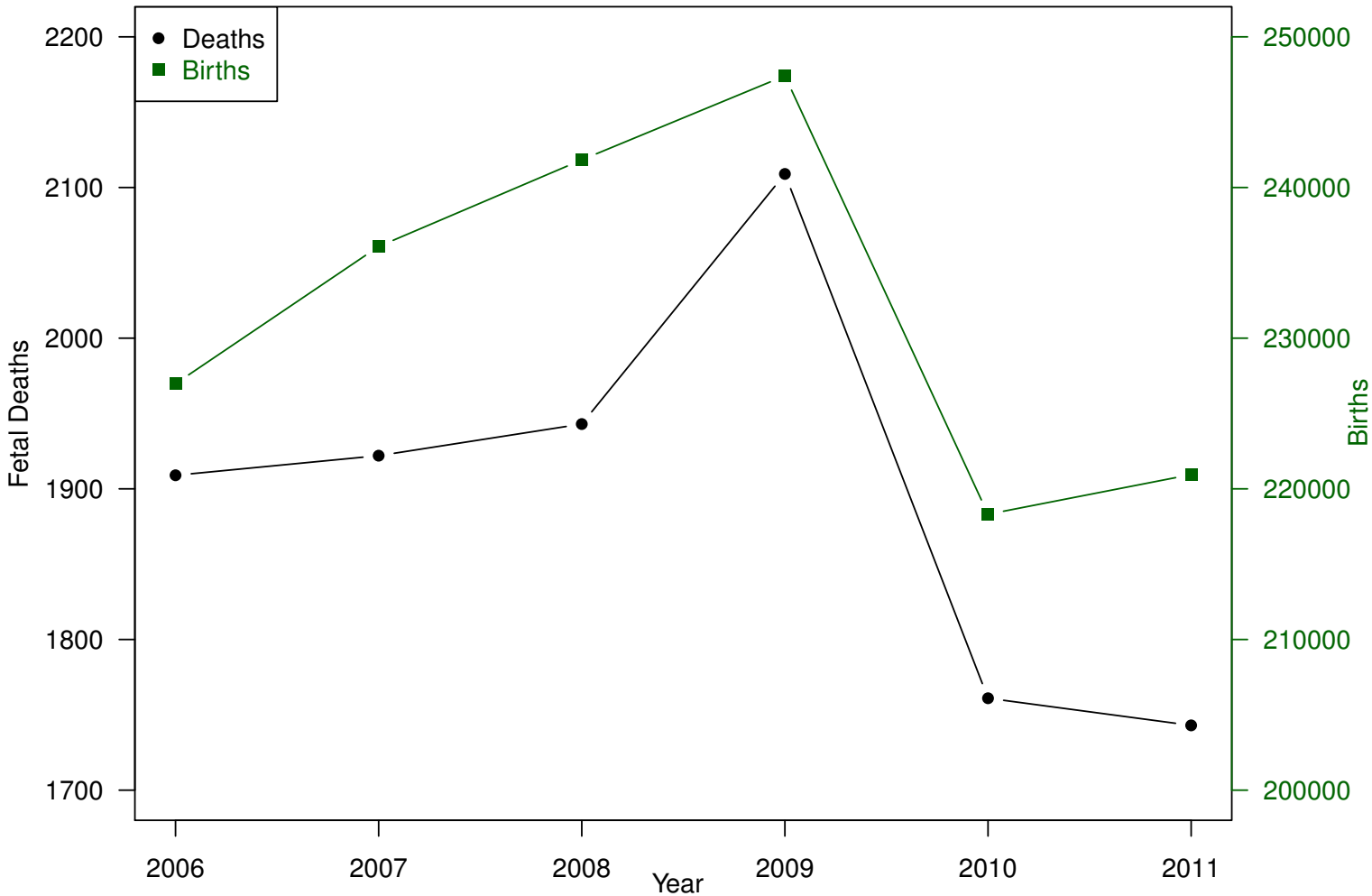


Data

- Matched administrative data files recording all live births and fetal deaths in Chile
- Crossed with data recording population by municipality. Principal outcomes:
  - Births per woman
  - Fetal deaths per live birth (late term, early term)
- All births and deaths from 2006–2011. 1,391,565 births; 11,387 fetal deaths
- Measure of treatment comes from an independent survey (Dides et al. 2009, 2010, 2011)
- Also have administrative data on pill disbursements

Descriptives

Figure: Total Recorded Births and Fetal Deaths, 2006-2011



Note: Data on pregnancies and fetal deaths comes from the Ministry of Health's birth census

Results

Headline results:

- Naive estimates of the effect of having the morning after pill available:
  - Reduces births by 5.5% for teenagers
  - Reduces births by 3.7% for 20-34 year olds
  - No effect on 35-44 year olds
  - Strong evidence for reduction in early term fetal deaths, no effect on late term
- However, strong evidence of spillovers. Those living 'close to' pill municipalities also have:
  - Reduction in births for 15–19, 20–34 year olds
  - Reduced rates of early-term fetal deaths
  - These effects persist for distances up to 30km...

Births

Table: The Effect of the Morning After Pill on Pregnancy

	All Births				First Births			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
15-19 YEAR OLDS								
Morning After Pill	−0.064***	−0.065***	−0.057***	−0.057***	−0.036**	−0.041***	−0.031**	−0.036**
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.016)	(0.016)	(0.016)
Observations	4,152,490	4,152,490	4,152,490	4,152,490	4,125,336	4,125,336	4,125,336	4,125,336
McFadden's R^2	0.670	0.670	0.671	0.671	0.633	0.634	0.635	0.636
20-34 YEAR OLDS								
Morning After Pill	−0.040***	−0.039***	−0.038***	−0.038***	−0.024*	−0.029**	−0.026*	−0.029**
	(0.010)	(0.011)	(0.011)	(0.012)	(0.014)	(0.014)	(0.015)	(0.015)
Observations	11,022,111	11,022,111	11,022,111	11,022,111	10,458,703	10,458,703	10,458,703	10,458,703
McFadden's R^2	0.772	0.772	0.773	0.773	0.684	0.685	0.685	0.686
35-49 YEAR OLDS								
Morning After Pill	0.001	0.001	0.005	0.008	0.042	0.039	0.040	0.042
	(0.013)	(0.013)	(0.013)	(0.013)	(0.036)	(0.038)	(0.038)	(0.039)
Observations	10,572,196	10,572,196	10,572,196	10,572,196	10,376,895	10,376,895	10,376,895	10,376,895
McFadden's R^2	0.537	0.537	0.538	0.538	0.641	0.641	0.642	0.642
Trends & FEs	Y	Y	Y	Y	Y	Y	Y	Y
Political Controls		Y	Y	Y		Y	Y	Y
Health, Educ Controls			Y	Y			Y	Y
Gender Controls				Y				Y

Fetal Deaths

Table: The Effect of the Morning After Pill on Fetal Deaths

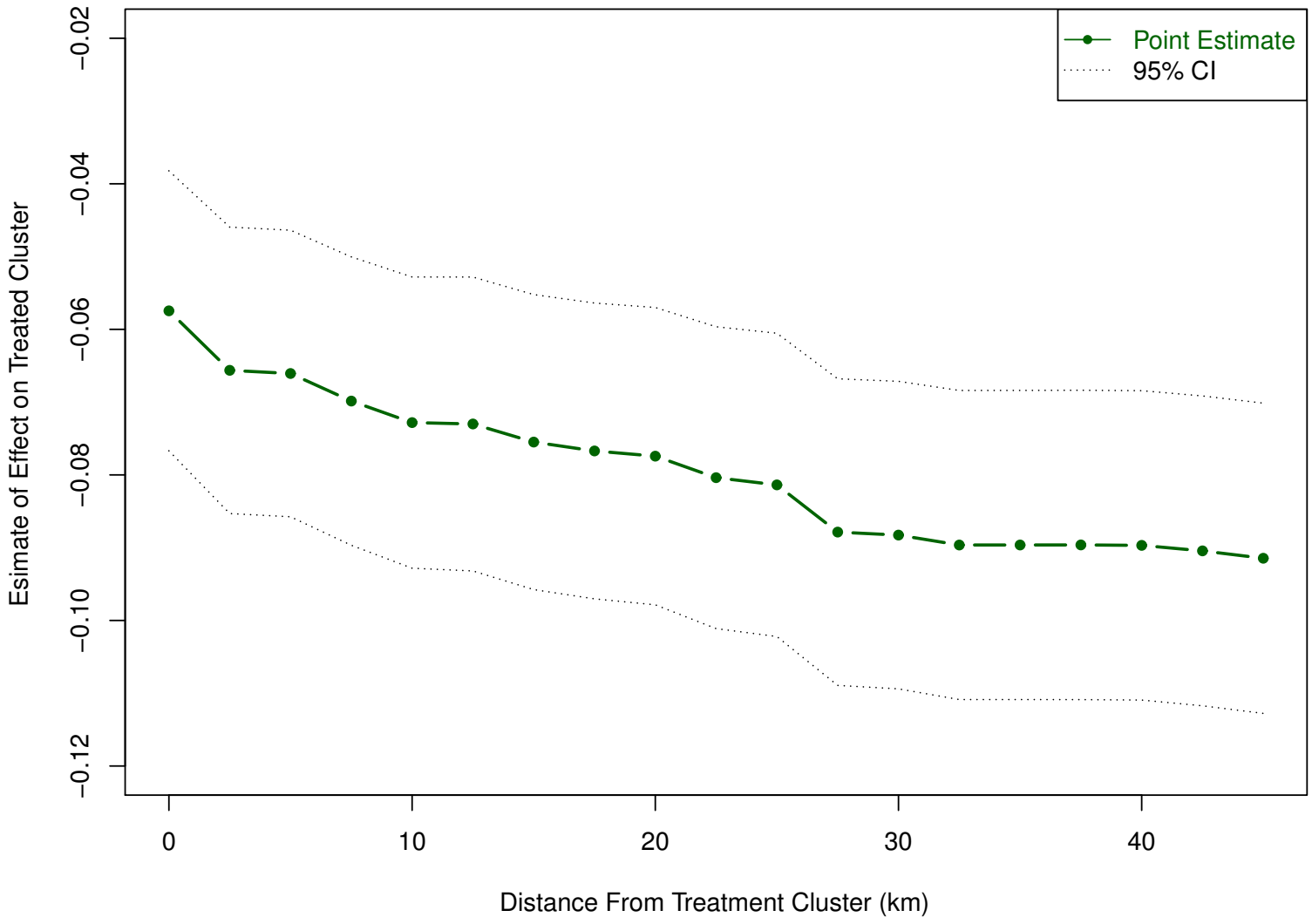
	All Deaths (1)	Early Gestation (2)	Late Gestation (3)
15-19 YEAR OLDS			
Morning After Pill	−0.185**	−0.815***	−0.155
	(0.081)	(0.183)	(0.111)
Mean (deaths/live birth)	0.008	0.002	0.005
Observations	219,608	218,388	218,911
McFadden's R^2	0.232	0.378	0.251
20-34 YEAR OLDS			
Morning After Pill	−0.058	−0.189*	−0.071
	(0.048)	(0.102)	(0.055)
Mean (deaths/live birth)	0.007	0.002	0.004
Observations	954,424	949,477	951,577
McFadden's R^2	0.198	0.385	0.170
35-49 YEAR OLDS			
Morning After Pill	−0.488***	−0.776***	−0.544***
	(0.079)	(0.208)	(0.101)
Mean (deaths/live birth)	0.012	0.003	0.007
Observations	228,920	227,029	227,781
McFadden's R^2	0.260	0.411	0.238

Spillovers

Table: The Morning After Pill and Treatment Spillovers

	15-19 Year olds	20-34 Year olds	35-49 Year olds
Panel A: Births			
Morning After Pill	-0.091^{***}	-0.053^{***}	0.016
	(0.016)	(0.013)	(0.014)
Close $<$ 15 km	-0.083^{***}	-0.044^{***}	0.019
	(0.021)	(0.014)	(0.016)
Close 15-30 km	-0.078^{***}	-0.024^{*}	
	(0.022)	(0.013)	
Close 30-45 km	-0.057	-0.026	
	(0.036)	(0.031)	
Observations	4,152,490	11,022,111	10,572,196
McFadden's R^2	0.673	0.774	0.538
Panel B: Fetal Deaths			
Morning After Pill	-0.935^{***}	-0.230^{*}	-0.785^{***}
	(0.217)	(0.125)	(0.230)
Close $<$ 15 km	-0.163	-0.031	0.051
	(0.234)	(0.151)	(0.226)
Observations	218,388	949,477	227,029
McFadden's R^2	0.379	0.386	0.412

Figure: Estimates of $\hat{\delta}^c$ for Pregnancy (15-19)



Plausibility?

These are large effects, and indeed much larger than what is reported in the two economic studies that exist in the USA. However:

- These effects are similar in magnitude to the effect of viewing "16 and Pregnant" (Kearney and Levine, 2014)
- In Chile, prior to the morning after pill, outside options were very limited: either give birth, travel to abort, or risk death/incarceration in the country
- In cases where abortion exists, this technology may shift women from abortion to post-coital contraceptives, and so may not turn up in net figures
- A back of the envelope calculation suggests that the effectiveness of the pill (pregnancies avoided per prescription) is ∼0.7-0.8. The US FDA suggests that typical use has effectiveness of 89%

▸ See results

The Take Away Points

1. There was quasi-experimental variation in fully-subsidised morning after pill availability in Chile.
2. Availability reduced teenage childbearing and (illegal) abortions by an important amount.
3. The control group may be partially treated via spillovers. Show how to recover consistent estimates.

Thank you.

Table: Summary Statistics

	No Pill Available	Pill Available	Total
Municipality Characteristics			
Poverty	16.4	17.0	16.5
	(7.48)	(7.71)	(7.52)
Conservative	0.285	0.291	0.286
	(0.451)	(0.454)	(0.452)
Education Spending	4,762	5,234	4,838
	(5,479)	(5,482)	(5,482)
Health Spending	1,842	2,333	1,921
	(2,595)	(2,830)	(2,640)
Out of School	4.07	3.99	4.06
	(3.17)	(3.10)	(3.15)
Female Mayor	0.119	0.135	0.121
	(0.323)	(0.342)	(0.326)
Female Poverty	60.4	60.7	60.5
	(10.61)	(9.64)	(10.5)
Pill Distance	5.11	0.00	4.29
	(16.2)	(0.0)	(15)
Individual Characteristics			
Live Births	0.054	0.054	0.054
	(0.226)	(0.226)	(0.226)
Fetal Deaths	0.0562	0.0457	0.0545
	(0.27)	(0.24)	(0.266)
Birthweight	3322.7	3334.3	3324.7
	(540.0)	(542.3)	(540.4)
Maternal education	11.92	12.03	11.94
	(2.967)	(2.894)	(2.955)
Percent working	0.295	0.395	0.312
	(0.456)	(0.489)	(0.463)
Married	0.340	0.309	0.335
	(0.474)	(0.462)	(0.472)
Age at Birth	27.05	27.15	27.07
	(6.777)	(6.790)	(6.779)
N Comunas	346	224	346
N Fetal Deaths	9,846	1,541	11,387
N Births	1,188,579	202,986	1,391,565

Back

Table: Back of the Envelope Calculation of Effect Sizes

	18 & Under (1)	19 & Over (2)
Morning After Pill	-0.088^{***}	-0.039^{***}
	(0.019)	(0.010)
Close < 15 km	-0.080^{***}	-0.033^{***}
	(0.030)	(0.012)
Close 15-30 km	-0.070^{**}	-0.021^{*}
	(0.028)	(0.012)
N Preg (pill)	20,713	182,273
N Preg (close 15)	10,370	105,776
N Preg (close 30)	6,141	48,756
Pills Disbursed	5,736	11,121

NOTES: Each specification is estimated by logistic regression, where the outcome variable is pregnant/not pregnant. Conley's spatial standard errors are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Back

Table: Emergency Contraception and Aggregate Human Capital

	15-19 year olds			20-34 year olds			35-49 year olds		
Panel A: Mother Characteristics	(1) Yrs Educ	(2) Working	(3) Married	(4) Yrs Educ	(5) Working	(6) Married	(7) Yrs Educ	(8) Working	(9) Married
Morning After Pill	0.022	-0.002	0.000	0.001	-0.004*	-0.003	0.061**	-0.004	-0.001
	(0.021)	(0.002)	(0.001)	(0.014)	(0.002)	(0.005)	(0.028)	(0.005)	(0.007)
Observations	131,605	131,746	131,614	896,230	897,363	896,318	198,885	199,472	198,906
R^2	0.02	0.01	0.01	0.14	0.04	0.17	0.21	0.03	0.247

Panel B: Child Characteristics	(1) Weight	(2) Gestation	(3) Length	(4) Weight	(5) Gestation	(6) Length	(7) Weight	(8) Gestation	(9) Length
Morning After Pill	-1.377	-0.020	0.039	-0.636	-0.023***	0.02	-4.923	-0.016	0.030
	(5.944)	(0.019)	(0.028)	(2.532)	(0.008)	(0.016)	(5.602)	(0.016)	(0.024)
Observations	131,746	131,471	129,880	897,363	895,671	885,932	199,472	198,745	195,863
R^2	0.01	0.01	0.03	0.01	0.01	0.03	0.09	0.01	0.03

Notes: Each column represents an OLS regression, and full controls listed in table 1 are included. Working and Married are binary variables, Weight is measured in grams, Gestation in weeks, and Length in centimetres. Summary statistics for these variables are available in table 4. Standard errors are clustered at the level of the municipality. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.