To Pill or not to Pill? Access to Emergency Contraception and Contraceptive Behaviour[*]

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Abstract

We examine the effect of an increase in availability of emergency contraception free-of-charge through the public sector on pre- and post-coital contraceptive choices in Chile. Using a survey of individuals 15 to 29, we exploit variation in availability at the municipality level as a consequence of legal and judicial decisions in the late 2000s. We not only find an increase in the use of emergency contraception in municipalities in which it was available through the public health system, but also an increase in the use of other methods of hormonal, pre-coital contraception, along with a decrease of more traditional contraceptive methods. This spillover effect is concentrated among groups with a low starting use of contraceptives, who may benefit from approaching health services. Unlike previous results for developed countries, our results indicate that there is scope for an effect of emergency contraception in settings with low starting levels of contraceptive use, and a significant potential for these policies to increase adoption of regular contraception.

Keywords: Emergency contraception; youth; contraception behaviour; risky behaviour
JEL codes: J13, I15, I18

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1 Introduction

Can information change individuals' contraceptive behaviour? Recent literature has emphasized the role that increased access to information plays on political attitudes (Chen and Yang, 2018), energy use choices (Allcott and Rogers, 2014; Jessoe and Rapson, 2014) or health choices (Wisdom, Downs and Loewenstein, 2010; Maclean, Buckell and Marti, 2019), among many others. In particular, regarding the role of information on fertility choices, La Ferrara, Chong and Duryea (2012) analyse the impact of mass media (television *novelas*) on completed fertility, while Ashraf, Field and Lee (2014) randomize whether the woman is with her husband when receiving information about contraceptive methods. Because contraception policies can alter the type or frequency of individuals' interactions with health care providers, policy changes can impact not only access to contraception itself, but also information about family planning available to households.

In this paper we ask whether an increase in the availability of emergency contraception through the public health sector can have an informational effect on the use of effective pre-coital contraceptives. Emergency Contraception (EC), also known as *the morning after pill*, lays between abortion and regular contraception, reducing the probability of pregnancy if taken within five days of the sexual intercourse. We thus study the consequences of free-of-charge availability of emergency contraception through the public health service on contraceptive behaviour of young people in a middle income country, Chile. Hence, this policy does not only reduce the price of emergency contraception but plausibly increases access to information regarding contraception.

The context of Chile is ideal for analysing the effects of this policy for various reasons. First, according to the United Nations, before the introduction of the EC pill, Chile had a relatively low rate of contraceptive use, even compared to other Latin American countries.[1] Teenage pregnancy is still a relevant issue, with 55 births per 1,000 women between ages 15 to 19 in 2006 (compared to 40 for U.S. or 12 for Spain).[2] Second, Chile has been one of the last countries to legalize abortion, and did so after our period of study, allowing us to isolate the effect on contraceptive choices. Finally, between years 2007 and 2010 there were a series of measures and counter-measures to allow/block the distribution of the EC pill through the public health service, in the form of legal changes and judiciary decisions. These produced variation in emergency contraception availability across municipalities and over time, explained in Section 2, that we exploit to identify its

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[1]Estimates of the UN Population Division for 2006 indicate that only 65 percent of married or in-union women aged 15-49 in Chile used any method of contraception, compared with 80 percent in Brazil, 72 percent in Mexico, 70 percent in Peru or 78 percent in Uruguay (World Contraceptive Use 2018, http://www.un.org/en/development/desa/population/publications/dataset/contraception/wcu2018.shtml, accessed December 17, 2018.)

[2]World Bank, Adolescent fertility rate, http://api.worldbank.org/v2/en/indicator/SP.ADO.TFRT?downloadformat=excel, accessed December 17, 2018.

effect on the use of other contraceptive methods.

We analyse the impact of emergency contraception availability through the public health service on a representative sample of individuals aged 15 to 29. The Chilean National Surveys of Youth (*Encuesta Nacional de la Juventud*) includes not only information on municipality of residency and individual characteristics, but also self-reported contraceptive use, and other non-sexual risky behaviour, that we will use as a control experiment. Our results show a substantial increase in the use of emergency contraception when freely available, but also an increase in the use of the regular pill and other hormonal, pre-coital, contraceptives, suggesting information spillovers to family planning across the board. Importantly, the effect is concentrated among sectors of the population that reported a low level of contraceptive use before any policy change, who could arguably benefit more from information.

To provide further evidence about the information channel, we conducted a small online survey of practitioners who prescribed the EC pill in or around 2010. Health practitioners were instructed to offer advise on family planning along with the EC pill, and, correspondingly, 94% of the surveyed practitioners report doing so when distributing it. In addition, they report that 65% of individuals decided to start using another contraceptive method. Therefore, it is plausible that our results are capturing the consequences of this additional information that individuals receive upon requesting the EC pill. Its free distribution through the public health system might have contributed to increase the effectiveness of family planning policies.

The study of the consequences of contraception availability for women outcomes has already attracted much attention in the economic literature. In developed countries, the introduction of modern contraceptive methods (*the pill*) reduced the risk of pregnancy, freeing women and partners from the cost of unwanted fertility (Goldin, 1990; Pop-Eleches, 2010). However, since contraception reduces the cost of engaging in sexual intercourse, increases in sexual activity could (partially or totally) compensate the effect of the decrease in the probability of the undesired outcome, and the net effect has been regarded as an empirical question (Myers, 2017).[3] In developing countries, there is limited and mixed evidence of the effect of family planning policies. Joshi and Schultz (2013) find a substantial decrease on fertility when pre-intercourse contraception becomes available in Bangladesh, and Angeles, Guilkey and Mroz (2005) report a similar result for an expansion of a family planning program in Peru. On the other hand, Miller (2010) reports small effects on total fertility using the expansion of the *Profamilia* program in Colombia, but large gains from postponing first births. Miller and Valente (2016) show evidence of the substitutability between abortion and modern contraception in Nepal, while Cav-

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[3] A similar mechanism operates in the case of abortion. Levine, Trainor and Zimmerman (1996) and Ananat, Gruber, Levine and Staiger (2009) present evidence for a large effect of abortion on fertility rates and maternal characteristics.

alcanti, Kocharkov and Santos (2016) find larger positive welfare effects of subsidizing abortion than contraceptives.

The literature has reported only limited impact of emergency contraception in developed countries. For instance, Girma and Paton (2006, 2011) find no effect on teen births after an improvement on access in the UK, but an increase in sexually transmitted diseases. In the U.S., Gross, Lafortune and Low (2014) report no effect on births or abortions, but a decrease in reports of sexual assault when they become unnecessary to access emergency contraception, and Durrance (2013) and Mulligan (2016) show an increase in sexually transmitted diseases. However, the majority these papers use changes transitioning from provision through a health provider to over-the-counter provision.

The paper closest to us, Bentancor and Clarke (2017), and one of the few analysing emergency contraception for developing countries, uses the same changes in emergency contraception availability in Chile to assess its effect on birth rates, foetal deaths and mother characteristics. Using birth and medical records from 2009 to 2011, they report a substantial (although imprecise) decrease in fertility and in late foetal deaths, suggesting that the results reported previously for developed countries may not extend to developing countries. However, they measure the overall effect of the policy and assume no indirect effects. Our results suggest that information may explain its findings and that needs to be taken into account when designing policy changes in contraceptive availability, particularly in settings with low starting levels of contraceptive use.

2 Background

This section describes the Chilean context and argues why this case study can expand the understanding of the role of contraception in developing countries. The Chilean Constitution (1980) protects the "right of life of those soon to be born" (*la vida del que está próximo a nacer*). Until 2017, Chile was one of the few countries in Latin America in which abortion was forbidden.[4] Illegal abortions did nevertheless occur in Chile, and estimates range between 60,000 and 100,000 per year (Casas and Vivaldi, 2014).

Pre-intercourse contraception has become widely available for the entire population over the last decades. Modern contraceptive methods are available for all women through hospitals and local health centres. Hospitals are operated by the Ministry of Health through its regional branches called *Servicios de Salud*, while local health centres (*consultorios*) are run directly by municipalities. In contrast, emergency contraception has been openly debated in Chile for over a decade. Denounced as abortive, its distribution was forbidden in August 2001 by the Chilean Supreme Court, regardless of whether the

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[4]A bill approved in 2017 known as abortion under three circumstances (*aborto en tres causales*) allowed women to have an abortion if the mother's life is at risk, the fetus will not survive the pregnancy, or in the case of rape.

health care provider was public or private. This decision was subsequently challenged and revoked in November 2005. Until February 2007, the EC pill was provided by the public health service only in case of rape. Pharmacies were allowed to sell emergency contraception, but a substantial share of them, including the most important pharmacy chains, refused to do so (Casas Becerra, 2008). Therefore, access to emergency contraception was possible but restricted and expensive for the majority of the Chilean population. The Ministry of Health regulated this anomalous situation through a Decree in 2007. It allowed free distribution of emergency contraception in the public health service through hospitals and local clinics. This regulation was subsequently challenged, and the Supreme Court decision of April 2008 forbade its distribution in the public health network, arguing that it needed to be authorized by a higher order norm (by law rather than by decree).

This decision ended the first period of free distribution of emergency contraception and gave place to an anomalous situation, in which emergency contraception was available through pharmacies (at a cost) and, in some cases, through local *consultorios*, since it was unclear whether the prohibition operated for these municipality-run health centres. Therefore, emergency contraception was available in some municipalities but not in others, depending, for instance, on the willingness of the mayor to provide emergency contraception but also on his or her understanding of the legal repercussions of the Supreme Court decision. This "partial ban" on lasted until June 2009. The *Contraloría* (government's auditor) established that the Supreme Court decision was also applicable at the municipality level, and therefore all distribution of emergency contraception within any public health service was illegal. The "full ban" lasted until January 2010, when congress approved a bill (Law No. 20418 of 8 January 2010) allowing the free distribution of the EC pill. However, the lower rank norm putting these dispositions into practice was delayed until 2013 (Health Ministry Decree of 28 March 2013), yielding a period of uncertainty, in which it was in some cases possible to avoid its distribution. From 2013 onwards, the emergency contraception pill has been freely distributed. In section 3 we give details on how we construct our measure of EC availability at the municipal level.
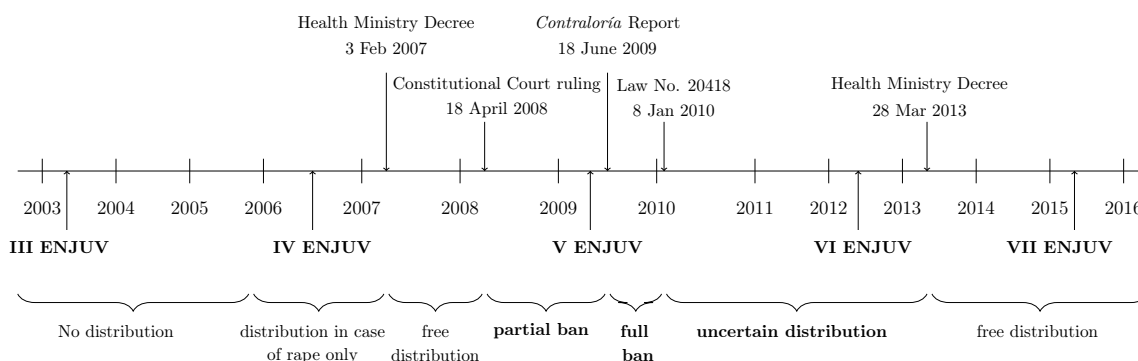

Figure 1: Emergency Contraception Availability and ENJUV Surveys

Figure 1 illustrates the different periods regarding emergency contraception availability, along with the survey waves that we use in our estimation (presented in the next section).

3   Data

We take advantage of the timing of the Chilean National Surveys of Youth (*Encuestas Nacionales de Juventud*, ENJUV hereafter), a cross section survey that took place at three-year intervals since the 1990s. We use waves III to VII, that took place in 2003, 2006, 2009, 2012 and 2015. The ENJUV interviews a nationally representative sample of men and women aged 15 to 29. It contains information on personal characteristics, including municipality of residence, education, religion or socio-economic status. Additionally, young people were asked to fill a self-completing questionnaire regarding their sexual behaviour, among other sensitive topics. Each respondent was asked whether they ever had sexual intercourse, and, if so, which contraceptive method was used on their most recent intercourse, although no information was recorded on when it occurred. They were presented with a list of contraceptive methods that included the morning after pill.

Contraceptive choices and the probability of having ever had intercourse, our main outcomes of interest, are presented in Table 1. For our estimation, we classify pre-intercourse contraceptive methods in highly effective and non-highly effective, considering highly effective only the following methods: pill, IUD, diaphragm, injectable and other types of hormonal contraception. This allows us to abstract from the introduction of new contraceptive methods, particularly new hormonal contraceptives (e.g., patches or injectables). Contraceptive choices are then grouped in four categories: emergency contraception, highly effective methods, non-highly effective methods and no method at all.[5]

We observe a small increase over time in the share of respondents who had sexual intercourse prior to the interview, particularly from 2006 to 2009. This increase appears to have a different timing than the increase in the use of emergency contraception (column (2)), more concentrated between 2009 and 2012, as it would be expected from the policy changes reported in Figure 1. Over time, young people appear more likely to be using any contraception, and mostly so highly effective contraception.

Column (6) of Table 1 presents our measure of emergency contraception availability. Emergency contraception was available at some pharmacies from 2005, and hence observing its use in a given municipality does not guarantee its availability through the public

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[5]We keep one contraceptive method per respondent in the following way: if the EC pill was used, we assumed all other methods were used unsuccessfully. If a highly effective method was used, we assume the goal of other methods (e.g., condoms) was not preventing pregnancy. Only if no emergency contraception and no highly effective method was used, a non-highly effective method is recorded if reported.

Table 1: Descriptive Statistics

| Survey year | Ever sexual intercourse (1) | Contraceptive choice at last sexual intercourse | | | | Emergency contraception availability |
		Emergency contraception (2)	Highly effective method (3)	Non-highly effective method (4)	No method (5)	$P(\# \text{ EC users}_{ct} > \# \text{ EC users}_{c,2006})$ (6)
2003	0.681	0	0.421	0.238	0.341	0
	(0.466)		(0.494)	(0.426)	(0.474)	
	6962	4738	4738	4738	4738	4738
2006	0.651	0.003	0.362	0.345	0.291	0
	(0.475)	(0.053)	(0.481)	(0.475)	(0.454)	
	6034	3958	3958	3958	3958	3958
2009	0.708	0.003	0.398	0.328	0.270	0.278
	(0.455)	(0.057)	(0.490)	(0.470)	(0.444)	(0.448)
	7294	5163	5163	5163	5163	5163
2012	0.717	0.028	0.437	.0331	0.203	0.628
	(0.451)	(0.166)	(0.496)	(0.471)	(0.402)	(0.483)
	7623	5465	5465	5465	5465	5465
2015	0.707	0.018	0.425	0.343	0.214	0.638
	(0.455)	(0.131)	(0.494)	(0.475)	(0.410)	(0.481)
	7333	5187	5187	5187	5187	5187
Total	0.695	0.011	0.411	0.317	0.260	0.333
	(0.460)	(0.105)	(0.492)	(0.465)	(0.439)	(0.471)
	35246	24511	24511	24511	24511	24511

Notes: Only the pill, IUD, diaphragm, injectable and other pre-intercourse hormonal contraceptives are considered highly effective methods. Few individuals report male or female sterilization, and these are dropped from our sample.

health service. Hence, we developed a measure of emergency contraception availability that takes value one from 2009 onwards if the number of users in a given municipality is higher than the number of users in 2006. Our results are robust to an alternative measure that takes value one if the share of respondents using the morning after pill is higher in the municipality than the share in 2006.[6] We observe similar levels and pattern for all measures, with an increase availability particularly from 2009 to 2012, as the changes in regulation would predict. Our measures are highly correlated to each other, and are presented in Table A1.

Table A2 in the Appendix includes the mean and standard deviations for the individual characteristics included in our estimation. We control for age, gender, education, religion, marital status, number of children, socio-economic background or labour force status of respondent and occupational group of household head.

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[6]Note that these measures do not exclude the own use of emergency contraception. Hence, by construction, municipalities with emergency contraception will have higher use.

4 Empirical strategy

We exploit variation in emergency contraception availability across municipalities in Chile during the period 2003 to 2015, arguably caused by a series of legislative and judicial decisions, described in detail in Section 2. During this time, family planning policy was decided by the central government; only as a consequence of the judicial decision and the unclear regulatory framework it resulted in, municipalities were allowed a certain degree of discretion on the provision of emergency contraception.

However, it is unlikely that this discretion was used in a random manner. Plausibly, municipal governments and mayors responded to the characteristics of their municipalities, allowing or forbidding emergency contraception depending on elements such as demand, attitudes towards contraceptives or other, potentially unobservable, municipal characteristics. To use emergency contraception availability at the municipality level to estimate a causal relationship between this availability and contraceptive choices, we would need to control for municipality characteristics that may influence the mayor's decision and individuals' choice of contraception. We will then use the remaining, municipality-mayor specific variation coming from the reading of the consequences of the Supreme Court decision, for identification. Hence, in addition to a dummy variable for availability of the EC pill and individual characteristics (X_{ict}), we control for year dummies δ_t (to capture changes over time at the national level in, for instance, attitudes towards contraception), municipality dummies, μ_c (to control for observable and unobservable time-invariant municipal characteristics), and municipality-specific linear time trends, $\phi_c * year_t$ (to control for changes over time of these municipality characteristics).[7] Therefore, our OLS estimation equation of outcome Y for individual i in municipality c at time t is as follows:

$$Y_{ict} = \alpha + \beta \text{ EC pill availability}_{ct} + X'_{ict}\gamma + \delta_t + \mu_c + \phi_c * year_t + \varepsilon_{ict}$$

In addition to including this wide array of controls to our main specification, we include two robustness checks to test whether our estimates may be confounded by, for instance, non-linear changes over time of unobservable characteristics. First, we run a regression of the effect of emergency contraception availability in 2009 on contraceptive behaviour in 2003 and 2006, before any of the mentioned changes took place. We find that municipalities in which the EC pill will become available in 2009 report, if anything, a lower use of contraceptives in 2003 and 2006, suggesting that unobserved elements that would cause a higher demand for emergency contraception are less present on our treated municipalities. If this is the case, our estimates would be a lower bound of the true effect.

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[7]We include the following individual characteristics: gender, age, living in an urban region, religion, marital status, education, socio-economic group, labour force status and occupation of the household head.

These results can be found in table A3 in the Appendix.

Finally, to address non-linear changes over time in unobservables, such as the way municipalities address risks taken by young people, we perform a placebo test using non-sexual risky behaviours. Smoking, drinking alcohol or using drugs are unlikely to be affected by the policy itself, but would be affected by unobservables biasing our results. This robustness check is presented in detail in Section 6.

5   Results

5.1   Contraception availability and engagement in sexual activity

Contraception availability may affect not only the type of contraception used, but also whether or not individuals engage in sexual intercourse in the first place. An increase in sexual activity as the one reported in Arcidiacono, Khwaja and Ouyang (2012) may alter the unobservable characteristics of individuals making contraceptive choices, confounding our parameters of interest. Hence, we first consider whether emergency contraception availability at the municipality level is correlated with a higher proportion of young people reporting ever had sex.

Table 2 presents the OLS results for our estimation equation when the dependant variable takes value one if the individual reported ever having had sexual intercourse. Column (1) includes the results without any individual, municipality or time controls. Municipalities where the morning after pill was available present a higher share of young people who ever had sex, suggesting the same unconditional relationship observed in previous literature. However, once we control for individual characteristics, municipality- and time-fixed effects, and municipality-specific time trends, our results show a small negative but insignificant relationship between availability of emergency contraception and sexual intercourse.[8] This suggest that the availability of contraception is not likely to have a significant impact on the composition of our sample, and, as such, unlikely to affect the unobservable characteristics of individuals making contraceptive choices.

5.2   Use of contraceptive methods

We now turn to the contraceptive choice for individuals 15 to 29 during their last sexual intercourse. We study the probability of choosing (1) emergency contraception; (2) a highly effective method; (3) a non-highly effective method; or (4) no method at all. We estimate our equation by OLS separately for each choice, where the dependant variable

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[8]Our results are robust to alternative specifications, namely logit and probit (results available upon request).

Table 2: Probability of ever having had sexual intercourse, 15-29 year old (OLS)

	(1)	(2)	(3)	(4)	(5)
EC pill availability	0.028***	0.012*	-0.016	-0.016*	-0.017
	(0.007)	(0.006)	(0.012)	(0.009)	(0.011)
N	35246	35246	35246	35246	35246
R^2	0.001	0.336	0.002	0.335	0.340
Municipality and year FE			✓	✓	✓
Individual characteristics		✓		✓	✓
Municipality-specific time trends					✓

Notes: Robust standard errors clustered at the municipality level are reported in parentheses. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level. Individual controls include age, gender, education, marital status, children, socio-economic status and occupation.

takes value one if the corresponding method was reported, and zero otherwise. Hence, each column represents a separate OLS regression.[9]

Table 3 presents the results for the four alternatives. We observe a large, positive effect of emergency contraceptive availability on its use (Panel A, column (1)), which is robust to include controls for personal characteristics, municipality- and year-fixed effects and municipality-specific time trends (columns (2) to (5)). This could be due to the way our treatment variable was constructed, as own use is not excluded from our measure. However, the size of the coefficient (an increase in the probability of 2.2 percentage points, with an average level of 11%) suggests that the coefficient captures an actual increase in the use of emergency contraception in municipalities included in our treatment group. This leads us to believe that the policy was effective and indeed emergency contraception was used more frequently on those municipalities in which it was readily available.

Furthermore, the availability of emergency contraception is accompanied by an increase in the use of other forms of modern contraception (Panel B). The use of effective contraception increases by 2.9 percentage points, from an average use of 40%. Note that no other element regarding contraceptive provision was left up to the discretion of municipality officials, so this would suggest a spillover effect of the policy. On the other hand, the likelihood of using non-effective contraception substantially decreases in municipalities where emergency contraception is available.[10] Finally, we observe no evidence of emergency contraception availability being correlated with the likelihood of having unprotected intercourse when controls are added (Panel D).

Emergency contraception is not recommended as a substitute for regular contracep-

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[9]Our results are robust to alternative specifications. The multinomial logit specification reports similar results, but our data does not allow for controlling for municipality-specific time trends.

[10]Note that this does not necessarily mean a substitution away from contraceptive methods such as condoms that can prevent sexually transmitted diseases, but rather than the main contraceptive method used to avoid pregnancy moved towards hormonal contraceptives and IUDs.

Table 3: Method used in last sexual intercourse, 15-29 year old (OLS)

	(1)	(2)	(3)	(4)	(5)
Panel A: Emergency contraception pill					
EC pill availability	0.023***	0.022***	0.021***	0.021***	0.022***
	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)
N	24511	24511	24511	24511	24511
R^2	0.010	0.013	0.013	0.015	0.015
Panel B: Any highly effective method					
EC pill availability	0.022*	0.018	0.034**	0.032**	0.026*
	(0.011)	(0.012)	(0.014)	(0.014)	(0.014)
N	24511	24511	24511	24511	24511
R^2	0.000	0.082	0.003	0.086	0.087
Panel C: Any non-highly effective method					
EC pill availability	0.022*	0.004	-0.057***	-0.056***	-0.053***
	(0.012)	(0.012)	(0.015)	(0.015)	(0.015)
N	24511	24511	24511	24511	24511
R^2	0.000	0.075	0.006	0.076	0.077
Panel D: No method used					
EC pill availability	-0.067***	-0.043***	0.003	0.002	0.005
	(0.009)	(0.009)	(0.013)	(0.012)	(0.012)
N	24511	24511	24511	24511	24511
R^2	0.005	0.028	0.010	0.028	0.029
Municipality and year FE			✓	✓	✓
Individual characteristics		✓		✓	✓
Municipality-specific time trends					✓

Notes: Robust standard errors clustered at the municipality level are reported in parentheses. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level. Pill, IUD, diaphragm, injectable and other hormonal contraceptives are considered highly effective methods. Individual controls include age, gender, education, marital status, children, socio-economic status and occupation.

tion, and its provision is often accompanied by the provision of information or even the alternative contraception method.[11] To understand the mechanism behind this increase in highly effective contraceptive use, we conducted an online survey of practitioners (doctors and midwives) who were registered to prescribe the EC pill in or around year 2010.[12] Our survey contacted them by email and asked about EC pill distribution and whether additional information was given at the time of the visit. Of a total of 549 registered

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[11]The National Guidelines for Fertility Planning of the Ministry of Health recommends practitioners to tell patients about other contraceptive methods, but this cannot be a prerequisite to obtain the EC pill. Practitioners should also advise that the EC pill will not protect patients from pregnancy if they continue having sexual intercourse in the next days or weeks, that the EC pill does not protect them from STDs, that recurrent use is not advisable, and that women should come to a check-up to receive information about pre-coital contraception (MINSAL, 2017).

[12]The website www.profesionalesquedanlapae.org, maintained by the ONG Prosalud, listed practitioners who were willing to prescribe the EC pill. The website is no longer available, so we used archive.org to retrieve this information.

practitioners with an email address, we received a valid answer from 115.

A large majority of these practitioners (94%) reported providing information about other contraceptives at the same time as the EC pill was provided. All of those provided information about the contraceptive pill (or other hormonal contraceptives) and over 90% provided information on preservatives. Hence, it seems that this was a regular convention among doctors and midwives when asked for emergency contraception. Furthermore, on average, practitioners estimated that 65% of individuals chose to use another contraceptive method after receiving emergency contraception.

Hence, the increase in highly effective contraception that we observe could be driven by this secondary effect of emergency contraception. This is important for two reasons: first, prior literature has reported large effects of emergency contraception on fertility for Chile. This should be interpreted with care, as it may include both a direct effect of the morning after pill itself, along with the effect of an increase in the use of other highly effective contraceptive methods. Therefore, similar policy changes in settings in which information is already available or in which highly effective contraception is already widely used may not provide similar effects. This would explain, for instance, the lack of effect reported for the US (see, for instance, Gross *et al.*, 2014), or the UK (Girma and Paton, 2011, 2006). Second, our results indicate that even in settings in which emergency contraception is already available, information or awareness of contraceptive methods, or policies that bring young individuals in touch with the health system may enhance the effects.

Table A4 in the Appendix presents in detail heterogeneous effects by age, gender and urban location. We find stronger effects, both in the use of emergency contraception and modern contraceptive methods, among men and younger respondents, groups that reported low levels of contraceptive use before any policy change occurred (see table A5). Arguably, groups with lower starting levels of contraceptive use are likely to benefit more from the information provided along the EC pill. We observe those groups having a higher take-up of highly effective, pre-intercourse contraceptives on those municipalities where emergency contraception was available through a health practitioner.

6   Robustness checks

Even when controlling for municipality-specific time trends, it might be the case that our measure of emergency contraception availability is capturing time-varying elements that correlate with risky behaviours. To address this concern, we now perform a robustness check on the relationship between emergency contraception availability and other risky choices. If the availability of emergency contraception is correlated with unobservables that reduce risky behaviours overall, as suggested by our results, we should expect to find

a reduction in risky behaviours such as drug use once the EC pill becomes available.

The ENJUV survey collects information on the probability of having engaged in risky behaviours in the year prior to the interview. In particular, individuals were asked whether they drink alcohol, smoked cigarettes or marijuana or consumed cocaine. About 65% of our sample reported having consumed alcohol over the last 12 months, 52% smoked cigarettes, 20% marijuana and only 2.5% reported having used cocaine.

Table 4 presents evidence of the relationship between emergency contraception availability and these risks. When none or only individual characteristics are included (columns (1) and (2)), we observe a positive relationship between risky behaviours (cigarettes and marijuana) and availability of the morning after pill. Once we add controls for municipality and year (columns (3) and onwards), there is no evidence of individuals aged 15 to 29 being more likely to engage in risky behaviours such as alcohol, cigarettes or drug use. Therefore, this table provides additional evidence of the morning after pill having an effect on reducing sexual risky behaviour and not risky behaviours overall.

Table 4: Effect of emergency contraception availability on other risky behaviours (OLS)

	(1)	(2)	(3)	(4)	(5)
Panel A: Alcohol					
EC pill availability	0.063***	0.033***	0.022	0.020	0.026
	(0.011)	(0.009)	(0.020)	(0.016)	(0.019)
N	22584	22584	22584	22584	22584
R^2	0.004	0.118	0.002	0.106	0.109
Panel B: Cigarettes					
EC pill availability	0.018	0.004	0.010	0.010	0.010
	(0.012)	(0.012)	(0.015)	(0.013)	(0.016)
N	22501	22501	22501	22501	22501
R^2	0.000	0.059	0.003	0.056	0.060
Panel C: Marijuana					
EC pill availability	0.070***	0.039***	0.016	0.014	0.001
	(0.011)	(0.008)	(0.015)	(0.013)	(0.015)
N	22113	22113	22113	22113	22113
R^2	0.008	0.075	0.019	0.070	0.075
Panel D: Cocaine					
EC pill availability	0.004	0.001	0.003	0.004	0.003
	(0.003)	(0.003)	(0.004)	(0.004)	(0.006)
N	21915	21915	21915	21915	21915
R^2	0.000	0.018	-0.000	0.016	0.018
Municipality and year FE			✓	✓	✓
Individual characteristics		✓		✓	✓
Municipality-specific time trends					✓

Notes: Robust standard errors clustered at the municipality level are reported in parentheses. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level. Individual controls include age, gender, education, marital status, children, socio-economic status and occupation.

7 Conclusion

This paper studies the consequences of freely available emergency contraception on contraceptive behaviour. In a developing country, we exploit a series of judicial decisions and legislative changes from 2006 to 2013, that allowed variation in the distribution of the *morning after pill* across municipalities and over time. Our results show that transitioning from a context in which emergency contraception was available only through the private health system at a cost to one in which it was available free of charge in the public health system is correlated with an increase in the its use by individuals aged 15 to 29. This suggests an unmatched demand for this type of contraception. Interestingly, this change is also correlated with an increase in the use of other forms of modern or highly effective contraception (i.e., hormonal contraception or IUD), and a decrease in the use of traditional, less effective methods, including condoms. Our results are robust to control not only for individual characteristics and time and municipality fixed effects, but also for municipality-specific time trends, to account for changes over time in unobservables at the municipality level. This effect is also concentrated in groups of the population who exhibit a lower level of use before the policy change, namely younger individuals (below 20) and men.

Our results suggest positive spillovers from emergency contraception availability, particularly in a context of low use of modern contraceptives. These groups may benefit particularly from being in contact with the formal health system regarding their contraceptive choices, and from the additional information that they may receive alongside the EC pill. This information may be particularly valuable for individuals approaching the formal health network in an unplanned manner (e.g., after a broken condom). Although our data does not allow us to test this hypothesis, the effect could partially be a by-product of encouraging these groups to get in touch with the formal health system. In contrast, most literature on developed countries explore variation in over-the-counter distribution of the EC pill, hence potentially driving individuals away from the formal health system.[13]

Notwithstanding these effects for unplanned fertility, our results do not rule out a negative impact of emergency contraception availability on sexually transmitted diseases. In developed countries, Girma and Paton (2011), Durrance (2013) or Miller (2010) report an increase in sexually transmitted diseases following a permanent change in access to emergency contraception. The temporary nature of the variation we exploit and the sometimes long lags until detection of sexually transmitted diseases made our setting and our data inadequate for its study. Sexually transmitted diseases have been a source of

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[13]Gross *et al.* (2014) interpret their results of a decrease in sexual assaults reported after easier access to emergency contraception in the U.S. as reducing transaction costs for victims. However, it might also limit access to other services provided to them.

concern in Chile and other countries in recent decades (MINSAL, 2016), and as such this potential unwanted consequence of transitioning towards hormonal contraception should not be dismissed in our setting.

Our results are relevant for two reasons. First, it is unlikely that the lack of effect of emergency contraception reported in the literature for developed countries would apply to developing countries. While Chile presents a lower level of contraceptive use than similar countries, low use of hormonal contraception is the norm for regions targeted by this type of policies, either directly by governments or other organizations. Second, it contributes towards reconciling previous results in developed countries showing little effect of emergency contraception with the results of Bentancor and Clarke (2017). The large decrease in fertility reported by the authors following the introduction of emergency contraception in Chile may be driven by the overall effect of the policy on contraceptive behaviour, rather than only by the increased availability of emergency contraception itself.

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Appendix

Table A1: Descriptive statistics: EC pill availability in municipality c in year t

Survey year	P(any respondent used EC_{ct}) (1)	P(# EC users$_{ct}$ > # EC users$_{c,2006}$) (2)	P(%EC users$_{ct}$ > %EC users$_{c,2006}$) (3)
2003	0	0	0
	4738	4738	4738
2006	0.212	0	0
	(0.409)		
	3958	3958	3958
2009	0.304	0.278	0.248
	(0.460)	(0.448)	(0.432)
	5163	5163	5163
2012	0.730	0.627	0.634
	(0.444)	(0.483)	(0.482)
	5465	5465	5465
2015	0.709	0.638	0.638
	(0.454)	(0.481)	(0.481)
	5187	5187	5187
Total	0.411	0.333	0.328
	(0.492)	(0.471)	(0.470)
	24511	24511	24511

Notes: Column (1) considers emergency contraception was available if anyone in that municipality reported using emergency contraception; columns (2) and (3) considers emergency contraception was available if a higher number and a higher share of respondents respectively than that municipality in 2006.

Table A2: Descriptive statistics: control variables

	2003	2006	2009	2012	2015	All years
Female	0.5464	0.5481	0.5489	0.5475	0.554	0.549
	(0.498)	(0.498)	(0.498)	(0.498)	(0.497)	(0.498)
Age	20.845	20.380	20.475	20.769	20.758	20.654
	(4.325)	(4.229)	(4.129)	(4.165)	(4.142)	(4.199)
Urban	0.869	0.877	0.837	0.874	0.873	0.866
	(0.337)	(0.328)	(0.370)	(0.332)	(0.333)	(0.341)
Catholic	0.572	0.595	0.487	0.483	0.374	0.498
	(0.495)	(0.491)	(0.500)	(0.500)	(0.484)	(0.500)
Evangelic	0.151	0.139	0.134	0.130	0.138	0.138
	(0.358)	(0.346)	(0.341)	(0.336)	(0.345)	(0.345)
Student	0.492	0.548	0.542	0.571	0.579	0.547
	(0.500)	(0.498)	(0.498)	(0.495)	(0.494)	(0.498)
Single	0.870	0.922	0.934	0.942	0.960	0.927
	(0.336)	(0.268)	(0.248)	(0.235)	(0.196)	(0.261)
Education						
Primary education	0.114	0.075	0.156	0.081	0.061	0.098
	(0.318)	(0.263)	(0.363)	(0.272)	(0.239)	(0.297)
High School	0.646	0.630	0.360	0.572	0.613	0.561
	(0.478)	(0.483)	(0.480)	(0.495)	(0.487)	(0.496)
Vocational training	0.098	0.098	0.426	0.125	0.129	0.178
	(0.297)	(0.298)	(0.495)	(0.330)	(0.335)	(0.383)
Some college	0.143	0.197	0.058	0.223	0.197	0.163
	(0.350)	(0.398)	(0.234)	(0.416)	(0.398)	(0.370)
Socio-economic group						
ABC1	0.048	0.071	0.050	0.061	0.037	0.053
	(0.213)	(0.257)	(0.219)	(0.239)	(0.189)	(0.225)
C2	0.133	0.179	0.302	0.194	0.152	0.193
	(0.340)	(0.384)	(0.459)	(0.395)	(0.359)	(0.394)
C3	0.265	0.334	0.198	0.305	0.331	0.285
	(0.441)	(0.472)	(0.399)	(0.460)	(0.471)	(0.452)
D	0.396	0.323	0.347	0.397	0.416	0.378
	(0.489)	(0.468)	(0.476)	(0.490)	(0.493)	(0.485)
E	0.1592	0.093	0.103	0.044	0.064	0.091
	(0.366)	(0.290)	(0.304)	(0.204)	(0.245)	(0.288)
Working	0.289	0.281	0.276	0.314	0.309	0.295
	(0.453)	(0.449)	(0.447)	(0.464)	(0.462)	(0.456)
Out of labour force	0.530	0.509	0.510	0.545	0.531	0.526
	(0.499)	(0.500)	(0.500)	(0.498)	(0.499)	(0.499)
Occupation of household head						
Occasional unskilled worker	0.070	0.074	0.081	0.032	0.085	0.068
	(0.255)	(0.263)	(0.273)	(0.177)	(0.279)	(0.252)
Unskilled worker	0.199	0.185	0.185	0.190	0.024	0.155
	(0.399)	(0.389)	(0.389)	(0.392)	(0.154)	(0.362)
Skilled blue collar worker	0.319	0.330	0.379	0.411	0.266	0.342
	(0.466)	(0.470)	(0.485)	(0.492)	(0.442)	(0.474)
Low skilled white collar worker	0.222	0.320	0.295	0.258	0.347	0.288
	(0.416)	(0.467)	(0.456)	(0.438)	(0.476)	(0.453)
Medium skilled white collar worker	0.063	0.082	0.047	0.059	0.233	0.098
	(0.243)	(0.274)	(0.212)	(0.236)	(0.423)	(0.297)
Managers	0.008	0.009	0.007	0.004	0.041	0.014
	(0.089)	(0.092)	(0.085)	(0.066)	(0.199)	(0.118)
Retired	0.117	0	0.005	0.031	0.003	0.032
	(0.321)		(0.073)	(0.173)	(0.060)	(0.175)
Unemployed	0	0	0	0.010	0	0.002
				(0.098)		(0.046)
Housewife	0.003	0	0	0.004	0	0.002
	(0.057)			(0.067)	(0)	(0.040)
Observations	6967	6034	7360	7655	7422	35438

Table A3: Placebo test: effect of EC availability in 2009 on 2006 and 2003 contraceptive behaviours

	Highly effective contraception	Non-highly effective contraception	No contraception
EC pill availability in 2009	-0.034**	0.017	0.019
	(0.016)	(0.013)	(0.016)
N	7408	7408	7408
R^2	0.136	0.124	0.041
Year dummies	✓	✓	✓
Individual characteristics	✓	✓	✓

Table A4: Heterogeneous effects of emergency contraception on the method used in last sexual intercourse, 15-29 year old (OLS)

	Emergency contraception		Highly effective method		Non-highly effective method		No method	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: age								
EC pill availability	0.026***	0.027***	0.082***	0.070***	-0.078***	-0.063***	-0.030**	-0.034**
	(0.004)	(0.004)	(0.015)	(0.016)	(0.016)	(0.019)	(0.014)	(0.014)
EC pill availability*age>20	-0.007*	-0.007*	-0.084***	-0.085***	0.037***	0.038***	0.054***	0.054***
	(0.004)	(0.004)	(0.014)	(0.014)	(0.014)	(0.014)	(0.012)	(0.012)
N	24511	24511	24511	24511	24511	24511	24511	24511
R^2	0.015	0.014	0.087	0.090	0.076	0.078	0.029	0.032
Panel B: gender								
EC pill availability	0.028***	0.030***	0.059***	0.046***	-0.054***	-0.039*	-0.033**	-0.037***
	(0.004)	(0.005)	(0.014)	(0.016)	(0.017)	(0.020)	(0.014)	(0.014)
EC pill availability*female	-0.013***	-0.013***	-0.048***	-0.049***	-0.003	-0.003	0.065***	0.065***
	(0.004)	(0.004)	(0.012)	(0.013)	(0.011)	(0.011)	(0.010)	(0.010)
N	24511	24511	24511	24511	24511	24511	24511	24511
R^2	0.016	0.015	0.086	0.089	0.076	0.078	0.029	0.033
Panel C: urban								
EC pill availability	0.021***	0.019***	0.007	-0.010	-0.000	0.010	-0.028	-0.020
	(0.007)	(0.007)	(0.030)	(0.033)	(0.027)	(0.027)	(0.025)	(0.027)
EC pill availability*urban	0.001	0.004	0.027	0.031	-0.059**	-0.055**	0.032	0.019
	(0.007)	(0.007)	(0.030)	(0.032)	(0.024)	(0.024)	(0.026)	(0.028)
N	24511	24511	24511	24511	24511	24511	24511	24511
R^2	0.015	0.014	0.086	0.089	0.076	0.078	0.028	0.031
Municipality and year FE	✓	✓	✓	✓	✓	✓	✓	✓
Individual characteristics	✓	✓	✓	✓	✓	✓	✓	✓
Municipality-specific time trends		✓		✓		✓		✓

Notes: Robust standard errors clustered at the municipality level are reported in parentheses. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level. Pill, IUD, diaphragm, injectable and other hormonal contraceptives are considered highly effective methods.

Table A5: Descriptive statistics of contraceptive use, 2006 ENJUV survey, by group

| | Ever sexual intercourse | Contraceptive choice at last sexual intercourse | | | |
| | | Emergency contraception | Highly effective method | Non-highly effective method | No method |
	(1)	(2)	(3)	(4)	(5)
Panel A: age					
Age ≤ 20	0.449	0.003	0.242	0.439	0.316
	(0.497)	(0.057)	(0.428)	(0.496)	(0.465)
	3420	1534	1534	1534	1534
Age > 20	0.927	0.002	0.437	0.285	0.275
	(0.260)	(0.050)	(0.496)	(0.452)	(0.447)
	2614	2424	2424	2424	2424
Panel B: gender					
Men	0.664	0.002	0.237	0.443	0.318
	(0.472)	(0.047)	(0.425)	(0.497)	(0.466)
	2727	1811	1811	1811	1811
Women	0.649	0.003	0.467	0.262	0.268
	(0.477)	(0.057)	(0.499)	(0.440)	(0.443)
	3307	2147	2147	2147	2147
Panel C: urban					
Rural	0.636	0	0.361	0.287	0.352
	(0.481)		(0.481)	(0.452)	(0.478)
	740	471	471	471	471
Urban	0.659	0.003	0.362	0.352	0.283
	(0.474)	(0.056)	(0.481)	(0.478)	(0.450)
	5294	3487	3487	3487	3487
Total	0.656	0.709	0.362	0.345	0.003
	(0.475)	(0.454)	(0.481)	(0.475)	(0.053)
	6034	3958	3958	3958	3958