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THE IMPACT OF ABORTION LEGALIZATION ON FERTILITY AND FEMALE EMPOWERMENT

New Evidence from Mexico



***The Impact of Abortion Legalization on Fertility
and Female Empowerment: New Evidence from
Mexico***

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ABSTRACT

We examine the effect of a large-scale, free, elective abortion program implemented in Mexico City in 2007. This reform resulted in a sharp increase in the request and use of early term elective abortions. We document that this localized reform resulted in a legislative backlash in 18 other Mexican states which constitutionally altered penal codes to increase sanctions on abortions. We take advantage of this dual policy environment to estimate the effect of progressive and regressive abortion reform on fertility and women's empowerment. Using administrative birth data we find that progressive abortion laws reduce rates of child-bearing, particularly among young women. Additionally, the reform is found to increase women's role in household decision making—an empowerment result in line with economic theory and empirical results from a developed-country setting. We however find little evidence to suggest that the resulting regressive changes to penal codes have had an inverse result over the time period studied. In turning to mechanisms, evidence from a panel of women suggests that results are directly driven by increased access to abortion, rather than changes in sexual behavior, contraceptive use or contraceptive knowledge.

1. INTRODUCTION

Breathtaking figures suggest that worldwide, unsafe abortions may result in as many as eight maternal deaths per hour (Lancet, 2009). By the best available estimates, 13% of all maternal deaths are due to complications surrounding clandestine and unsafe abortion, with these numbers being much higher in certain regions and groups (WHO, 2011). The highest estimated rate of unsafe abortion occurs in the Latin America and Caribbean region. Each year, an estimated 4.2 million unsafe induced abortions are carried out, accounting for 12% of all maternal deaths in the region (WHO, 2011). This region also exhibits some of the world's most conservative laws on abortion (United Nations, 2014).

Laws codifying access to abortion date from as far back as the early 20th century (Doan, 2007). However, the issue of abortion legalization remains a highly controversial social topic, with considerable variation in the availability and legality of elective abortion worldwide. From the 1970s onwards a number of large-scale reforms have increased access to elective abortion, and these have been documented to have considerable impacts on the life courses of women, children and families (Ananat et al., 2009; Bailey, M. J., 2013; Mitrut and Wolff, 2011; Pop-Eleches, 2005; Pop-Eleches, C., 2010). However, legislation, both *de jure* and *de facto* has also lead to a tightening of access to elective abortion in a number of contexts. At least in the USA, recent work has shown that these restrictions lead to reductions in the use of abortions (Cunningham et al., 2017; Grossman et al., 2017), and corresponding increases in fertility (Fischer et al., 2017).

Despite, the political and legal complexities of abortion reform, the decisions taken by national and local governments in setting these policies have important long and short-run welfare implications. As well as impacts

on total fertility and fertility timing (Ananat et al. (2007); Gruber et al. (1999); Guldi (2008); Valente (2014)) access to abortion has been documented to impact women's labor market outcomes (Angrist and Evans, 1996; Mølland, 2016), the composition of children as well as their living circumstances (Mitrut and Wolff, 2011; Pop-Eleches, C., 2010), and women's bargaining power (Oreffice, 2007).

In this study, we examine the effect of a sharply defined local abortion reform in Mexico City and document the effect of free access to legal and safe abortion services on fertility, sexual behavior and female empowerment. We combine the state-level variation over time resulting from this natural experiment with high quality vital statistics data on 23 million births. This reform—the so-called legal interruption of pregnancy (or ILE for its name in Spanish)—was of considerable importance. During the pre-reform period of 2001–2007 a total of 62 legal abortions (available in restrictive conditions) were performed in Mexico City. Following the 2007 reform, more than 90,000 women accessed safe legal abortion between 2008 and 2012.

Abortion laws are determined at the state level in Mexico, where Mexico City (also known as the federal district of Mexico or Mexico D.F.) has its own legislative assembly. The ILE reform provided all women who reside in Mexico City with access to legal and safe abortion procedures, free of charge and for any reason, during the first trimester of pregnancy (Becker, 2013). The law was a radical change from previous legislation in Mexico City, and also compared to the rest of the states of Mexico, where abortion is still banned in all but the extreme circumstances of rape, to save the mother's life, or in cases of severe fetal malformation. Moreover, by legalizing abortion, Mexico City distinguishes itself from nearly all other countries in Latin America and the Caribbean which remain highly restrictive in their policies related to elective abortion (Fraser, 2015). The passing of the ILE reform resulted in a swift backlash, with 18 states following the

announcement of the ILE reform by constitutionally modifying their penal codes to increase the harshness of the treatment of suspected abortions. We construct a database recording the precise date for each of these law changes by piecing together dates from published constitutional decrees for each state, resulting in a time and state-varying measure of changes in abortion laws.

This reform thus provides a unique opportunity to examine simultaneous expansions and contractions of abortion policies. While much of the existing literature on the impact of abortion—and contraceptive policies more generally—focuses on expansions in access, there are a number of papers which focus on the contractions in policies. These include historical restrictions in Romania (Pop-Eleches, 2010), the impact of parental consent or notification laws targeted at adolescents in the USA (Bitler and Zavodny, 2001; Joyce and Kaestner, 1996), and recent contractions in availability of providers due to state-specific legislation in the USA (Cunningham et al., 2017; Fischer et al., 2017; Lu and Slusky, 2016). However, the ILE reform in Mexico DF and resulting spate of constitutional changes increasing the harshness of sentencing of illegal abortion provides the opportunity to examine the impact of a contemporaneous series of restrictive and permissive abortion policies in a single country and time.

This study adds to the existing literature by providing evidence on the effect of abortion legalization absent simultaneous changes in other major contraceptive laws and reforms. And as described above, we take advantage of an idiosyncratic policy environment in which regressive changes in abortion laws in multiple and geographically disperse areas followed a large progressive change, allowing for the separate identification of the effects of both a loosening and tightening of abortion legislation. By combining rich administrative data with panel data following women on either side of abortion reforms we are able to test a number of existing hypotheses relating

to abortion reforms. We begin by testing whether—as in the existing literature—abortion reforms have immediate and important effects on fertility. Then we test the hypothesis that fertility reform, and abortion reform in particular, will increase female empowerment within the household (Chiappori and Orefice, 2008). While this has been documented to hold historically in the USA (Orefice, 2007), no similar evidence exists for an emerging economy, despite considerable interest in women’s well-being and empowerment in literature on economic development (Baird et al., 2014; Duflo, 2012).

By combining state by time variation provided by the ILE reform and the follow-on regressive law changes with rich administrative and panel data, we estimate a difference-in-differences effect of the reform on rates of fertility, and various measures of women’s empowerment. We document that the progressive reform resulted in a sharp decline in fertility, particularly among young women, and an increase in measures of women’s empowerment. These results are found to hold up to an event-study analysis, state-of-the-art correction for multiple hypothesis testing, and a number of placebo tests. We also document that effects and significance levels are largely unchanged when estimating using an entropy matching technique to form a more comparable quasi-control group for difference-in-difference estimates. The estimated effects on fertility are large, and in line with results documented in the developed-country literature. We estimate that the ILE reform resulted in a 3.7% reduction in fertility among all women, and a 6.9% reduction among adolescents. Moreover, we do not find evidence to suggest that the effect on fertility can be attributed to changes in other contraceptive use, nor do we find links between the abortions and contraceptive knowledge or altered sexual behavior.

Turning to empowerment, we estimate that the abortion reform made women approximately 10% more likely to report being involved in a series

of important decisions within her household. No similar results were found for women older than fertile age at the date of the reform, in line with placebo tests laid out in Oreffice (2007). However, we find little evidence to suggest that the reverse was true with regressive abortion reforms. The tightening of laws to increase punitive treatment of abortion was not shown to increase rates of birth, nor decrease rates of female empowerment. We suggest that this may be because regressive constitutional changes had little effect on rates of self-administered abortion, which often occur privately, without any formal medical intervention (Lara et al., 2011). And unlike other restrictions in abortion policy studied in the economic literature (Fischer et al., 2017; Joyce and Kaestner, 1996; Pop- Eleches, C., 2010), the prevailing policies prior to the legislative changes in Mexico were already restrictive.

In summary, this paper provides strong evidence that abortion reform in an emerging economy leads to rapid and discernible changes in political behavior, aggregate fertility rates, and individual empowerment within households. This paper joins a number of studies on Mexico's ILE reform, spread across a range of fields including law (Johnson, 2013), public health (Becker, 2013; Contreras et al., 2011; Mondragón y Kalb et al., 2011; Schiavon et al., 2010), medicine (Madrado, 2009), and demography (Gutierrez-Vazquez and Parrado, 2015). The present paper, however is the first to harness the full power of vital statistics data, the first to collect and combine the ILE reform with the regressive law changes following this reform, and the first to consider how women's empowerment, as well as fertility declines, may be affected by abortion reform in Mexico. The findings of this paper show how access to safe and legal abortion have important consequences for women's welfare, providing strong policy implications regarding women's reproductive choices. Abortion legislation continues to be a contested legal matter for local and national governments, however with

rapid globalization access to abortion is now also an issue for the global arena in which international cooperation is important for women's reproductive rights and female empowerment.¹

2. THE MEXICAN CONTEXT AND THE ILE REFORM

2.1 Fertility and the Mexican context

Between the years 1975 and 2015, the fertility rate in Mexico declined rapidly from roughly 6 children per woman to approximately 2.2 children per woman. This major shift in fertility can be partially attributed to changes in access to modern contraceptive methods in the country (Juarez et al., 2013). In 1975, the Mexican government passed the General Population Law, which obliged the government to supply family planning services and provide contraceptives via the public health care sector free of charge. In 1995, family planning services were decentralized to the state level, where different states fund family planning to various degrees, possibly making family planning services differentially available across states. Although 67% of all women of childbearing age in Mexico report using modern contraceptive methods (and 5% use traditional and less efficient methods), it is estimated that more than half of all pregnancies are unintended. Estimates suggest that up to 54% of these unintended pregnancies are terminated (Juarez et al., 2013).

¹ For instance, recent global governance efforts made by the Trump administration in the USA to limit access to family planning and abortion services (i.e. reinstatement of the Mexico City Policy also known as the Global Gag Rule), or efforts made by European countries (including the Swedish Government) with the pro-choice initiative (i.e. #SheDecides).

Mexico consists of 32 federal entities, 31 of which are federal states plus the federal district of Mexico (also known as Mexico D.F. or Mexico City). In addition to the national constitution, each of the 32 federal entities has its own state or local constitution, defined by its own legislative power. Abortion laws in all of Mexico are determined at the state level (Becker, 2013). Mexico City contains approximately 8% of the entire population (8.9 million of Mexico's 119.5 million inhabitants according to 2015 estimates) and, since 2007, is the only state that allows for elective abortion during the first trimester.

2.2 Legal restrictions and induced abortions

Prior to the reform in Mexico City, abortion laws were quite uniform across the 32 federal entities of Mexico. Induced abortion continues to be considered a criminal offense with the risk of up to 30 years imprisonment in many states, and legal abortion was only permitted in the limited cases of rape, threat to the life of the mother, or severe malformation of the fetus. In practice, even in these limited cases, legal abortion has been described by human rights organizations as extremely difficult to access due to rigid legal barriers (Juarez et al., 2013). In the densely populated Mexico City, only 62 abortions were legally performed during 2001-2007 (Becker, 2013).

The estimated rate of induced abortions for Mexico in 2006 was 33 abortions per 1,000 women of fertile age (Juarez et al., 2008), which is considered high internationally (Becker, 2013). As a substitute to legal options, abortions were performed in clandestine and often unsafe settings. In 2006 alone, medical records from public hospitals show that an estimated 150,000 women in Mexico were treated for abortion-related complications (Juarez et al., 2008). The most common method of induced abortion is believed to be the abortifacient drug Misoprostol, which despite the strict legal

restrictions in Mexico, has been available in pharmacies since 1985 (Lara et al., 2011). Despite the fact Misoprostol and other abortifacients formally require a doctor's prescription in Mexico, studies show that abortifacients are frequently sold over the counter without prescription (Lara et al., 2011). While a safe and well recognised method for induced abortion when appropriately taken, instructions on dosage and usage of Misoprostol is generally not available at pharmacies, leading to considerable risks when self administered (see for example Grimes (2005)).

Due to the high number of unsafe abortions as well as a growing movement for women's reproductive health rights and a coalition of pro-choice NGOs, the legislative assembly of the Federal District of Mexico City voted to legalize elective abortion (termed legal interruption of pregnancy, or ILE for its name in Spanish) on April 24, 2007, reforming Articles 145-148 of the penal code of Mexico City, and Article 14 of the Health Code. These reforms were signed into law the following day, and published in the official Gazette of the Federal District on April 26, 2007 (Ciudad de México, 2007). A broader discussion of the reform's social and legal setting is provided in Kulczycki (2011); Madrazo (2009), Blanco-Mancilla (2011) and Johnson (2013). This immediately permitted women above the age of 18 to request legal interruption of pregnancy at up to 12 weeks of gestation without restriction. Access for minors requires parental or guardian consent. Under this law, induced abortion was made legal in both the public and private health care sectors.

2.3 Implementation of the ILE reform 2007

Immediate implementation was made possible by collaboration between the Ministry of Health of Mexico City, members of the health department and international NGOs, which had thoroughly designed a program for public

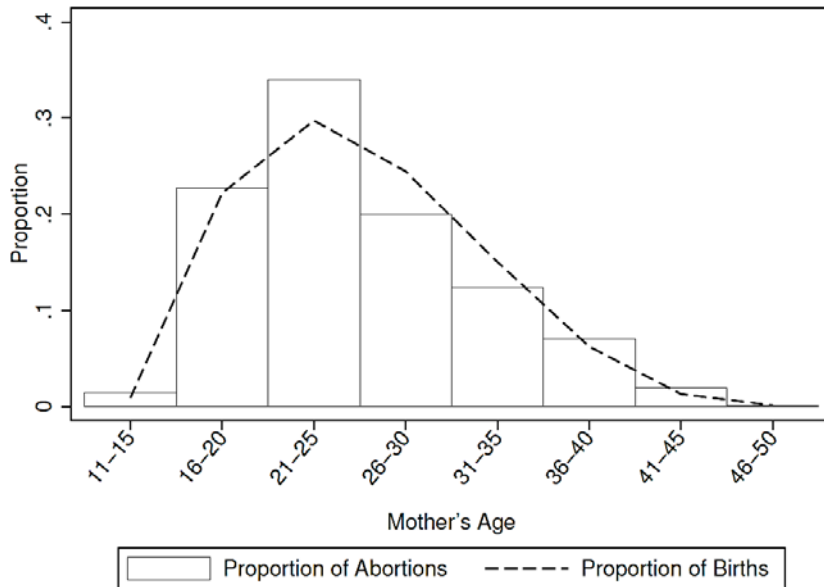
provision of abortion services called the “the ILE program” and its implementation even before the law was passed (Singh et al., 2012). As such, abortion services were made available via the public health care hospitals immediately after the law was passed in April 2007, although with lower capacity and efficiency compared to current conditions. Abortion services were also quickly available in the private health care sector (Blanco-Mancilla, 2011). Additionally, under this law sexual education in schools was improved, and post-abortion contraceptives were made freely available directly from the health clinics which provided abortions (Contreras et al., 2011). Records from public hospitals show that the demand for post-abortion contraceptives is high (approximately 82% of all women accept contraceptives) and that prevalence of repeated abortion procedures are low (Becker, 2013). On August 29, 2008 the decision to pass the ILE law was ratified by the Supreme Court of Mexico, making Mexico City, together with Cuba and Uruguay, the most liberal jurisdiction in terms of abortion legislation in the entire Latin American and Caribbean region (Fraser, 2015).

Under the ILE program, women above the age of 18 with residency in Mexico City can access abortion services free of charge at a selected number of public health clinics operated via the Ministry of Health in Mexico City (MOH-DF). Women with residency outside Mexico City can also access the public provision of abortion through MOH-DF but are charged with a sliding fee scale determined with regard to the woman’s socioeconomic background. In 2010, 74% of all women who received an abortion through the public health care sector were women living in Mexico City, 24% were living in the state of Mexico (which shares a border with Mexico City) and 2% were living in other states (Mondragón y Kalb et al., 2011).

Figures from the Secretary of Health’s administrative data suggest that abortions were used by women of all ages, though were disproportionately

sought by younger (21-25 year-olds) and older women (36 year-olds and above), with lower rates of abortion among 26 to 35 year olds. The proportion of all births by age and all abortions in public health clinics by age is presented in Figure 1. Approximately half of the abortions were sought by unmarried women (45.5% to single women, and 4.1% to divorced women), with the remainder nearly evenly split between married women, or those in a stable union. Information regarding the extent to which women below the age of 18 have access to abortion services is relatively scarce. However, according to a qualitative study by Tatum et al. (2012), the law on parental consent may be differentially enforced depending on the caregiver. While Public Hospitals require parental consent, only one out of three abortion providers in private health clinics require parental consent (Schiavon et al., 2010).

Figure 1: The Proportion of Births and Abortions by age



Notes: The proportion of all births and all abortions in public health clinics by age group in Mexico City 2007-2011. Births are calculated from administrative data (INEGI) and abortions from administrative data (Secretary of Health, Mexico DF).

2.4 Accessibility and utilization of legally induced abortions

Information regarding the private provision of abortion services is limited due to a lack of supervision of the private market for legal abortion services (Becker, 2013). Despite the fact that safe abortion, at no or low cost, is provided by the public health system in Mexico City, women do seek abortion services within the private sector. A descriptive study by Schiavon et al. (2012) suggests that private abortion services are provided at high costs (157–505 US dollars) and that the quality of care is inferior to that in the

public sector, given that the less safe and efficient “dilation and curettage” is used as the main method in the private sector (71%). A suggested explanation for the high rates of usage of private care relates to beliefs that the overall quality is higher in the private health sector (Schiavon et al., 2012).

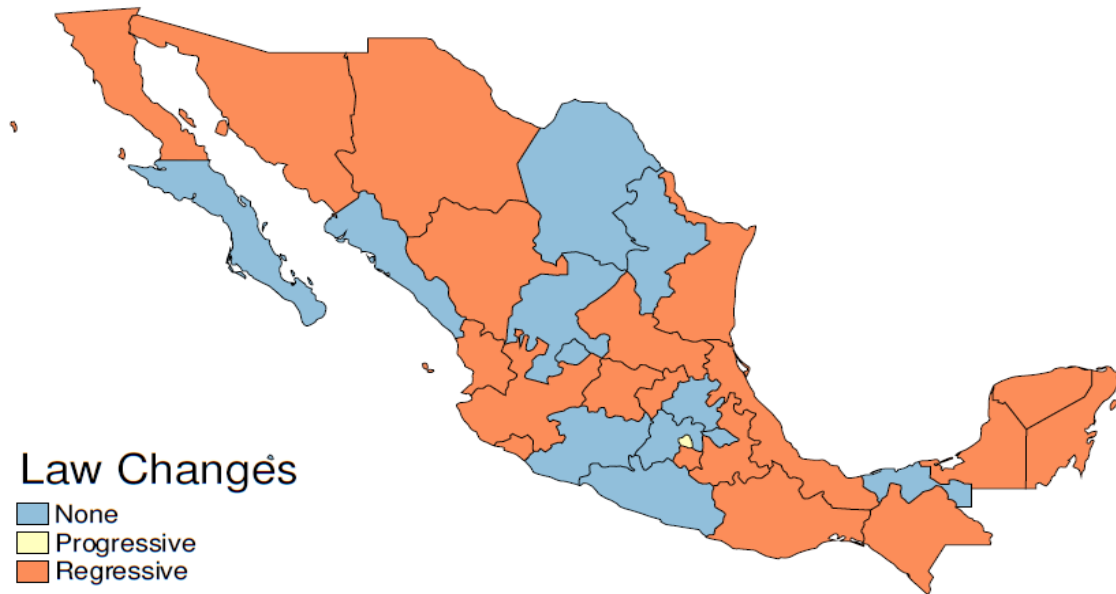
Records from public hospitals show that during the year of 2007, when the reform was implemented, more than 7,000 abortion procedures were performed at 14 selected MOH-DF clinics. Over the years, the MOH-DF abortion program expanded its services and became more efficient in meeting the high demand for elective abortion. The MOH-DF program offers both surgical and medical abortion procedures and is the main provider of medical abortion (Winikoff and Sheldon, 2012). The large shift from 25% of all abortion procedures being medical in 2007 to as much as 74% in 2011 have played a key part of meeting the demand (Becker, 2013). As of 2012, approximately 90,000 abortions were carried out at the MOH-DF clinics (Becker, 2013).

2.5 Post-April 2007 policy environment

Almost immediately following Mexico D.F.’s ILE reform, a number of states began a series of counter-legislations to change the respective sections of their penal codes, defining the beginning of human life as occurring at conception. Often, these legal responses directly referenced Mexico D.F.’s ILE reform. Even in cases where they did not directly refer to the ILE reform, it seems highly likely that the reform was a defining factor. For example, in the 20 years prior to the ILE reform there had been only two constitutionally defined changes to the articles relating to abortion in the penal codes of all states of Mexico (Gamboa Montejano and Valdés Robledo, 2014), compared to 18 changes between June 21, 2008 and November 17,

2009. Importantly, these reforms all changed the status of abortion from an act which was penalized according to specific articles of the penal code into a homicide, with considerably more severe sanctions of up to 30 years imprisonment. In Figure 2 below we display the geographical distribution of law changes (progressive, regressive or neutral) over the period under study. The only progressive reform refers to Mexico D.F.'s ILE reform, while 18 states made regressive changes after the initial reform. We have compiled on a state-by-state basis the exact dates the reforms were passed into law, and these are displayed in Table 1. To the best of our knowledge, there exists no centralized record of the dates and laws which were altered in the post ILE era, and as such we compiled these from our reading of legal source documents.

Figure 2: Geographical Distribution of State Law Changes (post August-2007)



Notes: The August 2007 ILE reform occurred in Mexico D.F. (yellow). Resulting (regressive) reforms in other states are indicated in red, with states highlighted in blue indicating that no law change occurred between 2007 and 2016.

Table 1: Constitutional Changes Following Mexico DF's ILE Reform

State	Reform Date	Constitutional Decree	Article in
<i>Baja California</i>	Dec 26, 2008	Decree 175	7
<i>Chiapas</i>	Jan 20, 2009	Decree 139	178
<i>Chihuahua</i>	Jun 21, 2008	Decree 231-08	143
<i>Colima</i>	Nov 25, 2009	Decree 296	187
<i>Durango</i>	May 31, 2009	Decree 273	350
<i>Guanajuato</i>	May 26, 2009	Dictamen 836	158
<i>Jalisco</i>	Jul 02, 2009	Decree 22361	228
<i>Morelos</i>	Dec 11, 2008	Decree 1153	115
<i>Nayarit</i>	Jun 06, 2009	Decree 50	335
<i>Oaxaca</i>	Sep 11, 2009	Decree 1383	312
<i>Puebla</i>	Jun 03, 2009	SPI-ISS-27-09*	136
<i>Querétaro</i>	Sep 18, 2009	P. O. 68 [‡]	339
<i>Quintana Roo</i>	May 15, 2009	Decree 158	92
<i>San Luis Potosí</i>	Sep 02, 2009	Decree 833	128
<i>Sonora</i>	Apr 06, 2009	Law 174	265
<i>Tamaulipas</i>	Dec 23, 2009	Decree LX-1850	356
<i>Yucatán</i>	Aug 07, 2009	Decree 219	389
<i>Veracruz</i>	Nov 17, 2009	G. L. 155 [‡]	150

Notes: All states which formally altered their constitutions following Mexico DF's ILE reform are indicated above. Constitutional decree refers to the law composed to alter the state constitution, and article in question refers to the article altered in the constitution or penal code which was altered by the decree. Dates, decrees and articles are collated by the authors from various state government sources. The official document approving each decree and its associated date is available in a zipped folder on the authors' websites.

* Decrees or official newspapers for the State of Puebla could not be located by the authors. The date and article in question is suggested by Gamboa Monte-jano and Valdés Robledo (2014).

[‡] P. O. refers to the official newspaper where laws are published in Querétaro, and G. L. refers to the same newspaper in Veracruz. The law was published without number (pp. 9857-9859) in P. O. 68 and in G. L. 155 (pp 2-5) in Querétaro and Veracruz respectively.

3 Data and method

3.1 Data and summary statistics

To examine the effects of abortion reforms on fertility, we use vital statistics on all births registered in Mexico for the time period 2002-2011. The data is provided by the National Institute of Statistics and Geography (INEGI for its name in Spanish) and covers 23,151,080 live births among women aged 15-44. The INEGI Birth Register contains information about the date of birth, actual birthplace and the official residency of the mother. In addition, information on maternal characteristics such as age, total fertility, educational attainment, marital status and employment status are recorded. Summary statistics for birth data (as well as state-specific time-varying controls), are provided in Table 2. Rates of birth are presented separately for Mexico D.F. (the principal reform state), states which went on to pass regressive reforms, and states which left unaltered their constitutions. We provide country averages in column 4, which agree with international calculations (The World Bank, 2015). Summary statistics show that rates of birth in Mexico D.F. are lower than rates of birth in the rest of the country, and broadly comparable among regressive and non-regressive reform states.

Table 2: State and Maternal Characteristics (Birth Data)

	(1) Mexico City	(2) Regressive States	(3) Rest of Mexico	(4) Full Country
<i>ILE Reform</i>	0.400 (0.491)	0.000 (0.000)	0.000 (0.000)	0.013 (0.111)
<i>Regressive Law Change</i>	0.000 (0.000)	0.226 (0.418)	0.000 (0.000)	0.134 (0.341)

<i>Illiteracy</i>	2.415 (0.259)	7.435 (3.992)	8.900 (5.543)	7.828 (4.735)
<i>People aged 6-14 with no schooling</i>	2.954 (0.152)	5.122 (1.188)	5.504 (2.086)	5.197 (1.632)
<i>No Health Coverage</i>	39.228 (4.357)	39.072 (12.970)	43.958 (17.128)	40.909 (14.698)
<i>Seguro Popular</i>	0.625 (0.463)	0.746 (0.370)	0.742 (0.363)	0.741 (0.371)
<i>Birth Rate (All)</i>	64.738 (33.552)	88.246 (47.809)	87.745 (48.068)	86.025 (47.305)
<i>Birth Rate 15-19</i>	56.500 (30.215)	76.481 (40.534)	78.216 (40.562)	75.673 (40.251)
<i>Birth Rate 20-24</i>	99.412 (2.676)	141.671 (15.313)	141.880 (12.711)	138.321 (17.952)
<i>Birth Rate 25-29</i>	92.580 (6.178)	127.298 (16.968)	127.876 (13.572)	124.484 (18.012)
<i>Birth Rate 30-34</i>	76.904 (10.155)	90.752 (18.504)	90.447 (17.557)	89.373 (17.979)
<i>Birth Rate 35-39</i>	40.845 (11.689)	47.316 (15.433)	45.461 (14.488)	46.002 (14.879)
<i>Birth Rate 40-44</i>	9.295 (5.507)	14.296 (8.803)	12.326 (7.810)	13.060 (8.307)
<i>States × Year</i>	300	5700	3600	9600
Total Births	1,505,790	12,729,949	8,921,380	23,157,119

Notes: Data on fertility and maternal characteristics is obtained from INEGI and covers all births among women aged 15-44 during the time period 2002-2011. Data on state level education and health care is obtained from the National Institute for Federalism and Municipal Development and the National Education Statistical Information System (respectively) for the same period. Mean values are displayed, with standard deviations below in parentheses. Regressive states are those which ever had a regressive law change posterior to 2008, and so regressive law change is the proportion of all years in these states which follow a law change. Similarly, ILE Reform refers to the proportion of years in Mexico D.F. which follow the implementation of the ILE Reform

In order to examine female empowerment and potential mechanisms through which the reform may have affected fertility, we use longitudinal data on household decision-making and contraceptive use and knowledge from the Mexican Family Life Survey (MxFLS). The MxFLS is a nationally and regionally representative longitudinal data set that follows the Mexican population over time, covering various topics regarding the well-being of individuals including information on household decision-making and reproductive health. The survey was conducted in three waves during 2002-2003, 2005-2006 and 2009-2012.

The sample used for the analysis of household decision-making consists of a panel of 5,816 unique women living in a household together with their spouse or partner and who completed the household module. The module on household decision-making includes questions on which household members decide on children's health and education, major household spending, labor market participation and contraceptive use, among other things. In Table 3, summary statistics regarding women's participation in household decision-making processes are presented, separated by their region of residence. The averages in participation are presented again separately for Mexico D.F (column 1), states which went on to pass regressive laws (column 2), states which left their constitutions un-altered (column 3) and the averages for the full country (column 4). Panel A displays decision-making for women aged 15-44 (fertile age) and Panel B for women above age 44. The summary statistics show that women with residency in Mexico City are on average more likely to participate in household decisions compared to women in the rest of the country. Finally, we use the reproductive health module from the MxFLS which collects information on contraceptive knowledge and usage as well as information on sexual behavior such as the number of sexual partners. This sample

consists of a panel of women aged 15-44 who completed the reproductive health questionnaire resulting in a total of 5,404 women.

Table 3: Summary Statistics, Household Decision Making, MxFLS

Elements and index	(1) Mexico City	(2) Regressive States	(3) Rest of Mexico	(4) Full Country
Panel A: Women aged 15-44				
<i>Child Education</i>	0.929 (0.258)	0.898 (0.303)	0.882 (0.323)	0.893 (0.309)
<i>Child Health</i>	0.895 (3.307)	0.903 (0.297)	0.880 (0.325)	0.894 (0.308)
<i>Expenditures</i>	0.723 (0.449)	0.681 (0.466)	0.667 (0.471)	0.678 (0.467)
<i>Work</i>	0.892 (0.311)	0.779 (0.415)	0.761 (0.427)	0.778 (0.416)
<i>Contraception</i>	0.863 (0.345)	0.833 (0.373)	0.854 (0.354)	0.842 (0.365)
<i>Index</i>	4.302 (0.945)	4.094 (1.081)	4.044 (1.111)	4.085 (1.088)
<i>Observations</i>	172	4769	3234	8175
Panel B: Women above age 44				
<i>Child Education</i>	0.442 (0.499)	0.464 (0.499)	0.475 (0.499)	0.466 (0.499)
<i>Child Health</i>	0.503 (0.502)	0.496 (0.500)	0.492 (0.500)	0.495 (0.500)
<i>Expenditures</i>	0.726 (0.448)	0.675 (0.469)	0.674 (0.469)	0.678 (0.467)
<i>Work</i>	0.885 (0.321)	0.818 (0.386)	0.797 (0.402)	0.816 (0.388)
<i>Contraception</i>	0.400 (0.492)	0.362 (0.481)	0.408 (0.492)	0.380 (0.485)

<i>Index</i>	2.956 (1.366)	2.814 (1.409)	2.846 (1.425)	2.834 (1.411)
<i>Observations</i>	112	3690	2178	5980

Notes: Data on household decision making and sexual behavior is obtained from the Mexican Family Life Survey (MxFLS), which was conducted in 2002- 2003, 2005-2006 and 2009-2012. In panel A, summary statistics of household decision making for women aged 15-44 are presented and for women above age 44 in panel B. Mean values are displayed with standard deviations in parentheses. Regressive states are those which ever had a regressive law change posterior to 2008.

We collect a number of additional controls measured at the level of state and year. This includes the population of women from the National Population Council of Mexico (CONAPO), socioeconomic variables including illiteracy, schooling, and access to health insurance from the National Institute for Federalism and Municipal Development (INAFED) and the National Education Statistical Information System (SNIE). It also includes data on the access to the national health insurance program *Seguro Popular*, obtained from the INEGI data bank.

3.2 Method

The impact of the abortion reform is evaluated by using the sub-national variation in abortion laws, and thus the access to legal and safe abortion procedures, resulting from the ILE reform. Given the temporal- and geographical-variation in availability of free legal abortions, and resulting regressive law changes, we estimate the causal impact of the ILE reform using a so-called difference-in-differences (DiD) method. Within this framework, outcomes before and after abortion reforms are compared across the treated state and untreated states. In certain specifications, we include a set of state-level time-varying controls, and allow for differential linear time trends in each state over time.

The underlying assumption for causally identifying the effects from the reform are parallel trends across treated and untreated areas. This implies that in the absence of the reform treated and untreated states would have followed similar trends over time. We examine the veracity of this assumption including estimating a so-called event study for the effect of the ILE reform. In this specification, we fully interact a binary variable (equal to one) if residing in Mexico D.F. with the years before and after the reform. The coefficients on these variables allow us to compare changes in outcomes in Mexico D.F. compared with changes in outcomes in the rest of the country.

While our difference-in-difference study will pick up any difference in levels, nevertheless we may be concerned that heterogeneity between groups drives the results, rather than the reform itself. In order to temper these concerns, we provide additional estimates, however this time using entropy balancing to determine an optimal quasi-control group. Entropy-balancing, from Hainmueller (2012), is a technique designed to optimize covariate balance between two groups. This technique, increasingly used in economic applications (for example Stanton and Thomas (2016)) matches the moments between samples of desired covariates.

4 Results

4.1 Fertility

The results, presented in Table 4 below suggest, first, that the legalization of abortion in Mexico D.F. caused a large and statistically significant reduction in rates of births, both for all women, and for teenage women. The estimated coefficient on the ILE Reform for all women fluctuates between a reduction of births by 2.2% ($p < 0.05$) to a reduction by as much as (a

marginally significant) 3.8% when including state-specific linear trends and time-varying controls. When considering only the effect of passing the ILE reform on teenage motherhood, we find larger effects, of a magnitude between 5.3 - 7 % comparable to international evidence (Ananat and Hungerman, 2012; Bailey, 2006; Guldi, 2008; Pop-Eleches 2005; Valente, 2014).

Table 4: The Effect of the ILE Reform and Resulting Law Changes on log(Births)

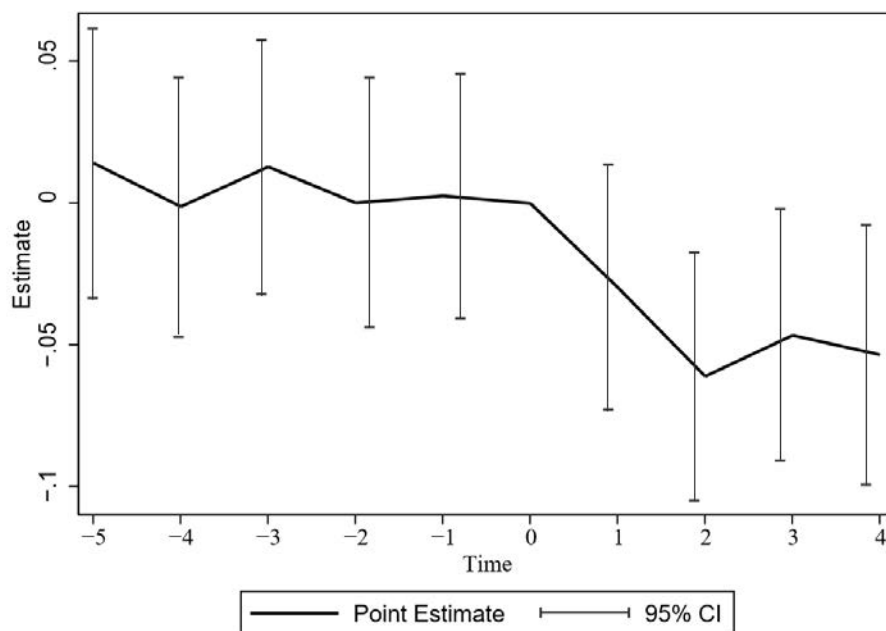
	All Women		Teen-aged Women			
	(1) ln(Birth)	(2) ln(Birth)	(3) ln(Birth)	(4) ln(Birth)	(5) ln(Birth)	(6) ln(Birth)
<i>ILE Reform</i>	-0.022** [0.010]	-0.028 [0.019]	-0.038* [0.020]	-0.053*** [0.016]	-0.058** [0.029]	-0.070** [0.029]
<i>Regressive Law Changes</i>	0.001 [0.006]	0.004 [0.008]	0.010 [0.009]	-0.007 [0.009]	0.001 [0.011]	0.013 [0.012]
<i>Constant</i>	5.537*** [0.016]	0.080 [12.536]	-7.458 [19.697]	5.443*** [0.021]	-12.660 [16.900]	-31.098 [26.589]
<i>Observations</i>	9600	9600	9600	1600	1600	1600
<i>State and Year FEs</i>	Y	Y	Y	Y	Y	Y
<i>State Linear Trends</i>		Y	Y		Y	Y
<i>Time-Varying Controls</i>		y				Y

Notes: Difference-in-differences estimates of the reform on rates of births are displayed. Standard errors clustered by state are presented in parentheses. All regressions are weighted by population of women of the relevant age group in each state and year. ***p-value<0.01, **p-value<0.05, *p-value<0.01.

The estimates corresponding to the effect of constitutionally *tightening* policies relating to abortion appear to be largely of the reverse direction,

however never at a statistically significant level. When considering the effect of “Regressive Law Changes” in Table 4 we see that these are associated with small positive coefficients for all women (ranging from a 0.1% to a 1% increase in rates of births), though always imprecisely estimated.

The validity of the previous results rely fundamentally on the validity of a parallel-trends assumption for the DiD specification. We examine this assumption formally in Figure 3 with the plotting of an event study examining the effect of the ILE reform on rates of birth. In this plot we fully interact a dummy of residing in Mexico D.F. with the years preceding and posterior to the reform. The coefficients on these variables then allow us to compare changes in levels of births in D.F. compared with changes in levels in the rest of the country, with respect to an arbitrary base year. If the estimated reduction in fertility from Table 4 is indeed due to the effect of the reform rather than capturing prevailing differences in trends between quasi-treatment and quasi-control areas, we should see that differences in trends emerge only *after* the implementation of the reform. We see precisely this pattern in Figure 3, where we display the event study for women of all ages. In the 5 pre-reform periods, there are no statistically significant differences between quasi-treatment and quasi-control compared to the prevailing difference in the year when the reform was implemented. However, a sharp reduction in fertility appears in Mexico D.F. in the first post-reform year, leveling off at approximately -5% in the following 3 years. This provides support of the parallel trend assumption, as any confounding factors which could explain the reform’s effect on fertility must have emerged over exactly the same time-period of the reform, rather than as pre-existing differential trends. The magnitude of the dynamic effects also matches up quite well with actual usage figures of abortions in public health clinics, which reached a plateau two years after the reform’s implementation.

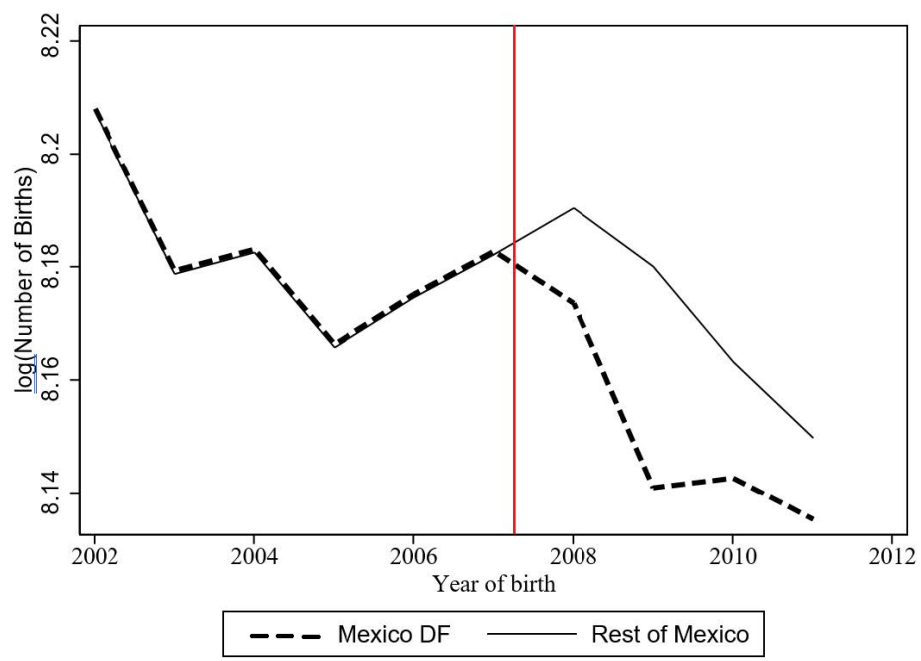
Figure 3: Event Study Estimates of ILE Reform

Notes: Event study estimates and confidence intervals interact the presence of legalized abortion with lags and leads. Each lag/lead is a yearly estimate, and year 0 (2007) is the omitted base year.

In the analysis up to this point, the reform area (Mexico D.F.) was compared to all untreated areas of the country, regardless of differential state-level characteristics. Given the heterogeneity between (and within) Mexican states, we examine the robustness of these findings to a potentially more comparable quasi-control group. In order to do so, we use an entropy weighting procedure described by Hainmueller (2012). This allows us to match states based on pre-reform rates of fertility, and examine how these pre-matched states evolve once the reform has been implemented. In Figure 4 we observe that entropy matching provides an appropriate pre-

trend balance between Mexico D.F. and the matched rest-of-Mexico sample. Graphically, we observe that even when demanding that states are matched on pre-trends and levels of fertility, rates of birth in Mexico D.F. decline faster and by a greater amount after the reform than in the matched but untreated states.

Figure 4: Births using Entropy Weights Based on Pre-Reform



Notes: Trends in $\log(\text{Births})$ for Mexico D.F. and an aggregate trend for the rest of Mexico are displayed. The aggregate trend is calculated using entropy weighting (Hainmueller, 2012). Weights are constructed based on pre-reform birth rates between treated and non-treated areas. The vertical red line displays the date of the law change.

4.2 Mechanisms: Availability, education or behavior

Along with the law change legalizing access to abortion, the ILE reform included additional components relating to sexual education and disbursement of additional contraceptives in clinics (refer to section 2 for a full discussion). In order to examine the channels through which the reform affected fertility: whether it be only access, or a combination of access with behavioral change, we turn to a dataset which allows us to observe (self-reported) behavior more directly. We use the MxFLS data which follows women over time, and has survey rounds both before and after the fertility reforms of interest. To examine the potential effect of the other aspects of the reform (sexual education and alternative contraceptives), we estimate a model which allows for individual specific fixed-effects given the panel data nature of the MxFLS data used. We examine the effect of abortion reform on all available measures of contraceptive use (whether using any contraceptive or using modern contraceptives), the number of reported sexual partners and whether the respondent reports having knowledge of modern contraceptive methods.

We present results of these regressions in Table 5. In general, we find very little evidence to suggest that the results of the abortion reform flow from an increase in *other* contraceptive knowledge in reform areas, or change in risky sexual behavior as a result of the reform. We find quite close to zero effects for change in contraceptive use and knowledge, and an insignificant reduction in the number of sexual partners reported. In all cases, these results are insignificant at the 10% level when using both traditional and corrected p-values (using Romano-Wolf).

Table 5: The Effect of the Abortion Reform on Reported Sexual Behavior (Panel Specification)

	(1) Modern Contraception Knowledge	(2) Any Contraception	(3) Modern Contraception	(4) Number of Sex Partners
<i>ILE Reform</i>	0.002 (0.276) [0.693]	-0.012 (0.914) [0.933]	-0.013 (0.901) [0.993]	-0.111 (0.776) [0.993]
<i>Regressive Law Change</i>	-0.009 (0.304) [0.600]	0.041 (0.492) [0.760]	0.014 (0.814) [0.833]	0.267 (0.064) [0.220]
<i>Observations</i>	10007	10007	10007	10007
<i>R-Squared</i>	0.889	0.568	0.558	0.531
<i>Mean of Dep Var</i>	0.999	0.569	0.610	1.418

Notes: Each column presents a separate regression of a contraceptive or sexual behavior variable on abortion reform measures, house-hold fixed effects, year fixed effects and time-varying controls. In order to correct for Family Wise Error Rates from multiple hypothesis testing, we calculate Romano and Wolf (2005) p-values, using their Stepdown methods. Romano-Wolf p-values are presented in square brackets, and traditional (uncorrected) p-values are presented in round brackets. Significance stars refer to significance at 10% (*), 5% (**) or 1% (***) levels, and are based on Romano-Wolf p-values.

Similarly, we do not find that regressive changes in abortion laws cause women to seek additional information or be more likely to use contraceptives, or change sexual behavior as proxied by the number of sexual partners compared to areas which were not subject to a regressive reform. Overall, like the case of the fertility results described in previous subsections, these results suggest that regressive reforms themselves are not sufficient to result in easily perceptible changes in fertility behavior.

4.3 Female empowerment

The impact of abortion laws on women's reported empowerment within the household, using MxFLS panel data, are presented in Table 6. The findings suggest that, the progressive abortion reform increases women's bargaining power within the household. In column 6 of this table, we present a panel-data regression of an aggregate empowerment index on reform indicators. This aggregate indicator, a sum of all ex-ante defined measures of women's empowerment in the household variables, takes a more positive value when women report having a greater role in decisions relating to their behaviors, or investments in their children. Following the ILE reform in Mexico D.F. the average value of this index for women was found to increase by substantially more than that for women in other parts of the country. The effect size is significant: on average, the sum of all empowerment variables increased by 10% of its baseline value when comparing between reform and non-reform areas. However, we find very little evidence to suggest that the regressive changes in abortion laws was sufficient to harm women when considering intra-household outcomes only.

In additional columns of Table 6 we examine each item of the index separately, where in each case a higher value for the variable indicates that the woman is more likely to take part in the respective decision in her household. With one exception, we see that for all outcomes considered, the reform's effect is to increase empowerment compared to non-reform areas. However, among the five elements, the largest and most statistically significant effect is found on women reporting to be more likely to participate in decisions regarding investments in their children.

Table 6: The Effect of the Abortion Reform on Women's Empowerment in the Household

	Individual Elements					Index
	(1) Child Educ	(2) Child Health	(3) Expendi- ture	(4) Work	(5) Contra- ception	(6)
<i>ILE Reform</i>	0.139** (0.012) [0.047]	0.076 (0.346) [0.740]	0.194 (0.059) [0.213]	-0.001 (0.994) [0.993]	0.066 (0.369) [0.587]	0.474** (0.028)
<i>Regressive Law Change</i>	-0.071 (0.128) [0.407]	-0.008 (0.809) [0.787]	0.138 (0.022) [0.100]	0.050 (0.355) [0.720]	-0.039 (0.503) [0.747]	0.071 (0.619)
<i>Observations</i>	8175	8175	8175	8175	8175	8175
<i>R-Squared</i>	0.604	0.571	0.520	0.570	0.536	0.593
<i>Mean of Dep Var</i>	0.874	0.873	0.678	0.770	0.850	4.044

Notes: Each column presents a separate regression of an empowerment variable or the empowerment index including household fixed effects, year fixed effects and time-varying controls. In order to correct for Family Wise Error Rates from multiple hypothesis testing, we calculate Romano and Wolf (2005) *p*-values, using their Stepdown methods. Romano-Wolf *p*-values are presented in square brackets, and traditional (uncorrected) *p*-values are presented in round brackets. Significance stars refer to significance at 10% (*), 5% (**) or 1% (***) levels, and are based on Romano-Wolf *p*-values.

These results, while suggestive, may capture many other underlying changes in empowerment across districts within Mexico which are unrelated to fertility reform. We provide an additional test of whether these results may flow from the fertility reform using a placebo group in which we estimate the same specification, however this time comparing women *above* fertile age in reform and non-reform areas. This type of test follows discussion in Oreffice (2007), who argue that empowerment effects should be observed among fertile aged couples, but not older couples. In Table 7 we present

results of the effect of the reform on women who are no longer of fertile age. As in the empirical work of Oreffice (2007), we find no evidence to suggest that the reform increases empowerment among women who are aged 45 or above. Indeed, among the aggregate index and all elements of the index, both for the ILE reform and regressive reform states, only one significant effect was found, and it was a significant *negative* effect on participation in large expenditures. These placebo tests lead credence to the interpretation that abortion reform increases empowerment among women of fertile age as, if anything, empowerment was weakly decreasing in Mexico D.F. among women over the ages of 45.

Table 7: Placebo Test of the Effect of the Reform on Women's Empowerment (Women Aged 45+)

	Individual Elements					Index
	(1) Child Educ	(2) Child Health	(3) Expenditure	(4) Work	(5) Contra- ception	(6)
<i>ILE Reform</i>	0.053 (0.611) [0.953]	-0.024 (0.837) [0.847]	-0.334** (0.007) [0.027]	-0.057 (0.616) [0.827]	0.083 (0.562) [0.960]	-0.279 (0.337)
<i>Regressive Law Change</i>	-0.098 (0.194) [0.533]	-0.041 (0.578) [0.820]	-0.171 (0.140) [0.500]	0.013 (0.885) [0.900]	0.118 (0.268) [0.547]	-0.179 (0.465)
<i>Observations</i>	5980	5980	5980	5980	5980	5980
<i>R-Squared</i>	0.674	0.683	0.540	0.529	0.607	0.676
<i>Mean of Dep Var</i>	0.463	0.497	0.668	0.791	0.380	2.799

Notes: For full notes, refer to Table 6. Regression results presented here are estimated as in Table 6, however now the sample consists of married women above fertile age (45 years and above).

Finally, we may be concerned that rather than being a result of the reform, women's empowerment may have been (part of) the cause of the reform. If this were the case, rather than our results indicating that contraceptive reform increased empowerment in Mexico D.F. we would be capturing causality that runs in the opposite direction. Fortunately, given our panel-data setting with two pre-reform periods, we can test this formally to see if empowerment changes emerge pre- or post-reform. In Table 8 we estimate a placebo specification where we remove the third round of survey data, and define the reform variables as if any reforms occurring between the second and third survey wave had occurred between waves 1 and 2 of the survey. In this case, any significant estimated effects of the reforms will indicate a pre-existing difference in trends among reform and non-reform states, rather than a direct effect of the reform itself. Once again, we find little—or no—evidence to suggest that this was the case. Among both the empowerment index and the elements of the index, no statistically significant effects are found (when appropriately adjusting for multiple hypothesis testing). While some individual elements have non-negligible but insignificant point estimates, the impact on the aggregate index is a quite tightly estimated zero (up to two decimal places).

Table 8: Identification Test of the Effect of the Reform on Women's Empowerment (Pre-Reform)

	Individual Elements					Index
	(1) Child Educ	(2) Child Health	(3) Expenditure	(4) Work	(5) Contra- ception	(6)
<i>ILE Reform</i>	-0.043 (0.815) [0.973]	0.095 (0.547) [0.907]	0.255 (0.028) [0.153]	-0.299 (0.050) [0.180]	-0.006 (0.972) [0.960]	0.002 (0.996)
<i>Regressive Law Change</i>	-0.008 (0.887) [0.900]	0.016 (0.774) [0.940]	0.077 (0.180) [0.473]	-0.076 (0.117) [0.387]	-0.112 (0.057) [0.267]	-0.103 (0.493)
<i>Observations</i>	3538	3538	3538	3538	3538	3538
<i>R-Squared</i>	0.768	0.783	0.708	0.676	0.722	0.768
<i>Mean of Dep Var</i>	0.507	0.546	0.668	0.782	0.381	2.883

Notes: For full notes refer to Table 6 This placebo test uses only the two pre-reform rounds, and defines as a placebo treatment group residents of Mexico D.F. in round two. A similar definition is used to create the placebo Regressive Law Change group based on residents of regressive states, prior to the implementation of the reform.

5 Conclusion

The passing of the ILE reform in Mexico D.F. provided an unprecedented case among Latin American countries, and joined very few large scale reforms of abortion in developing and emerging countries world-wide. Given continual social and economic discussion of the tightening and loosening of abortion policy in many contexts, the passing of this reform allows for an important examination of the broad scope of potential effects. This paper allows us to test the impact of state-specific expansions of abortion policies, and also joins recent work including Lu and Slusky (2016)

and Fischer et al. (2017) which examines the impact of regional contractions in abortion policies. The legislative environment following the ILE reform in Mexico D.F. provides an uncommon example of nearly simultaneous expansions and contractions of the availability of, and risk of accessing, elective abortions in a single country.

In this paper we document that, first, the passing of the ILE reform lead to immediate changes in policy which affected women even in states considerably separated from Mexico D.F. We generate a database of regressive law changes relating to abortion which precisely captures these *policy* changes, and allow for us to capture both the effects of the ILE reform, and resulting legislative changes on a state-by-state basis.

Second, we show that as documented extensively in the USA and in a number of lower and middle income countries, the legalization of abortion does lead to a reduction in fertility, and that this reduction is particularly noteworthy for younger women. Had the abortion law not been passed in Mexico D.F., we estimate that fertility would have been approximately 7% higher among adolescents, which is equivalent to 4 additional births per 1,000 15-19 year olds. For means of comparison, in the 14 years from 2000 to 2014, the adolescent fertility rate in the whole country has fallen from approximately 80 per 1,000 teens to 63.5 per 1,000, or a reduction of 15.5 births per 1,000 women (The World Bank, 2015). We document that this effect appears to be driven by access to legal abortion, and find little evidence to suggest that it leads to large changes in sexual behavior, contraceptive knowledge, or contraceptive use.

Finally, we document that in the context of Mexico, large- scale abortion reform brings with it increases in women's empowerment within the household, finding that empowerment changes accrue to fertile aged women rather than older women, as proposed in formal economic models of fertility

reform (Chiappori and Oreffice, 2008; Oreffice, 2007). Unlike recent evidence from the USA, we do not find statistically appreciable impacts of the tightening of restrictions on accessing elective abortion. However, the context studied is quite different to recent evidence from the USA (and other studies examining contractions of abortion availability worldwide). In the case of Mexico, contractions focus on the demand for, rather than supply of, elective abortions, and start from an already highly legislated setting where abortions are penalized by law.

This paper provides additional evidence of the potential scope of legalized abortion, even in a late-adopting setting. Although many countries, particularly in the developed world, do allow access to legal abortion, the lessons from this case are relevant to many countries in the developing world which currently do not allow abortion in any circumstance, or only under a very limited set of conditions. At present, approximately 25% of the world's population lives in a place where abortion is not legal, suggesting that future reforms could be responsible for (further) demographic transition, empowerment, and the additional benefits that accrue from women playing a larger role in household decisions.

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