Abortion legalization and fertility rates in Mexico[1]

Edith Y. Gutierrez Vazquez

Emilio A. Parrado

University of Pennsylvania

Preliminary Draft

Please do not cite without authors' permission

Abstract
In 2007 abortion was legalized in the Federal District of Mexico, making it the largest jurisdiction in Latin America, outside Cuba and Puerto Rico, to allow women to have abortions on demand during the first trimester of pregnancy. While the implications of the law for women's health and maternal mortality have been investigated, its potential association with fertility behavior has yet to be assessed. In this paper, we examine metropolitan area differences in overall and parity-specific fertility rates between 2000 and 2010 to more precisely isolate the contribution of abortion legalization to childbearing in Mexico. Our statistical specification applies difference-in-difference regression methods that controls for concomitant changes in other socioeconomic predictors of fertility to assess the differential influence of the law across age groups. In addition we compare the changes between 2000 and 2010 to the changes occurring between 1990 and 2000. Overall, the evidence suggests a systematic association between abortion legalization and fertility. The law appears to have contributed to lower fertility rates in Mexico City compared to other metropolitan areas, though the influence is mostly visible among women aged 20-34 and especially in connection with transition to first and second child. In particular, abortion legalization does not appear to have altered the trajectory of teenage childbearing. We also find evidence that the impact of legalization has begun to diffuse to the greater Mexico City metropolitan area. Implications for reproductive health policies in Latin America are discussed.

[1] Direct all correspondence to Emilio A. Parrado, University of Pennsylvania, eparrado@sas.upenn.edu

In recent decades fertility has fallen dramatically throughout Latin America. However, in spite of this decline the opening decades of the 21st century are still marked by a number of pressing reproductive health concerns. Two aspects in particular, the early initiation of childbearing and high levels of unplanned fertility, continue to pose challenges to population policies and women's health. Despite considerable reductions in the number of children women have, the timing of childbearing is still concentrated at relatively young ages. Particularly troubling is that teenage fertility has fallen more slowly than overall fertility and in some contexts even increased slightly. In addition, despite considerable expansion of contraceptive use, unsatisfied demand for contraception remains an obstacle to fertility regulation at all ages. These two dimensions indicate unevenness in the expansion of fertility regulation in the region and highlight the need for renewed discussions of the kind of policy initiatives that can further extend women's control over their reproduction.

Mexico is a case in point. The total fertility rate (TFR) in Mexico declined from 6.5 in 1970 to 2.2 in 2010 (Mier, Teran & Partida, 2001). The main contributor to this decline was the rapid expansion of contraceptive use, especially female sterilization at higher parities (Lerner & Quesnel, 1994). However, the age pattern of childbearing remains young, with the mean age at first child virtually unchanged between 1992 and 2006 (20.9 and 21.3 years of age, respectively (OECD, 2009)). Moreover, as many as 16 percent of Mexican women have their first child before age 18. While birthrates have fallen across the age spectrum, they have fallen more slowly for teens than for other groups. For instance, while the birth rate fell 27 percent among teenagers between 1980 and 2004, the drop was 42 percent among women aged 20 to 24. As a result, the share of births to teenage mothers *increased* from 17.1 to 19.2 between 2000 and

2011 (Guzman, Rodriguez, Martinez, Contreras, & Gonzalez, 2006; Juarez, Palma, Singh & Bankole, 2010).

In addition, unplanned and unwanted childbearing remains prevalent across all ages in Mexico. In 2009, 34 percent of all pregnancies were reported as unplanned/unwanted. While the figure was particularly high among teenagers (42 percent), even among 30-34 year-old women 29 percent of pregnancies were reported as unplanned/unwanted. The representation is actually higher (37 percent) among women 35 and older. Distinguishing unplanned from unwanted fertility highlights the differential meaning of unsatisfied demand for contraception over the life-course. While unplanned pregnancies decline with age, unwanted childbearing actually moves in the opposite direction. Among women between the ages of 30-34 and 35 and older, 14.4 and 32 percent of pregnancies were reported as unwanted, respectively (CONAPO, 2011).

Induced abortion, while illegal throughout Mexico for most of the country's history, has long been a byproduct of the limitations in women's capacity to control their fertility. Estimates of the extent of the practice vary widely. In 1997 it was estimated that as many as 19 percent of ever-pregnant Mexican women had had an abortion (induced or spontaneous) at least once in their lives (CONAPO 2000). The percentage declined to 15.3 percent in 2006 (Mendoza, 2006). The maternal health consequences of the practice have been significant; between 6 and 8 percent of maternal mortality can be attributed to complications caused by clandestine induced abortions (CONAPO 2000).

In 2007, in part as a response to the reality of induced abortion as well as pressure from feminist organizations and other advocates of women's health, the federal district of Mexico legalized the practice (for an account of the forces contributing to the passage of the law see Kulczycki 2007, 2011). The change in policy turned Mexico City,[2] with a population of 8.8 million people, into the largest jurisdiction in Latin America outside of Cuba and Puerto Rico to permit abortions on demand to women during the first trimester of pregnancy. Several studies have investigated the consequences of legalized abortion for women's health and maternal mortality (Olavarrieta et al., 2012; Schiavon, Troncoso & Polo, 2012; Becker et al., 2011a; Becker et al., 2011b; Mondragon y Kalb et al., 2011; Maldonado, 2010). However, the potential impact of legal access to abortion on childbearing and reproduction has yet to be assessed. Even though abortion has long been regarded as a proximate determinant of fertility the extent to which legalization can influence fertility levels and the age pattern of childbearing has not been assessed in the Latin American context.

In this paper we evaluate the implications of abortion legalization for fertility rates in Mexico. Taking advantage of temporal and spatial differences in fertility trends and abortion policies across metropolitan areas we investigate the connection between the 2007 legislation in Mexico City and several dimensions of reproductive behavior including overall fertility, the age-pattern of childbearing, and parity specific fertility rates. Legal access to abortion remains a highly contested and controversial aspect of population policy. Our study evaluates the effect of changing legal contexts rather than abortions per se on fertility rates. Understanding whether abortion legalization changes the timing and number of births is central for developing more precise accounts of the obstacles to family planning in Mexico and has implications for

[2] The Federal District of Mexico is a federal entity that is not part of any one of the 31 Mexican States. It is different from the larger Mexico City Metropolitan area which in addition to the Federal District includes the 60 adjacent municipalities of the states of Mexico and Hidalgo. For the purpose of our study, we refer to the Federal District of Mexico as Mexico City and to the municipalities surrounding the Federal District as the Greater Mexico City Metropolitan area.

the formulation of more targeted population policies that can facilitate the diffusion of reproductive health and women's control over reproduction in Latin America.

Background: Legalized abortion in Mexico City and fertility implications

Despite being illegal, indirect estimates show that induced abortion was widely practiced throughout Mexico prior to the Federal District reform. Estimates of the extent of the practice vary widely, however. For 1997, CONAPO (2000) estimated that as many as 102,000 induced abortions were performed in the country. At the other extreme, Juarez and colleagues (2008) argue that in 2006 the number of induced abortions fell in the range of 725,000 to 1 million, implying a national abortion rate of 33 per 1,000 women aged 15-44, which was 74 percent higher than the rate observed in the United States (19 per 1,000) and 83 percent higher than in Puerto Rico[3] (18 per 1,000 in 2001). While the methodology for producing these upper bound estimates has recently been questioned (see the exchange between Koch and colleagues and Singh and colleagues in Ginecol Obstet Mex (2012)) and the exact magnitude of the phenomenon is contested, survey data showing that at least 20 percent of Mexican women reported having had at least one abortion in 1997 and the demonstrated link between clandestine abortions and heightened maternal mortality make the issue a central concern in the area of reproductive health.

In response to political forces, including advocacy from feminist groups and public health statistics on the high toll of illicit abortions on maternal health, in April of 2007 the Mexico City legislature decriminalized elective abortion in the first 12 weeks of pregnancy

[3] http://www.johnstonsarchive.net/policy/abortion/ab-puertorico.html

(Kulczycki 2007, 2011). The law mandates that abortion be available to women in the Federal District of Mexico Ministry of Health facilities, free of charge for Mexico City residents and on a sliding fee scale for residents of other areas of the country. The fee depends on socioeconomic status with the maximum fee equivalent to approximately 100 U.S. dollars (Becker & Diaz Olavarrieta, 2013). Moreover, there are at least two clinics that provide abortion services for free to all women, further reducing the economic barriers to the procedure (Mondragon y Kalb et al., 2011). The one exception to the relatively open access to abortion relates to minors. Girls under 18 must obtain written parental or guardian consent and a parent or guardian must accompany her at her visits. Since abortion legislation in Mexico is made at the state level, the policy transformed Mexico City into the only geographic area within Mexico where abortion could be legally performed.

The impact of the law was far reaching. By 2012 more than 100,000 cumulative abortions had been performed in the District's Ministry of Health hospitals. As the policy became more established the number of abortions performed annually rose, from 13,404 in 2008 to 20,485 in 2012. The impact of the legislation has also reached women in other areas of Mexico, albeit slowly. In 2008, 76 percent of the women receiving abortion services were residents of Mexico City, while only 21 and 3 percent were from the state of Mexico (which includes the municipalities surrounding Mexico City) and the remainder of the country, respectively. By 2011, the composition has slightly changed, with 71 percent of abortions provided to residents of Mexico City, 25 to residents of the state of Mexico, and 6 percent to women from other states (GIRE, 2013).

Several studies have examined the impact of establishing a public sector legal abortion program on various dimensions of women's health. These studies have shown that the program is providing high-quality services to clients (van Dijk et al. 2011). Roughly seventy percent of the procedures were performed free of charge and in accordance with safe abortion methods for first trimester procedures. In 2011, 74 percent of procedures were medical abortions with women self-administering the abortion pill in the privacy of their own home and with limited complications. In addition, studies have found that women are receiving high quality post-abortion contraceptive services and counseling for the prevention of unintended pregnancies. Results show that the most common contraceptive method accepted by women after abortion is an IUD (29%) followed by the pill (11%) and injectable methods (5%). An additional 6.9 percent chose condoms, while 16 percent chose no method. Since the establishment of the program, only 2.1 percent of women have had more than one procedure.

Mondragón y Kalb and colleagues (2011) analyzed patient characteristics and services following abortion legalization. They document that the modal age of women receiving an abortion is between 20 and 24 years (36%). Only 5 percent of abortions were performed on women under age 18 and 12 percent were among women 18 or 19 years of age. Nearly one quarter (24.9%) of abortions were performed for women 30 years or older. Their results suggest that abortion might be connected with parity-specific fertility control, especially at lower parities; 32.5% of abortions were performed for women with no children and 26.3% for women with 1 child. Even though the majority of women were not in a union at the time of termination (60.8%) a sizeable 39.2% performed the procedure while in a union. Similarly, while most clients had relatively low levels of education (40.1 percent completed 9 or fewer years of formal schooling), 20.8 percent had 13 or more years which is only slightly lower than the percent of women with higher education in Mexico City (25.2%). Thus, overall the evidence suggests that the policy is reaching a wide range of the Mexican population. Moreover, it appears to be specifically contributing "to the prevention of repeat unintended pregnancies" (159).

Nevertheless, abortion legalization remains a highly contested issue, particularly in regions such as Latin America where Catholicism predominates. Only 37 percent of Mexico City residents supported legalizing elective first-trimester abortions in 2007. Though support had increased to 74 percent by 2009 (Wilson et al., 2011), there has been considerable backlash as well. In the years following abortion legalization in Mexico City, 16 Mexican states have amended their constitutions to state that life begins at conception, and there is evidence that many have moved to more aggressively prosecute violators of the law (GIRE, 2012). According to journalistic accounts, in the state of Guanajuato between 2000 and 2008, 130 women were reported to the authorities for criminal prosecution after suffering complications from clandestine abortions and 20 pregnant rape victims were denied the procedure even though it is allowed under the Penal Code.[4] In all of Mexico, the number of women facing penal charges related to illegal abortions increased from 62 to 226 a year for the 1992-2007 and 2009-2011 periods, respectively.[5] State level constitutional amendments restricting abortion have been challenged in court, and the debate over the issue is far from settled.

Abortion legalization and fertility rates

[4] http://www.jornada.unam.mx/2009/03/10/index.php?section=estados&article=030n1est
[5] http://www.zocalo.com.mx/seccion/articulo/aumenta-el-aborto-en-mexico-1373808425

Abortion has long been recognized as one of the proximate determinants of fertility, along with factors such as age at marriage, patterns of union dissolution, breastfeeding and other sources of postpartum infecundability, pathological sterility, and contraception (Bongaarts, 1987). Abortion legalization could in principle influence the fertility of a population if changing legal context affects the proximate determinants of fertility. This could include a direct effect on increased access to abortion but also more indirect effects related to changing any of the other proximate fertility determinants. For instance, in the case of Mexico the policy included the provision of high-quality contraceptive services and counseling for the prevention of unintended pregnancies which might become an indirect effect of abortion legalization. Empirically though, the main expectation is that within a country fertility rates would vary across areas in connection with different abortion regulations.

Previous research provides some support for this expectation. In Europe, studies found that fertility rates declined more rapidly in countries where abortion was legal and part of comprehensive family planning programs (David, 1992). And in the United States it is estimated that abortion legalization led to a 5-8 percent decline in birthrates, with the largest declines occurring among teenagers, women older than 35, and unmarried women (Levine et al., 1999). In addition to being instrumental in reducing overall teenage birth rates, abortion legalization was even more significant in reducing out-of-wedlock teenage fertility (Donohue III et al. 2009; Kane and Staiger 1996). Johnston and Hill (1996) estimated that induced abortion reduced fertility between 38 and 55 percent across four Latin American countries in the 1990s, though they did not connect cross-country variation to legal regulations.

The impact of legalizing abortion could be especially important in contexts of advanced but not fully completed fertility transitions.[6] In the early stages of the transition, reductions in family size can be achieved relatively rapidly through increased access to contraception, especially female sterilization, and diffusion of ideas about smaller families. The later stages of the transition, however, can be more difficult since they require much higher levels of birth control. At these last stages, in addition to continuing the decline in overall fertility, contraception becomes increasingly important for affecting the timing of fertility as well as the convergence of desired and actual childbearing.

Our expectations about the connection between abortion legalization and fertility in the Mexican case are guided by the international experience. The evidence suggests that the influence of legalized abortion on fertility can express variably on different dimensions of childbearing and across the life-course (Levine et al. 1999) which raises several interrelated questions that guide the empirical analysis. The first is simply whether or not fertility levels fall faster in places with legal access to abortion as compared to other areas. Overall declines in fertility rates would indicate that legalization is an important mechanism for further reducing unwanted childbearing in Mexico and achieving smaller families when desired.

The second and arguably more significant question in the contemporary Latin American context is whether abortion legalization affects the age pattern of childbearing. Irrespective of its connection with overall fertility levels legalization might lead to a general shift in childbearing towards later ages, which again would be indicative of women's increased control over reproduction. The impact of legalized abortion on teenage childbearing is particularly

[6] http://www.un.org/esa/population/publications/completingfertility/completingfertility.htm

important to assess. Much of teenage fertility is unwanted and abortion legalization could contribute to its prevention. Moreover, the specific comparison of fertility among minor and non-minor teenagers is particularly important in the Mexican case, as it potentially relates to the requirement of parental consent for girls under 18 built into the 2007 legislation. In other contexts parental consent requirements have been shown to lower the abortion rate of minors (Ellerston 1997), though the issue has not been explored in Latin America.

Finally, beyond its association with overall and age-specific birth rates, abortion legalization can also affect parity specific birth rates. Accounts of fertility change have long distinguished between initiation and stopping behaviors. Fertility initiation, which relates to women's ability to delay the age at first childbirth, has heretofore not been characteristic of the demographic transition in Latin America. Age at first birth has remained remarkably stable over the past several decades, even as fertility rates have plummeted. However, delayed initiation could become more salient as the region completes the fertility transition. Stopping, in turn, refers to those practices aimed at completing childbearing after the desired number of children has been reached. Abortion legalization can independently affect these two parity and age specific fertility rates potentially reducing both first (especially at younger ages) and higher parities birth rates.

Analytical strategy, data, and model specification

To examine the relationship between abortion legalization and fertility, our analytical strategy is to compare birth rates before and after legalization in Mexico City against those exhibited in other metropolitan areas of the country, including the Greater Mexico City

Metropolitan area. The comparison is a simple but robust strategy to identify whether abortion legalization set Mexico City apart from other areas in terms of changes in birth rates. In the language of experimental designs, the strategy approaches a before and after comparison of outcomes in a treatment group (i.e., Mexico City), and control group (other metropolitan areas). The approach has been widely applied in policy evaluation, including studies on the effect of minimum wage policies on employment (Card and Krueger 1994), the impact of competition in the retail market and gas prices (Hastings 1994), how immigrant inflows shape the employment and wages of natives (Card 1992), and the role of immigration enforcement policies on the size of the foreign born population in local areas across the United States (Parrado 2012).

The data for the analysis come from the 10 percent samples of the 2000 and 2010 Mexican Census (INEGI, 2011) (IPUMS xxx). The two time points capture fertility behavior before and after abortion legalization. The geographic units of analysis are the 60 metropolitan areas of Mexico, including Mexico City and the Greater Mexico City Metropolitan area. We aggregate the micro-level information on whether a woman had a child in the prior year to compute age-specific fertility rates (ASFRs) for women of reproductive ages (14 to 49 year-olds) in 2000 and 2010) by metropolitan area. This results in a total of 2160 observations (36 age groups x 60 metropolitan areas) in 2000 and 2010.

ASFRs are obtained by dividing the total number of births occurring to women of a given age by the total number of women of the same age. Aggregating over all reproductive ages produces the total fertility rate (TFR) which is an estimate of the number of children a woman would have if she were to experience the ASFRs observed in a particular period and survive from birth through the end of her reproductive life. The ASFRs describe the population's age pattern of childbearing and the TFR is a period approximation to the total number of children a hypothetical cohort of women would have. Formally, the TFR for metropolitan area *m* and year *t* can be written as:

$$TFR(m,t) = \sum_x ASFR(a,m,t) = \sum_a (B(a,m,t)/N(a,m,t))$$

where *B(a,m,t)* equals the number of births to women aged *a* in metropolitan area *m* at time *t* and *N(a,m,t)* is the number of women aged *a* in metropolitan area *m* at time *t*.

In addition, using information on the number of children-ever-born, we compute parity specific fertility rates for first, second, and third or higher births. They are an extension of the overall fertility rates and are computed dividing the number of parity specific births to women of a certain age in a particular metropolitan area and year by the total number of women of the same age in the same metropolitan area and year. Formally, the parity-specific TFR (PTFR) and ASFR (PASFR) can be written as:

$$PTFR(p,m,t) = \sum_a PASFR(p,a,m,t) = \sum_x (B(p,a,m,t)/N(a,m,t))$$

where *p* indexes parities 1, 2 or 3+.

The statistical analysis takes advantage of the temporal and spatial variation in the data and applies difference-in-difference (DD) methodologies that capture the extent to which changes in Mexico City differ from the average change across other areas. In its most basic form, the DD estimate is computed by taking the difference in ASFRs between 2000 and 2010 in Mexico City and subtracting it from the average difference in ASFRs across metropolitan areas that did not experience abortion legalization. A main strength of the approach is that the double difference or difference-in-difference removes the effect of permanent differences between the two groups as well as the effect of changes over time in the intervention group unrelated to the treatment, thus substantially reducing the omitted variable problems in cross-sectional analyses. Formally,

$$\delta_{00\text{-}10} = (\overline{\mathrm{FRC}}_{a,2010} - \overline{\mathrm{FRC}}_{a,2000}) - (\overline{\mathrm{FRT}}_{a,2010} - \overline{\mathrm{FRT}}_{a,2000})$$

where $\delta_{00\text{-}10}$ is the DD causal effect of interest for women; $\overline{\mathrm{FRT}}_{a,2000}$ and $\overline{\mathrm{FRT}}_{a,2010}$ are the average fertility rates for single age group *a* in years 2000 or 2010 in the control group, i.e. all other metropolitan areas; and $\overline{\mathrm{FRT}}_{a,2000}$ and $\overline{\mathrm{FRT}}_{a,2010}$ are the average fertility rates for single age group *a* in years 2000 or 2010 in the treatment group, namely Mexico City. Replacing the ASFRs with PASFR produces parity-specific DD estimates.

Another advantage of the approach is that δ can readily be estimated with ordinary least square regression. In our case this implies estimating the following equation:

$$\mathrm{FR}_{a,m,2010} - \mathrm{FR}_{a,m,2000} = \alpha_g + \delta_{00\text{-}10}\, MC + \varepsilon \qquad [1]$$

where the dependent variable is the difference between the fertility rate (FR) for single age groups (*a*) in metropolitan area (*m*) in 2010 and 2000. Since changes in fertility rates are expected to vary according to women's age, α_g is a set of 8 mutually exclusive dummy variables indexing the following age groups: 14-17, 18-19, 20-24, 25-29, 30-34, 35-39, 40-44, and 45-49. α_g is then an age-group specific intercept measuring the average change in fertility rates for a particular age group in non-treatment areas. We separate the 14-17 year old group from other teenagers to examine the potential impact of the law's parental notification requirement for minors under 18. *MC* is a dummy variable that equals one if the metropolitan area is Mexico City and 0 otherwise; $\delta_{00\text{-}10}$ is the DD estimate which is interpreted as the average effect of legalization on fertility rates; and ε is an error term.

The regression specification has several analytical advantages that improve the DD specification. DD is particularly appropriate when the assignment into the treatment group is close to random which enhances the comparability between treatment and control groups (Meyer 1995). Recent developments, however, have highlighted that random assignment cannot be assumed with observational data and that comparability can be enhanced by extending the simple two-group comparison to multiple groups as well as investigating the role of pre-intervention conditions and changes other than the policy intervention in affecting the DD estimate.

Several specific dimensions of the Mexican case justify extending the two group comparison. Even though the applicability of the law is restricted to Mexico City, access to the clinics is open to all women irrespective of place of residence. Thus, it is possible that the effect of the law is diffusing to other geographic areas. This might be particularly the case for the municipalities surrounding Mexico City. As reported above, as many as a quarter of reported abortions were performed to women from the neighboring state of Mexico and only 3 percent to women from other states. Accordingly, our model includes an additional dummy variable indexing residence in the 60 municipal districts that are part of the Greater Mexico City (GMC) metropolitan area; 59 of the municipalities are in the state of Mexico and one in Hidalgo. If the impact of abortion legalization is diffusing to areas outside of Mexico City then the association should be especially evident in the changing fertility rates in the Greater Mexico City metropolitan area.

In addition, as discussed above, the passage of the law motivated several states to introduce constitutional amendments further penalizing and restricting the procedure. If constitutional amendments affected fertility rates in the opposite direction of legalization then failure to control for the unique conditions in these states will bias the estimated association between abortion legalization and fertility rates. Accordingly, we also include a dummy variable indexing whether a metropolitan area is located in a state that passed an anti-abortion constitutional amendment before 2009 (CAM). A total of 9 states (Baja California, Colima, Durango, Guanajuato, Morelos, Nayarit, Puebla, Quintana Roo, and Sonora)[7] fall under this category which results in 19 metropolitan areas in states that passed constitutional amendments (Cancún, Celaya, Colima-Villa de Álvarez, Cuautla, Cuernavaca, Guaymas, La Laguna, La Piedad-Pénjamo, León, Mexicali, Moroleón-Uriangato, Puebla-Tlaxcala, Puerto Vallarta, San Francisco del Rincón, Tecomán, Tehuacán, Tepic, Teziutlán, Tijuana). Together the extensions result in a four-group comparison: Mexico City (MC); Greater Mexico City Metropolitan area (GMC); metropolitan areas in states with Constitutional Amendments (CAM); and other metros.

A major advantage of the regression specification is that it permits controlling for the effect of differential changes in socioeconomic conditions that might also affect group differences in fertility outcomes. This is a major concern in DD specifications and failure to account for these concomitant changes could bias estimates of the consequences of abortion legalization for fertility. For instance, it is possible that between 2000 and 2010 access to education expanded more rapidly in one area than in another. For evaluation purposes, failing to control for those differences limits the ability to capture changes resulting from policy implementations. Accordingly, we include several controls for changing socioeconomic

[7] An additional two states passed constitutional amendments after 2009. Since it is after our period of observation, they are not included in our dummy variable definition.

conditions. Since fertility behavior is likely connected to prior demographic conditions, we also include a control for changes in ASFR during the prior decade (1990-2000) to account for this momentum. In addition, we control for the main socioeconomic changes that have generally been found to correlate with fertility changes. They include change in the percent of women of reproductive ages: in a union (formal and informal), with secondary education or higher, and employed in professional occupations. In addition, we control for metropolitan population growth.

Another major advantage of the regression specification is that it allows for statistically testing for age differences in the effect of abortion legalization on fertility. This implies extending the DD formulation to a difference-in-difference-in-difference (DDD) specification where the age-group specific intercepts, α_g, are interacted with the metropolitan area group typology (MC, GMC, CAM) to obtain group specific estimates. Comparing age-specific changes in fertility rates in the intervention group against age-specific changes in other areas the DDD specification extends the cross group comparison to also a cross age comparison. The DDD extension allows us to test the empirical expectations regarding the connection between abortion legalization and fertility elaborated above. The model is specified as follows:

$$\text{FR}_{a,m,2010} - \text{FR}_{a,m,2000} = \alpha_g + \delta_{1,g}MC + \delta_{2,g}GMC + \delta_{3,g}CAM + \beta_n X_n + \varepsilon \qquad [2]$$

where α_g is average change fertility rates in age group g in unaffected non-treatment metropolitan areas; MC, GMC, CAM are dummy variables indexing residence in Mexico City, Greater Mexico City metropolitan area, and metros with constitutional amendments, respectively; and $\delta_{1\text{-}3,g}$ are the DDD parameters measuring the difference in the change in fertility rates for a given age group g in Mexico City (MC), Greater Mexico City, and metropolitan areas in States with constitutional amendments (CAM) relative to the average change in non-treatment metropolitan areas. The cross-group and cross-age comparison captures both how our metropolitan groups differ relative to the rest of the country as well as how changes differ across age groups. X_n is a vector of the control variables described above; β_n are parameters to be estimated; and ε is an error term. The same specification is extended in analysis of parity specific fertility rates, except that the dependent variable becomes: $FR_{p,a,m,2010} - FR_{p,a,m,2000}$ with *p* indexing parities 1, 2, and 3 or more. Appendix A reports the descriptive statistics for the explanatory variables.

Comparison with the 1990 to 2000 period

Since Mexico City led fertility changes in Mexico even before the passage of abortion legalization, in addition to the cross group comparison of before and after legislation we also compare the cross-metropolitan changes in fertility occurring between 2000 and 2010 to those taking place between 1990 and 2000. The cross-time in addition to the cross-area comparison substantively increases the robustness of our findings and better separates the fertility changes associated with legalization from other changes in area specific conditions. If abortion legalization has set Mexico City apart in terms of changes in birth rates then estimates will differ not only across areas between 2000 and 2010 but also for Mexico City between the 1990s and 2000s.

Accordingly, we apply the same methods described above to the changes in fertility rates between 1990 and 2000. The data for 1990 come from the 10 percent sample of the 1990 Census. Specifically, we estimate the following model which is the same as that presented in equation [2] only for the 1990 and 2000 period:

$$FR_{a,m,2000} - FR_{a,m,1990} = \lambda_g + \xi_{1,g}MC + \xi_{2,g}GMC + \xi_{3,g}CAM + \pi_n X_n + \varepsilon \quad [3]$$

where λ_g is average change fertility rates in age group *g* in non-treatment metropolitan areas; $\xi_{1\text{-}3,g}$ are the DDD parameters for the change between 1990 and 2000 for a given age group *g* in Mexico City (MC), Greater Mexico City, and metropolitan areas in States with subsequent constitutional amendments (CAM) relative to the average change in non-treatment metropolitan areas; X_n is a vector of the same control variables included in equation [2] but for the 1990 and 2000 period; π_n are parameters to be estimated; and ε is an error term. Comparing the coefficients $\delta_{1,g}$ to $\xi_{1,g}$ in equations [2] and [3], respectively, captures the extent to which abortion legalization has set Mexico City apart from the experience in the prior decade. The same specification is extended in analyses of parity specific fertility rates, except that the dependent variable becomes $FR_{p,a,m,2000} - FR_{p,a,m,1990}$ with *p* indexing parities 1, 2, and 3 or more. The cross-time comparison of changes in parity specific rates will similarly capture the extent to which the changes between 2000 and 2010 differ from the prior period.

Results

Table 1 reports average TFRs and ASFRs as well as their changes between 1990 and 2000, and between 2000 and 2010 by metropolitan type. Appendix B reports the average parity-specific rates. Results, as expected, document that fertility rates in Mexico City are much lower than in other metropolitan areas and the difference was already present in 1990. In 2010 the TFR in Mexico City was 1.748, well below replacement level (2.1) but was on average above replacement across all other metropolitan groups. The TFR was lower in the GMC (2.189) than the average TFR across CAMs (2.394) and the average TFR of other metros (2.325). The same pattern of metropolitan differences is observed across parity-specific rates.

The age pattern of childbearing also shows important differences by area. As one would expect, ASFRs are lower at young ages, peak between ages 20-24, and then decline. Comparison across the averages observed by group indicates that group differences in rates are not as pronounced at the very early or advanced childbearing ages as compared to the prime reproductive ages from 18 to 34. In MC the fertility rate for 14 to 17 year-olds in 2010 was 0.023 which is not substantially lower than the average rate observed in the GMC area (0.030), CAM (0.029), or other cities (0.033). Differences become more salient when we consider older ages. For instance, in 2010 the fertility rate for 18 to 19 year-olds in Mexico City was close to 0.030 points lower than the average in other metro areas and it was highest among the prime childbearing ages of 20-24, where we observe a 0.040-point difference.

Considering average changes in fertility rates between 1990 and 2000 and between 2000 and 2010 across groups illuminates potential differences in fertility outcomes across periods. Overall, results show that the TFR declined considerably in all areas. On average, the decline was most pronounced in the CAM group for both the 1990-2000 and 2000-2010 periods (-0,342 and -0.501, respectively) but the group also had the highest average TFR in 1990 and 2000 (3.178 and 2.794, respectively). Consistent with prior studies, results show that across all groups the average fertility rate among 14 to17 year-olds increased between 2000 and 2010. It is only among 18 to19 year-olds that we begin to see declining average fertility rates in all areas. For the most part, fertility decline is more sizeable and clearly evident among prime childbearing ages (20-34).

DDD results

Next, we investigate the extent to which changes in Mexico City differ from the changes in other metro areas in a multivariate specification. Table 2 reports estimates from DDD OLS regression models predicting change in ASFRs between 1990 and 2000 (equation 3) and between 2000 and 2010 (equation 2) in Mexico. Columns 1 and 5 report the difference, after accounting for prior fertility and concomitant socioeconomic changes in the fertility rate of age group *g* in non-treatment metropolitan areas, the control group, in 1990-2000 and 2000-2010, respectively. Columns 2, 3, and 4 report the DDD estimates for MC; GMC; and CAM, respectively for 1990-2000 and columns 6, 7, and 8 for 2000-2010. They capture the extent to which changes in MC, GMC, and CAM differ from the changes in the control group and correspond to $\xi_{1\text{-}3,g}$ in equation [3] $\delta_{1\text{-}3,g}$ in equation [2]. For the purposes of interpretation, columns 1 and 5 report the estimated change in ASFR in unaffected metros. Adding them to the DDD estimates reported for each group produces the group specific estimate of the change in ASFRs after socioeconomic controls and prior fertility behavior.

The changes in ASFRs in unaffected metro areas (Columns 1 and 5) document the overall pattern of fertility change across periods as well as their variation by age-group. Teenage fertility was already increasing between 1990 and 2000 with the difference between time points being 0.021 and 0.023 for ages 14-17 and 18-19, respectively. It continued to increase between 2000 and 2010 but at a slower pace (0.017 and 0.012 for the same age groups). As could be expected fertility decline was more pronounced in the 1990s relative to the 2000s. After age 20 the estimated change in ASFRs for the 1990s are all negative and larger than the ones obtained for the 2000s. The only exception is the estimated change in fertility rate among

20-24 year-old women, which became negative and statistically significant over time from -.001 to -.009 in 1990-2000 and 2000-2010, respectively. The larger decline in fertility rate among this group in the past decade is consistent with the slow trend towards later childbearing in Mexico.

The most important results for evaluating the effect of abortion legalization are the DDD estimates obtained for MC and reported in Columns 2 and 6 with the direction of the coefficients indicating negative or positive change in ASFRs *relative* to the change in unaffected metros. Results indicate that in comparison to the 1990s, the 2000s represent a considerable departure in fertility change in MC relative to unaffected metros. Results show that in the 1990s (column 2) the changes in fertility rates in MC among younger women (14-29 year-old) are not significantly different from the changes in unaffected metros. Only among 14-17 year-old the DDD estimate is negative which implies that while the fertility rate among this group increased 0.021 points in the control group, it increased a significantly lower 0.015 points (0.021+(-0.006)) in MC. Only after age 30 the DDD estimates for MC are positive and statistically different from the ones obtained for the control group. Again, MC has long been a leader in the fertility transition within Mexico and the change between 1990 and 2000 was less pronounced than the one observed in unaffected metros, for instance while in the control group the fertility rate for 30-34 declined -.020 points it declined only -0.013 points (-0.020+.007) in MC. The main implications for the results obtained for the 1990s is that we do not document significantly different fertility change among younger women in MC as compared to unaffected metros. If abortion legalization affected fertility behavior then we should see a different pattern for the change between 2000 and 2010.

The DDD estimates for MC in the 2000s are reported in Column 6. Bolded coefficients indicate that the estimates are statistically significantly different from the 1990s (z-test). For the teenage years, we see a pattern similar to the one observed for the changes in 1990-2000. Even though the DDD estimates for MC show negative change in teenage fertility rate (-.007 and -.008 for 14-17 and 18-19 year-old, respectively), as in the 1990s the effect is not large enough to offset the increase in teenage fertility estimated for the control group (.017 and .012 for the same groups). Moreover the negative estimate for MC in the 2000s is not statistically different from the one already observable in the 1990s. Thus, we do not document any significant change in teenage fertility in association with abortion legalization.

A different pattern emerges among prime reproductive ages. Results document that the fertility rates among 20-34 year old women declined more rapidly in MC between 2000 and 2010 as compared to unaffected metros as well as in comparison with the changes observed between 1990 and 2000. Between 2000 and 2010 the fertility rate among 20-24 year-old women in unaffected metro areas declined -.009 points (column 5). The DDD estimate for MC implies that in conjunction with legalization the fertility rate for the same group declined an additional and significant -.010 points (Column 6) bringing the total decline to -.019 points. A similar difference is evidenced for 25-29 and 30-34 year old women among whom the negative change in fertility rate is significantly more pronounced in MC than in unaffected metropolitan areas (-.010 and -.012, respectively). Moreover, the difference was not evident in the 1990s. Among older women the 2000-2010 decade describes a pattern of slower fertility decline in MC as compared to unaffected areas similar to the one observed in the 1990s.

To better illustrate the extent to which MC departs from the changes in ASFRs in unaffected metropolitan areas over time we also plotted the DDD estimates in Figure 1. The graph clearly illustrates the significant departure in fertility change in MC during the 2000s from both unaffected metros and the changes in the 1990s among women in prime reproductive ages (20-34). To put the changes in ASFRs in perspective and simulating the number of birth that would have been obtained in our sample if the changes in MC did not occur we estimate that in conjunction with abortion legalization, the number of births in MC was reduced by around 12 thousand or 7 percent in 2010 as compared to 2000.

The departure of MC in terms of fertility change between 2000 and 2010 is reinforced in the comparison of DDD estimates obtained for the GMC and CAM metro areas. For the period 1990-2000, similar to MC the change in ASFRs in these areas was not different from the change observed in unaffected metros (Columns 3 and 4). Contrary to the MC case, for the period 2000-2010 (Columns 7 and 8) results show no differences in fertility change in GMC and CAM areas relative to unaffected metros except for 30-34 year-old women. Among this group the DDD estimate is similar to the one obtained for MC (-.016 and -.019 for GMC and CAM areas, respectively). Given its proximity to MC the GMC area has easier access to health services relative to unaffected metro which could have contributed to faster fertility decline at somewhat older ages. The CAM areas had the highest fertility rates than any other area in our analysis; however, fertility decline appears to have accelerated in recent decades but only at older ages. In any event, it is possible that part of the change observed in MC among 30-34 year-old women is a continuation of the process of fertility decline that could have occurred without legislation. If that is the case, the implication is that effect of abortion legalization is only visible among younger women (20-29) since the DDD estimates obtained for MC are significantly different from the changes observed in GMC or CAM. Overall, the four-group comparison produces two additional implications. First, in terms of overall changes in ASFRs we do not find systematic evidence that the effect of abortion legalization is substantively extending to the GMC area outside MC. Second, constitutional amendments restricting abortion did not appear to have had an effect on fertility. Without attributing the DDD estimate obtained for MC for 30-34 year-old women to abortion legalization produces a more conservative estimate of the impact of the law and reduces the number of birth prevented between 2000 and 2010 to 8 thousand.

The bottom panel of Table 2 reports the coefficients estimating the effect of prior fertility and concomitant changes in socioeconomic conditions. Results show that areas with faster declines in ASFR in the prior decades; i.e. 1970-1990 for the period between 1990 and 2000 and 1990 and 2000 for the period between 2000 and 2010, continued with faster declines in the following decade. The change in the percent of women in union and with secondary education or more, are the only other two concomitant socioeconomic conditions affecting fertility change. They work in opposite direction, though. Increases in the percent of women in union have a positive effect, reducing the decline in ASFR between time points and increases in the proportion of women with higher levels of education have the opposite negative effect accelerating fertility decline.

Change in parity-specific rates

In order to disentangle differential association between abortion legalization and timing and stopping behaviors, Table 3 reports estimates from the same DDD regression models as before but where the dependent variable is change in PASFRs between 1990 and 2000 and between 2000 and 2010 in Mexico. We report only the estimates for the change by age-group $\xi_{1\text{-}3,g}$ in equation [3] and $\delta_{1\text{-}3,g}$ in equation [2] for parities 1, 2, and 3+ since they are the main parameters of interest. The models also control as before for prior fertility and concomitant socioeconomic changes. As in the ASFR analysis, columns 1 and 5 report the difference, after accounting for prior fertility and concomitant socioeconomic changes, in the parity-specific fertility rate of age group *g* in non-treatment metropolitan areas in 1990-2000 and 2000-2010, respectively. Columns 2, 3, and 4 report the DDD estimates for MC; GMC; and CAM, respectively for 1990-2000 and columns 6, 7, and 8 for 2000-2010. They capture the extent to which changes in PASFR in MC, GMC, and CAM differ from the changes in the control group.

Results show that for the 1990s, there were virtually no differences across metropolitan areas and age-groups in parity-specific fertility change. As could be expected the increase in teenage fertility rates documented before is exclusively the product of increases in the first birth rate among teenagers (0.011 and 0.013 for 14-17 and 18-19 year-old, respectively). Also as before, this increase was somewhat smaller in MC than in control areas but again not enough to offset the change (-.006 and -.009 for the same groups). A main implication for our purposes is that, overall, the DDD specification does not identify area specific changes in the 1990s.

Results differ when we consider the changes in PASFR between 2000 and 2010. Results for the change in first parity rates document a significant reduction in the rate of transition to first birth for women aged 20-24 and 25-29 in MC (-.007 and -.009, respectively in column 6) relative to unaffected metro areas and the reduction is statistically different from the changes in the 1990s. Even though results of changes in ASFR did not show any systematic evidence of diffusion of the effect of legalization to the GMC area, a somewhat different picture emerges for the transition to first birth. Results show a significant reduction in first parity rates for women ages 20-24 in GMC (-.004 column 7) relative to unaffected areas. Even though the size of the effect is much smaller than the one registered for MC it is statistically different from the experience in the 1990s. Thus, there appears to be a measurable effect of further delay in fertility initiation among 20-24 year old women in GMC during the 2000s in conjunction with abortion legalization. There are no major differences in CAM areas.

Interestingly results also show important differences for 2000-2010 for the change in second birth parity rate in MC and GMC relative to unaffected metros. The differences occur at older ages. Results show that in MC the second birth rate declined -.011 and -.008 among 25-29 and 30-34 year-old women (Column 6), respectively than in unaffected metro areas. The difference in the GMC area is only present from women aged 30-34 (-.008 in Column 7). This result is consistent with reports from service providers suggesting that abortion legalization has been instrumental in reducing recurrent unwanted childbearing. No differences are observed in CAM areas.

Somewhat surprisingly we do not find any systematic differences between unaffected metros and MC, GMC, or CAM areas for changes in the transition into third or higher births in 1990-2000 or 2000-2010. There is no evidence that abortion legalization might have changed the context of stopping behaviors associate with higher birth order fertility.

References

Becker, D., Diaz-Olavarrieta, C., Juarez, C., Garcia, S. G., Sanhueza, P., & Harper, C. C. (2011a). Clients' Perceptions of the Quality of Care in Mexico City's Public-Sector Legal Abortion Program. *Int Perspect Sex Reprod Health, 37*(4), 191-201.

Becker, D., Diaz-Olavarrieta, C., Juarez, C., Garcia, S. G., Smith, P. S., & Harper, C. C. (2011b). Sociodemographic Factors Associated With Obstacles to Abortion Care: Findings From a Survey of Abortion Patients in Mexico City. *Womens Health Issues, 21*(3), S16-S20.

Becker, D., & Diaz Olavarrieta, C. (2013). Decriminalization of abortion in Mexico City: the effects on women's reproductive rights. *Am J Public Health, 103*(4), 590-593.

Berquó, Elza (1999). Ainda a Questão da Esterilização Feminina no Brasil. In Giffin, K. and Costa, S. (Eds.) *Questões da Saúde Reprodutiva*. Rio de Janeiro: Editora FIOCRUZ.

Bongaarts, J. (1987). The proximate determinants of fertility. *Technology in Society, 9*(3–4), 243-260.

Consejo Nacional de Poblacion. (2000). *Cuadernos de salud reproductiva. Republica Mexicana*. Mexico: Consejo Nacional de Poblacion. http://www.conapo.gob.mx/work/models/CONAPO/salud_reproductiva/2000/1Republica.pdf

Consejo Nacional de Poblacion. (2011). *Perfiles de salud reproductiva. Republica Mexicana*. Mexico: Consejo Nacional de Poblacion. http://www.conapo.gob.mx/en/CONAPO/Republica_Mexicana_Perfiles_de_Salud_Reproductiva

David, H. P. (1992). Abortion in Europe, 1920-91: a public health perspective. *Stud Fam Plann, 23*(1), 1-22.

Grupo de Informacion en Reproduccion Elegida. (2012). Reformas aprobadas a las constituciones estatales que protegen la vida desde la concepcion/fecundacion 2008-2011 (pp. 9). Mexico.

Grupo de Informacion en Reproduccion Elegida. (2013). Cifras ILE (marzo 2013) Retrieved April 8, 2013, from https://www.gire.org.mx/index.php?option=com_content&view=article&id=504&Itemid=1397&lang=es

Guzman, J. M., Rodriguez, J., Martinez, J., Contreras, J. M., & Gonzalez, D. (2006). The demography of Latin America and the Caribbean since 1950. *Population, 61*(5-6), 519-576.

Instituto Nacional de Estadistica y Geografia. (2011). Censos y Conteos de Poblacion y Vivienda, from

Johnston, H. B., & Hill, K. H. (1996). Induced abortion in the developing world: Indirect estimates. *Int Fam Plan Perspect, 22*(3), 108-137.

Juarez, F., Singh, S., Garcia, S. G., & Olavarrieta, C. D. (2008). Estimates of Induced Abortion in Mexico: What's Changed Between 1990 and 2006?. *Int Fam Plan Perspect, 34*(4), 158-168.

Juarez, F., Palma, J., Singh, S. & Bankole, A. (2010). *Las necesidades de salud sexual y reproductiva de las adolescentes en Mexico: retos y oportunidades .* Nueva York: Guttmacher Institute.

Kulczycki, A. (2007). The abortion debate in Mexico: Realities and Stalled Policy Reform. *Bulletin of Latin American Research*, 26(1), 50-68.

Lerner, S. & Quesnel, A. (1994). Instituciones y reproduccion. Hacia una interpretacion del papel de las instituciones en la regulacion de la fecundidad en Mexico. In F. Alba and G. Cabrera (Eds.), *La poblacion en el desarrollo contemporaneo de Mexico* (pp.85-118). Mexico: El Colegio de Mexico.

Levine, P. B., Staiger, D., Kane, T. J., & Zimmerman, D. J. (1999). Roe v Wade and American fertility. *American Journal of Public Health, 89*(2), 199-203.

Long, J. S., & Ervin, L. H. (2000). Using Heteroscedasticity Consistent Standard Errors in the Linear Regression Model. *The American Statistician, 54*(3), 217-224.

Maldonado, N. (2010). *Analisis de la morbilidad por las nueve causas de complicaciones de embarazo que terminan en aborto, de acuerdo con la CIE-10, reportadas por la Secretaría de Salud : 2000-2007.* Master in Demography, El Colegio de Mexico

Mendoza, D. (2006). Planificación familiar: logros en la última década y retos futuros. In A. Hoekman (Ed.), *La Situación Demográfica de México, 2006* (pp. 49–64). Mexico: Consejo Nacional de Poblacion.

Mier y Teran, M., & Partida, V. (2001). Niveles, tendencias y diferenciales de la fecundidad en Mexico, 1930-1997. In J. Gomez de Leon & C. Rabell (Eds.), *La población de Mexico. Tendencias y perspectivas sociodemograficas hacia el siglo XXI* (pp. 168-206). Mexico: Consejo Nacional de Poblacion and Fondo de Cultura Economica.

Mondragon y Kalb, M., Ahued Ortega, A., Morales Velazquez, J., Diaz Olavarrieta, C., Rodriguez, J. V., Becker, D., & Garcia, S. G. (2011). Patient Characteristics and Service Trends Following Abortion Legalization in Mexico City, 2007-10. *Studies in Family Planning, 42*(3), 159-166.

OECD (2009). Fertility rates. In OECD, *Society at a Glance 2009: OECD Social Indicators*, OECD Publishing: http://dx.doi.org/10.1787/soc_glance-2008-6-en

Olavarrieta, C. D., Garcia, S. G., Arangure, A., Cravioto, V., Villalobos, A., AbiSamra, R., & Becker, D. (2012). Women's experiences of and perspectives on abortion at public facilities in Mexico City three years following decriminalization. *International Journal of Gynecology & Obstetrics, 118*, S15-S20.

Schiavon, R., Troncoso, E., & Polo, G. (2012). Analysis of maternal and abortion-related mortality in Mexico over the last two decades, 1990-2008. [Article]. *International Journal of Gynecology & Obstetrics, 118*, S78-S84

van Dijk, M. G., Arellano Mendoza, L. J., Arangure Peraza, A. G., Toriz Prado, A. A., Krumholz, A., & Yam, E. A. (2011). Women's experiences with legal abortion in Mexico City: a qualitative study. *Stud Fam Plann, 42*(3), 167-174.

Wilson, K. S., Garcia, S. G., Diaz Olavarrieta, C., Villalobos-Hernandez, A., Rodriguez, J. V., Smith, P. S., & Burks, C. (2011). Public opinion on abortion in Mexico City after the landmark reform. *Stud Fam Plann, 42*(3), 175-182.

Table 1: Average Total and Age-Specfic Fertility Rates by Area In Mexico, 2000 and 2010

	Mexico City			GMC			Cities Const. Mod.			Control Group: Other Cities		
Age	1990	2000	2010	1990	2000	2010	1990	2000	2010	1990	2000	2010
14-17	0.011	0.016	0.020	0.016	0.023	0.024	0.017	0.029	0.026	0.015	0.028	0.033
18-19	0.057	0.071	0.065	0.079	0.097	0.090	0.079	0.104	0.094	0.078	0.099	0.095
20-24	0.107	0.104	0.082	0.143	0.138	0.132	0.145	0.151	0.124	0.141	0.144	0.127
25-29	0.122	0.109	0.080	0.146	0.131	0.107	0.160	0.152	0.125	0.158	0.139	0.121
30-34	0.094	0.086	0.068	0.108	0.091	0.072	0.125	0.109	0.085	0.111	0.100	0.093
35-39	0.052	0.043	0.042	0.060	0.048	0.038	0.077	0.058	0.047	0.070	0.051	0.045
40-44	0.024	0.012	0.013	0.034	0.016	0.013	0.052	0.024	0.014	0.037	0.016	0.013
45-49	0.015	0.003	0.003	0.027	0.006	0.004	0.032	0.008	0.004	0.025	0.005	0.003
Average TFR	2.227	1.993	1.646	2.813	2.438	2.111	3.178	2.836	2.284	2.920	2.591	2.329

Differences in rates		90-00	00-10		90-00	00-10		90-00	00-10		90-00	00-10
14-17		0.005	0.003		0.008	0.001		0.012	-0.003		0.013	0.005
18-19		0.014	-0.007		0.017	-0.006		0.025	-0.010		0.022	-0.004
20-24		-0.003	-0.022		-0.004	-0.006		0.006	-0.027		0.003	-0.017
25-29		-0.014	-0.029		-0.015	-0.023		-0.008	-0.027		-0.019	-0.018
30-34		-0.008	-0.018		-0.017	-0.019		-0.016	-0.024		-0.011	-0.007
35-39		-0.009	-0.001		-0.012	-0.010		-0.019	-0.011		-0.018	-0.007
40-44		-0.012	0.001		-0.018	-0.003		-0.027	-0.010		-0.021	-0.003
45-49		-0.012	0.000		-0.021	-0.002		-0.024	-0.005		-0.020	-0.003
Difference in Avg. TFR		-0.234	-0.351		-0.376	-0.328		-0.342	-0.548		-0.329	-0.266

Table 2: Results from DDD OLS models predicting change in age-specfic fertility rates between 1990-2000 and 2000-

	1990-2000 Period				**2000-2010 Period**			
	Control:	DDD estimates			Control:	DDD estimates		
	Unaffected Metros	Mexico City	Greater MC	Metro Amend.	Unaffected Metros	Mexico City	Greater MC	Metro Amend.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age groups								
14-17	0.021 **	-0.006 *	-0.005 **	-0.003	0.017 **	-0.007 **	-0.007 **	-0.008 **
	(0.007)	(0.004)	(0.002)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)
18-19	0.023 **	-0.003	-0.005	0.004	0.012 **	-0.008 *	-0.005	-0.004
	(0.008)	(0.006)	(0.008)	(0.007)	(0.005)	(0.005)	(0.004)	(0.008)
20-24	-0.001	-0.004	-0.004	0.001	-0.009 **	**-0.010** **	0.007	-0.009
	(0.008)	(0.003)	(0.005)	(0.005)	(0.004)	(0.003)	(0.004)	(0.005)
25-29	-0.026 **	0.006	0.004	0.008	-0.021 **	**-0.010** **	-0.004	-0.004
	(0.008)	(0.004)	(0.003)	(0.005)	(0.004)	(0.004)	(0.004)	(0.006)
30-34	-0.020 **	0.007 *	-0.004	-0.007	-0.006	**-0.012** *	**-0.016** **	**-0.019** **
	(0.008)	(0.004)	(0.007)	(0.006)	(0.004)	(0.009)	(0.004)	(0.005)
35-39	-0.023 **	0.014 **	0.006	-0.008	-0.009 **	0.008 *	-0.001	-0.005
	(0.008)	(0.003)	(0.004)	(0.005)	(0.004)	(0.004)	(0.003)	(0.005)
40-44	-0.019 **	0.014 **	0.002	-0.007	-0.007 *	0.006 **	0.001	-0.010 **
	(0.008)	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)	(0.002)
45-49	-0.012 *	0.011 **	-0.004	-0.005	-0.005	0.003 *	-0.001	-0.004 **
	(0.007)	(0.003)	(0.003)	(0.003)	(0.004)	(0.002)	(0.001)	(0.002)
Change in socioeconomic conditions (difference)								
ASFR	-0.111 **				-0.474 **			
	(0.016)				(0.031)			
% in union	0.174 **				-0.037			
	(0.040)				(0.042)			
% Second. Educ.	-0.053 *				-0.057 **			
	(0.038)				(0.026)			
% in Labor Force	-0.015				0.007			
	(0.038)				(0.030)			
% in Prof. Occup.	-0.085				0.007			
	(0.108)				(0.056)			
Pop. Size (log)	0.002				-0.001			
	(0.004)				(0.004)			

** $p < 0.05$, * $p < 0.1$ Robust standard errors in parenthesis

Bolded coefficients indicate difference across periods statistically significant at $p < .05$

Table 3a: Results from DDD OLS models predicting change in parity and age-specfic fertility rates (1990-2000 and 2000-2010)

	1990-2000 Period				**2000-2010 Period**			
	Control:	DDD estimates			Control:	DDD estimates		
	Unaffected Metros	Mexico City	Greater MC	Metro Amend.	Unaffected Metros	Mexico City	Greater MC	Metro Amend.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Parity 1								
14-17	0.011 **	-0.006 **	-0.003	-0.003	0.015 **	-0.005 *	-0.007 *	-0.010 *
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
18-19	0.013 **	-0.009 **	0.001	0.000	0.007 *	-0.006 *	0.005	-0.006
	(0.005)	(0.004)	(0.004)	(0.007)	(0.004)	(0.004)	(0.003)	(0.006)
20-24	0.002	-0.002	0.001	0.001	0.000	**-0.007** *	**-0.004** *	-0.003
	(0.004)	(0.002)	(0.002)	(0.004)	(0.003)	(0.004)	(0.002)	(0.003)
25-29	0.004	-0.003	0.000	-0.002	0.004 *	**-0.009** **	-0.002	-0.003
	(0.004)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)
30-34	0.001	0.001	0.003 **	-0.001	0.006 **	0.001	-0.003	-0.003
	(0.004)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
35+	-0.002	0.003 **	0.002 **	0.000	0.001	0.004 *	0.001 *	0.000
	(0.004)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Parity 2								
Age groups								
14-19	-0.005	0.003	-0.002	0.001	-0.003 *	0.002	0.000	-0.002
	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
20-24	-0.005	-0.002	-0.002	0.004	-0.008 **	-0.004	0.008	-0.002
	(0.004)	(0.003)	(0.003)	(0.004)	(0.002)	(0.004)	(0.004)	(0.003)
25-29	0.002	-0.003	-0.002	0.000	-0.003	**-0.011** **	-0.003	0.000
	(0.004)	(0.003)	(0.002)	(0.003)	(0.002)	(0.004)	(0.003)	(0.003)
30-34	0.003	-0.001	0.000	0.000	0.007 *	**-0.008** **	**-0.008** **	-0.002
	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
35-39	-0.002	0.003	0.000	-0.001	0.002	0.001	-0.002 *	-0.001
	(0.004)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)
40-49	-0.005	0.001	0.000	-0.001	-0.002	0.002	0.001	-0.001
	(0.004)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)

** p <0.05, * p<0.1 (continues)

Robust standard errors in parenthesis

Table 3b: Results from DDD OLS models predicting change in parity and age-specfic fertility rates (1990-2000 and 2000-2010)

	1990-2000 Period				2000-2010 Period			
	Control:	DDD estimates			Control:	DDD estimates		
	Unaffected Metros	Mexico City	Greater MC	Metro Amend.	Unaffected Metros	Mexico City	Greater MC	Metro Amend.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Parity 3+								
Age groups								
20-24	-0.004	0.003 **	-0.002	0.001	-0.003 **	0.004 **	0.002	0.001
	(0.003)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)
25-29	-0.005	0.001	-0.001	0.008 **	-0.005 **	-0.003	-0.003 **	0.000
	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)
30-34	0.000	-0.001	-0.003	0.004	0.001	-0.004 *	-0.004	0.001
	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)
35-39	0.003	-0.001	0.000	-0.002	0.003 *	-0.001	-0.002	0.000
	(0.003)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)
40-44	-0.001	0.003 **	0.000	-0.002	0.001	0.000	0.002 **	0.001
	(0.003)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
45-49	-0.002	0.002 **	0.000	0.000	0.000	0.001	0.000	0.000
	(0.003)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)

** p <0.05, * p<0.1

(continued)

Robust standard errors in parenthesis

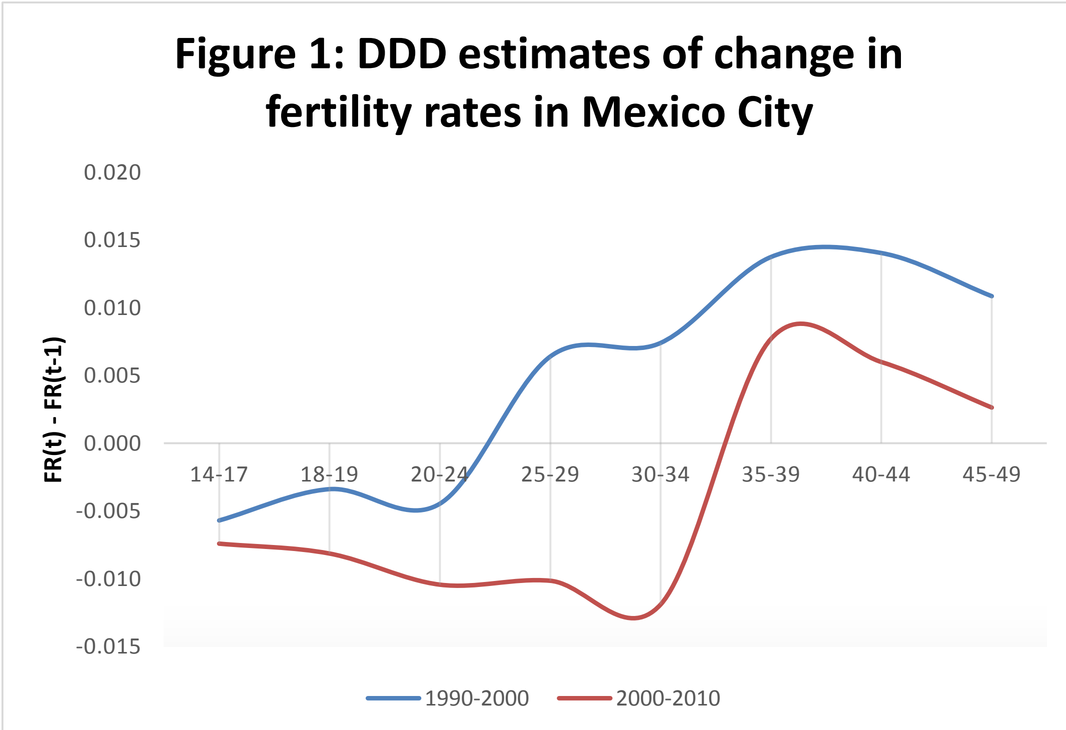
Figure 1: DDD estimates of change in fertility rates in Mexico City
0.020
0.015
0.010
0.005
0.000
-0.005
-0.010
-0.015
FR(t) - FR(t-1)
14-17
18-19
20-24
25-29
30-34
35-39
40-44
45-49
1990-2000
2000-2010