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Abstract

In these essays I focus on issues that affect the quality of marriage. First, I analyze the effect of the Chilean divorce law on a woman's decision of when to have the first child. Using survival analysis, I find that the divorce law has had a positive effect on the hazard for highly-educated women. This result suggests that highly-educated women may have waited to have the first child until they were able to afford the additional costs that a child may bring to a divorce process in case the couple decided to separate. In the second essay I analyze the relationship between domestic violence and marriage duration. Using a representative sample of Peru's female population between 15 and 49 years old, I find that domestic violence may increase the hazard of divorce. Moreover, I find that the change in the hazard varies over time, increasing immediately after the first physical or sexual aggression from the husband, and decreasing afterwards. In the third essay I evaluate the role of domestic violence as a causal mechanism in the effect of civil conflict violence on a woman's labor force participation. Using data on the civil conflict violence from Peru and assuming unconfoundedness, I find that the probability of working increased by 0.0454 (eight percent) for women who live in areas affected by the civil conflict and that about 27 percent of this increase is mediated by the woman's exposure to domestic violence.

Three Essays on the Quality of Marriage

by

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DISSERTATION

Submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy in *Economics*
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Preface

The institution of marriage is a cornerstone of society. Despite having lost relevance in the last decades, the type of decisions made within a marriage still capture the attention of researchers in different disciplines. In economics, the work of Theodore W. Schultz and Gary Becker initiated modern research on marriage and the family. Following their work, economists have approached marriage by developing theoretical models and empirical work in order to improve the understanding of different aspects of marital relationships. The following essays contribute to the economics literature on marriage by examining issues that still have not been completely disentangled: the effect of divorce laws on fertility decisions, the relationship between domestic violence and marital duration, and the role of domestic violence as a causal mechanism between civil conflict violence and women's labor force participation.

In the first essay I study the effect of the Chilean divorce law on a woman's decision of when to have the first child. The economics literature on divorce law focuses on the introduction of more flexible divorce regulation in the U.S. and has reached no consensus on the effects of divorce on fertility decisions. The introduction of absolute divorce in Chile in 2004 entails a greater change, going from a situation in which divorce is not allowed to one in which it is. Using birth histories constructed from the Social Protection Survey (*Encuesta de Prevision Social* – EPS) panel 2002-2009, I find that the divorce law increases the hazard of having the first child by 62 percent at all ages for highly educated women, controlling for socioeconomic characteristics, marital duration and the negative trend in fertility rates observed in Chile since the mid-1960s. The estimates also show that the response of the hazard to a one percent increase in the woman's potential

income after the divorce law was passed is larger than the response of the hazard before the new law was implemented.

In the second essay I examine how domestic violence affects a woman's hazard of divorce in Peru. Psychologists have done extensive work on this topic and conclude that the relationship between marital termination and domestic violence changes over the duration of the marriage. However there is little empirical evidence as available data on domestic violence is usually not representative of a population. In this essay I use a representative sample of Peru's female population between 15 and 49 years of age (Demographic and Health Survey 2005-2008) to construct 7,016 first-marriage spells for women who are currently in their first marriage or who were married only once before. Using these spells, I estimate a hazard model of divorce in which I take into account whether the woman experienced physical or sexual domestic aggression and when the first aggression occurred. I find that the hazard of divorce is 2.598 times the baseline hazard after the first time the woman is battered. When I allow the effect of domestic violence to change over time, the hazard of divorce is 4.3 times the baseline hazard during the first year after the woman is battered for the first time. However, between the first and sixth year the hazard of divorce decreases about 16.1 percent every year (0.851 times the baseline hazard). These estimates are obtained after controlling for marital duration, the woman's age, parity conception during marriage, the husband's education level and alcohol consumption habits, the woman's potential income at the time of marriage and native language, as well as a set of dummy variables indicating the decade in which the marriage started.

In the third essay I investigate how domestic violence operates as a causal mechanism between civil conflict and a woman's labor force participation. Psychologists have done most of the work on the relationship between civil violence exposure and domestic violence, while economists have focused on the causes and consequences of civil violence exposure. However, there is no evidence in the economics literature whether domestic violence may operate as a causal mechanism between civil conflict and female labor force participation. To investigate this possibility I apply the methodology developed in Flores and Flores-Lagunes (2011), which allows the identification of causal mechanisms and net effects under an unconfoundedness assumption. I use a representative sample of Peru's female population between 15 and 49 years of age (Demographic and Health Survey 2005-2008) to construct a sample of 6,691 women. I find that the exposure to the civil conflict between 1980 and 2000 increased the probability of urban women working by 0.0454 (eight percent) and that about 27 percent of this increase is mediated by the woman's exposure to domestic violence. This result is in line with previous investigations that show that the exposure to civil conflict violence increases the probability that a woman may become a victim of domestic violence, and that domestic violence may increase a woman's labor force participation.

Several people have contributed to the development of these essays on many ways, and it would be impossible to fully express my gratitude in a few lines. I would like to thank my parents. Their guidance and effort to provide me with the best education possible has been crucial in my life and career. I am also grateful to Paola, my wife, whose affection and support meant everything since the first day of my Ph.D. studies, and who dealt with my bad humor and who trusted me more than I did myself. Finally, I am grateful to my

future child, whose notice of arrival came in the best moment, and provided further inspiration in the most crucial decisions.

I thank my advisor, Prof. Jan Ondrich, for the endless discussions over Skype every weekend. His advice and support during the last three years went beyond the academic needs of my dissertation and still constitute a vital source of guidance. I would also like to thank Prof. Alfonso Flores-Lagunes, for his valuable suggestions and comments, as well as Professors Susan Gensemer, Jeffrey Kubik and Derek Laing.

Chapter I: The Effect of the Chilean Divorce Law on Women's First Birth Decisions

Abstract

The economics literature on divorce law focuses on the introduction of no-fault divorce laws in the U.S.A. and no consensus has been reached regarding its effects on divorce rates, labor force participation and fertility decisions. In 2004 Chile allowed divorce for the first time. The new divorce law established compensation in case of divorce for the spouse who gives up personal development for the good of the household. Using birth histories constructed from the Social Protection Survey (*Encuesta de Prevision Social* – EPS) panel 2002-2009, I investigate the effect of the divorce law on women's age at first birth. I find that the divorce law increases the hazard of having the first child by 61.8 percent for highly educated women at all ages after controlling for socioeconomic characteristics, marital duration and the negative trend in fertility rates observed in Chile since the mid-1960s. The estimates also show that the response of the hazard to a one percent increase in the woman's potential income after the DL was passed is larger than the response of the hazard before the new law was implemented.

1. Introduction

In this investigation I evaluate the impact of the introduction of divorce in Chile in 2004 on women's decision about when to have a first child. The evolution of Chilean society, as well as the historical trends of the regulation of marriages in Chile, provides a rich context to study a topic on which the economic literature has found no consensus so far.

In 1884 the regulation and registration of marriages passed from the Catholic Church to the State. However, the influence of the Church was not eliminated, in particular regarding the termination of the marital union. Indeed, couples were not allowed to divorce until 2004. In that year, new legislation introduced the concept of "*divorce a vincula matrimonii"* or total divorce, under which a member of a married couple was able to claim the termination of the marital union without any restriction.[1] The new legislation also introduced a monetary compensation regime for the spouse who gives up his/her personal and professional development for the good of the household.

Most of the economics literature focuses on the introduction of no-fault divorce in the United States in the decade starting in 1970. This new legislation allows a spouse to request the dissolution of the marital union to a court without having to prove a "fault" committed by the partner. Taking advantage of the variation in the implementation of this legal procedure across the different federal states, the economics

[1] Although Chilean society has been traditionally very conservative, more secular trends have become apparent in the last few decades. Recent surveys show that Chileans have become more open to homosexuality, divorce, euthanasia, prostitution and abortion (MORI, Press release - World Values Survey - Chile, 2006) . Moreover, women have been delaying their first marriage, as well as the conception of their first child in favor of more human capital accumulation: According to the National Institute of Statistics (*Instituto Nacional de Estadísticas* – INE) of Chile the average age at which women have their first child increased from 22.73 to 23.14 between 1997 and 2007, while the average age at which women get married for the first time increased by almost 4 years (24.86 to 27.74) in the same time period.

literature has not reached a consensus regarding the effects of divorce on fertility decisions.[2] In the case of Chile, the change in the legislation goes from the impossibility of terminating the marriage to the most flexible option: terminating the marital union on the grounds of irreconcilable differences. Thus, the radical change of the marital law in Chile provides a new opportunity to study the effects of the divorce-law change.

In this context, it is possible that the introduction of divorce affected the woman's decision of when to have the first child.[3] On the one hand, women may wait to see if a relationship succeeds before having a first child. If the marriage should fail, the presence of a child would increase the costs of divorce due to custody and child support issues. On the other hand, the monetary compensation regime introduced by the new legislation may create incentives for younger women to advance the conception of their first child, provided that the amount offsets the opportunity costs of becoming a mother. In other words, a woman becoming a mother at a young age could be entitled to a larger compensation in case of a future divorce.[4] The goal of this investigation is to contribute to the economic literature on divorce laws and to clarify the relation between divorce legislation and fertility decisions.

Initial results based on the Social Protection Survey (*Encuesta de Previsión Social* – EPS) panel 2002-2009 suggest that the divorce law has a positive effect on the hazard of having a first child for highly educated women after controlling for the

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[2] For instance, Becker (1971) concludes that the introduction of divorce decreases marital fertility, as the value of marriage diminishes and fewer couples get married. However, Alesina and Giuliano (2007) argue that the introduction of divorce may eliminate the deterrence of being locked into an unviable marriage. This may create incentives for marriage and child birth.

[3] Other effects could be observed through marital decisions, educational attainment, labor force participation, professional training, and any other individual's decisions that may be influenced by a future compensation in case of divorce.

[4] The amount of this compensation is determined by the court, which takes into account the beneficiary's age, education level, time of marriage, the existence of children and other socio-demographic characteristics.

woman's age, the negative trend observed on fertility rates in Chile since the mid-1960s, marital duration and other socioeconomic characteristics. The estimation also suggests that a high potential income level is associated with an increase in the hazard of first birth. In other words, divorcing women who are able to bear the costs of children will have their first child earlier.

This essay is structured as follows. Section 2 presents the context in which the Chilean divorce law (DL) was introduced, and the motivation to focus on first child births. The third section consists of a review of the literature focused on divorce laws and fertility decisions. The fourth section presents interesting evidence supporting my argument based on administrative data provided by the Chilean National Institute of Statistics (INE) on births and marriages. In the fifth section I present the data, describe the empirical strategy and discuss the results of the estimations. Finally, in the sixth section I present my conclusions and propose further research.

2. Context and Motivation.

Historically, religion played an important role on marital decisions and marriage legislation. This is the case in Latin America, where most countries did not allow divorce as a legal procedure to terminate the marital union throughout the 20th century.[5]

Peru introduced divorce in 1936, and modified it in 2008 allowing couples seeking to terminate the marriage quickly to do so over the Internet.[6] Colombia did the same in 1976,[7] and in 2005 implanted a new process to facilitate the divorce process.

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[5] Rossetti, Josefina (1993), "*Hacia un perfil de la familia actual en Latinoamérica y el Caribe*", *Cambios en el perfil de las familias: la experiencia regional*, Libros de la CEPAL, Nº 36 (LC/G.1761-P), Santiago de Chile, Comisión Económica para América Latina y el Caribe (CEPAL).
[6] See Law 2029227, 2008.
[7] See Law 1, 1976 (www.elabedul.net/Documentos/Leyes/1976/Ley_1_de_1976.pdf).

Argentina introduced new divorce legislation in 1987.[8] The previous legislation only regulated the separation of the couple's assets and the custody of children, but did not break the marital union. In all these countries the changes in the legislation occurred after long periods of political debate. As expected, the Catholic Church lobbied in favor of constraining marital dissolution, while other social organizations argued in favor of couple's free will to terminate or preserve the marital union. As of the beginning of this century, the Philippines, Chile, Malta[9] and the Vatican were the only countries that still banned divorce.

The attempts to implement divorce in Chile can be traced back more than a century.[10] The first attempt to change the divorce law in Chile after 1884 was presented to Congress in 1910. In the following decades similar attempts failed after lobby pressure from the Catholic Church. According to the Church allowing couples to terminate their marriage would diminish the value of the family, which was regarded as the most important social institution. The pressure of the Catholic Church was made evident through several official statements and documents against divorce issued by the Episcopal Conference of Chile.[11]

The most recent attempt to change the divorce law was presented to the Congress in November of 1995. However, it was not taken up in the Chamber of Deputies until

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[8] See Law 23.515, *Ley de Divorcio Vincular* (http://www.bcn.cl/carpeta_temas/temas_portada.2005-10-27.7388460505/pdf/92.pdf).

[9] In Malta, the population pronounced in favor of divorce through a referendum in May 2011, which led the Congress of the island to start working on a divorce law. To dissolve a marriage, Maltese citizens had to seek the annulment through the Catholic Church. This process could take up to 9 years. Another option was to get divorced abroad, and then validate the procedure in Malta (http://www.bbc.co.uk/news/world-europe-13588834). Indeed, the common denominator in the cases of Chile and Malta is the strong influence of the Catholic Church on the design of family-related legislation.

[10] Library of the Congress of Chile (http://www.bcn.cl/carpeta_temas/temas_portada.2005-10-27.7388460505).

[11] Before 1995, the Episcopal Conference of Chile issued statements regarding the implementation of divorce in Chile in 1964, 1971, 1982, 1990 and 1994 (http://www.iglesia.cl/iglesiachile/especiales/matrimonio/index.html).

January 15, 1997. After nine months of debate on the law change, the measure was finally approved and sent to the Senate. In the meantime, the Episcopal Conference of Chile issued a new statement against the legislation.[12] As expected, the Church's point of view became part of the debate as many deputies and senate members agreed with the Church's position.[13] For instance, some of the arguments against the DL were (1) the potentially large increase in the number of marriages terminated, (2) the impoverishment of the most vulnerable spouse, (3) the negative effects on children of divorced couples, and (4) the weakening of the family, the most important institution of society.[14]

The Senate postponed the debate of the legislation until March of 2002. During 2003, the Senate spent eighteen sessions debating the new law. The modifications suggested during these sessions were finally approved by the Chamber of Deputies in March of 2004, and Law No. 19.947 was passed in May of 2004 and implemented on November 12th of the same year. On the following day, 52 demands for divorce were presented; after one week, the number of demands increased to 133.[15]

Before 2004 the Chilean marriage law was based on the 1884 civil code, which stated that the only way of dissolving a marriage was through its annulment, an unpractical and restrictive process. The annulment of the marital union did not consider any type of economic compensation for either spouse. In practical terms, to get the annulment, both parties had to negotiate and come to an agreement to provide a credible argument to the judge: for instance, that one of the witnesses was not older than 18 years

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[12] Episcopal Conference of Chile (1998). "The Catholic Church and the Project of Civil Marriage" (http://www.iglesia.cl/iglesiachile/especiales/matrimonio/cp_1998.html).
[13] Peña, Ana Verónica (2004), "*Senado le dio el sí a la Iglesia*"; La Nación, p. 6.
[14] Chambers of Deputies, Records of the Session 24 (01/23/1997); Senate of Chile, Records of Session 12 (07/15/2003).
[15] Letelier, Lorena et al. (2004) "*133 causas de divorcio se tramitaron en una semana*", La Tercera, p. 14.

of age, or that the name of the spouse was misspelled in the marriage certificate. In addition to annulment, the 1884 marital law included the separation of the couple. However, the separation did not dissolve the marriage and it did not terminate marital obligations. The separation allowed women to demand a food pension; however pensions are not always paid, as administrative data has shown that 80 percent of the demands presented to courts specialized in children's issues are related to food pensions due to lack of payment or similar problems.[16] In this context, the approval and implementation of the new DL in Chile implied significant changes in the way couples terminated a marital relationship.

Succession rights, which determine the inheritance of patrimony between spouses and their children, are another important change introduced by the new DL. Before 2004 these rights were not broken by the separation or the annulment. Therefore, in case of death of one of the spouses, the former wife was entitled to a share of her former husband's wealth, even after they got the separation or annulment of their marriage. After November 2004 the new DL suspended these succession rights. With this law a divorced woman was no longer able to claim food pension or succession rights from her former husband unless the couple had children. Perhaps the most important feature of the new DL is the monetary compensation assigned to the spouse who sacrificed his/her personal development for the good of the household. For instance, under the new law the spouse who decided to give up his/her job or professional career in order to take care of the children and assume a homemaker role (most frequently women), is entitled to receive monetary compensation. The court that manages the divorce process would decide the amount of the compensation based on the

[16] Senate of Chile, Records of Session 12 (07/15/2003).

spouse's years of age, educational attainment, and other circumstances surrounding the couple's marriage.

The significance of the new Chilean DL has to be understood in the context of the observed trends on number of first births and first marriages in Chile in the last decade. As shown in Figure 1.1, there is a constant decrease in the number of marriages and births according to National Institute of Statistics of Chile (INE).[17] However, after 2004, when the DL was passed, there is an apparent recovery in the number of marriages and births.[18,] These trends may seem surprising considering that Chile has a very traditional society[19] (the Chilean Marital Law of 1884 aimed to protect this tradition). When considering that Chile has reached significant levels of development and economic growth in the last 20 years, the negative trends shown below are less surprising. In fact, a similar phenomenon is observed among most European countries.[20]

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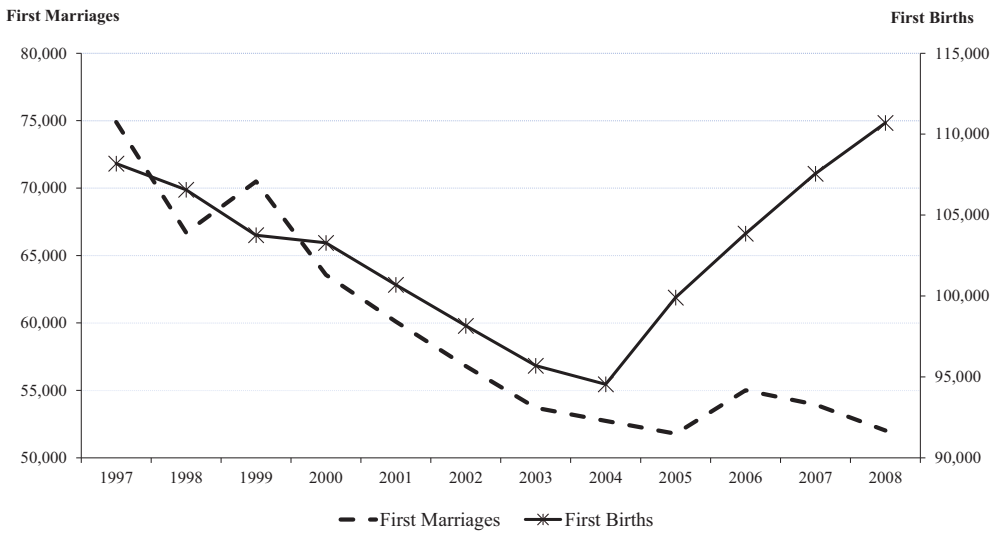
[17] The National Institute of Statistics of Chile annually produces the Vital Statistics (*Estadísticas Vitales*) report based on administrative information about births, marriages and other variables directly collected from birth registry offices. In Figure 1.1 the number of marriages for the years 2001, 2002 and 2004 has been estimated based on the annualized growth rate of first marriages for the period 2000-2003 and 2003-2005, respectively. The number of first births for the years 2001 and 2002 was also estimated based on annualized growth rate of the number of first births for the period 2000-2003.

[18] Between 1997 and 2005 marriage records show that the number of single women who got married decreased from 74,901 to 51,784 (see Figure 1.1). After 2005 this figure stabilized around 53 thousand marriages. Evidence from the Socioeconomic Characteristics Survey (*Encuesta de Caracterización Socioeconómica Nacional* – CASEN) show that in the period 1990-2009 the number of women in a cohabitating relationship increased from 460,574 to 1,704,303 and the number of married women increased from 4.8 to 5.1 million, which suggest an increasing preference towards cohabitation with respect to marriage. Given that marriage records do not distinguish between women who are in a cohabitating relationship from partnerless women, it is not possible to observe the contribution of cohabitating women to the number of first marriages. In this context, it is possible that divorce may have created incentives for cohabitating couples to get married, which could explain in part the relative stability in the number of first marriages shown after 2005. It should be noted that a similar trends are observed when 19 year-old women or younger are excluded from the analysis.

[19] Seventy two percent of Chileans are Catholics. See Lehmann (2001).

[20] According to Eurostat (http://ec.europa.eu/eurostat), between 1998 and 2008, the crude birth rate in the 15 countries of the Euro zone decreased 0.8%. The most drastic declines in the birth rate are observed in Portugal (19.7%), Malta (18.4%), Germany (16%), Luxemburg (13.5%), and the Netherlands (11%).

Figure 1.1: Women's First Marriages and First Births in Chile 1997-2008

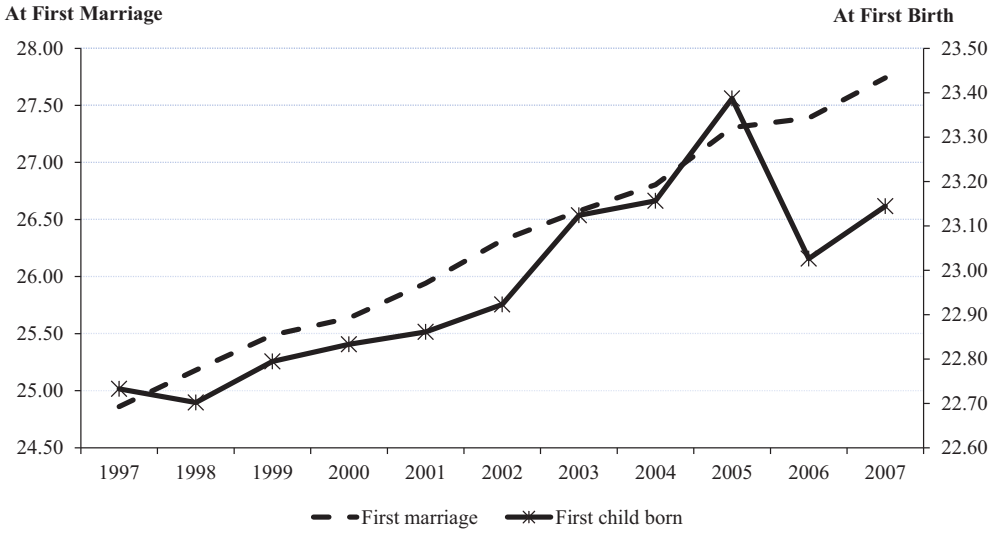


Another important factor to consider is the trend of the women's average age at first marriage and the average age at which they have their first child. The trends observed in the last decade show that Chilean women were delaying the occurrence of both events, which may suggest that they were less willing to sacrifice certain personal decisions (for instance, enrollment in training programs, participation in the labor market) in favor of starting a marital relationship and/or becoming a parent (see Figure 1.2 below). This trend is not surprising given the sustained economic development of Chile, accompanied by an increased participation of women in the labor market and significant increases in female educational attainment.[21] Moreover, the overall fertility rate shows a negative fall since the mid-1960s.[22] However, after the DL was approved, administrative data provided by the INE suggests a decrease in the average age at which women give birth to their first child: in the period 1997-2005 this average increased from 22.73 to 23.39, falling to 23.03 in 2006 and 23.14 in 2007. Although it is still too

[21] Between 1980 and the early 2000s, women's participation in the labor market increased 15 percent. See Larrañaga (2004).
[22] See CELADE, INE.2002. Chile: Proyección y Estimaciones de Poblacion. Total País. 1950-2050.

early to say whether there is a change in the trend, it appears that the average age at first pregnancy has declined after the DL. In terms of women's average age at first marriage, the administrative data available does not suggest a significant change after 2004, which may suggest that Chilean women continue delaying their first marriage.

Figure 1.2: Women's Average Age at First Birth and First Marriage



It is expected that the DL may affect a couple's willingness to get married, although it is hard to predict the direction of the effect. On the one hand, couples may get married, since it is now possible to terminate the marital union. In the case of couples who separate, each of the spouses may remarry under the new legislation. Therefore, the new law may have had a positive effect on marriage rates. On the other hand, the opposite effect is also possible. Indeed, although divorce may have become less expensive for the typical wife, it has become more expensive for the typical husband because of the introduction of the compensation scheme. Thus, it is hard to predict a response of marriage rates to the introduction of DL.

It must be noticed that the contribution of married couples to first births has significantly decreased between 1999 and 2006 (from 36.5 to about 22 percent), which is a consequence of the decrease in the number of first marriages.[23] As I explain in detail in Section 4, a significant share of the increasing number out-of-wedlock births is explained by women who are in a cohabitating relationship. These figures suggest that the DL had an effect on the first birth decision for married women and for cohabitating women.[24] Married women may delay the first birth to see if the relationship succeeds if they are not able to bear the additional costs brought by a child in case of a future divorce. In the case of cohabitating women, the effect of the DL on first birth may be related to the effect on the marriage decision. In fact, the 2008 Bicentenial Survey (*Encuesta Bicentenario*) suggests that 62.47 percent of Chileans do not disagree (44.67 percent agree and 17.80 are indifferent) with the idea that cohabitating couples should get married once they have a first child.[25]

In this context, the goal of this investigation is to study the effect of the DL on childbearing decisions of adult women (18 years or older). In particular, I will focus on the age at which women decide to conceive their first child. As I have mentioned, the DL may cause women to delay the first birth.[26] At the same time, the monetary

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[23] Larrañaga (2006) points out that the decrease in the number of births from married couples is a consequence of the decrease in the number of married couples.
[24] The effect on unmarried couples is labelled as "commitment" effect by Alessina and Giuliano (2007).
[25] Salinas, V. 2008. "*Matrimonio y Convivencia a la Luz de la Encuesta Bicentenario*". *Instituto de Sociología, Seminario Encuesta Bicentenario* 2008.
[26] The use of contraceptive methods in Chile has increased significantly in the last decade. According to UNDP (http://www.pnud.cl/odm/primer-informe/odm-estadisticas/odm6.asp) the share of individuals between 15 and 24 who used a condom in their first intercourse increased from 18 to 46.1 percent between 2000 and 2005. In a similar way, the availability of condoms for the population between 15 and 49 years of age increased from 1.7 to 2.6 condoms per capita between 2000 and 2005. Moreover, the number of women who use the public health system to receive contraceptives increased from 600,374 to 1,141,798 between 1990 and 2005. Despite these efforts, adolescent pregnancies (17 or younger) are still a public health concern, as most teenage pregnancies end up in abortions (Diaz, S. "*Información Sobre la Situación de la Planificación Familiar en Chile*". *Instituto Chileno de Salud Reproductiva*). Note that in 1930 the

compensation may generate incentives for women to have the first child at an early age. I the next section I review the literature on divorce laws.

3. Literature Review

Most of the literature on divorce laws relies on the introduction of no-fault and unilateral divorce during the 1970s in the United States. Before this law change divorce existed as a legal form of terminating a marriage; however, it required a “fault” by one of the spouses (for instance, adultery, physical or mental abuse, abandonment) for the affected spouse to demand divorce. While the no-fault regulation eliminated the "fault" requirement, unilateral divorce no longer required the consent of both spouses and either of them feeling the urge to end the marriage could do so and was free to leave. These laws were not implemented at the same time across all the states, and most of the literature has taken advantage of this variation to identify the effects of these laws.[27]

In this section I review the economic literature that has studied the effects of the introduction of unilateral divorce. I start with the literature focused on marital decisions and divorce rates. This part of the literature is abundant although it has not reached a consensus. In the next subsection I analyze the literature on fertility decisions. In this case, the existing literature is scarce and this essay attempts to contribute to this topic. In the third subsection I present the literature focused on labor force participation and educational attainment. Finally, I present some concluding remarks.

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therapeutic abortion was introduced in Chile. However, in 1989 the military government declared abortion illegal and since then it is considered as a murder, without exceptions (Penal Code, articles 342-345).

[27] Gruber (2004) does a summary of the timing in which these laws were implemented in each State.

3.1 Divorce Laws and divorce rates

The economic literature focused on divorce laws and its effect on divorce rates has not reach consensus and is still a source of debate. Peters (1986, 1992) and Allen (1992) sustained an exchange of opinions regarding their work.

Peters (1986, 1992) found no significant change in divorce rates given the introduction of unilateral divorce in the U.S.A. Peters (1986) points out that the increasing rate in U.S. divorce rates during the decade of 1980 and before was accompanied by changes in the divorce laws, making reference to the introduction of no-fault divorce in a significant number of states after 1970. The author acknowledges that the rules "might influence an individual's decisions about whether or not to divorce or to marry, and how much to invest in the marriage relationship." Based on a contract-theoretic framework, the author examines the "impact of both legal and informational constraints on several aspects of the marriage relationship: 1) the probability of divorce; 2) compensation at divorce (i.e., the terms of the divorce settlement); 3) the probability of entering marriage; and 4) incentives for investment in marriage-specific capital."

Peters' (1986) theoretical analysis is based on contrasting two contracting models that differ on the symmetry of information about the spouse's opportunities at divorce. In terms of the divorce rates, the author concludes that under symmetric information, a compensation regime could be designed so that "divorce only occurs when it is *ex post* efficient", in which case divorce rates would not differ significantly based on the different restrictions imposed by divorce regulations. However, when asymmetric

information arises, the author argues, divorce is more likely under the presence of a unilateral dissolution regulation. Regarding other marital aspects, as the probability of getting married and the compensation received at divorce, the study states that it is more difficult to predict an outcome. The empirical analysis is based on the March/April 1979 Current Population Survey. Results suggest that divorce rates did not differ significantly between unilateral (no-fault) divorce states and mutual consent states. However, the evidence found also suggested that the payments to settle divorce are lower under unilateral divorce regulations.

Allen (1992), however, reviews Peter's (1986) work and concludes that the findings presented in that document are too sensitive to strongly conclude anything. In particular, Allen (1992) argues that "Peters predicts no change in the divorce rate because marriages only end when it is efficient, and this depends on alternatives- not the law", and attributes Peters' findings to a misclassification of some states as no-fault. Allen (1992) argues that although some states required only *separation* to claim divorce, these could not be considered as no-fault as the *separation* requires a previous agreement by the spouses. In this sense, after reclassifying these states, Allen (1992) replicates Peters (1986) procedures, providing additional alternative specifications and concludes that no-fault divorce laws have a significant and positive effect on divorce rates.

In his reply, Peters (1992) shows that "Allen's (1992) empirical results are due to a classic problem of omitted variable bias", and argues that the results presented in Peters (1986) hold when controlling in her original model for the divorce rates previous to the introduction of the new divorce law. Peters (1992) also provides important evidence about the effects of transaction costs on divorce rates. The author argues that "it is

necessary to model the various transaction costs explicitly" given that they may determine which of the spouses "holds the property right to divorce".

Zelder (1993) argues in favor of divorce laws affecting divorce rates under particular circumstances, such as the presence of children. The author develops a theoretical model in which children are public goods that represent a significant share of the consumption within a marriage, and based on the assumption that children are not transferable within the marriage, the introduction of no-fault divorce laws has a positive effect on divorce rates among married couples with children. In particular, "the model predicts that residents of states whose divorce laws changed from "fault" to no-fault are more likely to divorce, the higher the fraction of their assets invested in children". The empirical tests are conducted using the Panel Study of Income Dynamics (PSID) of the period 1968-1991. He concludes that divorce rates increase in a regime of no-fault divorce because "the public-goods aspect of children within marriage can make a large fraction of each spouse's gains to marriage non-transferable. Under no-fault, this can lead to divorce even when the joint gains from marriage are positive." The estimates obtained suggest that "the transition to no-fault divorce law increases the annual divorce rate by 23 percent."

Using data from the National Longitudinal Study of the High School Class of 1972, Weiss and Willis (1995) investigate how variations in the expected earning capability of either spouse may affect marital dissolution. In this study, the authors consider the transformation of the divorce laws among the states that introduced no-fault divorce, and argue that the share of marriages in states that allowed no-fault divorce increased at the expenses of the share of marriages in those states that did not reform

their divorce law. The theoretical framework proposed by the authors produces a divorce rule, which they argue holds "whether or not mutual consent of the couple is required by law." Their estimation suggests that the divorce hazard depends significantly on the long-run earning capacities of both spouses. In particular, "an unexpected increase in the husband's predicted earning capacity reduces the divorce hazard, while an expected increase in the wife's predicted earning capacity raises the divorce hazard." On the other hand, they find that the expected income at the time of marriage does not influence the divorce hazard. Regarding divorce regulations, their findings suggest that the "legal environment also affects the cost of divorce." They argue that in those states where unilateral or no-fault divorce is allowed the chances of getting divorced is increased.

Friedberg (1998) goes back to the exchange held by Peters (1986) and Allen (1992) and proposes an alternative approach to evaluate the effect of divorce laws on divorce rates. Instead of using an individual-level panel, Friedberg assembled a state-level panel that included all divorces in the U.S. during the period 1968-1988. Although this implies that it is not possible to include individual information that may affect the propensity to divorce, the author argues that the main advantage is the significantly larger number of observations included compared to other samples (as the PSID, for instance).

The results provided by Friedberg (1998) confirm Allen's (1992) findings: the introduction of unilateral divorce increased the divorce rates in the U.S. At the same time, these results demonstrated that the way in which geographical heterogeneity is controlled for "affects the estimation considerably". Moreover, the results showed "that controlling flexibly for unobserved attributes of state populations that are correlated with both divorce behaviour and the divorce law is crucial [...], which is made possible by using

longitudinal divorce data." In particular, Friedberg's (1998) results suggest that divorce rates "would have been about 6 percent lower if states had not adopted unilateral divorce, accounting for 17 percent of the overall increase between 1968 and 1988."

In this context, Wolfers (2006) argues that Friedberg's approach may be "misleading", as he points out that "a major difficulty in difference-in-difference analyses involves separating out pre-existing trends from the dynamic effects of a policy shock." In particular, Wolfers argues that Friedberg's approach of including state specific trends may "pick up the effects of a policy and not just pre-existing trends."

Wolfers (2006) argues that "immediately following reform, the divorce rate is likely to rise dramatically as the courts cater to pent-up demand for the new type of divorce facilitated by this change." This trend should continue as norms change and due to "slow diffusion of information about the divorce regime", which "may be reinforced by developments in a thicker remarriage market." Furthermore, in the medium run, "bad matches may be dissolved earlier, shifting the pattern of divorce across the life-cycle; differential selection into marriage will change the nature of the "at-risk" population, and so on." In this context, the author's empirical approach to this problem consists on "imposing a minimal structure on the dynamic response of the divorce rate", as the standard "difference-in-difference estimates confound these stock-flow dynamics with panel-specific trends." His results show that the spike on divorce rates after the laws were introduced lasted for about 10 years, after which no effects are observed.

In sum, the literature analyzing the effects of the introduction of no-fault divorce on divorce rates and marital decisions is extensive. However, this effect is still a matter

of debate and has not reached a consensus. The next subsection will review the literature on the relationship between divorce laws and fertility decisions.

3.2 Divorce laws and fertility decisions

The literature on divorce laws and fertility decisions is scarce.[28] Becker (1981) and Becker, et al. (1977) can be considered the seminal works on the relationship between divorce laws and childbearing decisions. In both studies the authors argue that a more flexible regulation for the dissolution of marriage lead to a reduction of the value of marriage. As a consequence, people marry less and marital fertility decreases. Moreover, people may also choose to have children out of wedlock.

Alesina and Giuliano (2007) rely on the introduction of unilateral divorce in the U.S.A. to analyze the relationship between fertility decisions and divorce laws. They point out that a more flexible divorce regulation has two possible effects on marriage and fertility. On the one hand, given the decrease in the value of marriage, fewer couples get married and, consequently, the number of children born from married couples decreases.[29] They also argue that given that marriages are less frequent, people may prefer to have children out of wedlock. The authors call this effect the "dilution" effect. On the other hand, they argue that in a more flexible divorce regulation "the cost in terms of commitment of entering the 'wrong' marriage is lower", as it is easier to dissolve the relationship. The authors label this the "commitment" effect. The authors

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[28] The literature on the effect of divorce on other topics is relatively rich. For instance, Peters (1986, 1992), Allen (1992), Zelder (1993), Weiss and Willis (1995), Friedberg (1998) and Wolfers (2006) analyse the effects of divorce laws in the United States on divorce rates. Regarding the relationship between divorce laws and women's labor supply, the literature is focused on the response of women's labor supply after divorce: Johnson and Skinner (1986), Gray (1998), Stevenson (2007). Regarding human capital accumulation, King (1982) and Stevenson (2007) analyse the effect of divorce laws on couples' investments in the education of spouses and children, as well as household specialization.

[29] According to the authors, this effect goes in line with the work developed by Becker (1981) and Becker, et al. (1977).

argue that the literature on divorce regulations has been focused on the "dilution effect" but has not given much attention to the "commitment" effect.

To analyze both effects, Alesina and Giuliano (2007) use birth certificates from the National Vital Statistics of the U.S. to calculate different measures of fertility at state level. Based on a panel of states for the period 1968-1999, they recover the impact of the introduction of unilateral divorce on state fertility rates. Their results show that the introduction of no-fault divorce is associated with a decrease of about 3 percent in the fertility rates among those states that introduced it.

When they extend their analysis from the beginning of the decade starting in 1960, Alesina and Giuliano (2007) construct a panel of state-age records based on four decades of Census data – from 1960 to 1990. In this specification, they use as the dependent variable the "number of children ever born to women age 15-44 residents in those states that adopted unilateral divorce." Their results corroborate the negative effect of no-fault divorce on fertility rates. They conclude that "as divorce becomes easier, people feel less locked in when they marry. So when women consider having children (or are already pregnant) they are more willing to 'try' marriage. Therefore out of wedlock fertility declines and marriage rates go up."

Another relevant work is developed by Drewianka (2008), who investigates the effects of divorce law on marriage, fertility and legitimacy. The author states that while most of the literature has focused on the effect of divorce laws on the divorce rate, "very little empirical work has investigated the relationship between divorce law and these family formation behaviours." Based on states' administrative data from 1950 to 2002 on marriage, divorce, births and legitimacy rates, a state level panel is constructed,

including also several state-level control variables, such as “real per capita personal income in each year and a series of demographic indicators that are linearly interpolated from the 1950-2000 census microdata.”

Drewianka’s (2008) results are based on four fertility variables: (1) the crude birth rate (births/1000 people), (2) the share of out-of-wedlock births with respect to total births, or illegitimacy ratio, (3) the marital birth rate (marital births/1000 people), and (4) the nonmarital birth rate (nonmarital births/1000 people). Based on several specifications, the author finds that no-fault reforms decreased total birth rates by about 2 to 4 percent.

An additional contribution of this investigation is the dynamics behind the effect of the unilateral divorce regulations on fertility rates. The author argues that “the effects of unilateral divorce seem to grow with the duration of the law, especially in the case of nonmarital births.” In the case of no-fault regulations, the author adds that the trend is also increasing over time, although it is not as dramatic as in the case of the effect of unilateral divorce.

3.3 Divorce laws and women’s labor supply

The economic literature focused on the relationship between marital choice and women's labor supply is extensive. However, most of the work is focused on showing how women's labor supply changes when divorce occurs.

Using a sample of individuals who separated or divorced during the period they are observed on the Michigan Panel Study of Income Dynamics (PSID), Johnson and Skinner (1986) investigate the impact of marital separation on men’s and women’s labor supply. The authors find that “the average labor supply of women rose from 1024 hours

one year before the split to 1551 hours for years following the separation". However, they also find evidence that "much of the total increase in female hours of work associated with the divorce occurred *before* the separation". Based on these two facts, they argue in favor of two possible interpretations. One the one hand, women "may respond to a higher probability of divorce by working to gain job experience", which leads to an increase in her hours of work. On the other hand, they sustain that "an increase in labor supply could raise the probability of divorce, so that women who had recently worked more hours would be overrepresented in the sample of divorced families." To identify these effects, they proposed a theoretical and empirical model which simultaneously determines labor supply and divorce probabilities.

Johnson & Skinner's (1986) empirical findings suggest that a higher chance of getting divorced may lead women to work more hours, while no evidence supports the effects of labor force participation on the probability of getting divorced. In their model, a dummy variable indicating if the individual's state of residence allows unilateral divorce is included. However, their results show no significant differences between the two divorce regimes in terms of labor supply or divorce probabilities.

Gray (1998) argues that the introduction of unilateral-divorce laws in several states of the U.S. "has led to changes in the frequency and size of divorce settlements." This implies that these laws have an effect on the way family assets are distributed between the spouses when the marriage is terminated, which can be understood as "an exogenous and unexpected shift in the unearned income of each spouse." Using this exogenous change on income along with the variation in the implementation of these

laws along different states of the U.S., the author examines the impact of divorce laws and the laws governing property division in women's labor-force participation.

Based on three data sources (Current Population Survey (CPS), the 1/1000 Pulic Use Micro Sample of the United States Census of Population and Housing (Census), and the Panel Study of Income Dynamics (PSID)), Gray (1998) produces three main findings. Two of them are related to women's labor supply and demonstrate that exogenous changes in their potential income, due to the introduction of property laws that accompanied divorce laws, may affect their participation in the labor market: (1) women who benefited from the "reassignment of property rights increased their labor supply and wives who were disadvantaged decreased their labor supply, relative to married women who did not face a redistribution of marital property rights"; and (2) the variation in wives' labor supply mainly reflects "changes in their home-production hours rather than changes in their consumption of leisure." However, in terms of the probability of getting divorced, the author concludes that it is not affected by the reassignment of property rights introduced by divorce laws, and claims that this result is consistent with the Coase theorem.[30]

Stevenson (2007) addresses this issue and starts by reviewing Gray's (1998) results. Stevenson starts by questioning Gray's (1998) conclusion about the effect of the assignment of property rights on divorce rates and argues that these findings are the consequences of omitted variable bias. The author argues that "divorce laws change the value of exiting the marriage" and if the pertinent threat point is the threat of terminating

[30] The Coase theorem states that under the existence an externality, the full allocation of property rights guarantees that economic efficiency is always achieved. Gray (1998) argues that, if the spouses are able to make transfers between them, the rates of couples getting divorce in states allowing unilateral divorce should not be different from states that do not.

the marriage, bargaining within the household is changed. Under a context of mutual consent, the author continues, “the relevant exit threat is to physically [...] leave the marriage”, which leaves no chance of remarrying or “legal claim to a share of the couple’s joint assets.” However, under a no-fault divorce regime there may be a more appealing outside option, consequently “changing the resulting bargain inside the marriage, with bargaining power being redistributed toward those for whom unilateral divorce provides a credible threat to exit the marriage”. In this context, and unlike Gray’s (1998) argument, laws regarding the division of property “do not uniquely determine which spouse has a higher value of exiting the relationship”. Stevenson therefore proposes that “the empirical question is whether the transfer of bargaining power subsequent of unilateral divorce laws varies by gender and by property division laws for those couples for whom the exit threat is relevant”.

After replicating Gray’s (1998) results, Stevenson (2007) adds further controls for “state level time-varying factors”. The results suggest that unilateral divorce had a positive effect on female employment, an increase of 1 percentage point, and that this effect was similar across different regimes of division of property at divorce. Another important finding of this investigation is related to the timing of the effect of the divorce laws on women’s labor force participation. Based on a sample of 25 years, Stevenson finds that the increase in “female employment for both married and unmarried women following unilateral divorce” reaches its maximum 5 years after the introduction of unilateral divorce and “remains about 2 percentage points higher than that in states that did not adopt unilateral divorce”.

In conclusion, the economics literature studying the relationship between divorce laws and women's labor supply has not reached consensus on the direction or existence of the effect. Moreover, this part of the literature has also introduced new topics of analysis, as the effects of property rights and the duration of the effects, which need further investigation. In the next subsection, I will analyze the economics literature focused on the effects of divorce laws on educational attainment.

3.4 Divorce laws and investment on spouse's education

On this topic, I have found a vast amount of literature showing how women's education affects marital outcomes. However, the literature showing how divorce laws affect a couple's investment in the human capital of spouses is not as extensive.

King (1982) provides an interesting theoretical model showing how risk of divorce may affect family investments in each partner's human capital. A more recent work by Stevenson (2007) shows how the introduction of unilateral divorce in the decade of 1970s may have decreased couple's investment on spouse's education, children, and household specialization.

The previous investigations open interesting topics that deserve to be analyzed. In the next subsection, I present the literature on the long run effects of divorce laws.

3.5 Divorce laws and long run effects

Gruber (2004) relies also on the variation across states in the U.S. and over time in changes in divorce regulations to identify the long run effects of the implementation of unilateral divorce. His findings suggest that children who grew up exposed to unilateral

divorce are more likely to live with divorced parents. Moreover, the author argues that, as these children grow up, they are less likely to attain higher levels of education and have a high family income. The author attributes this to an early marriage, a larger number of children, and a reduced labor-force attachment by women. Additionally, the author argues that children exposed to these regulations are also more likely to commit suicide.

Gruber (2004) claims that the evidence supports the hypothesis that unilateral divorce has a negative effect on children's living standards. The mechanism he proposes is based on the fact that at younger ages many mothers stay at home with children rather than work. This channel leads the author to the following question: what are the welfare effects of an earlier family formation that results in a reduction in a mother's labor supply? According to Gruber the answer could be addressed by studying the children of those adults who grew up under the unilateral divorce regulation. In this particular topic, further research is required.

3.6 Concluding remarks

The effects of divorce laws have been widely studied in the economics literature based on the geographical variation in the introduction of unilateral divorce in the United States. Before the law change divorce was possible, although it required that one of the spouses committed a fault. The introduction of divorce in Chile in 2004 provides a more drastic change, going from the absence of divorce to the most flexible way of terminating a marriage. Therefore, the DL provides an alternative and clearer change to the analysis of divorce laws.

The literature on the effects of divorce laws on fertility decisions is scarce and it has focused on the effects of divorce on fertility rates. Indeed, fertility rates are important at an aggregate level; however, these measures do not allow a full exploitation of the individual's characteristics that determine child-bearing decisions. The overall fertility rate in Chile has decreased from 2.09 to 1.9 births per women between 2003 and 2010,[31] and it is possible that the introduction of the DL in 2004 may partially explain this trend. However, the nature of the newly introduced DL and the monetary compensation regime provides a useful framework to analyze the timing of first births based on individuals' characteristics, which, to my knowledge, has not been studied,[32] In the next section I present a descriptive analysis based on administrative data on first births.

4. Descriptive Analysis

The evidence presented in the previous section suggests the following:

(1) After the DL, there is a fall in the average age at which women have their first child (see Figure 1.2).

(2) The number of first births and first marriages slightly increases after the DL was approved (see Figure 1.1).[33]

In this section I use the Vital Statistics Report (*Estadisticas Vitales*) produced annually by the National Institute of Statistics (*Instituto Nacional de Estadísticas* – INE).

[31] CIA World Factbook (https://www.cia.gov/library/publications/the-world-factbook/geos/ci.html).

[32] Moreover, the economics literature on the particular case of the Chilean DL is almost non-existent. To my knowledge, the only study analyzing the Chilean DL was developed by Heggeness (2009). The author analyses the effect of this law on children's education enrollment using a difference-in-difference approach, in which children from couples that were married before and after 2004 are the treatment group, and children from couples who were living together before and after 2004 were the control group. The evidence provided by this investigation suggests that the DL increased school enrollment among children from married couples.

[33] These facts may be subject to revision in the future, when the DL would have been in place for longer.

The Vital Statistics Report provides administrative records of marriages and births in Chile, stratifying by several socioeconomic variables. The Civil Registry of the local government is responsible for collecting information on marriages, while the Ministry of Health collects the information on births. I will first analyze the distribution of first births by women's age cohort. I will follow with the distribution of first births by women's educational attainment. Finally, I will present my concluding remarks.

4.1 First Birth Rates by Women's Age Cohort

Table 4.1 shows the age distribution of first births by women's age group and marital status. According to the INE, almost 96,000 women gave birth to their first child in 2003 (See the First Panel in Table 4.1). Of these women 33 percent (31,622) were between 20 and 24 years old. There are more than 110,000 women who give birth to a first child in 2007, and 31.2 percent (35,220) of women were between 20 and 24 years old. Therefore, the contribution of this cohort to first childbirths in Chile remains relatively stable. There is a slight decrease in the contribution of women in older cohorts, as well as an increase in the contribution of women who are between 15 and 19 years old.

Table 4.1 Distribution of First Births by Women's Age Group and Marital Status

	1999	2000	2001-2002*	2003	2004	2005	2006	2007	2008
Total									
Less than 20	0.342	0.343	-	0.320	0.320	0.322	0.346	0.327	0.330
20 to 24	0.324	0.319	-	0.330	0.330	0.319	0.313	0.322	0.318
25 to 29	0.204	0.206	-	0.198	0.193	0.187	0.183	0.191	0.194
30 to 34	0.091	0.091	-	0.107	0.111	0.112	0.109	0.111	0.110
35 to 39	0.033	0.033	-	0.037	0.037	0.045	0.039	0.039	0.039
More than 39	0.006	0.007	-	0.009	0.009	0.015	0.010	0.009	0.009
Married									
Less than 20	0.141	0.131	-	0.094	0.083	0.074	0.076	0.060	0.058
20 to 24	0.323	0.313	-	0.286	0.275	0.260	0.252	0.249	0.232
25 to 29	0.332	0.345	-	0.345	0.342	0.329	0.335	0.347	0.355
30 to 34	0.152	0.157	-	0.209	0.226	0.236	0.249	0.251	0.263
35 to 39	0.045	0.045	-	0.056	0.063	0.078	0.072	0.077	0.078
More than 39	0.007	0.009	-	0.011	0.011	0.023	0.015	0.015	0.013
Single									
Less than 20	0.457	0.456	-	0.415	0.409	0.408	0.429	0.405	0.404
20 to 24	0.325	0.323	-	0.348	0.351	0.339	0.331	0.343	0.341
25 to 29	0.129	0.132	-	0.137	0.137	0.138	0.137	0.146	0.151
30 to 34	0.056	0.057	-	0.064	0.068	0.069	0.066	0.070	0.069
35 to 39	0.026	0.027	-	0.028	0.027	0.034	0.029	0.028	0.028
More than 39	0.006	0.007	-	0.008	0.008	0.012	0.009	0.007	0.007

Source: National Institute of Statistics - Government of Chile, Estadisticas Vitales 1999-2008

* No data available for 2001 and 2002

If we focus on married women (Table 4.1 – Second Panel) the contribution of the two youngest cohorts (less than 20 and 20 to 24 years old) decreases after 1999. This is not the case for the 25-to-29 year-old cohort: after a decrease from 33.2 percent in 1999 to 32.9 percent in 2005 the contribution of this cohort recovers to 35.5 percent in 2008. The contribution of women in the 30-to-34 year-old cohort shows a steady increase in the period from 1999 to 2008. Different trends are observed for single women (Table 4.1 – Third Panel). For instance, the contribution of single women in the 20-to-24 year-old cohort increases from 32.5 percent to 35.1 percent between 1999 and 2005 and then decreases to 24.1 percent in 2008. For single women between 25 and 29 years old, the contribution increases steadily between 1999 and 2008, while the contribution of the oldest age cohorts remains relatively stable.

In Table 4.2, I calculate the difference in differences for the share of first births in Table 4.1. For each year after the DL was approved (2004), I take the difference between the contribution of the older cohorts and the contribution of the group of women between 20 and 24, and compare these differences against the respective difference in the year 2003 (one year before the DL was passed).[34] The positive signs suggest that the effect of the DL on first births is positive for older women; this is in line with the delay in first birth shown in Figure 1.2. In Panel I of Table 4.2 the effect goes from 0.01 percent in 2005 to 0.8 percent in 2008 for women between 25 and 29. The effect is also positive for women between 30 and 34. However, for women between 35 and 39 years old the effect is negative, decreasing from 1.9 percent in 2005 to 1.5 percent in 2008.

[34] See the note at the end of the Table

In the Panel II of Table 4.2 I consider the difference in differences for first birth rates among married women. The results suggest an increasing trend for married women between 25 and 29 years old going from 1 percent in 2005 to 6.4 percent in 2008. There is also a positive effect for married women between 30 and 34 years old going from 5.2 percent in 2005 to 10.8 percent in 2008. For women between 35 and 39 years old the positive effect increases from 4.6 percent in 2005 to 7.5 percent in 2008. When focusing on single women (see Panel III) results suggest a positive trend for the youngest cohort as well, going from 1.1 percent in 2005 to 2.1 percent in 2008. However, for single women who are older than 30 years old the positive effect decreases between 2005 and 2008.

As I mentioned in Section 2, the total contribution of married couples to first births has decreased from 36.5 in 1999 to about 22 percent in 2006.[35] Regarding the increasing contribution of cohabitating women to first births, Palma (2006) suggests that 50 percent of the total out-of-wedlock births were explained by women in a cohabitating relationship; separated women and partnerless women contributed 10 and 40 percent, respectively. Therefore, it is possible that the DL had a positive effect on first birth decisions of both married and cohabitating women. In case of the latter, this effect may be related to the effect of the DL on the marriage decision.[36]

[35] See Larrañaga (2006).
[36] As I mentioned in Section 2, the 2008 Bicentenial Survey in Chile (*Encuesta Bicentenario*) suggests that 44.67 percent agree with and 17.80 are indifferent to the idea that cohabitating couples should get married once they have a first child. See Salinas (2008)

Table 4.2 Difference in Difference of First Births by Women's Age Group

	2005	2006	2007	2008
Panel I - Total				
25 to 29	0.000	0.002	0.001	0.008
30 to 34	0.017	0.020	0.012	0.016
35 to 39	0.019	0.020	0.010	0.015
Panel II - Married women				
25 to 29	0.010	0.024	0.039	0.064
30 to 34	0.052	0.074	0.079	0.108
35 to 39	0.046	0.049	0.057	0.075
Panel III - Single women				
25 to 29	0.011	0.017	0.013	0.021
30 to 34	0.015	0.019	0.011	0.012
35 to 39	0.015	0.017	0.005	0.007

Source: National Institute of Statistics – Government of Chile
Note: the following formula is applied:
$DD_i^y = \left(f_i^y - f_{20\,to\,24}^y\right) - \left(f_i^{03} - f_{20\,to\,24}^{03}\right)$, where y is 2005, 2006, 2007 and 2008, and i corresponds to the woman's age cohort in the first column of the table.

4.2 First Birth Rates by Women's Educational Attainment

Another important factor to be considered in the analysis is the woman's educational level.[37] According to the education system in Chile, after completing the primary level (8 years) students choose between a professional track or an academic track for their secondary school (4 years).[38] The individual who chooses the professional track may opt for furthering his/her studies in a professional institute, while the individual who chooses the academic track, may opt to obtain a university degree. It is expected that by 18 years of age,[39] an individual has already completed primary and secondary education

[37] The Chilean education system suffered a major reform in 2001. The data provided by the Vital Statistics reports do not differentiate between a year of education in the old system and a year of education under the new system. Despite the changes, it is reasonable to assume that an individual with more than 12 years of education has completed at least primary and secondary education (basic education).
[38] See the General Education Law (*Ley General de Educación, Ley 20.370*), and Constitutional Organic Law of Education 1990 (*Ley Orgánica Constitucional de Enseñanza, LOCE, Ley 18.962*).
[39] The General Education Law (*Ley General de Educación, Ley 20.370*) guarantees that every student who is 18 years old or younger has access to basic education (primary and secondary levels). However,

(basic education) and already started post-secondary education (in a professional institution or university).[40]

Between 1997 and 2008, women who have between 10 and 12 years of education (about to complete or very close to completing basic education) provide the largest contribution to first births in Chile. Moreover, their contribution in the period 1997-2008 increased from 48.5 percent to 55.3 percent. A similar trend is observed among women who have completed basic education and continued studying. Their contribution increased from 21.4 percent in 1997 to 29.8 percent in 2008. This is not the case of women who attained between 7 and 9 years of education: their contribution decreased from 22 percent in 1997 to 13 percent in 2008.

In Table 4.3 I disaggregate the contributions of each education group according to the women's age cohorts. In general, the contribution to first births of women who have no education is almost insignificant, varying between 0.2 percent in 1997 and 0.1 percent in 2008. The largest contribution within this group is provided by young women: almost 90 percent comes from women younger than 29 years old.

The contribution to first births of women who completed between 1 and 9 years of education (not completing basic education) is led by the youngest age cohorts. In particular, during the period between 1997 and 2008, the contribution of women younger than 20 and in the 20-to-24 year-old cohort was larger than 60 percent, usually led by the youngest group.

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individuals older than 18 who have not been able to complete the basic education levels may attend special private programs which are subsidized by the State (for instance, *ChileCalifica*).

[40] Idem.

Compared to less educated women the trend among women who have completed between 10 and 12 years of education (completed or about to complete basic education) seems different. In the period between 1997 and 2004, the contribution to first births of the 20-to-24 year-old cohort was larger than the contribution of the youngest cohort. However, in 2005 (one year after the DL was approved), this difference disappeared and the contribution to first births of women younger than 20 years old was equivalent to the contribution of women in the 20-to-24 year-old cohort. It should be noted that the contribution of women who completed between 10 and 12 years of education increased from 48.5 percent to 55.3 percent of total first births in Chile during the period 1997-2008.

In the case of women who completed 13 years of education or more (completed the basic education or continued into post-secondary levels), the largest contribution is provided by women who are between 25 to 29 years old, followed by women in the 20-to-24 year-old cohort. However, it should be taken into account that the contribution to first births of these highly educated women is only 25 percent of first births in Chile, which is as half as much as the contribution of women who have completed only between 10 and 12 years of education.

Table 4.3 Distribution of First Births by Woman's Educational Attainment and Age Cohort

Years of Education	1997	1998	1999	2000	2001/02*	2003	2004	2005	2006	2007
No education	**0.002**	**0.002**	**0.002**	**0.002**		**0.001**	**0.001**	**0.002**	**0.001**	**0.001**
Less than 20	0.333	0.274	0.204	0.276	-	0.266	0.221	0.235	0.225	0.266
20 to 24	0.243	0.235	0.288	0.286	-	0.266	0.265	0.167	0.265	0.291
25 to 29	0.195	0.207	0.229	0.141	-	0.165	0.124	0.080	0.147	0.215
30 to 34	0.105	0.179	0.192	0.168	-	0.115	0.177	0.136	0.147	0.101
35 to 39	0.094	0.095	0.075	0.108	-	0.158	0.133	0.222	0.118	0.114
40 and more	0.030	0.011	0.013	0.022	-	0.029	0.080	0.160	0.098	0.013
1 to 3	**0.009**	**0.009**	**0.007**	**0.006**		**0.005**	**0.004**	**0.006**	**0.003**	**0.002**
Less than 20	0.426	0.430	0.430	0.464	-	0.396	0.420	0.257	0.356	0.351
20 to 24	0.230	0.236	0.244	0.230	-	0.283	0.288	0.219	0.242	0.287
25 to 29	0.131	0.132	0.132	0.136	-	0.133	0.122	0.130	0.126	0.177
30 to 34	0.115	0.114	0.114	0.086	-	0.088	0.085	0.123	0.110	0.087
35 to 39	0.066	0.062	0.054	0.068	-	0.062	0.054	0.159	0.120	0.083
40 and more	0.031	0.025	0.026	0.017	-	0.039	0.031	0.111	0.046	0.015
4 to 6	**0.070**	**0.066**	**0.060**	**0.046**		**0.035**	**0.032**	**0.030**	**0.024**	**0.021**
Less than 20	0.509	0.536	0.526	0.535	-	0.485	0.498	0.418	0.501	0.475
20 to 24	0.270	0.250	0.250	0.239	-	0.253	0.248	0.195	0.191	0.247
25 to 29	0.120	0.114	0.117	0.111	-	0.128	0.110	0.133	0.108	0.116
30 to 34	0.064	0.064	0.066	0.068	-	0.066	0.079	0.094	0.086	0.085
35 to 39	0.030	0.029	0.031	0.038	-	0.053	0.044	0.103	0.072	0.054
40 and more	0.008	0.007	0.010	0.009	-	0.014	0.021	0.058	0.041	0.023
7 to 9	**0.220**	**0.218**	**0.207**	**0.200**		**0.163**	**0.155**	**0.151**	**0.153**	**0.141**
Less than 20	0.598	0.616	0.622	0.630	-	0.651	0.660	0.653	0.724	0.703
20 to 24	0.249	0.236	0.232	0.221	-	0.208	0.199	0.173	0.151	0.180
25 to 29	0.090	0.085	0.085	0.083	-	0.075	0.076	0.069	0.058	0.059
30 to 34	0.042	0.041	0.038	0.040	-	0.039	0.040	0.049	0.037	0.033
35 to 39	0.018	0.017	0.019	0.019	-	0.021	0.019	0.036	0.021	0.017
40 and more	0.004	0.004	0.004	0.006	-	0.007	0.006	0.019	0.009	0.007
10 to 12	**0.485**	**0.487**	**0.497**	**0.520**		**0.541**	**0.543**	**0.545**	**0.544**	**0.551**
Less than 20	0.316	0.332	0.345	0.353	-	0.348	0.355	0.368	0.392	0.378
20 to 24	0.414	0.407	0.394	0.387	-	0.401	0.401	0.387	0.377	0.385
25 to 29	0.166	0.161	0.162	0.164	-	0.160	0.154	0.148	0.144	0.151
30 to 34	0.071	0.067	0.067	0.063	-	0.061	0.061	0.061	0.057	0.059
35 to 39	0.026	0.027	0.027	0.027	-	0.025	0.023	0.027	0.023	0.022
40 and more	0.006	0.005	0.005	0.006	-	0.006	0.006	0.008	0.007	0.006
13 and more	**0.21**	**0.22**	**0.23**	**0.23**		**0.25**	**0.26**	**0.27**	**0.28**	**0.28**
Less than 20	0.029	0.028	0.028	0.027	-	0.029	0.030	0.034	0.032	0.036
20 to 24	0.339	0.308	0.278	0.267	-	0.270	0.276	0.279	0.286	0.278
25 to 29	0.397	0.419	0.429	0.431	-	0.370	0.353	0.341	0.337	0.341
30 to 34	0.174	0.182	0.197	0.207	-	0.252	0.258	0.253	0.255	0.253
35 to 39	0.052	0.052	0.058	0.057	-	0.067	0.071	0.075	0.076	0.080
40 and more	0.010	0.010	0.010	0.010	-	0.012	0.012	0.017	0.014	0.013

Source: National Institute of Statistics - Government of Chile, Estadisticas Vitales 1999-2008

* No data available for 2001 and 2002

In Table 4.4 I calculate the difference in differences of the share of first births by women's educational attainment using the rates in Table 4.3. For each year after the DL was passed (from 2004), I take the difference between the contribution to first births of

highly educated women (13 years of education or more) and the contribution of women who attained between 10 and 12 years of education. (who contribute about 50 percent of first births), and compare it with the difference in the contribution of the same education groups in the year 2003, which is one year before the DL was approved.[41]

The positive signs in Table 4.4 are in line with the delay in first birth shown in Figure 1.2. These results suggest that the DL has a positive effect on first births of highly educated women. Moreover, the effect increased from 0.77 percent in 2005 to 3.06 percent in 2008. This trend can be mostly attributed to women in the 25-to-29 year-old cohort, who contributed about 35 percent of first births within this education level. It should be noted that there is no distinction between married and single women in Tables 4.3 and 4.4. Indeed, it is possible that part of the positive effect for highly educated women could be attributed to cohabitating women (see Section 4.1) as they contribute about 50 percent of the births for single women.

Table 4.4 Difference in Difference of First Births by Women's Years of Education

	2005	**2006**	**2007**	**2008**
13 or More Years of Education	0.0077	0.0180	0.0199	0.0306

Source: National Institute of Statistics – Government of Chile
Note: the following formula is applied: $DD_{13}^{y} = \left(f_{13}^{y} - f_{10\,to\,12}^{y}\right) - \left(f_{13}^{03} - f_{10\,to\,12}^{03}\right)$, where y is 2005, 2006, 2007 and 2008.

4.3 Concluding Remarks

In summary, it is possible to draw some useful conclusions from the Chilean administrative data on first-child conceptions:

[41] See the formula in Table 4.4

(1) Chilean women have delayed the birth of their first child in the period between 1997 and 2008.

(2) Administrative data shows that the largest contribution to total first births in the period 1997-2008 correspond to women between 25 and 29 years old. According to the administrative data, the largest contribution to total first births in the period 1997-2008 corresponds also to women who have completed between 10 and 12 years of education. These are women who were about to complete or completed the basic education levels.

(3) The delay in women's first-child conception is clearly related with a higher level of education. According to the administrative data, the delay is larger among more educated women, in particular among those women who have at least completed the basic education levels (13 or more years of education).

(4) A simple difference in differences using administrative data reveals:

   (i) A potential positive effect on first births of women who attained 13 years of education or more. This may not imply a change in trends in Chilean society, but it may suggest a temporal effect.

   (ii) This positive trend in the effect is clearer among the group of women who contributes more to first-child conceptions in Chile.

It should be noted that the administrative data does not distinguish between planned and unplanned pregnancies. The latter are a matter of public health concern,[42] and for the purpose of this essay it is important to exclude them from the analysis.

[42] See See Diaz, S. "*Información Sobre la Situación de la Planificación Familiar en Chile*". *Instituto Chileno de Salud Reproductiva.*

However, it is reasonable to assume that most births from women who are 19 or younger are unplanned given that these women:

(i) Contribute about 97 percent of first births from mothers who attained 12 years of education or less,

(ii) Contribute about 40 percent of first births from single mothers, and

(iii) Most under-age pregnancies are related to school dropouts.[43]

The conclusions presented in this section do not change when excluding from the analysis the contribution of women 19 or younger to first births. Therefore, the evidence presented so far suggests that the DL may contribute to the delay in first births. As I mentioned in Section I, if the marriage should fail, the presence of a child would increase the costs of divorce due to custody and child support issues. Highly educated women may be able to afford the additional cost in case of a divorce, while low educated women may wait to see if a relationship succeeds before having the first child. In the next section I will focus on the timing of this decision based on a hazard model of first births.

5. Time to First Birth: Hazard Analysis

The estimation of the hazard of first births raises several empirical issues that must be considered. In duration data it is not always possible to observe the occurrence of the event of interest. In the particular case of first births, some women have a first child during the period they are observed, but others do not. It would be inaccurate to discard the childless women from the analysis given that they can contribute useful information. At the same time, these women cannot be treated as women who give birth to a child. Relevant work on this topic applying hazard analysis has been developed by

[43] See Molina et.al (2004).

Newman and McCulloh (1984). The authors argue in favor of hazard analysis in the study of the timing of births. They point out that hazard analysis "uses all available information and corrects for censoring bias without generating selectivity bias". Kravdal (2001) studies the duration of second and third birth intervals in Norway. Li and Choe (2001) study second birth intervals in China, where the "one-child" policy creates disincentives for couples to have a second child. In this context, I include the DL in the hazard model to find if this policy had an effect on women's hazard of having a first child.

5.1 Data: The Social Security Survey (EPS)

I use the Social Security Survey (*Encuesta de Previsión Social* - EPS) panel 2002-2009.[44] This data provides 8,126 birth histories as of the date of the interview for each woman in the sample. I start each woman's birth history at the age of 18 and focus on women who turned 18 in 1980 or later (3,866 women). At this age, individuals are defined as adults by law, they are supposed to have completed primary and secondary education,[45] and they are allowed to fully enter the labor force.[46] If a woman conceived a child before 18, she is excluded from the sample, as most likely the pregnancy was unplanned.[47] Each birth history is terminated when the woman conceives her first child

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[44] The original sample was collected in 2002. The wave of 2004 added around 3,000 new individuals to the sample, while the waves in 2006 and 2009 updated the individuals' information.

[45] In 2003 the Government modified the Constitution so that the State would extend the guarantee of free access to secondary education (in addition to primary) to people up to 21 years old (the previous limit was 18).

[46] According to the Ministry of Labor and Social Protection, in urban areas, 5 percent of children between 5 and 17 years of age were working by 2002. This figure increases to 8.3 in rural areas. In fact, the Chilean legislation considers that a child can enter the labor force at age 15 under special conditions (the Law No. 19.684 of the Labor Code).

[47] As I mentioned in Section 4, administrative data suggest that most pregnancies of women who are 19 years old or younger are most likely unplanned [See the *Vital Statistics Report* (INE)]. Despite improvements in access to contraceptive methods between 1990 and 2005, the number of adolescent pregnancies has increased significantly and they have become a matter of public health concern as most of

(2,820 women), or when she is no longer observed in the data - right censored observations (1,046 women).

I limit the sample to women who were 18 in 1980 or later for two reasons. First, the political changes in Chile during the decade of 1970 have left deep marks in society. The people who were born before the coup d'état of 1973 grew up under significantly different circumstances from the people who were born in the late 1970s or after. Therefore, the decision of having a first child may have been affected by characteristics that are not possible to recover. Second, women who were 18 years old before 1980 turned at least 42 years old when the DL was passed (2004), which implies that these women are at the end of their fertility period.

Each observation in the sample is a woman's birth history; for each observation or duration, individuals' characteristics remain constant during the woman's birth history. Given that birth histories start when the woman turns 18, the covariates are intended to recover individual characteristics that may influence the 18-year-old woman's decision of when to conceive her first child. The DL, however, is included as a time-varying covariate. If the woman conceived her first child before November 2004 (when the DL was approved), her birth history is not affected by the DL. But if the woman conceives her first child after the DL was approved, the DL affects the spell. Therefore, the DL divides the duration of the spell into two intervals. The duration of these intervals depends on when the spell starts and ends with respect to the DL.

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these end up in backstreet abortions (See Diaz, S. "*Información Sobre la Situación de la Planificación Familiar en Chile*". *Instituto Chileno de Salud Reproductiva*).

5.2 The DL and Women's Expected Level of Education

As mentioned before, the DL may have one of two possible effects. The first effect is the delay of the first birth. Women who would not be able to bear the additional costs attributed to child support and custody in case of a divorce may wait and see if the relationship succeeds. Therefore, less educated women will have fewer incentives to have the first birth relative to more educated women. The second possible effect is due to the monetary compensation. The DL may create incentives for women with lower levels of education to have the first child at an early age, as they would be entitled to more compensation in case of a future divorce.

To recover the effect of the DL, based on the woman's expected education I estimate the following equation:

$$\ln h(t) = \gamma_0 T(t) + \gamma_1 T80(t) + \gamma_2 M(t) + \beta_w W + \beta_E E + \delta DL(t) + \varphi E \cdot DL(t) \tag{1}$$

where $\ln h(t)$ is the log-hazard of first birth at time t. The term $T(t)$ represents the baseline hazard duration dependence, which is a piecewise-linear spline. $T80(t)$ is a piecewise-linear spline that provides a time trend with 1980 as the origin.[48] This spline captures the effect of the decrease in fertility rates observed in the administrative data.

The term $M(t)$ represents a piecewise-linear spline for the number of years since the woman first married or started cohabitating (t_m).[49] The point of origin t_m is calculated as 18 - age at first marriage/cohabitation. Therefore t_m takes a negative value

[48] As the sample includes only women who were 18 in 1980 or later, the duration has 1980 as point of origin.

[49] It is not possible to identify the exact duration of marriages or cohabitating relationships in the data as the survey does not collect this information until 2009. However, it should be taken into account that less than 18 percent of the women in the sample report having terminated a first marriage (through separation or annulment) or cohabitating relationship. Moreover, only 11.5% of the women who were not single had more than one marital or cohabitating relationship.

if the marriage/cohabitation starts after the woman was 18. This indicates that the first relationship starts in $|t_m|$ periods from 18. Take into account that less than three percent of married/cohabitating women in the sample (53 women) started the relationship before reaching 18 years of age. For these cases, I assume that they got married at age 18. Also, notice that the point of origin of this duration, t_m, provides information on the delay in first marriages observed in the administrative data (See Figure 1.2).

The variable W represents the woman's socioeconomic characteristics. These variables are time-invariant. I include a set of dummy variables indicating the attained education level of the woman's father and mother. I also include a dummy variable indicating if the woman has always lived in the same household where she was born.

The variable E represents the woman's potential education. The EPS provides the highest educational level attained by the woman. Therefore, it is not possible to know exactly in which level she was enrolled when she was 18 years old unless she is interviewed at that age.[50] However, for the purposes of the woman's birth decisions at 18 years old, it is not necessarily important to know the exact education level she was enrolled in when she was that age, but her educational attainment. Around 92 percent of the women included in the sample are no longer attending an education institution by the time they were first interviewed (89.6 were no longer attending and 2.4 percent stopped attending during the period 2002-2009). For women in this group I consider the highest education level they report as the education level they completed before turning 18 or as their potential education level at 18 if they furthered their studies to technical, professional or university degree.

[50] Only 0.23 percent of the female sample in the EPS 2004 is 18 years old.

However, 7.9 percent of the women in the sample report attending an education institution in at least one of the EPS interviews (1.3 percent attended continuously while 6.6 percent attended with interruptions). For women in this group the potential level of education attained will differ from the actual level reported in the survey as it is possible that the woman will continue studying.[51] Therefore, to construct the expected education level for women who are still attending an education institution I assume the following:

(i) For women who are 18 years old or younger and who are attending a basic education institution, I assume that they will complete basic education;

(ii) For women who are 18 years old or younger and who are enrolled in the last year of basic education and who report attending an education institution on every wave of the EPS, I assume that they will complete the corresponding track of post-secondary studies; and

(iii) For women who are older than 18 and who report attending a post-secondary education, I assume that they will complete the track they are enrolled in.

The variable of interest is the DL, which is included as a time-varying covariate, $DL(t)$. When the DL indicator becomes "active" it will produce a parallel shift in the hazard. The hazard attributed to the DL will remain constant during the duration of the interval.[52] Notice that the length of these intervals is not the same for all women in the sample. As I mentioned before, the DL divides each spell into two intervals. The

[51] It should be taken into account that the regular education system guarantees free access to primary and secondary levels to students up to 18 years old. Older students may opt to complete the basic education levels through special programs implemented by the Government.

[52] It is possible to include the DL as a duration spline with a point of origin in November 2004. This allows the hazard explained by the DL to vary along time. This also allows analyzing the duration of the effect of the DL. For instance, Gray (1998) analyzes the duration of the effect of unilateral divorce laws in the US, focusing on labor force participation.

coefficient of the interaction of $DL(t)$ with the education variables E provides the effect of the DL on the hazard of first births for highly educated women.

Equation (1) follows the specification in Lillard, et.al (1996). The estimates are obtained using *aML* software.[53] Table 4.1a presents the coefficients and marginal effects for the estimation of equation (1). In panel A the education indicator E is a dummy variable for all women with some university or any higher level of education (base category: women who attained post-secondary technical/professional education or any basic education level). In panel B the education indicator E is for women with university degree or any higher level of education (base category: women with some university, professional/technical career, or any lower level of education).

The first spline in the model is for the woman's age.[54] The estimates suggest an inverted u-shape in the hazard between the woman's 18th and 24th birthday, although the estimates are not significant. After the 24th birthday, the hazard decreases about 4.67 percent every year until the 35th birthday. After this age, the estimates suggest a larger decrease: the new hazard is about 0.81 times the baseline hazard. The estimates are similar in both specifications.

The decrease in overall fertility rates observed in Chile is recovered by the time trend. The estimates suggest a clear negative slope after 1990 in both specifications. The estimates in panel A suggest that between 1990 and 2000 the hazard decreases by 1.7 every year (2 percent in panel B). After 2000 the hazard decreases at a much higher rate.

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[53] Lillard, L., Panis, C. 2003. aML Multilevel Multiprocess Statistical Software, Version 2.0. EconWare, Los Angeles, California.

[54] Figure I.B.1 in Appendix I.B shows the baseline duration for the specification in panel A. Figure I.B.2 shows the baseline duration for the specification in panel B.

Table 4.1a Hazard of First Births – Women's Attained Education

		(A) Incomplete University or more		(B) Complete University or more	
		Coefficient	exp(Coef.)	Coefficient	exp(Coef.)
Splines					
Woman's age	18-19	0.2095	1.2331	0.2068	1.2297
		(0.1414)		(0.1414)	
	20-24	-0.0159	0.9842	-0.0137	0.9864
		(0.0149)		(0.0149)	
	24-35	-0.0467 ***	0.9544	-0.0445 ***	0.9565
		(0.0106)		(0.0106)	
	35 or more	-0.2057 ***	0.8141	-0.2045 ***	0.8151
		(0.0657)		(0.0657)	
Time Trend	1980 - 1990	0.0134	1.0135	0.0131	1.0132
		(0.0121)		(0.0121)	
	1990 - 2000	-0.0168 **	0.9833	-0.0203 ***	0.9799
		(0.007)		(0.007)	
	2000 or After	-0.1654 ***	0.8476	-0.1701 ***	0.8436
		(0.0244)		(0.0244)	
Years since first marriage or cohabitating relationship	1 or less	0.2305 ***	1.2592	0.2302 ***	1.2589
		(0.0081)		(0.0081)	
	1 to 5	0.1246 ***	1.1327	0.1231 ***	1.1310
		(0.0211)		(0.0211)	
	5 to 10	-0.1871 ***	0.8294	-0.1857 ***	0.8305
		(0.0463)		(0.0466)	
	10 or more	0.0055	1.0055	0.0096	1.0096
		(0.0854)		(0.0854)	
Covariates					
Constant		-1.7416 ***	0.1752	-1.8091 ***	0.1638
		(0.1529)		(0.1525)	
DL		-0.0111	0.9890	0.021	1.0212
		(0.1818)		(0.1744)	
Education Level Attained[1]		-0.6112 ***	0.5427	-0.6650 ***	0.5143
		(0.0584)		(0.0756)	
DL * Education Level Attained		0.4924 ***	1.6362	0.7090 ***	2.0320
		(0.1879)		(0.223)	
Lives in Same Household Where Born		-0.7302 ***	0.4818	-0.7470 ***	0.4738
		(0.043)		(0.043)	
Missing - Lives in Same HH where Born		-0.1764 ***	0.8383	-0.1623 ***	0.8502
		(0.0483)		(0.0483)	
Mother's Education Complete Primary or Less		0.1132 **	1.1199	0.1360 ***	1.1457
		(0.0466)		(0.0464)	
Mother's Education Unknown		-0.0644	0.9376	-0.0458	0.9552
		(0.0905)		(0.0901)	
Mother's Education Missing		0.2079 **	1.2311	0.2270 ***	1.2548
		(0.0868)		(0.0877)	
Father's Education - Incomplete Secondary or less		0.0312	1.0317	0.0685	1.0709
		(0.055)		(0.0541)	
Father's Education Unknown		0.1114	1.1178	0.0935	1.0980
		(0.0795)		(0.0788)	
Father's Education Missing		-0.0999	0.9049	-0.1258	0.8818
		(0.0813)		(0.0821)	
Ln-L		**-15677.87**		**-15692.41**	

NOTE: Asymptotic standard errors in parentheses; Significance: '*'=10%; '**'=5%; '***'=1%.

[1] Base Category: Post-Secondary Technical/Professional or Basic Education Levels | Incomplete University, Technical/Professional Education, or Basic Education

The spline capturing the effect of the number of years since the start of the first marriage or cohabitating relationship suggests that the hazard of having a first child increases during the first year of the relationship and then decreases as the couple remains childless.[55] Similar results are observed in both specifications. During the first year of the relationship the hazard is 1.26 times the hazard at the beginning of the relationship,[56] slowing down between the 1st and the 5th year of the relationship. The hazard starts decreasing after the 5th year, with no significant change after the 10th year.

The next variables are the DL indicator, a dummy for highly educated women, and their interaction. From equation (1), The effect of the DL on highly educated women is obtained by adding the DL coefficient δ to the coefficient of the interaction of DL and the education indicator, φ.

Table 4.1b: Effect of DL on Highly Educated Women

Effect of DL on Women with :	**Some University or Higher Level**		**University Degree or Higher Level**	
	Est.	Exp(Est.)	Est.	Exp(Est.)
$\delta+\phi$	0.4813	1.6182	0.7300	2.0751
Std. Error	(0.2041)		(0.2413)	

Table 4.1b shows the effect of the DL on highly educated women calculated using the estimates in Table 4.1a. After the DL passes, the hazard of first birth for women with some university increases by 62 percent. Using the alternative measure for

[55] This spline only enters the equation when the woman started a marital or cohabitating relationship. See Lillard, L. and Panis, C. (2003), Section 13.9

[56] Although it is difficult to predict an effect on marriage decisions, the evidence suggests that the age at first birth is related to the age at which the woman got married for the first time or started cohabitating. In 2003 the number of births from cohabiting couples represented almost 50 percent of the total number of out-of-wedlock births [See Larrañaga (2006)]. Assuming that the DL generated incentives for cohabitating couples to get married, it is possible that the effect could also be observed in these couple's decision of when to have the first child.

high education, the hazard for women who completed university increases by 108 percent. These results suggest that highly educated women are more likely to have a first child after the DL. Indeed, highly educated women will be better able to bear the costs of a child in case of divorce.

Regarding other women's characteristics, the hazard of having a first child decreases for women who have always lived in the same household where they were born. The estimates in Table 4.1a suggest that the education level attained by the woman's father do not affect the hazard. However, the hazard of first birth increases for women whose mother attained primary education or any lower level. In general, I would expect that the woman's attained level of education also recovers the effect of the parent's education, assuming that low (high) educated parents tend to have low (high) educated children.[57]

5.3 The DL and Women's Potential Income

In this section I assume that an 18-year old woman is able to foresee her potential income given her expected education level and her future labor experience. To estimate the woman's potential income level I rely on the Heckman two-step procedure.[58] In the wage equation I regress the natural logarithm of hourly income on the woman's expected education and labor experience at age 25, and the square of this measure.[59] I obtain three measures of the woman's potential income based on three specifications of the selection equation. In addition to the variables in the wage equation I include (a)

[57] Ermisch, and Pronzatto, (2010) show that an additional year of parent's education increases their children's education by at least one tenth of a year.
[58] See Heckman (1979).
[59] I calculate the individual's labor experience as 25 – Years of Education – 6.

attained education of the woman's father, (b) attained education of the woman's mother, and (c) the attained education of both father and mother. [60]

I now estimate a hazard model, which includes the interaction of the DL indicator and the woman's potential income:

$$\ln h(t) = \gamma_0 T(t) + \gamma_1 T80(t) + \gamma_2 M(t) + \beta_w W + \beta_I I + \delta DL(t) + \theta I \cdot DL(t) \tag{2a}$$

where I is the woman's potential income at age 25. Table 4.2 shows the estimated hazard elasticity of the woman's potential income before (β_I) and after ($\beta_I + \theta$) the DL, based on the three alternative income measures explained above. [61] Column (a) suggests that, before the DL passed, a one percent increase of the woman's potential income is associated to reduction of 0.78 percent in the hazard of first birth. However, after the DL was passed, the hazard elasticity is not significantly different from zero. Therefore, the hazard of having a first child increases for women with a higher potential income after the DL was passed. This result is consistent with the positive effect of the DL on the hazard for highly educated women from equation (1).

Note that the results do not change significantly when the woman's potential income is predicted based on a Heckman 2-step procedure that includes in the selection equation the father's educational attainment or both father's and mother's educational attainment (column (b) and (c), respectively).

[60] Given that the goal is to predict an expected measure of the woman's income, which does not take into account whether the woman chooses to work or not, I do not include the estimate for the inverse of the mill's ratio in the prediction.
[61] See Appendix I.B, Table I.B.1, for a full set of results.

Table 4.2a: Hazard Elasticity of First Birth with Respect to Woman's Income at Age 25 – Equation (2a)

	(a)	(b)	(c)
Before DL (β_I)	-0.7831	-0.6952	-0.7438
Std. Error	(0.0541)	(0.0487)	(0.0487)
After DL ($\beta_I + \theta$)	-0.1763	-0.1619	-0.1604
Std. Error	(0.1945)	(0.1819)	(1.5999)

Measure included in the Heckman two-step to predict the woman's income measure: (a) Father's educational attainment, (b) Mother's educational attainment, (c) Mother's and father's and educational attainment.

To further investigate these results, I estimate equation (2a) adding the woman's expected education (E):

$$\ln h(t) = \gamma_0 T(t) + \gamma_1 T80(t) + \gamma_2 M(t) + \beta_w W + \beta_E E + \beta_I I + \delta DL(t) + \theta I \cdot DL(t) \tag{2b}$$

Table 4.2b shows the hazard elasticity before and after the DL for equation (2b) when the education variable is for women with (I) some university or any higher level of education and (II) and women who completed a university degree or any higher level of education. [62] Columns (a), (b) and (c) differ on the woman's potential income measure included in the specification (see note below Table 4.2b). Note that the hazard elasticity before the DL do not differ significantly from the results obtained from equation (2a). However, in this specification the elasticity after the DL becomes significant and suggests a decrease in the negative effect of income on the hazard after the DL was passed. For instance, in column (a) under specification I the elasticity of the hazard goes from -74.4 percent before the DL to -12.7 percent after the DL. Note that the hazard elasticities are larger when the education group dummy is for women with a university

[62] Table I.B.2, in Appendix I.B shows a full set of results for equation (2b).

degree or any higher level of education (II). In equation (2b), however, the estimate of β_E is not statistically significant, which suggests that the woman's income variable is recovering the effect of the woman's education. As expected, highly educated women have potentially higher income levels.

As an alternative specification (See Table I.B.3 in Appendix I.B), I include in equation (2b) the interaction of DL with the woman's expected education ($E \cdot DL(t)$). The estimates from this specification corroborate the negative effect of the woman's potential income on the hazard of having a first child. However, the estimated coefficients corresponding to the interactions terms $I \cdot DL(t)$ and $E \cdot DL(t)$ were not significant, although their sign corroborated the results presented so far.

Table 4.2b: Hazard Elasticity of First Birth with Respect to Woman's Income at Age 25 – Equation (2b)

	I			II		
	(a)	(b)	(c)	(a)	(b)	(c)
Before DL (β_I)	-0.7443	-0.6313	-0.6961	-0.8404	-0.7178	-0.7869
Std. Error	(0.0736)	(0.065)	(0.0663)	(0.0722)	(0.0639)	(0.0642)
After DL ($\beta_I + \theta$)	-0.1269	-0.0785	-0.0977	-0.2525	-0.1925	-0.2206
Std. Error	(0.0423)	(0.0366)	(0.0384)	(0.0421)	(0.0366)	(0.0383)

Note: Women's Educational Attainment: (I) Some post-secondary education or any higher level, (II) University degree or any higher level. Measure included in the Heckman two-step to predict the woman's income measure: (a) Father's educational attainment, (b) Mother's educational attainment, (c) Mother's and father's and educational attainment.

5.4 The DL and the Partner's Expected Income

The results described in the previous sections are based on women's characteristics at the age of 18, and do not take into consideration the information of a potential partner. In this section, I explore the possibility that an individual is able to foresee the characteristics of a future spouse or cohabitating partner. In this scenario, 18-year-old

women are able to consider the partner's income in the decision process of when to have a first child.

To estimate the partner's expected income I use a *Mincerian* equation. Using the EPS 2004 male sample, I regress the natural logarithm of the hourly income on education dummy variables, labor experience at 25 and the square of the labor experience measure. I use these estimates to predict the natural logarithm of the partner's hourly income at 25 years of age based on his education level and labor experience at 25. Notice that the EPS provides information about the partner's education level only in the marriage histories updated after the EPS 2006 (in the previous waves this information was not collected). However, for those marriages or cohabiting relationships that started before January 2004 (which are registered in the EPS 2002), if the woman reports having been married only once and to be still living with the spouse (58 percent of women included in the sample), it is still possible to recover the partner's educational attainment from the household members' demographic characteristics. It should be noticed that when the woman's marriage was terminated or when the woman is always single, there is no information on the partner's educational attainment and, therefore, it is not possible to obtain an estimate of the natural logarithm of the husband's income. In these cases, I assign the mean of this variable according to the partner's educational attainment.

The partner's expected income affects the woman's labor participation decision. Therefore, I predict a new measure of the woman's potential income at age 25 by including in the selection equation of the Heckman two-step procedure the partner's expected income and estimate equations (2a) and (2b) replacing I with the new woman's

income measure.[63] Table 4.3 shows the hazard elasticity before and after the DL was passed for equation (2a) and (2b). The results corroborate the conclusions obtained in the previous subsection: in the period before the DL the hazard elasticity is negative and becomes less negative after the DL was passed.

It should be noticed that the magnitudes of the hazard elasticities differ significantly from the estimates in Tables 4.2a and 4.2b. In other words, although the results lead to similar conclusions, the degree of responsiveness of the hazard depends on the assumptions behind the prediction of the woman's potential income.

Table 4.2c: Hazard Elasticity of First Birth with Respect to Woman's Income at Age 25
Selection equation of Heckman 2-step procedure includes the Partner's Estimated Income

Equation	2a	2b	
		I	II
Before DL	-0.5334	-0.4456	-0.5108
Std. Error	(0.0373)	(0.046)	(0.046)
After DL	-0.1259	-0.0013	-0.0923
Std. Error	(0.155)	(0.1611)	(0.1615)

Women's Educational Attainment: (I) Some post-secondary education or any higher level, (II) University degree or any higher level.

6. Conclusions

This investigation analyzes the effect of the new divorce law (DL) implemented in Chile in November 2004 on women's decision of when to have the first child. The new DL introduced divorce in Chile for the first time and implemented a monetary compensation regime, which benefited the spouse who decided to give up his/her personal and professional development for the good of the household. Two effects are possible. On the one hand, the presence of children increases the cost of divorce due to custody and other child support issues. Therefore, women may take into account these additional

[63] Note that under this specification I include the educational attainment for both the woman's father and mother. See Table I.B.4 in Appendix I.B for a full set of results.

costs when deciding about having a first child and may wait to see if the relationship will succeed, which is translated in a delay in the arrival of first births. On the other hand, it is possible that the monetary compensation regime offsets the opportunity costs of having a child and may create incentives for women to advance the first birth.

Using the Social Protection Survey (*Encuesta de Previsión Social* – EPS) panel 2002-2009, I construct birth histories for women who turned 18 in 1980 or later (3,688 women). The estimates obtained from a hazard model show that the DL increased the hazard of first births for women with some university or any higher level of education by 61.8 percent (108 percent for women with university degree or any higher level), after controlling for age, marital duration, decreasing fertility rates observed in Chile since the mid-1960s, and women's education and other socio-demographic characteristics. Moreover, the estimates show that before the DL the hazard elasticity with respect to a one percent increase on the woman's income at age 25 was negative. However, after the DL, the hazard elasticity is not significantly different from zero.

These results go in line with the trends observed in the administrative data. Birth records provided by the National Institute of Statistics show that between 2000 and 2003 the contribution to first births of women who completed 13 years of education or more (women who attained at least some level of post-secondary education) remained relatively stable, while between 2004 and 2008 increased from 26 to 30 percent. The trend is the same when births from women who are 19 years old or younger are excluded from the analysis given that these pregnancies most likely are unplanned.

Although the economic literature has paid attention to divorce regulations based on the introduction of no-fault divorce in the United States in the decade of 1970,

researchers have not reached a consensus regarding the effects of the introduction of more flexible laws regulating marriage on several individuals' decisions. In this context, this investigation contributes to this part of the literature. However, the results I show propose additional questions to be answered: what is the effect of the DL on women's marriage decisions? If there is such an effect, has it affected the timing at which women decide to start a marriage or a cohabiting relationship? The estimates I obtain suggest that the DL affected the hazard of having a first child for married and cohabitating couples, which leads to focus on the analysis on the effect of the DL on marriage decisions. The estimates also suggest that the longer a couple waits after getting married or starting cohabitation the chances of having a child decrease steadily until the 10th year of the relationship. Moreover, administrative data shows that the age at which women get married for the first time is still increasing after the implementation of the new civil marriage regulations. This evidence provides grounds to further the analysis of marriage histories.

Another interesting topic to explore is the anticipation effect of the new divorce regulation. Indeed, it is possible that couples may anticipate the effect of the DL given the political circumstances under which it was approved. Although it was not the first attempt to pass a new legislation on divorce and marital issues, the fact that the President was a woman for the first time and that she was supporting the reforms may have created high expectations on the public. Therefore, more research on the timing of the effect of the new law is also needed.

Chapter 2: Domestic Violence and the Duration of Marriage

Abstract

This paper examines how domestic violence affects the hazard of divorce. Psychologists have done extensive work on this topic and conclude that the relationship between marital termination and domestic violence changes over the duration of the marriage. I use a representative sample of Peru's female population between 15 and 49 years of age (Demographic and Health Survey 2005-2008) to construct 7,016 first-marriage spells for women who are currently in their first marriage or who were married only once before. Using these spells, I estimate a hazard model of divorce in which I take into account whether the woman experienced domestic violence (DV). The hazard of divorce is 2.598 times the baseline hazard after DV. When the effect of DV is allowed to change over time, the hazard of divorce is 4.3 times the baseline hazard in the first year. However, between the first and sixth year the hazard of divorce decreases about 16.1 percent every year (0.851 times the baseline hazard). These estimates are obtained after controlling for marital duration, the woman's age, parity conception during marriage, the husband's education level and alcohol consumption habits, the woman's potential income at the time of marriage and native language, as well as a set of dummy variables indicating the decade in which the marriage started.

1. Introduction.

This paper examines how domestic violence affects the duration of marriage. I use survival analysis to estimate the hazard of divorce and explore the dynamics of domestic violence (DV from now on) during marriage. The economics literature on DV is scarce,[1] due in part to the lack of reliable data. However, several economic studies focus on explaining marital outcomes, applying survival analysis to the analysis of the determinants of the divorce.[2]

The psychology literature, on the other hand, has explored the link between DV and divorce more extensively. In general, these studies conclude that DV may cause divorce. However, most of the investigations rely on data that is not representative of the population of women who may be exposed to DV. For instance, Herbert et al. (1991) and Campbell et al. (1994) use data that is collected from women who are recruited through media advertisements[3] or from women who seek help from public institutions.

In addition, most of the psychology research on DV and divorce does not include women who have not been victims of DV. DeMaris (2000) and Charles (2009) are the exception. The former finds that DV may increase the hazard of divorce, while the latter finds no relationship between these variables. To further investigate the relationship between DV and marital dissolution, I construct a hazard model of divorce based on a representative sample of women between 15 and 45 years old who are currently in their

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[1] See Pollak (2004).
[2] For instance, see Balakrishnan et al (1987), Austen (2004), and Papps (2006).
[3] For instance, see Herbert et al. (1991), Campbell et al. (1994), Lawrence and Bradbury (2001), Frye and Karney (2006).

first marriage or who were married only once before. [4] First, I include DV as a time-varying covariate. [5] In other words, the first event of DV during the marriage marks a constant change in the relationship. The second approach includes DV as a duration spline, which allows the divorce hazard to vary with the duration of DV.

The main source of data is the Peruvian version of the Demographic and Health Survey (DHS) 2005-2008. This data provides information on women's exposure to DV and socioeconomic characteristics. Given that the DHS does not include information on income, I predict the woman's hourly income using estimates obtained from a *Mincerian* equation estimated with data of the National Household Survey (*Encuesta Nacional de Hogares* - ENAHO) 2006.

The Peruvian context is useful to develop this investigation given that DV is a major problem among women who are currently married or were married before. [6] The acknowledgement of DV as a problem produced significant changes in Peruvian legislation. In 1982 the Peruvian government subscribed to the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW). Later in 1994, Peru ratified the Inter-American Convention to Prevent, Sanction, and Eradicate Violence Against Women.[7]

Most of the legislation on DV was passed during the 1990s after the creation of the Ministry of Promotion of Women and Human Development (*Ministerio de*

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[4] I will come back to this point in Section 3.
[5] As I will explain in more detail later, this approach assumes that the effect of DV on the hazard of divorce is constant.
[6] In Peru, according to the DHS 2004-2006, 41 percent of the women who are currently married or were married before have suffered physical or sexual violence.
[7] See http://www.mimdes.gob.pe/files/DIRECCIONES/DGM/dia_mujer_2010/violencia_peru_2009.pdf

Promoción de la Mujer y de Desarrollo Humano – PROMUDEH), which since 2002 is known as Ministry of the Woman and Social Development (*Ministerio de la Mujer y Desarrollo Social* – MIMDES). [8] In 1997 the Peruvian Congress modified the Penal Code to specifically address DV through the Law of Protection Against Family Violence. [9] In 2001 the MIMDES also created the National Assistance Program Against Domestic and Sexual Violence. [10] More recently, in 2005 the MIMDES approved new legislation that specified the procedures to prevent and sanction sexual harassment within its institution, [11] and in 2007 the government passed the Law of Equal Opportunities for Women and Men. [12]

The initial results I obtain from the survival analysis suggest that the hazard of divorce after DV is 2.598 times the baseline hazard (see Table 3.1). This estimate is obtained after controlling for the marriage duration, the woman's age, children conception, husband's education and alcohol abuse, the woman's potential income at the time of marriage and/or expected education, the woman's native language and the decade of marriage. This estimate increases to 4.271 when I include unobserved heterogeneity in the model (See Table 3.2).

When I allow the hazard to vary with the time since DV started, I find that during the first year of DV the hazard of divorce is 4.231 times the baseline hazard. However, between the first and sixth year since DV began, the hazard of divorce decreases at a yearly rate of 16.07 percent (about 0.852 the baseline hazard). No statistically significant

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[8] See Law No. 27050 and 27779.
[9] See *Decreto Supremo* No. 006-97-JUS and 002-98-JUS.
[10] See *Decreto Supremo* No. 008-2001-PROMUDEH.
[11] See *Resolución Ministerial* No. 746-2005-MIMDES.
[12] See Law No. 28983.

change in the hazard is observed beyond the sixth year. When including unobserved heterogeneity in the model, only the estimate for the spline during the first year after the initial aggression is significant, although the estimate for the period between the first and sixth year is still negative.

This investigation is structured as follows. In Section 2 I present a review of the research literature: first I focus on the psychology literature that studies the relationship between DV and divorce as it provides useful insights into the determinants that explain the decision to end an abusive relationship. Then I review the economics literature on DV, and present my concluding remarks on the literature. In Section 3 I present the data, the empirical strategy and discuss the results of the hazard model. Finally, in Section 4 I present my conclusions and propose further research.

2. Literature Review: DV and Marital Disruption

The relationship between divorce and DV has primarily been analyzed in the psychology literature while the economics literature has extensively focused on other aspects of marriage. At the same time, the economics literature has paid little attention to determining the causes of DV. In this section I review the literature on DV and marriage. First, I briefly review the literature on DV. I follow with the literature on the relationship between DV and marital disruption. Finally, I present my concluding remarks.

2.1. Literature on DV

Both the economics and psychology fields have studied the causes of DV. However, the psychology literature has made most of the contributions, as pointed out by Pollak

(2004). I will first review three recent papers in the psychology literature and then I will focus on the economics literature.

Recent studies in the psychology literature are Bates et al. (2004), Frye and Kamey (2006) and Charles (2009). Bates et al. (2004) use survey data, interviews and small group discussions with married women from six villages in Bangladesh to "examine the types and severity of domestic violence." The authors also analyze how women's socioeconomic characteristics may affect their vulnerability to DV within marriage. Their qualitative findings suggested that participants expected "women with more education and income to be less vulnerable to DV." Based on a logistic regression, the authors find that "women whose earnings contributed more than nominally to covering their household's expenses were significantly more likely to report violence than were women who contributed very little or none."

Frye and Karney (2006) argue in favor of the use of longitudinal data to study DV. In their work the authors "examine correlates of within-subject variability in physically aggressive behavior among newlyweds couples" to analyze "the relationship-specific and situational correlates of within couple variability in aggression over time." The authors reviewed marriage licenses from a community and posted advertisements in a newspaper to solicit participants. The couples who responded to the advertisements, attended a laboratory session and received questionnaires to be completed at home. These couples received follow-up questionnaires every six months during the first three years of their marriage.

Charles (2009) argues that there is wide debate regarding the effect of welfare reform legislation on marital outcomes. The author sustains that "marriage supporters (…) argue that marriage would dramatically decrease the child poverty rate", while marriage critics "maintain that women and children who are victims of domestic violence will be unnecessarily pressured into staying in violent relationships under the guise of 'healthy marriage' goals".

Most of the economic research on domestic violence follows a game theoretic approach based on non-cooperative household models. In line with this framework is the paper of Tauchen, Witte and Long (1991). The authors use a non-cooperative household model to include violence as a source of gratification and as an instrument for controlling behavior. They find that the equilibria in this model depend on family income. As noted by Pollak (2004), this paper may be the most serious attempt to account for domestic violence within the framework of a bargaining model of marriage.

Farmer and Tiefenthaler (1997) also follow this line of research. Their empirical results suggest that wives' income and other financial sources have a negative effect on the level of violence within a household. Farmer and Tiefenthaler (1996) explain why some battered women return to a conflictive relationship, even after using the services available to assist them (for instance, shelters). The authors argue that battered women act rationally and use these services to signal their threat points. The results suggest that support services may improve women's status, even when battered women do not terminate the relationship.

The economics literature also provides interesting approaches to specific cultural contexts, for example, Rao and Bloch (2002). Using a non-cooperative bargaining and

signaling model the authors investigate how domestic violence may be used as an instrument to extract large transfers from a spouse's family in the context of three villages in Southern India. Their empirical analysis suggests that women who pay smaller dowries suffer an increased risk of marital violence, as do women who come from richer families. It should be noticed that while Tauchen, Witte and Long (1991) find an inverse relationship between the occurrence of domestic violence and women's income, Bloch and Rao (2002) find that husband's may use violence to extract economic resources from the families of richer women. Thus, cultural factors should be taken into consideration when studying domestic violence.

Angelucci (2007) provides an interesting study based on the rural context in Mexico. In this investigation the author studies the effects of exogenous changes in wife's and husband's income on husband's alcohol abuse and alcohol-induced violence. The author does not provide a theoretical framework supporting her analysis. However, the analysis can be framed within the non-cooperative models used by the literature. The author argues that wives use higher income to reduce the husband's consumption of goods that decrease her utility. An additional result in Angelucci (2007) suggests that welfare programs may have beneficial effects in reducing alcohol dependence and domestic violence.

Other contributions from the economics literature focus on the mechanism of transmission behind DV. For instance, Tauchen and Witte (1995) provide a dynamic analysis paying particular attention to the "short term" dynamics behind DV. In line with this work is Pollak (2004). The author proposes and analyzes an intergenerational model of domestic violence, focusing on how violent behaviors are transmitted from parents to

children. It should be noticed that the model proposed by Pollak (2004) does not consider the bargaining problem approached by previous literature as his main concern is the intergenerational correlation of domestic violence. In particular, the author argues that behavioral strategies are transmitted from parents to children.[13]

2.2. DV and Marital Disruption

According to DeMaris (2000) the literature on DV and marital outcomes is not extensive.[14] In addition, most of these studies are limited by the "lack of control groups and the use of select samples of abused women, such as women in shelters or emergency rooms".[15] Indeed, this limitation does not allow generalizations based on the findings of these studies. However, most of these studies agree on the fact that DV has an effect on the woman's decision of terminating a relationship and that the process behind this decision is complex.

Herbert et al. (1991) focus their analysis on the strategies adopted by women who suffer or suffered DV to cope with the abusive relationship. They recruit 132 women through public service announcements on media services in 15 locations in Ontario, Canada. Each participant completed a questionnaire containing "standardized psychological measures and open-ended and fixed-response items developed for the purposes" of the study.

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[13] This argument is based on the literature on epidemiology of family, which recognizes multiple pathways of transmission: the spectrum goes from witnessing violence in the community to being a victim of family violence.
[14] See DeMaris (2000).
[15] See Zlotnick et al. (2006).

The authors use discriminant function analysis to "differentiate the women who were currently in a relationship with their abusive partners from those no longer involved." They conclude that "leaving an abusive relationship does not necessarily facilitate a woman's level of psychosocial adjustment", which leads the authors to argue that a woman's low self-esteem or depression does not create a trap in the conflictive relationship. They also conclude that the duration of the abusive relationship is no different in ongoing relationships from terminated relationships.

Follingstad et al. (1992) collected data on socioeconomic characteristics and DV from 234 battered women. The authors' goal is to determine the strategies followed by the victims after they were battered and the subsequent behavior of the abusive partner. The authors pay particular attention to the comparison between women who left a violent relationship and women who stayed in it given that "leaving the abusive relationship is the ultimate negative sanction." It should be noticed that most of the women included in the sample were no longer in the relationship.

Based on a multivariate regression, Follingstad et al. (1992) argue that women who terminated the relationship "were less likely to deny the negative effects of the abuse on the relationship and experienced the effect of their reaction to the first abusive incident as producing a cessation or decrease in the violence." The authors also conclude that the frequency of abuse is higher for women who were able to leave the violent relationship. In terms of the severity of the incidents, the authors argue that these women

"had a shorter duration of abuse, and experienced a shorter time lapse from first involvement to the first use of physical force than women still in the relationship."[16]

Campbell et al. (1994) analyze the change in relationship status of women who are physically abused and identify "emotional, demographic and contextual predictors of relationship status." The authors originally recruit 97 battered women and 96 women who were not battered by newspaper advertisements and bulletin board postings. In the first wave the authors collect information on DV and socioeconomic characteristics. The second wave is collected two and a half years later (114 women were interviewed). Based on descriptive statistics and a stepwise linear discriminant function analysis the authors argue that a woman who suffered DV at a certain point in time, may not suffer DV in the future. Moreover, the authors argue that peaceful relationships may become violent, disregarding the length of the non-violent period. Campbell et al. (1994) also argue that "it is also apparently possible for relationships to be violent for a brief period of time and then became non-violent."

Henderson et al. (1997) focus on the attachment patterns of women who have left a violent relationship. For this purpose, the authors recruit 63 women who were physically or psychologically abused and who left their partners. The authors collect data on DV and relationship characteristics using a questionnaire and interviews. A follow-up questionnaire is undertaken six months later. Using the information from the first interview, the authors classify the woman's attachment pattern based on four categories[17]: "secure (low anxiety and low avoidance), fearful (high anxiety and high

[16] The authors do not specify if they use a logit, probit or linear probability model.
[17] These categories were designed following Bartholomew (1990) and Bartholomew and Horowitz (1991).

avoidance), preoccupied (high anxiety and low avoidance) and dismissing (low anxiety and high avoidance).” Based on correlations between the attachment pattern and the relationship outcome, the authors find that “fearfulness is associated with longer relationships”, which suggests that “fearful” women may have more trouble terminating the abusive relationship than women showing some other attachment pattern. The authors also argue that preoccupied women may adapt more easily to separation based on the correlation between the preoccupation pattern and shorter relationship length.

During the 2000s, most longitudinal studies developed in the psychology literature show that domestic violence is a predictor of marital disruption. [18] For instance, Barnett (2000) argues that a woman’s decision to terminate a relationship depends on several factors. The author concludes that victimized women “usually do not leave their relationships the first time their partners abuse them”, and supports the argument using the study of Okun (1996).

Barnett (2000) also mentions that victimized women go through a process of change in beliefs during the abusive relationship. This process starts when the woman acknowledges that her relationship is unhealthy. Then the woman realizes that the relationship will not improve. Finally, the woman experiences DV, which leads her to give up the dream of an idealized relationship, and ends up accepting that the violence will never be over.

According to Barnett (2000), women’s “economic dependency is one of the many reflections of patriarchy and the major reason that battered women do not leave” a

[18] See Amato (2010).

conflictive relationship. Moreover, the author argues that "the American political and legal system continues to allow sexist practices that sabotage women's attempts to become economically independent in areas of income, employment and child support."

DeMaris (2000) estimates a hazard model of divorcedivorce using a sample of married and cohabitating couples of opposite sex who were observed in the first two waves of the National Survey of Families and Households (NSFH). The author constrains the sample to relationships that last less than 20 years given that "most separations and divorces occur in the earlier years of a union." The DV variables are time-invariant indicators constructed using the first-wave data. In other words, the DV information is included as part of the initial characteristics of the union, although the questions used to construct the DV indicators make reference to the year before the first wave. The estimates suggest that the hazard of divorce increases given that the man was violent, after controlling for other characteristics.

Using data on physical aggression and other socioeconomic characteristics from 56 couples who were interviewed every six months over a 4-year period, Lawrence and Bradbury (2001) show that "marital dysfunction was more common among aggressive than among non-aggressive couples and among severely aggressive than among moderately aggressive couples." [19] The authors arrive at this conclusion using questionnaires, problem- solving simulations and interviews. It should be noted that the couples included in the sample were gathered using advertisements in a local newspaper and received a payment for participating in the study.

[19] See Lawrence and Broadbury (2001).

One of the few studies that use a random sample is developed by Zlotnick et al. (2006). The authors use the first and second waves of the National Survey of Families and Households (NFHS) and compare psychosocial outcomes and divorce rates between women who have been involved in DV and women who have not. Their results indicate that 42.6 percent of the women who reported DV in the first wave of the study were no longer married or cohabitating at the time of the second wave. The authors argue that these women were "younger, had lower individual incomes, and reported more social support at wave 1." [20]

Using data from the first three waves of the Fragile Families and Child Wellbeing Study, Charles (2009) constructs relationships spells of 3,022 women with a newborn child. The initial data is collected from the mother at the hospital, right after her child's birth. A follow-up wave is collected after two years. Given that the survey does not provide information on the start date of the relationship, the author constructs the spells using the date of the interview as the start of the spell. In the same way as DeMaris (2000), the author includes DV in the hazard model as a time-invariant covariate. Charles' (2009) estimates suggest that "violence and conflict were not associated with dissolution", after controlling for other relationship characteristics. According to the author, "the lack of significance between violence and relationship stability is surprising but may be explained by" the fact that the DV variable only indicates whether the father hits or slaps the mother.

In conclusion, the psychology literature provides a large variety of approaches to analyze the relationship between DV and marital outcomes. Moreover, this part of the

[20] See Zlotnick, et al. (2006).

literature takes into consideration many qualitative factors that are mainly obtained from direct interviews or couples exercises –as the perception on the quality of a relationship. Given the limitations of the data, it is not possible to produce general conclusions. I will now briefly review the part of the literature that aims to find the causes of DV.

2.3. Concluding remarks

Although the psychology literature provides useful insights to understand the relationship between DV and relationship outcomes, it is not possible to draw general conclusions given that most empirical procedures use samples that are not representative of a particular population. Moreover, some of these studies are based on information collected from women who have requested assistance from a public institution –for instance, shelters.

This investigation builds upon the findings in the psychology literature and the survival analysis framework applied by the economics literature to analyze marital duration. In the next section I present the DHS data 2005-2008 and the empirical procedures.

3. Data and Empirical Analysis

In this section I estimate a hazard model of marital duration to analyze the relationship between DV and the woman's decision of when to terminate her first marriage. First I present the data and describe the sample used in the estimation of the hazard model. In the final section I describe the variables to be included in the analysis and discuss the results obtained from the different estimated specifications.

3.1. Data

The main source of information is the Peruvian version of the Demographic and Health Survey (DHS) 2005-2008[21]. This survey provides a random sample of about 28 thousand women and is representative of Peru's female population between 15 and 45 years of age. The use of a random sample is a significant advantage compared to previous studies on DV that are based on information provided by women who reported DV cases to authorities.[22]

The DHS includes a detailed set of questions to determine if the woman has ever been victimized by her current partner, in case she is currently married or in a cohabitating relationship, or by a former partner in case the relationship was terminated. Given that the DV section of the questionnaire makes reference to violence inflicted by the current or previous partner, I focus on the subsample of women who are currently in their first marriage (6,739) or who have been married only once (277).[23]

I do not exclude from the sample women who first married before 18 years of age (1,976 women, which represents 28.2 percent of the sample). Although the legal age for marriage is 18, the legislation allows under-age marriage with explicit authorization of

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[21] In 2008 the National Institute of Statistics (INEI) included additional clusters in the sample, which increased the size of the sample by 7,207 women. To maintain the size of the sample in each cross section, I exclude the observations from the additional clusters.

[22] For instance, see See Tauchen and Witte (1995), Farmer and Tiefenthaler (1997).

[23] Notice that I do not include women who had more than one marriage or cohabitation (2,039 out of 17,431 women who had at least one union) because it is not possible to identify the relationship she is making reference to when responding the domestic violence questionnaire. Moreover, it is not possible to identify if the first relationship was a marriage or cohabitation, and when the first relationship terminated. However, it should be taken into account that it is unlikely for a woman who experienced DV and terminated the violent relationship to start a new union.

the parents. [24] Notice that 98.9 percent of the women who got married before 18 years of age conceived their first child on the same year they got married or before. Therefore, it is reasonable to assume that all women in the sample who got married before 18 years of age were forced to get married by their parents.

The Demographic and Health Survey (*Encuesta de Demografía y Salud* – DHS) is perhaps the only reliable source of figures of DV at a national level. Using the DHS 2004-2006, the National Institute of Statistics (INEI) found that 40.9 percent of the same group of women has suffered physical or sexual violence. [25] A similar incidence rate is found using DHS 2000.

There is no official source of information on the duration of marriages in Peru. The National Office of Identification and Marital Status (*Registro Nacional de Identificación y Estado Civil* - RENIEC) and local governments keep the official records of marriages. However, in case of divorce, the divorcee's identification and marital status records in RENIEC are not automatically updated because local governments (where divorces are processed) do not share information with RENIEC.

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[24] This limitation was first established by the Civil Code of 1936 and was not changed by the Civil Code of 1984, which currently regulate marriages.

[25] There are no official figures of the incidence of DV in Peru. A study developed by the Peruvian NGO Flora Tristan and Amnesty International on DV in Peru reviews several sources of information that provide incidence rates of DV for different contexts in Peru. For instance, the study mentions that Guezmes et al. (2002) found that 48 and 61 percent of women in Lima and Cuzco, respectively, have been physically victimized by their partner. The study also provides information from the Peruvian Police (PNP): in 2002 about 36 thousand cases of physical and psychological violence were reported in Lima and Callao. In 2003 and 2004 the number of cases reported increased to more than 38 and 41 thousand, respectively.

3.2. Hazard Analysis of Marital Duration

In this section, I estimate a hazard model of the woman's decision to terminate the first marriage. Each observation or spell corresponds to a woman's first marriage. I estimate two models based on alternative ways of including DV in the hazard. First, I introduce the DV indicator in the hazard model as a time-varying covariate (Section 4.2.1); then I include DV as a duration spline in the hazard model (Section 4.2.2).

3.2.1. DV as a Time-Varying Covariate.

I estimate the following equation:

$$\ln h^D(t) = \gamma_0' M(t) + \gamma_1' A(t) + \gamma_3' P(t) + \alpha_0 + \alpha_X' X + \alpha_W W + \alpha_Y Y + \delta DV(t) \tag{1}$$

I first describe the duration splines. In equation (1) I decompose the baseline duration into three duration splines. Each duration spline depend on time, t, and its origin. The first spline is $M(t)$. This spline represents the duration of the woman's marriage and its origin is zero. The spline $A(t)$ represents the woman's age and its origin is the woman's age at marriage.

The third spline, $P(t)$, represents the number of years since the woman's first conception. The origin of this duration indicates if the woman's first conception happened before or after her first marriage. The spline is included in the model as a combination of an intercept which marks the start of the effect of the spline, and the time-dependent component.

The second element in equation (1), X, represents the time-invariant characteristics of the woman and her husband. For the husband I include *dummy*

variables for his education level and alcohol consumption habits. For the woman I include *dummy* variables for her educational attainment and her native language (indigenous language).[26]

I calculate the woman's expected education level based on the woman's reported educational attainment and age. [27] If the woman is older than 25 at the time of the interview, I assume that her expected education level is the education level they report. If the woman is younger than 25 and is still attending an education institution (6.65 percent), I apply the following adjustments:

- If she has some primary education, I assume she will complete her primary education;
- If she has some secondary education, I assume she will complete her secondary education.

If the woman is in post-secondary education at the time of the interview, I assume she will complete her post-secondary education For women younger than 25 and who are not attending an educational institution at the time of the interview, I assume that they will not go back to school.

The variable W represents the woman's potential income at the age of marriage. Given that the DHS does not provide information on the woman's income, I predict it

[26] According to the census of 2007, 83.9 percent of the population in Peru speak Spanish as a native language. Quechua and Aimara are the native language of 13.2 and 1.8 percent of the population, respectively. The remainder of the population (0.1 percent) speak other indigenous of foreign language. See http://censos.inei.gob.pe/censos2007/

[27] The Peruvian education system assumes that an individual enters primary school at the age of six. Primary school continues for six years, and secondary school for additional five years. The education system guarantees free access to both levels.

based on the woman's expected education level, her accumulated labor experience at the age of marriage and the estimated parameters of a Mincer equation.

To estimate this equation I apply the Heckman two-step procedure to the female sample of the National Household Survey (*Encuesta Nacional de Hogares* - ENAHO) 2006.[28] In the wage equation, I include education *dummy* variables which replicate the education categories provided by the DHS. I also include the individual's labor experience and the square of this measure. [29] In the selection equation I include all the variables from the wage equation and the household's non-labor income. Using the estimates of the wage equation and the DHS variables, I predict the woman's potential income at the time of marriage. Note that I am not considering the inverse Mills ratio in the prediction as the aim of this auxiliary estimation is to predict the woman's income disregarding her decision of whether to work or not at that age.

To account for possible generational differences between first marriages, I include *dummy* variables (Y) indicating the decade in which the woman got married. The first variable represents women who got married in the decades of the 1960s and the 1970s, and the second variable for women who got married in the decades of the 1980s and the 1990s. The base category includes women who got married in the decade of the 2000s.

The last term on the right hand side of equation (1) is the domestic violence time-varying indicator, $DV(t)$. If the woman has ever been physically or sexually victimized

[28] The ENAHO system is a cross section survey representative of Peru's population, and provides information for more than 20 thousand households.

[29] I calculate the woman's expected labor experience using the following formula: $Experience = Age\ at\ First\ Marriage - Years\ of\ Education - 6$. To calculate the woman's $Years\ of\ Education$ I rely on her expected educational attainment. In case the woman is expected to be attending an education institution by the time of marriage, I assume that her labor experience is zero.

by her husband, the spell is divided in two intervals. The first interval corresponds to the period between the start of the marriage and the moment she was first subject to DV. The second interval corresponds to the period after she was first victimized. In case the woman never suffered DV, the length of the first interval is equal to the length of the spell.

I present the results of the estimation of equation (1) in column (I) of Table 3.1. In column (II) I replace the woman's potential income, W, for the woman's expected education. Finally, in column (III) I include both measures. I will first analyze the results using specification (I).

In Table 3.1 the first duration spline is the marriage duration in years. The estimates suggest that the hazard of divorce increases with time. The largest increase in the hazard, 29.7 percent, occurs between the fourth and tenth year of marriage. The change in the hazard is not statistically different from zero after the 10th year of marriage although the sign suggests a slowdown in the increasing hazard.

The next duration spline is the woman's age. The hazard of divorce does not change until the woman's 18th birthday. This result is not surprising as women who get married before turning 18 are most likely under pressure from their parents and/or are not able to afford a divorce process. The hazard decreases about 8.2 percent every year between the 18th and 25th birthday. Between the 25th and 35th year there is no significant change. However, after the 35th year of age, the hazard of divorce changes the negative trend and increases about 11.8 percent every year.

The third duration spline represents the woman's conception history. The hazard of divorce at the moment of conception is 0.686 times the initial hazard, which may suggest that a child brings stability to a family. However, every year after a child is born the hazard of divorce increases about 1.8 percent. In other words, as the children grow up, the woman may feel less attached to the marriage and divorce becomes easier. In fact, the disincentives to terminate the relationship, i.e. child custody, tend to disappear as the children grow up.[30]

The next group of variables in Table 3.1 presents the time-invariant covariates. The first three variables after the constant represent the husband's characteristics. The partner's educational attainment is not significant. In fact, it is not easy to predict what the effect of the husband's education would be. On the one hand, highly educated husbands may be able to generate more income and therefore create incentives for the woman to remain in the relationship. On the other hand, assuming that assortative mating occurs, highly educated men would marry highly educated women, who are able to afford the costs of divorce and live without the economic support of the husband.

The next variable is an indicator of the husband's alcohol consumption. The hazard of divorce is about 4.1 times the baseline hazard for women whose husband consumes alcohol and gets drunk often. In general, the abuse of toxic substances, as alcohol and other drugs, is related to behaviors that damage the stability of marriage.

Next, I focus on the woman's socioeconomic characteristics. I include a dummy variable indicating if the woman's native language is not Spanish. The estimate indicates

[30] Notice that I am not considering the possibility that child birth decisions are related to the woman's decision to terminate the marriage. See Panis and Lillard (2003).

that the hazard for indigenous women is about 0.6 times the baseline hazard. Although Peru gathers several cultures and languages, government services are mainly provided in Spanish. Therefore, the indigenous population has relatively more impediments to start a divorce process. In addition, most of the indigenous population lives in rural areas, where government services are almost non-existent, and where transportation means to urban areas are infrequent an expensive.

The next covariate is the woman's potential income at the time of marriage. The estimate suggests that a one percent increase in the woman's potential income is associated with a 77.58 percent increase in the hazard of divorce.[31] In other words, women with larger potential income are more likely to afford a divorce process. Moreover, these women may be able to live without the economic support of their husband. [32]

In column (II) I replace the woman's potential income with the woman's expected education. The estimated coefficient suggests that the hazard of divorce for women with incomplete primary education or any lower level is about 0.628 times the baseline hazard. Indeed, less educated women may not have the economic resources to bear the costs of a divorce process or to live without a partner.

In column (III) I include both the woman's education *dummy* and potential income at the time of marriage. The estimate of the woman's education variable is no longer significant. However, the estimate of the woman's potential income suggests that

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[31] In this case, the coefficient can be interpreted as the elasticity of the hazard with respect to the woman's hourly income as both elements of the equation are introduced in logarithms.

[32] It is important to notice that the estimates of the duration spline that represents the marital duration and the woman's age decrease when the woman's potential education is replaced by her potential income. Bear in mind that the woman's labor experience is calculated using the woman's age at the age of marriage.

the hazard of divorce increases by 66.71 percent given a one percent increase in the woman's potential income. Notice that the estimate for this variable is significantly lower than the estimate in column (I).

I also include a set of *dummy* variables for the decade in which the woman got married. The base category includes women who got married in the decade of the 2000s. These variables recover the generational effect, as the equation already controls for the woman's age and duration. In column (I) the estimates shows that the hazard of divorce is about 0.011 times the baseline hazard for women who got married in the decades of the 60s and 70s. For women who got married in the 80s or 90s the rate is about 0.053 the baseline hazard. The estimates are similar in column (II) and (III). As expected, couples who married more recently are more open to divorce relative to "less-modern" couples, which tend to be more conservative.

The last covariate is the time-varying indicator of DV. As I mentioned, this variable divides the spell in two intervals. The first occurrence of DV generates a parallel shift of the baseline hazard on every period between the first time the woman is victimized and the end of the spell. In other words, by introducing the DV indicator as a time-varying covariate we are assuming the effect is constant during the "affected" interval. The estimate of DV in specification (I) suggests that hazard of divorce for women who have been physically or sexually abused by the husband is about 2.609 times the baseline hazard after the first DV episode occurs. In columns (II) and (III) the magnitude of the change in the baseline hazard is similar. In other words, the hazard of divorce increases significantly after the first time the woman is physically or sexually abused by her husband.

Table 3.1: Hazard Model of Divorce - DV Time-Varying Covariate
(Sample: women in their first marriage or who were married before once)

		I		II		III	
		β	exp(β)	β	exp(β)	β	exp(β)
Duration Splines							
Marriage Duration	0-4	0.2323 *	1.261	0.2821 **	1.326	0.2350 *	1.265
		(0.127)		(0.126)		(0.127)	
	4-10	0.2602 ***	1.297	0.3206 ***	1.378	0.2669 ***	1.306
		(0.068)		(0.067)		(0.069)	
	10-15	0.1199	1.127	0.1823 ***	1.200	0.1259 *	1.134
		(0.074)		(0.07)		(0.076)	
	15-25	0.0497	1.051	0.1034 **	1.109	0.055	1.057
		(0.049)		(0.048)		(0.05)	
	25 or more	-0.0692	0.933	-0.0103	0.990	-0.0632	0.939
		(0.099)		(0.1)		(0.099)	
Woman's Age	Younger than 18	0.0154	1.016	-0.0368	0.965	0.0079	1.008
		(0.036)		(0.033)		(0.037)	
	18-25	-0.0864 *	0.918	-0.1508 ***	0.861	-0.0941 *	0.910
		(0.048)		(0.044)		(0.05)	
	25-35	0.0028	1.003	-0.0543	0.947	-0.0026	0.998
		(0.041)		(0.037)		(0.043)	
	35 or older	0.1114 ***	1.118	0.0655	1.068	0.1074 ***	1.113
		(0.04)		(0.041)		(0.04)	
Parity	Intercept	-0.3774 ***	0.686	-0.3645 ***	0.695	-0.3661 ***	0.694
		(0.095)		(0.095)		(0.095)	
	Years since conception	0.0177 ***	1.018	0.0163 **	1.016	0.0174 ***	1.018
		(0.006)		(0.006)		(0.006)	
Time Invariant Covariates							
Constant		-4.8099 ***	0.008	-5.1917 ***	0.006	-4.8283 ***	0.008
		(0.435)		(0.42)		(0.437)	
Partner Attained Higher Education		0.0332	1.034	0.173	1.189	0.021	1.021
		(0.151)		(0.144)		(0.151)	
Partner Education missing/unknown		1.7723	5.884	1.5473	4.699	1.8352	6.266
		(1.098)		(1.165)		(1.131)	
Partner Gets Drunk Often		1.4111 ***	4.100	1.4492 ***	4.260	1.4182 ***	4.130
		(0.147)		(0.146)		(0.147)	
Native Language: Indigenous		-0.4863 **	0.615	-0.4649 *	0.629	-0.4397 *	0.645
		(0.242)		(0.247)		(0.248)	
Potential Income at Age of Marriage		0.7758 ***	2.172	-		0.6671 ***	1.949
		(0.192)				(0.232)	
Educational Attainment		-		-0.4663 **	0.628	-0.1852	0.831
				(0.181)		(0.217)	
Decade of Marriage (Base Category = 2000s)							
60-70		-4.4928 ***	0.011	-4.5054 ***	0.011	-4.4810 ***	0.011
		(0.435)		(0.438)		(0.435)	
80-90		-2.9456 ***	0.053	-2.9557 ***	0.052	-2.9402 ***	0.053
		(0.326)		(0.326)		(0.326)	
Time-Varying Covariate							
Domestic Violence		0.9588 ***	2.609	0.9634 ***	2.621	0.9560 ***	2.601
		(0.138)		(0.138)		(0.138)	
Ln-L		**-2329.91**		**-2333.73**		**-2329.5**	

NOTE: Asymptotic standard errors in parentheses;
Significance: '*'=10%; '**'=5%; '***'=1%.

In equation (1) I have assumed that women with identical characteristics are "exchangeable." In other words, the results presented so far assume that observations in which the covariates take the same values are identical. However, this assumption may be unrealistic because there may be unobserved heterogeneity that distinguishes the observations. To account for unobserved heterogeneity in equation (1) I estimate the following equation:

$$\ln h^D(t) = \gamma_0' M(t) + \gamma_1' A(t) + \gamma_3' P(t) + \alpha_0 + \alpha_X' X + \alpha_W W + \alpha_Y Y + \delta DV(t) + \varepsilon \tag{2}$$

The element ε represents the random component drawn from a normal distribution that is integrated out numerically. Table 3.2 presents the estimates for the DV time-varying indicator and the standard deviation of ε.[33]

The results in column (1) of Table 3.2 suggest that the hazard of divorce is 4.371 times the baseline hazard after the first event of DV during the marriage. When the woman's potential income is substituted by her expected educational attainment, the hazard increases to 3.895 times the baseline hazard. When both education and income are included –column (III), the hazard of divorce is 4.170 times the baseline hazard. In general, these estimates are almost twice the estimates when unobserved heterogeneity is not considered (Table 3.1). Although the standard errors have increased, the estimates remain highly significant in all the specifications.

Notice that the standard deviation of ε is significantly different from zero. Therefore, we can conclude that there are unobserved individual characteristics that

[33] See Table B.2 for a full set of results.

affect marriages. Let us compare the results in column (1) of Table 3.1 and Table II.B.1 in Appendix II.B. After including heterogeneity, the marriage duration spline becomes significant between the 10th and 25th year of marriage. Moreover, the trend shown by the estimates of this duration suggest that the hazard of divorce is higher during the first years of a marriage following a decreasing pattern. This result reinforces the conclusion that marriages may become stronger with time. Regarding the time-invariant husband's characteristics, no significant change is observed in the estimates of the husband's education. However, the magnitude of the estimate of the husband's alcohol consumption has doubled.

Regarding the woman's native language, this variable is significant under the new specification. The estimate of the woman's income has increased and remains highly significant. Also notice that the estimates of the decade-of-marriage indicators have become larger and remain significant.

Table 3.2: Hazard Model of Divorce with Unobserved Heterogeneity - DV Time-Varying Covariate
(Sample: women in their first marriage or who were married before once)

	I		II		III	
	β	**exp(β)**	**β**	**exp(β)**	**β**	**exp(β)**
Time-Varying Covariate						
Domestic Violence	1.4749 ***	4.371	1.3597 ***	3.895	1.4278 ***	4.170
	(0.209)		(0.208)		(0.208)	
Unobserved Heterogeneity						
σ_ε	2.6472 ***		2.5337 ***		2.6091 ***	
	(0.209)		(0.214)		(0.209)	
Ln-L	**-2324.72**		**-2328.02**		**-2324.11**	

NOTE: Asymptotic standard errors in parentheses;
Significance: '*'=10%; '**'=5%; '***'=1%.

In general, the results presented in this section suggest that the hazard of divorce increases after the occurrence of DV. Moreover, the estimates suggest that it is important

to consider the existence of unobserved characteristics. The results presented in this section assume that the change in the hazard of divorce after the first event of DV remains constant until the marriage is terminated or censored. In the next section I lift this assumption and consider that the change in the hazard may vary along time.

3.2.2. DV as a Duration Spline

As I mentioned in the previous section, a time-varying covariate in a hazard model introduces a constant change in the hazard at a certain point in time. However, there is no reason to assume that the change in the hazard of divorce is constant after the woman is physically or sexually abused for the first time by her husband. In this section I introduce DV as a duration spline to further explore the change in the hazard of divorce.

The DHS provides information on the year after marriage in which the woman was abused by her husband for the first time. Using this year as a point of origin, I construct a duration spline and restrict its effect to the period after the DV occurs. The equation to estimate is:

$$\ln h^D(t) = \gamma_0' M(t) + \gamma_1' A(t) + \gamma_2{}' P(t) + \gamma_3{}' DV(t) + \alpha_0 + \alpha_X' X + \alpha_W W + \alpha_Y Y \tag{3}$$

where $DV(t)$ is the DV duration spline. The estimates for this equation are presented in Table 3.3. I will focus the analysis on the DV duration spline given that there is no significant change in the estimates of the other variables with respect to equation (1).

The estimates of the duration spline in Table 3.3 suggest that the hazard of divorce is about 4.3 times the baseline hazard during the first year after the woman is

abused for the first time. However, between the first and sixth year after the first DV event, the hazard decreases about 16.10 percent (0.851 times the baseline hazard) every year. After the sixth year since the first DV event there is no significant change in the hazard of divorce. In other words, if the woman does not make the decision to terminate the conflictive relationship during the first year of abuse, the chances that she will divorce decrease significantly in subsequent years.

It should be noticed that these results do not change significantly when the woman's potential income is substituted by the woman's expected education in column (II), or when both measures are included in the specification in column (III).

Table 3.3: Hazard Model of Divorce - DV Duration Spline
(Sample: women in their first marriage or who were married before once)

		I		II		III	
		β	exp(β)	β	exp(β)	β	exp(β)
Duration Splines							
Marriage Duration	0-4	0.1948	1.215	0.2439 *	1.276	0.1999	1.221
		(0.129)		(0.127)		(0.129)	
	4-10	0.2973 ***	1.346	0.3586 ***	1.431	0.3030 ***	1.354
		(0.07)		(0.069)		(0.071)	
	10-15	0.1169	1.124	0.1796 **	1.197	0.1231	1.131
		(0.074)		(0.07)		(0.076)	
	15-25	0.0399	1.041	0.0937 *	1.098	0.0448	1.046
		(0.049)		(0.048)		(0.05)	
	25 or more	-0.0821	0.921	-0.0225	0.978	-0.0765	0.927
		(0.099)		(0.1)		(0.099)	
Woman's Age	Younger than 18	0.0127	1.013	-0.0397	0.962	0.0052	1.005
		(0.036)		(0.033)		(0.037)	
	18-25	-0.0823 *	0.921	-0.1465 ***	0.864	-0.0899 *	0.915
		(0.048)		(0.044)		(0.05)	
	25-35	0.0037	1.004	-0.0539	0.948	-0.0021	0.998
		(0.042)		(0.037)		(0.043)	
	35 or older	0.1101 ***	1.116	0.0639	1.066	0.1058 ***	1.112
		(0.04)		(0.041)		(0.041)	
Parity	Intercept	-0.3704 ***	0.691	-0.3573 ***	0.700	-0.3590 ***	0.698
		(0.096)		(0.096)		(0.096)	
	Years since conception	0.0172 ***	1.017	0.0159 **	1.016	0.0170 ***	1.017
		(0.007)		(0.007)		(0.007)	
DV Duration Spline							
Years After First DV Event	0-1	1.4462 ***	4.247	1.4614 ***	4.312	1.4427 ***	4.232
		(0.275)		(0.276)		(0.275)	
	1-6	-0.1610 **	0.851	-0.1639 **	0.850	-0.1612 **	0.851
		(0.071)		(0.071)		(0.071)	
	6 years of later	0.0212	1.021	0.0215	1.022	0.0215	1.022
		(0.022)		(0.022)		(0.022)	
Time Invariant Covariates							
Constant		-4.7725 ***	0.008	-5.1553 ***	0.006	-4.7994 ***	0.008
		(0.437)		(0.421)		(0.439)	
Partner Attained Higher Education		0.0269	1.027	0.1652	1.180	0.0145	1.015
		(0.151)		(0.146)		(0.151)	
Partner Education missing/unknown		1.8138 *	6.134	1.5632	4.774	1.8777 *	6.538
		(1.037)		(1.098)		(1.072)	
Partner Gets Drunk Often		1.4345 ***	4.198	1.4715 ***	4.356	1.4406 ***	4.223
		(0.147)		(0.146)		(0.147)	
Native Language: Indigenous		-0.4924 **	0.611	-0.4681 *	0.626	-0.4442 *	0.641
		(0.242)		(0.248)		(0.248)	
Potential Income at Age of Marriage		0.7769 ***	2.175	-		0.6662 ***	1.947
		(0.192)				(0.233)	
Educational Attainment		-		-0.4737 ***	0.623	-0.1916	0.826
				(0.182)		(0.219)	
Decade of Marriage (Base Category = 2000s)							
60-70		-4.5053 ***	0.011	-4.5158 ***	0.011	-4.4888 ***	0.011
		(0.436)		(0.439)		(0.436)	
80-90		-2.9670 ***	0.051	-2.9762 ***	0.051	-2.9565 ***	0.052
		(0.328)		(0.329)		(0.329)	
Ln-L		**-2330.15**		**-2333.91**		**-2329.71**	

NOTE: Asymptotic standard errors in parentheses;
Significance: '*'=10%; '**'=5%; '***'=1%.

The specification in equations (3) ignores unobserved heterogeneity. Incorporating unobserved heterogeneity leads to the following specification:

$$\ln h^D(t) = \gamma_0' M(t) + \gamma_1' A(t) + \gamma_2' P(t) + \gamma_3' DV(t) + \alpha_0 + \alpha_X' X + \alpha_W W + \alpha_Y Y + \varepsilon \tag{4}$$

I present the estimates for the DV duration spline and the standard deviation of ε in Table 3.4. The estimate of the standard deviation of ε is significant in column (I) through (III), which indicates the existence of unobserved characteristics determining the hazard of divorce.

The estimates of the DV spline in column (I) suggest that the hazard of divorce increases 4.9 times the baseline hazard. However, the estimate for the spline between the first and sixth year is no longer significantly different from zero, although the negative sign suggests that the hazard should decrease.

Table 3.4: Hazard Model of Divorce - with Unobserved Heterogeneity - DV Duration Spline
(Sample: women in their first marriage or who were married before once)

		I		II		III	
		β	exp(β)	β	exp(β)	β	exp(β)
DV Duration Spline							
Years After	0-1	1.5811 ***	4.860	1.4954 ***	4.461	1.5417 ***	4.673
First DV Event		(0.323)		(0.322)		(0.322)	
	1-6	-0.1177	0.890	-0.1192	0.888	-0.1209	0.887
		(0.082)		(0.082)		(0.082)	
	6 years of	0.0428	1.044	0.044	1.045	0.0418	1.043
	later	(0.027)		(0.028)		(0.028)	
Unobserved Heterogeneity							
σ_ε		2.5369 ***		2.4465 ***		2.4697 ***	
		(0.228)		(0.231)		(0.23)	
Ln-L		**-2326.62**		**-2329.44**		**-2325.9**	

NOTE: Asymptotic standard errors in parentheses;
Significance: '*'=10%; '**'=5%; '***'=1%.

4. Conclusions and Further Research

The objective of this investigation is to analyze the relationship between physical and sexual violence (DV) and the woman's decision to terminating her marriage. While the economics literature has applied survival analysis to study divorce decisions, the psychology literature has been focused on the relationship between DV and divorce. In this investigation I attempt to bring together both frameworks to provide further evidence.

Using the Demographic and Health Survey (DHS) 2005-2008 survey from Peru, I construct marriage spells for women (15 to 49 years old) who are in their first marriage or who were married once. One of the advantages of the DHS is that women report when in the marriage they were first abused. This information is very useful in the context of a hazard model given that it is possible to exploit the temporal component of DV within the first marriage spell.

The estimates obtained when DV is included as a time-varying covariate in the hazard model suggest that the hazard of divorce is 2.609 times the baseline hazard after the first time the woman is abused by her husband. When I include DV as a duration spline, which allows the estimate to change along time after the first DV event, I find that the new hazard of divorce is 4.3 times the baseline hazard during the first year after the initial DV event. However, between the first and sixth year after the initial DV event the hazard of divorce decreases about 16.1 percent every year (0.851 times the baseline hazard). These estimates are obtained after controlling for marital duration, the woman's age, parity conception during marriage, the husband's education level and alcohol

consumption habits, the woman's potential income at the time of marriage and native language, as well as a set of dummy variables indicating the decade in which the marriage started.

Indeed, these results suggest that the relationship between DV and the woman's decision to terminate the marriage vary across the current duration of marriage. In this context, if a policy aims to provide assistance for battered women to terminate the relationship, it may be more successful if it works as soon as the DV starts.

It should be noted that the data do not provide information on whether DV continues after the first event with stable frequency and with the same intensity. The DHS does not provide further information on the timing or intensity of later DV events. Campbell et al. (1994) suggests that there is no particular pattern in the evolution of DV for those women who remain in a relationship after the first attack. Further research is needed in this particular issue.

The next step in this investigation is to lift the assumption that DV is exogenous. Both the psychology and economics literature have approached this issue and found that the probability of occurrence of DV depends on the woman's and the partner's characteristics. Moreover, there is no consensus on how DV depends on the marriage duration. Ghosh (2007) suggests that it is possible that in longer marriages the chances of being affected by DV decrease given that the relationship is more consolidated, while most of the psychology literature argues that the chances of being abused increases given that the woman has been exposed to the husband for more time. Therefore, I will estimate a hazard model of DV using the DHS data, and estimate it simultaneously with the model

presented in this investigation. This procedure will expand the economics literature that aims to explain DV, and will further clarify the relationship between marriage duration and the occurrence of DV.

Chapter 3: The Effect of Civil Conflicts on Women's Labor Force Participation: A Causal Mechanism Approach

Abstract

This essay investigates how civil conflict affects women's labor force participation and provides evidence that part of this effect is through the mechanism of domestic violence exposure. Psychologists have done most of the work on the relationship between civil violence exposure and domestic violence, whereas economists have focused on the causes and consequences of civil violence exposure. However, there is no evidence in the economics literature on how domestic violence may operate as a causal mechanism between civil conflict and women's labor force participation. To investigate this relationship I apply the methodology developed in Flores and Flores-Lagunes (2011), which allows the identification of causal mechanisms and net effects under some uncofoundedness assumption. I use a representative sample of Peru's female population between 15 and 49 years of age (Demographic and Health Survey 2005-2008) to construct a sample of 6,691 women. I find that the exposure to the civil conflict between 1980 and 2000 increased the probability of urban women working by 0.0454 (eight percent) and that about 73 percent of this increase is net of the effect through domestic violence. I argue that the deteriorating economic conditions during the post-conflict period in affected areas may have forced women to enter the labor market in order to contribute to household income.

1 Introduction

In this essay I investigate the role of domestic violence as a causal mechanism between women's exposure to civil conflicts and the effects on labor force participation decisions. I argue that the terror and violence generated by civil conflict events had an effect on women's labor force participation and that part of this effect was mediated by women's exposure to domestic violence. To my knowledge, the economics literature has made little effort to understand the causes and consequences of domestic violence. In fact, the psychology literature has made most of the contributions, although the lack of representative data limits the conclusions from these studies.[1]

The economics literature has mainly focused on determining the causes and consequences of civil conflicts in terms of human capital accumulation.[2] The theoretical model of Pollak (2004) is probably the first formal attempt in the economics literature to study the relationship between the exposure to civil conflict violence and domestic violence. More recently, Gallegos and Gutierrez (2010) use data from Peru to provide empirical evidence of the effects of civil conflict exposure during adolescence on domestic violence incidence during adulthood. Therefore, in this essay I take advantage of the existing evidence of the relationship between civil conflicts and labor market outcomes, and I explore the possible role of women's exposure to domestic violence as a causal mechanism.

For the empirical section I follow the methodology developed in Flores and Flores-Lagunes (2011) to estimate causal mechanism effects under the assumption of

[1] For instance, see Fowler et al. (2009), Guerra et al. (2003), Schwab-Stone, et al. (1995), Scarpa et al.
[2] For instance, see Miguel et al. (2003), Ciccone (2011), Blattman and Miguel (2010), Ostby et al. (2010), Leon (2010) and Galdo (2010).

unconfoundedness. I use three sources of data. The Peruvian version of the Demographic and Health Survey (DHS) 2005-2008 provides individual-level data on labor force participation and domestic violence exposure.[3] The information on civil conflict is provided by the data collected by the Truth and Reconciliation Commission (*Comisión de la Verdad y Reconciliación* – CVR). Finally, I use the 1981 Population Census to construct the characteristics of the women's district of residence before the conflict.

Given the importance of distinguishing between the characteristics of the urban and rural population in Peru, I provide results for the total female sample, as well as for urban and rural subsamples. I exclude from the analysis women who moved from their original place of residence because it is not possible to identify the moving date and if they were exposed to civil conflict events. The initial results for the total sample suggest that the exposure to civil conflict violence increases by 0.0243 the probability of women working (3.1 percent). In the case of urban women, the increase is of 0.0454 (eight percent). No significant effect is observed for rural women.

The estimates for the total sample suggest that the effect of civil conflict net of the mechanism of domestic violence is not statistically different from zero, implying that the whole effect works through the mechanism of domestic violence. However, when urban women are considered, I find that 73 percent (0.0403) of the total effect is net of the effect through domestic violence, which implies that a significant 27 percent of the effect is mediated through women's exposure to domestic violence. In the case of rural women, the positive net effect is offset by the negative effect through domestic violence exposure.

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[3] Given that the DHS does not provide information on income, I predict the woman's hourly income using estimates obtained from a *Mincerian* equation estimated with data of the National Household Survey (ENAHO - *Encuesta Nacional de Hogares*) 2006.

This essay is organized as follows. After this introduction I present the Peruvian context and the motivations for this essay in the second section. In the third section I review the literature on the relationship between civil conflict and domestic violence and their effect on women's labor force participation. I complement the scarce economics literature with psychology literature as the latter has made the largest contribution on civil conflict and domestic violence. The fourth section presents the data, describes the methodology and the main results. Finally in the fifth section, I present my conclusions and discuss further research.

2 Context and Motivation

The Peruvian civil conflict between 1980 and 2000 had profound economic and social consequences. The political instability generated by two consecutive military governments during the late 1970s and the worsening economic situation created a context in which radical ideologies rapidly spread and public grievance grew. By the late 1970s, and as a consequence to the government's lack of response, the Peruvian Communist Party – Shining Path (*Partido Comunista del Perú – Sendero Luminoso* – PCP-SL) had already gained numerous extreme left-wing supporters in the south Andes, and discontent turned into violence

The first violent event occurred in 1980 when the PCP-SL burned the election ballots in the district of Chuschi (Ayacucho, South of Peru).[4] Thereafter the PCP-SL targeted their violent actions towards public and private property and distributed propaganda to promote the conflict. Their continuous incursions in rural and poor urban

[4] Final Report of the Truth and Reconciliation Commission (2002).

areas imposed a constant threat to civilians, many of whom were forced to join their rebels and provide support to their organization.

Initially, the government labeled the PCP-SL as a small group of left-wing insurgents and considered their actions unimportant given that they mainly occurred in poor areas. However, the frequency and severity of the attacks increased systematically and rapidly. The Police forces, which were not prepared to face conflict of such proportions, was rapidly outnumbered by the guerilla tactics of the PCP-SL.

In 1982, another left-wing group, the Revolutionary Movement Tupac Amaru (*Movimiento Revolucionario Tupac Amaru* – MRTA) committed its first terrorist action. Despite having different political ideology, MRTA and PCP-SL had similar operating modes and tactics.[5] In 1983 the government started showing concerns and increased the severity of its response. As the Peruvian army started collaborating with the Police forces against the rebel group, the PCP-SL created an organized militia sub-group called the People Guerilla Army. In contrast to previous violence on property, this militia group favored political violence, as they focused their attacks on police/military facilities and patrols and committed targeted assassinations of civil authorities.

Although still a matter of investigation by the Peruvian authorities, there is evidence of the existence of a paramilitary group, *Comando Rodrigo Franco*, which was secretly supported by the government of the time and significantly contributed to the violence during the late 80's.[6] In the years to follow the level of violence continued to

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[5] See the Final Report of the Truth and Reconciliation Commission (2002) for further details on the political views of these groups.
[6] Final Report of the Truth and Reconciliation Commision (2002).

increase and by 1986 the conflict spread from Ayacucho in the South to other regions of Peru, including Lima.

By the early 1990s the violence reached its peak. The severity of the civil conflict events in Lima increased, particularly in the form of assassinations and car-bomb explosions. In order to control the conflict, the new government led by Alberto Fujimori introduced a curfew a system and constrained civil rights, such as limiting the freedom of speech and assembly in certain areas of the country. In 1991 the president suspended the Congress in favor of a more authoritarian regime. In this context, the secret paramilitary group known as *Colina* committed several extrajudicial assassinations of civilians who were alleged to have been sympathizers of PCP-SL.[7]

Following the capture of the PCP-SL leader, Abimael Guzman, on the 5th of April of 1992, the level of violence decreased. The government started a campaign to highlight the accomplishments on the fight against the rebel groups and to minimize the criticisms towards the violent repression undertaken by government forces. This campaign was boosted by the peace proposal of Abimael Guzman, which led many militants of the guerrilla to desert and abandon the extreme left wing group. The subsequent arrests of other important leaders of the PCP-SL and MRTA significantly affected the ability of such groups to organize themselves and to maintain an active political and militant agenda. After 1995 the last and most important civil conflict event was the hostage crisis in the residence of the Japanese ambassador in Lima.

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[7] Later investigations have concluded that this group was funded by the former National Intelligence Service, which was managed by Vladimiro Montesinos, the main advisors of the President Alberto Fujimori.

In 2002, after the fall of Fujimori, the government created the Truth and Reconciliation Commission. Based on testimonies of civilians, military personnel, politicians and militants of the rebel groups, this commission analyzed the causes and consequences of the conflict. The final report concluded that between 1985 and 2000 about 70 thousand people died as a consequence of the conflict. The various rebel groups are held responsible for more than 56 percent of the deaths; however, the contribution of the National Armed Forces is still subject of debate.

In addition to the high death tolls, the destruction of productive assets and the threatening life conditions have deeply marked Peru's socioeconomic development. Roads and energy infrastructure were damaged isolating entire populations and limiting trade and the development of regional markets. The rebel groups also hindered any type of social organization that aimed to generate wealth. For instance, PCP-SL eliminated the Agriculture Societies of Social Interests (*Sociedades Agricolas de Interés Social* – SAIS) created in the 70s in the central Andes as a consequence of the land reform.[8] In this context, the share of the population who opted for staying in the areas affected by the civil conflict may have been forced to engage in other productive activities to compensate for the loss of income and the long-lasting deteriorating economic conditions.[9]

Another potential consequence of the civil conflict is the development of domestic violent behavior in the population who were affected by the events. The Peruvian government started paying attention to domestic violence with the creation of the Ministry of the Woman and Social Development (*Ministerio de la Mujer y Desarrollo*

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[8] See Koonings and Kruijt *eds.* (2002)
[9] Unfortunately, most of the evidence on post-conflict labor market outcomes is focused on the population who fled from the affected areas.

Social – MIMDES) in the early 1990s.[10] Specifically, in 1997 the Peruvian Congress passed the Law of Protection Against Family Violence, introducing domestic violence explicitly as a criminal offence.[11] Between 2001 and 2005 the MIMDES created the National Assistance Program Against Domestic and Sexual Violence,[12] and introduced internal policies to prevent and sanction sexual harassment within the Ministry itself.[13] In 2007 the government passed the Law of Equal Opportunities for Women and Men.[14] Despite a number of programs, policies and laws, domestic violence is still a major problem that affects many women in Peru.[15]

In sum, the Peruvian post-conflict scenario provides a useful context to study the relationship between the civil conflict, the incidence of domestic violence and the effects on women's labor market decisions. I argue that the stress and destruction generated by the civil conflict in Peru had an effect on women's labor force participation decision and that part of this effect was mediated by the women's exposure to domestic violence.

In the next section I review the economics literature on these topics. I complement the scarce economics literature on domestic violence with the psychology literature as this discipline has made important contributions on the relationship between civil conflict and domestic violence.

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[10] Until 2002 this ministry was known as the Ministry of Woman's Promotion and Human Development (*Ministerio de Promoción de la Mujer y Desarrollo Humano* – PROMUDEH). See Law No. 27050 and 27779.
[11] See *Decreto Supremo* No. 006-97-JUS and 002-98-JUS.
[12] See *Decreto Supremo* No. 008-2001-PROMUDEH.
[13] See *Resolución Ministerial* No. 746-2005-MIMDES.
[14] See Law No. 28983.
[15] According to the DHS 2004-2006, 41 percent of the women who are currently married or were married before have suffered physical or sexual violence.

3 Literature Review

The psychology literature has made most of the contributions to the study of domestic violence in terms of their consequences on human behavior. While there is economic literature on civil conflicts, even from the Peruvian context, the economics literature on domestic violence is scarce and mainly focused on explaining the causes of domestic violence rather than the consequences on human behavior.

In this section I first review the recent psychology and economics literature on civil conflict and domestic violence. Then I explore the literature that studies the link between the exposure to violence and labor force participation. Finally, I present my concluding remarks.

3.1 Literature on civil conflict and domestic violence

The psychology literature argues that the exposure to civil conflict during childhood or adolescence may condition individual's behavior during adulthood. For instance, Fowler et al. (2009) argue that "social cognition theories propose that exposure to community violence normalizes the use of aggressive behavior. As a result, youths learn that violence is an effective method of problem solving, and therefore, are more likely to engage in violent acts themselves." Using data from Chicago, Guerra et al. (2003) find that school children who are exposed to community violence are more likely to approve aggression as a normal conduct. Schwab-Stone, et al. (1995) argue that the exposure to violence of children between the 6th and 10th grade is associated with a greater acceptance of physical aggression. Scarpa et al. (2006a) find that the exposure to community violence during early adulthood is associated with a higher incidence of depressed mood, aggressive behavior and post-traumatic stress symptoms. Williams (2007) argues that "the negative

developmental effects appear more likely if children experience repeated or repetitive 'process' trauma or live in unpredictable climates of fear", and that anger, irritability and interpersonal conflict are normal reactions after traumatic experiences.

The economics literature on civil conflict analyses both the causes and consequences of civil conflict. For instance, Miguel et al. (2003) use instrumental variables to investigate the relationship between economic growth and the incidence of civil conflict and finds that lower rainfall is associated to a higher risk of civil conflict given lower income levels. Ciccone (2011) revisits Miguel et al. (2003) and argues that their findings are susceptible to the definition of civil conflict and on the rainfall measure used. Blattman and Miguel (2010) review the applied microeconomic research in civil conflict and the "theoretical and limitations of the existing work." Ostby et al. (2010) review the quantitative literature on the relationship between education and civil conflict and "examine how education may affect various forms of political violence."

In the case of Peru, Leon (2009) uses census data and finds that "the average person exposed to the political violence … before starting school accumulated about 0.21 less years of education as an adult." Using DHS data, Sanchez (2010) argues that civil conflict has a negative impact on children nutritional status. Finally, using data from the Peru's National Household Survey, Galdo (2010) argues that exposure to civil conflict during childhood has a negative impact on monthly earnings during adulthood.

However, the economics research on the effects of civil conflict on individual's violent behavior is very scarce. Pollack (2004) proposes an intergenerational model of domestic violence to show how domestic violence is transmitted from parents to children. In addition, Pollack (2004) argues that his model can be extended to include external

(i.e., non-home) sources of violence. To my knowledge, only Miguel et al. (2011) and Gallegos and Gutierrez (2010) address empirically the relationship between civil conflict and individual violence. Miguel et al. (2011) use individual level data and find that the propensity to have a violent behavior is higher for soccer players in the European professional league who have larger periods of exposure to civil conflict in their country of origin. Using the DHS 2002-2004 from Peru, Gallegos and Gutierrez (2010) show that women who were exposed to civil conflict events during their adolescence are more likely to become victims of domestic violence.

In conclusion, the economics literature, although scarce, provides evidence of the effect of the exposure to civil conflict on the development of individual violent behavior. This corroborates the findings of the psychology literature and raises several research questions. In the next subsection I review the literature on the relationship between domestic violence and women's labor force participation.

3.2 Literature on domestic violence and labor force participation

The psychology literature has generated most of the contributions in trying to explain the causes of domestic violence. [16] For instance, Bates et al. (2004), Frye and Karney (2006), Charles (2009) study the causes of domestic violence based on interviews, surveys and focused group discussions. Other researchers in the psychology literature contribute to analyze the consequences of domestic violence. For instance, Herbert et al. (1991), Follingstad et al. (1992), Campbell et al. (1994), Okun (1996), Henderson et al. (1997), Barnett (2000) and DeMaris (2000) focus on the effects of domestic violence on marital disruption. However, it should be noted that it is not possible to draw general scientific

[16] See Pollak (2004)

conclusions from most of these investigations given that they are not based on representative samples of a population.[17]

In addition to studying the causes of domestic violence, the psychology literature also approaches the relationship between domestic violence and women's labor force participation and finds mixed results. Tolman and Wang (2005) review several studies and argue that these fail to control for individual unobserved characteristics, which lead them to find no conclusive results on the effects of domestic violence on women's employment[18]. To overcome this problem, Tolman and Wang (2005) estimate an individual fixed-effect model of labor supply using the first three waves of the Women's Employment Study (WES)[19]. Their results suggest that domestic violence has a negative effect on the number of hours a woman works during a year.

Kimerling et al. (2009) construct a sample of 6,698 adult women using three waves of the California Women's Health Survey (CWHS) to estimate logit models of unemployment. After controlling for the woman's socioeconomic characteristics the authors find that suffering physical violence during the year previous to the interview did not affect the woman's labor force participation. However, they argue that suffering psychological violence increase the likelihood of unemployment. The authors attribute the lack of significance of physical domestic violence to three factors: the data only allows to "focus on employment status, rather than the more sensitive measures of hours worked, wages, or length of continuous employment", in representative samples there is a

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[17] See DeMaris (2000).
[18] These studies are Barusch et al. (1999), Lloyd (1997), Tolman and Rosen (2001), Lloyd and Taluc (1999), Brown et al. (1999) and Moore and Selkowe (1999).
[19] This data set provides individual-level information of a random "sample of women who were on the welfare rolls in February 1997" and who lived in an urban area of Michigan. See Tolman and Wang (2005) for more details on the data.

"relatively lower frequency of severe violence", and there is an overlap of physical with psychological violence.

More recently, Crowne et al. (2011) use a sample of 512 women who gave birth at a hospital in Hawaii to study the effects of domestic violence on employment outcomes. Rather than focusing on the woman's labor force participation at a particular point in time, the authors estimate multivariate regression of employment stability *dummy* variables[20] on the woman's socioeconomic characteristics and an indicator of domestic violence. The authors argue that women who suffered domestic violence in the preceding 12 months to an interview "had more than twice the odds of low or moderate employment stability."

While the psychology literature on domestic violence is abundant, the economics literature on domestic violence is scarce. Most of the economics research on domestic violence is based on non-cooperative household models. According to Pollak (2004), the work of Tauchen, et al. (1991) may be the most serious attempt in this topic. Other work following a non-cooperative household approach is Farmer and Tiefenthaler (1996, 1997) and Rao and Bloch (2002) and Angelucci (2007). Probably the only contributions on the dynamics of domestic violence are Tauchen and Witte (1995) and Pollak (2004). The latter argues that behavioral strategies are transmitted from parents to children.[21] More recently, Gallegos (2012) provides empirical evidence of the effects of domestic violence on marital duration.

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[20] These variables indicate if the woman worked between 0 and 33, 34 to 99, and 100 percent of the number of months in the interval between the follow-up interviews.

[21] This argument is based on the literature on epidemiology of family, which recognizes multiple pathways of transmission: the spectrum goes from witnessing violence in the community to being a victim of family violence.

To my knowledge, the only contribution of the economics literature on the relationship between domestic violence and women's labor force participation is Farmer and Tiefenthaler (2004). The authors point out that the existing research focuses on the effect of income on the incidence of domestic violence[22] and does not take into account the evidence that suggests that domestic violence may affect women's labor force participation.

Farmer and Tiefenthaler (2004) account for endogeneity of domestic violence by estimating a 2SLS probit of women's labor force participation using data from the annual National Crime Victimization Surveys (NCVS) and the National Violence Against Women Survey (NVAW). Their findings suggest that domestic violence has a positive and significant effect on women's employment status. The authors argue that this result corroborates with previous studies in the economic literature as women may reduce their vulnerability to domestic violence by improving their economic situation.

In conclusion, the psychology literature has not achieved a final conclusion on the relationship between domestic violence and women's labor force participation. However, the economics literature –mainly represented by Farmer and Tiefenthaler (2004), has provided evidence on the positive effect of domestic violence on women's labor force participation.

3.3 Final remarks

Both the psychology and economics literature have explored the relationship between civil conflict and domestic violence, providing evidence that exposure to civil conflict events increases the chances to develop violent behavior or to become used to it.

[22] The intuition behind this direction of the effect is "that if a woman's own income increases, the man must lower the violence (or increase monetary transfers to her) to keep her in the relationship."

However, the relationship between domestic violence and women's labor market outcomes is still relatively unexplored. While the psychology literature has reached mixed results, the scarce economics literature argue in favor of a positive effect of domestic violence on women's labor force participation.

This paper takes advantage of the previous literature and explores the effect of civil conflict on women's labor force participation considering domestic violence as a causal mechanism through which the effect of civil conflict works. In the next section I present the empirical procedures based on Flores and Flores-Lagunes (2011) to identify the effect of civil conflict on labor force participation and to decompose it in (i) the effect of civil conflict net of domestic violence and (ii) the effect of civil conflict through domestic violence.

4 Empirical Procedures

In the previous section I reviewed the economics and psychology literature on the relationship between civil conflict and domestic violence, and how these may affect women's labor force participation. To further analyze this relationship, I use the Peruvian context and apply the methodology described by Flores and Flores-Lagunes (2011) on the identification of causal net and mechanism effects under unconfoundedness.

After describing the three sources of data, I will describe the empirical procedures and present the estimated results.

4.1 Data

The main source of information is the Peruvian version of the Demographic and Health Survey (*Encuesta de Demografía y Salud* – DHS) 2005-2008[23]. This survey provides a random sample of about 28 thousand women and is representative of Peru's female population between 15 and 45 years of age. The use of a random sample is a significant advantage compared to previous studies on domestic violence that are based on information provided only by women who reported domestic violence cases to authorities.[24]

The DHS includes a detailed set of questions to determine if the woman has ever been subject to violence by her current partner, if she is currently married or in a cohabitating relationship, or by a former partner, if the relationship was terminated. Given that the domestic violence section of the questionnaire references to violence inflicted by the current or previous partner without distinction, I focus on the subsample of women who are currently in their first marriage (6,422) or who have been married only once (962). [25]

I do not exclude from the sample women who first married before 18 years of age (1,976 women, which represents 28.2 percent of the sample). Although the legal age for marriage is 18, the legislation allows under-age marriage with explicit authorization by

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[23] In 2008 the National Institute of Statistics (*Instituto Nacional de Estadística e Informática* - INEI) included additional clusters in the sample, which increased the size of the sample by 7,207 women. To maintain the size of the sample in each cross section, I exclude the observations from the additional clusters.

[24] For instance, see Tauchen and Witte (1995), Farmer and Tiefenthaler (1997).

[25] Notice that I do not include women who had more than one marriage or cohabitation (2,039 out of 17,431 women who had at least one union) because it is not possible to identify the relationship she is making reference to when responding the domestic violence questionnaire. Moreover, it is not possible to identify if the first relationship was a marriage or cohabitation, and when the first relationship terminated.

parents. [26] Notice that 98.9 percent of the women who got married before 18 years of age conceived their first child in the same year they got married or before. Therefore, it is reasonable to assume that all women in the sample who got married before 18 years of age were likely forced (or strongly encouraged) to get married by their parents.

The DHS is perhaps the only reliable source of figures of domestic violence at a national level. Using the DHS 2004-2006, the National Institute of Statistics (*Instituto Nacional de Estadística e Informática* - INEI) found that 40.9 percent of the same group of women has suffered physical or sexual violence.[27] A similar incidence rate is found using DHS 2000.

The information on civil conflict violence is provided by the Truth and Reconciliation Commission (2002). In its final report, this commission provides information on the location of violent events occurred in the context of the civil conflict between 1980 and 2000. Using the woman's district of residence and the date of occurrence of a civil conflict event it is possible to identify if she has been affected by the civil conflict.

Note that I restrict the sample to women who have never moved from their original place of residence. For women who moved from their original place of residence it is not possible to identify if they have been affected by the civil conflict given that they

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[26] This limitation was first established by the Civil Code of 1936 and was not changed by the Civil Code of 1984, which currently regulates marriages.

[27] There are no official figures on the incidence of domestic violence in Peru. A study developed by the Peruvian NGO Flora Tristan and Amnesty International on domestic violence reviews several sources of information that provide incidence rates of domestic violence for different contexts in Peru. For instance, the study mentions that Guezmes et al. (2002) found that 48 and 61 percent of women in Lima and Cuzco, respectively, have been physically abused by their partner. The study also provides information from the Peruvian Police (PNP): in 2002 about 36 thousand cases of physical and psychological violence were reported in Lima and Callao. In 2003 and 2004 the number of cases reported increased to more than 38 and 41 thousand, respectively.

do not report the date when they moved. About a half million people (mostly indigenous from rural areas) fled from their place of origin to urban areas as a consequence of the violence generated by the civil conflict (See Truth and Reconciliation Commission 2002).

In fact the National Institute of Statistics (2009) shows that 435 communities of south central Peru were abandoned. Three hundred of these communities are located in Ayacucho, the region where the conflict started. According to the Truth and Reconciliation Commission, once a community was occupied by the rebel forces, migrating became substantially more difficult. The rebel forces would sustain their military by forced conscription of the people who remained in these areas. Those who could not fight would be required to provide assistance on other logistic needs. The National Institute of Statistics claims that about 52 percent of those who did migrate before occupation returned to their former communities between 1993 and 1998.[28]

4.2 Empirical Procedure

The research literature suggests that civil conflict has an effect on domestic violence, and that domestic violence may affect women's labor force participation. Therefore, the objective of this essay is to learn about the effect of civil conflict (treatment) on labor force participation (outcome) that is mediated through the mechanism domestic violence (outcome). For this purpose, I apply the methodology presented in Flores and Flores-Lagunes (2011), which allows decomposing the total effect of civil conflict in women's

[28] See National institute of Statistics (2009).

labor force participation in the effect that operates through the mechanism and the effect net of the mechanism.

Throughout this section I adapt the formulae and definitions in Flores and Flores-Lagunes (2011) according to the relation between women's labor force participation and the exposure to domestic violence and civil conflict. The main potential outcome is LO (women's labor force outcome, which in this case is her labor force participation), which is a function of the mechanism DV (domestic violence) and the treatment CC(civil conflict). Note also that DV is affected by CC. Therefore, the individual potential outcomes observed in the data are:

(i) $LO_i(1, DV_i(1))$: women's labor force participation when her district of residence is affected by civil conflict and her exposure to domestic violence is $DV(1)$. Hereafter, $LO_i(1, DV_i(1)) = LO_i(1)$;

(ii) $LO_i(0, DV_i(0))$: women's labor force participation when her district of residence is not affected by civil conflict and her exposure to domestic violence is $DV(0)$. Hereafter, $LO_i(0, DV_i(0)) = LO_i(0)$.

The potential outcomes which are not observed in the data are:

(iii) $LO_i(1, DV_i(0))$: women's labor force participation if she lived in a district affected by civil conflict but was exposed to domestic violence as if she lived in a district not affected by civil conflict; and,

(iv) $LO_i(0, DV_i(1))$: women's labor force participation if she lived in a district not affected by civil conflict but was exposed to domestic violence as if she lived in a district affected by civil conflict.

Based on these potential outcomes, Flores and Flores-Lagunes (2011) decompose the average treatment effect as:[29]

$$ATE = E\big[LO(1) - LO\big(1, DV(0)\big)\big] + E\big[LO\big(1, DV(0)\big) - LO(0)\big] \tag{1}$$

Note that in ATE the authors decompose the difference between the potential individual outcomes (i) and (ii) by introducing (iii).[30] Therefore, the first term in equation (1) represents the change in LO attributed only to a change in DV in response to a change in CC. This is known as the mechanism average treatment effect, $MATE$. The second term in equation (1) is the change in women's labor force participation attributed only to civil conflict as the exposure to domestic violence is held constant at $DV(0)$. This part of the effect is the net average treatment effect, $NATE$.[31] As the authors point out, if $LO_i\big(1, DV_i(0)\big)$ is understood as a counterfactual treatment in which the effect of civil conflict on domestic violence is blocked and held constant, then for each individual $NATE$ is the difference between this treatment and the observed potential outcome for each control observation.[32]

The estimation of ATE and NATE of civil conflict on labor force participation require several assumptions. Since the treatment –exposure to civil conflict, is not randomly assigned. I assume that the exposure to civil conflict is unconfounded; this implies that a woman's labor force participation and domestic violence are independent

[29] Note that the potential outcomes (i) through (iv) are defined at the individual level and the ATE is an aggregate measure across individuals. See equation (2) in Flores and Flores-Lagunes (2011).
[30] For further details see Flores and Flores-Lagunes (2011), page 5.
[31] Flores and Flores-Lagunes (2011) point out that these parameters are not unknown in the statistics literature (see Section 2.3 of their paper).
[32] See Section 2.2 in Flores and Flores-Lagunes (2011) for further discussion on these parameters.

of her exposure to civil conflict given on a set of covariates.[33] This allows to compare treated and control women and to provide a causal interpretation of the adjusted differences between them.

In the next sections I present the estimation of ATE and NATE following the procedures in Flores and Flores-Lagunes (2011). I will first present the estimation of ATE. Then I will continue with the estimation of NATE.

4.2.1 Average Treatment Effect (ATE)

The ATE of civil conflict on women's labor force participation is estimated using treatment and control observations in the data. However, to provide a causal interpretation to the adjusted difference between women in treatment and control groups it is necessary to eliminate the bias generated by fact that the outcome is only observed for these groups. Therefore, I assume that the treatment is unconfounded given a set of pre-treatment characteristics.

Assumption 1 *Unconfounded treatment,*

$LO_i(1), LO_i(0), LO_i\big(1, DV_i(0)\big), DV_i(1), DV_i(0) \perp CC_i | X_i$.

Assumption 1 indicates that a woman's exposure to the violence of the civil conflict is independent of the woman's labor force participation decision and her exposure level to domestic violence, given a set of pre-treatment characteristics.

I ensure that it is possible to compare treated and control units in infinite samples given the following overlapping assumption:

Assumption 2 *Overlapping assumption,* $0 < \Pr(CC = 1 | X = x) < 1$, for all x.

[33] The authors point out that this assumption should also eliminate any systematic selection into the treatment due to unobserved characteristics that are not incorporated through the covariates.

To satisfy assumptions 1 and 2 I estimate a propensity score of women's exposure to civil conflict violence in the district of residence and identify those observations that are within the overlap area or common support area of the propensity score. Table III.A.1 in Appendix III.A shows the specifications of the propensity score based on a probit model.[34] The first group of variables included in the models is for women's individual characteristics: mother's native language and wealth quintiles[35]. The results suggest that women whose mother's native language was not indigenous –i.e. Spanish or any foreign language, were less exposed to civil conflict violence while poorer women were more exposed. The next group of variables represent characteristics of the woman's district of residence for the year 1981– a year after the first civil conflict events. In the case of the urban sample I also include the estimated GDP for the year 1980.[36] Although the GDP measure is not statistically significant, it suggests that women in richer districts were more exposed to civil conflict violence. This is corroborated by the variables representing the degree of development of the district. When considering the total and urban samples it is observed that women in areas with better infrastructure were more exposed to the civil conflict violence. Indeed, rebel groups would cause larger damages in more developed areas.

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[34] I estimated similar specifications using logit models. However, probit models showed a better fit of the data.

[35] The DHS provides a wealth index estimated using principal components based on asset tenancy. Indeed, this variable represents her wealth by the time of the survey. However, it is plausible to assume that this measure is a good proxy of her parent's wealth.

[36] The National Institute of Statistics provide the 1980 GDP per capita at the regional level. I approximate the GDP level in the woman's district of residence by multiplying the GDP per capita by the district population obtained from the 1981 Census.

Additionally, for the total and rural sample I include an indicator variable for the existence of the *mita* system prior to 1812.[37] This is a measure of the oppression suffered by the population that has historically lived in these areas. The results indicate that women who live in districts in which *mita* existed are more exposed to civil conflict violence in both total and rural samples. Finally, I also include the interactions of the individual characteristics with the district level information. The results suggest that poorer women living in more developed areas were more exposed to the civil conflict violence.

Note that it is important to take into account the differences between urban and rural areas given that the civil conflict evolved in different ways. While the rebel groups took control of some rural areas forcing the population to provide resources and join their forces, population in urban areas were subject to car-bomb explosions, blackouts and kidnappings.

As I mentioned before, from now on I constrain the analysis to the common support area of the propensity score[38], in order to be able to compare treatment and control units. The final total sample includes 6,961 observations. The final urban and rural samples include 3,456 and 2,820 observations.[39] Table 4.1 shows the average labor force participation by civil conflict occurrence in the woman's district of residence. In the three samples women who live in districts affected by civil conflict are more likely to

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[37] The *mita* was the system imposed by the Spanish until 1812 by which the native population worked in the mines under quasi-slavery conditions. These populations were not allowed to move to other areas and there is evidence that the population still living in *mita* districts still do not move away. See Dell (2008).
[38] Following Flores and Flores-Lagunes (2011), I identify the observations that have a propensity score between the first percentile for women who were exposed to the conflict and the 99th percentile for women who were not exposed to the conflict.
[39] The original total sample has 7,394 observations, of which 3,658 and 3,736 are urban and rural women, respectively.

work.[40] This could be explained by the worsened economic conditions of districts affected by civil conflict which may force women to enter the labor force in order to contribute to the household's income. Note also that in urban areas the difference is almost twice the difference in rural areas.

Table 4.1 Average Labor Force Participation by Civil Conflict in District of Residence

	Sample		
	Total	Urban	Rural
Districts Affected by CC	0.7922	0.7448	0.8589
	(0.0061)	(0.0085)	(0.0093)
Districts not Affected by CC	0.7909	0.6989	0.8368
	(0.0081)	(0.0163)	(0.0098)
Unadjusted difference	0.0013	0.0460	0.0221
	(0.0098)	(0.0174)	(0.0116)

To estimate ATE I regress labor force participation on the civil conflict applying weighted least squares (WLS). The weights are constructed using the propensity score of civil conflict.[41] Again, I constrain the sample to those observations in the common support area of the propensity score. Note that this is a "double-robust" estimator given that the estimated ATE is consistent provided that either the outcome regression or the propensity score are correctly specified.[42]

Table 4.2 shows the estimated ATE for the three samples considered using different specifications.[43] In the first panel I do not include covariates in the WLS

[40] Based on interviews and testimonies of individuals who were directly affected by the civil conflict, the Final Report of the Truth and Reconciliation Commission argues that the civil conflict had a immediate negative effect on labor market outcomes.

[41] The weights are constructed applying the following formula: $\gamma_i = \left[\frac{CC_i}{p(X_i)} + \frac{1-CC_i}{1-p(X_i)}\right]^{1/2}$, where $p(X_i)$ is the propensity score.

[42] See Inbens (2004)

[43] The estimate corresponding to civil conflict in the model is the ATE. See Tables III.A.2, III.A.3 and III.A.4 in Appendix III.A for a full set of results.

regression; in the second panel I add covariates to the specification. The third panel is restricted to the total sample as I include interactions of selected covariates with the urban area indicator.

When no covariates are included, the ATE is only significant for the urban sample. The estimate of ATE falls from 0.0425 to 0.0407 when I add the linear term of the propensity score. Note also that additional powers of the propensity score did not contribute to improve the specification.

The estimate for the total sample is positive and significant when I add covariates, even after including the linear term of the propensity score. In the urban sample, the estimate of the ATE increases with respect to the specification with no covariates. Moreover, I include up to the second power of the propensity score. Under this specification the ATE is 0.0545, which represents an increase by eight percent in the probability of women working. For rural areas no significant change is observed after including covariates or the propensity score.

Finally, for the total sample, I include interactions of the urban area indicator with the household head indicator, altitude and altitude squared as the improvement in the specification suggests that it is important to distinguish urban from rural areas. After including the linear term of the propensity score the estimate of ATE is 0.0243. This estimate represents an increase by 3.1 percent in the probability of women working.

Given these specifications and considering the Bayesian information criteria as well as the improvements obtained in the fit of the model, I continue the analysis based on the ATE of 0.0243 and 0.0545 for the total and urban samples, respectively. In the case of the rural subsample, I consider the ATE of 0.0082.

Table 4.2: ATE of Civil Conflict on Labor Force Participation – Double Robust Estimator

Specification includes:		Sample		
Covariates?	Propensity Score?	Total	Urban	Rural
1. No Covariates	i. No	0.0084 (0.0104)	0.0425** (0.0183)	0.0085 (0.0136)
	ii. Linear	0.0152 (0.0109)	0.0407** (0.0183)	-0.0054 (0.0136)
	iii. Powers[1]	0.0139 (0.0108)	-	-
2. Including Covariates	i. No	0.0227** (0.011)	0.0542*** (0.0191)	0.0127 (0.0142)
	ii. Linear	0.0198* (0.0111)	0.0559*** (0.0191)	0.0082 (0.0142)
	iii. Powers[2]	-	0.0545*** (0.0191)	-
3. Interacting Covariates with Urban Indicator	i. No	0.0266** (0.0111)	-	-
	ii. Linear	0.0243** (0.0111)	-	-

[1] Up to the 4th power
[2] Up to the 2nd power
* p<0.1, ** p<0.05, *** p<0.01
Robust Standard Errors in Parenthesis

4.2.2 Average Treatment Effect Net of the Mechanism (NATE)

In this section I estimate NATE: the average treatment effect net of the mechanism of domestic violence. To estimate NATE I follow the first approach described in Flores and Flores-Lagunes (2011). This method exploits the relation of domestic violence and labor force participation assuming a functional form and treatment unconfoundedness. From equation (1) MATE can be calculated as $ATE - NATE$.

Based on equation (1), NATE is defined as follows:

$$NATE = E\left[LO\left(1, DV(0)\right) - LO(0)\right] \quad (2)$$

To empirically estimate NATE, Flores and Flores-Lagunes (2011) employ the concept of principal strata.[44] The principal strata is given by the values that the vector $\{DV_i(1), DV_i(0)\}$ can take. If the covariates included in X control for the characteristics that affect both the assignment into a strata and her potential outcomes, then individuals in different strata are comparable. In this sense, I assume that the principal strata are unconfounded given a set of pre-treatment characteristics:

Assumption 3 *Unconfounded principal strata,* $LO_i(1), LO_i(0), LO_i(1, DV_i(0)) \perp \{DV_i(1), DV_i(0)\}|X_i$.

Therefore, equation (2) can be expressed as follows:[45]

$$NATE = E\{E[LO_i(1, DV_i(0))|DV_i(0) = v_0, X_i = x]\} \\ -E\{E[LO_i(0)|DV_i(0) = v_0, X_i = x]\} \quad (3)$$

The first term in equation (3) corresponds to the labor force participation of women who were affected by the civil conflict, but whose exposure level to domestic violence was as if they were not affected by civil conflict. Indeed, this is not observed in the data. Therefore, I estimate a model of labor force participation on domestic violence and the women's characteristics c for women who were affected by the civil conflict, and then evaluate this equation on $DV(1) = \hat{E}(DV_i(0))$. To model $\hat{E}(DV_i(0))$ I regress domestic violence on a series of women's characteristics and variables characterizing the woman's domestic violence family background: if the woman ever witnessed her father beating her mother, if the woman was ever beaten by her father since she turned 15 years old, and if the woman was ever beaten by her mother since she turned 15. I provide

[44] See Frangakis & Rubin (2002)
[45] See Section 3.1 in Flores and Flores-Lagunes (2011) for further details on the derivation of this expression.

results for both a linear probability model and a logit model.[46] The second term of equation (3) is estimated with a model of labor force participation on domestic violence and X for women who lived in areas not affected by the civil conflict.

Note that to estimate both terms of equation (3) it is necessary to assume that they share the same functional form. As pointed out by Flores and Flores-Lagunes (2011), this assumption allows extrapolating information from $LO_i(1)$ to learn about $LO_i\big(1, DV_i(0)\big)$:[47]

Assumption 4 *Functional form.* If $E[LO_i(1, DV_i(1))|DV_i(1) = v_1, X_i = x] = f_1(v_1, x; \theta)$, and $f_1(\cdot)$ is a known function and θ is an identified parameter, then $E[LO_i(1, DV_i(0))|DV_i(0) = v_0, X_i = x] = f_1(v_0, x; \theta)$.

Table 4.3 shows the results for equation (3) under different specifications of X. In the first panel I include pre-treatment variables and women's characteristics that are not affected by the civil conflict. In the second panel, I add domestic violence background variables to the specification of the first panel. Finally, in the third panel, I include also interaction of domestic violence with covariates. In the case of the total sample, the first column corresponds to the specification that does not include the interaction of urban residence indicator with domestic violence. In second column I include this interaction in the specification.[48] I will focus the discussion on the results obtained when $\hat{E}\big(DV_i(0)\big)$ is estimated using a linear probability model given that there is no significant difference with the estimates obtained through a logit model.

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[46] See Table III.A.3 in Appendix III.A for a full set of results.
[47] See Section 3.1 in Flores and Flores-Lagunes (2011) for further details on this assumption.
[48] See Tables III.A.4, III.A.5 and III.A.6 in Appendix III.A for a full set of results.

For the total sample the estimate of NATE is negative and not statistically significant under any specification. However, when the sample is split in urban and rural women NATE is positive and significant for both subsamples. For urban women NATE is 0.0401 in the first panel. When family domestic violence background variables are included, the estimate slightly increases to 0.0406. Finally, when the specification for urban women includes interactions of domestic violence the estimate falls to 0.0402. Based on an ATE of 0.545 for urban women, the effect of civil conflict net of the effect through domestic violence represents about 73 percent of the total effect of civil conflict on labor force participation. In the case of rural women there is no significant change between the first and second panel. However, when interactions of domestic violence are included in the specification NATE increases from 0.0188 to 0.0197.

The rationale of these results is based on the fact that a woman who never moved from her original place of residence is likely to have married or cohabitated with someone from the same area and with similar characteristics.[49] In this context, if the woman was exposed to the civil conflict violence, her partner was exposed to it as well. Based on Galdo (2011) and Leon (2010), it is reasonable to assume that her partner's labor income might have been negatively affected. Therefore, a woman who was exposed to the civil conflict violence may be forced to enter the labor force to compensate for her partner's lower income level.

[49] As in Gallegos and Gutierrez (2010), I am assuming assortative mating.

Table 4.3: NATE of Civil Conflict on Labor Force Participation

	DV predicted with OLS/Logit?	*Sample*			
		Total		Urban	Rural
		I	II		
1. No DV Background variables	OLS	-0.0044	-0.0049	0.0401	0.0188
		(0.0036)	(0.0036)	(0.0045)	(0.0048)
	Logit	-0.0044	-0.0048	0.0402	0.0188
		(0.0036)	(0.0036)	(0.0045)	(0.0048)
2. DV Background variables	OLS	-0.0041	-0.0046	0.0406	0.0189
		(0.0036)	(0.0036)	(0.0046)	(0.0048)
	Logit	-0.0041	-0.0046	0.0407	0.0189
		(0.0036)	(0.0036)	(0.0046)	(0.0048)
3. Intearctions of DV with covariates	OLS	-0.0036	-	0.0402	0.0197
		(0.0037)		(0.0047)	(0.0048)
	Logit	-0.0035	-	0.0403	0.0197
		(0.0037)		(0.0047)	(0.0048)

4.2.3 Causal Mechanism Average Treatment Effect (MATE)

Using the estimates of ATE in Table 4.2 and NATE in Table 4.3 I calculate the effect of civil conflict that works through domestic violence. Take into account that Gallegos and Gutierrez (2010) find that an increase of one standard deviation in the number of civil conflict events that a woman is exposed to when she was between 11 and 15 years old increases the probability of being physically or sexually victimized by her partner during adulthood by 2.2 percentage points.

As I mentioned before, MATE is calculated by subtracting NATE from ATE given that $ATE = NATE + MATE$. Table 4.4 presents the calculation of MATE considering an ATE of 0.0243 for the total sample and 0.0545 for the urban subsample.

In the total sample MATE is not statistically different from ATE. This result suggests that all the effect of civil conflict goes through the mechanism of domestic violence. In the case of the urban subsample, MATE is positive and statistically significant under any of the specifications. The part of the effect of the exposure to the civil conflict violence on women's labor force participation that is mediated through domestic violence accounts for about 27 percent of the total effect, which represents a 2.2 percent increase in the probability of women working. This result is in line with the findings of Farmer and Tiefenthaler (2004) who show that women who are exposed to domestic violence are more likely to enter the labor force. In other words, a woman's exposure to the violence generated by the civil conflict is observed through her increased exposure to domestic violence. Indeed, these women will attempt to enter the labor force to generate an income that would facilitate leaving a violent relationship.

In the case of rural areas, the estimate of $NATE = -MATE$ given that the total effect is not statistically different from zero. This situation is feasible. However, it is possible that these results are also a consequence of the lack of information on rural characteristics in the data. For instance, it would be very useful to have information on the available road network in rural areas prior to 1980, or 1980 GDP disaggregated by economic activity for rural areas within a region. As pointed out by Yamada (2004), "analyzing rural Peru is definitely much more complex because it depends on agriculture production models." Therefore, further research is needed to gain understanding of the effect of civil conflict on labor force participation for rural women.

Table 4.4: MATE of Civil Conflict on Labor Force Participation

	DV predicted with OLS/Logit?	*Sample*			
		Total		Urban	Rural
		I	II		
1. No DV Background variables	OLS	0.0287	0.0292	0.0144	-0.0106
		(0.0038)	(0.0038)	(0.0051)	(0.0048)
	Logit	0.0287	0.0291	0.0143	-0.0106
		(0.0038)	(0.0038)	(0.0051)	(0.0048)
2. DV Background variables	OLS	0.0284	0.0289	0.0139	-0.0107
		(0.0038)	(0.0038)	(0.0052)	(0.0048)
	Logit	0.0284	0.0289	0.0138	-0.0107
		(0.0038)	(0.0038)	(0.0052)	(0.0048)
3. Intearctions of DV with covariates	OLS	0.0279	-	0.0143	-0.0115
		(0.0039)		(0.0055)	(0.0047)
	Logit	0.0278	-	0.0142	-0.0115
		(0.0039)		(0.0055)	(0.0047)

5 Conclusions and Further Research

In this essay I investigate the role of domestic violence as a causal mechanism between women's exposure to civil conflicts and the effects on labor force participation decisions. To my knowledge, the economics literature has made little effort to understand the causes and consequences of domestic violence. I follow the methodology developed in Flores and Flores-Lagunes (2011) to estimate causal mechanisms effects under the assumption of unconfoundedness. Using a sample of non-migrant women of Peru's Demographic and Health Survey (DHS) 2005 – 2008, I find that the exposure to civil conflict violence increases the probability of women working by 0.0243 (3.1 percent). In the case of urban women, the increase is of 0.0454 (eight percent). I find no effect for rural women.

Moreover, I find that the part of the effect that is net of the effect through domestic violence for urban women is 73 percent (0.0403) of the total effect, which implies that a significant 27 percent is caused through women's exposure to domestic violence. In the case of rural women, the positive net effect is offset by the negative effect through domestic violence exposure. No net effect is found when using the total sample, which suggests that the totality of the effect is through domestic violence.

The rationale of the positive net effect is based on the fact that a woman who never moved from her original place of residence is likely to have married or cohabitated with someone from the same area and with similar characteristics. In this context, if the woman was exposed to the civil conflict violence, her partner was exposed to it as well. Based on Galdo (2011) and Leon (2010), it is reasonable to assume that her partner's labor income might have been negatively affected. Therefore, a woman who was exposed to the civil conflict violence may be forced to enter the labor force to compensate for her partner's lower income level.

The positive mechanism effect is also in line with the evidence provided by Pollack (2004) and Gallegos and Gutierrez (2010). Women who were exposed to civil conflict violence are more likely to experience domestic violence. Therefore, they are also more likely to enter the labor force in order to increase their chances of leaving the violent relationship, as suggested by Farmer and Tiefenthaler (2004).

The results and methodology applied in this essay open a series of research questions. As pointed out by Flores and Flores-Lagunes (2011), the accuracy of estimates of the net effect and the mechanism effect rely on the availability of covariates that

makes plausible the assumption of unconfoundedness of the treatment, i.e. the exposure to civil conflict violence. For this purpose I take advantage of information on women's parents and census data from 1981 to include characteristics of the area of residence by the time the conflict started. However, further research is needed on how to deal with variables that could be affected by the treatment but at the same time could enrich the specifications used in this investigation.

Furthermore, the scarce economics literature on the Peruvian civil conflict suggests that the exposure to civil violence during the early childhood and adolescence has consequences on educational attainment, income, health outcomes and domestic violence exposure[50]. Therefore, the methodology applied in this essay could be adapted to include more than one causal mechanism.

[50] See Leon (2009), Galdo (2010), Sanchez (2011) and Gallegos and Gutierrez (2011)

Appendices

I.A Sample Basic Characteristics

Table A.1 - Time - Invariant Covariates

Time - Invariant Covariate			Mean	Std. Dev.	Min.	Max.
Woman's Expected Education						
Basic Education		Incomplete	0.36	0.479	0	1
		Complete	0.22	0.416	0	1
Post Secondary	Technical/ Professional	Incomplete	0.11	0.314	0	1
Education		Complete	0.10	0.296	0	1
	University	Incomplete	0.09	0.288	0	1
		Complete	0.10	0.301	0	1
Graduate education			0.02	0.141	0	1
Woman's Place of Residence						
Woman lives in same household where born			0.41	0.455	0	1
Missing - Woman lives in same household where born			0.17	0.377	0	1
Education of the Woman's Parents						
Mother's	None		0.05	0.217	0	1
education	Primary	Incomplete	0.58	0.494	0	1
		Complete	0.06	0.246	0	1
	Secondary	Incomplete	0.14	0.347	0	1
		Complete	0.13	0.337	0	1
	Post - Secondary		0.04	0.186	0	1
	Doesn't know		0.04	0.200	0	1
	Missing		0.24	0.425	0	1
Father's	None		0.04	0.206	0	1
education	Primary	Incomplete	0.58	0.493	0	1
		Complete	0.04	0.199	0	1
	Secondary	Incomplete	0.14	0.343	0	1
		Complete	0.13	0.341	0	1
	Post - Secondary		0.06	0.237	0	1
	Doesn't know		0.06	0.240	0	1
	Missing		0.27	0.444	0	1
Woman's Potential Income at Age 23*						
Women's potential income at age 25 (mother's education)			8.69	0.42	8.13	9.88
Women's potential income at age 25 (Partner's estimated income)			8.22	0.56	6.99	9.67

* Variable Included in the Selection Equation of the Heckman 2-step Procedure

I.B Figures and Full sets of Results

Figure B.1 - Baseline Hazard
Table 4.1 - Panel (A)

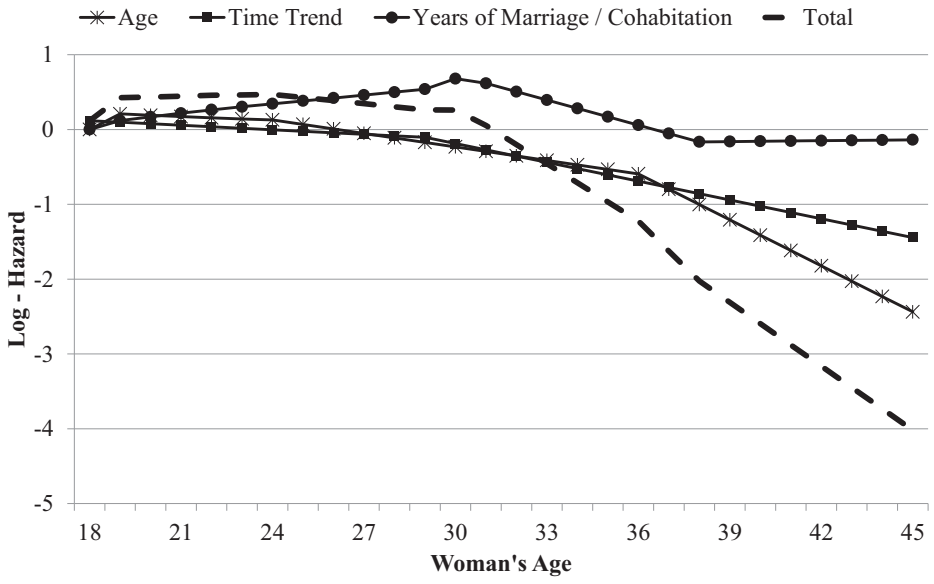

Figure B.2 - Baseline Hazard
Table 4.1 - Panel (B)

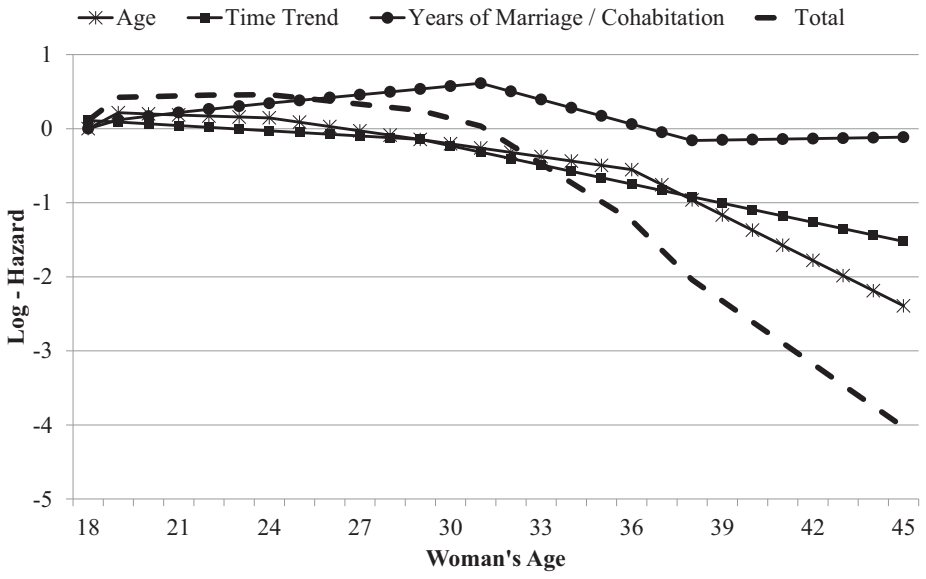

Table I.B.1 Hazard of First Birth
Introducing the Woman's Potential Income at Age 25 (Equation 2a)

		(a)	(b)	(c)
Splines				
Woman's age	18-19	0.2242	0.2266	0.2243
		(0.1416)	(0.1417)	(0.1416)
	20-24	-0.0097	-0.0092	-0.0106
		(0.0149)	(0.0149)	(0.0149)
	24-35	-0.0467 ***	-0.0462 ***	-0.0476 ***
		(0.0105)	(0.0105)	(0.0105)
	35 or more	-0.2073 ***	-0.2059 ***	-0.2087 ***
		(0.0656)	(0.0657)	(0.0655)
Time Trend	1980 - 1990	0.0146	0.0152	0.0142
		(0.0121)	(0.0121)	(0.012)
	1990 - 2000	-0.0128 *	-0.0129 *	-0.0125 *
		(0.0071)	(0.0071)	(0.0071)
	2000 or After	-0.1625 ***	-0.1650 ***	-0.1602 ***
		(0.0243)	(0.0244)	(0.0243)
Years since first marriage or cohabitating relationship	1 or less	0.2261 ***	0.2255 ***	0.2264 ***
		(0.0081)	(0.0081)	(0.0081)
	1 to 5	0.1132 ***	0.1135 ***	0.1130 ***
		(0.0208)	(0.0208)	(0.0207)
	5 to 10	-0.1892 ***	-0.1897 ***	-0.1886 ***
		(0.046)	(0.0461)	(0.0459)
	10 or more	0.0056	0.005	0.007
		(0.0833)	(0.0839)	(0.0828)
Covariates				
Constant		4.9495 ***	4.0666 ***	4.5782 ***
		(0.4862)	(0.4346)	(0.4249)
DL		-5.1700 ***	-4.4625 ***	-4.9237 ***
		(1.7875)	(1.6509)	(1.694)
Potential Log-Hourly Income at Age 25		-0.7831 ***	-0.6952 ***	-0.7438 ***
		(0.0541)	(0.0487)	(0.0487)
DL * Potential Log-Hourly Income at Age 25		0.6068 ***	0.5333 ***	0.5834 ***
		(0.2024)	(0.1893)	(0.1934)
Lives in Same Household Where Born		-0.7348 ***	-0.7372 ***	-0.7377 ***
		(0.0424)	(0.0423)	(0.0423)
Missing - Lives in Same HH where Born		-0.1661 ***	-0.1534 ***	-0.1765 ***
		(0.0471)	(0.0473)	(0.0461)
Father's Education - Incomplete Secondary or less		0.0062		
		(0.0499)		
Father's Education Unknown		0.0736		
		(0.0684)		
Father's Education Missing		0.0552		
		(0.0441)		
Mother's Education Complete Primary or Less			0.0464	
			(0.0433)	
Mother's Education Unknown			-0.012	
			(0.0774)	
Mother's Education Missing			0.077	
			(0.0479)	
Ln-L		**-15640.28**	**-15640.97**	**-15642.44**

NOTE: Asymptotic standard errors in parentheses; Significance: '*'=10%; '**'=5%; '***'=1%.

Measure included in the Heckman two-step to predict the woman's income measure: (a) Father's educational attainment, (b) Mother's educational attainment, (c) Mother's and father's and educational attainment.

Table I.B.2 Hazard of First Birth
Introducing the Woman's Potential Income at Age 25 (Equation 2b)

		I			II		
		(a)	(b)	(c)	(a)	(b)	(c)
Splines							
Woman's age	18-19	0.2238	0.226	0.2238	0.2255	0.2276	0.2256
		(0.1416)	(0.1417)	(0.1416)	(0.1417)	(0.1417)	(0.1417)
	20-24	-0.0099	-0.0095	-0.011	-0.0097	-0.0092	-0.0106
		(0.0149)	(0.0149)	(0.0149)	(0.0149)	(0.0149)	(0.0149)
	24-35	-0.0469 ***	-0.0464 ***	-0.0478 ***	-0.0469 ***	-0.0463 ***	-0.0477 ***
		(0.0105)	(0.0105)	(0.0105)	(0.0105)	(0.0105)	(0.0105)
	35 or more	-0.2075 ***	-0.2065 ***	-0.2092 ***	-0.2073 ***	-0.2060 ***	-0.2086 ***
		(0.0656)	(0.0657)	(0.0655)	(0.0656)	(0.0657)	(0.0655)
Time Trend	1980 - 1990	0.0145	0.0151	0.0141	0.0147	0.0153	0.0143
		(0.0121)	(0.0121)	(0.012)	(0.0121)	(0.0121)	(0.012)
	1990 - 2000	-0.0128 *	-0.0129 *	-0.0124 *	-0.0125 *	-0.0128 *	-0.0123 *
		(0.0071)	(0.0071)	(0.0071)	(0.0071)	(0.0071)	(0.0071)
	2000 or After	-0.1621 ***	-0.1643 ***	-0.1595 ***	-0.1625 ***	-0.1650 ***	-0.1604 ***
		(0.0243)	(0.0244)	(0.0243)	(0.0243)	(0.0244)	(0.0243)
Years since first marriage or cohabitating relationship	1 or less	0.2262 ***	0.2258 ***	0.2266 ***	0.2259 ***	0.2254 ***	0.2262 ***
		(0.0081)	(0.0081)	(0.0081)	(0.0081)	(0.0081)	(0.0081)
	1 to 5	0.1134 ***	0.1140 ***	0.1132 ***	0.1131 ***	0.1135 ***	0.1129 ***
		(0.0208)	(0.0208)	(0.0208)	(0.0207)	(0.0208)	(0.0207)
	5 to 10	-0.1893 ***	-0.1897 ***	-0.1885 ***	-0.1892 ***	-0.1897 ***	-0.1885 ***
		(0.046)	(0.0461)	(0.0459)	(0.046)	(0.0461)	(0.0459)
	10 or more	0.0054	0.0049	0.0069	0.0055	0.005	0.0068
		(0.0835)	(0.0841)	(0.083)	(0.0832)	(0.0839)	(0.0827)
Covariates							
Constant		4.6260 ***	3.5424 ***	4.1855 ***	5.4310 ***	4.2533 ***	4.9332 ***
		(0.6367)	(0.5576)	(0.5604)	(0.6281)	(0.5509)	(0.544)
DL		-5.2623 ***	-4.6310 ***	-5.0537 ***	-5.0038 ***	-4.3936 ***	-4.7749 ***
		(1.7933)	(1.6574)	(1.7006)	(1.7926)	(1.6568)	(1.7005)
Potential Log-Hourly Income at Age 25		-0.7443 ***	-0.6313 ***	-0.6961 ***	-0.8404 ***	-0.7178 ***	-0.7869 ***
		(0.0736)	(0.065)	(0.0663)	(0.0722)	(0.0639)	(0.0642)
Woman's Attained Education Level		-0.0556	-0.1018	-0.0736	0.1097	0.0476	0.0906
		(0.0765)	(0.0744)	(0.0747)	(0.0983)	(0.0963)	(0.0963)
DL * Potential Log-Hourly Income at Age 25		0.6174 ***	0.5528 ***	0.5984 ***	0.5879 ***	0.5253 ***	0.5663 ***
		(0.2032)	(0.1901)	(0.1942)	(0.203)	(0.19)	(0.1942)
Lives in Same Household Where Born		-0.7341 ***	-0.7358 ***	-0.7369 ***	-0.7335 ***	-0.7366 ***	-0.7366 ***
		(0.0424)	(0.0424)	(0.0423)	(0.0423)	(0.0423)	(0.0422)
Missing - Lives in Same HH where Born		-0.1675 ***	-0.1558 ***	-0.1790 ***	-0.1660 ***	-0.1536 ***	-0.1755 ***
		(0.0471)	(0.0474)	(0.0462)	(0.0471)	(0.0473)	(0.0461)
Father's Education - Incomplete Secondary or less		0.0046			0.0045		
		(0.05)			(0.05)		
Father's Education Unknown		0.0747			0.0733		
		(0.0686)			(0.0683)		
Father's Education Missing		0.0583			0.0505		
		(0.0442)			(0.0442)		
Mother's Education Complete Primary or Less			0.047			0.0449	
			(0.0433)			(0.0434)	
Mother's Education Unknown			-0.0119			-0.0124	
			(0.0777)			(0.0773)	
Mother's Education Missing			0.0825 *			0.0746	
			(0.0481)			(0.0481)	
Ln-L		**-15640.03**	**-15640.1**	**-15641.99**	**-15639.67**	**-15640.85**	**-15642.01**

NOTE: Asymptotic standard errors in parentheses; Significance: '*'=10%; '**'=5%; '***'=1%.

Women's Educational Attainment: (I) Some post-secondary education or any higher level, (II) University degree or any higher level.

Measure included in the Heckman two-step to predict the woman's income measure: (a) Father's educational attainment, (b) Mother's educational attainment, (c) Mother's and father's and educational attainment.

Table I.B.3 Hazard of First Birth
Introducing the Woman's Potential Income at Age 25 (Equation 2b + (t))

		I			II		
		(a)	(b)	(c)	(a)	(b)	(c)
Splines							
Woman's age	18-19	0.2235	0.2257	0.2235	0.2244	0.2264	0.2245
		(0.1416)	(0.1417)	(0.1416)	(0.1417)	(0.1417)	(0.1417)
	20-24	-0.0099	-0.0095	-0.011	-0.0094	-0.0084	-0.0103
		(0.0149)	(0.0149)	(0.0149)	(0.0149)	(0.0149)	(0.0149)
	24-35	-0.0468 ***	-0.0463 ***	-0.0477 ***	-0.0468 ***	-0.0460 ***	-0.0476 ***
		(0.0105)	(0.0106)	(0.0105)	(0.0105)	(0.0105)	(0.0105)
	35 or more	-0.2072 ***	-0.2061 ***	-0.2088 ***	-0.2078 ***	-0.2064 ***	-0.2092 ***
		(0.0657)	(0.0657)	(0.0655)	(0.0657)	(0.0658)	(0.0656)
Time Trend	1980 - 1990	0.0145	0.0151	0.014	0.0146	0.0147	0.0142
		(0.0121)	(0.0121)	(0.012)	(0.0121)	(0.0121)	(0.012)
	1990 - 2000	-0.0128 *	-0.0129 *	-0.0124 *	-0.0127 *	-0.0131 *	-0.0124 *
		(0.0071)	(0.0071)	(0.0071)	(0.0071)	(0.0071)	(0.0071)
	2000 or After	-0.1621 ***	-0.1643 ***	-0.1595 ***	-0.1622 ***	-0.1650 ***	-0.1600 ***
		(0.0244)	(0.0244)	(0.0244)	(0.0244)	(0.0244)	(0.0243)
Years since first marriage or cohabitating relationship	1 or less	0.2262 ***	0.2258 ***	0.2266 ***	0.2259 ***	0.2255 ***	0.2262 ***
		(0.0081)	(0.0081)	(0.0081)	(0.0081)	(0.0081)	(0.0081)
	1 to 5	0.1135 ***	0.1142 ***	0.1134 ***	0.1130 ***	0.1139 ***	0.1129 ***
		(0.0208)	(0.0208)	(0.0208)	(0.0207)	(0.0208)	(0.0207)
	5 to 10	-0.1893 ***	-0.1898 ***	-0.1886 ***	-0.1891 ***	-0.1898 ***	-0.1884 ***
		(0.046)	(0.0461)	(0.0459)	(0.0461)	(0.0461)	(0.046)
	10 or more	0.0052	0.0046	0.0067	0.0047	0.0044	0.0059
		(0.0834)	(0.0841)	(0.083)	(0.0832)	(0.0838)	(0.0827)
Covariates							
Constant		4.5977 ***	3.5074 ***	4.1514 ***	5.3036 ***	5.0808 ***	4.8164 ***
		(0.6511)	(0.5692)	(0.5742)	(0.6441)	(0.6515)	(0.5583)
DL		-4.7842	-4.0093	-4.4692	-3.0627	-2.868	-2.8687
		(3.0883)	(2.7745)	(2.876)	(2.7843)	(2.788)	(2.6303)
Potential Log-Hourly Income at Age 25		-0.7409 ***	-0.6269 ***	-0.6919 ***	-0.8252 ***	-0.8025 ***	-0.7727 ***
		(0.0754)	(0.0665)	(0.068)	(0.0742)	(0.0751)	(0.0661)
Woman's Attained Education Level		-0.0606	-0.109	-0.0801	0.0803	0.0613	0.0607
		(0.0802)	(0.0779)	(0.0784)	(0.1041)	(0.1046)	(0.1018)
DL * Potential Log-Hourly Income at Age 25		0.5604	0.4773	0.5279	0.3594	0.3371	0.3396
		(0.3626)	(0.3308)	(0.341)	(0.323)	(0.3234)	(0.3081)
DL * Woman's Attained Education Level		0.0644	0.0935	0.0846	0.3251	0.3395	0.34
		(0.3354)	(0.3272)	(0.3296)	(0.3551)	(0.355)	(0.3543)
Lives in Same Household Where Born		-0.7342 ***	-0.7360 ***	-0.7370 ***	-0.7336 ***	-0.7356 ***	-0.7367 ***
		(0.0424)	(0.0424)	(0.0423)	(0.0423)	(0.0424)	(0.0422)
Missing - Lives in Same HH where Born		-0.1675 ***	-0.1557 ***	-0.1789 ***	-0.1659 ***	-0.1524 ***	-0.1755 ***
		(0.0472)	(0.0474)	(0.0462)	(0.0471)	(0.0473)	(0.0461)
Father's Education - Incomplete Secondary or less		0.0045			0.0045		
		(0.05)			(0.05)		
Father's Education Unknown		0.0747			0.0734		
		(0.0686)			(0.0683)		
Father's Education Missing		0.0583			0.0516		
		(0.0442)			(0.0442)		
Mother's Education Complete Primary or Less			0.0469			0.0432	
			(0.0433)			(0.0433)	
Mother's Education Unknown			-0.012			-0.0119	
			(0.0778)			(0.0776)	
Mother's Education Missing			0.0826 *			0.0828 *	
			(0.0481)			(0.0482)	
Ln-L		**-15642.01**	**-15640.01**	**-15640.04**	**-15641.95**	**-15639.21**	**-15637.91**

NOTE: Asymptotic standard errors in parentheses; Significance: '*'=10%; '**'=5%; '***'=1%.

Women's Educational Attainment: (I) Some post-secondary education or any higher level, (II) University degree or any higher level.

Measure included in the Heckman two-step to predict the woman's income measure: (a) Father's educational attainment, (b) Mother's educational attainment, (c) Mother's and father's educational attainment.

Table I.B.4 Hazard of First Birth – Introducing Woman's Potential Income at Age 25
Selection equation of Heckman 2-step procedure includes the Partner's Estimated Income

	Equation	2a	2b I	2b II
Splines				
Woman's age	18-19	0.2272	0.2257	0.2273
		(0.1417)	(0.1417)	(0.1417)
	20-24	-0.0109	-0.0112	-0.0108
		(0.0148)	(0.0149)	(0.0149)
	24-35	-0.0468 ***	-0.0471 ***	-0.0467 ***
		(0.0106)	(0.0106)	(0.0106)
	35 or more	-0.2064 ***	-0.2075 ***	-0.2064 ***
		(0.0658)	(0.0657)	(0.0658)
Time Trend	1980 - 1990	0.0165	0.0162	0.0164
		(0.0121)	(0.0121)	(0.0121)
	1990 - 2000	-0.0124 *	-0.0122 *	-0.0126 *
		(0.0071)	(0.0071)	(0.0071)
	2000 or After	-0.1645 ***	-0.1632 ***	-0.1645 ***
		(0.0244)	(0.0244)	(0.0244)
Years since first marriage or cohabitating relationship	1 or less	0.2255 ***	0.2261 ***	0.2256 ***
		(0.0081)	(0.0081)	(0.0081)
	1 to 5	0.1126 ***	0.1133 ***	0.1127 ***
		(0.0207)	(0.0208)	(0.0208)
	5 to 10	-0.1885 ***	-0.1888 ***	-0.1886 ***
		(0.0461)	(0.0461)	(0.0461)
	10 or more	0.0069	0.0066	0.0071
		(0.0843)	(0.0845)	(0.0844)
Covariates				
Constant		2.4926 ***	1.8208 ***	2.3154 ***
		(0.3384)	(0.3936)	(0.3959)
DL		-3.2438 **	-3.5492 ***	-3.3354 **
		(1.3511)	(1.3601)	(1.3606)
Potential Log-Hourly Income at Age 25		-0.5334 ***	-0.4456 ***	-0.5108 ***
		(0.0373)	(0.046)	(0.046)
Woman's Attained Education Level			-0.1955 ***	-0.0646
			(0.0691)	(0.0902)
DL * Potential Log-Hourly Income at Age 25		0.4075 **	0.4443 ***	0.4185 ***
		(0.1604)	(0.1616)	(0.1617)
Lives in Same Household Where Born		-0.7373 ***	-0.7345 ***	-0.7381 ***
		(0.0423)	(0.0424)	(0.0424)
Missing - Lives in Same HH where Born		-0.1573 ***	-0.1611 ***	-0.1569 ***
		(0.0474)	(0.0476)	(0.0475)
Father's Education - Incomplete Secondary or less		0.0537	0.0557	0.0556
		(0.0469)	(0.047)	(0.047)
Father's Education Unknown		-0.063	-0.0659	-0.0623
		(0.0891)	(0.0897)	(0.0893)
Father's Education Missing		0.1785 **	0.1842 **	0.1824 **
		(0.0874)	(0.0873)	(0.0876)
Mother's Education Complete Primary or Less		-0.0016	-0.0133	-0.0024
		(0.0545)	(0.0547)	(0.0545)
Mother's Education Unknown		0.0899	0.0954	0.0898
		(0.0792)	(0.0796)	(0.0793)
Mother's Education Missing		-0.1235	-0.113	-0.1231
		(0.082)	(0.0818)	(0.082)
Ln-L		**-15646.2**	**-15642.48**	**-15646**

NOTE: Asymptotic standard errors in parentheses; Significance: '*'=10%; '**'=5%; '***'=1%.

Women's Educational Attainment: (I) Some post-secondary education or any higher level, (II) University degree or any higher level.

II.A Sample Basic Characteristics

Table II.A.1 Table of Means

		Not Censored (275)			
		Mean	**Min**	**Max**	**SD**
Marriage Duration (years)		14.035	0.045	33.795	7.941
Age at first Marriage		21.665	13.083	35.833	4.675
Woman was physically or sexually abused by her husband		0.658	0	1	0.475
Years After Marriage when Occurred first DV episode		3.008	0.003	23.003	4.070
Husband's	No education	0.011	0	1	0.104
Educational	Incomplete Primary	0.156	0	1	0.364
Attainment	Complete Primary	0.018	0	1	0.134
	Incomplete Secondary	0.087	0	1	0.283
	Complete Secondary	0.302	0	1	0.460
	Higher Education	0.418	0	1	0.494
	Doesn't remember	0	0	0	0.000
	Doesn't know	0.007	0	1	0.085
Husband Gets Drunk Often		0.265	0	1	0.442
Native Language Indigenous		0.087	0	1	0.283
Woman's	No education	0.025	0	1	0.158
Expected	Incomplete Primary	0.229	0	1	0.421
Educational	Complete Primary	0.029	0	1	0.168
Attainment	Incomplete Secondary	0.102	0	1	0.303
	Complete Secondary	0.178	0	1	0.383
	Incomplete Higher	0.225	0	1	0.419
	Complete Higher	0.211	0	1	0.409
Ln of Woman's Potential Hourly Income at Age of Marriage		-0.011	-1.214	0.947	0.620
Married in the 60's or 70's		0.105	0	1	0.308
Married in the 80's or 90's		0.753	0	1	0.432

		Censored (6,697)			
		Mean	**Min**	**Max**	**SD**
Marriage Duration (years)		16.120	0.041	36.124	7.795
Age at first Marriage		20.991	11.000	43.583	4.628
Woman was physically or sexually abused by her husband		0.372	0	1	0.483
Years After Marriage when Occurred first DV episode		3.162	0.003	26.003	3.759
Husband's	No education	0.014	0	1	0.116
Educational	Incomplete Primary	0.248	0	1	0.432
Attainment	Complete Primary	0.067	0	1	0.251
	Incomplete Secondary	0.130	0	1	0.336
	Complete Secondary	0.240	0	1	0.427
	Higher Education	0.300	0	1	0.458
	Doesn't remember	0.0003	0	1	0.017
	Doesn't know	0.000	0	1	0.021
Husband Gets Drunk Often		0.048	0	1	0.214
Native Language Indigenous		0.207	0	1	0.405
Woman's	No education	0.068	0	1	0.252
Expected	Incomplete Primary	0.286	0	1	0.452
Educational	Complete Primary	0.094	0	1	0.292
Attainment	Incomplete Secondary	0.115	0	1	0.319
	Complete Secondary	0.181	0	1	0.385
	Incomplete Higher	0.149	0	1	0.356
	Complete Higher	0.107	0	1	0.309
Ln of Woman's Potential Hourly Income at Age of Marriage		-0.251	-1.276	1.057	0.599
Married in the 60's or 70's		0.111	0	1	0.315
Married in the 80's or 90's		0.774	0	1	0.418

II.B Full Set of Results

Table II.B.1: Hazard Model of Divorce with Unobserved Heterogeneity - DV Time-Varying Covariate
(Sample: women in their first marriage or who were married before once)

		I		II		III	
		β	exp(β)	β	exp(β)	β	exp(β)
Duration Splines							
Marriage Duration	0-4	0.4969 ***	1.644	0.5299 ***	1.699	0.4964 ***	1.643
		(0.155)		(0.156)		(0.156)	
	4-10	0.3489 ***	1.418	0.4261 ***	1.531	0.3596 ***	1.433
		(0.08)		(0.077)		(0.08)	
	10-15	0.2732 ***	1.314	0.3520 ***	1.422	0.2837 ***	1.328
		(0.092)		(0.085)		(0.093)	
	15-25	0.1466 **	1.158	0.2324 ***	1.262	0.1606 **	1.174
		(0.067)		(0.065)		(0.068)	
	25 or more	0.013	1.013	0.1075	1.113	0.0193	1.019
		(0.121)		(0.124)		(0.124)	
Woman's Age	Younger than 18	0.0221	1.022	-0.0505	0.951	0.0094	1.009
		(0.05)		(0.043)		(0.052)	
	18-25	-0.0994	0.906	-0.1875 ***	0.829	-0.1145 *	0.892
		(0.064)		(0.056)		(0.065)	
	25-35	-0.0295	0.971	-0.1192 **	0.888	-0.0451	0.956
		(0.055)		(0.048)		(0.057)	
	35 or older	0.1341 **	1.144	0.0507	1.052	0.1175 **	1.125
		(0.058)		(0.056)		(0.059)	
Parity	Intercept	-0.4931 ***	0.611	-0.4395 ***	0.645	-0.4689 ***	0.626
		(0.118)		(0.118)		(0.119)	
	Years since conception	0.0214 ***	1.022	0.0189 **	1.019	0.0212 ***	1.021
		(0.008)		(0.008)		(0.008)	
Time Invariant Covariates							
Constant		-7.6384 ***	0.000	-7.9988 ***	0.000	-7.6234 ***	0.000
		(0.693)		(0.679)		(0.694)	
Partner Attained Higher Education		0.2254	1.253	0.3489	1.418	0.1926	1.212
		(0.226)		(0.212)		(0.226)	
Partner Education missing/unknown		2.2046	9.067	1.8417	6.307	2.2607	9.590
		(2.187)		(1.863)		(1.916)	
Partner Gets Drunk Often		2.1815 ***	8.860	2.2212 ***	9.218	2.1762 ***	8.813
		(0.267)		(0.272)		(0.269)	
Native Language: Indigenous		-0.8735 **	0.418	-0.7090 **	0.492	-0.7309 **	0.482
		(0.354)		(0.348)		(0.354)	
Potential Income at Age of Marriage		1.1271 ***	3.087	-		0.9272 **	2.527
		(0.319)				(0.367)	
Educational Attainment		-		-0.7739 ***	0.462	-0.3547	0.702
				(0.267)		(0.304)	
Decade of Marriage (Base Category = 2000s)							
60-70		-7.3345 ***	0.001	-6.9711 ***	0.001	-7.1730 ***	0.001
		(0.744)		(0.743)		(0.745)	
80-90		-4.5559 ***	0.011	-4.3303 ***	0.013	-4.4802 ***	0.011
		(0.489)		(0.485)		(0.491)	
Time-Varying Covariate							
Domestic Violence		1.4749 ***	4.371	1.3597 ***	3.895	1.4278 ***	4.170
		(0.209)		(0.208)		(0.208)	
Unobserved Heterogeneity							
σ_ε		2.6472 ***		2.5337 ***	12.600	2.6091 ***	
		(0.209)		(0.214)		(0.209)	
Ln-L		**-2324.72**		**-2328.02**		**-2324.11**	

NOTE: Asymptotic standard errors in parentheses;
Significance: '*'=10%; '**'=5%; '***'=1%.

Table II.B.2: Hazard Model of Divorce - with Unobserved Heterogeneity - DV Duration Spline
(Sample: women in their first marriage or who were married before once)

		I		II		III	
		β	exp(β)	β	exp(β)	β	exp(β)
Duration Splines							
Marriage Duration	0-4	0.4608 ***	1.585	0.5059 ***	1.658	0.4521 ***	1.572
		(0.159)		(0.158)		(0.159)	
	4-10	0.3680 ***	1.445	0.4476 ***	1.565	0.3799 ***	1.462
		(0.083)		(0.08)		(0.083)	
	10-15	0.2477 ***	1.281	0.3276 ***	1.388	0.2562 ***	1.292
		(0.091)		(0.085)		(0.092)	
	15-25	0.1293 *	1.138	0.2111 ***	1.235	0.1431 **	1.154
		(0.066)		(0.065)		(0.068)	
	25 or more	-0.0049	0.996	0.0871	1.091	0.0042	1.004
		(0.119)		(0.122)		(0.121)	
Woman's Age	Younger than 18	0.0172	1.017	-0.0568	0.946	0.0025	1.003
		(0.05)		(0.043)		(0.051)	
	18-25	-0.0919	0.913	-0.1770 ***	0.838	-0.1068 *	0.899
		(0.063)		(0.055)		(0.064)	
	25-35	-0.0289	0.972	-0.1185 **	0.889	-0.0457	0.956
		(0.055)		(0.049)		(0.058)	
	35 or older	0.1252 **	1.133	0.0469	1.048	0.1085 *	1.115
		(0.057)		(0.056)		(0.058)	
Parity	Intercept	-0.4739 ***	0.623	-0.4275 ***	0.652	-0.4443 ***	0.641
		(0.119)		(0.119)		(0.119)	
	Years since conception	0.0192 **	1.019	0.0170 **	1.017	0.0188 **	1.019
		(0.008)		(0.008)		(0.008)	
DV Duration Spline							
Years After First DV Event	0-1	1.5811 ***	4.860	1.4954 ***	4.461	1.5417 ***	4.673
		(0.323)		(0.322)		(0.322)	
	1-6	-0.1177	0.890	-0.1192	0.888	-0.1209	0.887
		(0.082)		(0.082)		(0.082)	
	6 years of later	0.0428	1.044	0.044	1.045	0.0418	1.043
		(0.027)		(0.028)		(0.028)	
Time Invariant Covariates							
Constant		-7.4063 ***	0.001	-7.8428 ***	0.000	-7.3764 ***	0.001
		(0.699)		(0.692)		(0.701)	
Partner Attained Higher Education		0.1799	1.197	0.2859	1.331	0.1275	1.136
		(0.225)		(0.211)		(0.223)	
Partner Education missing/unknown		2.2781	9.758	1.9577	7.083	2.3319	10.297
		(2.197)		(1.967)		(1.941)	
Partner Gets Drunk Often		2.1490 ***	8.576	2.1583 ***	8.656	2.1101 ***	8.249
		(0.274)		(0.275)		(0.274)	
Native Language: Indigenous		-0.8560 **	0.425	-0.6984 **	0.498	-0.7006 **	0.497
		(0.35)		(0.346)		(0.348)	
Potential Income at Age of Marriage		1.0870 ***	2.965	-		0.8676 **	2.381
		(0.314)				(0.361)	
Educational Attainment		-		-0.7687 ***	0.464	-0.38	0.684
				(0.262)		(0.298)	
Decade of Marriage (Base Category = 2000s)							
60-70		-7.0470 ***	0.001	-6.7111 ***	0.001	-6.7870 ***	0.001
		(0.773)		(0.756)		(0.767)	
80-90		-4.4026 ***	0.012	-4.1906 ***	0.015	-4.2514 ***	0.014
		(0.513)		(0.492)		(0.508)	
Unobserved Heterogeneity							
σ_ε		2.5369 ***		2.4465 ***		2.4697 ***	
		(0.228)		(0.231)		(0.23)	
Ln-L		**-2326.62**		**-2329.44**		**-2325.9**	

NOTE: Asymptotic standard errors in parentheses;
Significance: '*'=10%; '**'=5%; '***'=1%.

III. B Full set of Results

Table III.A.1: Propensity Score of civil conflict

Sample	Total	Urban	Rural
Individual Level Variables			
Mother's Native Language NOT Indigenous	-0.3674**	0.0053	-0.5264***
	(0.1863)	(0.1701)	(0.1502)
Mother's Native Language - Don't Know	-0.1342	-0.0813	-0.1486
	(0.3604)	(0.7362)	(0.4098)
Mother's Native Language - Missing	0.1881*	0.2248*	0.1481
	(0.1068)	(0.1309)	(0.1757)
Wealth Index - 1Q (Lowest)	0.6727***	0.3241	0.7096***
	(0.2057)	(0.6589)	(0.2295)
Wealth Index - 2Q	0.4483***	0.1073	0.4832**
	(0.1393)	(0.314)	(0.2112)
Wealth Index - 3Q		0.1108	0.3179
		(0.1826)	(0.1959)
Urban Area	0.9061***		
	(0.2229)		
Wealth Index - 1Q (Lowest) * Mita	-0.9991**		-0.3041
	(0.4793)		(0.5379)
Wealth Index - 2Q * Mita	0.1404		0.8408**
	(0.3615)		(0.3978)
Census 1981 District Level Variables			
Mita	1.0092***		0.3086
	(0.3211)		(0.4673)
Most Common Type of Residence in District: House - Census 1981	0.0429		
	(0.6878)		
Iliteracy (Percentage of Population in District of Residence) - Census 1981	-0.0698		-0.0837
	(0.4643)		(0.5293)
Most Common Type of Fuel for Cooking: Kerosene		0.1356	
		(0.2555)	
Most Common Type of Floor: Cement, Laminated Floor, Tiles		-0.6854	
		(0.576)	
Most Common Type of Floor: Cement or Parquet			-0.4034
			(0.317)
Most Common Type of Wall: Bricks			0.4692
			(0.5103)
No Sewage in Most Households			0.2875
			(0.4719)
GDP district 1980		-1.792946	
		(5.9003)	
Interactions			
Wealth Index - 1Q (Lowest) * Lives in Urban Area	-0.6776		
	(0.5934)		
Wealth Index - 2Q * Lives in Urban Area	-0.4085**		
	(0.1904)		
Mother's Native Language NOT Indigenous * Lives in Urban Area	0.2784		
	(0.2161)		
Mother's Native Language NOT Indigenous * Lives in Urban Area * Wealth Index - 1Q	-0.3493		
	(0.6326)		
Mother's Native Language NOT Indigenous * Wealth Index - 1Q	-0.218	-0.1711	
	(0.2452)	(0.706)	
Mother's Native Language NOT Indigenous * Wealth Index - 2Q	-0.2408	-0.3189	
	(0.164)	(0.318)	
Mother's Native Language NOT Indigenous * Wealth Index - 3Q		-0.3014*	
		(0.1708)	
GDP District 1980 * Wealth Index - 1Q		-5.42E-08	
		(1.48E-07)	
GDP District 1980 * Wealth Index - 2Q		-5.53E-09	
		(2.98E-09)	
GDP District 1980 * Wealth Index - 3Q		-3.02E-10	
		(1.25E-09)	
Constant	-0.1627	0.9841***	-0.4592
	(0.7013)	(0.2698)	(0.5148)
Pseudo - R2	**0.09**	**0.027**	**0.072**
BIC	**8876**	**3992**	**4905**
Observations	**7394**	**3658**	**3736**

* p<0.1, ** p<0.05, *** p<0.01

Table III.A.2: ATE of civil conflict on labor force participation – Double Robust Estimator – Total Sample

	No covariates			Including Covariates			
		Propensity Score		No interactions		Interactions with Urban Indicator	
	No propensity score	*Linear*	*4th power*	*No Propensity Score*	*Propensity Score - Linear*	*No Propensity Score*	*Propensity Score - Linear*
CC Indicator	0.0084	0.0152	0.0139	0.0227**	0.0198*	0.0266**	0.0243**
	(0.0104)	(0.0109)	(0.0108)	(0.011)	(0.0111)	(0.0111)	(0.0111)
Estimated propensity score		-0.1346***	-36.3840***		0.3013***		0.2163***
		(0.0366)	(9.3614)		(0.0712)		(0.072)
Estimated propensity score - Squared			111.7475***				
			(26.2453)				
Estimated propensity score - Cubic			-141.3838***				
			(31.8022)				
Estimated propensity score - Fourth			63.0408***				
			(14.0866)				
Woman's Age 15 - 19				-0.1223***	-0.1199***	-0.1135***	-0.1126***
				(0.0406)	(0.0405)	(0.0405)	(0.0405)
Woman's Age 20 - 24				-0.1201***	-0.1187***	-0.1119***	-0.1117***
				(0.0311)	(0.0311)	(0.0311)	(0.0311)
Woman's Age 25 - 29				-0.0201	-0.0185	-0.0144	-0.0138
				(0.0263)	(0.0263)	(0.0263)	(0.0263)
Woman's Age 30 - 34				-0.0074	-0.007	-0.0022	-0.0023
				(0.0234)	(0.0235)	(0.0234)	(0.0235)
Woman's Age 35 - 39				0.0004	0.002	0.0042	0.0049
				(0.0211)	(0.0212)	(0.0211)	(0.0212)
Woman's Age 40 - 44				0.023	0.0244	0.0231	0.024
				(0.0199)	(0.0199)	(0.0199)	(0.0199)
Woman is Household Head				0.1035***	0.1047***	0.0621***	0.0653***
				(0.0183)	(0.0184)	(0.0239)	(0.0241)
Duration of First Marriage/Cohabitation (years)				0.0004	0.0005	0.0007	0.0007
				(0.0011)	(0.0011)	(0.0011)	(0.0011)
Woman's Mother Native Language - Spanish				-0.0682***	-0.0224	-0.0607***	-0.0283
				(0.0128)	(0.0174)	(0.0129)	(0.0176)
Woman's Mother Native Language - Doesn't Remember				-0.0492	-0.0388	-0.0513	-0.0431
				(0.1046)	(0.1093)	(0.1057)	(0.1088)
Woman's Mother Native Language - Missing				0.0086	-0.0119	0.0062	-0.0085
				(0.0152)	(0.016)	(0.0152)	(0.0161)
Lives in Urban Area				-0.0606***	-0.1476***	-0.0181	-0.0890***
				(0.014)	(0.0232)	(0.0232)	(0.0315)
Altitude of Place of Residence (meters)				0.0000443***	0.0000472***	0.0000503***	0.0000474**
				(0.003)	(0.000015)	(0.011)	(0.0000199)
Altitude of Place of Residence (meters) - squared				-2.25E-09	-3.45E-09	3.13E-10	2.87E-10
				(0.536)	(3.64e-09)	(0.944)	(4.43e-09)
GDP per capita 1980 in Region of Residence				0.0165***	0.0161***	0.0176***	0.0171***
				(0.0035)	(0.0035)	(0.0036)	(0.0036)
Urban * Household Head						0.0625*	0.0589*
						(0.0347)	(0.0348)
Urban * Altitude						0.0000346	0.0000416
						(0.285)	(0.0000324)
Urban * Altitude squared						-0.0000000198**	-2.07e-08**
						(0.000015)	(8.32e-09)
Constant	0.7860***	0.8682***	4.8731***	0.7835***	0.6059***	0.7295***	0.6100***
	(0.0084)	(0.0224)	(1.215)	(0.0369)	(0.0578)	(0.0394)	(0.058)
R2	-	0.002	0.025	0.072	0.074	0.077	0.077
Adjusted-R2	-	0.001	0.024	0.07	0.071	0.074	0.075
BIC	7621	7620	7473	7018	7015	7010	7012
Observations	6691	6691	6691	6691	6691	6691	6691

* p<0.1, ** p<0.05, *** p<0.01
Robust Standard Errors in Parenthesis

(contd. next page)

Table III.A.2: ATE of civil conflict on labor force participation – Double Robust Estimator – Urban Sample (*contd.*)

	No Covariates		Covariates		
				Propensity Score	
	No Propensity Score	Propensity Score Linear	No Propensity Score	Linear	Squared
CC Indicator	0.0425**	0.0407**	0.0542***	0.0559***	0.0545***
	(0.0183)	(0.0183)	(0.0191)	(0.0191)	(0.0191)
Estimated propensity score		0.5663***		0.5820**	-15.2317***
		(0.1762)		(0.2431)	(5.2705)
Estimated propensity score - Squared					10.3495***
					(3.4419)
Woman's Age 15 - 19			-0.2101***	-0.2033***	-0.2146***
			(0.0655)	(0.0659)	(0.066)
Woman's Age 20 - 24			-0.1950***	-0.1907***	-0.1991***
			(0.0469)	(0.047)	(0.0469)
Woman's Age 25 - 29			-0.0542	-0.0507	-0.057
			(0.0408)	(0.0407)	(0.0407)
Woman's Age 30 - 34			-0.038	-0.0369	-0.0413
			(0.0372)	(0.0371)	(0.037)
Woman's Age 35 - 39			-0.016	-0.0156	-0.0172
			(0.0346)	(0.0345)	(0.0345)
Woman's Age 40 - 44			0.0317	0.0312	0.0318
			(0.0326)	(0.0326)	(0.0325)
Woman is Household Head			0.1114***	0.1126***	0.1109***
			(0.0253)	(0.0254)	(0.0253)
Duration of First Marriage/Cohabitation (years)			-0.0042***	-0.0040**	-0.0045***
			(0.0016)	(0.0016)	(0.0016)
Woman's Mother Native Language - Spanish			-0.0532**	-0.0403*	-0.0363
			(0.0227)	(0.0234)	(0.0234)
Woman's Mother Native Language - Doesn't Remember			0.1771***	0.2011***	0.1928***
			(0.0319)	(0.0365)	(0.0436)
Woman's Mother Native Language - Missing			-0.0131	-0.0428*	-0.0550**
			(0.0227)	(0.0258)	(0.026)
Altitude of Place of Residence (meters)			0.0001***	0.0001***	0.0001***
			(0.0000258)	(0.0000258)	(0.0000258)
Altitude of Place of Residence (meters) - squared			-1.84e-08***	-1.93e-08***	-0.0000***
			(7.05e-09)	(7.06e-09)	(7.11e-09)
GDP per capita 1980 in Region of Residence			0.0131**	0.0157***	0.0136**
			(0.0055)	(0.0056)	(0.0056)
Number of Children Under 5 in the Household			-0.0520***	-0.0511***	-0.0523***
			(0.0124)	(0.0125)	(0.0125)
Constant	0.7017***	0.2666*	0.8213***	0.3656*	6.3984***
	(0.0162)	(0.136)	(0.0528)	(0.1977)	(2.0201)
R2	0.002	0.003	0.047	0.048	0.051
Adjusted-R2	0.001	0.003	0.043	0.043	0.046
BIC	4427	4430	4188	4194	4193
Observations	3456	3456	3456	3456	3456

* p<0.1, ** p<0.05, *** p<0.01
Robust Standard Errors in Parenthesis

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Table III.A.2: ATE of civil conflict on labor force participation – Double Robust Estimator – Rural Sample *(contd.)*

	No Covariates		Covariates	
	No Propensity Score	Propensity Score Linear	No Propensity Score	Propensity Score Linear
CC Indicator	0.0085	-0.0054	0.0127	0.0082
	(0.0136)	(0.0136)	(0.0142)	(0.0142)
Estimated propensity score		0.7473***		0.4481***
		(0.0755)		(0.1444)
Woman's Age			0.0166**	0.0176***
			(0.0067)	(0.0067)
Woman's Age Squared			-0.0003***	-0.0003***
			(0.0001)	(0.0001)
Woman is Household Head			0.0770***	0.0818***
			(0.0244)	(0.0247)
Duration of First Marriage/Cohabitation (years)			0.0065***	0.0062***
			(0.0017)	(0.0017)
Woman's Mother Native Language - Spanish			-0.0526***	0.0224
			(0.0177)	(0.0298)
Woman's Mother Native Language - Doesn't Remember			-0.1469	-0.1466
			(0.1339)	(0.1378)
Woman's Mother Native Language - Missing			0.031	-0.0054
			(0.0201)	(0.0237)
Altitude of Place of Residence (meters)			0.0001***	0.0001***
			(0.0000214)	(0.000022)
Altitude of Place of Residence (meters) - squared			-4.79E-09	-3.07E-09
			(4.70e-09)	(4.78e-09)
GDP per capita 1980 in Region of Residence			0.0172**	0.0118
			(0.0071)	(0.0073)
Variation GDP 1970 - 1975			0.0034	0.0031
			(0.0023)	(0.0023)
Variation GDP 1975 - 1980			0.0022*	0.0023*
			(0.0013)	(0.0013)
Proportion of Catholics in District of Residence			-0.3566***	-0.3371***
			(0.0794)	(0.0795)
Constant	0.8436***	0.4753***	0.6362***	0.3647**
	(0.0096)	(0.04)	(0.1315)	(0.1567)
R2	-	0.04	0.101	0.105
Adjusted-R2	-	0.039	0.096	0.1
BIC	2243	2137	2048	2043
Observations	2820	2820	2820	2820

* p<0.1, ** p<0.05, *** p<0.01
Robust Standard Errors in Parenthesis

Table III.A.3: Domestic Violence Estimation – Women Resident in Areas Not Affected by the Civil Conflict

	OLS			Logit		
Sample:	Total	Urban	Rural	Total	Urban	Rural
Woman's age	0.0311**		0.0306*	0.1384*		0.1420*
	(0.0158)		(0.017)	(0.0723)		(0.0799)
Woman's Age squared	0.0003			0.0013		
	(0.0002)			(0.0008)		
Woman's Age 15-19		-0.0363			-0.1026	
		(0.151)			(0.7006)	
Woman's Age 20-24		-0.0255			-0.0596	
		(0.1232)			(0.5693)	
Woman's Age 25-29		0.1173			0.5512	
		(0.0771)			(0.3643)	
Woman's Age 30-34		0.1218*			0.5653*	
		(0.0653)			(0.3029)	
Woman's Age 35-39		0.1652***			0.7415***	
		(0.0599)			(0.2754)	
Less than 10 between 1990 and 1995		0.2279**			1.0167**	
		(0.0908)			(0.4096)	
Father Used to Beat Mother	0.1173***	0.1577***	0.1231***	0.5267***	0.7039***	0.5617***
	(0.0199)	(0.0356)	(0.0264)	(0.0901)	(0.1611)	(0.1216)
Mother Beat her Since 15	0.2296***	0.1760**	0.2084**	1.0076***	0.7647**	0.9457**
	(0.0575)	(0.0863)	(0.0837)	(0.263)	(0.3861)	(0.3977)
Father Beat her Since 15	0.1289**	0.0529	0.1794**	0.5750**	0.2317	0.8183**
	(0.0541)	(0.0816)	(0.0803)	(0.2428)	(0.3597)	(0.3734)
Age at First Marriage	-0.0492***		-0.0266	-0.2251***		-0.1235
	(0.0118)		(0.0172)	(0.0539)		(0.0811)
Duration of First Marriage	-0.0303***	0.0241***	-0.0166	-0.1321**	0.1137***	-0.0705
	(0.0116)	(0.0089)	(0.0169)	(0.0527)	(0.0427)	(0.0797)
Duration of First Marriage squared	-0.0004**	-0.0004	-0.0002	-0.0019**	-0.002	-0.001
	(0.0002)	(0.0003)	(0.0002)	(0.0008)	(0.0013)	(0.0008)
Altitude of Place of Residence	0.0000188**			0.0001***		
	(7.34e-06)			(0.0000342)		
Lives in Urban Area	0.0537**			0.2499**		
	(0.0242)			(0.1122)		
GDP per capita 1980	0.0120**		0.0118	0.0545**		0.0551
	(0.0055)		(0.0081)	(0.0249)		(0.0372)
Number of Household Members			-0.0087			-0.0423
			(0.0066)			(0.0313)
Altitude < 1000			-0.0466			-0.2066
			(0.0354)			(0.1665)
Altitude 1000 - 2000			-0.0910*			-0.4242*
			(0.0478)			(0.2302)
Altitude 3000 - 4000			-0.1188***			-0.5785***
			(0.0341)			(0.168)
Constant	0.3618**	-0.0293	0.1448*	-0.5534	-2.4162***	-1.6382***
	(0.1741)	(0.0911)	(0.083)	(0.8177)	(0.4461)	(0.3996)
R2	0.054	0.057	0.064			
Adjusted-R2	0.05	0.043	0.058			
Pseudo - R2				0.042	0.044	0.051
BIC	3218	1049	1839	3071	1003	1756
Observations	2389	737	1358	2389	737	1358

* p<0.1, ** p<0.05, *** p<0.01

Table III.A.4: Estimation of Equation (3) – NATE – No domestic violence Background Variables

	Total				Urban		Rural	
	I		II					
	Treated	Control	Treated	Control	Treated	Control	Treated	Control
DV	0.0629***	0.0536***	0.0229	0.0584***	0.0858***	0.0335	0.0405**	0.0744***
	(0.0137)	(0.0182)	(0.0221)	(0.0222)	(0.0188)	(0.0378)	(0.0187)	(0.0198)
DV * Urban			-0.0987	-0.0754				
			#VALUE!	(0.0938)				
Woman's Age	0.0281***	0.0274***	0.0278***	0.0275***	0.0319***	0.0287	0.0316***	0.0316***
	(0.0064)	(0.0081)	(0.0064)	(0.0081)	(0.0091)	(0.0184)	(0.0117)	(0.0118)
Woman's Age squared	-0.0004***	-0.0003***	-0.0003***	-0.0003***	-0.0004***	-0.0003	-0.0004**	-0.0004**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0003)	(0.0002)	(0.0002)
Household Head	0.1103***	0.0985***	0.1093***	0.0989***	0.1205***	0.1482**	0.0686*	0.0696*
	(0.0226)	(0.0309)	(0.0226)	(0.0309)	(0.0301)	(0.0574)	(0.0367)	(0.0391)
Woman's Mother Native Language - Spanish	-0.0332	0.0253	-0.0321	0.025	-0.026	0.0631	-0.0517**	-0.0141
	(0.0204)	(0.0305)	(0.0204)	(0.0305)	(0.0282)	(0.0632)	(0.023)	(0.0245)
Woman's Mother Native Language - Doesn't Remember	0.1076	-0.3280*	0.1115	-0.3259*	0.1709	0.317	0.0731	-0.3632**
	(0.1493)	(0.1966)	(0.1492)	(0.1967)	(0.2499)	(0.4748)	(0.136)	(0.1742)
Woman's Mother Native Language - Missing	0.0223	-0.0311	0.0211	-0.0309	0.0057	-0.0475	0.0549**	-0.0178
	(0.0195)	(0.0266)	(0.0195)	(0.0266)	(0.0246)	(0.0514)	(0.0251)	(0.025)
Lives in Urban Area	0.1622*	0.0931*	0.1332	0.0979*				
	(0.0926)	(0.0498)	(0.0934)	(0.0514)				
Share of Houses with Earthened Floor	-0.0011	0.1133	-0.0004	0.1136	0.094	0.1423		
	(0.0521)	(0.076)	(0.052)	(0.076)	(0.0799)	(0.164)		
Altitude of Place of Residence	0.0000***	0.0000***	0.0000***	0.0000***	0	0	0.0001***	0.0001***
	0	0	0	0	0	-0.0001	0	0
Altitude - squared					0	0		
					(0)	(0)		
Wealth Index - 1Q (Poorest)	0.1461	0.0798	0.1428	0.0801	-0.1301	0.0622		
	(0.0934)	(0.0525)	(0.0933)	(0.0526)	(0.1463)	(0.2378)		
Wealth Index - 2Q	0.1076	0.0389	0.1044	0.0392	-0.0483	-0.1399		
	(0.0931)	(0.0494)	(0.0931)	(0.0494)	(0.0428)	(0.0853)		
Wealth Index - 3Q	0.1598	0.0045	0.1595	0.0044	-0.0389	-0.0982*		
	(0.0974)	(0.0505)	(0.0973)	(0.0505)	(0.0267)	(0.0572)		
Wealth Index - 4Q					-0.0073	-0.0423		
					(0.0229)	(0.0486)		
Wealth Index - 1Q, 2Q, 3Q							0.1583	0.1185
							(0.1011)	(0.0759)
Wealth Index - 1Q (Poorest) * Urban	-0.3966***	-0.073	-0.3970***	-0.0747				
	(0.136)	(0.2018)	(0.1359)	(0.2019)				
Wealth Index - 2Q * Urban	-0.1538	-0.1526**	-0.1538	-0.1527**				
	(0.0988)	(0.0754)	(0.0987)	(0.0754)				
Wealth Index - 3Q * Urban	-0.2140**	-0.0938	-0.2151**	-0.0938				
	(0.0994)	(0.0608)	(0.0993)	(0.0609)				
Altitude * Urban	-0.0001***	0	-0.0001***	0				
	(0)	(0)	(0)	(0)				
Share of Population that doesn't Speak Spanish * Urban	0.2031***	0.0025	0.2024***	0.0022				
	(0.0613)	(0.1176)	(0.0612)	(0.1176)				
Share of Houses - Walls made of Brick or Quincha					-0.0791	-0.0772		
					(0.0495)	(0.0856)		
Younger than 10 between 1990 and 1995							0.0476	0.0423
							(0.0403)	(0.041)
Share of Houses with Source of Water: River or Canal							0.0782**	0.0363
							(0.034)	(0.0334)
Share of Houses - Walls made of Adobe							-0.042	-0.0886**
							(0.0433)	(0.0432)
Share of Houses - Roof made of Raw Materials							0.018	0.0346
							(0.0356)	(0.0361)
Share of Houses that own TV	0.1147*	-0.0704	0.1172*	-0.0684	0.2980***	-0.1508		
	(0.0605)	(0.1117)	(0.0605)	(0.1118)	(0.0975)	(0.2385)		
Average Number of Members per Household	-0.0021**	-0.0126	-0.0020**	-0.0127	-0.0021**	-0.0634		
	(0.0009)	(0.0162)	(0.0009)	(0.0162)	(0.001)	(0.0475)		
Share of Households that Use Logs for Cooking	0.1061**	0.0182	0.1061**	0.019	0.1268*	-0.1599		
	(0.048)	(0.0789)	(0.048)	(0.079)	(0.0755)	(0.1653)		
Share of Population that doesn't Speak Spanish	0.041	0.1119***	0.0444	0.1112***	0.2096***	0.0642		
	(0.0392)	(0.0399)	(0.0392)	(0.04)	(0.0635)	(0.1721)		
GDP per capita 1980							-0.0373***	0.0499***
							(0.0098)	(0.0073)
GDP growth 1975 - 1980							0.0045**	-0.0016
							(0.002)	(0.0013)
Constant	-0.0235	0.068	-0.0032	0.0653	-0.0196	0.4512	-0.0721	-0.1251
	(0.1407)	(0.1783)	(0.1409)	(0.1785)	(0.1608)	(0.4113)	(0.2374)	(0.2329)
R2	0.088	0.122	0.089	0.122	0.056	0.064	0.109	0.135
Adjusted-R2	0.082	0.112	0.083	0.112	0.048	0.035	0.1	0.126
BIC	3686	2085	3688	2093	2731	920	979	1105
Observations	3625	2044	3625	2044	2266	642	1410	1409

* p<0.1, ** p<0.05, *** p<0.01

Table III.A.5: Estimation of Equation (3) – NATE – Three domestic violence Background Variables

	Total				Urban		Rural	
	I		II					
	Treated	Control	Treated	Control	Treated	Control	Treated	Control
DV	0.0571***	0.0563***	0.0165	0.0615***	0.0802***	0.0401	0.0349*	0.0724***
	(0.0139)	(0.0185)	(0.0222)	(0.0225)	(0.0192)	(0.0382)	(0.0191)	(0.0201)
DV * Urban			0.0290**	-0.01				
			(0.0137)	(0.0181)				
Father Used to Beath Mother	0.0284**	-0.0099	0.0290**	-0.01	0.0224	-0.0255	0.0227	0.0049
	(0.0137)	(0.0181)	(0.0137)	(0.0181)	(0.019)	(0.0376)	(0.0185)	(0.0196)
Mother Beat her Since 15 Years Old	-0.0595	-0.0028	-0.0604	-0.003	-0.0819*	-0.0845	-0.0421	0.0649
	(0.0396)	(0.054)	(0.0396)	(0.054)	(0.0455)	(0.0986)	(0.077)	(0.0622)
Father Beat her Since 15 Years Old	0.0352	-0.0468	0.0335	-0.0473	0.0633	-0.0657	0.0631	-0.0246
	(0.0331)	(0.0498)	(0.0331)	(0.0499)	(0.0409)	(0.0882)	(0.0544)	(0.0595)
Woman's Age	0.0282***	0.0273***	0.0279***	0.0274***	0.0316***	0.0287	0.0316***	0.0314***
	(0.0064)	(0.0081)	(0.0064)	(0.0081)	(0.0091)	(0.0185)	(0.0117)	(0.0118)
Woman's Age squared	-0.0004***	-0.0003***	-0.0003***	-0.0003***	-0.0004***	-0.0003	-0.0004**	-0.0004**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0003)	(0.0002)	(0.0002)
Household Head	0.1109***	0.1015***	0.1099***	0.1020***	0.1210***	0.1561***	0.0676*	0.0703*
	(0.0226)	(0.031)	(0.0226)	(0.031)	(0.0301)	(0.0577)	(0.0367)	(0.0392)
Woman's Mother Native Language - Spanish	-0.0321	0.0245	-0.0309	0.0241	-0.0259	0.0569	-0.0483**	-0.0127
	(0.0204)	(0.0305)	(0.0204)	(0.0305)	(0.0282)	(0.0634)	(0.0231)	(0.0246)
Woman's Mother Native Language - Doesn't Remember	0.1149	-0.3321*	0.1189	-0.3300*	0.1708	0.2897	0.0866	-0.3612**
	(0.1492)	(0.1967)	(0.1491)	(0.1968)	(0.2498)	(0.4762)	(0.1363)	(0.1743)
Woman's Mother Native Language - Missing	0.0198	-0.0307	0.0186	-0.0306	0.0058	-0.0522	0.0515**	-0.017
	(0.0195)	(0.0266)	(0.0195)	(0.0266)	(0.0246)	(0.0517)	(0.0252)	(0.0251)
Lives in Urban Area	0.1578*	0.0947*	0.1285	0.0999*				
	(0.0925)	(0.0499)	(0.0933)	(0.0515)				
Share of Houses with Earthened Floor	-0.0031	0.1123	-0.0022	0.1126	0.0945	0.1353		
	(0.0521)	(0.0761)	(0.052)	(0.0761)	(0.0798)	(0.1645)		
Altitude of Place of Residence	0.0000***	0.0000**	0.0000***	0.0000**	0	0	0.0001***	0.0001***
	0	0	0	0	0	-0.0001	0	0
Altitude - squared					0	0		
					(0)	(0)		
Wealth Index - 1Q (Poorest)	0.1441	0.0802	0.1407	0.0806	-0.1279	0.053		
	(0.0933)	(0.0526)	(0.0933)	(0.0526)	(0.1462)	(0.2382)		
Wealth Index - 2Q	0.1051	0.0391	0.1018	0.0393	-0.0498	-0.1345		
	(0.0931)	(0.0494)	(0.093)	(0.0495)	(0.0429)	(0.0857)		
Wealth Index - 3Q	0.1537	0.006	0.1534	0.006	-0.0393	-0.0996*		
	(0.0974)	(0.0505)	(0.0973)	(0.0505)	(0.0267)	(0.0573)		
Wealth Index - 4Q					-0.0083	-0.0405		
					(0.0229)	(0.0487)		
Wealth Index - Q1,2,3							0.1587	0.1192
							(0.1028)	(0.076)
Wealth Index - 1Q (Poorest) * Urban	-0.3927***	-0.0784	-0.3933***	-0.0802				
	(0.1359)	(0.2019)	(0.1359)	(0.202)				
Wealth Index - 2Q * Urban	-0.1509	-0.1514**	-0.1509	-0.1515**				
	(0.0987)	(0.0755)	(0.0987)	(0.0755)				
Wealth Index - 3Q * Urban	-0.2075**	-0.0978	-0.2087**	-0.0978				
	(0.0993)	(0.0609)	(0.0993)	(0.061)				
Altitude * Urban	-0.0001***		-0.0001***					
	(4.22e-06)		(4.25e-08)					
Share of Population that doesn't Speak Spanish * Urban	0.2010***	-0.0015	0.2002***	-0.0019				
	(0.0612)	(0.1177)	(0.0612)	(0.1178)				
Share of Houses - Walls made of Brick or Quincha					-0.0846*	-0.0687		
					(0.0495)	(0.0859)		
Younger than 10 between 1990 and 1995							0.0468	0.0422
							(0.0403)	(0.041)
Share of Houses with Source of Water: River or Canal							0.0773**	0.037
							(0.0341)	(0.0334)
Share of Houses - Walls made of Adobe							-0.0427	-0.0889**
							(0.0433)	(0.0432)
Share of Houses - Roof made of Raw Materials							0.0163	0.036
							(0.0356)	(0.0363)
Share of Houses that own TV	0.1154*	-0.0661	0.1179*	-0.0639	0.3075***	-0.1666		
	(0.0605)	(0.1119)	(0.0605)	(0.1121)	(0.0976)	(0.2393)		
Average Number of Members per Household	-0.0021**	-0.0125	-0.0020**	-0.0125	-0.0021**	-0.0606		
	(0.0009)	(0.0162)	(0.0009)	(0.0162)	(0.001)	(0.0476)		
Share of Households that Use Logs for Cooking	0.1068**	0.0217	0.1069**	0.0226	0.1333*	-0.1727		
	(0.048)	(0.0791)	(0.048)	(0.0792)	(0.0756)	(0.1665)		
Share of Population that doesn't Speak Spanish	0.0392	0.1137***	0.0426	0.1129***	0.2034***	0.0644		
	(0.0392)	(0.04)	(0.0392)	(0.04)	(0.0635)	(0.1723)		
GDP per capita 1980							-0.0379***	0.0499***
							(0.0098)	(0.0073)
GDP growth 1975 - 1980							0.0045**	-0.0016
							(0.002)	(0.0013)
Constant	-0.0314	0.0742	-0.0112	0.0713	-0.0244	0.4711	-0.0824	-0.1268
	(0.1409)	(0.1787)	(0.1411)	(0.1789)	(0.1609)	(0.4142)	(0.2383)	(0.2333)
R2	0.09	0.123	0.091	0.123	0.059	0.067	0.111	0.136
Adjusted-R2	0.083	0.112	0.084	0.112	0.05	0.034	0.1	0.125
BIC	3703	2106	3705	2113	2748	937	998	1125
Observations	3625	2043	3625	2043	2266	641	1410	1409

* p<0.1, ** p<0.05, *** p<0.01

Table III.A.5: Estimation of Equation (3) – NATE – Interacting domestic violence with Covariates

	Total		Urban		Rural	
	Treated	Control	Treated	Control	Treated	Control
DV	-0.3762*	0.5115*	-0.5655*	0.584	0.0228	0.0689***
	(0.2206)	(0.2919)	(0.3033)	(0.6479)	(0.0196)	(0.0212)
Father Used to Beath Mother	0.0282**	-0.0093	0.0228	-0.0262	0.0228	0.0049
	(0.0137)	(0.018)	(0.019)	(0.0376)	(0.0185)	(0.0196)
Mother Beat her Since 15 Years Old	-0.0598	-0.0076	-0.0791*	-0.0935	-0.0475	0.0657
	(0.0396)	(0.054)	(0.0455)	(0.0985)	(0.0769)	(0.0623)
Father Beat her Since 15 Years Old	0.033	-0.0493	0.0604	-0.053	0.0626	-0.0251
	(0.0332)	(0.0498)	(0.0408)	(0.0882)	(0.0543)	(0.0595)
Woman's Age	0.0206**	0.0308***	0.0154	0.0361	0.0300**	0.0316***
	(0.0081)	(0.0098)	(0.0116)	(0.0225)	(0.0117)	(0.0118)
Woman's Age squared	-0.0002**	-0.0004**	-0.0002	-0.0004	-0.0004**	-0.0004**
	(0.0001)	(0.0001)	(0.0002)	(0.0003)	(0.0002)	(0.0002)
Household Head	0.1429***	0.0808*	0.1176***	0.1527***	0.0691*	0.0707*
	(0.0343)	(0.042)	(0.0301)	(0.0577)	(0.0367)	(0.0392)
Woman's Mother Native Language - Spanish	-0.0616**	0.0177	-0.0277	0.0528	-0.0497**	-0.013
	(0.0275)	(0.0393)	(0.0282)	(0.0636)	(0.0231)	(0.0246)
Woman's Mother Native Language - Doesn't Remember	0.0777	-0.5258**	0.1524	0.34	0.0876	-0.3624**
	(0.1979)	(0.2254)	(0.2499)	(0.4762)	(0.136)	(0.1744)
Woman's Mother Native Language - Missing	0.0433*	-0.0306	0.0061	-0.0531	0.0535**	-0.0167
	(0.026)	(0.0327)	(0.0246)	(0.0516)	(0.0252)	(0.0251)
Lives in Urban Area	0.1097	0.1342**				
	(0.0944)	(0.0528)				
Share of Houses with Earthened Floor	-0.0015	0.1207	0.089	0.1267		
	(0.052)	(0.0762)	(0.0798)	(0.1647)		
Altitude of Place of Residence	0.0000***	0.0000**	0	0	0.0001***	0.0001***
	(0)	(0)	(0)	(0.0001)	(0)	(0)
Altitude - squared	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)
Wealth Index - 1Q (Poorest)	0.1418	0.0871*	-0.1218	0.0153		
	(0.0933)	(0.0524)	(0.1461)	(0.2386)		
Wealth Index - 2Q	0.1031	0.0434	-0.0506	-0.1355		
	(0.093)	(0.0493)	(0.0429)	(0.0857)		
Wealth Index - 3Q	0.1554	0.0148	-0.0393	-0.0863		
	(0.0974)	(0.0504)	(0.0267)	(0.0576)		
Wealth Index - 4Q			-0.009	-0.0406		
			(0.0229)	(0.0487)		
Wealth Index - Q1,2,3					0.1578	0.1192
					(0.1026)	(0.076)
Wealth Index - 1Q (Poorest) * Urban	-0.3962***	-0.1273				
	(0.1359)	(0.2016)				
Wealth Index - 2Q * Urban	-0.1538	-0.1733**				
	(0.0986)	(0.0756)				
Wealth Index - 3Q * Urban	-0.2082**	-0.1032*				
	(0.0993)	(0.0609)				
Altitude * Urban	-0.0001***	0				
	(0)	(0)				
Share of Population that doesn't Speak Spanish * Urban	0.0282**	-0.0093	0.0228	-0.0262	0.0228	0.0049
	(0.0137)	(0.018)	(0.019)	(0.0376)	(0.0185)	(0.0196)
Share of Houses - Walls made of Brick or Quincha			-0.0861*	-0.0635		
			(0.0495)	(0.0863)		
Younger than 10 between 1990 and 1995					0.0442	0.0429
					(0.0403)	(0.0411)
Share of Houses - Walls made of Adobe					-0.0428	-0.0895**
					(0.0433)	(0.0432)
Share of Houses - Roof made of Raw Materials					0.0152	0.036
					(0.0356)	(0.0363)
Share of Houses that own TV	-0.1511*	0.2228*	-0.1439*	0.2734		
	(0.081)	(0.1221)	(0.0845)	(0.2035)		
Average Number of Members per Household	-0.0021**	-0.0132	-0.0021**	-0.0644		
	(0.0009)	(0.0162)	(0.001)	(0.0476)		
Share of Households that Use Logs for Cooking	0.1073**	0.0196	0.1306*	-0.1811		
	(0.0481)	(0.0791)	(0.0756)	(0.1675)		
Share of Population that doesn't Speak Spanish	0.0208	0.1442***	0.2055***	0.0797		
	(0.0456)	(0.049)	(0.0635)	(0.1722)		

(Contd. next page)

Table III.A.5: Estimation of Equation (3) – NATE – Interacting domestic violence with Covariates (Contd.)

	Total		Urban		Rural	
	Treated	Control	Treated	Control	Treated	Control
GDP per capita 1980					-0.0526***	0.0476***
					(0.0114)	(0.0085)
GDP growth 1975 - 1980					0.0045**	-0.0016
					(0.002)	(0.0013)
Altitude * Urban	-0.0001***	0				
	(0)	(0)				
Share of Population that doesn't Speak Spanish * Urban	0.2024***	0.029				
	(0.0614)	(0.1179)				
Share of Houses with Source of Water: River or Canal					0.0768**	0.037
					(0.034)	(0.0334)
DV*Age	0.0208	-0.0203	0.0428**	-0.0292		
	(0.0132)	(0.0174)	(0.0185)	(0.039)		
DV*Age squared	-0.0003	0.0002	-0.0006**	0.0003		
	(0.0002)	(0.0003)	(0.0003)	(0.0006)		
DV * Household Head	-0.063	0.0449				
	(0.0456)	(0.062)				
DV*Woman's Mother Native Language - Spanish	0.0686*	0.0183				
	(0.0407)	(0.0624)				
DV*Woman's Mother Native Language - Doesn't Remember	0.0746	0.8530*				
	(0.3016)	(0.4572)				
DV*Woman's Mother Native Language - Missing	-0.0592	0.0084				
	(0.039)	(0.0546)				
DV*Urban	0.1138***	-0.1159**				
	(0.0409)	(0.0535)				
DV*Share of Houses that Own TV in the District of Reside	-0.1511*	0.2228*	-0.1439*	0.2734		
	(0.081)	(0.1221)	(0.0845)	(0.2035)		
DV*Share of Population that doesn't Speak Spanish	0.0486	-0.0992				
	(0.0583)	(0.0742)				
DV*GDP per capita 1980					0.0481***	0.0057
					(0.0186)	(0.0109)
Constant	0.1248	-0.0273	0.2203	0.3515	-0.0485	-0.1282
	(0.1608)	(0.2004)	(0.1982)	(0.4664)	(0.2381)	(0.2334)
R2	0.094	0.133	0.062	0.076	0.115	0.136
Adjusted-R2	0.085	0.119	0.052	0.038	0.103	0.124
BIC	3759	2150	2763	950	998	1132
Observations	3625	2043	2266	641	1410	1409

* p<0.1, ** p<0.05, *** p<0.01

III.B. Tables of Means

Demographic and Health Survey (DHS) 2005-2008 – Total Sample (*n=6,961*)

	Mean	Std. Dev.	Min.	Max
Lives in urban area	0.498	0.500	0	1
Lives in district affected by Civil Conflict (CC)	0.638	0.480	0	1
Worked in the last 12 months (LO)	0.792	0.406	0	1
Was victim of physical/sexual violence (DV)	0.388	0.487	0	1
Father used to beat mother	0.413	0.492	0	1
Woman beated by mother since 15	0.032	0.176	0	1
Woman beated by father since 15	0.040	0.197	0	1
Age	33.145	8.268	15	49
No education	0.060	0.237	0	1
Incomplete Primary	0.250	0.433	0	1
Complete Primary	0.114	0.318	0	1
Incomplete Secondary	0.146	0.353	0	1
Complete Secondary	0.203	0.402	0	1
Higher Education	0.227	0.419	0	1
Wealth Index Quintile 1 (Poorest)	0.198	0.398	0	1
Wealth index Quintile 2	0.267	0.443	0	1
Wealth index Quintile 3	0.198	0.399	0	1
Wealth index Quintile 4	0.174	0.379	0	1
Wealth index Quintile 5 (Richest)	0.162	0.369	0	1
Woman is household head	0.089	0.285	0	1
Age at first marriage / cohabitation	20.185	4.694	10	45
Marriage duration	12.469	8.105	0	36.08333
Woman's mother native language Spanish	0.686	0.464	0	1
Number of children under 5 in Household	0.814	0.827	0	7
Altitude (meters) of district of residence	1674.702	1566.763	3	4723
Per capita GDP region of residence 1980	0.495	1.495	0.02559	7.71736
GDP growth region of residence 1970 - 1975	3.307	4.244	-7.2	11.6
GDP growth region of residence 1975 - 1980	4.111	8.519	-4.1	40.9

Demographic and Health Survey (DHS) 2005-2008 – Urban Sample (*n=3,456)*

	Mean	Std. Dev.	Min.	Max
Lives in urban area	1.000	0.000	1	1
Lives in district affected by Civil Conflict (CC)	0.769	0.421	0	1
Worked in the last 12 months (LO)	0.734	0.442	0	1
Was victim of physical/sexual violence (DV)	0.406	0.491	0	1
Father used to beat mother	0.434	0.496	0	1
Woman beated by mother since 15	0.046	0.210	0	1
Woman beated by father since 15	0.054	0.226	0	1
Age	33.451	8.082	15	49
No education	0.003	0.056	0	1
Incomplete Primary	0.071	0.256	0	1
Complete Primary	0.030	0.171	0	1
Incomplete Secondary	0.151	0.358	0	1
Complete Secondary	0.310	0.462	0	1
Higher Education	0.435	0.496	0	1
Wealth Index Quintile 1 (Poorest)	0.005	0.074	0	1
Wealth index Quintile 2	0.063	0.244	0	1
Wealth index Quintile 3	0.270	0.444	0	1
Wealth index Quintile 4	0.330	0.470	0	1
Wealth index Quintile 5 (Richest)	0.332	0.471	0	1
Woman is household head	0.108	0.311	0	1
Age at first marriage / cohabitation	21.489	4.837	10	43
Marriage duration	11.282	7.739	0	36.08333
Woman's mother native language Spanish	0.839	0.367	0	1
Number of children under 5 in Household	0.667	0.747	0	7
Altitude (meters) of district of residence	872.807	1279.069	3	4338
Per capita GDP region of residence 1980	0.501	1.378	0.02559	7.71736
GDP growth region of residence 1970 - 1975	3.365	4.369	-7.2	11.6
GDP growth region of residence 1975 - 1980	4.371	9.491	-4.1	40.9

Demographic and Health Survey (DHS) 2005-2008 - Rural Sample (*n=2,820)*

	Mean	Std. Dev.	Min.	Max
Lives in urban area	0.000	0.000	0	0
Lives in district affected by Civil Conflict (CC)	0.500	0.500	0	1
Worked in the last 12 months (LO)	0.848	0.359	0	1
Was victim of physical/sexual violence (DV)	0.364	0.481	0	1
Father used to beat mother	0.388	0.487	0	1
Woman beated by mother since 15	0.020	0.141	0	1
Woman beated by father since 15	0.029	0.169	0	1
Age	32.967	8.454	15	49
No education	0.100	0.300	0	1
Incomplete Primary	0.423	0.494	0	1
Complete Primary	0.204	0.403	0	1
Incomplete Secondary	0.141	0.348	0	1
Complete Secondary	0.103	0.304	0	1
Higher Education	0.029	0.169	0	1
Wealth Index Quintile 1 (Poorest)	0.263	0.441	0	1
Wealth index Quintile 2	0.560	0.496	0	1
Wealth index Quintile 3	0.165	0.371	0	1
Wealth index Quintile 4	0.010	0.099	0	1
Wealth index Quintile 5 (Richest)	0.002	0.042	0	1
Woman is household head	0.063	0.243	0	1
Age at first marriage / cohabitation	18.944	4.150	11	45
Marriage duration	13.730	8.314	0	35.91667
Woman's mother native language Spanish	0.629	0.483	0	1
Number of children under 5 in Household	0.911	0.862	0	5
Altitude (meters) of district of residence	2501.268	1352.274	3	4723
Per capita GDP region of residence 1980	0.418	1.434	0.02559	7.71736
GDP growth region of residence 1970 - 1975	3.503	4.006	-7.2	11.6
GDP growth region of residence 1975 - 1980	3.558	7.165	-4.1	40.9

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