Paternidad responsable: Efectos económicos de la legislación de reconocimiento obligatorio de los hijos[1]

Responsible Fathers: Behavioral impact of child support legislation in Costa Rica

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1 Abstract

In 2001, a Law was passed in Costa Rica that made it mandatory for men to submit to a DNA test if the mother of a recently born baby claimed they were the father. To acknowledge a child in Costa Rica has significant legal and economic effects, particularly due to strongly enforced child support laws. This paper seeks to explore the overall effects of such a law: how do men react towards risky (unprotected) sex given that potential costs have increased? How does family structure change? How do economic outcomes change for children and women, given this kind of shock to family structures?

2 Introduction

Latin America in general and Costa Rica in particular have had, historically, a high fraction of births from single mothers. Fathers often would refuse to acknowledge the child to avoid child support. Even such early practitioners of the economic analysis of marriage such as Gary Becker in his Theory of Marriage [Becker1974] point out that the difficulty of divorcing in Latin America (back in 1974) encourages consensual unions.

In the late 1990s, the fraction of children without a registered father in Costa Rica increased so much that politicians felt compelled to take action. The result was the Ley de Paternidad Responsable (Responsible Paternity Law), which made it much easier for unwed mothers to register the presumptive father of the child and made it compulsory for men to submit to a DNA test to verify the mother's claim if they rejected it.

This is, due to the particular Costa Rican context, a reproductive policy change that changes the relative costs of risky sex for men and women [3]. Most reproductive policy changes tend to be very controversial both politically and in terms of measuring their true impact. To be concrete about the difficulty with impact measurement consider an increase in the availability of a contraceptive. The contraceptive might decrease the likelihood of a pregnancy given the level of sexual activity. However, if sexual activity increases because couples have less fear of a

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[3] This wasn't the original intention of the Law. One of the reasons the Law was passed with such high support was the personal involvement of then-President Rodríguez, who had made it a centerpiece of his government. In a brief interview with me, he pointed out that his main goal was to "ensure the intergenerational wealth transfer from fathers to their children".

pregnancy, this change in behavior can more than offset the direct effect of the contraceptive, paradoxically increasing the number of pregnancies.

Abortion in particular is especially controversial in its effects. [Ananat *et al.*2009] use a terminology of marginal pregnancies and marginal births to explain this dynamic. Couples might engage in unprotected sex more often after abortion is available: this would increase the number of pregnancies and more of them would not be desired or planned. However, women might not follow through with an actual abortion after they are pregnant, either because they are unable or unwilling. If they are unable to get an abortion (cost, distant clinics) then the birth outcomes are worse. If they are unwilling to abort, then presumably they want the baby and the set of birth outcomes is better than before abortion.

Identifying the effects of abortion is very difficult because the same period of time saw the rise of the Pill [4] and the availability of unilateral divorce laws [5]. The seminal papers that drew this battleground were: First, [Akerlof *et al.*1996] who find that out-of-wedlock births increase after abortion and contraceptives became widely available because women who want children lose the ability to guilt men into shotgun-marrying them. Second, [Gruber *et al.*1999] who find that the selection effect of abortion is positive, that is, the pregnancies that are terminated happen to be those where the women believe the outcome will be adverse.

Finally, [Ananat *et al.*2009] solve the conflict by showing that even if there are more out-of-wedlock mothers after abortion, as long as the children are strongly desired by those mothers, there will be positive selection and children born after abortion legalization have better outcomes.

One of the important contributions of this research is that [Akerlof *et al.*1996] and [Levine2001] both point out that making it harder for men to avoid their responsibility towards the child could have very different results from the ones described so far in the literature and that this particular effect hasn't been explored. The Responsible Paternity Law is precisely about a change that affects primarily men's costs.

3 Institutional Background

Costa Rica is a middle-income country with stable political and economic institutions. This stability allowed the country to achieve what is widely considered a positive outlier status in terms of health outcomes relative to its income. For example, average life expectancy exceeds that of much wealthier countries. Of more direct concern to this research, important gains in infant mortality (which is often linked to fertility outcomes) were achieved in the sixties and seventies. Therefore, infant mortality has been low the last three decades: in 1988 it was already 14.67 deaths per thousand newborns and this has steadily decreased to 8.95 in 2008 [Ins2008]. These good outcomes are partly due to a political and legal system that has long made it a priority to protect the well-being of children.

[4] which [Goldin and Katz2000] describe as not only changing the education and professional choices of Pill-users, but even of those women that weren't using it but knew that the late-marriage market was thickening thanks to the cohort-wide delay of marriage

[5] see [Alesina and Giuliano2006] and their finding that it decreases the total fertility rate, especially among out-of- wedlock mothers

3.1 The Responsible Paternity Law and previous legislation

The *Ley de Paternidad Responsable* (Responsible Paternity Law) was signed by President Rodríguez on April 16th, 2001. It was then published in the official newspaper [6] on April 27th, 2001 [Congress2001], but to analyze its impact, the key date is February 26th, the date of the first debate in Congress, when it was approved by all but 3 congressmen and its eventual passage was certain. This date was also the start of major media exposure of the law and its immediate effects.

After the passage of the Responsible Paternity Law it became compulsory for a man to submit to DNA testing when the mother of a newborn child claims he is the presumptive father. "Malicious behavior", that is, refusal to submit to the test, implies automatic paternity. In particular, the key change is that to request the test, it suffices with a written claim by the mother.

This last point is extremely important, because a 1997 reform to the Family Code already made it compulsory for men to submit to DNA tests and malicious behavior already implied automatic paternity [Congress1997]. However, that reform still required a court order for the DNA test and placed the burden of proof upon the mother. Mothers had to find witnesses to their relationship with the presumptive father before they were able to obtain this court order. This process, besides being unpredictable and subject to the whims of the presiding judge, often took years and was very costly, so most mothers gave up if they were liquidity constrained or if they lacked credible witnesses to the relationship. [Camacho2006]

Besides the key change that the written claim of the mother now suffices to request the DNA test, there were another four major changes. First, mothers now get retroactive child support for the entire pregnancy costs. Second, fathers that refuse to acknowledge the child lose any custody rights, even though they still pay child support. Third, the State, through the Social Security Administration, guaranteed initial funding for the tests, which are paid afterwards by the man if he turns out to be the father, by the woman if not. Fourth, it was now permitted to register the presumptive father of the newborn in the hospital even in his absence. However, final legal affiliation of out-of-wedlock paternity still has to be decided by a court, subject to the voluntary acknowledgement of the father or to the DNA test results[7].

The core of family law is the 1973 Código de Familia (Family Code) [Congress1973] which is part of the Costa Rican civil law system. Early versions of the Code appeared in 1842 and early child support laws were published in 1916, but the latest version dates from 1996 [Benavides2007]. Recent major amendments include the 1995 addition of 3-year proven cohabitation as equivalent, upon dissolution, to marriage, for asset and child support purposes[8][Congress1995]. No-fault divorce [9], exists since 1970 if the marriage had lasted at least 3 years. This restriction of no-fault divorce was removed in late 2008, so its effects are beyond the period of interest of this research.

For a child to receive support, the father must be legally affiliated. Registering affiliation within marriage is usually a simple matter given the high quality of the marriage registry: the husband of the mother is the father. To affiliate a child outside marriage, there are three major

[6] Laws in Costa Rica are enforceable only after publication in the official newspaper

[7] There is no registry of cohabiting couples as there is with married ones, so it can't be an automatic administrative decision

[8] This doesn't apply to same-sex partnerships, which currently have no legal status in Costa Rica

[9] of interest in the literature as a potential confounding factor when analyzing fertility decisions, see [Alesina and Giuliano2006]

venues: a)Direct acknowledgement [10]. b) The administrative procedure described in the Responsible Paternity Law. c) A court declaration of paternity. In the past, having an out-of-wedlock affiliation meant the child had fewer rights, but this is not true anymore[Camacho2006].

3.2 Enforcement of Child Support Legislation

The Responsible Paternity Law by itself only means that more children are affiliated with their biological father, but its true impact comes in the connection to child support payments, which are somewhat arbitrary, but frequently reach 25-35% of income [Mata and Vargas2010] and multiple children can add up to 50% of income. Payments continue until the child reaches legal adulthood (18 years old) or up to 25 years old if the child is studying.

Not only is child support expensive, the Law of Child Support Payments [Congress1996] has strong built-in enforcement mechanisms: it restricts travel outside Costa Rica for the obligor (the parent that has to pay child support) unless 13 months of payments are deposited in advance. For salaried workers, their wage can be embargoed. There is jail for up to six months if the obligor is not salaried and refuses to pay even after repeated requests [11]. Trying to hide assets to avoid payment can result in fines up to 20 times the monthly payment. Not having a job is no excuse to avoid payment.

Furthermore, the family law court system has very experienced judges and lawyers thanks to its long period of development and specialization and heavy but quickly-handled caseloads (23 thousand child support cases in 2004). For example, there are six specialized child support courts and also sixty-six small-issue courts that can handle child support problems. Furthermore, universities that train lawyers must require their students to provide a certain number of hours of social service which is very often focused in child support and domestic violence cases.

The widespread knowledge that child support is strongly enforced made the Responsible Paternity Law very popular. Children received all this protection if they had parental affiliation, but those fathers who rejected affiliation didn't have to pay anything. This was perceived as a great injustice. Hence, polls on the Responsible Paternity Law while it was under discussion in Congress showed support in the 90% range and it was higher among men [Vega2001a]. Costa Rican men, facing an actual pregnancy, might prefer to shirk their responsibility, but the framing of the Law as "Responsibility" made it very difficult to oppose it. In any case, studies of Costa Rican men's attitudes towards paternity and gender roles show that these were closer to developed country attitudes than to countries such as El Salvador [Ortega *et al.*2005]. This same study also found that in 2002, 77% of Costa Rican men knew about the Responsible Paternity Law.

Before the Responsible Paternity Law was passed, several scholars tried to build the case for passing it. Foremost among those efforts was [Budowski and Rosero-Bixby2000] who used data on childhood poverty and levels of fatherless children to emphasize the need for a new Law.

In September 2000, Vega did an analysis of the psychological issues on the first women that were able to request the paternity inscription. There is a paper [Vega2001b] and a small book [Vega2001a]. In the paper, Vega interviews 100 single mothers that gave birth in two of the major hospitals. According to her research, 82% of the women claimed to have a good relationship with

[10] which, if performed soon after birth, can be done even against the wishes of the mother [Aguirre *et al.*2006]

[11] this really happens: at any point in time, there are roughly 150 men in jail due to child support non-payment, e.g in June 19th, 2010 there were 187 men in prison due to child support nonpayment [Mata2010]

the father. Additionally, a majority of those fathers had helped during the pregnancy. In the end, her sample of 100 single mothers between August 25th and September 20th, 2000 had only 42% of registered fathers. The Census and Statistics database shows 561 births from single mothers in those two hospitals over this period, of which 40% had a registered father. This would seem to imply that the interviewed sample is close to the true population.

It seems strange that, if 82% of women had such a good relationship to their unmarried partners, half of them had such a hard time getting the father to register. However, this would explain why after the law so few DNA tests were needed relative to the number of additional children that had a registered father (that is, out of 150 thousand new registered children, less than 17 thousand DNA tests were needed).

[Vega2006] examined the characteristics of mothers and in particular, how likely were mothers to request a DNA test. However, this study focuses only in the 2002 to 2005 period, that is, after the law, so it doesn't explore the changes before and after the law.

3.3 The direct effects of the Paternity Law

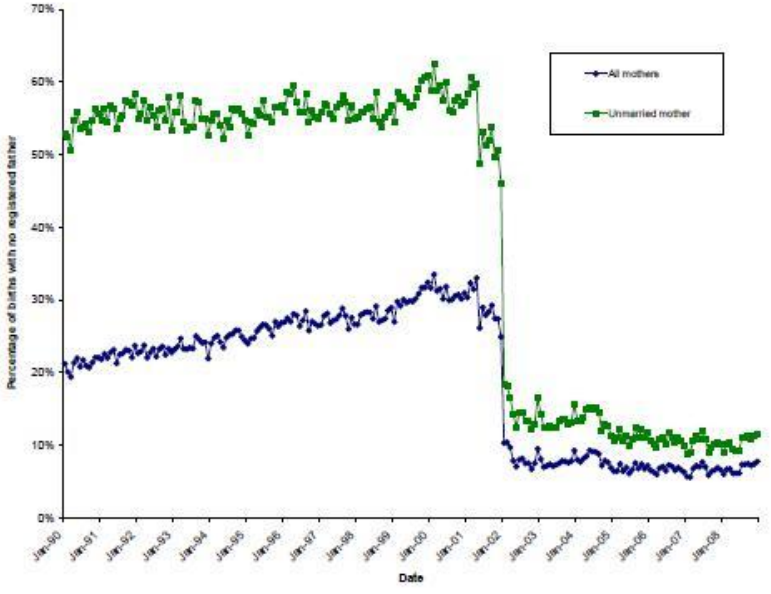

Figure 1: Percentage of children without a registered father at birth, monthly from 1990 to 2008

Notes: Source is the Birth Database of the Institute of Census and Statistics

For the original purposes of the Law, which were to reduce significantly the number of children without a registered father at birth, it was wildly successful. Unknown fathers went from roughly 30% of all births in 2001 to 8% after the Law (2002), and the change was much more dramatic for births to single mothers, which went from 55% to 18%. In absolute numbers this implies that, given an average of 75 thousand births yearly, more than 20 thousand additional children per year now have a registered father at birth (for a total of more than 140 thousand in the period 2002-2008), see Figure **Error! Reference source not found.**.

Of course, this number overestimates the actual change in final registration of fathers, because before the law some fathers ended up acknowledging the child some time after the birth.

However, the great success of the law was how few DNA test were needed (less than 35 thousand by the end of 2008): the threat sufficed.

After the Law, three important changes can be seen in Figure **Error! Reference source not found.**: 1. the drop in the total number of births, 2. the drop in the number of children registered as born within a marriage 3. The appearance of a clear distinction, among unmarried mothers, between those that are cohabiting and those that self-report as being single.

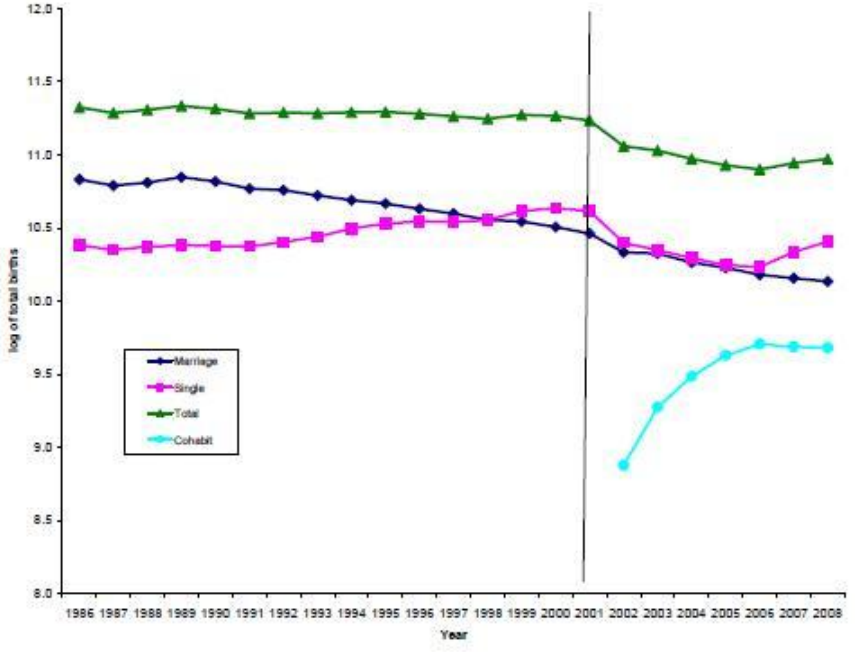

Figure 2: Natural logarithm of the number of yearly births from 1990 to 2008, total and by marital status

Black vertical line emphasizes the year 2001, when the law was passed. Source of data is the Birth Database of the Institute of Census and Statistics

4 Data sources

The main data sources for the behavioral and economic analysis are:

1. The Birth Micro data at the Costa Rican Census and Statistics Institute, which compiles some basic information on 1.8 million births from 1986 to 2008. Among the information that is available in this data set is: day of birth and location (hospital-level), whether the child is single or twins (or higher multiples), gender of the child, weight at birth. Of the mother we have age, civil status and nationality. Of the father we have, if known, age and civil status. There is also an affiliation variable that has a value of 1 if the parents of the child live together (this is important because many women who claim to have a domestic partnership are not actually living in the same household with the father).

This data is acquired because any child born in Costa Rica becomes a citizen of Costa Rica, but to obtain this birthright, by law the child has to be inscribed in the Civil Registry. Hence, in every Costa Rican hospital there is an office of the Civil Registry, with at least one official in charge of ensuring inscription. Before the Paternity Law, an unwed father had to arrive at the hospital in person and sign the birth certificate to be formally registered as the father.[Vega2001b]

The Law of the Supreme Electoral Tribunal and the Civil Registry, after the paternity law, states that an unmarried mother must be informed of the implications of claiming a presumptive father for the child if said father is not there to sign. The child is registered with the mother's surnames while the Civil Registry attempts to locate the father.[Congress1965]

The births database is not a sample. It includes the entire population of births in Costa Rica (75 thousand births per year in recent times), with very high coverage (close to 98% of all births). In all years since 1985, the database includes the day, month and year of birth, weight and height of the newborn, length of the pregnancy, age of the mother, hospital where the birth occurred, district, county and province of the mother, whether she is from a rural or urban area, and, key for this paper, whether the birth was within a marriage or outside it. There is also information such as the age of the father.

Since 2002, they have collected more information on the mother and the father, such as education level. However, this information isn't as useful because they started collecting it after the law, so it cannot be compared with the situation before.

2. To be able to estimate the general birthrates and especially for the subgroups, I have used the "Proyecciones de Poblacion 1950-2050" database available at the website of the Central American Population Center (CCP in Spanish) of the University of Costa Rica, where they record the estimated population by age, updated and adjusted after each Census. Fortunately, the Census was done in 2000, so the numbers at the time of the Law change in 2001 can be trusted to be reasonably close to the truth. I would be less confident on 2008 data, because the new census won't be done until 2011.

5 Results

An important issue is that, when there is only one time series and we are attempting to find a discontinuity in the data, it is hard to tell whether the results are truly reflecting an underlying true change in behavior or if they are an artifact of the data. An approach to discover whether the discontinuity is reflecting an underlying true discontinuity is to run the same regression for all days in a period before and after the date I believe to be true thanks to the institutional change (here Nov 26th is used as the center point: 2000 days before and after, for a total of 4001 regressions and estimated discontinuities). The results can be seen in Figure **Error! Reference source not found.**. From this graph, it is clear that the largest negative discontinuities over the 4001 day period (more than 10 years!) were precisely during late November 2001 to early January 2002. For further confirmation that this is reflecting a true underlying distribution, I look at the R^2 fit for each of those daily regressions at Figure **Error! Reference source not found.** and it turns out again that the best fit of this specification (a trend, a discontinuity and a trendbreak, adjusted for seasonality and with robust standard errors) is in late November 2001. Other specifications, such as adding squared terms or restricting the sample to only Costa Rican mothers also show this combination of best fit and largest discontinuity around the November-December 2001 period.

These are the number of births so it's not addressing the fact that a country like Costa Rica which used to have very fast demographic growth could have big spikes in the number of women that are entering fertile age. Hence I also look at the birthrates.

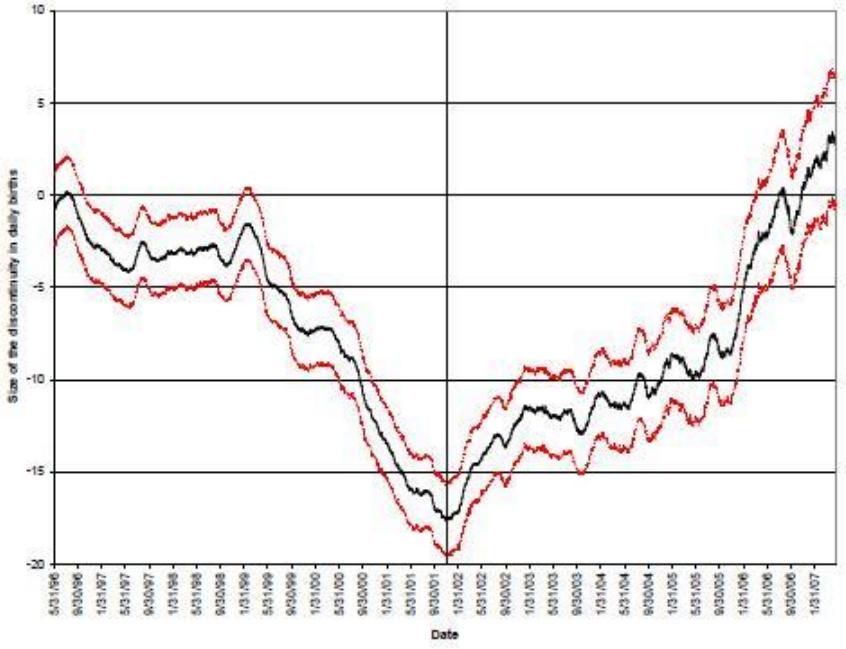

Figure 3: Size of the estimated discontinuity in the number of daily births, accounting for long-term trends and seasonality of the birthrate, estimated for each day in the period from May 31st, 1996 to May 14th, 2007. The vertical line shows Nov 26th, 2001

Figure 4: Values of the R2 for each of the daily regressions to estimate the discontinuity using the number of daily births, accounting for long-term trends and seasonality of the birthrate. Period from May 31st, 1996 to May 14th, 2007. The vertical line shows Nov 26th, 2001

To obtain daily birthrates, I estimate the number of women that are in the fertile ages (15-49 years old). To obtain these daily data, I interpolated the data from yearly estimations at the CCP database which are estimated at June 30th of every year. The stable levels of births are deceiving, since the number of fertile-age women has grown significantly, from less than 700 thousand in early 1986 to more than 1.2 million women in 1998, which implies a steadily declining birthrate.

Even if population estimates are imperfect (measured with error), they provide us with a good approximation. And this is important especially to address concerns about possible large drops of population in the past.

My major concerns when switching from total births to birthrates were: First, that I would find some unusual change in the estimated number of women entering their fertile ages around the years 2001 and 2002. If this were so, it could partly explain the big change in total births. Estimations of exactly how many women there were around these years can be considered very precise because the Census was done in 2000. Second, that the growth in total fertile age women and the stagnation in the number of births would imply a birthrate that was dropping so fast that the drop after the law could be easily explained with the usual birthrate variation.

That turns out not to be the case: it is true that the birthrate fell very quickly from 1986 to 2008, with an average of 0.33 daily births per thousand fertile-age women in 1986 (equivalent to 120 yearly births per thousand fertile-age women) and falling to roughly half those numbers by 2008, because the number of births fell while the population of fertile-age women exploded. This halving of the birthrate in such a brief period (it is actually briefer, since most of the halving had already happened by 2003) would suggest that it would be difficult to find a discontinuity on top of the already large average yearly fall in the birthrate.

Table 1: Birthrate table

	(1) birthrate	(2) birthrate	(3) birthrate
Law	-5.1^{***}	-4.26^{***}	-3.26^{***}
	(.382)	(.344)	(.498)
Trend	$-.00842^{***}$	$-.00852^{***}$	$-.00781^{***}$
	$(7.8e-05)$	$(7.2e-05)$	(.00027)
Law*Trend	$.00652^{***}$	$.00613^{***}$	$.00151^{**}$
	(.00021)	(.00019)	(.00075)
Constant	69.7^{***}	69.4^{***}	70.1^{***}
	(.242)	(.219)	(.31)
R^2	0.798	0.831	0.831
N	8401	8401	8401
Seasonality	No	Yes	Yes
Squared terms	No	No	Yes

Standard errors in parentheses

$^{*}\ p<0.10$, $^{**}\ p<0.05$, $^{***}\ p<0.01$

This turns out not to be the case as seen in Table **Error! Reference source not found.** and Table **Error! Reference source not found.**, because even in the most conservative specification,

the fall is a permanent 5% decrease in the birthrate after the law, which is a large effect if we consider that the average yearly fall was already 3% yearly, among the fastest birthrate falls in the world. In other words, the birthrate fall in 2002 was roughly 8% in the most conservative specification. Other specifications suggest falls of up to 10% on top of the aforementioned 3% yearly fall.

Table 2: Log Birthrate table, entire period and short time-window

	(1) birthrate	(2) birthrate	(3) birthrate
Entire period			
Law	$-.103^{***}$	$-.0925^{***}$	$-.0507^{***}$
	(.0152)	(.012)	(.0167)
Trend	$-9.1e-05^{***}$	$-9.2e-05^{***}$	$-.0001^{***}$
	$(2.6e-06)$	$(2.6e-06)$	$(6.7e-06)$
Law*Trend	$6.0e-05^{***}$	$5.6e-05^{***}$	$5.2e-07$
	$(1.0e-05)$	$(8.0e-06)$	$(2.6e-05)$
Constant	4.26^{***}	4.26^{***}	4.25^{***}
	(.00693)	(.00673)	(.00884)
R^2	0.796	0.829	0.830
N	8401	8401	8401
Seasonality	No	Yes	Yes
Squared terms	No	No	Yes
	(1) birthrate	(2) birthrate	(3) birthrate
Eight-year window			
Law	$-.102^{***}$	$-.0763^{***}$	$-.0624^{***}$
	(.0222)	(.0127)	(.0132)
Trend	$-6.3e-05^{***}$	$-8.1e-05^{***}$	$-.00018^{***}$
	$(1.6e-05)$	$(1.4e-05)$	$(3.4e-05)$
Law*Trend	$2.2e-05$	$2.2e-05$	$.00015^{***}$
	$(2.3e-05)$	$(1.7e-05)$	$(4.5e-05)$
Constant	4.28^{***}	4.26^{***}	4.24^{***}
	(.0139)	(.0122)	(.00988)
R^2	0.381	0.484	0.487
N	2921	2921	2921
Seasonality	No	Yes	Yes
Squared terms	No	No	Yes

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Log Births and Log Birthrate by Age groups

	(1) Less than 18	(2) 18 to 22	(3) 23 to 27	(4) 28 to 32	(5) 33 to 37	(6) 38 to 49
	births	births	births	births	births	births
Law	$-.113^{***}$	$-.105^{***}$	$-.0412^{*}$	$-.0506^{***}$	$-.0183$	$-.0443^{*}$
	(.0316)	(.0199)	(.0242)	(.0192)	(.0219)	(.0228)
Trend	$9.6e-05^{***}$	$8.7e-05^{***}$	$-5.6e-05^{***}$	$-9.5e-05^{***}$	$-7.2e-05^{***}$	$-7.2e-05^{***}$
	$(2.9e-05)$	$(1.3e-05)$	$(7.8e-06)$	$(1.1e-05)$	$(9.8e-06)$	$(1.3e-05)$
Law*Trend	$-.00028^{***}$	$-.0001^{***}$	$.0001^{***}$	$1.8e-05$	$-5.5e-05$	$-1.7e-05$
	$(4.9e-05)$	$(2.9e-05)$	$(3.1e-05)$	$(2.4e-05)$	$(4.1e-05)$	$(3.7e-05)$
Constant	3.05^{***}	4.15^{***}	3.94^{***}	3.65^{***}	3.12^{***}	2.2^{***}
	(.0325)	(.0198)	(.0103)	(.013)	(.0124)	(.0163)
R^2	0.169	0.150	0.287	0.235	0.146	0.084
N	8401	8401	8401	8401	8401	8401
Seasonality	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Squared terms	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
	birthrate	birthrate	birthrate	birthrate	birthrate	birthrate
Law	$-.0893^{***}$	$-.0435^{***}$	$-.0831^{***}$	$-.0572^{***}$	$-.00771$	$-.0244$
	(.0264)	(.0168)	(.0194)	(.0194)	(.0241)	(.0256)
Trend	$-3.6e-05^{*}$	$-8.7e-05^{***}$	$-9.3e-05^{***}$	$-5.8e-05^{***}$	$-.00012^{***}$	$-.00022^{***}$
	$(2.0e-05)$	$(7.2e-06)$	$(1.0e-05)$	$(1.0e-05)$	$(1.1e-05)$	$(1.4e-05)$
Law*Trend	$-.00018^{***}$	$-1.8e-05$	$3.3e-05$	$-3.9e-05$	$2.5e-05$	$2.1e-05$
	$(4.4e-05)$	$(2.6e-05)$	$(3.4e-05)$	$(2.5e-05)$	$(3.7e-05)$	$(3.7e-05)$
Constant	4.1^{***}	4.76^{***}	4.78^{***}	4.55^{***}	3.97^{***}	2.39^{***}
	(.0249)	(.0113)	(.00957)	(.0123)	(.0167)	(.0192)
R^2	0.195	0.594	0.601	0.490	0.482	0.517
N	8401	8401	8401	8401	8401	8401
Seasonality	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Squared terms	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

For robustness, I tested other specifications, such as testing different time windows (a smaller three-year window and a larger ten-year window) or adding higher order covariates of the trends (cubic and quadratic) and they all show a statistically significant discontinuity, with remarkable lack of variance in the case of changing the window of time and all results are at least a 4.5% drop (most of them much larger).

5.1 The age group tables

The next tables are especially interesting because they show the differences across age groups, both in the change of the birth levels and the change in the birthrate Table **Error! Reference source not found.**. The main notable difference is that among 23 to 27 year-old women, the effect doesn't appear at the birth levels, but it does when we adjust for the growth in numbers to estimate a birthrate. Besides the result being statistically significant, it is also significant in terms of size: for example, the 8% drop among teenagers is the largest of all groups and women older than 33 do not seem to have been affected. This suggests that the costs of child support seem especially large to younger men who are, presumably, the partners of younger women.

5.2 Impact of the law on the births within marriage

One of the major concerns about the impact of the law is that it should be very focused only on those children born to unmarried parents. The immediate reason is, obviously, that the law was designed to give additional rights to children from unwed mothers, but those born within marriage had no change whatsoever in the rules.

The expected effect, if married people were a control group and unmarried people are the treatment group, would be to see that virtually all of the fall in the birthrate comes from unmarried children and that the birthrate from married people continues with previous trends. This would imply an immediate upward spike in the percentage of children born within marriage, accounting for trends. This is not what I find in Table **Error! Reference source not found.**: the coefficients change according to the specification and some of them are not significant. The overall impression is that births registered within marriage must have fallen, after the law, at least as much as births registered outside marriage, since the percentage of births within marriage either remained constant or fell (up to 1.5% in one specification). This is suggestive evidence that premarital sex in Costa Rica is very common and that the law reduced the number of shotgun marriages.

5.3 Sex Ratio and Urban Ratio

One of the most surprising results was the increase in the male to female sex ratio immediately after the Law. It is not a very robust result, as it doesn't appear in all specifications in Table **Error! Reference source not found.**. However, given the concerns raised by literature such as [Sen1990] of missing women, these results would suggest a few hundred missing girls in the year after the Law. It is possible that there is some preference for sons under the shock of the change in policy that was the Responsible Paternity Law.

Another important result is to find out whether rural and urban areas react differently to the Law which applied equally to the whole country. Table **Error! Reference source not found.** suggests that there wasn't any change, because only one specification has statistically significant results. If we took that one specification at face value, the effect would be very large: the share of urban births would go from 47.6% to 52.4%, but it is also noticeable that the constant is very different from the other specifications, which again suggests it is not a good specification.

Table 4: Percentage of Births within Marriage

	(1) percmarr	(2) percmarr	(3) percmarr	(4) percmarr
All Mothers				
Law	−.0153***	−.00365	.00644	−.0087**
	(.00487)	(.00334)	(.00611)	(.00352)
Trend	$-3.1e-05$***	$-3.9e-05$***	$-5.4e-05$***	$-1.6e-05$
	$(2.1e-06)$	$(2.6e-06)$	$(4.8e-06)$	$(9.9e-06)$
Law*Trend	$-1.3e-05$***	$-5.8e-06$*	$1.1e-05$*	$-3.1e-05$**
	$(2.3e-06)$	$(3.4e-06)$	$(5.9e-06)$	$(1.5e-05)$
Constant	.461***	.449***	.439***	.455***
	(.00472)	(.00258)	(.00552)	(.0026)
R^2	0.840	0.468	0.847	0.469
N	8401	2921	8401	2921
Window	*No*	*Yes*	*No*	*Yes*
Squared terms	*No*	*No*	*Yes*	*Yes*
Only Costa Rican Mothers				
Law	−.0169***	−.00632*	−.00015	−.009**
	(.00414)	(.00354)	(.00546)	(.00444)
Trend	$-2.3e-05$***	$-3.1e-05$***	$-4.0e-05$***	$-2.5e-05$***
	$(1.6e-06)$	$(1.5e-06)$	$(3.5e-06)$	$(8.0e-06)$
Law*Trend	$-2.6e-05$***	$-1.8e-05$***	$-1.2e-05$*	$-2.1e-05$
	$(2.3e-06)$	$(3.8e-06)$	$(6.4e-06)$	$(1.8e-05)$
Constant	.511***	.501***	.495***	.502***
	(.00356)	(.00145)	(.00335)	(.00206)
R^2	0.790	0.440	0.795	0.440
N	8401	2921	8401	2921
Window	*No*	*Yes*	*No*	*Yes*
Squared terms	*No*	*No*	*Yes*	*Yes*
Only First time Costa Rican Mothers				
Law	−.0258***	−.00739**	−.0048	−.00442
	(.00559)	(.00361)	(.00479)	(.00697)
Trend	$-2.8e-05$***	$-4.6e-05$***	$-4.9e-05$***	$-5.2e-05$***
	$(2.1e-06)$	$(3.6e-06)$	$(3.8e-06)$	$(1.3e-05)$
Law*Trend	$-1.6e-05$***	$2.3e-06$	$4.2e-06$	$2.2e-06$
	$(2.6e-06)$	$(4.8e-06)$	$(6.5e-06)$	$(1.9e-05)$
Constant	.432***	.414***	.412***	.413***
	(.00526)	(.00176)	(.00318)	(.00306)
R^2	0.652	0.299	0.657	0.299
N	8401	2921	8401	2921
Window	*No*	*Yes*	*No*	*Yes*
Squared terms	*No*	*No*	*Yes*	*Yes*

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Ratio of males to females

	(1) sexratio	(2) sexratio	(3) sexratio	(4) sexratio
Law	.00508	.0169*	.0278***	.0342**
	(.00924)	(.00888)	(.00766)	(.014)
Trend	$-1.7e-06$	$-7.3e-07$	$-4.4e-06$	$-1.2e-05$
	$(1.2e-06)$	$(9.1e-06)$	$(5.0e-06)$	$(3.4e-05)$
Law*Trend	$-2.4e-06$	$-2.4e-05$*	$-4.6e-05$***	$-7.2e-05$**
	$(5.4e-06)$	$(1.3e-05)$	$(1.1e-05)$	$(3.6e-05)$
Constant	1.06***	1.06***	1.06***	1.06***
	(.00404)	(.00692)	(.00585)	(.0106)
R^2	0.001	0.002	0.002	0.003
N	8400	2921	8400	2921
Squared terms	*No*	*No*	*Yes*	*Yes*
Windows	*No*	*Yes*	*No*	*Yes*

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Percentage of children born in urban areas

	(1) sexratio	(2) sexratio	(3) sexratio	(4) sexratio
Law	$-.00449$	.0137	$-.00717$	.0479***
	(.0102)	(.0191)	(.0183)	(.0125)
Trend	$-1.7e-05$***	$-4.1e-05$**	$-1.2e-05$	$-.00018$***
	$(2.7e-06)$	$(1.7e-05)$	$(1.3e-05)$	$(3.2e-05)$
Law*Trend	$5.6e-05$***	$7.9e-05$***	$4.7e-05$***	.00021***
	$(3.2e-06)$	$(1.7e-05)$	$(1.5e-05)$	$(4.0e-05)$
Constant	.526***	.509***	.531***	.476***
	(.00876)	(.0174)	(.0166)	(.0101)
R^2	0.329	0.160	0.330	0.216
N	8400	2921	8400	2921
Squared terms	*No*	*No*	*Yes*	*Yes*
Windows	*No*	*Yes*	*No*	*Yes*

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

6 Conclusion

The evidence suggests that the paternity law created a discontinuity in the number of births and in the birthrate, in the sense of a large and permanent one-off decline. What makes this discontinuity especially striking is that it happened in the context of an already rapidly falling birthrate. Also striking is the fact that the number of births within marriage fell by a similar proportion, which implies that the percentage of births within marriage was not affected and hence that married couples are not the "control group" regarding the Law that we would expect them to be. Hence, marriage in Costa Rica is a dynamic decision that often involves premarital sex and a pregnancy is the trigger. The Law, with the transfer in costs from men to women, seems to have discouraged shotgun marriages. There is some evidence, for further work, of a rise in cohabitation.

One of the surprising results is the change in the ratio of males to females, which is very stable over most of this period. This could be evidence for some "preference for sons" that could

partially explain the large drop in total births if we consider the possibility of selective abortion of females that are less desired by the fathers that now are expecting to pay child support for them.

For future research, this permanent and dramatic drop in the birthrate and especially in total births implies potential discontinuities across cohorts in educational outcomes, crime, access to health services and so on. Eventually, with adult outcomes, it will be possible to determine if there was a positive selection effect due to the Responsible Paternity Law.

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