Where are the Missing Babies: The Role of Higher Education Access on Family Planning

Fabian Duarte
University of Chile

Valentina Paredes
University of Chile

July 2014
(Preliminary and Incomplete)

Abstract

In Chile, the total fertility rate has fallen from 2.66 births per woman in 1985 to 1.86 births per woman in 2010. We attribute this fall to changes in access to higher education, in particular, the LOCE law, which allowed the creation of 13 universities in 1990. We find that the greater access to higher education negatively affected fertility through a postponement of fertility, and no catch up 10 years later.

JEL Classification:
Keywords:

1 Introduction

Since the 70's, most developed countries have suffer a decline in their fertility rates, which worries policy makers because of its consequences in population aging and the shrinking labor force. This phenomenon is not exclusive to wealthy countries. In Chile, the total fertility rate has fallen from 2.66 births per woman in 1985 to 1.86 births per woman in 2010. This decrease has not been constant across cohorts. Between 1985 and 2010 the total number of births for women aged 20-24 fell from more than 80 thousands to less than 60 thousands. During the same time period, the number of births for women aged 30 or more increased (see Figure 1).

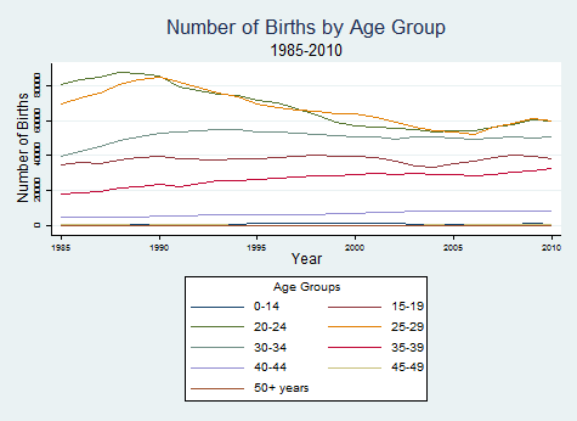

Figure 1: Number of Births by Age Group

In this study, we want to answer what caused this decline in fertility. Our hypothesis is that changes in the access to higher education could explain the fall. In particular, we attribute part of the decrease in fertility to the LOCE law in 1990, which allowed the creation of private Universities, giving greater access to higher education.

This paper is structured as follows. In Section 2 we discuss the mechanisms through which education may have an effect on fertility, and the results of the related literature. Section 3 and 4 describes the institutional background and the data used in this study. Section 5 and 6 discusses the econometric framework and our results. Finally, Section 7 presents our conclusions.

2 Fertility and Education

From a theoretical perspective, education can have an impact in fertility through multiple channels. First, education can improve individual's knowledge of fertility options or reproductive health. Second, education can have an effect on fertility through an increase in permanent income, which can come from higher earnings, or from positive assortative matching, under which a woman's education is causally related to her partner's education. Third, under limited time constraints, women may postpone fertility until after they finish their studies. However, this postponement may be temporary, and thus it may not have an effect on completed fertility.

From an empirical perspective, the main difficulty of studying the effect of education on fertility is the potential reverse causality and selection on unobservable factors. Recent studies overcome this difficulties by using quasi-experiments to estimate the causal effect of education. However, the results of these studies are mixed, with some studies finding no effect, while other finding positive and even negative effects of education on fertility.

Clark, Geruso and Royer (2014) use a change in UK compulsory schooling laws and find a 20% reduction in births at ages 16 and 17 caused by the additional year of schooling. Cygan-Rehm and Maeder (2013) use an exogenous variation from a German compulsory schooling reform and find a reduction on completed fertility.

McCrary and Royer (2011) use school entry policies in California and Texas to estimate the effect of education on fertility and find no effect on the probability of becoming mothers nor the timing of first births.

Fort, Schneeweis and Winter-Ebmer (2011) use data from 8 European countries and find that more education causes an increase in the average number of children per woman. The authors explain their findings arguing that women with higher education are more likely to be married and have more stable marriages.

For Chile, Kruger and Berthelon (2009) exploit variation on the school reform that lengthened the school day from half to full-day. The authors find that an increase in full-day municipal enrollment of 20% reduces the likelihood of teen motherhood by 5%.

3 Background

Until 1990, there were only 20 universities (college) in Chile [1]. However, in March of 1990, at the end of the military government, the LOCE law was promulgated, which created the Higher Education Council (HEC) and formalized the entry of new higher education institutions. This council was on charge of supervising the entry of new institutions of higher education. Given this new framework, in 1990, 13 new private universities entered the market for higher education.

The LOCE law set the minimum requirements that any institution had to

[1] Among those universities, the called traditional universities were grouped on a council called Consejo de Rectores

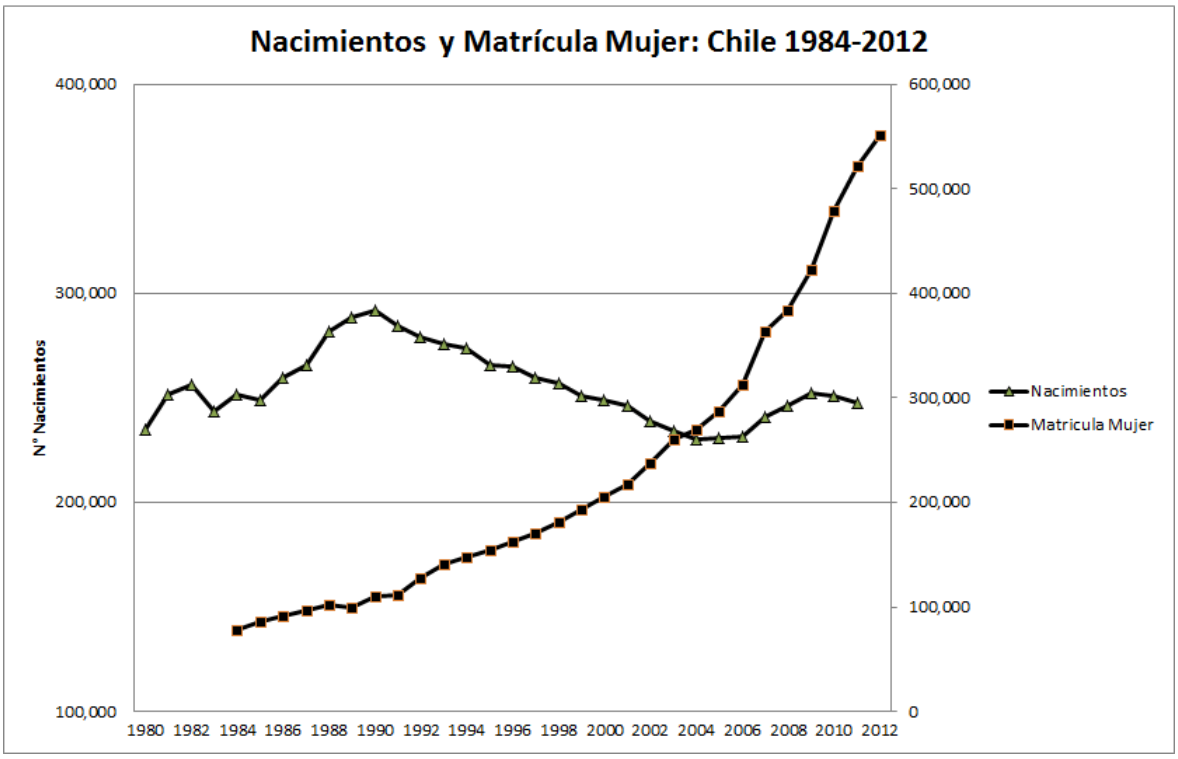

Figure 2: Number of Enrolles

satisfied in order to be education institution, not only higher education, but also primary and secondary. Therefore, there were incentives to higher education institutions to be created during that time. This new scenario change the probability to be enrolled in a higher education institution for everyone. In particular, the increase of the number of universities, classes and careers changed the options than young women faced exogenously.

As is shown in table 1, 13 new universities entered in 1990.

As consequence of the new scenario, the number of higher education enrolles started to increase as seen in figure 3.

4 Data

Given the nature of the problem, we gather information from several sources to complement our analysis. In particular, we have aggregated information from the INE (National Institute of Statistics), where we got access to the number of births by age group and region from 1985 to 1993. We also have information from the DEIS (the Health Statistics and Information Department) of all births records from 1994 to 2010. This is publicly available data for all Chileans born between 1994 and 2010 (approximately 230,000 births a year) and include demographic variables at the time of birth for the mother such as maternal age, municipality of residence, education, occupation, labor status, marital status, number of children alive, dead and total. Similar demographic variables are also available for the father at the time of birth. Important variables for the newborn include date of birth, gender, birth order, gestational age, birth weight and length, type of delivery (single or multiple) hospital ID and type of birth (natural or C section). Finally we use a national representative survey called CASEN. CASEN is a survey of more than 200 thousand households. We use it for years 1996 and 2000.

Descriptive statistics of key variables from the 1996 and 2000 CASEN are shown in table 2 and table 3.

5 Empirical Strategy

To address the endogeneity of education, we exploit a the LOCE law, and use a difference in difference approach (DID). The difference in difference estimator would capture the impact of the shock on an outcome, Y, trough the β_3 coefficient in regression (1).

$$\mathrm{Y}_{it} = \alpha + \beta_1 \mathbb{D}_{\text{Affected}} + \beta_2 \mathbb{D}_{Year} + \beta_3 \mathbb{D}_{Year} \mathbb{D}_{\text{Affected}} + X_{it} + \varepsilon_{it} \quad (1)$$

where $\mathbb{D}_{\text{Affected}}$ is a dummy that is equal to one for the group of women affected by the policy (the treatment group), and zero otherwise. $\mathbb{D}_{Year}$ is also a dummy that is equal to one when the year is the one when the treatment took place and zero otherwise. X_{it} are control variables that could change over time.

The LOCE law was implemented in 1990 and allowed the creation of private universities. As we saw in previous sections, in 1990, 13 new universities were created. The young women that are most likely affected by the creation of new universities are the ones that at the time of the creation are about to finish high school, have just finished high school that year or have completed high school a couple of years before. Thus, we define our treatment group as women between 16 and 20 years old.

On the other hand, our control group are women that their schooling decision is not likely to be affected by the creation of new universities. We chose as our control group women between 33 to 38 years old.

Women that were between 16 and 20 years old in 1990 were likely to be affected by the creation of the new universities. But women who were between 16 and 20 years old in 1986 were not affected by the new law. So we can use 1986 as our before period.

Because we want to study their fertility decisions after they have completed their education, we follow these women into adulthood. Thus we set our treatment group as women between 26 and 30, and our control group as women between 43 and 48 years. We use year 2000 as the period were our treatment group was treated and 1996 as the period before treatment.

We will run several regressions using different outcomes in order to explain changes on women behavior. In the first regression we analyze the probability of being a mother, which means that we use a dependent variable that is equal to 1 if a women is a mother and zero otherwise. In the second specification, we use as a dependent variable the probability of being a mother for the first time. This variable is equal to 1 if a women was a mother for the first time and zero otherwise. The sample comprise all women that had a baby in the last 12 months. Finally, we run a regression on the number of kids a woman has.

Results of these three regression will help us to understand women behavior when faced with changes in access to higher education. In particular, we hypothesize that young women between 16 and 20 years old in 1990 increased their chances of applying and being enrolled in a higher education institution. This change in their chances of being accepted in a college, changed their decision to become a mother. Therefore, the first regression will help us to see if a proportion of women in this group decided to avoid motherhood. The second regression will help us to see if a proportion of women decided to postpone their decision to be a mother and finally the last regression will help us to see if a proportion of women decided to have less kids. The three

results go in the direction of a decrease in the number of births as shown in a previous section.

6 Results

In this section we show the main results of our three regressions and three dependent variables[2]. The independent variables are the same across the three specifications. These independent variables are: After, which is 1 if the year is 2000 and 0 if the year is 1996; Age Group, which is equal to 1 if the women is between 26 and 30 years old and zero otherwise; DID, which is the difference in difference coefficient; University, is equal to one if a women live in the county were a university entered in 1990 and zero otherwise; Working, which is equal to 1 if is working and zero otherwise; and regional dummies.

Table 4 shows the results for the regression on the probability of being a mother. In column one we use the treatment group described in the previous section. In the second column we separate the treatment group into two groups. The first are all women in the treatment group (same as before), while the second one are women in the treatment group that live in municipalities were universities entered in 1990. In the last column, the sample is reduced to women in the treatment group that live in municipalities were universities entered.

For this first specification, we found that the entry of new universities affected negatively (-0.0318) the probability of being mother. In other words, women that were 16 to 20 years old in 1990 are less likely to be mothers in 2000, when they were 26 to 30 years old, than women that were 16 to 20 years old in 1986 (and therefore 26 to 30 years old in 1996). When we separate the treatment group into two (column two), we find that women living in municipalities were a new university was created were more affected (-0.0709) than women in the treatment group but not living in those municipalities. Finally, in column three, we restricted the sample to women in the treatment group living in municipalities were a university entered. In this case the effect disappear. However, the sample size is too small.

In the second specification, we look at the effect of this exogenous shock on

[2]We run several falsification regressions, in order to check if our results are robust. In the falsification regression we used a different treatment group, women of 35 to 40 years old that were not affected (or less affected) from the entry of the new universities (we use the same control group). The results show there is no effect for those women.

the probability of being mother for the first time. The independent variables are the same as the ones we used for the first specification. The dependent variable is equal to 1 if a women had a baby in the last 12 months for the first time and zero if a women had a baby in the last 12 months, but it is not her first baby.

Table 5 shows the results for this regression. We found only effects on column one for the whole sample. The effect is negative and significant, which translates in the fact that women in the treatment group are more likely to be mother for the first time in 2000, than in 1996. This is evidence of the fact that women on the treatment group were postponing becoming mothers. In other words, women of 16 to 20 years old in 1990 are more likely to have babies for the first time in 2000, than women of 16 to 20 years old in 1986.

Finally, in the third specification, we run a regression in which the dependent variable is the number of kids. Table 6 shows the results. We found no effect on the whole treatment group. However, when we separate the group into two groups, we found an effect on the women in the treatment group living in municipalities were universities entered in 1990. The effect is negative and significant.

7 Conclusions

In this paper we exploited an exogenous shock to the supply of universities to study the effect of education on fertility. We found that the greater access to higher education reduced the probability of being a mother. For the women who decided to have children, the larger supply of universities lowered the probability of being a mother for the first time, which means that these women decided to postpone fertility. Finally, we found that the number of kids decreases for the group of women affected by this shock. So the negative effect of education on fertility operates through a postponement of first births in the early 20s, and no catch up 10 years later.

We attribute this effect to the incompatibility of the educational system and motherhood, which forces girls to postpone their fertility decisions to after completing their studies, but also to an effect of a higher permanent income, so that there is no catch up later in life.

References

1. Fort, M., Schneeweis, N., Winter-Ebmer, R., 2011. More Schooling, More Children: Compulsory Schooling Reforms and Fertility in Europe. IZA Discussion Paper 2693. IZA. Bonn.

2. Geruso, M., Clark, D., Royer, H., 2014. The impact of education on family formation: Quasi-experimental evidence from the UK. mimeo, University of California, Santa Barbara.

3. McCrary, J., Royer, H., 2011. The Effect of Female Education on Fertility and Infant Health: Evidence from School Entry Policies Using Exact Date of Birth. American Economic Review, 101(1): 158-195.

4. Cygan-Rehm, K., Maeder, M., 2013. The effect of education on fertility: Evidence from a compulsory schooling reform. Labour Economics, 25: 35-48.

5. Kruger, D., Berthelon, M,2009. Delaying the Bell: The Effects of Longer School Days on Adolescent Motherhood in Chile. IZA Discussion Paper 4553. IZA. Bonn.

Table 1: New Private Universities 1990

Adventista	Viña del Mar	Marítima
Autonoma del Sur	Del Desarrollo	San Sebastián (Concepción)
Bernardo O Higgins	Del Pacífico	Santo Tomás
Blas Cañas	SEK	
Los Andes	Mariano Egaña	

Table 2: Descriptive Statistics, CASEN 1996, CASEN 2000

	Percentage of Mothers	
Age Group	1996	2000
Less than 15 years	0	0
Between 15-19 years	0.09	0.10
Between 20-24 years	0.41	0.41
Between 25-29 years	0.66	0.65
Between 30-34 years	0.83	0.82
Between 35-39 years	0.87	0.87
Between 40-44 years	0.88	0.87
Between 45-49 years	0.83	0.86
50 years and older	0.63	0.63

Table 3: Descriptive Statistics, CASEN 1996, CASEN 2000

	Number of Kids	
Age Group	1996	2000
Less 15 years	0	0
Between 15-19 years	0.09	0.11
Between 20-24 years	0.54	0.53
Between 25-29 years	1.15	1.07
Between 30-34 years	1.78	1.71
Between 35-39 years	2.20	2.08
Between 40-44 years	2.20	2.15
Between 45-49 years	1.93	1.89
50 years and older	1.08	1.04

Table 4: Regression on Probability of being mother

Name	(1) Treatment alone	(2) Two groups	(3) Restricted Sample
After	0.0292**	0.0293**	-0.00253
	(0.0121)	(0.0119)	(0.0406)
Age Group	-0.126***	-0.126***	-0.170***
	(0.0133)	(0.0133)	(0.0346)
University		-0.0454**	
		(0.0177)	
DID	-0.0318*	-0.0201	-0.0370
	(0.0178)	(0.0171)	(0.0562)
DID University		-0.0709**	
		(0.0343)	
Working	-0.169***	-0.164***	-0.222***
	(0.00939)	(0.00920)	(0.0273)
Constant	0.914***	0.922***	0.937***
	(0.0111)	(0.0118)	(0.0259)
Observations	28,326	28,326	1,847
R-squared	0.074	0.078	0.102

Robust standard errors in parentheses
***: 1% , **: 5% and *: 10% significance.

Table 5: Regression on Probability of being mother for the first time

	(1)	(2)	(3)
Name	Treatment alone	Two groups	Restricted Sample
After	-0.156	-0.156	-0.0490
	(0.109)	(0.115)	(0.0518)
Age Group	0.0556	0.0555	0.255***
	(0.0993)	(0.0994)	(0.0822)
University		0.00105	
		(0.0752)	
DID	0.222*	0.202	0.192
	(0.116)	(0.125)	(0.126)
DID University		0.101	
		(0.116)	
Working	0.217***	0.211***	0.170
	(0.0516)	(0.0515)	(0.119)
Constant	0.195**	0.194**	-0
	(0.0990)	(0.0990)	(0)
Observations	1,436	1,436	106
R-squared	0.066	0.070	0.096

Robust standard errors in parentheses
***: 1% , **: 5% and *: 10% significance.

Table 6: Regression on Number of Kids

	(1)	(2)	(3)
Name	Treatment alone	Two groups	Restricted Sample
After	-0.0313	-0.0313	-0.112
	(0.0424)	(0.0424)	(0.134)
Age Group	-0.731***	-0.731***	-0.859***
	(0.0402)	(0.0403)	(0.112)
University		-0.0397	
		(0.0517)	
DID	-0.0454	-0.0177	-0.0345
	(0.0507)	(0.0504)	(0.157)
DID University		-0.160**	
		(0.0756)	
Working	-0.560***	-0.554***	-0.644***
	(0.0251)	(0.0252)	(0.0760)
Constant	2.291***	2.298***	2.376***
	(0.0432)	(0.0435)	(0.113)
Observations	28,326	28,326	1,847
R-squared	0.140	0.141	0.175

Robust standard errors in parentheses
***: 1% , **: 5% and *: 10% significance.