

The Effects of Government Policies towards
Contraception Use in Women

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Audrey Núñez

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Advisor: Professor James Hughes

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INTRODUCTION

“The dominant behavioural pathway linking education to fertility, is of course, the use of contraceptives” (Cleland, 2004, p. 190). The focus of this thesis paper is to analyze if fertility rates in countries are reduced due to government policies, specifically, direct support towards the use of birth control methods for women relative to countries with indirect support.

Women’s lives, skills, and status have enormously changed since the second half of the 20th century. There has been a vast amount of research done in order to improve women’s welfare as well as their economic conditions, especially in developing countries. “Not surprisingly, therefore, developing countries are generally characterized by an extremely low standard of living, high rates of infant mortality, short life expectancy, and high rates of illiteracy” (Blau, Ferber, Winkler, 2002, p. 416). Consequently, due to the low levels of income, women in developing countries have minimal access to health care services, proper nutrition and opportunities for education. As women lack access or knowledge to education and health care services, not only they risk their own lives during childbirth but also the lives of their newborns. Therefore, the World Bank, along with the United Nations has made an effort to encourage governments to modify their center of attention to the control of women’s reproductive behavior.

This thesis is divided in three chapters, which compares two Central American countries, Belize and Honduras. Since 1976, Honduras has given direct support towards contraception use, whereas, Belize gave no support until 1996

when the government changed their policies to indirect support towards contraception use. The first chapter of this thesis explains the importance of women's educational attainment and two crucial determinants to reduce fertility rates in countries. These factors are government's policies towards contraception and women's labor force participation.

The second chapter discusses the economic theory regarding the relationship between educational attainment and fertility rates. There are two analyses that illustrate the impact of contraception use and education in women which enable them to control their reproductive behavior. Finally, the third chapter presents an empirical analysis assessing the relationship between the following dependent variables: fertility rates and contraception use. These two variables were studied relative to the following determinants: education, religious affiliation, religious intensity, marital status, contraception use, subsidies on contraceptive methods, and women's labor force participation.

As a result, empirically, we find that countries that have policies which grant direct support for contraception use do not have lower fertility rates, relative to governments that give indirect support. In addition, empirically, we find that women who are from countries with indirect support towards contraception are more likely to use birth control methods, relative to women who come from countries with direct support. Thus, the determinant in the reduction of fertility rates in countries is the effectiveness of their contraception programs, regardless of the type of birth control support they grant women.

CHAPTER 1: THE IMPACT OF EDUCATION, GOVERNMENT POLICIES, AND WOMEN'S LABOR FORCE PARTICIPATION ON FERTILITY RATES

According to the World Bank, "In high- income countries most women have access to health care during pregnancy, but in developing countries an estimated 8 million suffer pregnancy- related complications every year, and over half a million die" (Women in Development, 2006, p. 37). I hypothesize if a government gives direct support towards contraceptive methods then the country's fertility rates decrease, relative to countries that provide indirect support towards birth control methods. In later chapters this hypothesis will be tested by analyzing the data obtained from the Family and Health Survey by Centro Centroamericano de Población (Central American Center for Population) done in 1991. These surveys were conducted in two countries Belize, which offers indirect support towards contraception, and Honduras, which offers direct support. If my hypothesis is correct we will see that direct support towards contraception promotes economic development.

THE IMPORTANCE OF EDUCATION ON FERTILITY RATES

Education is considered to be the most important growth determinant in countries, as well as a major influence for fertility rates. Education has been one of the most employed factors by economists and demographers in their analyses to evaluate households' socio-economic status as well as developmental growth in countries. It was not until "the use publication of results from a survey in Nigeria

that showed the schooling of mothers to be a more powerful predictor of child survival than economic characteristics of the family, such as the father's occupation...Subsequent research has confirmed that the schooling of the mother is generally a more decisive influence on reproduction than characteristics of the father" (Cleland, 2004, p. 187). This analysis showed that as women acquire a higher educational level, the autonomy over their reproductive behavior also increases. Education gives women the control over their total number of children.

The fertility rate is the average of the total number of children over a woman's lifetime. High fertility rates result in high population growth. They reveal a country's economic development. Fertility rates are studied in economics because this discipline examines the cost and benefit in the decision-making process of choices. Economists analyze which outcomes provide a higher amount of satisfaction and financial return. Therefore, fertility is a choice commonly made by the mother, the father, or both. This decision is done based on the amount of satisfaction, productivity, and financial returns each child will provide them. As women become better educated they become more conscious of how many children they are able to sustain. Therefore, women with fewer children are more likely to maximize each of their child's lives. This is accomplished through the better allocation of the available resources among their children.

Women with higher levels of education are able to better evaluate their decision of having another child. "Both the bearing and rearing are costly activities; goods and services invested on children have to be purchased in the market by paying a price...In this process, important determinants of the demand

for children are household income and the cost of children” (Lakshmanasamy, 1991, p. 1). The opportunity cost of having another child for educated women is high. Parents who have another child incur in monetary opportunity cost as well as the opportunity cost in their time when bearing and rearing. The opportunity cost of mothers’ time is said to be higher than the fathers’ one, since women are more likely to commit more time in the bearing and rearing of children. Women who have acquired a higher educational level have also incurred in an investment. Therefore, women who can not control their fertility rates incur in a risky investment due to the opportunity cost of mothers’ time when they bear and rear. Their investment results in a reduced financial return, as opposed to women who control their fertility rates which result in an educated investment.

Education is directly related to earnings. “Human capital theory postulates that earnings rise with additional education because of the productivity-enhancing effects of education” (Blau, Ferber and Winkler, 2002, p. 165). With education they are certain skills that come along, such as writing, critical thinking, problem solving, and computer ones. People who invest in higher levels of education become better candidates for higher paying positions. Employers view them as more productive candidates for the company. Therefore, as women opt for higher levels of education they are more likely to be considered for more demanding and higher paying positions. These positions require more of the women’s concentration, presence, and time commitment to the company. As a result, these job opportunities make women more conscious about the number of children they can bear as well as the time difference between each birth.

Therefore, higher levels of education in women result in higher paying jobs which usually make them reduce their fertility.

Another important factor why economists study fertility rates is quality versus quantity of children. Parents in less- developed countries as well as those who have low levels of education usually have many children. They opt for quantity rather than quality. This is done with hopes that all the children will work and help sustain the household. Parents allocate their resources on what provides them short run satisfaction. Therefore, in most cases parents restrain their children's education because having all of their children attend school does not give them immediate results. Children becomes an economic activity, they become a financial burden, rather than an investment, which will later give them higher returns. On the other hand, parents who have a higher educational level, choose their family size on quality rather than quantity. They decide to allocate most of their resources on fewer children. They invest in better clothing, better education, school supplies, and in some cases extra help to take care of the children.

Finally, the economic theory leads us to conclude that better educated women are more likely to use contraception, marry older, have their first child later in life, have longer duration of postpartum abstinence, and shorter durations of breastfeeding. Moreover, better educated women are more likely to have higher incomes and live in urban areas relative to women with low levels of education.

DETERMINANTS IN THE DECREASE OF FERTILITY RATES IN LATIN AMERICA

After several years of studies conducted in developing countries, researchers have found various factors that have had the most direct impact on women's lives. These factors have also had an indirect impact on a country's development. Some of them are government policies towards contraception, educational attainment and labor force participation.

Government Policies towards Fertility and Contraception

Government policies on fertility have immensely contributed to the reduction of fertility rates in Latin America. Their support towards health care facilities and distribution of contraceptive methods has made it possible for women to reduce their reproductive behavior. As women benefit from the government's support towards contraception, the country as a whole also benefits from this support. This is acquired through the promotion of economic development and the reduction in population growth due to the established policies.

Over time governments have either given a direct, indirect, limited or no support to the distribution of contraceptive methods. "Direct support entails the provision of family planning services through Government-run facilities, such as hospitals, clinics, health posts and health centres and through Government fieldworkers... By 2001, 92 per cent of all countries supported family planning programs and contraceptives, either directly (75 per cent), through government facilities, or indirectly (17 per cent), through support of non- governmental

activities, such as those operated by family planning associations” (United Nations Secretariat, Fertility, Contraception and Population Policies, 2003, p. 7).

Women with low or limited levels of income benefit from the support governments provide towards contraceptive methods. They have access to child and maternal health care such as information, services, and facilities.

Women’s access to contraceptive methods also improves their well-being. Increasing women’s options for reproductive behavior will empower them by giving them more ability to control their family size. In addition, as women’s empowerment increases it will give them a greater autonomy over their body. “High population growth, high abortion rates and significant rural- urban migration flows were the background against which population issues and their social and economic implications were discussed at the Latin American Preparatory Meeting for the World Population Conference, held in Costa Rica in 1974. Most Governments acknowledged the need to support family planning programmes in general, but their strategies for implementation differed widely...In the decade following the conference, many countries gradually adopted policies in support of family planning and contraception” (United Nations Secretariat, Fertility, Contraception and Population Policies, 2003, p. 25). Therefore, by 2001 all Latin-American countries had reformed their contraceptive policies and established either direct support or indirect support towards it.

The sources provided by the United Nations, mentioned above, were very useful to me. I was able to obtain several facts regarding the subject of contraception and government policies. I should note that at the end of reading

these sources I was left with more questions than answers regarding the subject. This might be due to some generalizations that were made from the sources. In the issue of abortion for example, they were not clear if abortion is considered contraception. In case it was not a contraceptive method, they did not specify how to determine what is considered a contraceptive method and what is not. In addition, the issue of rural- urban migration was portrayed as if all women migrate or wish to move to the cities.

Women's Educational Attainment

Women's educational attainment improves their job opportunities and socio-economic well-being. "It could be argued that in a mostly literate society, education becomes a vital necessity for daily life, hence women who have not attended school are affected even more adversely than in a mainly illiterate society" (United Nations, 1995, p. 31). Low income families in developing countries, who lack education, believe that the long term benefit for sending boys to school is higher than sending girls to school. This is due to the way these societies have been shaped and structured. They believe that men must be the sole provider and supporter of the family, while women should stay home, do household work, and raise the children. Even though men can contribute and help, women are the ones responsible for child bearing. They have the nurture characteristics to perform tasks associated with raising children, such as breastfeeding. In order to perform these duties, women usually stay home.

As Blau, Ferber and Winkler state, "from an economic standpoint, the opportunity cost of sending daughters to school is often greater in terms of

productive output forgone because, in many cases, girls do more household work and market work than boys. Even more important, sons will become the breadwinners and in most cultures are expected to support their parents in their old age, while girls marry into another family and have no independent means to support their parents” (2002, p. 417). Several studies done in developing countries have shown that throughout the years men have had a higher educational attainment than women.

As women’s education increases, their decisions to get married and become pregnant are delayed. Their opportunities to join the labor force also increase. “Having a child during the teenage years limits the girls’ opportunities for better education, jobs, and income and increases the likelihood of divorce and separation” (World Development Indicators, 2006, p. 37). As women’s views and opportunities are expanded through education, children and marriage move down in the scale of importance. “The evidence on the former is fairly clear: the higher the level of schooling, the later the age at marriage and the more preferences are implemented by means of contraceptive use” (Bongaarts, 2003, p. 326).

In addition, delaying marriage and childbirth reduces mortality rates during conception. As teen age girls’ bodies are not ready for conceiving, they have higher chances of complications or even death during childbirth. Women who are better educated are able to choose their future husband from a bigger pool of men, therefore deciding to marry when ready. “When the price of time increases, families opt for fewer children, but spend more on each of them. Fertility falls, but child quality increases” (Hoffman and Averett, 2005, p. 165).

Education empowers women, as more options and possibilities are open to them. It provides autonomy, as they are able to choose and decide what ever best suits and fulfill their needs. “There is a growing awareness that education is not only the key to independence and empowerment for women, but that it gives them both the incentive and ability to reduce their fertility, as well as the opportunity to better contribute to their families. Hence, there is also increasing recognition that there are substantial links between women’s educational attainment and a country’s standard of living and general well- being” (Blau, Ferber and Winkler, 2002, p. 417). Their ability to delay marriage and child birth at their own convenience, impacts the country’s fertility and mortality rates. This also affects socio-economic development by reducing population growth.

In addition, as women become better educated, their knowledge of contraceptive methods increases. “For one, they will be able to read labels and instructions, and are thus likely to be better informed about nutrition, proper hygiene, and health care, including birth control” (Blau, Ferber, Winkler, 2002, p. 417). This acquired knowledge facilitates their access to health care facilities, services and family planning programs, which can also be passed onto friends, sisters, daughters, etc, therefore spreading the possibilities of reducing fertility rates. “The dominant behavioural pathway linking education to fertility, is of course, the use of contraceptives. With few exceptions, contraceptive use rises monotonically and steeply across schooling categories” (Cleland, 2004, p. 190).

The sources mentioned above were very concise and precise when explaining the issues regarding fertility and economics. They showed the

disadvantages for women who have high fertility and gave two clear solutions to this problem, education and contraception. Even though they clearly explained these issues they lacked numbers and statistics for Latin America. Therefore, I was not able to do any comparisons between education, contraception, and fertility rates through time in this region. When they provided statistics they were from the United States, thus not applicable to my focus in Latin America. Due to this, I had to search data elsewhere in order to provide the missing pieces from these authors. I took statistics from the World Bank Group in order to see the change and effects in fertility rates, education enrollment and completion rate, and women's labor force participation in Latin America and the Caribbean.

The following table shows fertility rates (total births per woman) in Latin America and the Caribbean have decreased, while secondary and tertiary education enrollment and primary completion rates have increased. All of these factors promote economic development for the region.

Table 1.1 Latin America and Caribbean

	1990	2000	2004
GNP per capita (US\$)	2239	3680	3576
Total Population (millions)	437.6	515.1	545.9
Female (% of total)	50.3	50.5	50.6
Total fertility rate (births per woman)	3.2	2.6	2.5
Adolescent fertility rate (births/1000 women ages 15-19)	--	82	78
Gross enrollment rate (% of age group)			
Primary- female	--	121	119
Secondary- female	--	86	90
Tertiary- female	--	24	28
Primary completion rates- female	89	--	97
Youth literacy rate (% of people aged 15-24)- female	--	92.8	97

Source: World Bank. "Gender Stats"

<http://genderstats.worldbank.org/genderRpt.asp?rpt=profile&cty=LAC,Latin%20America%20Caribbean&hm=home>

Women's Labor Force Participation

Recently women's labor participation has incredibly increased, due to the higher levels of education and completion rates. Women have become more competitive in the work force. They have been able to take over jobs that many years ago were only considered or reserved for men, such as CEO's, lawyers, doctors, etc. "In terms of private benefits, education enhances women's potential for entry into the labor force, raises their potential earnings, and also increases women's productivity in the home" (Blau, Ferber, Winkler, 2004, p. 417). As women are able to have higher paying jobs and a higher education, the opportunity cost between child bearing and salary is higher for them, than for those women whose education level is low.

“Finally, because the education of women increases the opportunity cost of raising children, they are likely to have fewer of them, allowing parents to devote more of their limited resources to each child” (Blau, Ferber, Winkler, 2002, p. 418). This impacts women’s decision on how many children to have. Women with lower numbers of children are able to fully dedicate themselves to their jobs, increase their levels of income, and provide the best possible resources for their children. “As pointed out by other researchers (P I Schultz 1990, for example), this impact comes from the facts that (a) labor force participation empowers women to have control over their returns to labor, and (b) by enhancing the socio-economic status of women, it also gives them the power to participate more actively in households decisions, including households’ fertility decisions” (Singh, 1994, p. 218). This author’s work will be discussed later in the chapter.

As you can see in the following table women’s labor force participation in Latin America and the Caribbean has increased. As women have become better educated, their unemployment rate decreases. In addition, it is valuable to note that women’s labor force participation is moving away from the agricultural and industrial sector to a service based one. This is due to the higher levels of education and reduction in fertility rates women are obtaining. Women are able to search for jobs that satisfy their professional needs according to their education levels. Rather than looking for jobs that allow them to take care of their children while working.

Table 1.2 Latin American and the Caribbean Labor Force Participation

	1990	2000	2004
Total labor force (millions)	171	227	249
Female (% of total)	34	39	40
Female employed in agricultural sector (% of female labor force)	7	12	9
Female employed in the industrial sector (% of female labor force)	17	14	14
Female employed in the services sector (% of female labor force)	74	74	76
Female unemployed (% of female labor force)	7.1	12.1	11.8
Female unemployed (% of total unemployment)	7.1	12.1	11.8
Female unemployed by primary education level (% of female unemployment)	--	28	--
Female unemployed by secondary education level (% of female unemployment)	--	36	--
Female unemployed by tertiary education level (% of female unemployment)	--	14	--

Source: World Bank. "Labor Force."

<http://genderstats.worldbank.org/genderRpt.asp?rpt=labor&cty=LAC, Latin%20America%20Caribbean&hm=home2>

The World Bank Group's data provides very useful information about women's fertility, educational attainment and labor force participation and they

have changed though time. A difficulty I found in this data though was that some of the data for certain years was missing. Therefore, this lack of information made it difficult to see changes through years.

THE IMPACT OF GOVERNMENTS' POLICIES TOWARDS CONTRACEPTION USE IN BELIZE AND HONDURAS

Belize

Formerly known as British Honduras, the country is situated in Central America. According to the United Nations Secretariat in their Fertility, Contraception, and Population Policies; “several countries in the region, however, did not provide access to contraceptive methods until the early or mid 1980s. Among them were Argentina, Belize, Bolivia, Guyana, Suriname and Uruguay. Nevertheless, by 2001, almost all countries in Central and South America, with the exception of Argentina and Belize, had policies in place to provide direct support for contraception” (2003, p. 24). By 1996, Belize had changed their contraceptives policies from no support to indirect support, which is the policy it currently holds.

Table 1.3 Belize Data Profile

	1990	2000	2004	2005
GDP (current US\$)	--	832.0 million	1billion	1.1 billion
GDP growth (annual %)	--	12.3	4.6	3.1
Total population (thousands)	189	250	283	--
Female population (% of total)	49	49	49	--
Total fertility rate (births per woman)	4.5	3.4	3	--
Adolescent fertility rate (births per 1,000 women ages 15-19)	--	93	82	--
Infant mortality rate (per 1,000 live births)	39	34	32	--
Gross primary enrollment ratio (% of age group) Female	111	115	123	--
Gross secondary enrollment ratio (% of age group) Female	47	70	87	--

Gross tertiary enrollment ratio (% of age group) Female	--	--	4	--
Progression to grade 5 (% of cohort) female	--	66	79	--
Female primary completion rate	93	97	104	--
Contraceptive prevalence rate (% of women aged 15-49)	47	56	--	--
Women traveling > 1 hour to family planning facilities (%)	--	--	--	--
Pregnant women receiving prenatal care (%)	--	--	--	--
Births attended by trained health staff (% of total births)	77	83	--	--
Maternal mortality rate (per 100,000 live births)	--	140	--	--
Adolescent fertility rate (births per 1,000 women ages 15-19)	--	93	82	--

Female (% of total labor force)	27	32	34	--
Unemployment rates- female (% of female labor force)	--	20.3	15.3	--

Source: World Bank. "Belize Data Profile."

<http://devdata.worldbank.org/external/CPProfile.asp?PTYPE=CP&CCODE=BLZ>

Honduras

Officially named the Republic of Honduras, the country is also situated in Central America. The Honduran government has given direct support to contraception methods since 1976 up until today. The Secretariat of Health is responsible for planning, regulating, coordinating, and evaluating all public health programs. The United States Agency for International Development (USAID) has been Honduras' principal supplier of contraceptives since 1995 (Contraceptive Security in Honduras: Assessing Strengths and Weaknesses, 2004, p. 8).

Table 1.4 Honduras Data Profile

	1990	2000	2004
GDP (current US \$)	--	6.0 billion	7.4 billion
GDP growth (annual %)	--	5.8	4.6
Total population (millions)	4.9	6.4	7
Female population (% of total)	49.7	49.6	49.6
Total fertility rate (births per woman)	5.1	4	3.6
Adolescent fertility rate (births per 1,000 women ages 15-19)	--	107	99
Infant mortality rate (per 1,000 live births)	44	33	31
Gross primary enrollment ratio (% of age group) Female	110	107	118
Gross secondary enrollment ratio (% of age group) Female	37	--	--
Gross tertiary enrollment ratio (% of age group) Female	8	16	20

Progression to grade 5 (% of cohort) female	--	--	69
Female primary completion rate	62	--	82
Contraceptive prevalence rate (% of women aged 15-49)	47	62	--
Women traveling > 1 hour to family planning facilities (%)	--	--	--
Pregnant women receiving prenatal care (%)	--	--	--
Births attended by trained health staff (% of total births)	45	56	--
Maternal mortality rate (per 100,000 live births)	--	110	--
Adolescent fertility rate (births per 1,000 women ages 15-19)	--	107	99
Female (% of total labor force)	28	34	37

Unemployment rates- female (% of female labor force)	6.2	3.9	4.7
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Source: World Bank. "Honduras Data Profile."

<http://devdata.worldbank.org/external/CPProfile.asp?PTYPE=CP&CCODE=HND>

Evidence shows that governments' policies towards contraceptive methods improve a country's socio-economic wellbeing. Countries that effectively reduce their population growth positively affect their economic development. This is due the higher amount of resources available which become more easily for the governments to allocate. From the data profiles shown above, it is important to note that the total fertility rates (births per woman) in both countries have decreased. Furthermore, in both countries progression to grade 5 and female primary completion rate have increased.

The World Bank Group's data was useful to see some changes Latin American, as well as Belize and Honduras have incurred through time, such as population size, GDP annual growth, fertility rates and education enrollment. In order to properly test my research question this data would not properly fit my analysis. My research question is: are fertility rates lower in countries that give direct support towards contraception use, relative to governments that provide indirect support towards family planning methods, other things being equal? Therefore, individual households will be analyzed first. Afterwards, this will provide us with the impact governments policies have on households' welfare as well as the socio- economic development of countries. Consequently, this study uses the household surveys done by Centro Centroamericano de Población conducted in Belize and Honduras in 1991.

LITERATURE REVIEW

Several studies were mainly useful for this research, including: John Bongaarts' "Completing the fertility transition in the developing world: The role of educational differences and fertility preferences," Ram D Singh's "Fertility-Mortality Variations Across LDCs: Women's Education, Labor Participation, and Contraceptive- Use," Charles Hirschman's "Why Fertility Changes," Germán Rodríguez's "The Spacing and Limiting Components of the Fertility Transition in Latin," and John Cleland's "Education and Future Fertility Trends, with Special reference to Mid-Transitional Countries."

First, Bongaarts' (2003) article analyzes the patterns of unwanted and wanted fertility with respect to education levels. His study was conducted by analyzing the shift from high fertility to low fertility that developed countries have experienced in the past decades. He used the data from the Demographic and Health Surveys (DHS) conducted in 57 less developed countries since 1985. All surveys with nationally representative samples were included. His data was divided in three education categories- no schooling, primary (complete and incomplete), and secondary or higher (each defined by the countries).

In most of his DHS surveys, Bongaarts found that women with more than primary education had lower levels of fertility than those who had no education. "This relationship is in part attributable to other factors such as family income, rural- urban residence, and husband's education. After controlling for such factors in multivariate analyses, the effect of wife's education remains statistically significant and it is more powerful than the effect of husband's education or the

family's economic status" (Bongaarts, 2003, p. 322). His study showed that average fertility in a population with little schooling will be higher than in a population in which schooling is common.

His findings showed, as expected, that fertility is inversely related to level of education in every stage of the transition from one grade level to the next. The estimates of total fertility by level of education from surveys in 57 less developed countries showed that for each education group the average total fertility is higher in pre-transitional countries than in late transitional ones: 7.7 vs. 4.0 for women with no schooling, 6.4 vs. 3.1 for women with primary education, and 4.3 vs. 2.1 for women with secondary- plus education. Therefore as suspected, as women have higher levels of education, they marry later. His model also showed that unwanted child bearing is low at the beginning of the transition. Furthermore, his study showed that women who wait longer for a desired family size have limited exposure to unwanted child bearing. This is due to their increased use in birth control. Increases in unwanted child bearing occur when women don't properly use contraceptive methods. Therefore, unwanted fertility gets decreased with the use of contraception methods.

Then, Singh's (1994) article shows how as women become better educated, their value of time gets increased. As women's labor force participation increases their decision- making process in the household increases. In addition, he examines how contraceptive methods and access to information and health facilities can slow population growth in low income countries.

Singh ran regressions with the three alternate measures of the human capital variable, the female's school enrollment, the female's literacy rate, and the school years completed by females. As expected, the results on the three human capital variables appeared constantly negative and statistically significant across several alternate specifications of the estimating model. The estimated coefficients on human capital variables, the female's literacy rates and the female's school enrollment appeared negative and statistically highly significant across the fertility equations. These results clearly showed that education is a significant factor in reducing fertility rates, thus slowing population growth in less developed countries. Also, these results showed that literacy levels are a good measure of human capital.

Moreover, he ran regressions using the variable for contraceptive- use, but for his study the results showed that "of all the explanatory variables of the fertility model estimated, the contraceptive variable (CNT) appeared statistically the most powerful determinant of fertility response variations. The result of a significant negative coefficient on the variable thus unambiguously indicates that, other things equal, contraceptive- use has had strong negative impact on LDC's fertility rates" (Singh, 1994, p. 219). These results dismiss the theories by Hirschman in 1985 and Entwistle Mason and Hermalin in 1986, which argue that contraception use does not necessarily lead to a decline in fertility rates (Singh, 1994).

Third, Hirschman (1994) discusses the two major economic approaches of the study of fertility. The first is the "new home economics" which applies

microeconomic theory to the family issues. This approach involves the relationship between fertility behavior and consumer choice theories. This approach considers women's opportunity cost of time as well as the impact on prices and incomes.

The second approach he examines is the relation between fertility and supply and demand of Richard Easterlin. According to Easterlin, fertility is determined by demand, supply, and the costs of fertility regulation. "Demand factors include the standard socioeconomic determinants of fertility from modernization (demographic transition) theory. Supply factors are environmental and cultural factors that constrain natural fertility. The costs of fertility regulation include the monetary, time, and psychic, factors associated with the use of contraception" (Hirschman, 1994, p. 215). Hirschman notes, that Easterlin's model contains many flaws. "First, the assumption of natural fertility means that the wide variations in pretransition marital fertility (and marital behavior) are outside the scope of theory" (Hirschman, 1994, p. 215). Second, there is no solution to the problem of which socio-economic variables account for demand. "In general, demand for fertility does decline with modernization, but the question of the many weak associations between the standard predictor variables and fertility remains unsolved" (Hirschman, 1994, p. 215-216).

Subsequently, Rodríguez (1996) studies fertility rates within marriage or a couple's long-term union rather than overall fertility. "This choice reflects our view that an essential feature of the fertility transition is a change in childbearing within marriage, which in turn results from changes in spacing and limiting

fertility behaviours...It turns out, however, that the effect of changes in age at marriage on fertility is relatively modest, compared to the magnitude of changes in marital fertility” (Rodríguez, 1996, p. 27). The data used by Rodríguez for this study came from Colombia, Dominican Republic, Ecuador, Mexico, Peru, and Trinidad and Tobago. These countries were selected because they had “successfully completed fertility surveys as part of the WFS and the DHS programmes...The WFS core questionnaire included complete birth and marriage histories, together with information on proximate determinants of fertility such as breast-feeding and contraception, and on socio-economic factors affecting fertility, such as place of residence, education, and employment. The DHS basic questionnaire covers essentially the same topics, but did not collect a complete marriage history; the information on marriage is limited to current marital status and date of first marriage” (Rodríguez, 1996, p. 28- 29).

The dependent variable is number of births preceding the interview (each woman who has ever been in a union, thus, since the first union, one to sixty months before the interview). The explanatory variables which include two demographic controls: age, duration since first union (years). Rodríguez notes it is very important to see the age of women when first united or married. The socio-economic factors are residence, wife’s education, husband’s occupation.

$$E(B_i = f(a_i, d_i, x_i)E_i)$$

B_i = number of births for the i-th woman in sample

E_i = exposure of time

Theoretical fertility rate:

a_i = age

d_i = duration since first union

x_i = socio-economic attributes

$\alpha(x_i) = x_i' \theta_\alpha$ and $\beta(x_i) = x_i' \theta_\beta$

The models involve two demographic controls and one of the socio-economic factors. Rodríguez allowed the two parameters to vary freely across categories of the explanatory variable of interest. In order to count the births B_i follow a log-linear Poisson regression model, with

$$\log(E(B_i)) = \log(E_i) + \log(n(a_i)) + x_i' \theta_\alpha + x_i' \theta_\beta d_i$$

The results from Rodríguez' analysis showed significant regularities in the process of transition across the six countries. "In all social strata where fertility has started to decline the indices of spacing and limiting seem to have followed the same broad but well- defined paths over time, a feature which allows us to discern general patterns, as well as highlight interesting exceptions. The general trends are consistent with a simple process of one stratum to the next, but once it has reached any stratum it appears to spread at a rate roughly proportional to the number of controllers" (Rodríguez, 1996, p. 28). Therefore, particular social class's patterns were observed to follow similar paths among them. They indicated that education does reduce fertility in women by making them limit or space their births.

Finally, Cleland's (2004) article shows how of all socio-economic indicators, education remains the most significant one. The launch of the UN Millennium Development Goals for 2015 by the United Nations has been welcomed by many scholars. The achievement of primary education for boys and

girls was the second goal in the list. Therefore, economists, demographers, sociologists, anthropologists, and others have become very interested in how to increase education levels especially for women.

Cleland states, “education of adults persistently emerges as the single most powerful predictor of their demographic behaviour. Thus, length of schooling is associated with the start of reproductive life (age at marriage and maternity), with childbearing and the use of birth control, and with mortality... The main purpose of this paper is to identify the implications of past and projected changes in the educational composition of populations for the future course of fertility in countries that have now entered in the mid- and later phases of fertility transition, broadly defined here in terms of total fertility in the range of three to five births per woman” (Cleland, 2004, p. 187).

Cleland put together past analyses and research done by other authors in order to come up with “a theory of fertility that specifies the role of schooling as a determinant in the context of other determinants” (Cleland, 2004, p. 187). This is what he concluded, “Two components of educational composition of a population are potentially relevant to fertility: the composition of the school-age population and the composition of the population in the reproductive ages. Considering the first of these, school enrolments may transform intergenerational relationships by raising the direct costs of childbearing, reducing their availability for household production and allowing parents to invest in the quality of offspring at the expense of quantity” (Cleland, 2004, p. 188).

After he ran his tests to prove his hypotheses he concluded what seemed expected, “The most obvious way in which schooling may influence the fertility of couples is by providing them with the means of acquiring and understanding correct information about prevention of pregnancy and childbirth... Even one to three years of maternal schooling is associated in some countries with an appreciable reduction in childbearing and this modest exposure to primary schooling is rarely sufficient to impart lasting reading and writing skills” (Cleland, 2004, p. 192).

As women’s educational level increase their knowledge of contraceptive methods, where to obtain them, and how to use them also increases. In addition, women with higher education level value the opportunity cost of children, have greater autonomy in household decisions as well as their reproductive behavior, and have higher confidence in health care systems.

These last two models seem the most pertinent ones in relation to the data Centro Centroamericano de Población provided me. Therefore, these two analyses will serve as a basis for the methodology used in my empirical analysis to analyze my research question: are fertility rates in countries that provide direct support towards contraceptive methods lower relative to the fertility rates in countries that give indirect support, other things being equal? The countries chosen for this analysis are Belize and Honduras. Belize provides indirect support towards family planning methods, while Honduras gives direct support.

CHAPTER 2: METHODOLOGY OF ANALYSIS

This section will explain the sources of the data used in my analysis, definition of variables, choice of statistical model, and choice of hypotheses to prove my research question. Moreover, this section will provide a summary of indicators that affect fertility rates in countries.

The data for this study was provided by Centro Centroamericano de Población, Universidad de Costa Rica. The surveys were conducted in 1991 in all Central America, but the countries of interest in this analysis are Belize and Honduras. Centro Centroamericano de Población developed standardized questionnaires regarding health, household and fertility issues for women who aged between 15 to 49 years old. In Belize there were a total of 2,656 completed interviews. The urban and rural areas were shown in a separate form (Centro Centroamericano de Población, 1991). While, in the Honduras there were a total of 8088 completed surveys. In order to select the sample the regions were stratified by the eight regions of health, and then by residence: big cities (Tegucigalpa, San Pedro Sula), other urban areas, and other rural areas (Centro Centroamericano de Población, 1991).

Centro Centroamericano de Población core questions included complete birth history, which contained information on determinants of fertility, such as breast-feeding and contraception use and cost. The information on marriage history was limited to current marital status. In addition, it included socio-economic factors affecting fertility, such as women's education level and employment or performance of any sort of task that remunerated women. The

information on household occupation was limited to women's education; there is no information regarding the husband's occupation.

There has been a lot of research done on the topic of the effects of contraception and education on fertility rates. It is important to recall that my hypothesis and the models are designed to differentiate the effects caused on fertility rates and contraception use due to the contraception policies of Belize and Honduras. As mentioned earlier, Belize gives indirect support towards family planning, while Honduras gives direct support. The following equations are directly related to my research question: are fertility rates lower in countries that give direct support towards contraception use, relative to governments that provide indirect support towards family planning methods, other things being equal?

First Hypothesis

Based on Rodríguez's work (1996) and my available data, I hypothesize that women who receive direct support for contraception use will have lower fertility rates relative to women that receive indirect support for contraception use. The dependent variable defined for each woman who has been in a union, is the total number of live births. The decision to focus on live births rather than total births derives from the fact that depending on the number of live births a woman has to sustain, her working attitude is different from a woman who has had children but did not survive. The explanatory variables include four demographic controls and two socio-economic factors.

The demographic controls are age, religion, marital status and if currently using any type of contraceptive method. Religion was measured in the same way in both surveys. Women were asked if they belonged to any religion and how religious they were. The only difference was found in the Belize survey, where women were asked how regularly they attended religious services. I should note that contraception use can not be analyzed, without knowing what the religious percentages of the examined countries are. Honduras' population is 97% Roman Catholic and 3% Protestant (CIA the World Fact Book, Honduras). While, in Belize the population's religion is composed of 49.6% Roman Catholic, 27% Protestant, 14% other, and 9.4% are non religious. The Protestants are divided into 7.4% Pentecostal, 5.3% Anglican, 5.2% Seventh-day Adventist, 4.1% Mennonite, 3.5% Methodist, and 1.5% Jehovah's Witnesses (CIA the World Fact Book, Belize, 2000). As shown by these statistics both countries prevalent religion is Roman Catholicism. Therefore, religion does play an important role in the use of contraception, as Catholicism opposes the use of any contraceptive method.

Moreover, current contraception use was measured the same in both countries. Women were given a list of various birth control methods. They were asked if they had ever heard or used any of the methods mentioned. Then, they were asked if they are currently using any of these methods. In addition, the inclusion of women's marital status variable will allow us to see how a woman's autonomy is influenced. A woman's marital status can sometimes be a predictor of their household decision- making power. Women, who are married, separated,

divorced, separated, or in a union will have different views and decisions to make regarding fertility levels and household investments and savings, relative to single women.

In addition the socio-economic factors in this model are all numeric variables, and include wife's education and their occupation. Educational attainment was measured the same way in both countries with a question of highest grade or years of education obtained; therefore I can derive years of schooling. Also, the current or most recent occupation of women is recorded in the same way in both countries, where they were asked if they performed any type of job where they received money in exchange. Then, they were asked what type of work they performed and where did they work. In the survey for Belize, the questions were more detailed as women were asked if they worked full or part time, if they were self employed and the age they began working.

The Statistical Model

The model I used in this analysis is a model whose dependent variable denotes the number of live births. Let Y_i denote the total number of live births for the i -th woman in the sample. Let X_{i1} , X_{i2} , X_{i3} , and X_{i4} be the demographic controls which represent age, religion, marital status, and women currently using contraceptive methods respectively. Let X_{i5} be the socio-economic factor for education level and let X_{i6} be the one for women currently participating in the labor force. In the following chapter all parameters of estimation and their respective signs will be thoroughly defined according to the theory.

Second Hypothesis

Based on John Cleland's (2004) model and my available data, I hypothesize that direct subsidies of contraception result in greater use, than indirect subsidies of contraception, other things being equal. Also, I must acknowledge the fact that this hypothesis is similar to the previous one. The difference lies that this model will enable us the factors that influence a woman's decision to control their reproductive behavior, through the usage of any birth control method. While, the previous model showed us the determinants affecting fertility rates in women. The dependent variable defined is any woman who currently uses any type of contraception. The explanatory variables include four demographic controls and two socio-economic factors. The demographic controls are age, religion, marital status, and where the contraception was obtained.

Religion was measured in the same way in both countries. First women were asked if they belonged to any particular religion and if so, how often they attended religious services. The demographic control, family planning supplier, was chosen because the questionnaire did not ask women the amount they currently pay for contraception use. The family planning supplier was measured by where women obtained their current contraceptive method. This provides us with information about whether women paid or not for contraception.

Contraception in both countries is free, and can be obtained in the public hospital or health clinics. Contraception can also be purchased at the pharmacy evidently at some cost. It is important to note that as Belize gives indirect support towards family planning and Honduras gives direct support, Belize receives less funding

for contraception in relation to Honduras. This is due to Belize's funding which is provided by foreign aid only, while Honduras' funding is sponsored by foreign aid as well as by the government itself.

As in the previous model some of these factors were measured the same way in the first model. The socio-economic factors are all treated as numeric variables. They include women's education level and if they currently participate in the labor force. Educational attainment was measured the same way in both countries with a question of the highest grade or year obtained. With this information I can derive the years of schooling. As mentioned before, the women's labor force participation factor was measured with questions regarding if at the time of the survey they performed any job where they were remunerated.

The Statistical Model

The model I will use to test this prediction in my analysis is a model with a dependent variable of use contraceptive use. Let Y_i denote any woman who currently uses any contraceptive method. The demographic controls are X_{i1} , X_{i2} , X_{i3} , and X_{i4} which denote age, religion, marital status, and where contraception was obtained, respectively. In addition, the socio-economic factors are X_{i5} and X_{i6} which respectively denote women's educational level and current labor force participation. As previously mentioned in the following chapter all parameters of estimation and their respective signs will be thoroughly defined according to the theory.

**CHAPTER THREE: REGRESSIONS ON THE EFFECT OF
GOVERNMENT POLICIES TOWARDS CONTRACEPTION ON
FERTILITY RATES**

The previous chapter established the appropriate determinants for my two dependent variables, live births (LIV) and contraception use (CON). I will now compute a regression analysis to see the effects caused by each independent variable to live births and contraception use. This analysis is done to evaluate how fertility rates are affected, due to governments' direct or indirect policies towards birth control methods. The countries used for this study are Belize and Honduras. Since 1976 until 2003, Centro Centroamericano de Población, Universidad de Costa Rica, has gathered data regarding household and health issues in Central America.

It is extremely important to recall the policies both Belize and Honduras have regarding contraception use. Since 1976, Honduras has given direct support towards contraception. On the other hand, Belize gave no support, but in 1996 the government changed their policies to indirect support towards family planning methods (Population Division, Fertility, Contraception and Population Policies, 2003).

Data Description

Following are the summary statistics of the relevant variables from the data from Belize and Honduras. Both surveys were conducted in 1991 by Centro Centroamericano de Población, Universidad de Costa Rica. The data was available in Stata9. This institution also provided the questionnaires used in the surveys with their respective dictionaries (See Appendix A).

Presentation of Model 1: Dependent Variable: Live Births

The first model I analyzed was based on Germán Rodríguez's (1996) article. My prediction for this model is: *women who receive direct support for contraception use will have a lower fertility rate than women with indirect support for contraception use, other things being equal*. Therefore, I expect the number of live births a woman has to be affected by: age (AGE), education level (EDU), nationality (NAT), marital status (MST), religion (REL), religious intensity (RIN), contraception use (CON), and current labor force participation (LBF).

We predict that the following independent variables have a negative relation with a woman's total number of children:

- Age squared: The marginal effect of age changes in older women because births peak at a certain age. In other words, women have children later in life, but after some time they stop as they are no longer able to conceive. The relationship is concave as age increases at a decreasing rate.

- Education level: As women become better educated, they are able to make better informed decisions regarding their households, fertility levels, and community issues. In addition, with more years of education women are able to earn enough to support their families without the help from their children. This enables children to attend school.
- Nationality: On average, women who seek birth control supplies and assistance from countries that give direct support for contraception will have fewer children. These countries have more funding for various contraceptive supplies as well as better equipped facilities.
- Protestant and other religions: Women who practice these religions will have fewer births. As their doctrines do not condemn contraception, they are able to use any variety of family planning methods. This is relative to Catholic women who are condemned for the use of any type of contraception and are the “left- out category” in this group.¹
- Non religious: Women who do not practice any religion will have fewer births. This is attributable to the fact that non religious women do not fear any kind of condemnation when using any method of family planning, as opposed to Catholic women.
- Religious intensity: Women who attend religious services less than once or once or twice a month are more likely to have fewer births as their devotion to their religion’s doctrines are not very strong. Thus, they do not fear condemnation for the use of contraceptive methods.

¹ When including dummy variables, which are variables that have a value of either 1 or 0, one category has to be left out. This is done to avoid multicollinearity.

- Contraception use: On average, women who currently use any type of family planning method control their reproductive behavior. Therefore, they have fewer children.
- Current labor force participation: Women with less number of children are more likely to engage in any type of remunerated job, especially outside the home. This increases women's opportunity cost of bearing children, which motivates them to have fewer children.

We predict the following independent variables have a positive effect on a woman's total number of children:

- Age1: The age variable increases at a decreasing rate. On average women usually have children when they get older. After some time they stop having children as they are not able to conceive anymore due to biological limitations caused by age.
- Education squared: As education increases at a decreasing rate, the marginal effect on the education variable is more likely to change with more years of education.
- Marital status: On average, women wait until older to get in a committed relationship and start a family. Therefore, relative to single women, the "left- out category" in this group, women that are: married, in a union, separated, divorced, and widows are more likely to have more children.
- Religious intensity: Religious, somewhat, and very religious women are more likely to have more children relative to non religious women, the "left- out category" in this group. Also, women who attend 3 to 4 or 5 or more religious

services per month are more probable to have higher fertility rates than non religious women. This is due to their stronger religious convictions as they fear condemnation for the use of contraception.

- Did not respond: Women who didn't respond to the religious affiliation question are more likely to have more live births as they do not precisely belong to any denomination.

The live births equation for Belize and Honduras is postulated to look as follows:

$$\text{LIV} = f(\text{AGE1}, \text{AGE2}, \text{EDU1}, \text{EDU2}, \text{NAT}, \text{MAR}, \text{SEP}, \text{DIV}, \text{WID}, \text{ORELI}, \text{1RELI}, \\ \text{3RELI}, \text{5RELI}, \text{NRES2}, \text{NREL}, \text{PRO}, \text{OTH}, \text{NRES1}, \text{UNI}, \text{CON}, \text{LBF}, \text{NCON})$$

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Key decisions in how I drew my sample

After analyzing the data sets from Belize and Honduras separately, the data sets from both countries were appended so they could be analyzed at the same time. In other words, the Belize data set was added to the end of the Honduras dataset. Thus, to get consistent results the variables for both countries had to mean and be named the same.

First, the P- value is a measure of significance. A p- value can range from 0 to 1.0. With a significance level, α , fixed at 10%, and a test of significance which yields a p- value less than 0.1, then the coefficient is said to be statistically significant. In other words, 90% of the time we can reject the null hypothesis that $\beta = 0$. If the test of significance gives a p- value of 1.0, then we fail to reject the null hypothesis, and $\beta = 0$.

Moreover, live births is a count variable. Count variables are measured by a nonnegative integer over a given time period. They are relatively rare and are assumed to be generated by a Poisson process. A Poisson distribution conveys the probability of a number of events occurring during a fixed amount of time. These events are independent of the time since the last event. Thus, running an Ordinary Least Squares with a count variable as a dependent variable provides biased and inconsistent results. This is due to “Ordinary Least Squares assume a symmetric distribution of errors while a Poisson regression is skewed. Second, Ordinary Least Squares can sometimes predict values that are negative, while Poisson regressions are non- negative. Finally, Ordinary Least Squares assume a constant variance, while in Poisson regressions the variance increases as the mean increases” (Children’s Mercy, 2007). Therefore, both Ordinary Least Squares and Poisson regressions were run to compare both results.

After running a Poisson regression the Goodness- of- fit test was done to see if all of the regression coefficients are simultaneously equal to zero. The established alpha level of 0.1 and the small p- value from the Likelihood Ratio test $p < 0.00001$, lead me to conclude that at least one of the regression coefficients in the model is not equal to zero. Therefore, a Nominal Binomial regression was done to check for over- dispersion in the data. Over- dispersion is a phenomenon when the data displays more variability than predicted by the variance and it is measured by the parameter alpha. If alpha is greater than zero, the response variable, live births, is over- dispersed. If alpha is less than zero, the response variable is under- dispersed. The Nominal Binomial regression was not able to

find the maximum as these functions are not globally convex. Thus, we report it as a Poisson regression.

Finally, the religious intensity variable was dropped from all the models. This was due to collinearity found between the religion and religious intensity variables. Collinearity is any linear relationship among independent variables in a regression. It was causing statistical insignificant results for both variables mentioned above. In addition, an interactive term was added to this model. This was done to see if there is a difference in the number of children current female contraceptive users have relative to the country where they get their birth control attention and supplies. This interactive term is the product of the nationality variable and the current contraception use one.

Presentation and Interpretation of Results

	Dependent Variable: Live Births	
	Equation 2.1 OLS	Equation 2.2 Poisson
R ² / Pseudo R ²	0.4930	0.2059
<i>n</i>	7794	7794
Intercept	-5.084263	-2.67422
<i>P- value</i>	0	0
AGE1	0.3545585	0.1817855
<i>P- value</i>	0	0
AGE2	-0.0022882	-0.0019605
<i>P- value</i>	0	0
EDU1	-0.0792834	-0.008826
<i>P- value</i>	0	0.055
EDU2	-0.0014045	-0.0008095
<i>P- value</i>	0.002	0
MAR	1.129814	0.461327
<i>P- value</i>	0	0
UNI	1.183039	0.4760939
<i>P- value</i>	0	0
DIV	-0.329733	0.0634407
<i>P- value</i>	0.291	0.514
WID	0.819122	0.4038225
<i>P- value</i>	0	0
SEP	0.4241923	0.2804726
<i>P- value</i>	0	0
PRO	0.0938162	0.0230719
<i>P- value</i>	0.083	0.088
NREL	0.1621907	0.0385366
<i>P- value</i>	0.03	0.046
OTH	-0.1890196	-0.0388814
<i>P- value</i>	0.545	0.633
NORE	0.1630231	0.0563272
<i>P- value</i>	0.806	0.756
LBF	-0.5391268	-0.1241516
<i>P- value</i>	0	0
NAT	1.177166	0.2403236
<i>P- value</i>	0.078	0.188
CON	-0.0054968	0.0011487
<i>P- value</i>	0.951	0.961
NCON	-0.19306	-0.0420735
<i>P- value</i>	0.064	0.116

First, equation 2.1 had an R- squared of 0.4930, meaning that 49.30% of the dependent variable is explained by the independent variables. The following equation was produced with the corresponding P- value below each coefficient:

$$\begin{aligned}
 \text{LIV} = & -5.084263 + .3545585 (\text{AGE1}) - .0022882 (\text{AGE2}) - .0792834(\text{EDU1}) - \\
 & \quad (0) \quad (0) \quad (0) \quad (0) \\
 & .0014045 (\text{EDU2}) + 1.129814 (\text{MAR}) + 1.183039 (\text{UNI}) - 0.329733 (\text{DIV}) + \\
 & \quad (0.002) \quad (0) \quad (0) \quad (0.291) \\
 & .819122 (\text{WID}) + .4241923 (\text{SEP}) + .0938162 (\text{PRO}) + .1621907 (\text{NREL}) - \\
 & \quad (0) \quad (0) \quad (0.083) \quad (0.030) \\
 & .1890196 (\text{OTH}) + .1630231 (\text{NORE}) - .5391268 (\text{LBF}) + 1.177166 (\text{NAT}) - \\
 & \quad (0.545) \quad (0.806) \quad (0) \quad (0.078) \\
 & .0054968 (\text{CON}) - .19306 (\text{NCON}) \\
 & \quad (0.951) \quad (0.064)
 \end{aligned}$$

In this regression the coefficients for age, education, women who are married, widows, separated, in a union, Protestant, non religious, and those who are currently participating in the labor force are statistically significant. The coefficients for the interactive term and the one for nationality also resulted statistically significant. In addition, some of the coefficients' signs resulted different than what we expected. This equation says that divorced women have fewer children relative to single women, the "left- out category" in that group. The total number of live births women have, according to this equation, is positively affected by the following categories: Protestant and non religious. Surprisingly, the coefficient on the nationality variable resulted positive. This tells

us that women from Honduras are more likely to have more live births relative to Belizean women. Of the variables mentioned above whose signs resulted different than expected, the only ones that are considered are Protestant and non religious. This is due to the coefficients of the rest which resulted statistically insignificant.

Second, equation 2.2 was produced with the corresponding P- value below each coefficient:

$$\begin{aligned}
 \text{LIV} = & -2.67422 + .1817855 (\text{AGE1}) - .0019605 (\text{AGE2}) - .008826 (\text{EDU1}) - \\
 & \quad (0) \quad (0) \quad (0) \quad (0.055) \\
 & .0008095 (\text{EDU2}) + .461327 (\text{MAR}) + .4760939 (\text{UNI}) + .0634407 (\text{DIV}) + \\
 & \quad (0) \quad (0) \quad (0) \quad (0.514) \\
 & .4038225 (\text{WID}) + .2804726 (\text{SEP}) + .0230719 (\text{PRO}) + .0385366 (\text{NREL}) - \\
 & \quad (0) \quad (0) \quad (0.088) \quad (0.046) \\
 & - .0388814 (\text{OTH}) + .0563272 (\text{NORE}) - .1241516 (\text{LBF}) + .2403236 (\text{NAT}) + \\
 & \quad (0.633) \quad (0.756) \quad (0) \quad (0.188) \\
 & .0011487 (\text{CON}) - .0420735 (\text{NCON}) \\
 & \quad (0.961) \quad (0.116)
 \end{aligned}$$

In this regression the coefficients for age, education, women that are married, in a union, widows, separated, non religious, and those who currently work are statistically significant. Also, some of the coefficients' signs resulted different than what we expected. This equation says that the total number of live births women have is positively affected by women that fall into these categories: Protestants and non religious. Surprisingly, the coefficient on the contraception use variable resulted positive. This tells us that women who are currently using

any contraceptive methods are more likely to have more children. Moreover, the positive coefficient on the women's nationality variable tells us that women from Honduras are more likely to have more live births relative to Belizean women. Of these variables which their coefficients' signs resulted different than expected, the only ones that are not disregarded are Protestant and non religious women. This is due to their coefficients which resulted statistically significant.

Finally, the Poisson model distribution is a better fit with count data as opposed to Ordinary Least Squares, thus we consider the Poisson's results. From these results we can conclude the following, the coefficient on nationality resulted statistically insignificant across samples, thus we fail to reject the null hypothesis that $\beta = 0$. In other words, even though Honduras gives direct support for contraception use and Belize gives indirect support, there is no difference in the birth rates in Honduras relative to Belize.

Presentation of Model 2: Dependent Variable: Contraception Use

The second model was based on John Cleland's work. The prediction for this model is: *direct subsidies of contraception result in greater use, than indirect subsidies of contraception, other things being equal*. Therefore, I expect women's decisions to use any contraceptive method to be affected by: age (AGE), education level (EDU), nationality (NAT), marital status (MAR), religion (REL), religious intensity (RIN), current labor force participation (LBF), and contraceptive method supplier (CSU). We predict that the following independent

variables will have a negative effect on a woman's decision to use any contraceptive method:

- Age squared: The marginal effect of age changes in older women because the age variable increases at a decreasing rate. This is due to women usually having children later in life, thus controlling their reproductive behavior with any contraceptive method. In addition, women also reach an age where they can no longer conceive due to biological reasons.
- Education squared: The marginal effect of education changes with more years of education as the education variable decreases at an increasing rate. Women who are better educated are more likely to use contraception.
- Religious intensity: Women who attend religious services 3 to 4 or 5 or more times per month are more likely to use less methods of contraception. This strong devotion to their religion and doctrines make them fear condemnation for the use of any type of birth control method.

The following independent variables are predicted to have a positive effect on a woman's decision to use any contraceptive method:

- Age 1: The age variable increases at a decreasing rate. On average, women usually have children later in life. Until they reach an appropriate age to conceive they control their reproductive behavior with the use of contraceptive methods. However, later in life women also reach an age where they can no longer conceive due to biological reasons.

- Education level: As women become better educated, they are able to make better informed decisions regarding their households, fertility levels, and community issues. Also better educated women are able to read, learn, and better understand the advantages and directions for using any type of contraceptive method. Thus, better educated women are more likely to control their reproductive behavior.
- Nationality: On average, women that seek contraceptive assistance and supplies from a country that provides direct support towards birth control methods will use more contraception. These countries have more funding for various contraceptive supplies as well as better equipped facilities.
- Marital status: On average, relative to single women, the “left- out category” in this group, women that are: married, in a union, separated, divorced, and widows are more likely to use more birth control methods. Relative to the “left- out category” women who fall in these categories are more likely to be older and more experienced in the use of contraceptive methods. Thus, these women tend to control their reproductive behavior more in order to prevent unintended pregnancies.
- Protestant, other religions and non religious: Women who fall in these categories are more likely to use more contraceptive methods relative to Catholic women, the “left- out category” in this group. They do not fear condemnation for the use of contraception.
- Religious intensity: Women who attend religious services less than once or once or twice per month are more likely to use more contraception. This is due to their

doctrines and convictions not being that strong relative to the “left- out category”.

Hence, they do not fear condemnation for the use of birth control methods.

- **Contraceptive method supplier:** On average, women who seek any kind of family planning supplier learn about the advantages and the different types of birth control methods. Therefore, they are more likely to control their reproductive behavior.
- **Currently working:** Women who perform any remunerated task increase their opportunity cost of bearing children, especially if they are able to work outside the household. This provides an incentive for women to control their fertility levels, hence use any type of family planning method.

The contraception use equation for Belize and Honduras is postulated to look as follows:

$$\text{CON} = f(\text{AGE1}, \text{AGE2}, \text{EDU1}, \text{EDU2}, \text{NAT}, \text{MAR}, \text{UNI}, \text{DIV}, \text{WID}, \text{SEP}, \text{0RELI}, \\ \text{1RELI}, \text{3RELI}, \text{5RELI}, \text{NRES2}, \text{NREL}, \text{PRO}, \text{OTH}, \text{NRES1}, \text{CSU}, \text{LBF})$$

+ - + - + + + + + + -
- - - + + + + + + +

Key decisions in how I drew my sample

As the religious intensity variable was eliminated from the previous model, this variable was also eliminated in this model. This was due to present collinearity between religious intensity and the religion variables. In addition, when running the Ordinary Least Squares regressions for Belize, the dependent variable Y_i contraception use, and the variable for family planning supplier showed evident perfect multicollinearity. Multicollinearity can be defined as:

“...The normal equations of least squares (4.3.3.)cannot be solved for the estimator $\hat{\beta}$... If one of the explanatory variables is constant over the sample, it is a multiple of the unity variable included to account for the intercept” (Intriligator, Bodkin, Hsiao, 1996, p. 126). In other words, the perfect lining, illustrated as blank results after running the regressions, was due to everyone using birth control and getting it from the same family planning supplier. In order for the regression to run properly, the family planning supplier variable was eliminated from this model.

Contraception use is a limited dependent variable, more specifically a binary dependent variable. This variable takes one of two values: 0 or 1, thus a Probit regression was run in this model. Probit models are assumed to follow a binomial distribution. In a number of successes, n , of independent yes or no experiments each yields successes with a probability p . The parameters are usually estimated by maximum likelihood. The coefficients found in Probit regressions are slopes times marginal probability, but running a dProbit regression gave us the marginal effects of the independent variables. These are the probabilities of success p following a Probit regression. In other words, the dProbit regression provided us with the individual slopes of each of the independent variables with respect to contraception use.

Presentation and Interpretation of Results

	Dependent Variable: Contraception Use		
	Equation 3.1	Equation 3.2	Equation 3.3
	OLS	Probit	Dprobit
R ² / Pseudo R ²	0.2228	0.2214	0.2214
n	10741	10741	10741
Intercept	-0.5965196	-4.839959	
<i>P-value</i>	0	0	
AGE1	0.0341246	0.1683011	0.0522367
<i>P-value</i>	0	0	0
AGE2	-0.0004585	-0.0023327	-0.000724
<i>P-value</i>	0	0	0
EDU1	0.0231157	0.071221	0.0221053
<i>P-value</i>	0	0	0
EDU2	-0.0003821	-0.0011113	-0.0003449
<i>P-value</i>	0	0	0
MAR	0.3905213	1.609048	0.5455823
<i>P-value</i>	0	0	0
UNI	0.3253781	1.493114	0.5030273
<i>P-value</i>	0	0	0
DIV	0.1188806	0.7786314	0.2883325
<i>P-value</i>	0.052	0	0
WID	-0.0056533	0.3450808	0.1185379
<i>P-value</i>	0.878	0.02	0.02
SEP	0.0837972	0.7147613	0.256986
<i>P-value</i>	0	0	0
PRO	0.0370936	0.14776	0.0469894
<i>P-value</i>	0	0	0
NREL	0.0085387	0.0439066	0.0137929
<i>P-value</i>	0.521	0.36	0.36
OTH	0.1004752	0.3341584	0.1146502
<i>P-value</i>	0.074	0.091	0.091
NORE	-0.1317079	-0.3600393	-0.1183257
<i>P-value</i>	0.267	0.397	0.397
LBF	0.1002623	0.3745298	0.1209432
<i>P-value</i>	0	0	0
NAT	-0.0532469	-0.24522	-0.0792612
<i>P-value</i>	0.656	0.567	0.567

First, equation 3.1 had an R- squared of 0.2228, so 22.28% of the dependent variable is explained by the independent variables. Equation 3.1 produced the following result, with the P- value below each coefficient:

$$\begin{aligned} \text{CON} = & -.5965196 + .0341246 (\text{AGE1}) - .0004585 (\text{AGE2}) + .0231157 (\text{EDU1}) - \\ & (0) \quad (0) \quad (0) \quad (0) \\ & .0003821 (\text{EDU2}) + .3905213 (\text{MAR}) + .3253781 (\text{UNI}) + .1188806 (\text{DIV}) - \\ & (0) \quad (0) \quad (0) \quad (0.052) \\ & .0056533 (\text{WID}) + .0837972 (\text{SEP}) + .0370936 (\text{PRO}) + .0085387 (\text{NREL}) + \\ & (0.878) \quad (0) \quad (0) \quad (0.521) \\ & .1004752 (\text{OTH}) - .1317079 (\text{NORE}) + .1002623 (\text{LBF}) - .0532469 (\text{NAT}) \\ & (0.074) \quad (0.267) \quad (0) \quad (0.656) \end{aligned}$$

In this regression the coefficients for age, education, women who are married, in a union, divorced, separated and Protestant resulted statistically significant. Women who have other religious affiliations and those who currently work also resulted statistically significant. In addition, the coefficients on the following variables: widows, nationality, and women who did not answer the question concerning their religious affiliation resulted with different signs than expected. They all can be disregarded as they resulted statistically insignificant. It is important to note that the negative coefficient for women's nationality tells us that women from Belize are more likely to use more contraception relative to women from Honduras.

Second, equation 3.2 had the following result with the P- value below each coefficient:

$$\text{CON} = -4.839959 + .1683011 (\text{AGE1}) - .0023327 (\text{AGE2}) + .071221 (\text{EDU1}) -$$

$$\begin{aligned}
 & \quad (0) \quad \quad (0) \quad \quad (0) \quad \quad (0) \\
 & .0011113 \text{ (EDU2)} + 1.609048 \text{ (MAR)} + 1.493114 \text{ (UNI)} + .7786314 \text{ (DIV)} + \\
 & \quad (0) \quad \quad (0) \quad \quad (0) \quad \quad (0) \\
 & .3450808 \text{ (WID)} + .7147613 \text{ (SEP)} + .14776 \text{ (PRO)} + 0.439066 \text{ (NREL)} + \\
 & \quad (0.020) \quad \quad (0) \quad \quad (0) \quad \quad (0.360) \\
 & .3341584 \text{ (OTH)} - .3600393 \text{ (NORE)} + .3745298 \text{ (LBF)} - .24522 \text{ (NAT)} \\
 & \quad (0.091) \quad \quad (0.397) \quad \quad (0) \quad \quad (0.567)
 \end{aligned}$$

In this regression the coefficients for age, education, women who are: married, in a union, divorced, widows, separated, and Protestant resulted statistically significant. The coefficients for women who belong to other religious affiliations and those who currently perform some kind of remunerated task also resulted statistically significant. As in the previous regression the coefficients on the variables for nationality and women who did not respond to the question concerning their religious affiliation resulted with different signs than expected. However, they both can be disregarded as they resulted statistically insignificant. Furthermore, the negative coefficient on the nationality variable tells us that women from Belize are more likely to use contraception relative to women from Honduras.

Third, equation 3.3 had the following result with the following P- value with the coefficient below:

$$\begin{aligned}
 \text{CON} = & .0522367 \text{ (AGE1)} - .000724 \text{ (AGE2)} + .0221053 \text{ (EDU1)} - .0003449 \text{ (EDU2)} + \\
 & \quad (0) \quad \quad (0) \quad \quad (0) \quad \quad (0) \\
 & .5455823 \text{ (MAR)} + .5030273 \text{ (UNI)} + .2883325 \text{ (DIV)} + .1185379 \text{ (WID)} + \\
 & \quad (0) \quad \quad (0) \quad \quad (0) \quad \quad (0.020)
 \end{aligned}$$

$$\begin{array}{cccc}
 .256986 \text{ (SEP)} & .0469894 \text{ (PRO)} & + .0137929 \text{ (NREL)} & + .1146502 \text{ (OTH)} - \\
 (0) & (0) & (0.360) & (0.091) \\
 .1183257 \text{ (NORE)} & + .1209432 \text{ (LBF)} & - .0792612 \text{ (NAT)} & \\
 (0.397) & (0) & (0.567) &
 \end{array}$$

In this regression the marginal effects that resulted statistical significant are: age, education, women that are: married, in a union, divorced, widows, separated and Protestant. Women who have other religious affiliations and those who currently work resulted statistically significant. Two of the derivatives had signs different than what we expected and also resulted statistically insignificant. These are the coefficients for nationality and women who did not answer the question regarding their religious affiliation. As previously mentioned, the negative derivative on the nationality variable indicates that women from Belize women are more likely to use contraception relative to Honduran women.

Finally, from these results we can conclude, as the coefficient on the nationality variable resulted statistically insignificant across samples, we fail to reject the null hypothesis that $\beta = 0$. In other words, even though Honduras gives direct subsidies for contraception and Belize gives indirect subsidies, there is no difference in the frequency of contraception use between women from Honduras relative to Belizean women.

Appendix A

Table A.1 Data Description

<i>VARIABLE</i>	<i>OBS</i>	<i>MEAN</i>	<i>STD. DEV.</i>	<i>MIN</i>	<i>MAX</i>
Live Births (LIV)	7796	4.031939	2.786687	0	20
AGE (AGE1)	10744	27.96733	9.129869	15	49
AGE Squared (AGE2)	10744	865.5183	553.6613	225	2401
Education level 1 (EDU1)	10742	13.46611	7.053635	0	37
Education level 2 (EDU2)	10742	231.0854	230.1875	0	1369
Married (MAR)	12749	0.2516276	0.4339653	0	1
In a union (UNI)	12749	0.268727	0.443315	0	1
Divorced (DIV)	12749	0.0036866	0.0606074	0	1
Widows (WID)	12749	0.0110597	0.104586	0	1
Separated (SEP)	12749	0.0763197	0.2655194	0	1
Protestant (PRO)	12901	0.2140144	0.4101528	0	1
Non religious (NREL)	12901	0.0883652	0.2838363	0	1
Other religions (OTH)	12901	0.0042632	0.0651567	0	1

Did not respond to the religious affiliation question (NRES1)	12901	0.6275483	0.4834765	0	1
Currently working (LBF)	12901	0.2750174	0.4465404	0	1
Nationality (NAT)	12901	0.6386327	0.4804153	0	1
Currently using contraception (CON)	12901	0.2758701	0.446969	0	1
Interactive term, product of nationality and current contraception users (NCON)	12901	0.1982792	0.3987191	0	1

CONCLUSION

Education is considered the most important growth determinant in countries, as well as a major influence for fertility rates. High fertility rates affect both households and nations. In households, high fertility rates reduce welfare, while in countries high fertility rates slow socio- economic development. Therefore, in order to reduce fertility rates in countries, the World Bank together, with the United Nations and several governments has seen the need to promote educational attainment, especially in women. Women who are better educated are able to understand the advantages of controlling their reproductive behavior. They are also able to learn about the different types of contraceptive methods available, which one suits them the best, as well as their correct use. Therefore, in the past thirty years governments have given serious consideration to the need to reduce fertility rates in their countries. This has been done through coupling education with their contraception policies. One of the most important initiatives undertaken by the governments has been the establishment of free family planning clinics and suppliers around their countries. This has enabled the accessibility of contraceptive methods to all women, regardless of their socio- economic status.

The following variables negatively affect fertility rates in countries: education, women who belong to other religious affiliations, and those who currently participate in the labor force. On the other hand, contraception use is negatively affected by women who do not affiliate themselves with any religion, as well as the country where they receive their contraceptive attention and

supplies. In other words, the family planning programs each country establishes influence women's fertility rates.

This thesis compares two countries' different contraception policies. Since 1976, Honduras has given direct support towards contraception; while in 1996 Belize changed its contraceptive policies from no support to indirect support. These policies allowed us to analyze whether fertility rates were reduced due to direct or indirect support towards contraceptive methods. Regardless if countries give direct or indirect birth control support, empirically, we find that an effective contraceptive program in countries reduces the countries' fertility rates. Therefore, evidence showed that the family planning program in Belize is more effective in relation to the program in Honduras. Belizean women are more likely to use contraception. Consequently, women in Honduras are having more children relative to Belizean women.

The data from these two countries was obtained from Centro Centroamericano de Población, Universidad de Costa Rica. Even though the data this institution provided me was very solid there is one important variable that is not included in the survey, family income. The variable on family income would have given us an idea about the socio- economic status of women answering the survey. This variable would have made the analysis more complete and stronger.

This analysis illustrates the crucial factor here is not to only give women as many methods as possible. Women need to be educated on the variety of contraceptive methods available, as well as their correct use. Governments need to invest in preparing the staff working in the family planning clinics and

suppliers, rather than solely focusing on the attainment of supplies. Women need to be educated in the importance and advantages of birth control methods. Equally important is to teach women how to use these methods as well as how to follow the directions correctly. The staff must ensure each woman understands which method suits her and her partner's lifestyle best. In addition, the staff needs to also teach women what to do if they miss a pill, which day to take it, how to insert a diaphragm, and many other indications from the various methods available.

In conclusion, governments can make their programs more successful if they complement them with schooling, besides solely investing in training the staff. Evidence has shown that an extra year of education increases women's socio-economic status. Governments can put into action an informative program, regarding birth control methods, to be taught in schools across countries. These programs will educate young girls about how to control their reproductive behavior, where they can obtain the family planning methods, as well as how to properly use them. These educational programs along with effective contraceptive ones, will teach girls and women the benefits that come along with limiting their number of children. Therefore, lower fertility rates in countries will be achieved if governments establish effective contraceptive programs as well as encourage women's educational attainment. Lower fertility rates give women higher levels of welfare and household empowerment, which result in a positive impact on the socio-economic development of countries.

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