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University  
of Glasgow

**Effect of Conditional Cash Transfers on  
Education: The Case of Mexican Program  
*Progres-a-Oportunidades***

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for the Degree of Master in Business Administration*

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# Abstract

Development through education has been a topic of interest in the research world for many years. Countries' administrations and development International Institutions like the World Bank, IADB, ADB, etc. play a core role in this matter. These actions and projects may lead to different outcomes that we can group mainly in three: access to education, quality of education, and education attainment. This dissertation analyzes the effects of Mexican biggest aid program *Progres-Oportunidades*, focusing on education attainment; and tries to understand how this program has impacted on education, and to what extent it has improved the beneficiaries.

This dissertation complements the existing evidence of the impact evaluation series of the *Progres-Oportunidades* program, focusing on education attainment. Using micro-data from the Mexican Secretariat of Social Development which covers the Conditional Cash Transfers monitoring and surveys to families from the *Progres-Oportunidades* program, I find that, overall, the Mexican program improves the promotion of education (access, attendance, and quality) compared to same scenario without aid. The findings and discussion demonstrate the high impact of the *Progres-Oportunidades* program in educational attainment. Overall, the beneficiaries of the program achieve, on average, two years education degrees higher than the ones in the control group. More research is needed to measure if raising enrollments and increasing attainment and quality are sufficient to ensure basic literacy and numeracy, and therefore, reduce poverty at the national level.

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# I. Introduction

The program for human capital development, *Oportunidades* (before *Progresa*) is a pioneer program which has become the main initiative to fight poverty in the Federal Republic of Mexico. The main goal is to break the inter-generational poverty cycle through the investment in human capital (Becker, 1964). The aid is in the form of contributions to families living in extreme poverty in rural areas. The main areas covered are education, health, and nutrition. Furthermore, the Program links the beneficiary families with other new development programs to reduce poverty and increase the quality of living. In 2007, at the end of my data study, *Progresa-Oportunidades* covered more than five million families, which represents around 30 million beneficiaries (Unicef, 2015).

A distinctive aspect of the Program *Progresa-Oportunidades* is its evaluation component. From inception, the program considered the importance of being evaluated. This aspect made the Program improve on its design and implementation. Rawlings (2005) states that *Progresa-Oportunidades* has become a model to follow for many other developing countries such as Colombia, Brazil and Bangladesh.

The specific objectives of the study are:

- To contextualize the origin of the Program *Progresa-Oportunidades* in the economic and social frameworks of the last decades.
- To understand the impact of *Progresa-Oportunidades* on the development process of social policies.
- To identify the impact of the Program actions on education, especially on the education level achieved by the beneficiaries of the program, and its importance on human capital investment.

The empirical analysis uses information about the scholar level achieved as well as other socio-economic characteristics from the treatment and control families between 1997 and 2007. Using Difference in Differences estimators, the impact of *Progresa-Oportunidades* on education level achieved is estimated by comparing the growth trend in education level achieved with and without the program over time. The results obtained for primary level schools are similar to those obtained in previous studies. In general terms, there is no relevant impact detected for the program on primary level education (pupils are 6 to 10 years old) improvement in rural areas. This is largely due to the fact that education at this

level is accessed by more than 90% of Mexican youth, even in rural areas OECD, 2012). At secondary level, there are significant increases in achievement in rural areas. Overall, the results show a clear improvement on the scholar level achieved by beneficiaries of the aid from the *Progres-Oportunidades* program. Also, the results suggest that the program impact is not temporary, and that effects of the program increase over time (Levy, 2007). The observed trends of the program impact on secondary levels encourage the consideration of extending the program to other areas with similar characteristics (Gertler et al. 2016). Also, I suggest implementing new policies to encourage university education; most of the beneficiaries have additional barriers to accessing university education such as the distance between the rural areas and the universities. This problem, among others, needs to be addressed to obtain better results on human capital investment. Additional research is recommended in the future to keep analyzing the program possible impacts on education over time and the future performance on upper secondary levels.

The dissertation, based on micro data for *Progres-Oportunidades*, contributes to other impact evaluations focusing on education attainment, which has not been researched enough previously for this program. The research is supported from household level data from the Mexican Secretary for Social Development (SEDESOL, 2016). The dissertation provides an analysis of the direct impact of the program on the level of education achieved by the beneficiaries. Many other evaluations have approached the program impact on evaluation trying to control many different variables at once (Schultz, 2004); this research focuses on the education level development. Through an empirical examination of the data from 1997 to 2007, this dissertation explores the evidence inferring that the relationship between *Progres-Oportunidades* aid and education level achieved is one which shows that the Program contributes to poverty reduction and improves the life of the most underprivileged (Greenstein and Merisotis, 2015).

The structure of this dissertation is as follows: chapter 1 is the introduction; chapter 2 covers the literature review, from which goes from social protections policies in general, to Conditional Cash Transfers, and more specifically to the *Progres-Oportunidades* program in Mexico; chapter 3 presents the its background of the *Progres-Oportunidades* program; chapter 4 describes the data, the methodology used in the analysis and the limitations of the analysis; chapter 5 presents the results obtained through the statistical analysis and discussion; and chapter 6 provides conclusion and recommendations.

## II. Literature Review

### Social Protection

On 2006, the United Kingdom Secretary of State presented to Parliament, UK's national interest to ensure "...right to food, clothing, shelter, education, health and social security" (Department for International Development, 2006). Social protection policies are critical to support and secure the human right to social security for all (ILO, 2015). Collier & Dollar (2002) state that these policies help to reduce poverty and close the gap between classes, through boosting human capital and productivity. To achieve this, social investment in education and social protection policies need to be interrelated. This interrelation contributes to the reduction of poverty (Beblavy et al., 2013). Social protection is an emerging matter in many low and middle-income countries. During the last decades, many of these countries have created social policies addressing to reduce economic risk, vulnerability and chronic poverty (Holmes, 2001). As the primary objective of social protection, interventions focus on improving the access to services and resources; thereby mitigating unprivileged household vulnerability. However, the programs to achieve this may have different strategies: 1) basic service delivery, where education is provided to all, and 2) targeted social protection interventions, as cash transfer to specific population to solve specific problems (Holmes, 2011).

### Education matters

Education is one of the cornerstones for development and to reduce inequality. Education has mainly two categories of influence. In terms of monetary influence, education results in increased productivity, leading to higher economic growth which is essential for development (Burnett, 2011). In terms of non-monetary influence, it has been proved that education improves personal health and nutrition, reduces crime and improves social behavior (Heyneman & Lee, 2016).

In May 2014, the UNESCO Global Education Meeting was held in Oman to discuss the main educational goals for the coming years. Three main areas were identified: first, consensus among education stakeholders on why education matters for development; second, the importance of financing education, enrolment rate and learning; and third, the ability to evaluate and enforce the goals (UNESCO, 2014). Global organizations, such as the World Bank, the Inter-American Development Bank (IADB), and the Asian Development Bank (ADB) among others, suggest that these three areas are

complementary, and only joint action can pursue the international education goals desired (Wolfensohn, 2000).

The importance of education in reducing inequality is a subject extensively examined in the inequality literature. In particular, Bird and Higgins (2010) find that education has been shown to reduce poverty directly. Other studies such as Hanushek and Woessman (2010) point out that increasing education enrolments, and especially quality, lowers inequality rates. As mentioned, education increases economic growth and reduces poverty. Furthermore, Heyneman (2003) finds that in addition to its economic effects, education contributes to social cohesion in general. Soares (2004) states that it also contributes to reducing crime rates, and improving health in general, but specifically maternal and child health (Feinstein et al., 2006). Greenstein and Merisotis (2015) combine all these ideas to conclude that education is the key for the unprivileged to promote economic growth. Therefore, poor and disadvantaged citizens improve their talent, economic opportunity, and social equality.

### International institutions and types of aid

International institutions, such as the United Nations (UN) World Bank (WB), have made explicit statements through the years about education as a right for all. This idea has been supported by most of the major countries, including this right in their constitutions (Wolfensohn, 2000).

Former World Bank President, Mr. James D. Wolfensohn, stated:

*“Education must be higher on the agenda of everyone: governments, donor agencies, NGOs, trade unions, the private sector, foundation. Achieving quality education for all can no longer be the responsibility of Ministries of Education alone” (Wolfensohn, 2000).*

International institutions hold a crucial role making education policies (Jallade et al., 2001). Conforming to Moutsiois (2009) these policies shape the directions and programs implemented in national education systems. International institutions, among other external actors in education aid, provide funding on specific terms and conditions, defining the lines to be followed (Klein, 2007). These policies have created different tools to pursue educational goals and reduce inequality (Harvey, 2005). The most common are: 1) reducing the cost of access to education, and increasing the provision of school health, nutrition programs, and school participation (Glewwe and Kremer, 2006); 2) cash transfer programs, which, in addition to a good network of schools and infrastructure, have a positive impact on school participation (Petrosino et al, 2012); and 3) funding teaching

resources and computer-assisted learning, considered to be the most effective tool in terms of learning outcomes and improving education quality (Krishnaratne et al., 2013).

Additional interventions were addressed by national and international institutions. for example, Engle et al, (2009); Cooper et al., (2009) find that parenting and education support promotes parent-child interactions to improve education in families. Parenting education and support are often delivered through specialists visiting families or community groups. Another common intervention is that of pre-school and primary school programs, providing free education. This intervention allows low-income families to develop potential in early childhood, the most effective and cost-efficient time for this (Bernal et al., 2009).

### **Cash Transfers**

Baird et al. (2014) and Petrosino et al. (2012), present the connection between inequality and education as have many other academic studies through the years. As Petrosino et al. (2012) point out, one of the most effective tools to increase education access and quality, and reduce the gap between rich and poor is that of cash transfers. Baird et al. (2014) suggest that cash transfer programs are one of the most innovated and extended social protection tools in developing countries during the last decades. These programs involve the direct distribution of money, rather than traditional aid items, to individuals or families who meet certain criteria to tackle income poverty and support developmental objectives. In addition to their social contribution, cash transfer programs lead to building a fairer and more equal economic system, boosting the domestic demand and increasing the potential productivity (Asian Development Bank, 2003). The World Bank is one of the main endorsers of social transfers in developing countries. and endorses states the high potential impact on poverty and inequality and support for economic growth of such programs. This theory holds that human resources development is a key priority for developing countries to progress (The World Bank, 2005).

Among different cash transfer interventions, the most common are Conditional Cash Transfer (CCT) and Unconditional Cash Transfer (UCT) interventions (Baird et al., 2014). Both CCT and UCT consist in programs that transfer cash, generally to poor households; however, Conditional Cash Transfers (CCT) are made on condition of some contingencies, mostly on children's educational and health investments, with the main purpose of breaking the intergenerational poverty transmission (Fiszbein & Schady, 2009).

Before CCTs, most of the programs designed to improve education among the poor communities were approached by the **supply** side, where resources for the schools were increased (building schools in poor areas, provision of higher trained teachers and computer labs etc.) (Deolalikar, 1997). According to this approach, Lyons (2001) states that education aid programs aiming for better and more infrastructure, equipment and so forth, may result in an increase in the accessibility and quality of the education. CCTs emphasizes the household **demand** approach, where beneficiaries obtain subsidies, which helps to reduce inequality among social classes (Schultz, 2004). However, CCTs are not a substitute for the supply side programs, but as a **complement** of the investments from the supply side which helps to improve problems on the demand of education services from the lower classes (Rawlings & Rubio, 2005). The conditionality and its intrinsic market-oriented demand side makes of CCTs the perfect instruments to create economic value in the long term through human capital investment, as well as short term social assistance (Rawlings & Rubio, 2005).

It is widely accepted that a successful approach for decreasing poverty and inequality is through the improvement of education (Glewwe & Kremer, 2006). The United Nations demonstrated with international evidence that one of the first requirements to break out the intergenerational poverty cycle is through investing in health and education (UNDP, 2017). Education supply benefits productivity, health, equality, and politics (Cassity, 2010), therefore governments have the duty and responsibility to secure progress in the education sector, through improving access, quality, and participation. Pillay (2006) states that education is a key component of human capital acquisition. Development on education and skills can be achieved by efficient investments through the supply and demand side, crucial to enhancing productivity, employment and growth (Pillay, 2006). The financial responsibility to accomplish the investments required to boost human capital through education lies with governments (Benavot et al. 2010). One of the most powerful tools used during the last decades to improve education are CCTs, where eligible households receive cash payments under the condition of keeping attendance rates above a certain threshold or achieving better results in tests or other evaluation measures (Baird et al., 2014).

### ***Progres-a-Oportunidades: Conditional Cash Transfers in Mexico***

Latin America has been leading the introduction and development of Conditional Cash Transfer programs from the start. The first country to introduce Conditional Cash Transfer (CCT) was Mexico (Behrman et al., 2011). In August 1997, Mexico started to substitute

general subsidies which focused on consumption. The program involved cash transfers to people living under conditions of extreme poverty which were conditioned to the assistance of health checks and school attendance (Levy, 2007). The grants provide social assistance, and potentially help the investment in human capital in the longer term (Sedlacek, Ilahi and Gustafssib-Wright, 2000). This program was initially called *Progres*a, then *Oportunidades* (and nowadays *Prospera*) and benefited more than 30 million Mexicans in poverty, or about one quarter of all families in Mexico, as of 2015 (Unicef, 2015). Health, nutrition and education are the three areas covered by the program. This CCT Mexican program (*Progres*a-*Oportunidades*-*Prospera*) has become one of the most successful initiatives in promoting a strategy change on the Mexican poverty fight and in incentivising the improvement of human capital in the lower segments of the population (Levy, 2007). The Mexican program provides grants for children between third grade and twelfth grade and the major part of the subsidies is linked to education improvement for the beneficiaries (Behrman et al., 2011). Cash transfer amounts increase by grade, and grants are slightly higher for girls than for boys to decrease the gap between genders (Levy, 2007). *PROGRESA* is designed to target potential beneficiaries in two stages. Initially, to identify the population targeted by the program, an index with the poorest localities is constructed, based on the national census. Secondly, households of the localities identified at the previous stage are classified as “poor” or “non-poor”, taking under consideration household income and other related characteristics (Caldes et al. 2006). Once potential beneficiaries are identified, grants are randomly allocated among an initial group of 495 localities (Schultz, 2004). International Institutions as the World Bank and the Inter-American Development Bank (IADB) have been active supporters of CCTs; this support includes funding and financial support, technical support and knowledge shared (Teichman, 2007). As an example of this, the IADB supported the *Progres*a-*Oportunidades* program with a loan of US\$ 1 billion (Hall, 2008). This channel of development promotes short-term alleviation of poverty through redistribution of the rent and long-term human capital accumulation as a primary objective (Rawlings & Rubio, 2005).

### **Evaluation and Progres**a-**Oportunidades**

Social protection programs and policies try to improve results, typically on education, health, or employment, and its measurement is a key aspect for development. Impact evaluations have become the tool to analyze outcomes, and provide the information required to reshape the programs and policies to achieve better results (Gertler et al.

2016). Several Latin American countries have evaluated and documented positive impact on achieving their goals, specially health and education. The tools for this success consist of an efficient administration, well established targets, and a continuous monitoring and evaluation of the phases of the project (Rawlings, 2005). The Mexican program *Progres-Oportunidades* has adopted, from its inception, extended control and evaluation. The results obtained through its impact evaluation have shown that the program has successfully targeted the poor and has achieved considerable changes in household human capital (Schultz, 2004). Part of the success is due to this program being one of the most strictly supervised, and evaluating it by internal as well as external institutions (Skoufias, 2007). Among other findings, there is a positive impact on enrolment rates and education levels. Studies also reveal that a third of the decrease in poverty in rural areas is attributed to the CCT Mexican program (Lamanna, 2014). *Oportunidades* combine three key mechanisms, **grants** to increase the income of poorest families, **awareness** of the importance of investment in human capital to break the intergenerational poverty, and **conditionality**, which works as the nexus between grants and awareness. These three components together have generated very positive results (Britto, 2005). The Mexican Government has recognized the value of monitoring and evaluating, not only as a tool to define the impact of *Oportunidades*' program, but also as a way to improve it (Santibanez et al., 2005). Furthermore, the results of its evaluation through the years have allowed other countries to replicate its success, and have contributed to the expansion of CCTs around the globe (Gertler et al. 2016). Some of the countries inspired by *PROGRESA* in replicating similar programs are Colombia, Honduras, Nicaragua, Argentina, Brazil and Turkey (Rawlings, 2004).

### Critics of CCTs

However, as with other policies and tools, CCTs present a downside that could decrease or even null their benefits. As pointed by the Overseas Development Institute, Cash Transfer programs present two main problems: 1. Incorrect target of the desired population due to the use of incorrect assumptions or not relevant data, i.e. false assumptions and incorrect or not relevant data used to select potential beneficiaries. 2. Combination of different objectives to reduce poverty, such as education, health, gender equality, which can create confusion and may pull policy-makers in wrong directions (Wingfield et al., 2015; Slater & Farrington, 2009). Furthermore, CCT aid is not effective if government policy and management capacity is weak (Benavot et al., 2016).



CCTs targeting families who meet the requirements could be confusing and, in the worst cases, may not accomplish the program's goals. Slater and Farrington (2009) identified three interrelated areas to test if targeting is successful. First, targeting should be **appropriate**, and contribute to the achievement of the program goals and objectives. Second, it must be **achievable**, so governments or institutions should be able to provide and implement the resources and skills needed. Third, the targeting has to be **acceptable**, counting on enough support from population and government. If the three areas are covered, the program targeting increases its chances of success (Slater & Farrington, 2009). However, several critiques has been made related to targeting of CCTs. Studies have pointed that some programs only target their potential beneficiaries from areas where educational and health infrastructure are adequate to fulfill the transfers' goals. In the case of Mexico's *Oportunidades*, communities which do not have schools or hospitals (clinics) are disregarded in provision of the grants (De Janvry and Sadoulet, 2005). Since the poorest people usually live in the most unprivileged areas, the program is failing to serve those who need it most.

Furthermore, Caldes et al. (2006) point out that monitoring CCT contingencies significantly increases the administrative cost; in the case of *Progres-a-Oportunidades-Prospera*, around 2% of the total program cost. Some opponents of CCTs argue that attaching conditions to the poorest households in order to obtain aid is a demagogic tool and fails to meet the Universal Declaration of Human rights, signed in 1948, which states that "everyone has the right to social protection" (Freeland, 2007). A common criticism of CCT is that its investment on human capital focuses only on children, and it takes several years to see the outcomes achieved (if any). These programs tend to ignore adults in this process of human capital accumulation, and the resources accumulation of productive capital, which also alleviates poverty, and so CCTs fail to provide the resources needed to allow the families to support themselves without relying for cash transfers which cannot be perpetual (Farrington et al., 2004). Other households find difficulties and additional costs of accomplishing the conditions imposed on them, which may reduce the positive outcomes of the program (Brauw & Hoddinott, 2011). In addition, in the Mexican case, *Oportunidades*' families who do not fulfill the conditions imposed are immediately suspended from obtaining the grants, which appears to contradict the poverty reduction argument of CCTs (Ayala, 2003). Institutions working as externals evaluators of educational programs, such as the IADB, World Bank, ADB, etc., have admitted that the current evaluation methodology is highly focused on school attendance and resources provided rather than social development considerations and

economic efficiency (Picciotto, 1996). The World Bank has stated that the key to reducing poverty is not only related to educational attainment, but also to the knowledge and skills acquired by the unprivileged (Nielsen, 2006).

### **Access to education, quality and institutional capacity**

To better understand the results of social security programs attached to education, researchers have identified the four main areas to study the impact of aid on education: 1) improving **access** to education, 2) improving **educational attainment**, 3) improving **the quality** of education, and 4) **institutional capacity** (Farroq, 2012).

**Education access for all** has to be guaranteed by Governments, as stated in the Universal Declaration of Human Rights (United Nations General Assembly, 1948). The Mexican Government is committed to achieve high and equal access to education for all, and this is demonstrated by the high proportion of education provided by public institutions, making Mexico the country in Latin America with the largest proportion of students enrolled in public institutions – in 2012, around 92% of primary pupils, comparing with the 89% of the OECD average- (OECD, 2012). Nonetheless, enrolment rates for the 15-19 year old population remain very low compared to other countries; in 2012, Mexico showed the smallest proportion of secondary enrolment in education of all the OECD countries, with enrolment rate as low as 53% of the youngsters in the country (OECD, 2012). Controversially, there is an increase evidence of the rise of private costs of education to households, derived from increases in school's fees, and crucial education items such as uniforms and books, etc., contributing to reducing access to education (Pillay, 2003). Also, the long distance between some schools and neighborhoods (mostly poor ones) and the inadequate provision of school transport exacerbate the inequalities in access to education, and restrict some potential students from attending schools (StatsSA, 2014).

As stated by the US Census Bureau (2017), **Educational attainment** refers to the highest degree of education an individual has completed. Several studies have found that educational attainment is a direct function of school attendance and individual performance (Skoufias, 2005). In addition, Todd and Parker (2007) highlight that poor nutrition and health negatively affect educational attainment. The impact of achieving higher educational attainment may result in future higher salaries. An individual covered by the program *Progres-a-Oportunidades*, obtains aid to improve his/her health, nutrition, and education access, increasing the chances of achieving a higher educational attainment, therefore, higher income in the future (Freije and Rodriguez-Oreggia, 2008).

According to UNESCO, the definition of **education quality** is based on physical resources and associated processes which would result in improved student performance (Adams, 1993). Three main factors have been identified as key to improve quality of education: i.e. structural condition (e.g.: evaluation system, teacher education), technical conditions (e.g. school management, teacher development), and physical resources (infrastructure, books, etc.). These three factors combined in the proper context (values, cultures, and traditions) and well implemented, can deliver an improved quality of education (MINEDUC, 2006).

The OECD Program for International Student Assessment (PISA) provides a good indicator of the quality of the education is through its report published by the OECD. The OECD Indicators provide data on the structure, finances, and performance of the education systems in the 34 OECD member countries, as well as in a number of G20 and partner countries. In 2012, Mexico showed an improvement in 15-year-old students in evaluation assessments (PISA), achieving an average score of 413 points, which means an increase of 28 points since PISA 2003 and the biggest improvement among OECD countries (PISA-OECD, 2013). Another way to measure the quality of the education could be through the investment made in it. Mexico's expenditure on educational institution has remained higher than the OECD average: in 2011, 6.2% of Mexico's GDP was set aside for education. However, to be more accurate on the measurement of actual expenditure, GDP per capita is a better option. In this case, Mexico devoted to education only 19% per capita GDP –the second lowest in the OECD – well below the OECD average of 27% per capita GDP (OECD, 2012).

The last area related to the improvement of education is **institutional capacity**. Institutional capacity is "...the sets of rules, processes or practices that prescribe behavioral roles for actors, constrain activity, and shape expectations..." (Keohane, 1988) enabling an environment which forms the basis upon which individuals and organizations interact (Willems & Baumert, 2003). According to this definition, educational improvement requires adequate institutional capacity and structures. Governments, and especially education ministries, need to increase the capacity of the education ministry and associated organizations to support future improvement. Through this approach, policy directions, infrastructure, and resources work towards the same goal, to increase the chances of large-scale educational improvements. This could require changes in the organization structure, culture, ways of working, etc. to lead to new skills and capacities which allows the move from regulation to capacity building (OECD, 2010).

Countries need to rethink policy and practice and engage all partners in the development process. It is not rational to face new challenges with the same skills and capacities used for previous ones. In the case of Mexico, due to its size and diversity, changes in education policies may not affect stakeholders in the short term. Reforms will succeed when policies, structure, resources, and stakeholders move in the same direction over time, leading to the desired educational goals (OECD, 2010).

### **III. Progres-Oportunidades: background**

*Progres-Oportunidades* is considered world-wide a pioneer program in the fight against extreme poverty. Nevertheless, the idea, design, and commission of a program of the size of *Progres-Oportunidades* are the consequence of the economic and social environment in Mexico, and globally (Behrman et al., 2011). In order to have a better idea of the origin of *Progres-Oportunidades*, two main topics are covered in this chapter. First, the context of the socio-economic changes around the world in the 80s and 90s, which fostered the origin of the Program; second, the generation and implementation of social policies to eradicate poverty and reduce inequality.

The changes that have happened in societies, in the context of globalization, have raised new questions and challenges on social policies, especially on reducing poverty (Sanchez, 2000). According to Serrano, C. (2005), within the context of economic and social development, globalization has contributed overall to increase the average income per capita. However, recognized institutions such as the IMF have also confirmed that globalization helps to increase the gap between rich and poor (IMF, 2000). As a consequence, states have focused their efforts on finding innovative answers to solve the complex issue of poverty. These efforts are supported by multilateral institutions as the World Bank, or the International Monetary Fund (from now on, the IMF). At the end of the nineties and during the two thousand's, important changes in social policies were implemented in the Latin American region. It is at this moment when Conditional Cash Transfer programs arose in an attempt to solve poverty and inequality. Among these programs, *Progres-Oportunidades* is the first and best known.

According to Serrano (2005), before the nineties, social policies failed in Latin America; after the failure, a new understanding of democracy, where citizens are first; and the rise of new information technologies etc. established the foundation of the “new” social State. This “new” State has used different perspectives to reduce poverty and inequality. Social policies now look to invest in the citizen as human capital, the generation of new capabilities, and social development (Pillay, 2006). All these perspectives shift the focus from the Government providing the solution of deficiencies, to developing human capital, and allowing the citizens to be auto-sufficient.

In the programs to reduce poverty and inequality in Mexico, actions were focused on the population in extreme poverty. As part of this focus, the program *Progres-*

*Oportunidades*, through food support, basic health, and education, pursues the provision of equal opportunities for poor families (Levy, 2004). According to Szekely (2005), the most important characteristics of the *Progres-Oportunidades* program is that it provides aid to the targeted population, on certain conditions, such investment in education or health. In other words, the program provides aid in the short-term, but also provides the tools to break intergenerational poverty in the long-term.

*Progres-Oportunidades* is an aid federal program to improve the education, health and nutrition of disadvantage families. This program was created in 1997 with the purpose of breaking inter-generational poverty (Fiszbein & Schady, 2009). Ten years later, in 2007, the program covered 5.2 million families, or a quarter of the whole Mexican population (Unicef, 2015). *Progres-Oportunidades* consists in Conditional Cash Transfers with goals in the short term and the long term. In the short term, it aims to reduce poverty by increasing the household income through monetary transfers. In the long term, it tries to break intergenerational poverty by increasing the human capital of the population in extreme poverty. It mainly focuses on women and children. In relationship to human capital, the program focuses on three main aspects: education, health, and nutrition. The combination of these three aspects in one program generates synergies; which allows the increase of human capital with higher effectivity (as an example of this, children with malnutrition have a higher propensity to drop out of school). The Program's core actions cover the basic health services, health education and prevention, education cash transfers to support school-age children, and food complements to children and pregnant or breastfeeding women (SEDESOL, 2016). *Progres-Oportunidades* is notable for being a program targeting a specific population to invest in human capital, and not only a strategy to reduce poverty. This characteristic has made the program require the contribution of other initiatives which support the Program, plus a context of economic sustainability growth (Levy and Rodriguez, 2005).

The Federal Executive Bodies of Mexico stated in 1997 the main objectives of the Program. These can be divided in five: 1) Substantially improve the conditions in education, health and nutrition matters of the poorest families in Mexico, and specially the children and their mothers; 2) Increase learning achievement, and reduce school dropouts due to health issues, nutrition issues, or child labor; 3) Provide enough resources to families to complete at least basic education; 4) Promote social education, and increase the participation of the whole family in their children's education, health and nutrition; 5) Promote the participation and community support of the Program actions in the areas

where the program operates. This will have a multiplier effect on the community, rather than if it is targeted to isolated families.

The *Progres-Oportunidades* program has two main aid components. An educational component and a health and nutrition component. The educational component focuses its action on increase the school enrollment, attendance, and educational attainment. As part of the educational aid, *Progres-Oportunidades* provides monthly scholarships, monetary support, and in-kind support (Petrosino et al., 2012). Nowadays, monetary aid is provided to each individual in the household younger than 18 years old, and registered and attending (at least 80% of the attendance is required) school (until secondary grade). The monetary support increases with the scholar level, and it is higher for women than men (to reduce gender inequality). Furthermore, an additional cash transfer is provided each year to support the additional expenses generated by books, uniforms and school supplies. The economic support is provided every two months through the school year. In order to receive the aid, the families have to register their children at school and prove an attendance rate above 85% (monthly and yearly). The failure to fulfill these conditions entails the loss of the aid.

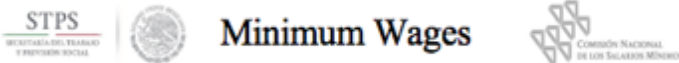
The health and nutrition component aims to improve the basic health of all the beneficiary members of the household receiving the aid (Fiszbein & Schady, 2009). It mainly focuses on basic and preventative health. The services are provided by the national health system. The nutrition component consists in a monthly fixed monetary transfer to buy healthier food, and nutritional supplements. This aid is specially targeted to women and children. The beneficiaries need to attend to the clinic for checks every month as a condition of the aid. Pregnant women and children have to attend more than once as a requirement. During the health checks, matters about nutrition, hygiene, infection diseases, vaccines, and prevention health are discussed, and the help needed is provided.

In relationship to the aid amounts, the average monetary transfer per month assigned to each of the household beneficiaries is \$385 MXN. The payments are higher through the summer months, when the transfers include the nutritional fixed payment aid. To put the amounts in context, during 2007, the transfers done were from \$140 MXN for children in primary education, to \$785 MXN for boys and \$895 MXN for girls in secondary school (SEDESOL, 2016). The higher aid for girls provides an incentive to increase gender equality participation in education, and to reduce the gender gap in the workplace (Skoufias, 2007). To have a better understanding of the amounts, the minimum wage in Mexico was \$47.60 MXN per day in 2007. A person working 22 days per month would obtain \$1,100MXN. So, the aid for a child in secondary school represents around

two thirds of a minimum wage. The amounts provided to the beneficiary families have a maximum monthly level. This policy reduces the incentives created for the program to increase the number of children.

In 2007, the Mexico Ministry of Labor and Social Welfare (STPS, for its acronym in Spanish “*Secretaria del Trabajo y Asuntos Sociales*”) elaborated a table classifying the minimum income in three big geographic areas, denominated them “area A”, “area B”, and “area C”. Area A includes the states with highest minimum salaries, while the area C has those with the lowest. The period shown in the table below runs from 1997 to 2007.

Table 3.1: Mexico minimum wages from 1997 to 2007.



MINIMUM WAGES DISTRIBUTED BY GEOGRAPHIC AREAS 1997-2007			
YEAR	Geographic Area		
	A	B	C
Mexican pesos per day			
1997	26.45	24.50	22.50
1998	30.20	28.00	26.05
1999	34.45	31.90	29.70
2000	37.90	35.10	32.70
2001	40.35	37.95	35.85
2002	42.15	40.10	38.30
2003	43.65	41.85	40.30
2004	45.24	43.73	42.11
2005	46.80	45.35	44.05
2006	48.67	47.16	45.81
2007	50.57	49.00	47.60

Source: STPS (Mexican Ministry of Labor and Social Welfare)

It is not surprising that all of the seven states where *Progres-a-Oportunidades* was initially implemented (Guerrero, Hidalgo, Michoacán, Puebla, San Luis Potosi, Queretaro y Veracruz) are part of “area C”, which is the one with the lowest minimum wage. A remarkable characteristic of the program payments is the way they are executed. The payments are handed directly to the “main” woman in the family, usually the mother of the children in the household. The transfers are made through the program support offices close to the beneficiary communities.



The focus of the aid is based on the rural areas, where *Oportunidades-Progres*a has selected the beneficiary families according to three stages (Levy, 2007). The first stage is selecting the poorest areas with accessible infrastructure to schools and health centers. In the second stage, the program identifies the potential beneficiary families. These families are selected using the ENCASEH97, social-economic surveys, to determine their household characteristics. With this data, a discriminate analysis is conducted to distinguish between beneficiaries and non-beneficiaries. In summary, the program conducts an initial poverty classification using a lineal combination which estimates the household income per capita. According to the classification, a deeper analysis is conducted on the observable characteristics of the households (for example, the house condition), and a socio-economic survey of the household members. Then a provisional list of eligible families and non-eligible families are published at a community meeting. In the final third stage, the community has the opportunity to express themselves if any anomaly is found in the selected families, and disqualified if required. According to the public workers, this final step has been rarely executed to disqualify any of the families selected. Once the families are officially selected, they are introduced in a ceremony where the characteristics of the program are explained, and the families sign the contracts as beneficiaries.

The impact evaluation of the social policy action is extremely important. It provides the information required to improve a program, enhance its operations, and focus on achievement of goals (Levy, 2004). One of the main recognized successes of *Progres*a-*Oportunidades* is to have designed and put in operation an evaluation project of the program since its inception. The evaluations provide useful specific inputs to inform and improve the program implementation, therefore, they enhance its effectivity and efficiency (SEDESOL, 2016).

The main goal of the program is to break intergenerational poverty (Freije and Rodriguez-Oreggia, 2008). The measure of the impact on this is crucial to evaluate the success of the program. For the newborns, and under 4 years old, the program provides nutritional aid, preventive visits to the doctor, and monetary cash transfers to invest in their human capital from early stages. For school-age children, the program objective is to increase their human capital through education. The investment in human capital aims to give the tools to youth people to be able to obtain better jobs and, therefore, break the legacy of poverty in their adult life. The purpose of the evaluations done is to review the impact on the *Progres*a-*Oportunidades*' beneficiaries in terms of health, nutrition,

education, cognitive development, job placement, etc. To have a better idea of the evaluations done, a summary of the most relevant ones is provided.

*Progres-Oportunidades* has been subject of several studies and impact evaluations. Behrman, Todd and Parker (2007) studied the *Progres-Oportunidades* impact on beneficiary children from 1998 to 2003: before the program started (between 9 to 15 years old) and in 2003 (at that time between 15 to 21 years old). The researchers identified significant improvements on the scholar achievement. Specifically, in the group between 9 to 12 years old before the program; after 5.5 years of conditional cash transfers, the beneficiary young men achieved on average a grade higher than before the Program. Young women's improvement was similar but not as high. In relation to the labor force, these researchers pointed out the increase in non-agricultural jobs. Furthermore, young women's insertion into the labor force was slightly increased.

Freije and Rodriguez-Oreggia (2008) analyzed the impact on the short, medium, and long term of the Program on the labor conditions of young beneficiaries between 14 and 24 years old. This study looked for findings on the break of intergenerational poverty. The researchers found evidence of the long-term effect of the Program, increasing the wages of the beneficiaries, and more specifically the wages of indigenous women. However, the researchers pointed out that the sample used had important limitations (for example, number truncation) which could distort the results. In the context of intergenerational job mobility, Yaschine (2012) studied the impact of the Program in the original youth population from 1997 to 2007. There is evidence of improvement in the nutrition, health and scholar achievement of the beneficiaries comparing to the ones who did not get any aid from the Program. However, Yaschine could not find any evidence related to improvement in the labor opportunities, neither of job improvement.

Related to the impact on children, Gertler and Fernald (2005) studied the impact of the Program on several dimensions of the children development on children between three to six years old (in 2003). The sample used included the children born of the beneficiary mothers. Using this sample allowed the researchers to analyze how the effects can vary if the Program aid started in a prenatal period. The indicators identified and measured included: cognitive development, physical development, and social-emotional development. The analysis was done for the first time in 2003. Therefore, the Gertler and Fernald (2005) analysis is cross-sectional. The results based on the cross-sectional analysis show an impact on physical development. However, results are not significant for the cognitive development of children between two to five years old. The results were disappointed; the cognitive development rates in the areas where *Progres-*

*Oportunidades* operated were extremely low. Due to the importance of this matter, additional studies are needed to confirm the results. It is important to determine if the Program had no impact, or, on the other hand, whether any analysis was not conducted correctly. Finally, there is a lack of evidence on the synergies generated by the Program. This study is still to be done. However, Behrman et al. (2000) suggest that the synergies could be substantial, especially on the children's nutritional development impact and how these affect the educational component.

## IV. Methodology

### IV.a Data

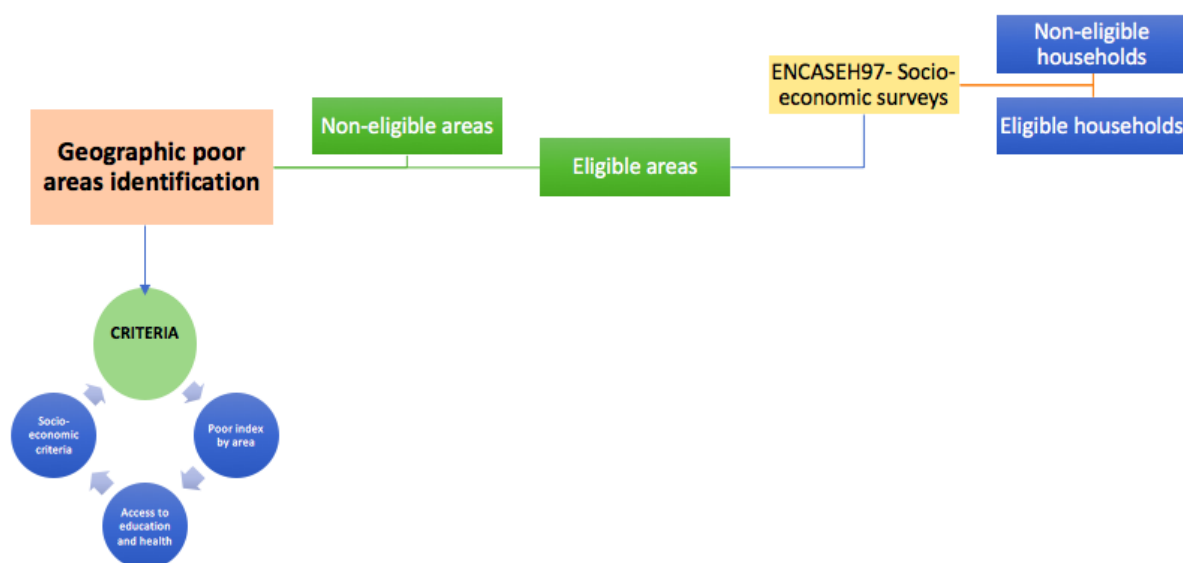
This chapter explains the methodology followed in the study of the Conditional Cash Transfers (CCT) in Mexico. The dissertation focuses on the Program *Progres-Oportunidades*, from 1997 to 2007, particularly on its impact on education. The aim is to show how monetary transfers under conditionality impact on the education of the family, especially the education attainment impact.

The data used for the analysis came from the Mexican National Household Income and Expenditure Survey, ENIGH, for its acronym in Spanish: *Encuesta Nacional de Ingresos y Gastos de los Hogares*, the ENCASEH97 (or Socio-economic Conditions of Rural Households) surveys, and the ENCEL (*Progres-Oportunidades* evaluation) surveys. This data plays a crucial role in the impact evaluation of the Program *Oportunidades-Progres*, due that is the only direct information source to create a reliable longitudinal study. From the initial stages of *Progres-Oportunidades*, evaluation was an important part of the project. The need to evaluate the effects on the families treated was fundamental. The evaluation allowed not only measurement of the results achieved, but also enhancement of the Program to increase its effectivity and efficiency (Schultz, 2004).

The surveys and evaluations were made to identify results; and the impact of the Program has been used to analyze the effects in the treatment groups. The analysis is distinguished geographically between different states in Mexico. The surveys also helped to identify the individual and family effects, and the synergies generated over time (Brauw & Hoddinott, 2011). The Program's impact evaluation was realized under the supervision of prestigious academic institutions such as the IFPRI, INSP and the CIESAS-Occidente. The following paragraphs describe the general design of the evaluation in poor rural areas in Mexico, the sampling procedures used, the data collection techniques, and the analysis and evaluation made.

In the rural areas, the Program used a process to identify the areas for the treatment. First, based on poverty index, the poorest areas across Mexico with access to basic education and health infrastructure were identified. Secondly, the initial areas selected were studied individually, collecting census data for each of them (ENCASEH97, social-economic surveys). Thirdly, all the gathered data was analyzed by experts, cleaned and the areas for treatment selected (Caldes et al. 2006).

Diagram 4.1: Process to identify individuals for treatment and control groups.



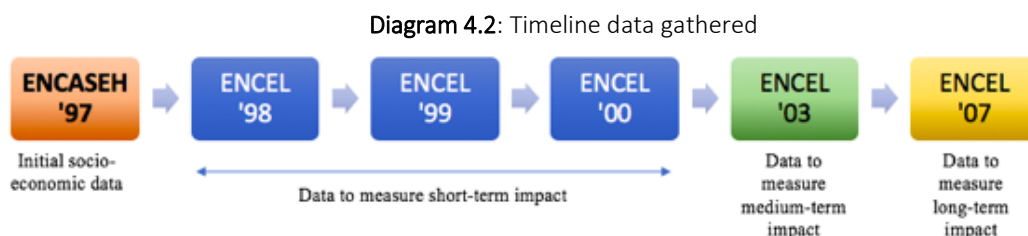
Source: Author's diagram made with information from ENCASEH and ENCEL

Due to the uncertainty of the Program effects, the evaluation was a main key to measure the success or failure (Skoufias, 2007). In order to create a rigorous evaluation, two scenarios were envisioned: 1) A scenario where families obtained aid from the Program; and 2) another scenario with similar characteristics, but without any aid from the Program. Observing and comparing both scenarios, it is possible to estimate the impact attributable to the *Progres-a-Oportunidades* Program.

The experimental evaluation design selected randomly, among the treatment families and the control families, the ones to be studied. Hence, all the families had the same probability to be selected. With a random selection, it is feasible to suppose that there were no differences among the groups, and if so, these were caused by chance. This is why the experimental design used meets the principle of interchangeability, and it is considered a reliable way to evaluate social programs from the statistical point of view. To identify the treatment families and the control families, the random selection was done on a state/ area basis. The steps followed were: 1) the areas which meet the selection criteria were identified, 2) each of these areas, was randomly assigned for treatment or for control, and 3) under the criteria of social-economic survey (ENCASEH 97), the families were selected as aid beneficiaries or not. This was the way to select the group of areas and families' beneficiaries of the aid and the ones without aid (Caldes et al. 2006).

The focus of the analysis consisted of a longitudinal study, where observations are gathered for the same subjects repeatedly over a period of time. From the beginning of the Program, it was important to analyze the effects in the short term, medium term, and long term (Britto, T., 2005). In order to achieve this, in 1997, an initial collection of

socio-economic data was gathered (ENCASEH 97). After the initial collection in 1997, data was gathered every year from 1998 to 2000 (ENCEL 98-99-00). This allowed for analysis of the effects in the short term. Later on, in 2003, surveys were done again (called ENCEL 2003), for the purpose of measuring the impact of the Program in the medium-term. The last surveys were executed in 2007 (ENCEL 2007), allowing the evaluation of the impact in the long-term.



Source: Author's chronogram with SEDESOL data 1997-2007

According to the Mexican Secretary for Social Development (SEDESOL, 2016) the full data from the surveys was gathered from 320 treatment areas and 186 control areas. The original data for the impact evaluation in disadvantaged rural areas in Mexico covers seven states across the Republic: Hidalgo, Puebla, Guerrero, Veracruz, Michoacán, San Luis Potosi, y Queretaro, with a total of 506 different areas (320 treatment areas, and 286 control areas).

**Diagram 4.3:** Mexican states where the Program was implemented.



Source: Author's design with SEDESOL data 1997-2007

The first and initial evaluation was conducted under the name of ENCASEH 97. The socio-economical evaluation made in 1997 (ENCASEH 97) is the main instrument of the *Oportunidades-Progresas* Program which allowed identification of beneficiary families. The information obtained from ENCASEH 97 was obtained through individual interviews with each one of the members of the treatment and control families. These surveys were done before the aid was given to the beneficiary families. The data gathered helped to determine the eligibility of the families.

After ENCASEH 97, the ENCEL surveys were conducted every year. The objective of the ENCEL surveys was to collect diverse information related to the household as a whole, and to each of the individuals. The surveys gathered information about the demographic composition of families and their socio-economic status. These questions focus on education, social environment, and health, etc. (Behrman, Jere, 2010). The ENCEL surveys constituted the main stream of information to evaluate the impact of the aid over time. The ENCEL 98 was the first data set which allowed the evaluation of the impact of the Program. The survey was conducted on the same 506 areas where ENCASEH 97 was done. Under this strategy, the rest of the ENCEL surveys were undertaken. The main tool to gather information from the ENCEL surveys was the part related to the household's socio-economical aspects and education. One of the main interests of the Program was to evaluate the impact of *Progres-a-Oportunidades* on the demand of educational services: scholar attendance, school dropouts, failure, back to school rates, etc.

The importance of education in children and youths is crucial to any country's development. As Glewwe and Kremer (2006) point out, education is one of the most successful approaches to decreasing poverty and reducing inequality. The research analysis in this paper is restricted to children between 5 to 18 years old, who lived in rural areas (less than 2,500 population). In this age range we have the individuals who were of school age between 1997 and 2007. The education related variables cover aspects such as receiving aid for education, regular attendance at school, and the scholar level achieved. To understand the following analysis, it is important to have clear the numerical ranking assigned to the different educational levels.

*Table 4.1: Educational levels –numerical assignation*

<b>Education attained</b>	<b>Numerical assignation</b>
None	0
Kinder	1
Primary	2
Secondary	3
Higher levels	4 (and consecutives)

Source: Author's table

Furthermore, due to the extreme poverty characteristics, and following the socio-economic surveys, the following units of analysis were identified:

Table 4.2: Units of analysis and characteristics

Units of analysis	Characteristics
Beneficiary child	Gender and age
Household chief	Gender, age, and education
Mother of beneficiary child	Age and education
Household	Total number of residents

Source: Author's table with data from SEDESOL 1997-2007

In this study, I have cleaned the data from the ENCASEH 97 and ENCEL surveys to gather the significant fields related to the study. The data selected is the following:

Table 4.3: variable description

Variable	Description
<b>Code</b>	Code number formed by the Family ID plus the year
<b>Year</b>	Year of the survey
<b>Family ID</b>	Individual unique ID per family
<b>Individual ID</b>	Individual ID per person
<b>State</b>	State where the data is gathered
<b>County</b>	County where the data is gathered
<b>Area</b>	Area where the data is gathered
<b>Age</b>	Age of the individual
<b># of people in household</b>	Number of persons living in the same household
<b>Gender</b>	Gender of the individual
<b>Poor Index</b>	Poverty index dividing population on “poor”, “almost poor”, and “not poor”
<b>Education Aid?</b>	If the family receive aid from the Program or not
<b>Treatment/Control</b>	Population divided on two groups, the “treatment” and the “control”
<b>Goes to school?</b>	It shows if the individual go to school on the survey year or not.
<b>Scholar level achieved</b>	Maximum scholar level achieved (could be “none”, “kinder”, “primary”, “secondary”, “high school” and “professional degree”).
<b>Relationship with house “chief”</b>	The household “chief” is the person identified as the head of the family, the rest of individuals of the family are assigned according to the relationship with him/her.
<b>Marital Status</b>	Marital status of the individuals

Source: Author's table with data from SEDESOL 1997-2007

## IV.b Methodology

### *Study and Data subsample*

The aim of this research is to identify the impact of *Progres-a-Oportunidades* Program on education attainment for disadvantaged rural communities in Mexico. To facilitate this, the sample obtained comprised the families for all the initial states' beneficiaries with consistent information from 1997 to 2007. The analysis is based on the comparison of the treatment group and control group (Santibanez et al., 2005). The analysis of the differences obtained comparing the data before the aid was implemented (1997) and after (1998-2007) is also relevant for the study. The data is extracted from surveys on 131



families, in which 3,744 observations belong to the treatment group, and 959 observations to the control group (non-intervention families).

*Table 4.4a # of observation in the treatment and control group*

<b>Year</b>	<b>Control</b>	<b>Treatment</b>	<b>Total</b>
1997	152	562	714
1998	152	580	732
1999	152	599	751
2000	164	624	788
2003	172	674	846
2007	167	705	872
<b>TOTAL</b>	<b>959</b>	<b>3,744</b>	<b>4,703</b>

Source: Author's calculations with SEDESOL data 1997-2007

It is also important to identify the data related to the children and youth between 5 and 18 years since the analysis focuses on them. For this sample, the treatment group consists of 1,423 observations and the control group of 380. The results are presented in the following table:

*Table 4.4b # of observations in treatment & control group for population aged 5 – 18 yrs*

<b>Year</b>	<b>Control</b>	<b>Treatment</b>	<b>Total</b>
1997	56	218	274
1998	59	226	285
1999	62	231	293
2000	71	246	317
2003	68	252	320
2007	64	250	314
<b>TOTAL</b>	<b>380</b>	<b>1,423</b>	<b>1,803</b>

Source: Author's calculations with SEDESOL data 1997-2007

### *Hypothesis statement*

The Program *Progres-Oportunidades* aroused my interest because it assumes an improvement in the life conditions of the beneficiaries (Braine, 2006). The research questions, seeking to determine to what extent the *Progres-Oportunidades* beneficiaries have improved their education level over a decade, lead me to formulate the following hypothesis:

*“Mexican unprivileged rural population increase education levels when they obtain Conditional Cash Transfers from the Progres-Oportunidades Program”.*

### *Measures*

To examine the impact of the Program *Progres-Oportunidades* on education, the following dependent and independent variables were identified:

- a) Dependent variables: a main outcome measure is examined, **the impact of the Program on the maximum education level achieved** (the educational attainment). Each individual from the treatment group and the control group was asked to provide information about the “maximum school level achieved” per year; starting in 1997 before the Program started, and after. The “school level achieved” measure captures individual’s top academic achievement.
- b) Independent variables: families being part of the **treatment population or control population** were determined through a random selection as explained above. It determines the individuals’ relationship to the aid provided by the Program. The rest of the independent variables were subtracted from the family surveys. The independent variables include **education attendance**, where individuals provide information about attending school on a daily basis; **household composition**; which determines the status of individuals in the family, including their power to make decisions. The **number of people living in the household** is captured, as a determinant of the income required to support the members of the family, therefore, their possibility of going to school. **Marital status** is also considered; marriage is a proximate determinant of family stability and **gender** as a determinant of unequal access to school. I also included two education variables: 1) a measurement of the **individuals currently attending school**; 2) and a measure of **the household chief scholar level achieved**, which is a proxy of sons’/daughters’ future education.

### *Analytical Approach*

I restricted the data to youths aged five to eighteen years, in rural areas (considered the ones with a population lower than 2,500 inhabitants). The objective of my analysis is to study the impact of the Program *Progres-a-Oportunidades* on education, focusing on educational attainment. The longitudinal study obtained estimators of *Difference in Differences* (DID) and *Difference in Differences Propensity Score Matching* (DiD PSM) by studying the differential effect of the families with aid and the ones without. The use of both methods allows for the estimation of heterogeneous effects, to put more emphasis on specific variables and provides higher reliability on the results (White and Sabarwal, 2014). Overall, this research compares the situation of the beneficiary families on education matters, before the aid ( $t_0$ ) and after the aid ( $t_1$ ) from 1997 to 2007 (due to the changes attributable to the Program). Furthermore, to gain specificity in the comparison, the previous results are contrasted with other similar measures (made also in the moments

$t_0$  and  $t_1$ ). The difference is that, this time, the families studied were the ones without aid from the Program. This population is the one called the control group.

According to Stock and Watson (2007), for the analysis of any indicator “X” from the beneficiary families, the impact of the Program is the difference between X at the final moment ( $X_{t1}$ ) minus X before the Program started ( $X_{t0}$ ):  $X_{t1}-X_{t0}$ . On the other side, for the analysis of any indicator “Y” from the control’s families, the impact of the Program is the difference between Y at the final moment ( $Y_{t1}$ ) minus Y before the Program started ( $Y_{t0}$ ):  $Y_{t1}-Y_{t0}$ . So, the Difference in Difference (DiD), as described before, is the subtract between  $X_{t1}-X_{t0}$  and  $Y_{t1}-Y_{t0}$ . The DiD shows the impact of *Progres-a-Oportunidades*, removing other possible changes not attributable to the Program. For this research, the timeline study is from 1997( $t_{97}$ ) to 2007( $t_{07}$ ), then the Differences in Differences estimator captures the treatment effect (TE) over the treated population, as following:

**Equation 4.1:**

$$\text{Impact Program on Education (IPE)} = E(X_T^{t_{07}} - X_T^{t_{97}}) - E(Y_C^{t_{07}} - Y_C^{t_{97}})$$

Hence, under the counterfactual analysis, I subtracted the difference of the effect between the treated group before and after the intervention, and the difference of the control group in the same period of time (1997-2007). Analyzing the equation further, the differences inside the brackets eliminate the systematic effect of individuals. The subtraction of the effects differentiates between the treatment and control group removes the common time trend effect (Card et al., 2011).

**Econometric specification**

The econometric techniques used in this research are the Difference in Difference (DiD) estimation, and the Difference in Differences propensity score matching (DiD PSM) approach (Stuart et al., 2014), where I analyzed the educational impact, focusing on the maximum education level achieved, of the Program *Progres-a-Oportunidades* on the children and youths of the treatment group versus the untreated ones, considering data before the treatment and after.

**Difference in Difference Estimator**

As mentioned above, difference in difference estimator compares the change in the average of the education for the treatment group with the change in the average of the education for the control group, before and after the implementation of the Program (Gertler et al. 2016). The basic equation to estimate the education impact of the Program is the following:

**Equation 4.2:**

$$S_{it} = \beta_0 + \beta_1 Tr_i + \delta_0 Yr_{i2007} + \delta_1 Tr_i \cdot Yr_{i2007} + \varepsilon_{it}$$

where  $S_{it}$  is the maximum scholar level achieved that an individual  $i$  completed in period  $t$  (from 1997 to 2007);  $Tr_i$  is a dummy variable, which equals one if the individual is a beneficiary of the Program, and zero if from the control group;  $Yr_{i2007}$  is a dummy related to the period of time of the observation, which equals one if the year is 1998 or after (until 2007) and equals zero if the year is 1997; the interaction term  $Tr_i \cdot Yr_{i2007}$  works as a dummy variable, with the value one for individuals from the treatment group, and zero for the control group;  $\varepsilon_{it}$  is an error term.

The estimated coefficient  $\delta_1$  is the difference in differences estimator, where

**Equation 4.3:**

$$\delta_1 = [E(S|Tr = 1, Yr_{i2007} = 1) - E(S|Tr=1, Yr_{i2007} = 1)] - [E(S|Tr = 1, Yr_{i2007} = 1) - E(S|Tr = 0, Yr_{i2007} = 0)]$$

is capturing the Program causal effect on the maximum scholar level achieved for the treated observation.

***Difference in Differences Propensity Score Matching Estimator (DiD PSM)***

Used for first time by Heckman, Ichimura and Todd in 1997, the propensity score matching estimator (PSM) is used along with the Difference in difference (DiD) method to take into account the difference in the characteristics before the Program implementation, between the treated group and the untreated group. The DiD PSM helps to match the treatment individuals with the control individuals with equal characteristics. The control group is used as a reference to estimate the unobservable or contra-factual outcome. A similar way to proceed can be found in Behrman et al., (2012). The DiD PSM estimator provides an additional control of heterogeneity and reduces the selection bias problem.

The first step to estimate the DiD propensity score matching estimator is to define the propensity scores of the pre-treatment characteristics variables:

$$P_r(Tr = 1|Z)$$

where  $P_r$  is the propensity score;  $Tr$  is a dummy variable, which equals one if the individual is a beneficiary of the Program, and zero if from the control group; and  $Z$  is the conditioning variables for matching, which includes household demographic and socioeconomic characteristics. These variables have been measured before the

implementation of the Program, which are understood as external to the Program, and represents its invariability due to the intervention. The propensity score model is calculated using logistic regression.

The second step is to use the Gaussian kernel matching estimator to connect each individual from the treatment group with one or more control group individuals on propensity scores:

**Equation 4.4:**

$$w(u, v) = \frac{K(z_v - z_u)}{\sum_{v \in (Tr=0)} K(z_v - z_u)}$$

where  $u$  represents the Program beneficiaries;  $v$  the control individuals;  $K$  is a Gaussian kernel,  $K(z) = (2\pi)^{-1/2} \exp(-z^2/2)$ , using the untreated observation. As the last step to finalize the calculation, a standard difference in differences estimator is calculated to obtain the impacts before and after the Program.

#### IV.c Study Limitations

The results obtained must be interpreted considering the following limitations. I was able to analyze the exposure of *Progres-Oportunidades* Program between the 1998 to 2007 period. This means that I only had pre-treatment data from 1997. The scarcity of data previous to the implementation of the Program could distort in some degree the results (Freije and Rodriguez-Oreggia (2008)). In relation to the data collection, even though the socio-economic surveys done by The Mexican Secretary for Social Development (SEDESOL, for its acronym in Spanish) are of high quality, they may have sampled a misrepresentative treatment group of *Progres-Oportunidades*. If so, the extrapolation of the sample to the entire population with similar characteristics (young rural Program beneficiaries) would be limited or mismatched. Also, I restricted the analysis to children and youths, which eliminated any possible finding about education enhancement of older beneficiaries. Furthermore, the Program is assumed to improve the life condition of the beneficiaries; however additional research in the future would be needed to corroborate the sustainability of improvement of lives over time (Szekely 2005).

Related to analysis, the Differences in Differences (DiD) method is used on the analysis of the education impact of the *Progres-Oportunidades* Program. However, the validity of Differences in Differences estimation assumes a common trend, which strongly depends on how the control group was constructed, and its relevance to the analysis (White and Sabarwal, 2014). Thus, in the event that there are observable

characteristics resulting in an inconsistent trend between the beneficiary group and the untreated group, the calculation of DiD approach would be biased.

Finally, this analysis, as other observational studies, presents limitations such as omission of potential relevant variables, and other appropriate information. However, as suggested by Rosenbaum, (2010), the DiD PSM is used to reduce model dependence and performed sensitivity analyses to assess the robustness of my results.

# Findings

## Empirical analysis framework

In this study, I focus on children and youth observed from 1997 to 2007 across all the SEDESOL socio-economic surveys. This empirical analysis has the purpose of identifying and analyzing the educational impact of the Program in the children and youths, measuring the highest school level achieved of the treatment group compared to the untreated group, considering data before and after the treatment.

A statistic summary based on the basic information of the observations of the treatment group for individuals between 5 and 18 years old is provided below in Table 5.1c (similar tables with descriptive statistics for the control group and the whole data are provided in Tables 5.1a, 5.1b, and 5.1d in the appendix section). In the table below, the variables “goes to school”, “scholar level achieved”, “# people in household”, age, and a dummy variable “female” are displayed. Goes to school equals zero if the child does not go to school and 1 if he or she goes; Scholar level achieved represents the different education levels, where 0 is none, 1 is kindergarten, 2 primary school, 3 secondary school, etc.; The rest of variables are described on the previous chapter on Table 4.3.

Table 5.1c – Descriptive statistics on basic information of the individuals between 5 and 18 years old from the treatment group.

Year	Variable	Obs.	Mean	St. Dev.	Min	Max
1997	Goes to School	218	0.7844037	0.4121819	0	1
	Scholar Level achieved	218	2.825688	0.8570019	1	5
	# people in household	218	6.678899	1.684195	3	10
	Age	218	11.24312	3.900913	5	18
	Female*	218	0.4816514	0.5008132	0	1
Year	Variable	Obs.	Mean	St. Dev.	Min	Max
1998	Goes to School	226	0.7743363	0.4189466	0	1
	Scholar Level achieved	226	3.035398	0.7294345	1	5
	# people in household	226	6.800885	1.707552	3	10
	Age	226	11.16373	3.91518	5	18
	Female*	226	0.4823009	0.5007958	0	1
Year	Variable	Obs.	Mean	St. Dev.	Min	Max
1999	Goes to School	231	0.7748918	0.4185605	0	1
	Scholar Level achieved	231	3.095238	0.6656307	1	5
	# people in household	231	6.952381	1.769888	3	11
	Age	231	11.22078	3.953941	5	18
	Female*	231	0.4935065	0.5010435	0	1
Year	Variable	Obs.	Mean	St. Dev.	Min	Max
2000	Goes to School	246	0.7520325	0.4327132	0	1
	Scholar Level achieved	246	3.117886	0.6927652	1	4
	# people in household	246	7.085366	1.844138	3	12
	Age	246	11.3374	4.10624	5	18
	Female*	246	0.495935	0.5010028	0	1
Year	Variable	Obs.	Mean	St. Dev.	Min	Max
2003	Goes to School	252	0.797619	0.4025742	0	1
	Scholar Level achieved	252	3.277778	0.6454115	1	5
	# people in household	252	7.460317	2.161418	3	13
	Age	252	11.38095	3.993734	5	18
	Female*	252	0.5	0.500995	0	1
Year	Variable	Obs.	Mean	St. Dev.	Min	Max
2007	Goes to School	250	0.848	0.3597411	0	1
	Scholar Level achieved	250	3.268	0.6370237	1	5
	# people in household	250	8.020243	2.372693	3	15
	Age	250	11.664	3.865082	5	18
	Female*	250	0.496	0.500987	0	1
TOTAL	Variable	Obs.	Mean	St. Dev.	Min	Max
TOTAL	Goes to School	1423	0.7891778	0.4080358	0	1
	Scholar Level achieved	1423	3.111033	0.7196542	1	5
	# people in household	1423	7.185211	2.000403	3	15
	Age	1423	11.34153	3.954738	5	18
	Female*	1423	0.4919185	0.5001104	0	1

\* Dummy variable: =1 if female; =0 if male. Source: Author's calculations with SEDESOL data 1997-2007



As highlighted in the results of the descriptive statistics (Table 5.1), the children and youths between 5 and 18 years old present a considerable impact in terms of educational attainment, which increases in 0.442 points from 2.826 in 1997 to 3.268 in 2007. This reflects, on average, an increase of around three years more of secondary finalized by the treatment group in 2007 in comparison with the same group before the implementation of the Program. The “education level achieved” information of observations and other education measures, in the treatment and control groups, in the baseline year and the follow-up year are presented in Table 5.2:

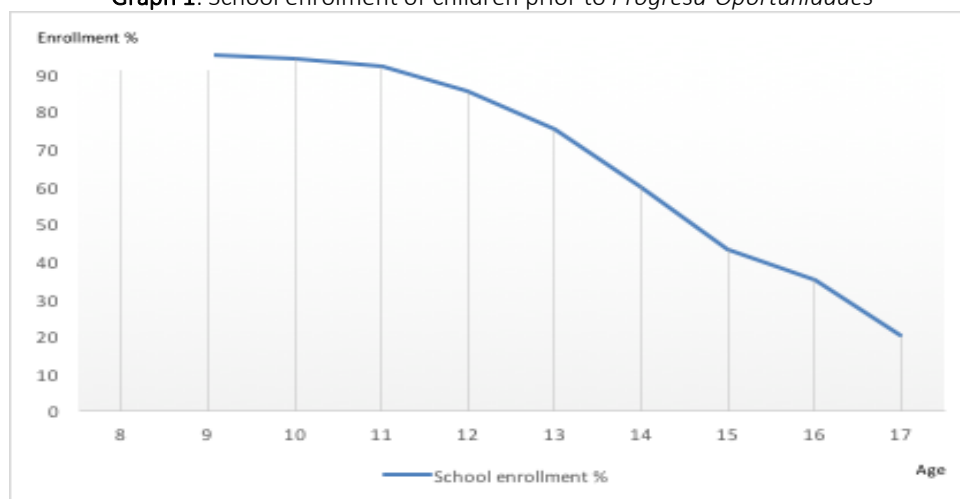
*Table 5.2 Maximum Education attainment and observations – Treatment vs. Control*

Year	Treatment group			Control group		
	1997	2000	2007	1997	2000	2007
Total number of obs.	218	246	250	56	71	64
Age	5 to 18	5 to 18	5 to 18	5 to 18	5 to 18	5 to 18
Scholar level achieved	<b>2.826</b>	3.1179	<b>3.268</b>	<b>2.6607</b>	2.7042	<b>2.75</b>
Number of school attendance	171	185	212	39	38	24
Percentage of schooling (%)	<b>78.44</b>	75.20	<b>84.80</b>	<b>69.65</b>	53.52	<b>37.5</b>
# out of school	47	61	38	17	33	40
Aver. # people in the household	6.6788	7.0854	8.0202	6.6364	6.8727	6.97727

Source: Author's calculations with SEDESOL data 1997-2007

Descriptive statistics on the basic information of the observations suggest that children and youth in the treatment group have higher education attainment than the ones from the control group; on average, during the 10 years period from 1997 to 2007, the ones on the treatment group achieve “two years education level” higher than the ones in the control group (in 2007, 3.268 vs. 2.75). Furthermore, the attendance at school is significantly higher in the treatment group than in the control group, showing in 2007 on average 84.8% in the treatment versus 37.5% in the control group. This indicates that the youths (5-18 years old) from the treatment group have a higher propensity to stay on at school than the ones from the control group, therefore to achieve a higher education level. This is on the same line as the results obtained by Behrman, Todd and Parker (2007), where these researchers identified significant improvements on the scholar achievement due to Conditional Cash Transfers. According to Parker and Skoufias (2000), the school enrolment of children prior to the implementation of the Program *Progres-Oportunidades* decreased strongly once they turned 11 years old. This is corroborated in my analysis; and the decrease is especially steeper in the control group.

**Graph 1:** School enrolment of children prior to *Progres-Oportunidades*



Source: Parker and Skoufias (2000)

Nine years after the implementation of the Program, in 2007, the results reflect that on average 74.8% of the treated youths (between 5 to 18 years old) go to school against the 37.5% of the untreated ones, therefore, the chances to achieve a higher education level for the Program’s beneficiaries increase as well. As show in Table 5.1, the treated youths remain at school on a 6.36% rate higher than before the implementation of the Program (in 1997).

## Results

The results present the identification of differences in the maximum school level achieved for the treatment group versus the untreated one before and after the treatment.

## Education attainment

The estimated result of the equation 4.2 for education level achieved shows the estimated Program impacts on the maximum level school obtained for children and youths from the treated group and untreated group applying Differences in Differences estimation.

Table 5.3a - DiD estimation on scholar level achieved

Variables	Estimation on regression
	Scholar level achieved
Time	0.0399 [0.107]
Treated	0.165 [0.111]
_diff Year 2007	0.297** [0.12]
Constant	2.661*** [0.099]
Observations	1,803
R-squared	0.069

Robust standard errors in brackets []

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

Source: Author's calculations with SEDESOL data 1997-2007

Table 5.3b -DiD estimation on education level achieved

Outcome variable(s)	Mean Edu. level achieved	Std. Error	T	P >  t	Observations
<b>1997 (Base line)</b>					
Control	2.6607	0.09903			56
Treated	2.82568	0.05019			218
Diff(BL)	0.16497	0.11102	1.49	0.137	274
<b>2007 (Follow up)</b>					
Control	2.70061	0.041102			324
Treated	3.16265	0.021348			1205
Diff(FU)	0.46203	0.04637	9.96	0.000***	1529
<b>DIFF IN DIFF</b>	0.297**	0.12	2.47	0.014**	1803

a. Means and Standard Errors are estimated by linear regression

b. Inference: \*\*\* p<0.01; \*\* p<0.05; \* p<0.1

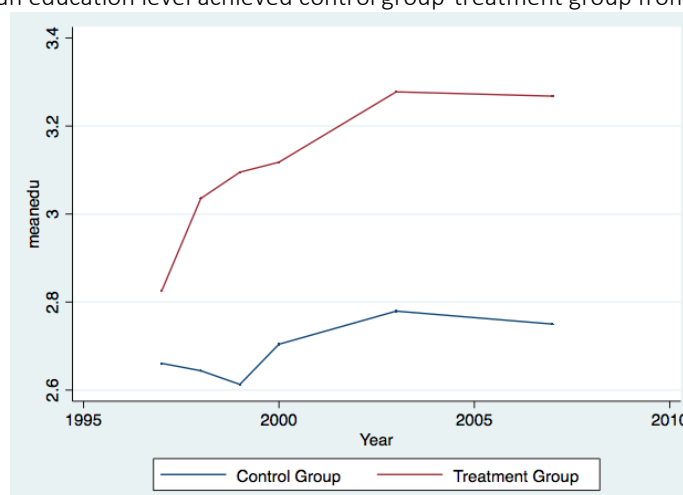
Source: Author's calculations with SEDESOL data 1997-2007

The first table presents the regression version of the Differences in Differences estimates; the second table exhibits in detail the Differences in Differences analysis of the treated group and the untreated group from 1997 to 2007. The results obtained from Differences in Differences (Tables 5.3a & 5.3b) are consistent with the ones obtained from the descriptive statistics (Table 5.1). The estimated coefficient on “treatment” before the Program is 0.16497 (in Table 5.3b), which explained that even in the absence of the Program *Progres-a-Oportunidades*, the beneficiary children and youths have on average 0.16497 higher level of school achieved than their peers in the untreated or control group. In other words, it represents the difference between the academic level achieved of the treatment and control groups on the base line.

The difference in differences estimation is 0.297; this means that the children and youths treated by the Program tend to achieve on average 0.297 higher school level than untreated ones between 1998 to 2007 due to the Program's implementation. This means an achievement of around two degrees higher education level than the ones in the control group. This discrepancy in the improvement of school level achieved between the two groups is statistically significant at the five percent level.

On the next graph, it is easy to identify both groups, the treatment group and the control group, and its path on education through time. In 1997, the treatment group reflected a 2.8 education attainment, while the control group showed a 2.65, both level pretty similar. After the implementation of the treatment in 1998, the differences increased sharply in the treatment group; however, the control group shows almost no change in the 10 years period observed.

**Graph 2:** Mean education level achieved control group-treatment group from 1997 to 2007.



Source: Author's calculations with SEDESOL data 1997-2007

In order to obtain higher reliability of the results, I conducted a Propensity Score Matching estimation (Todd, 2006), and a Difference in Difference propensity score matching estimator applying Gaussian kernel function. The estimation matching was done through STATA based on the command written by Edwin Leuven and Barbara Sianesi (2003). The propensity score matching was calculated using a treatment indicator “t”, covariates  $x_1$  and  $x_2$  equivalent to age and school assistance respectively, and school attainment as the outcome. First, I ran a t test to compare the mean value of “y” (school attainment) for the treated and control groups. As shown on Table 5.4, the mean for the treated group, with a value of 3.11, is much higher than the one for the control group, with a school attainment value of 2.69. This means that according to the mean calculations, the Program *Progres-Oportunidades* has a high impact on the school

attainment, specifically the impact is around 0.416 (treatment group achieves around three degrees higher than the control group). However, just comparing the mean value of “school attainment: for the treated and control groups badly overestimates the effect of the treatment. The following steps provide higher reliability.

*Table 5.4 - Two sample t test with equal variances*

Group	Obs.	Mean	Std. Error	Std. Dev.	[95% Conf. Interval]	
Control	380	<b>2.695</b>	0.043	0.848	2.609	2.78
Treated	1,423	<b>3.111</b>	0.019	0.719	3.073	3.148
Combined	1,803	3.023	0.018	0.767	2.988	3.058
Diff		<b>0.416</b>	0.043		0.501	0.331

Source: Author's calculations with SEDESOL data 1997-2007

Then regressing the “school attainment” on the “treated” will give a good picture of the situation (appendix, Table 4.5b). The regression provides a much better estimate of the treatment effect. Secondly, I conducted a Kernel Matching Differences in Differences estimation.

*Table 5.5a – DiD matching estimation on scholar level achieved*

Variables	Estimation on regression
	Scholar level achieved
Time	0.0399 [0.0729]
Treated	0.165* [0.0952]
_diff Year 2007	0.297*** [0.103]
Constant	2.661*** [0.0673]
Observations	1,803
R-squared	0.076

Robust standard errors in brackets []

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

Source: Author's calculations with SEDESOL data 1997-2007

Table 5.5b -DiD matching estimation on education level achieved

Outcome variable(s)	1997 (Base line)			2007 (Follow up)			DIFF IN DIFF
	Control	Treated	Diff(BL)	Control	Treated	Diff(FU)	
Education level achieved	2.661	2.826	0.165	2.701	3.163	0.462	0.297***
Std. Error			0.095			0.4	0.103
T			1.73			11.54	2.88
P >  t			0.083*			0.000**	*
Observations	56	218	274	324	1205	1529	1803

a. Means and Standard Errors are estimated by linear regression

b. Inference: \*\*\* p<0.01; \*\* p<0.05; \* p<0.1

Source: Author's calculations with SEDESOL data 1997-2007

The Difference in Differences propensity score matching estimate is 0.297, with a 1% statistical significance. The statistical significance below 1% indicates that the estimation has more than 99% chance of being true. The calculation indicates that during the 10 years of the Program, the level of school achieved by the treated individuals is 0.297 higher than the school level achieved by their peers in the control group. The enhancement in education attainment is in line with the data obtained by the descriptive statistics and the DiD estimation. The matching combined with the Differences in Differences technique provides a more reliable and robust approach to compare the impact of the Program than just DiD estimation (Blundell and Costa Dias, 2000). Tables 5.6a and 5.6b (both below) represent the differences estimated by the Program impact on the maximum level school obtained for male and female from the treated group and control group applying Difference in Differences estimation.

Table 5.6a - DiD estimation on scholar level achieved by gender

Variables	Estimation on regression
	Scholar level achieved
Gender	-0.127 [0.0772]
Treat	0.354*** [0.0638]
_diff	0.111 [0.0868]
Constant	2.765*** [0.0574]
Observations	1,803
R-squared	0.05

Robust standard errors in brackets []. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Source: Author calculations with SEDESOL data '97'07

Table 5.6b -DiD estimation on education level achieved (by gender)

Outcome variable(s)	Men			Women			DIFF IN DIFF
	Control	Treated	Diff(BL)	Control	Treated	Diff(FU)	
Education level achieved	2.765	3.119	0.354	2.638	3.103	0.465	0.111
Std. Error			0.064			0.059	0.087
T			5.55			7.89	1.27
P >  t			0.000*			0.000**	0.203
			**			*	
Observations	170	723	893	210	700	910	1,803

a. Means and Standard Errors are estimated by linear regression

b. Inference: \*\*\* p<0.01; \*\* p<0.05; \* p<0.1

Source: Author's calculations with SEDESOL data 1997-2007

Table 5.6a presents the regression version of the DiD estimates, distinguishing men and women; Table 5.6b shows the differences in difference analysis by gender for treated and untreated groups. The estimated coefficient for men is 0.354 (on table 5.6.b), which explains that the beneficiary young men have on average 0.354 higher level of school attainment than their peers in the untreated or control group. For the women's population, the estimated coefficient is 0.465 (table 5.6b). The beneficiary young women have on average 0.465 higher educational attainment than untreated women. The control group for women is able to pass until mid-primary, while the treated women achieved secondary levels.

Altogether, the difference in differences estimation by gender is 0.111; due to the Program's impact, the women tend to achieve on average 0.111 higher school level than the men between 1998 to 2007. The results are promising, showing a higher impact on women than men. The 0.111 estimation represents an achievement of around one academic year higher for women than for men, attributable to the Program's conditional cash transfers. The results by gender are on line with the Program's goals. The results show an improving on education overall, but specially on women, achieving one of the Program goals, reducing gender gap.

Overall, the analysis of the data confirms that the individuals obtaining aid from the Program *Progres-a-Oportunidades* achieve on average a higher education level (around 2 degrees higher) than the ones in the control group, with a higher impact on women than men.

## Discussion

The empirical analysis evaluates the large-scale Program *Progres-Oportunidades* based on human capital investment, focusing on one the most important area: education level (Becker, G. 1996; de Janvry, A and Sadoulet, E. 2005; Picciotto, R. 1996). For my analysis, the data set used reflects observations from the treatment group as well as the control group between 1997 to 2007. The results demonstrate that with the economic incentives provided through conditional cash transfers, beneficiaries are better off on education matters, and achieve a higher education level. The findings obtained using the Difference in Differences (DiD) and the Difference in Differences Propensity Score Matching methods both indicate that targeting the right population (the unprivileged from rural areas in Mexico) and providing them with economic incentives to send their children to school may be enough to have an impact on youths' future education level achieved. The results suggest that access to cash aid supporting school expenses, which is one strategy to improve education of future generations, needs to be expanded to other areas and so cover everyone who would need it (Gertler et al. 2016).

The study captures the impact of *Progres-Oportunidades* on children and youths' education attainment. I found evidence that the Program has a direct positive impact on education among youths, and these results are higher for women than for men. In addition, the increase on school attendance relates to the effect of *Progres-Oportunidades*' economic incentives with higher odds of achieving a higher education level. The study reveals that for the ones being part of the treatment group, school attendance and educational attainment are positively related. This suggests what is commonly accepted that education is one of the cornerstones for human development, and its positive contribution against poverty (Becker, 1964). However, in the near future, the problem for these more educated youths is to find much more "productive" jobs. According to Levy, (2007), one of the main problems Mexicans are facing is low productivity, both in the formal and informal sectors; if productivity does not increase, these workers will have to receive permanent income transfers, either through *Progres-Oportunidades* or any other mechanism.

*Progres-Oportunidades* stipulates that children and youths in beneficiary households obtain a monthly payment based on educational conditions (among others) (STPS, 2017). The results show that the individuals who obtained aid have higher propensity to stay in school, and therefore achieve a higher educational attainment. This corroborates the research of Burnett (2011), who found that the monthly payments have



direct effects on a persistent school attendance; the aids reduce the opportunity cost of children and youths doing different activities, like working.

Related to the gender side, in many developing countries women face higher barriers to attend to school than men (King and Mason, 2001). The Mexican Program gives greater cash payments to girls than boys to reduce the education gender gap (Behrman et al., 2005). As presented in my analysis, the results suggest that *Progres-Oportunidades* is increasing educational attainment on women as targeted, and therefore reducing the gender gap.

This empirical study of *Progres-Oportunidades* finds a connection between the aid and the education level from 1997 to 2007. As stated by Fiszbein and Schady (2009), investment in human capital through education takes time to develop, and provides small impact in the short term; however, in the long term these investments in human capital have a great impact, especially for the most unprivileged. Therefore, it is expected that higher impacts on education level are achieved by beneficiaries of the Program in the longer run.

# Conclusion & Recommendations

## Conclusion

According to Levy (2007), *Progres-Oportunidades* is currently the most important social program in Mexico to provide basic services in the areas of nutrition, health, and education to the most unprivileged families. Its operation has shown that it is possible to develop programs with a high level of efficiency in terms of targeting social spending and identifying beneficiary groups (Freije and Rodriguez-Oreggia, 2008; Behrman, Todd, and Parker, 2007; Freije and Rodriguez-Oreggia, 2008; Yaschine, 2012; Gertler and Fernald, 2005). The cash transfers that these households receive through the Program contribute to alleviate their condition of social deprivation and poverty. In this dissertation, the impact on education of the Conditional Cash Transfer through *Progres-Oportunidades* is under research. The aim of the study is to prove the causal effect of the Conditional Cash Transfers on educational attainment. To facilitate this objective, an empirical analysis is done, using data from unprivileged rural areas, extracted from the Mexico Ministry of Labor and Social Welfare.

Previous evaluations have indicated that Conditional Cash Transfers (CCT) can be an effective incentive for investment in human capital of the most unprivileged (Petrosino et al., 2012). Focusing on education, the CCTs have proven to have a positive effect on education, both for boys and girls. In Mexico, before the implementation of the Program in 1997, the average children's maximum education level achieved was around completing primary school (Parker and Skoufias, 2000). The estimations of the impact of the Program show an increment of education attainment, from primary in 1997 to secondary in 2007. The theoretical analysis, based on the human capital development through education (De Janvry and Sadoulet, 1995; Piccioto, 1996), evidence that Conditional Cash Transfer interventions provide economic incentive to increase the demand on education. This enables, especially, the disadvantage population in rural areas to increase their education accumulation. The empirical evidence shows that the treatment group on average obtained higher education level than the control group. Calculations were done using the Difference in Differences method and the Difference in Differences Propensity Score Matching approach to control for the perceptible and imperceptible heterogeneity, respectively, which produce selection bias (Heckman et al., 1997). As a final result, both methods provided similar findings, indicating a direct correlation between the positive impact on education level achieved and the Conditional Cash Transfers provided by the Program *Progres-Oportunidades*.

Using micro data provided from *Progres-Oportunidades* surveys covering treated and untreated populations with similar socioeconomic characteristics, a 10 year long empirical analysis shows that investing in human capital plays a crucial role in the enhancement of education, especially in the education level achieved by the youths, therefore may increase their future opportunities. With this framework and analysis in mind, human capital investment on education provides positive expectations on having a more educated society in the long term with more opportunities, which could lead to reducing poverty situations and breaking the vicious circle of intergenerational poverty (Engle et al, 2009). Additional research could focus on longer effects produced by the Conditional Cash Transfer programs in education goals, as well as investigating and providing evidence from the disadvantaged population on the urban areas, and the differences between rural and urban areas.

This study has some limitations, most of them related to data availability. Authors such as Roberts (2003) and Bennell (2002) have pointed out the imperfections of the educational data for assessing the impact of the Program in this matter. Firstly, the study was only able to obtain pre-treatment socio-economic data for 1997; only one year before the Program implementation, which limits the reliability of the results. Secondly, even though SEDESOL creates high quality evaluation surveys, the sample population studied could not fairly represent the whole population of beneficiaries. Finally, this analysis, as other observational studies, presents limitations such as omission of potential relevant variables, and other appropriate information. However, I used DiD PSM method to try to minimize some of these limitations.

### Recommendations

The study proved the positive impact on education level achieved. *Progres-Oportunidades* must continue persisting in the effort to achieve the Program goals. In order to continue improving, I suggest a few policy recommendations.

First, to be able to translate higher education level achieved into higher academic performance and better education, the Program's educational part should be expanded to evaluate educational knowledge and skills, ideally tested through standardized language and math skill tests. Although additional scholarships and conditional transfers could increase the educational level in higher education, according to Gertler et al. (2016) many *Progres-Oportunidades* beneficiaries face extra barriers to access university, such as the distance between the disadvantaged rural areas and the university (among other barriers such as economic aid and information, etc.).

Furthermore, it is important to consider the little impact the Program has on enrollment rates in primary grades, as enrollment rates in primary grades were already very high before the implementation of *Progres-a-Oportunidades* (Parker and Skoufias, 2000). If a main goal of the Program is to raise average educational levels, then it is worth considering more seriously lowering or eliminating subsidies in lower grades and using these resources to increase the level of payments for higher educational levels. It is also relevant to consider that changing the scheme of subsidies in this way would have distribution consequences and shift resources to families whose children have higher levels of educational achievement.

Studies reveal (Rodriguez and Amman, 2007) that many *Progres-a-Oportunidades* short-terms goals have been achieved since its inception. However, the long-term goal of breaking the intergenerational transmission of poverty has yet to be determined. Further studies are recommended in the future to explore the potential impacts of *Progres-a-Oportunidades* on educational matters such as scholar level achieved, skills learned and enrollment, etc. in a longer term to continue improving and achieving the Program's long-term goals.

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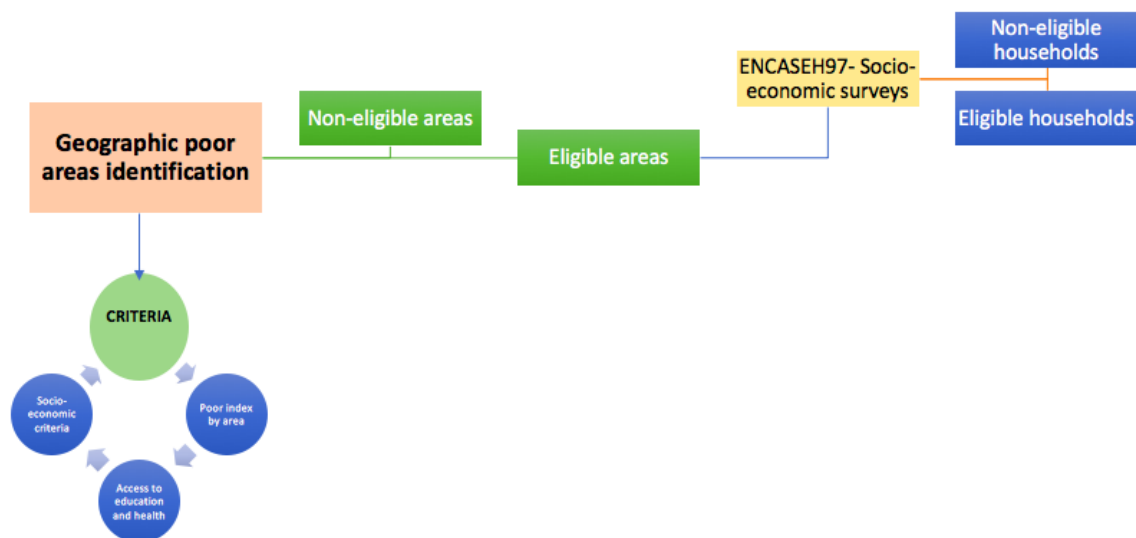
# APPENDIX

Table 3.1: Mexican minimum wages from 1997 to 2007.

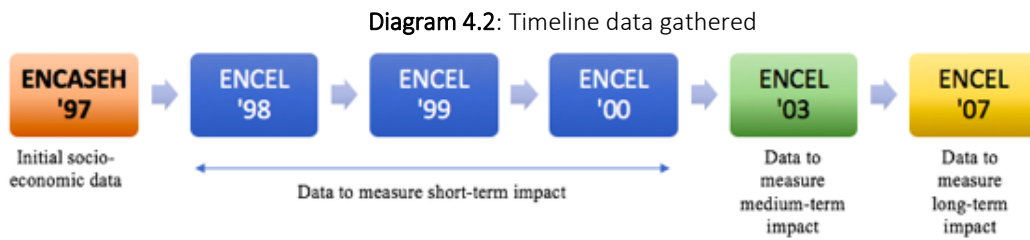
Year	Geographic Area		
	A	B	C
Mexican pesos per day			
Daily Mexican pesos			
1997	26.45	24.50	22.50
1998	30.20	28.00	26.05
1999	34.45	31.90	29.70
2000	37.90	35.10	32.70
2001	40.35	37.95	35.85
2002	42.15	40.10	38.30
2003	43.65	41.85	40.30
2004	45.24	43.73	42.11
2005	46.80	45.35	44.05
2006	48.67	47.16	45.81
2007	50.57	49.00	47.60

Source: STPS (Mexican Ministry of Labor and Social Welfare)

Diagram 4.1: Process to identify individuals for treatment and control groups.



Source: Author's diagram made with information from ENCASEH and ENCEL



Source: Author's chronogram with SEDESOL data 1997-2007

**Diagram 4.3: Mexican states where the program was implemented.**



Source: Author's design with SEDESOL data 1997-2007

**Table 4.3a: # of observations in the treatment and control group.**

`. tab year control_treatment`

Year	Control_Treatment		Total
	0	1	
1997	152	562	714
1998	152	580	732
1999	152	599	751
2000	164	624	788
2003	172	674	846
2007	167	705	872
Total	959	3,744	4,703



Table 4.3b: # of observations in treatment & control group for population 5 – 18 yrs.

. tab year control\_treatment

Year	Control_Treatment		Total
	0	1	
1997	56	218	274
1998	59	226	285
1999	62	231	293
2000	71	246	317
2003	68	252	320
2007	64	250	314
Total	380	1,423	1,803

Table 5.1a: Descriptive statistics – basic information of all observations.

```
. tabstat goes_to_school scholar_level_achieved number_of_people_in_household age fem, by(y
> ear) stat(n mean sd min max) col(stat)long
```

year	variable	N	mean	sd	min	max
1997	goes_to_school	714	.2955182	.4565952	0	1
	scholar_level_achieved	714	2.354342	1.135523	0	6
	number_of_people_in_household	714	6.134454	1.926814	1	10
	age	714	21.51261	18.36517	0	87
	fem	714	.4971989	.5003427	0	1
1998	goes_to_school	732	.3005464	.4588092	0	1
	scholar_level_achieved	732	2.479508	1.138009	0	6
	number_of_people_in_household	732	6.273224	1.949203	1	10
	age	732	22.09153	18.45077	0	88
	fem	732	.4931694	.5002952	0	1
1999	goes_to_school	751	.2929427	.4554157	0	1
	scholar_level_achieved	751	2.52996	1.135533	0	6
	number_of_people_in_household	751	6.478029	1.960744	1	11
	age	751	22.18509	18.44015	0	89
	fem	751	.4886818	.500205	0	1
2000	goes_to_school	788	.285533	.4519548	0	1
	scholar_level_achieved	788	2.596447	1.113433	0	6
	number_of_people_in_household	788	6.71066	2.040265	1	12
	age	788	22.93655	18.59352	0	90
	fem	788	.4873096	.5001564	0	1
2003	goes_to_school	846	.2919622	.454934	0	1
	scholar_level_achieved	846	2.771868	1.119473	0	6
	number_of_people_in_household	846	7.288416	2.362334	1	13
	age	846	24.474	18.88617	0	90
	fem	846	.498818	.5002944	0	1
2007	goes_to_school	872	.2844037	.4513888	0	1
	scholar_level_achieved	872	2.932339	1.067744	0	6
	number_of_people_in_household	861	7.650407	2.557654	1	15
	age	872	26.27752	18.53525	0	85
	fem	872	.5080275	.5002225	0	1
Total	goes_to_school	4703	.2915161	.4545089	0	1
	scholar_level_achieved	4703	2.624708	1.133066	0	6
	number_of_people_in_household	4692	6.794118	2.231206	1	15
	age	4703	23.36487	18.62082	0	90
	fem	4703	.4958537	.500036	0	1

Table 5.1b: Descriptive statistics –basic information of all the observations (only individuals with an age between 5 and 18).

```
. tabstat goes_to_school scholar_level_achieved number_of_people_in_household age fem,
> by(year) stat(n mean sd min max) col(stat)long
```

year	variable	N	mean	sd	min	max
1997	goes_to_sc~l	274	.7664234	.4238801	0	1
	scholar_le~d	274	2.791971	.8540838	0	5
	number_of_~d	274	6.678832	1.728597	3	10
	age	274	11.08394	3.891886	5	18
	fem	274	.4927007	.5008615	0	1
1998	goes_to_sc~l	285	.7614035	.4269753	0	1
	scholar_le~d	285	2.954386	.7925867	0	5
	number_of_~d	285	6.750877	1.759594	3	10
	age	285	11.05965	3.901961	5	18
	fem	285	.4912281	.5008024	0	1
1999	goes_to_sc~l	293	.7406143	.4390474	0	1
	scholar_le~d	293	2.993174	.7719091	0	5
	number_of_~d	293	6.894198	1.743599	3	11
	age	293	11.11604	3.972532	5	18
	fem	293	.5051195	.5008292	0	1
2000	goes_to_sc~l	317	.70347	.4574495	0	1
	scholar_le~d	317	3.025237	.7155553	1	4
	number_of_~d	317	7.0347	1.826855	3	12
	age	317	11.29653	4.113164	5	18
	fem	317	.5141956	.5005886	0	1
2003	goes_to_sc~l	320	.74375	.4372452	0	1
	scholar_le~d	320	3.171875	.7027641	0	5
	number_of_~d	320	7.31875	2.090048	3	13
	age	320	11.40938	3.930977	5	18
	fem	320	.509375	.500695	0	1
2007	goes_to_sc~l	314	.7515924	.4327791	0	1
	scholar_le~d	314	3.16242	.7165692	0	5
	number_of_~d	311	7.758842	2.278166	3	15
	age	314	11.82484	3.840829	5	18
	fem	314	.5127389	.5006355	0	1
Total	goes_to_sc~l	1803	.7437604	.4366768	0	1
	scholar_le~d	1803	3.023295	.7673345	0	5
	number_of_~d	1800	7.088333	1.956582	3	15
	age	1803	11.30948	3.948145	5	18
	fem	1803	.5047144	.5001165	0	1

Table 5.1c: Descriptive statistics – basic information of all observations (only individuals with an age between 5 and 18 from the treatment group).

```
. tabstat goes_to_school scholar_level_achieved number_of_people_in_household age fem i
> f control_treatment==1, by(year) stat(n mean sd min max) col(stat)long
```

year	variable	N	mean	sd	min	max
1997	goes_to_school	218	.7844037	.4121819	0	1
	scholar_level_achieved	218	2.825688	.8570019	1	5
	number_of_people_in_household	218	6.678899	1.684195	3	10
	age	218	11.24312	3.900913	5	18
	fem	218	.4816514	.5008132	0	1
1998	goes_to_school	226	.7743363	.4189466	0	1
	scholar_level_achieved	226	3.035398	.7294345	1	5
	number_of_people_in_household	226	6.800885	1.707552	3	10
	age	226	11.16372	3.91518	5	18
	fem	226	.4823009	.5007958	0	1
1999	goes_to_school	231	.7748918	.4185605	0	1
	scholar_level_achieved	231	3.095238	.6656307	1	5
	number_of_people_in_household	231	6.952381	1.769888	3	11
	age	231	11.22078	3.953941	5	18
	fem	231	.4935065	.5010435	0	1
2000	goes_to_school	246	.7520325	.4327132	0	1
	scholar_level_achieved	246	3.117886	.6927652	1	4
	number_of_people_in_household	246	7.085366	1.844138	3	12
	age	246	11.3374	4.10624	5	18
	fem	246	.495935	.5010028	0	1
2003	goes_to_school	252	.797619	.4025742	0	1
	scholar_level_achieved	252	3.277778	.6454115	1	5
	number_of_people_in_household	252	7.460317	2.161418	3	13
	age	252	11.38095	3.993734	5	18
	fem	252	.5	.500995	0	1
2007	goes_to_school	250	.848	.3597411	0	1
	scholar_level_achieved	250	3.268	.6370237	1	5
	number_of_people_in_household	247	8.020243	2.372693	3	15
	age	250	11.664	3.865082	5	18
	fem	250	.496	.500987	0	1
Total	goes_to_school	1423	.7891778	.4080358	0	1
	scholar_level_achieved	1423	3.111033	.7196542	1	5
	number_of_people_in_household	1420	7.185211	2.000403	3	15
	age	1423	11.34153	3.954738	5	18
	fem	1423	.4919185	.5001104	0	1

Table 5.1d: Descriptive statistics – basic information of all observations (only individuals with an age between 5 and 18 from the control group).

```
. tabstat goes_to_school scholar_level_achieved number_of_people_in_household age fem if
> control_treatment==0, by(year) stat(n mean sd min max) col(stat)long
```

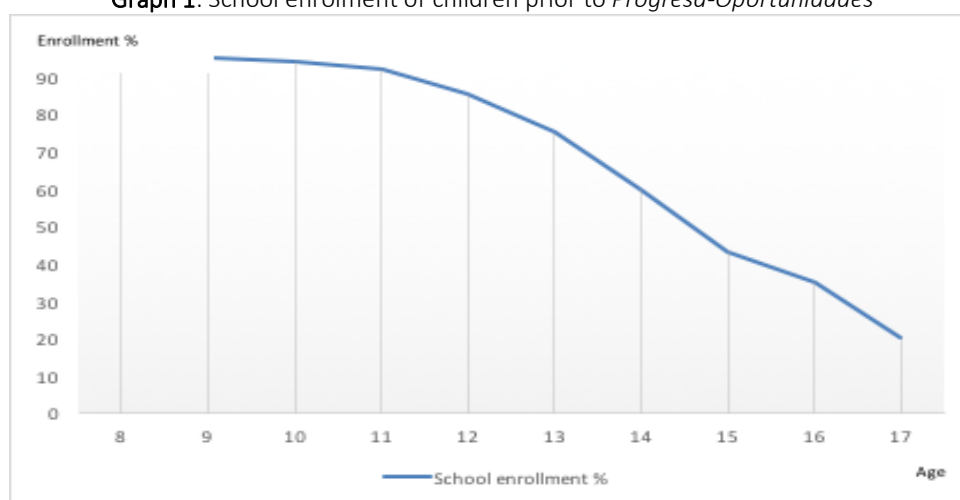
year	variable	N	mean	sd	min	max
1997	goes_to_school	56	.6964286	.4639609	0	1
	scholar_level_achieved	56	2.660714	.8372419	0	4
	number_of_people_in_household	56	6.678571	1.907946	4	10
	age	56	10.46429	3.827956	5	18
	fem	56	.5357143	.5032363	0	1
1998	goes_to_school	59	.7118644	.4567821	0	1
	scholar_level_achieved	59	2.644068	.9425335	0	4
	number_of_people_in_household	59	6.559322	1.949988	3	10
	age	59	10.66102	3.857863	5	18
	fem	59	.5254237	.5036396	0	1
1999	goes_to_school	62	.6129032	.4910624	0	1
	scholar_level_achieved	62	2.612903	.9976175	0	4
	number_of_people_in_household	62	6.677419	1.637413	3	10
	age	62	10.72581	4.049567	5	18
	fem	62	.5483871	.5017157	0	1
2000	goes_to_school	71	.5352113	.5023086	0	1
	scholar_level_achieved	71	2.704225	.7049694	1	4
	number_of_people_in_household	71	6.859155	1.767127	3	10
	age	71	11.15493	4.163268	5	18
	fem	71	.5774648	.4974786	0	1
2003	goes_to_school	68	.5441176	.5017529	0	1
	scholar_level_achieved	68	2.779412	.7696789	0	4
	number_of_people_in_household	68	6.794118	1.715242	3	10
	age	68	11.51471	3.715609	5	18
	fem	68	.5441176	.5017529	0	1
2007	goes_to_school	64	.375	.48795	0	1
	scholar_level_achieved	64	2.75	.8544933	0	4
	number_of_people_in_household	64	6.75	1.501322	3	10
	age	64	12.45313	3.707263	5	18
	fem	64	.578125	.4977629	0	1
Total	goes_to_school	380	.5736842	.4951928	0	1
	scholar_level_achieved	380	2.694737	.8480763	0	4
	number_of_people_in_household	380	6.726316	1.738541	3	10
	age	380	11.18947	3.926219	5	18
	fem	380	.5526316	.4978777	0	1

Table 5.2: Maximum education level achieved and individuals' situations observation

Year	Treatment group			Control group		
	1997	2000	2007	1997	2000	2007
<b>Total number of obs.</b>	218	246	250	56	71	64
<b>Age</b>	5 to 18	5 to 18	5 to 18	5 to 18	5 to 18	5 to 18
<b>Scholar level achieved</b>	<b>2.826</b>	3.11786	<b>3.268</b>	<b>2.6607</b>	2.7042	<b>2.75</b>
<b>Number of school attendance</b>	171	185	212	39	38	24
<b>Percentage of schooling (%)</b>	<b>78.44</b>	75.20	<b>84.80</b>	<b>69.65</b>	53.52	<b>37.5</b>
<b># out of school</b>	47	61	38	17	33	40
<b>Aver. # people in the household</b>	6.6788	7.0854	8.020	6.6364	6.8727	6.9773

Source: Author's calculations with SEDESOL data 1997-2007

Graph 1: School enrolment of children prior to *Progres-Oportunidades*



Source: Parker and Skoufias (2000)

Table 5.3a: Difference in Differences estimation on education level achieved: regressions

```
. reg scholar_level_achieved time treated did,r
```

```
Linear regression                Number of obs   =    1,803
                                F(3, 1799)     =    38.18
                                Prob > F             =    0.0000
                                R-squared            =    0.0688
                                Root MSE         =    .74108
```

scholar_level_achieved	Robust		t	P> t	[95% Conf. Interval]	
	Coef.	Std. Err.				
time	.039903	.1206435	0.33	0.741	-.1967131	.2765191
treated	.1649738	.1252288	1.32	0.188	-.0806354	.410583
did	.2970645	.1352766	2.20	0.028	.0317488	.5623803
_cons	2.660714	.1110009	23.97	0.000	2.44301	2.878419

The estimation of the DiD estimator is presented above. The coefficient for DiD represents the DiD estimator.

```
. reg scholar_level_achieved time##treated,r
```

```
Linear regression                Number of obs   =    1,803
                                F(3, 1799)     =    38.18
                                Prob > F             =    0.0000
                                R-squared            =    0.0688
                                Root MSE         =    .74108
```

scholar_level_achieved	Robust		t	P> t	[95% Conf. Interval]	
	Coef.	Std. Err.				
1.time	.039903	.1206435	0.33	0.741	-.1967131	.2765191
1.treated	.1649738	.1252288	1.32	0.188	-.0806354	.410583
time#treated						
1 1	.2970645	.1352766	2.20	0.028	.0317488	.5623803
_cons	2.660714	.1110009	23.97	0.000	2.44301	2.878419

On the table above, the coefficient for “time#treated” is the Differences in Differences estimator.

Table 5.3a: Difference in Differences estimation on education level achieved (summary)

VARIABLES	model 2
time	0.0399 -0.107
treated	0.165 -0.111
_diff	0.297** -0.12
Constant	2.661*** -0.099
Observations	1,803
R-squared	0.069
Standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

Table 5.3a - DiD estimation on scholar level achieved

Variables	Estimation on regression
	Scholar level achieved
Time-Year 2007	0.0399 [0.107]
Treated	0.165 [0.111]
_diff Year 2007	0.297** [0.12]
Constant	2.661*** [0.099]
Observations	1,803
R-squared	0.069

Robust standard errors in brackets []

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

Source: Author's calculations with SEDESOL data 1997-2007



Table 5.3b: Difference in Differences estimation on education level achieved

**DIFFERENCE-IN-DIFFERENCES ESTIMATION RESULTS**

Number of observations in the DIFF-IN-DIFF: 1803

	Before	After		
Control:	56	324		380
Treated:	218	1205		1423
	274	1529		

Outcome var.	schol~d	S. Err.	t	P> t
<b>Before</b>				
Control	2.661			
Treated	2.826			
Diff (T-C)	0.165	0.111	1.49	0.137
<b>After</b>				
Control	2.701			
Treated	3.163			
Diff (T-C)	0.462	0.046	9.96	0.000***
<b>Diff-in-Diff</b>	<b>0.297</b>	<b>0.120</b>	<b>2.47</b>	<b>0.014**</b>

R-square: 0.07

\* Means and Standard Errors are estimated by linear regression

\*\*Inference: \*\*\* p<0.01; \*\* p<0.05; \* p<0.1

Table 5.3b -DiD estimation on education level achieved

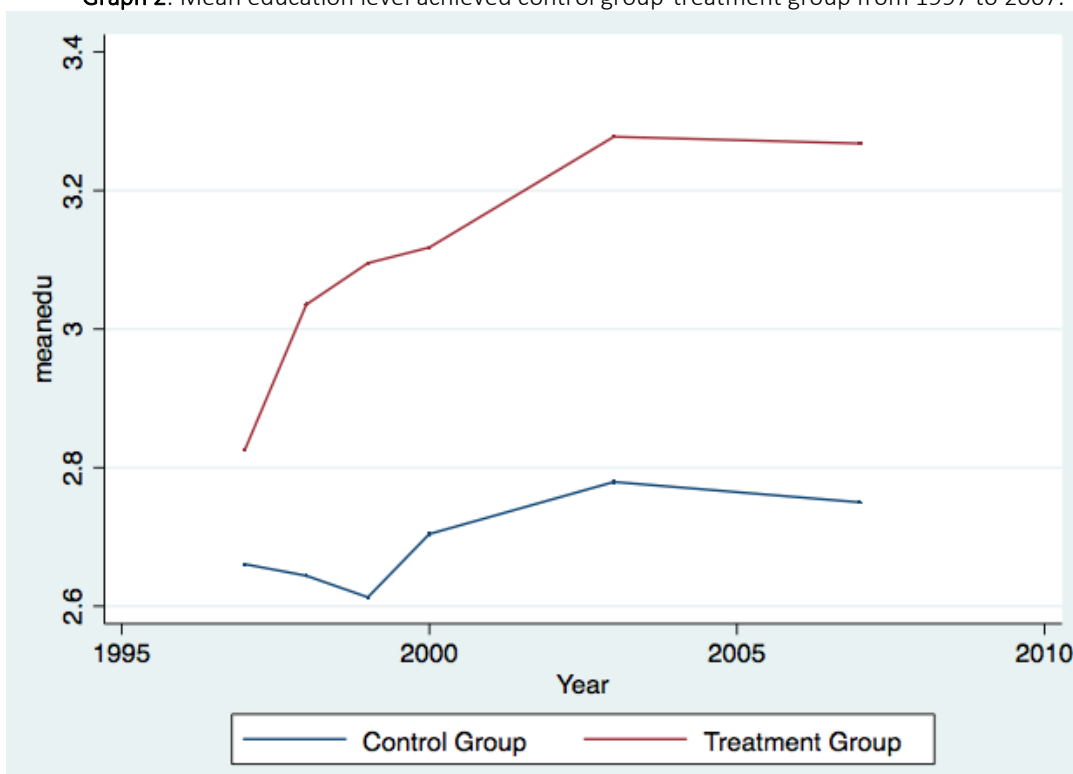
Outcome variable(s)	Mean Edu. level achieved	Std. Error	T	P >  t	Observations
<b>1997 (Base line)</b>					
Control	2.6607	0.09903			56
Treated	2.82568	0.05019			218
Diff(BL)	0.16497	0.11102	1.49	0.137	274
<b>2007 (Follow up)</b>					
Control	2.70061	0.041102			324
Treated	3.16265	0.021348			1205
Diff(FU)	0.46203	0.04637	9.96	0.000***	1529
<b>DIFF IN DIFF</b>	<b>0.297**</b>	<b>0.12</b>	<b>2.47</b>	<b>0.014**</b>	<b>1803</b>

a. Means and Standard Errors are estimated by linear regression

b. Inference: \*\*\* p<0.01; \*\* p<0.05; \* p<0.1

Source: Author's calculations with SEDESOL data 1997-2007

Graph 2: Mean education level achieved control group-treatment group from 1997 to 2007.



Source: Author's calculations with SEDESOL data 1997-2007

Table 5.4: Two – sample t test with equal variances

```
. ttest scholar_level_achieved, by(control_treatment)
```

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
0	380	2.694737	.0435054	.8480763	2.609195	2.780279
1	1,423	3.111033	.0190775	.7196542	3.07361	3.148456
combined	1,803	3.023295	.0180712	.7673345	2.987852	3.058737
diff		-.4162962	.0432217		-.5010662	-.3315262

diff = mean(0) - mean(1)

t = -9.6316

Ho: diff = 0

degrees of freedom = 1801

Ha: diff < 0

Ha: diff != 0

Ha: diff > 0

Pr(T < t) = 0.0000

Pr(|T| > |t|) = 0.0000

Pr(T > t) = 1.0000

Table 5.5a: Difference in Differences matching estimation on education level achieved

VARIABLES	model 2
time	0.0399 -0.0729
treated	0.165* -0.0952
_diff	0.297*** -0.103
Constant	2.661*** -0.0673
Observations	1,803
R-squared	0.076
Standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

Table 5.5a – DiD matching estimation on scholar level achieved

Variables	Estimation on regression
	Scholar level achieved
Time	0.0399 [0.0729]
Treated	0.165* [0.0952]
_diff Year 2007	0.297*** [0.103]
Constant	2.661*** [0.0673]
Observations	1,803
R-squared	0.076

Robust standard errors in brackets []

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

Source: Author's calculations with SEDESOL data 1997-2007

Table 5.5b: Difference in Differences matching estimation on education level achieved

**KERNEL PROPENSITY SCORE MATCHING DIFFERENCE-IN-DIFFERENCES**

Matching iterations...

.....  
> .....

**DIFFERENCE-IN-DIFFERENCES ESTIMATION RESULTS**

Number of observations in the DIFF-IN-DIFF: 1803

	Before	After		
Control:	56	324	380	
Treated:	218	1205	1423	
	274	1529		

Outcome var.	schol~d	S. Err.	t	P> t
Before				
Control	2.661			
Treated	2.826			
Diff (T-C)	0.165	0.095	1.73	0.083*
After				
Control	2.701			
Treated	3.163			
Diff (T-C)	0.462	0.040	11.54	0.000***
Diff-in-Diff	0.297	0.103	2.88	0.004***

R-square: 0.08

\* Means and Standard Errors are estimated by linear regression

\*\*Inference: \*\*\* p<0.01; \*\* p<0.05; \* p<0.1

Table 5.5b -DiD matching estimation on education level achieved

Outcome variable(s)	1997 (Base line)			2007 (Follow up)			DIFF IN DIFF
	Control	Treated	Diff(BL)	Control	Treated	Diff(FU)	
Education level achieved	2.661	2.826	0.165	2.701	3.163	0.462	0.297***
Std. Error			0.095			0.4	0.103
T			1.73			11.54	2.88
P >  t			0.083*			0.000**	* 0.004***
<b>Observations</b>	56	218	274	324	1205	1529	1803

a. Means and Standard Errors are estimated by linear regression

b. Inference: \*\*\* p<0.01; \*\* p<0.05; \* p<0.1

Source: Author's calculations with SEDESOL data 1997-2007

Table 5.6a: Difference in Differences estimation on education level achieved by gender (summary)

VARIABLES	model 2
time	-0.127 -0.0772
treated	0.354*** -0.0638
_diff	0.111 -0.0868
Constant	2.765*** -0.0574
Observations	1,803
R-squared	0.05

Standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 5.6a - DiD estimation on scholar level achieved by gender

Variables	Estimation on regression
	Scholar level achieved
Gender	-0.127 [0.0772]
Treat	0.354*** [0.0638]
_diff	0.111 [0.0868]
Constant	2.765*** [0.0574]
Observations	1,803
R-squared	0.05

Robust standard errors in brackets []

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

Source: Author's calculations with SEDESOL data 1997-2007

Table 5.6b: Difference in Differences estimation on education level achieved

**DIFFERENCE-IN-DIFFERENCES ESTIMATION RESULTS**

Number of observations in the DIFF-IN-DIFF: 1803

	Before	After	
Control:	170	210	380
Treated:	723	700	1423
	893	910	

Outcome var.	schol~d	S. Err.	t	P> t
Before				
Control	2.765			
Treated	3.119			
Diff (T-C)	0.354	0.064	5.55	0.000***
After				
Control	2.638			
Treated	3.103			
Diff (T-C)	0.465	0.059	7.89	0.000***
Diff-in-Diff	0.111	0.087	1.27	0.203

R-square: 0.05

\* Means and Standard Errors are estimated by linear regression

\*\*Inference: \*\*\* p<0.01; \*\* p<0.05; \* p<0.1

Table 5.6b -DiD estimation on education level achieved (by gender)

Outcome variable(s)	Men			Women			DIFF IN DIFF
	Control	Treated	Diff(BL)	Control	Treated	Diff(FU)	
Education level achieved	2.765	3.119	0.354	2.638	3.103	0.465	0.111
Std. Error			0.064			0.059	0.087
T			5.55			7.89	1.27
P >  t			0.000*			0.000**	0.203
			**			*	
Observations	170	723	893	210	700	910	1803

a. Means and Standard Errors are estimated by linear regression

b. Inference: \*\*\* p<0.01; \*\* p<0.05; \* p<0.1

Source: Author's calculations with SEDESOL data 1997-2007