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The Transition from the Childcare Program to Support Working Mothers to the Child Welfare Support Program for Working Mothers: The Effect on Maternal Labor Supply in Mexico

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*The Transition from the Childcare Program to Support Working Mothers to the
Child Welfare Support Program for Working Mothers:
The Effect on Maternal Labor Supply in Mexico*

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Acronyms

2SLS	Two-Stage least squares
ALSP	Active Labor Social Policies
CCT	Conditional Cash transfer programs
CEPAL	Economic Commission for Latin America
CNCH	National Crusade Against Hunger
CONAPO	National Population Council
CONEVAL	National Council for the Evaluation of Social Development Policy
CWSP	Children Welfare Support Program for Working Mothers
DOF	Federation Official Gazette
ENOE	National Occupation and Employment Survey
INEGI	National Institute of Statistics and Geography
INMujeres	Naitional Institute of Women
ITT	Intention-to-treat
LFP	Labor force participation
MI	Marginalization Index
MLE	Maximum likelihood estimation
OECD	Organisation for Economic Cooperation and Development
OLS	Ordinary Least Squares
PEI	Daycare Program to Support Working Mothers
PROFECO	Federal Consumer Prosecutor's Office
RD	Regression Discontinuity
SD	Standard Deviation
UN	United National
WHO	World Health Organization

Abstract

Women are still lagging behind men regarding their participation in the labor market, full-time employment, and the wages they earn. Subsidized childcare favors maternal employment for impoverished mothers. In Mexico, the largest childcare subsidized program (PEI) was suspended in February 2019, and replaced by an unconditional cash transfer program (CWSP). Using a Fuzzy Regression Discontinuity, Logistic Regressions, and Heckman Correction models, this study seeks to explain the effect of the transition from the PEI to the CWSP on women's employment rate in Mexico. The study analyzes 1) the sociodemographic characteristics that explain the participation in the PEI and CWSP, and 2) the effect of the programs' beneficiaries' rate in women' labor force participation. The results suggest that the trend in women's employment rate didn't change after the PEI ended and was substituted with the CWSP, at least in the short run. As for the programs' focalization, the PEI did reach its target population, and the CWSP, as derived from the PEI, also reached its target population. Finally, the largest share of women that participate in the labor force is actually in the municipalities where there is a greater share of beneficiaries.

Introduction

Women are still lagging behind men regarding their participation in the labor market, full-time employment, and the wages they earn. Women's employment is cardinal because it contributes to greater fiscal contributions, and higher economic growth (Euwals, Knoef & van Vuuren, 2011); spending on social policies that encourage women's employment is urgent. In Mexico, only 44.7% of women participate in the labor market, that is the fourth lowest women participation rate among the OECD member countries, just after Turkey, South Africa and Costa Rica (OECD, Q1. 2021).

Active labor social policies, such as policies that encourage parent's work-life balance, are crucial to promote labor market participation. For example, public subsidized childcare favors maternal employment, especially among disadvantaged mothers that without this subsidy wouldn't be able to enter, reenter, or remain in the labor market. In Mexico, the largest childcare subsidized program was the Daycare Program to Support Working Mothers (PEI, for its acronym in Spanish). In February 2019, two months after President López Obrador took office, the PEI was suspended allegedly because there was corruption, and it was replaced with the Children Welfare Support Program for Working Mothers (CWSP). The international trend is to establish subsidized childcare programs or expand the existing ones, so there is no literature that analyzes the effect on maternal labor supply of ending childcare subsidies.

Through a Fuzzy Regression Discontinuity, Logistic Regressions and Heckman Correction models, this study analyzes the effect of the transition from the PEI to the CWSP on women's employment rate, analyzes the sociodemographic characteristics that explain the participation in the PEI and CWSP, and examines the effect of the programs' beneficiaries' rate in women's labor force participation. The results indicate that the trend in women's employment rate didn't change after the PEI was substituted with the CWSP, at least in the short run. This result may be due to the fact that the transition from one program to another was successful, that the PEI had had permanent effects on labor market behavior of women, or that the PEI, despite being the principal subsidized nursery program in Mexico, was quite small in comparison with women's labor participation rate, and for that reason the effect could not be detected.

As for the programs' focalization, the PEI did reach its target population, and the CWSP, as derived from the PEI, also arrived to its target population. At last, the largest share of women that participate in the labor force is actually in the municipalities where there is a greater share of beneficiaries. Then, if the PEI was a well targeted program that reached its objective population, there is no rationale why the government should have cut the program's budget by half. On the contrary, the government should have expanded the program's coverage. This study is organized

as follows. First, it presents the literature review, then it details the PEI and the CWSP. After, it describes the empirical strategy and data. Later, it presents the statistical analysis followed by the discussion, and finally it includes the conclusion.

Literature Review

Gender inequality in the labor market

Over the last few decades, women are becoming more integrated into the labor market. The “gender equality equilibrium” refers to women’s changing behavior related to marriage, family, domestic work and career education, that aims to be equal to that of men. However, this equilibrium has not yet been reached. Women are still lagging behind men regarding their participation in the labor market, full-time employment, and the wages they earn. Regarding the economic sphere, women’s employment is cardinal because it contributes to greater fiscal contributions, and higher economic growth (Euwals, Knoef & van Vuuren, 2011). In this context, spending on social policies that encourage women’s employment should be viewed as an investment that strengthens society’s well-being.

Some of the reasons that avert women from participating in the labor market in the same proportion as men do are pregnancy, motherhood, and the absence of equally shared responsibility between men and women for childcare and housework. In fact, women’s underemployment increases their incidence of poverty, and affects the economic development and well-being of society, especially that of girls and boys (Rawat, 2014). Hence, the unequal distribution of domestic work and family care affects the women’s activity in the labor market, and their economic empowerment. Furthermore, stereotypes on gender roles encourage unequal distribution of unpaid care work. Depending on the country, women spend from two to ten times more time doing unpaid care work than men (OECD, 2015).

Active Labor Social Policies

Active labor social policies (ALSP) are crucial to reduce social inequalities, as they aim to invest in human capital, as well as to mitigate the obstacles to employment or career advancement. They focus on helping the target population to overcome “incentive traps”. These social policies may not only have a positive impact not only on the target population, but also on society as a whole. Active social policies aim to increase the productivity and economic capacity of disadvantaged individuals, who in consequence will pay more taxes. By promoting the inclusion of these individuals in the labor market, there will be maximization of the labor force. In addition, society also benefits from less social spending, while collecting higher tax revenues. In contrast to redistributive social policies, active social policies do not represent a zero-sum game; society as a whole benefit from these policies (Bonoli, 2013). Based on Bonoli (2010), ALSP are the interventions that seek to remove obstacles to participate in the labor market (Bonoli, 2010). The

lack of affordable childcare represents an obstacle for parents to be employed. Hence, it is also seen as an “incentive trap”, for parents with young children that can’t attend kindergarten yet. Likewise, this situation affects predominantly mothers that, as a consequence of gender stereotypes, usually are in charge of the children's wellbeing.

Childcare subsidy as an active labor social policy

Work-life balance policies are crucial to promote labor market participation, for example, policies that encourage parent’s work-life balance. One of the most prominent policies that aims to contribute to gender equality equilibrium in the labor market is childcare subsidies (Esping-Andersen, 2009). Public provision and subsidies on childcare services are intended to promote women’s participation in the labor market, and reduce the labor participation gap between women and men (OECD, 2015). Public subsidized childcare intends to promote maternal employment, especially among disadvantaged mothers that without this subsidy wouldn’t be able to enter, reenter, or stay in the job market. Nonetheless, the literature demonstrates that the relationship between women’s labor participation and childcare subsidies is not straightforward; it depends on the attributes of the labor market, the characteristics of the target population, and the particularities of the childcare services (IDB, 2013). Childcare subsidies have also proven to produce a positive impact on the children’s development (Bonoli, 2013). However, this thesis only focuses on the effect childcare subsidies have in improving women’s employment.

Mothers who have access to safe and affordable childcare have greater possibilities of having a stable employment position, and are able to concentrate on their work, since they know that their children are being supervised while they are working (Boushey & Wright, 2004). It is also relevant to mention that childcare services have a greater impact on low skilled mothers. Anderson and Levine (1999) concluded that the least-skilled women in the United States used less costly paid care, and were more likely to use unpaid care. Nonetheless, low-skilled women paid more for childcare as a percentage of their income. The following experimental and non-experimental research designs present evidence on the relationship between childcare subsidies and maternal labor supply.

Baker, Gruber and Milligan (2008) analyzed the universal subsidized childcare program in Quebec, and focused on the impact of childcare use through employment. They found evidence of new childcare use, and maternal labor supply increased significantly. Berlinski and Galiani (2005) studied the impact of large-scale construction of pre-primary school facilities on maternal labor supply in Argentina. They concluded that pre-primary school construction expanded the school

enrollment of children between three and five years old; childcare subsidies did enhance maternal employment.

Mother's marital status, and the number of children they have, as well as their age, can also influence the positive relationship between childcare subsidies and maternal labor supply. Gelbach (2002) estimated the effect of public-school enrollment of five-year-olds on women's labor supply in the United States. She found significant evidence that public school enrollment had a positive effect on maternal labor supply among single women whose youngest child was five. However, among single mothers who had a five-year-old, but additional younger children, there was no significant impact on maternal labor supply of public-school enrollment for the five-year-olds.

Consistent with Gelbach' (2002) findings, Fitzpatrick (2012) estimated how public enrollment affects maternal labor supply in the United States. She found evidence that child enrollment in public kindergarten only increases the employment of single mothers without additional young children. Goux & Maurin (2010) studied the effect of the universal pre-elementary school for two- and three-years old children on maternal labor supply in France. They concluded that this pre-elementary school program had a significant and positive effect on maternal employment on single mothers, but no effect on two-parent families.

Lefebvre and Merrigan (2008), studied the 1997 new child-care policy in Quebec. They demonstrated that the policy had a large and statistically significant positive impact on the maternal labor supply of mothers with preschool children. In addition, Lefebvre, Merrigan & Verstraete (2009) continued studying the childcare policy that was established in 1997 in Quebec. During the following years, the government reduced the age requirement, created new childcare facilities and spaces, and paid for the additional costs entailed by this low-fee policy. They found evidence that the policy had long-term maternal labor supply effects on mothers who benefited from the program when their child was less than six years old. In addition, Bauernschuster & Schlotter (2015), studied public childcare impact on maternal employment in Germany, and also found positive effects.

Nonetheless, the impact of the progressive implementation of childcare policies on maternal labor supply is not conclusive. Lundin, Mörk & Öskert (2008) analyzed the effects of the Swedish childcare reform that set a cap on the tuition fee that municipalities were allowed to charge parents. They found that reducing nurseries' tuition fees did not seem to modify women's labour supply. Their results differ from the aforementioned studies (Baker, Gruber & Milligan, 2008, Berlinski & Galiani, 2004, Gelbach, 2002, Fitzpatrick, 2012, Goux & Maurin, 2010, Lefebvre & Merrigan, 2008, Lefebvre, Merrigan & Verstraete, 2009, Bauernschuster & Schlotter, 2015, & Calderón, 2014). However, this difference could be expected, since subsidized childcare did not exist in most

of these countries and the analyses were carried out after the reforms that established childcare were implemented. In contrast, highly subsidized childcare already existed in Sweden already, and this study only analyzed the cap on price

In line with Lundin, Mörk & Öskert's (2008) findings, Bettendorf, Egbert and Muller (2015) analyzed the effects of the public spending increment in childcare subsidies on labor supply in 2005 in the Netherlands. They concluded that the budget for public spending enlargement in childcare had a limited impact on employment. Furthermore, they also found that the reform slightly reduced hours worked by fathers. Table 1 summarizes the experimental and non-experimental research designs regarding the relationship between childcare subsidies and maternal labor supply.

**Table 1. Childcare subsidies and maternal labor supply
Experimental and non-experimental research designs**

Author(s)	Year	Analysis	Country/ City	Main findings
Boushey & Wright	2004	Evolution of childcare arrangements for working mothers based on the hours of work, household income, and childcare cost.	United States	Mothers who have access to safe and affordable childcare have greater possibilities of having a stable employment position. Compared to 1997, in 2001 more working mothers were using formal daycare.
Anderson and Levine	1999	Childcare options of working mothers based on their skill level, and the role that childcare costs have in determining their employment participation.	United States	The least-skilled women used less costly paid care, and were more likely to use unpaid care. Nonetheless, low-skilled women paid more for childcare as a percentage of their income; they pay 10.4 % of their income compared to 6.5 % that skilled women pay.
Baker, Gruber and Milligan	2008	Effects of the universal subsidized childcare program on employment.	Quebec	This rise in child care use was associated with an increase in the employment of women in two-parent families. It rose by 7.7 percentage points.
Berlinski and Galiani	2005	Impact of large-scale construction of pre-primary school facilities on maternal labor supply.	Argentina	Pre-primary school construction expanded the school enrollment of children between three and five years old. The available spaces per child rose by 0.09, and increases the average probability of pre-primary school attendance by 7.5. Childcare subsidies did enhance maternal employment; it increases the likelihood of maternal employment in 7 percentage points.
Gelbach	2002	Effect of public-school enrollment of five-year-olds on women's labor supply	United States	Public school enrollment increased maternal labor supply among single women whose youngest child was less than 5 years old by between 6% to 24%, while it reduced public assistance receipt by 10 %. However, among single mothers who had a five-year-old, but additional younger children, there was no significant impact on maternal labor supply. Among married mothers of five-year-olds, public school enrollment rose maternal labor supply by between 6% to 15%.
Fitzpatrick	2012	Impact of public kindergarten enrollment on maternal labor supply	United States	Child enrollment in public kindergarten increased the employment of single mothers without additional young children by between 15 to 20 percentage points.
Goux & Maurin	2010	Effect of the universal pre-elementary school for two- and three-years old children on maternal labor supply.	France	Pre-elementary school program had a significant and positive effect on maternal employment on single mothers (4% points increase), but no effect on two-parent families. In addition, there were greater labor market participation effects for less educated mothers only (5.1% points).

<i>Table 1. Childcare subsidies and maternal labor supply (continuation)</i>				
Author(s)	Year	Analysis	Country/ City	Main findings
Lefebvre and Merrigan	2008	Analysis of the 1997 new child-care policy	Quebec	They demonstrated that the policy had a large and statistically significant positive impact on the maternal labor supply of mothers with preschool children.
Lefebvre, Merrigan & Verstraete	2009	Analysis of the following years of the 1997 new child-care policy when the government reduced the age requirement, created new childcare facilities and spaces, and paid for the additional costs entailed by this low-fee policy.	Quebec	The child-care policy y, increased maternal labor supply approximately 6 % points. It also had long-term maternal labor supply effects on mothers who benefited from the program for low-education mothers but not on high-education ones.
Bauernschuster & Schlotter	2015	Public childcare impact on maternal employment	Germany	Eligibility for child care increases a mother's probability of being employed by 6.4 percentage points.
Lundin, Mörk & Öskert	2008	Impact of the childcare reform that set a cap on the tuition fee that municipalities were allowed to charge parents.	Sweden	The estimated effects of reducing nurseries' tuition fees on maternal labor supply were statistically insignificant. This difference could be expected, since subsidized childcare did not exist in most of these countries and the analyses were carried out after the reforms that established childcare were implemented. In contrast, highly subsidized childcare already existed in Sweden already, and this study only analyzed the cap on price.
Bettendorf, Egbert and Muller	2015	Effects of the public spending increment in childcare subsidies on labor supply in 2005.	Netherlands	They concluded that the budget for public spending enlargement in childcare had a limited impact on employment; it had a 0.19% percentage point increase in the employment rate of mothers with a youngest child 0–3 years of age in formal childcare. Furthermore, they also found that the reform slightly reduced hours worked by fathers.

Childcare in Mexico

The following studies are experimental and non-experimental research designs on the relationship between childcare subsidies and maternal labor supply in Mexico. Calderón (2014) studied the effects of the PEI in women's labor participation. She found that the program increased the

probability of women to participate in the labor market, raised their labor income, and they were able to obtain more stable jobs. She also identified that mothers that benefited from this program reduced the time they dedicated to childcare and housework activities. Nevertheless, this program disappeared in 2018. Cejudo, Michel, & Gerhard (2012) also evaluated the PEI and the effect it had on maternal labor supply. They concluded that about 80% of the beneficiaries who did not have a job before entering the program entered the labor market within two months of entering the PEI. As for the ones who already were employed, 90% of them kept their employment while they benefited from the program, and 95% of the beneficiaries reported using their available time, product of childcare services, to work, look for an employment, or study. Finally, Ángeles et. al. (2011) made an impact evaluation of the PEI and found favorable and statistically significant impacts on PEI beneficiaries in the labor participation variables. The PEI increased by 18% their probability of having a job, accompanied by an increase of 6 hours of work a week. Table 2 summarizes the impact evaluations of the PEI.

Table 2. Daycare Program to Support Working Mothers (PEI)

Author	Year	Analysis	Country/ City	Findings
Calderón	2014	Effects of the PEI in women's labor participation	Mexico	The PEI increased the probability of women to participate in the labor market by 12.93%, raised their labor income, and they were able to obtain more stable jobs. Also, mothers that benefited from this program reduced the time they dedicated to childcare and housework activities.
Cejudo, Michel, & Gerhard	2012	Evaluation of the PEI and the effect it had on maternal labor supply	Mexico	They concluded that about 80% of the beneficiaries who did not have a job before entering the program entered the labor market within two months of entering the PEI. As for the ones who already were employed, 90% of them kept their employment while they benefited from the program, and 95% of the beneficiaries reported using their available time, product of childcare services, to work, look for an employment, or study.
Ángeles et. al.	2011	Impact evaluation of the PEI	Mexico	The PEI increased by 18% their probability of having a job, accompanied by an increase of 6 hours of work a week.

Conditional and Unconditional Cash Transfer Programs and women's employment

Conditional cash transfer programs (CCT) are government grants for impoverished families that are conditional on their compliance with health, education, and nutrition services. During the 1990's, these programs became popular in several developing countries, as an instrument to alleviate poverty by providing an immediate additional income to impoverished populations, contingent on fulfilling specific behavioural conditions, for example, children's school attendance, or regular health care checkups. As for the cash, the beneficiaries can spend however they want or save this money (WHO, 2019). CCT also aim to empower women, and give them access to some social protection. However, these programs haven't necessarily promoted maternal labor supply nor gender equality. The following studies present evidence on the relationship between CCT or unconditional cash transfers and maternal labor supply.

Scarlato, D'Agostino and Capparucci (2016) studied the effects of the *Solidario* program in Chile on women's labor participation. This was a conditional cash transfer program that aimed to provide liquidity to impoverished families, including support for employment. The authors found that the program had a strong impact on labor market outcomes. Specifically, there was a positive effect on women's employment, but only after the beneficiaries complied with the program's conditions.

Progresa (1997) - *Oportunidades* (2001)- *Prospera* (2010) ¹ was the main anti-poverty social assistance program in Mexico. Its main objective was to end the intergenerational cycle of poverty by promoting human development through investment in education, health, and nutrition. This program gave cash transfers to mothers. The transfer was conditioned to their children's regular school attendance, and their periodic health check-ups. In general, the program did raise the number of years the children attended school (Parker, 2019). Notwithstanding, Gil-García (2016) studied the program's impact on gender equality and concluded that it reinforced gender stereotypes. The cash transfers were given to mothers because they are supposed to care more for children than fathers do. Consequently, this program reinforced the mother's role as primary caregivers.

Novella, Ripani, Alzuá, & Cruces, (2012) examined how conditional cash transfers programs changed household structures and affected the parental labor supply. They analyzed programs in Honduras (Family Allowance Program), Mexico (*Progresa*), and Nicaragua (Social Protection Network), and concluded that the conditional cash transfer programs slightly enhanced maternal labor supply, but the effect was contingent on the household structure, regarding the distribution

¹ *Progresa* program was established in 1997, and remained until 2018. However, in 2001 it was renamed *Oportunidades*, and in 2010 *Prospera*.

of power. Palacio (2019) studied how conditional cash transfers in Ecuador promoted women's labor participation. She concluded that gender roles hampered the program from promoting women's full-time secure employment, or gave them more social rights.

Universal child benefits provide cash transfers to all families with children and intend to contribute to the children's development, especially for those who live in poverty or extreme poverty. In contrast to conditional cash transfers, unconditional ones allow parents to spend the money on their family needs and without having to meet any requirement to maintain the benefit. However, there is less evidence of the impact of unconditional cash transfers in promoting women's labor participation or even gender equality. Bonilla et. al. (2017) evaluated the Government of Zambia's Child Grant Program, a poverty-targeted, unconditional transfer given to mothers or primary caregivers of young children aged zero to five. They concluded that mothers that benefited from the program raised their financial empowerment. Nonetheless, the intrahousehold relationships' modifications were limited by entrenched gender norms that established men as decision makers.

Levasseur, Paterson, & Carvalho (2018) analyzed Canada's Mincome experiment, an unconditional income program, and Brazil's Bolsa Familia program, the largest conditional cash transfer program in the world. They concluded that, in spite both programs produced different benefits, neither was able to tackle structural inequality. Moreover, both programs intensified the gendered division of labor within and beyond households. Table 3 summarizes the experimental and non-experimental research designs regarding the effect of conditional and unconditional cash transfer programs on women's employment.

<i>Table 3. Conditional vs. Unconditional Cash Transfer Programs (CCT) and women's employment</i>				
<i>Experimental and non-experimental research designs</i>				
Author	Year	Analysis	Country/ City	Findings
Scarlato, D'Agostino and Capparucci	2016	Effects of the <i>Solidario</i> program in Chile on women's labor participation	Brazil	Solidario program had a positive effect on women's employment, but only after the beneficiaries complied with the program's conditions. A 1% increase in the program participation produces a 0.05% (d-in-d) variation in the probability of being employed.
Gil-García	2016	<i>Progresa</i> (1997) - <i>Oportunidades</i> (2001)- <i>Prospera</i> (2010) impact on gender equality and concluded that it reinforced gender stereotypes	Mexico	The program reinforced the mother's role as primary caregivers.
Novella, Ripani, Alzuá, & Cruces	2012	Conditional cash transfers programs ' impact on household structures and parental labor supply	Honduras, Mexico & Nicaragua	PRAF & RPS slightly enhanced maternal labor supply, but the effect was contingent on the household structure, regarding the distribution of power. PROGRESA reduced maternal employment by about 3 percentage points.
Palacio	2019	Impact of <i>Bono de Desarrollo Humano</i> , a conditional cash transfer, on women's labor participation.	Ecuador	Gender roles hampered the program from promoting women's full-time secure employment and giving them access to social security.
Bonilla et. al.	2017	Impact evaluation of the Child Grant Program, a poverty-targeted, unconditional transfer given to mothers or primary caregivers of young children aged zero to five.	Zambia	Mothers that benefited from the program raised their financial empowerment by 6%. Nonetheless, the intrahousehold relationships' modifications were limited by entrenched gender norms that established men as decision makers.
Levasseur, Paterson, & Carvalho	2018	Analysis of Canada's Mincome experiment, an unconditional income program, and Brazil's Bolsa Familia program, a conditional cash transfer program.	Canada & Brasil	In spite of both programs produced different benefits, neither was able to tackle structural inequality. Moreover, both programs intensified the gendered division of labor within and beyond households.

Thesis contribution

Regarding the promotion of women's employment, the international trend is to establish subsidized childcare programs or expand the existing ones. Governments either establish, maintain or increase subsidies for childcare. However, it is not usual that childcare subsidies suffer retrenchment and even less usual that these subsidies disappear. In consequence, there is no literature that analyzes the effect on maternal labor supply of ending childcare subsidies.

In Mexico, there have been several studies that analyze the Daycare Program to Support Working Mothers (PEI, for its acronym in Spanish) (Cejudo, Michel, & Gerhard, 2012, Calderón, 2014, Ángeles, et. al, 2011). Nonetheless, until now there is no literature that evaluates the effect on maternal labor supply of ending the PEI (2017-2019), a childcare subsidy program, and substituting it with the CWSP, an unconditional cash transfer program. Furthermore, there is no literature yet that studies the characteristics of the municipalities where the beneficiaries of the Child Welfare Support Program of Working Mothers are.

Thereupon, this thesis aims to analyze the effect on maternal labor supply of ending childcare subsidies in Mexico. It is the first study to examine the impact that withdrawing childcare subsidies has on women's labor participation. Additionally, these studies the sociodemographic characteristics that influence the municipal probability of participating in the PEI or in the CWSP. This is relevant to understand if the PEI and the CWSP are driven by the operation rules, and therefore reach the objective population or not. At last, this thesis analyzes if the share of beneficiaries among the municipalities that participated in the PEI/CWSP affects the share of women that participate in the labor force. Finally, this thesis is innovative because, until now there are no studies on the CWSP, and this study presents a first approach to the analysis of the CWSP.

Childcare and women's employment in Mexico

In Mexico, even though women's participation in the labor market has been increasing in the last decade, the gender gap is far from closed. Based on the National Occupation and Employment Survey (ENOE, for its acronym in Spanish) for the October-December 2019 quarter, the economic participation of women was well below that of men; 44.7% of women over the age of fifteen belong to the economically active population, in contrast to 75.6% of men (OECD, Q1. 2021).

Women in Mexico are predominantly responsible for caring for children, elderly and sick people, as well as doing the housework. Based on the 2015 intercensal survey of the National Institute of Statistics and Geography (INEGI), on average, women in Mexico spend 48.55 hours a week doing

unpaid housework, while men only spend 19.57 hours (INMujeres, UN, CEPAL, INEGI, n.d). In a context where mothers are perceived as the main responsible for their daughters and sons' wellbeing, childcare services have a central role in promoting women's labor participation.

Child care services in México

In Mexico, public childcare supply services are divided into contributory and non-contributory services, depending on the source of funding. Under the contributory scheme, they are funded through social security. Social security is financed with contributions between workers, employers, and the government. Therefore, only citizens that are employed in the formal sector of the economy benefit from social security. In contrast, non-contributory benefits are financed by the government through public resources unrelated to labor taxes paid by the people who benefit from those services (CONEVAL, 2017-2018). In consequence, citizens that do not benefit from social security only have access to non-contributory services.

Until 2019, childcare non-contributory services were provided by the Ministry of Public Education (SEP, for its acronym in Spanish), the National System for the Integral Development of the Family (DIF, for its acronym in Spanish), and the Ministry of Welfare. The Ministry of Public Education supplies childcare services through the Community Child Assistance Centers, Community Preschool Courses, and Indigenous Preschool. In addition, the National System for the Integral Development of the Family offers Child Development Assistance Centers. Lastly, the Ministry of Welfare supplied Childcare Centers to Support Working Mothers (CONEVAL, 2017-2018).

Table 4. Non-contribution child care services

Institution	Program	Schedule	Target population	Number of children assisted	Number of day care centers
Ministry of Public Education	Community Child Assistance Centers	part-time	Children from 2 to 4 years old	70,998	1,715
	Community Preschool Courses	part-time	Children from 3 to 5 years and 11 months old	164,743	18,237
	Indigenous Preschool	full-time	Children from 4 to 6 years old	432,344	9,838
National System for the Integral Development of the Family	Child Development Assistance Centers	full-time	Children from 45 days old to 5 years and 11 months old	35,462	486
Ministry of Welfare	Child Care Centers to Support Working Mothers	full-time	Children from one to 3 years and 11 months old or until 5 years and 11 months old for disabled children	317,723	9157

Produced by Coneval (2019) with 2017 data.

As Table 1 presents, the supply of full-time non-contributory daycare options for toddlers between one and four years old relied on the Childcare Program to Support Working Mothers.

Childcare Program to Support Working Mothers (PEI, 2007-2019)

Due to the lack of public childcare services, in addition to the inability of mothers to pay for these private services, in 2007 the Federal Government established the Childcare Program to Support Working Mothers (Bienestar, 2015). This program worked based on two schemes. The first one was designed to attend to the demand of childcare services to support mothers with young children from zero to three years and eleven months (DOF, 13-12-2015). The second scheme aimed to increase the supply of childcare services by giving subsidies to women that could establish and administer nurseries.

The main objective of the first scheme was to promote the integration and permanence of women in the labor market that didn't have access to any childcare services due to lack of benefit from

social security and whose income was below the poverty line². For these mothers, nonparticipation in the labor market broadened their likelihood to remain in poverty (Section 3.2, PEI Operating Rules, 2015). Additionally, it also intended to support working mothers without social security, and mothers who were unemployed, searching for a job³ or studying (DOF, 13-12-2015). To determine if they met these requirements, the interested mothers had to complete a Single Socio-Economic Information Questionnaire. Furthermore, women who belong to the Prospera⁴ and the National Crusade Against Hunger (CNCH, for its acronym in Spanish)⁵ programs had priority when registering their children for the PEI (Bienestar, 2015).

How did the PEI work?

The PEI program was supposed to work based on market principles: the supply and demand of childcare services would determine where and how many nurseries were established. The fact that there were two modalities of this program implies that the people who wanted to participate on the PEI may have two different profiles. Therefore, the target population of this program was divided into two main groups. First, women who had small children and wanted to enter or remain in the labor market, or continue their studies to avoid remaining in a state of poverty. These women were interested in counting on a safe and affordable place that could take care of their children while they worked. Second, there were women who wanted to provide childcare services themselves.

Regarding the promotion of nursery services, the program subsidized the establishment of childcare facilities (Section 3.2 PEI Operating Rules, 2015). The one-time subsidy to establish a nursery was up to \$ 70,000 MXN. However, this thesis only focuses on the target population of women who had children between zero and three years and eleven months old, who attempted to enter or remain in the labor market.

As for the toddler's mothers, they received a subsidy in those nurseries; part of the daycare fee was covered by the Federal Government, and the remaining amount was paid by them. For boys

² The Poverty Lines for Income is updated monthly based on the National Consumer Price Index. In January 2020, the urban Income Poverty Line was considered under a monthly earning of \$3,538.97 MXN, equivalent to €147.72. On that same date, the rural Income Poverty Line was considered under a monthly earning of \$2,485.63 MXN, equivalent to €103.75.

³ In Mexico there is no unemployment insurance.

⁴ Prospera was a Mexican nationwide conditional cash transfer program that aimed to support the population in extreme poverty. The cash transfer was conditioned by sending their children to school and taking them to their medical appointments.

⁵ The National Crusade Against Hunger was a social welfare program established by the Mexican federal government that sought to massively reduce poverty, malnutrition and social marginalization in Mexico.

and girls from 1 to 3 years with 11 months old, the total subsidy amount was up to \$ 900.00 MXN.⁶ The subsidy covered on average 90% of the daycare cost. Hence, mothers had to pay on average \$100.00 MXN monthly for the subsidized daycare services. The subsidy was transferred directly to the nurseries, and not to the beneficiaries (Secretaría del Bienestar, 2015). In addition, daycares had to offer at least an eight hours service, that is equivalent to a workday. Finally, the program was restricted to 3 infants per household enrolled during the same time (with the exception of cases of multiple births). As will be argued in the empirical analysis, this thesis only focuses on the target population of women who had children between zero and three years and eleven months old, who attempted to enter or remain in the labor market. The reason not to include women who offered childcare services through the PEI nurseries is that this study focuses on the effect of childcare subsidies in employment.

PEI's Coverage

In 2018, the PEI had childcare facilities nationwide. It operated in the 32 states, and in 1,278 municipalities from a total of 2,457. In total, the PEI had benefited 1,825,394 beneficiaries since 2007, when the program was established. In 2018, there were 300,433 beneficiaries and 9,399 daycare centers (CONEVAL, 2017- 2018). Based on the Impact Evaluation carried out by Ángeles, G., et. al., the PEI increases by 18% the probability of mother's employment (Ángeles, G., et. al., 2011). Furthermore, only 0.05% of the women that participated on the PEI had used childcare services before. Almost none of the mother's that participated in the PEI used nurseries before. This implies that the nurseries that participated in the program represented an important opportunity for childcare that would not exist otherwise. In addition, 92.9% of the mothers that participated in the program considered that participating on the PEI improved their quality of life, and that of their children, since it offered them the possibility of being employed and receiving an income or continuing with their studies (Ángeles, G., et. al., 2011).

Until 2017, the PEI had national coverage. It was present in 1,278 municipalities, out of 2,547 in total. This means that the PEI was present in 50.17% of the municipalities in Mexico. In 2017, through 9,399 nurseries, it provided childcare services to 300,433 single mothers and 10,535 single fathers. In total, the nurseries took care of 327,854 boys and girls. Finally, since its creation in 2007, the PEI has benefited 1,825,394 single mothers and fathers and has cared for 2,174,415 girls and boys (CONEVAL, 2017-2018).

⁶ For boys and girls from 1 to 5 years old with 11 months of age who have a disability, the subsidy is up to 1,800.00 MXN. * \$900.00 MXN is equivalent to €37.5, \$100.00 MXN to €4.17, and \$1800.00 MXN to €75.

Child Welfare Support Program for Working Mothers (CWSP)

In February 2019, two months after President Andrés Manuel López Obrador took office, the PEI was suspended allegedly because there was corruption. In March of that same year, the PEI was replaced by the CWSP. The corruption accusation was based on the 2016 spending review where the Federal Superior Audit detected irregularities in this federal social program, such as deposits that did not reach their destination, and lack of permits to operate (Congreso de la Unión, 20.02.2019). In spite of the irregularities only representing 1.8% of its total budget, President López Obrador's Administration accused the former government of using the program to profit from childhood and vulnerable mothers.

In response, the Federal Government decided to close the nurseries that belonged to this program, and substitute the PEI with the Children Welfare Support Program for Working Mothers. The objective of this program is to ensure that mothers, single parents or guardians who work, seek employment, or study have resources to pay for childcare of their toddlers. In principle, the program aims to continue promoting women's access and permanence in the labor market, so it contributes to improving labor equality between women and men. Nonetheless, it works differently. Instead of subsidizing childcare, it gives unconditional direct cash transfers to working mothers.

Mothers with toddlers receive a direct cash transfer of \$1,600.00 MXN bimonthly for each child from 1 to 3 years old with 11 months of age⁷. This amount is equivalent to €66.85. The program is also restricted to 3 infants per household enrolled during the same period of time (with the exception of cases of multiple births) (DOF, 31-12-2020). In contrast to the Childcare Program to Support Working Mothers, the new program is also meant to be for mothers that don't have access to social security, but is not limited to those that are below the poverty line.

In addition, the budget allocated to this program was reduced by 51.5% from 2018 to 2019. In 2018, the program received \$3,143,000,000.00 MXN, while in 2019 it only received \$1,556,000,000.00 MXN (Inventario CONEVAL de Programas y Acciones Federales de Desarrollo Social, 2007-2019). As for the program's coverage, in December of 2019, the Child Welfare Support Program for Working Mothers was present in 1,411 municipalities in the country. The Child Welfare Support Program for Working Mothers had 140,196 beneficiaries.

⁷ For boys and girls from 1 to 5 years old with 11 months of age who have a disability, the subsidy is \$3,600.00 MXN per bimester.

PEI & CWSP coverage comparison

As Table 2 shows, the PEI was present in 1,411 municipalities in the country. Its coverage was greater than the CWSP, which had beneficiaries in 1,253 municipalities. Even though the territorial coverage of the CWSP being greater, the intensity of the coverage was larger in the PEI than in the Child Welfare Support Program of Working Mothers; while the CWSP had 140,196 beneficiaries, the PEI had 292,285. The reduction in the number of beneficiaries is consistent with the 51.5% cutback of the budget (Bienestar, n.d.).

Participates in the PEI	Participates in the CWSP		Total
	NO	YES	
NO	1,010	206	1,216
	83.06%	16.94%	100%
	95.46%	14.60%	49.25%
YES	48	1,205	1,253
	3.83%	96.17%	100%
	4.54%	85.40%	50.75%
Total	1,058	1,411	2,469
	42.85%	57.15%	100%
	100%	100%	100%

It is also important to mention that 96.17% of the municipalities that participated in the PEI also benefit from the CWSP. Yet, 3.83% of the municipalities that participated in the PEI don't belong to the new program. In addition, the CWSP operates in 206 municipalities (16.94%) where the PEI wasn't established.

Hypotheses

The PEI provided subsidized child care services to mothers with young children whose income was below the poverty line, had no social security, and in consequence were not able to pay for these private services. Its main objective was to promote maternal labor supply among economically disadvantaged mothers. As mentioned previously, the subsidy covered on average 90% of the daycare cost. So, mothers had to pay on average \$100.00 MXN monthly for the subsidized daycare services. Plus, the subsidy was transferred directly to the nurseries, and not to the beneficiaries.

In contrast, the incentives of the CWSP encourages women's labor participation less than the PEI because the cash they received is insufficient to pay for private childcare. First, found on the Survey on Private Nursery Services (PROFECO, 2107), on average, the private daycare service costs between \$1,500 and \$2,500 MXN monthly. Therefore, the \$1,600.00 MXN bimonthly cash transfer is insufficient for covering the daycare's monthly fee. Second, the CWSP promotes women participation less than the PEI because the cash is unconditionally given directly to mothers, so they can spend it as they wish.

Based on Calderón (2014), most of the mothers that participated in the PEI didn't use formal childcare services before the program was implemented. Thus, it is very likely that, given that the direct cash transfer is insufficient to pay for private childcare services, mothers with young children are less likely to use the money they receive from this program to pay for childcare. In consequence, the promotion of maternal labor supply that the PEI had could be expected to decrease. Even though the CWSP does not cover the complete childcare cost, if working is rewarded to some extent, encouragement of maternal labor supply could continue. As aforementioned, there is no literature that analyzes the effect on maternal labor supply of ending this program.

Did the transition from the PEI to the CWSP affect women's employment rate? As the incentives of each program are different, what characteristics explain the participation rate in the PEI/ CWSP? This thesis intends to answer both questions. The empirical analysis is divided in two stages. First, it analyzes if the substitution of the PEI with the CWSP affected women's labor participation. Then, it studies the program's focalization.

Substituting the PEI with the CWSP led to the closure of nurseries. Based on the literature, if the childcare subsidies promote maternal labor supply, closing abruptly the nurseries that belonged to the PEI should negatively impact women's labor participation rate, as impoverished mothers with

young children no longer had a place where their toddlers could be taken care of while they were at work.

H1. The closure of the nurseries that belonged to the PEI, and the transition to the CWSP, negatively affected the participation of women in the labor market.

In the second part of the analysis, the hypotheses intend to evaluate the sociodemographic characteristics of the municipalities that participate in the PEI/CWSP and compare them to those that didn't participate in either program. The central purpose of this analysis is to assess the programs' focalization. If the programs' follow the operation rules, the municipal probability of participating in the PEI/CWSP should increase where women's labor participation is higher, there are more children between 0 and 4 years old, and where there is more marginalization. Hypotheses H₂ test the socio-demographic determinants of the probability of participating in the PEI or CWSP.

H_{2a}= Where more women participate in the labor force, the municipalities are more likely to participate in the PEI and in the CWSP.

H_{2b}= The higher the average number of children, the municipalities are more likely to participate in the PEI and in the CWSP.

H_{2c}= The greater their degree of marginalization, the municipalities are more likely to participate in the PEI and in the CWSP.

Finally, the third part of the analysis seeks to examine if there is any relation between the women's labor rate and the beneficiaries' rate among the municipalities that did participate in the PEI/CWSP. If the PEI aspired to promote the integration and permanence of impoverished mothers in the labor market, by giving them access to childcare services or cash transfers for paying for this service, there should be a positive relationship between the women's employment rate and the program's beneficiaries' rate. Hypotheses H₃ evaluate the municipal participation rate in the PEI or CWSP in relation with women's labor rate.

H_{3a}= The largest share of women that participate in the labor force is in the municipalities where there is a greater share of beneficiaries.

H_{3b}= The largest share of women that participate in the labor force is in the municipalities where the average number of children between 0 and 4 years old is lower.

H_{3c}= The largest share of women that participate in the labor force is in the municipalities where there is more poverty.

Empirical strategy and data

Empirical strategy

To test the above-mentioned hypotheses, an empirical analysis is conducted. Hypotheses H_1 , H_2 and H_3 are tested by doing a Fuzzy Regression Discontinuity, Logistic Regression, and Heckman Correction Model, respectively. The use of these methods is linked to the structure of the data at hand.

Fuzzy Regression Discontinuity Model

To analyze if the closure of these nurseries affected women's participation in the labor market in their municipalities (H_1), a Regression Discontinuity model (RD) is used. Regression Discontinuity Designs estimate the treatment effect in observational data where the treatment is determined by whether an observed "running variable" transcends a given cutoff point (Lee & Lemieux, 2010). A critical characteristic of RD is that individuals are not able to influence the assignment variable. In consequence, the variation in the running variable near the cutoff point is randomized. So, RD designs can be analyzed and tested as if they were randomized experiments (Lee & Lemieux, 2010).

On February 7th 2019, President Andrés Manuel López Obrador announced that PEI would be suspended, and in March it was replaced by the CWSP. The analytical strategy relies on the fact that the decision to end the PEI, in spite of its substitution with the CWSP, led to the abrupt closure of nurseries. Mothers did not anticipate the program's change; they didn't resume work because they didn't know the PEI would end. This decision establishes a cutoff in the childcare service for impoverished mothers that don't have access to social security; mothers that benefited from the childcare subsidy were left without affordable childcare. Hence, they weren't able to manipulate the access to those nurseries and childcare subsidies, but if they were already working, they could have found an alternative childcare scheme. Consequently, the women's employment rate could have decreased as a consequence of the PEI's daycares sudden closure. Furthermore, if the substitution with the new Child Welfare Support Program for Working Mothers was successful, it is expected to observe no statistically change in the women's employment rate. In consequence, the empirical strategy consists of analyzing women's employment rate over time and searching for differences in its trend around March 2019, when the nurseries that belonged to the PEI disappeared. Specifically, as there might be only a change in the probability of treatment at the cutoff, instead of a deterministic assignment rule, a Fuzzy RD is used.

If closing the PEI's nurseries (treatment) had an effect on employment, maternal labor supply should change. Since closing these nurseries could not affect all mothers, the jump at the cutoff in

women's labor participation has to be rescaled by the jump at the cutoff in the probability of treatment, as if it were a standard instrumental variable.

The Fuzzy- RD model results from the following equations:

Reduced 2SLS

$$i) \quad \text{Women 's labor rate}_{0j} = \alpha_0 + \beta_0 (\text{Time})_j + \rho I(\text{Time}_i > T^*)_j + b_0 (\text{Beneficiaries' Rate})_j + c_0 X_j + e_{0j}$$

The dependent variable of the regression discontinuity model is women's labor rate; α_0 corresponds to the intercept, β_0 is the coefficient of the time variable that indicates the continuous time effect, ρ is interpreted as the Intention-to-treat (ITT) effect of the cutoff; it is the change in the probability of having an alternative childcare scheme (π_1), divided by the change in the expected probability of treatment of finding an alternative childcare scheme (π_2).

$$\rho = \pi_2 / \pi_1$$

$b_0 X_j$ are the parameters of the control variables for the running (time) variable, the average number of children per mother, Marginalization Index, women's average years of schooling, children's rate between 0 and 4 years old, and population logarithm, respectively. At last, e_{0j} is the residual.

The first stage equation that goes with the reduced 2SLS is

$$\bar{X}_{(j)} = \text{Beneficiaries' Rate}_j = \alpha_1 + \beta_1 (\text{Time})_j + \phi I(\text{Time}_i > T^*)_j + c_1 X_j + e_{1j}$$

where the ϕ parameter captures the jump in the average beneficiaries' rate induced by the policy changes.

The second stage equation captures the effect of the beneficiaries' rate on women's employment at the cutoff. This equation is written:

$$\text{Women 's labor rate}_{2j} = \alpha_2 + \beta_2 (\text{Time})_j + \lambda \hat{X}_{(j)} + c_2 X_j + e_{2j}$$

where λ is the causal effect of the PEI/CWSP beneficiaries' rate, and the variable $\hat{X}_{(j)}$ is the first-stage fitted values of the beneficiaries' rate produced by estimating the first stage equation.

Logistic regression models

Hypotheses H_{2a}, H_{2b}, and H_{2c}, that intend to explain the programs' focalization, are evaluated using logistic regression models. The logit regression model estimates the probability of treatment, which reads as the probability of program participation of a municipality. Each observation is assigned a probability between zero and one. Consequently, logit regression models categorical binary dependent variables (Dougherty, 1992). Hence, the logistic regression model is used to evaluate the probability of a municipality to participate in the PEI/CWSP, given its sociodemographic characteristics.

The logistic regression models result from the following equations:

$$\begin{aligned} \text{ii) } E(\text{Municipality participation PEI}_i) &= P = \frac{\exp(\beta_0 + \beta_1 X_i)}{1 + \exp(\beta_0 + \beta_1 X_i)} \\ \text{iii) } E(\text{Municipality participation CWSP}_i) &= P = \frac{\exp(\beta_0 + \beta_1 X_i)}{1 + \exp(\beta_0 + \beta_1 X_i)} \end{aligned}$$

As above-mentioned, the dependent variable of the logistic regression models is a dummy variable that takes the value of 1 if the municipality participates in the program, and 0 otherwise. The logit model estimates the odds ratio of participating in the PEI and the CWSP for each municipality. β_0 corresponds to the intercept, while β_1 are the parameters of the independent variables that adjust for the rate of labor force participation (LFP) of women (lagged), average number of children per mother, children's rate between 0 and 4 years old, marginalization index, women's average years of schooling, infant mortality rate, and population.

Heckman Correction Model

The analysis performed to test hypotheses H_{3a}, H_{3b}, & H_{3c}, that aim to study the programs' impact on women's employment rate, is conducted by using two Heckman Correction Models. When the sample is not random or has a truncated dependent variable, the statistical analysis can lead to misleading results. The bias inherent with this follows from using the least squares model when there is sample selection bias or truncated dependent variables due to a specification mistake or an

omitted variable problem. In general, the direction of the bias is not known (Heckman, 1976). In the context of the current analysis, a similar bias may occur if municipalities with characteristics leading to lower or higher women employment rates are more likely to step into the program.

The Heckman Correction Model constitutes a two-step statistical approach that corrects for bias that comes from sample selection bias or truncated dependent variables. In the first step, the model calculates the probability of participating in the treatment of the subpopulation. In the current context, this first step entails a maximum likelihood estimation (MLE) probit regression model where the dependent variable is a dummy variable that takes the value of one if the observation participates in the program or 0 if it doesn't. The probit model assumes that the error term follows a standard normal distribution. In the second stage, the model corrects for self-selection by incorporating these predicted individual probabilities as an additional explanatory variable. In other words, the second stage estimates the (log of) women's labor participation rate, while controlling for the program selection process (Heckman, 1976). The estimated parameters from the first stage are used to calculate the inverse Mills ratio, that is included as an additional explanatory variable in the second stage.

In this context, the Heckman Correction Model first estimates a model that calculates the probability that a municipality had to participate in the PEI or in the CWSP. In order to do so, in the probit regression model, the dependent variable is a dummy variable that takes the value of one if the municipality participated in the PEI/CWSP or zero if it didn't. Then, to evaluate if women's labor participation rate responds to the beneficiaries' rate ($H_{3,a}$), in the second stage, the model includes the inverse Mills ratio as an additional explanatory variable, that results from the estimated parameters from the first stage. The Mills ratio then should control for selection biases in program participation.

The Heckman Correction Model consists of the following equations:

$$iv) Pr (Participate_{PEI} = 1 | X) = \Phi (X_i^T \beta_i)$$

$$v) Women's Labor Rate_{PEI} = \alpha + b_1 (X_i^T \beta_i) + Mills (X_i^T \beta_i) + e_i$$

$$vi) Pr (Participate_{CWSP} = 1 | X) = \Phi (X^T_i \beta_i)$$

$$vii) Women 's Labor Rate_{CWSP} = \alpha + b_1 (X^T_i \beta_i) + Mills (X^T \beta)_i + e_i$$

where $X^T b$ corresponds to the control variables that adjust beneficiaries' rate average number of children's rate between 0 and 4 years, MI, women's average schooling years, child rate between 0 and 4 years old, and population logarithm.

The dependent variable in the first stage of the Heckman model is a binary variable that measures if the municipality participates in the PEI/CWSP or not. Pr denotes the municipal probability of participating in each program, and Φ represents the cumulative distribution function of the standard normal distribution. Then, in the second stage of the Heckman model, the dependent variable is the women's labor rate, and the independent variable is the beneficiaries' rate, which measures the intensity of engagement in the program by municipality. Both of them are continuous variables. a corresponds to the intercept. Additionally, the second stage includes the inverse Mills ratio. At last, e is the residual.

Moreover, an important remark is that the first stage of the Heckman model includes an additional variable, the infant mortality rate, that is omitted in the second stage. The reason to include this variable only in the first stage is that the infant mortality rate is a proxy for poverty. This proxy matters because one of the requirements to open a nursery of the PEI was that mothers had an income that was below the poverty line. However, it wasn't included in the second stage because it was not statistically significant in the first stage.

Data

The statistical analysis is carried out at the state and municipal level. In total, Mexico is divided into 2,456 municipalities that belong to 32 states. This section is divided into two parts. First, it describes the data. Specifically, it specifies the information sources, explains the variables that are used, and presents descriptive statistics. Then, the second part of the section explains the statistical analyses that are used to evaluate the hypotheses.

H_1 , that tests if the nurseries' closure, and the transition to the CWSP, negatively affected the participation of women in the labor market, will be tested at the state level. The Fuzzy RD is conducted through an instrumental variable (IV) regression analysis where the dependent variable of the first stage is the number of beneficiaries of the PEI & CWSP, while the dependent variable

for the 2nd stage is the number of women that belong to the labor force participation. Both are continuous variables. The programs' beneficiaries' data comes from the list of beneficiaries that is available on the website of the Ministry of Welfare. This information is accessible per trimester, and covers from the fourth quarter of 2017 to the first one of 2020, except for the first trimester of 2019 when there is no data because it was the transition between programs. As for the women's labor force participation, it comes from the National Occupation and Employment Survey (ENOE, for its acronym in Spanish), that measures employment at the state level per trimester, and is available on the website of the National Institute of Statistic and Geography (INEGI, for its acronym in Spanish). This variable covers ten trimesters that go from the fourth quarter of 2017 to the first one of 2020.

The additional control variables that are used to estimate whether the distribution of the PEI and CWSP responded to the socioeconomic needs, and therefore followed the operation rules, are the Marginalization Index (MI), infant mortality rate, women's average years of schooling, average number of children per mother, children's rate between 0 and 4 years old, and population. MI⁸, as well as the infant mortality rate, are accessible in the website of the National Population Council (CONAPO, for its acronym in Spanish). The data for the rest of the variables comes from the 2020 Census and is attainable at the INEGI's website.

The MI and the infant mortality rate are two variables used as a proxy to measure poverty. Women's average years of schooling is important because years of schooling is a proxy to measure the levels of social development and income. The average number of children per mother is included because as the number of children increases, the probability that mothers are employed outside home decreases. Then, the children's rate⁹ between 0 and 4 years old is taken into consideration because as this rate increases, the demand for nurseries could increase as well. At last, the population variable controls for the size of the state. The statistical summary of variables for the analyses at the state level is in tables 6 and 7.

Hypotheses H₂- that evaluates the programs' focalization- and H₃, that seek to analyze the programs' impact on women's employment rate, will be tested at the municipal level. The Logistic and Heckman Correction Models are cross sectional models that study the PEI 2017¹⁰, and CWSP

⁸ Mexico's National Population Council defines marginalization as a "structural process in relation to the socioeconomic development achieved by our country", that averts the progress of social groups, that influences development structures and generates territorial inequalities. The marginalization index considers education, housing, population distribution and monetary income (CONAPO, n.d.).

⁹ Children's Rate (0-4 years) = total number of children (0-4 years)/ total population

¹⁰ The PEI's cross section analysis includes information of 2017 because it was the last year the program published the beneficiaries' list. Even though the program concluded in 2018, the information of 2017 is assumed to be as good

of 2019. H_2 is evaluated through Logistic Regression models. The dependent variable for these models is a binary variable that identifies whether or not the municipality participates in the PEI or in the CWSP. The independent variable is the lagged women's labor participation rate because the central objective of the PEI was to promote women's labor participation among mothers who weren't working, and to enhance the labor participation of the ones that were already in the labor market. The reason to use lagged women's labor participation rate¹¹ is to avoid endogeneity. This data is from the year 2000, it is available in the INEGI's website, and comes from the 2000 Population Census, which is the last measurement of women's labor force participation by municipality before the PEI was established. This is also a continuous variable. The variable of women's labor participation rate (without lag) is from the year 2020 and comes from the 2020 Population Census.

The other control variables that are used to estimate whether the distribution of the PEI and CWSP responded to the socioeconomic needs, and hence followed the operation rules, are the MI, infant mortality rate, women's average years of schooling, the average number of children per mother, children's rate between 0 and 4 years old, and population logarithm. The statistical summary of variables for the analyses at the municipal level is in tables 6, 7, 8.1, 8.2 and 8.3.

Finally, H_3 is tested through a Heckman Correction Model. The dependent variable for the first stage is the dummy that identifies whether or not the municipality participates in the PEI or in the CWSP, and the dependent variable for the second stage is the women's labor participation rate. The independent variable for the first stage is women's employment rate, and for the second stage is the beneficiaries' rate¹² of the PEI & CWSP. Both of them are continuous variables. This data is also accessible at the website of the Ministry of Welfare. The average number of children per mother, MI, women's average years of schooling years, children's rate between 0 and 4 years old, population logarithm, and infant mortality rate are included as control variables in the first and second stage, except for infant mortality rate that is only included in the first stage.

as the data of 2018 because the PEI's trend (and budget) remained the same since 2012, when former president Enrique Peña took office.

¹¹ Women's Labor Rate = Women's Participation in the Labor Force / Total Population

¹² Beneficiaries' Rate = PEI/CWSP Beneficiaries / Women's Participation in the Labor Force

Descriptive Statistics

This section presents the descriptive statistics of the variables that are used in the Fuzzy RD, Logistics, and Heckman Correction models. Table 6 includes the variables for the Fuzzy RD analysis at the state level. Table 6.1 describes the time running variable for this model.

Table 6. State Statistical Summary of the Variables (Rates)

Variable	Mean	SD	Minimum	Maximum
PEI Beneficiaries' Rate - 2017 Q.IV	0.036	0.016	0.005	0.065
PEI Beneficiaries' Rate - 2018 Q.I	0.036	0.016	0.006	0.066
PEI Beneficiaries' Rate - 2018 Q.II t	0.036	0.017	0.005	0.065
PEI Beneficiaries' Rate - 2018 Q.III	0.038	0.023	0.004	0.126
PEI Beneficiaries' Rate - 2018 Q.IV	0.035	0.016	0.004	0.065
CWSP Beneficiaries' Rate - 2019 Q.II	0.011	0.006	0.001	0.023
CWSP Beneficiaries' Rate - 2019 Q.III	0.010	0.005	0.001	0.021
CWSP Beneficiaries' Rate - 2019 Q.IV	0.010	0.005	0.001	0.020
CWSP Beneficiaries' Rate - 2020 Q.I	0.007	0.004	0.001	0.014
Municipal Participation Rate in the PEI	0.694	0.236	0.142	1.000
Municipal Participation Rate in the CWSP	0.736	0.203	0.198	1.000
Women's Labor Rate - 2017 Q.IV	0.424	0.055	0.258	0.529
Women's Labor Rate- 2018 Q.I	0.421	0.054	0.284	0.525
Women's Labor Rate - 2018 Q.II	0.432	0.058	0.252	0.540
Women's Labor Rate - 2018 Q.III	0.422	0.060	0.267	0.521
Women's Labor Rate - 2018 Q.IV	0.434	0.057	0.258	0.534
Women's Labor Rate - 2019 Q.I	0.431	0.054	0.272	0.538
Women's Labor Rate - 2019 Q.II	0.441	0.047	0.319	0.534
Women's Labor Rate - 2019 Q.III	0.441	0.049	0.317	0.556
Women's Labor Rate - 2019 Q.IV	0.446	0.048	0.325	0.547
Women's Labor Rate - 2020 Q.I	0.441	0.043	0.321	0.538
Women's Average Years of Schooling	9.671	0.819	7.500	11.320
Average Number of Children per Mother	2.119	0.200	1.650	2.540
Marginalization Index	0.000	1.000	-1.451	2.557
Population Logarithm	14.860	0.748	13.475	16.600
Children's Rate (0-4 years)	0.086	0.010	0.054	0.110
Number of observations	320			

Number of states	32
Trimesters	10

Table 7 Time Variables - Fuzzy RD

Year	Trimester	Time running variable	Dummy discontinuity
2017	IV	-5	0
2018	I	-4	0
2018	II	-3	0
2018	III	-2	0
2018	IV	-1	0
2019	I	0	1
2019	II	1	1
2019	III	2	1
2019	IV	3	1
2020	I	4	1

Figure 1 presents the evolution of the beneficiaries' rate of the PEI and CWSP by trimester since the last quarter of 2017, until the first quarter of 2020, except for the first quarter of 2019 when the transition between the PEI and CWSP was made. It exhibits a drop in the beneficiaries' rate by almost a half when the CWSP began to operate.

Figure 2 also shows the beneficiaries' rate of both programs by trimester since the last quarter of 2017, until the first quarter of 2020 by state. In this figure it is possible to identify the heterogeneity of participation rate between states. In spite of the beneficiaries' rate decreasing in every state, the proportion of the rate reduction was steeper in the states that had a greater participation rate, for example Aguascalientes, Chiapas, Tlaxcala, and Zacatecas.

Figure 1. Beneficiaries of the PEI and CWSP by State and Trimester in Mexico

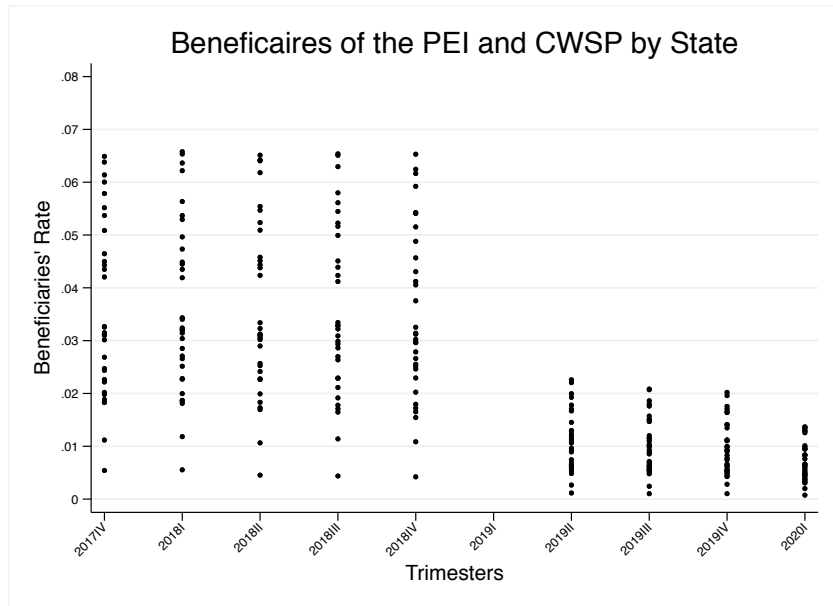


Figure 2. Beneficiaries of the PEI and CWSP by State in Mexico (Q.IV 2017- Q.I 2020)

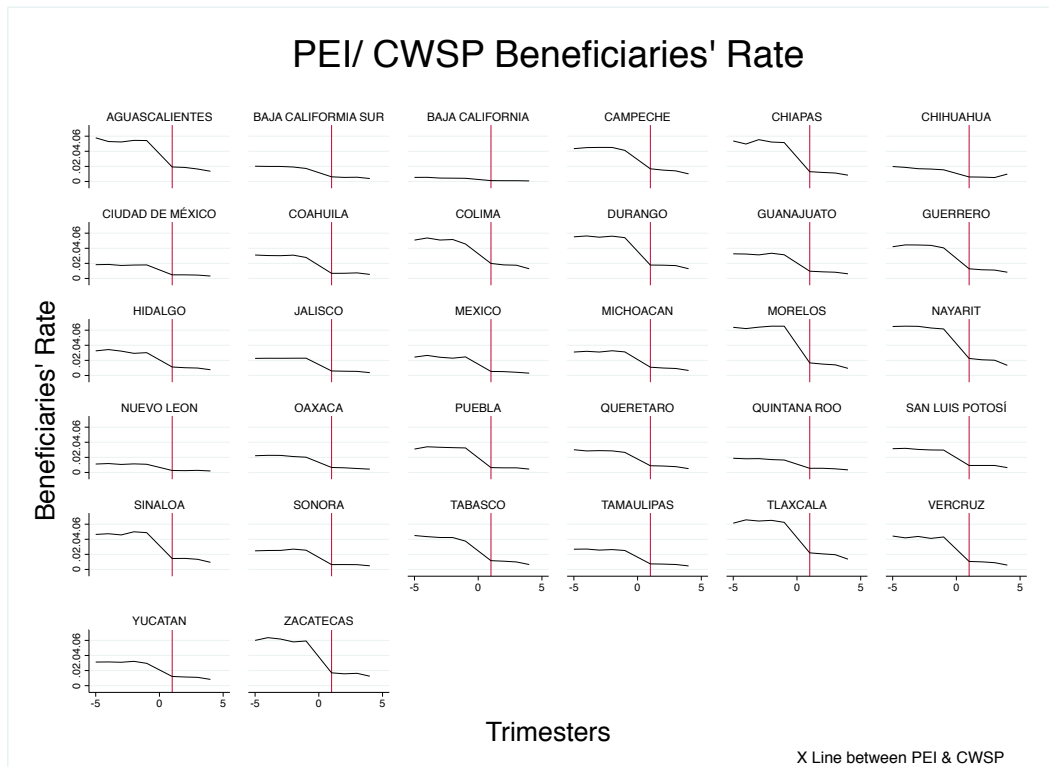


Figure 3 presents the evolution of women’s employment rate by trimester since the last quarter of 2017, until the first quarter of 2020. For this variable the trend is less obvious than in figures 1 and 2. Conversely to the programs’ beneficiaries rate, women’s employment rate seems to be constant before and after the transition from the PEI to the CWSP. Figure 4 displays the same information as figure 3, but it is sorted by state. In this figure it is possible to identify the heterogeneity of women’s employment rate between states. However, women’s labor rate does not follow the same trend as the beneficiaries’ rate from the PEI and CWSP.

Figure 3. Women’s Employment Rate by State and Trimester in Mexico

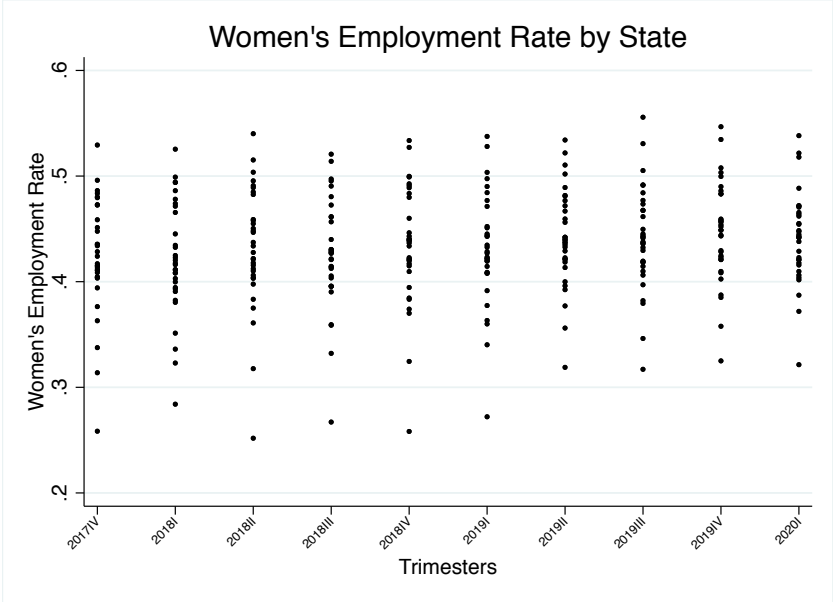


Figure 4. Women's Employment Rate by State in Mexico (Q.IV 2017- Q.I 2020)

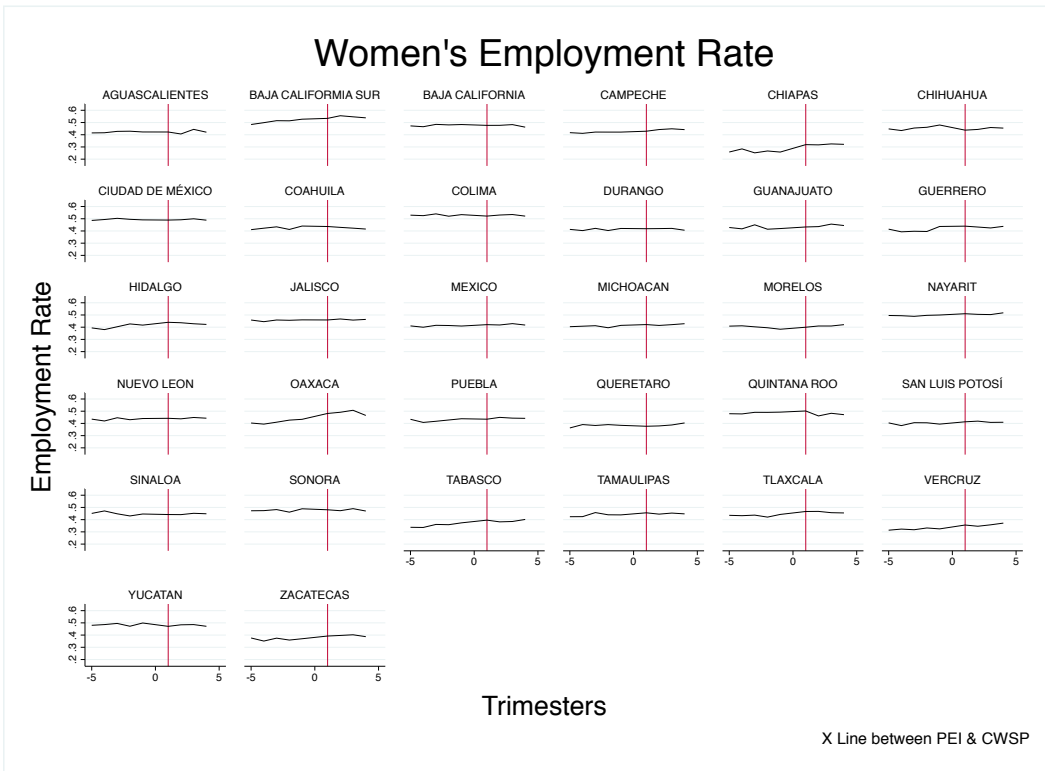


Figure 5 presents a scatter plot of the PEI/CWSP beneficiaries' and women's employment. It shows a negative relationship between these variables. The negative relationship is related to the heterogeneity of the population among the states; there are states where the population density is so high that the program seems to be very small.

Figure 5.

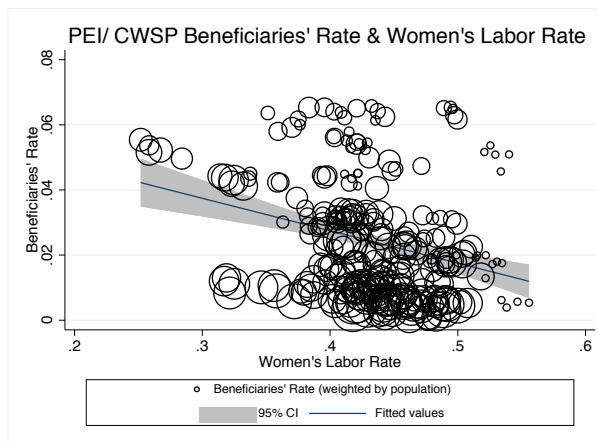


Table 8.1 and 8.2 include the statistical summary of the variables that are used in the Logistic and Heckman Correction models, that are cross-sectional studies at the municipal level. In addition to the mean and standard deviation (SD), they contain sample descriptive T-tests. Based on the results of table 8.1, the null-hypothesis, which states that the mean of municipal beneficiaries' rate of both programs is equal, can be rejected with a statistical significance level at 1% ($p < 0.01$).

Table 8.1 Sample Descriptives Using T-test for Equality of Means

		M	SD	<i>t</i> -test	Pr(T > t)
Municipal beneficiaries' rate	PEI	0.0189	0.0180	28.548***	0.000
	CWSP	0.0106	0.0114		

N= 2456

Note: M= Mean. SD= Standard Deviation. Levels of statistical significance: * $p < .1$, ** $p < .05$, *** $p < .01$.

Table 8.2 shows the results of T-tests on interest variables where the null hypothesis is that the mean of those variables is equal between the municipalities that participated in the PEI, and the ones that didn't. As the p-value displays, for all the variables, except for the children's rate, the null hypothesis can be rejected with the statistical significance level at 1% ($p < 0.01$). In other words, this means that the municipalities that participated in the PEI differ from those that didn't regarding the women's labor rate, women's average years of schooling, average number of children per mother, Marginalization Index, children's mortality rate, and population logarithm. For children's rate between 0 and 4 years old, the null hypothesis cannot be rejected.

Table 8.2 Sample Descriptives Using T-test for Equality of Means

PEI Municipality

Variable	With		Without		t-test	Pr(T > t)
	M	SD	M	SD		
Women's LFP rate	0.438	0.085	0.294	0.116	-34.879***	0.000
Women's Avg Years of Schooling	8.570	1.380	6.947	1.233	-34.879***	0.000
Avg # of Children per Mother	2.342	0.347	2.773	0.379	29.437***	0.000
Marginalization Index	-0.427	0.876	0.443	0.926	23.916***	0.000
Children's rate (0-4 years)	0.090	0.020	0.091	0.023	0.962	0.336
Children's mortality rate	15.128	4.873	18.959	7.703	14.669***	0.000
Total population	10.485	1.216	8.371	1.166	-43.9902***	0.000

N= 2,546

Note: M= Mean. SD= Standard Deviation. Levels of statistical significance: * p <.1, ** p <.05, *** p <.01.

Table 8.3 also indicates the results of T-tests on interest variables as table 8.2 did, but the null hypothesis is that the mean of those variables is equal between the municipalities that participated in the CWSP, and the ones that didn't. The T-tests results for the CWSP are very similar to those of the PEI; for almost all the variables, the null hypothesis can be rejected with the statistical significance level at 1% (p< 0.01). Although, in addition to children's rate, the null hypothesis that the mean of children's mortality rate in the municipalities that participate in the CWSP and those that didn't- can't be rejected.

Table 8.3 Sample Descriptives Using T-test for Equality of Means

CWSP Municipalities

Variable	With		Without		t-test	Pr(T > t)
	M	SD	M	SD		
Women's LFP rate	0.429	0.090	0.285	0.117	-33.366***	0.000
Women's Avg Years of Schooling	8.472	1.229	6.835	1.369	-31.182***	0.000
Avg # of Children per Mother	2.360	0.343	2.813	0.377	30.708***	0.000
Marginalization Index	-0.380	0.886	0.511	0.913	24.221***	0.000
Children's rate (0-4 years)	0.090	0.020	0.091	0.023	1.116	0.265
Children's Mortality Rate	15.369	5.144	19.205	7.820	13.816	0.000
Total population	10.320	1.270	8.278	1.178	-41.091***	0.000

N= 2456

Note: M= Mean. SD= Standard Deviation. Levels of statistical significance: * p <.1, ** p <.05, *** p <.01.

Figures 6.1 and 6.2 display scatter plots of the PEI & CWSP, respectively, and the lagged variable of women's employment rate. Figures 7.1 and 7.2 likewise show the scatter plots of the PEI & CWSP, respectively, and the variable of women's employment rate.

Figure 6.1

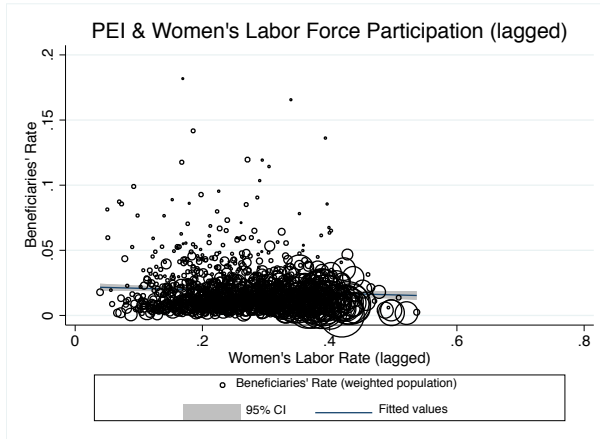


Figure 6.2

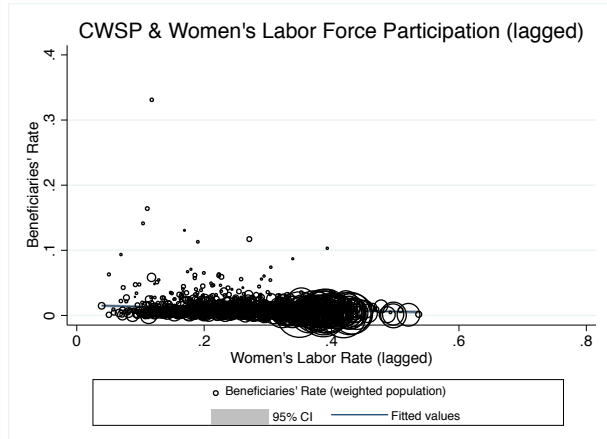


Figure 7.1

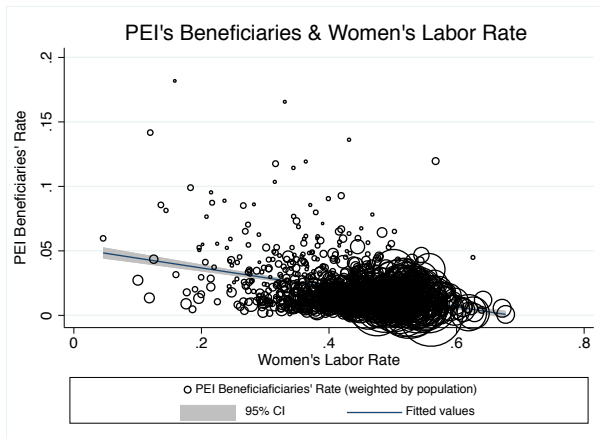
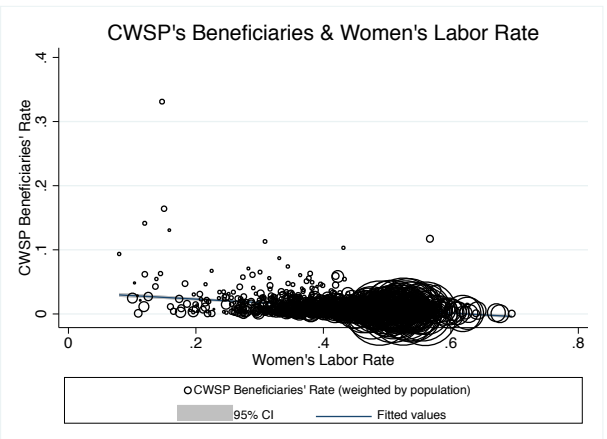


Figure 7.2



Statistical analyses

Fuzzy Regression Discontinuity Model

The Fuzzy RD model uses the presidential decision to suspend the PEI, and replace it with the CWSP, an exogenous shock, as an instrumental variable to test whether the substitution of the PEI with the CWSP was successful by analyzing women's employment rate over time looking for a change in the probability of intensity of the treatment at the cutoff. In the OLS first stage (model 1), the dependent variable is the beneficiaries' rate of the PEI and the CWSP. The running variable is time (trimesters), and the treatment effect is the discontinuity (dummy variable) at the time when the PEI was substituted by the CWSP. As table 8 presents, this variable has a negative coefficient and it is statistically significant at 1%. This result means that there is a significant drop in the treatment variable; the number of beneficiaries decreased significantly when the government made the transition from the PEI to the CWSP. As for the control variables, the average number of children per mother, children's rate between 0 and 4 years old, and population logarithm have positive and statistically significant coefficients at 5% and 1%, respectively. The R^2 is 0.711, which indicates that this model improves the likelihood by 71.1% in relation to the null model. The F-statistic has a value of 98.2.

Regarding the second stage (2SLS), the dependent variable is women's labor force participation, and the independent variable is the beneficiaries' rate of the PEI/CWSP. This variable is not statistically significant. This indicates that the closure of the PEI's nurseries and its substitution with the unconditional cash transfers of the CWSP did not affect women's labor rate, at least in the short run. As for the control variables, the average number of children per mother and population logarithm have a negative and statistically significant coefficient at 1%. The remaining control variables are not statistically significant. The R^2 is 0.447, which indicates that this model improves the likelihood by 44.7% in relation to the null model. Finally, the Wald chi2 is 221.38. Table 9 displays Fuzzy RD models that correspond to equation (i).

Table 8. Fuzzy RD on the Beneficiaries' Rate and Participation Rate in the PEI/CWSP

Dependent Variable	Beneficiaires's Rate PEI & CWSP		Women's Labor Rate	
	OLS First stage (1)	<i>p</i>	2SLS (2)	<i>p</i>
Trimesters (running variable)	-0.001 (0.000)	0.162	0.002 (0.002)	0.389
Dummy Discontinuity	-0.023 (0.003)***	0.000		
PEI/ CWSP Beneficiaries' rate			-0.203 (0.470)	0.666
Avg # of Children per Mother	0.037 (0.005)***	0.000	-1.567 (0.315)***	0.000
Marginalization Index	0.000 (0.002)	0.877	-0.007 (0.006)	0.280
Women's Average Years of Schooling	0.001 (0.002)	0.769	0.007 (0.009)	0.454
Children's rate (0-4 years)	-0.198 (0.077)**	0.011	-0.026 (0.025)	0.314
Population Logarithm	-0.007 (0.001)***	0.000	-0.026 (0.005)***	0.000
Constant	0.067 (0.038)*	0.077	0.954 (0.151)***	0.000
N		288		288
R-squared		0.711		0.447
F-stat		98.200		
Wald Chi2				221.38 0.000

Note: IV Regression Model with robust standard errors in parentheses. Levels of statistical significance: * $p < .1$, ** $p < .05$, *** $p < .01$. The instrumental variable is equal to 0 for the trimesters of the PEI and 1 for the trimesters of the CWSP.

Instrumented: Beneficiaires' ratePEI/CWSP / Instruments: Trimesters ,Dummy Discontinuity, Avg number of children per mother, Marginalization Index, Women's average years of schooling, Children's rate (0-4 years), Population Logarithm .

Logistic Regression Models

The objective of the PEI was to boost maternal labor supply by giving mothers with young access to subsidized day care. The PEI worked based on the market principles. In contrast, the CWSP provides them unconditional cash transfers. As both programs operated based on different incentives, the PEI and the CWSP could be targeted differently. First, it is useful to analyze where each program's focalization is to evaluate if it reached the target population defined in their operation rules or not. To the extent that the programs' targeting adheres to the operating rules, their efficiency should increase. Also, this analysis is convenient to compare and contrast their focalization among programs.

The logistic regression models explain the socioeconomic determinants of municipal participation in the PEI and in the CWSP. These models included the variables that should explain the existence of at least one childcare center for the PEI or at least one beneficiary of the CWSP in some municipalities and not in others. These assumptions are based on the operating rules of both programs.

In model 3, the lagged LFP of women, women's average years of schooling, the MI, and the population logarithm have positive coefficients. These variables are statistically significant at 1%. In contrast, the average number of children per mother, and the infant mortality rate have a negative coefficient, and are statistically significant at 1% and 5%, respectively. The children's rate between 0 and 4 years old has a negative coefficient, but it is statistically insignificant. The pseudo R^2 is 0.542, which indicates that this model improves the likelihood by 54.2% in relation to the null model.

In model 4, women's (lagged) LFP of women, women's average years of schooling, the MI, and the population logarithm have positive coefficients. These variables are statistically significant at 1%, except for the MI, that is significant at 10%. The average number of children per mother has a negative coefficient, and is statistically significant at 1%. Children's rate between 0 and 4 years old has a negative coefficient, as well as the infant mortality rate, but both are statistically insignificant. The pseudo R^2 is 0.516, which indicates that this model improves the likelihood by 51.6% in relation to the null model.

Table 9 illustrates both logistic regression models 3 and 4, which correspond to equations ii and iii. To compare the parameters of both models, the third column of table 9 includes a Chi2 test on the estimated parameters of models 3 and 4. The average number of children per mother, and the population logarithm are statistically significant at 1%, and the infant mortality rate is at 5% but

only for the PEI. The negative impact of the average number of children per mother is greater for the participation in the CWSP than for the PEI. At last, the positive coefficient of the population logarithm is greater for the PEI than for the CWSP.

Table 9. Sociodemographic Determinants in Municipal Participation in the PEI & CWSP

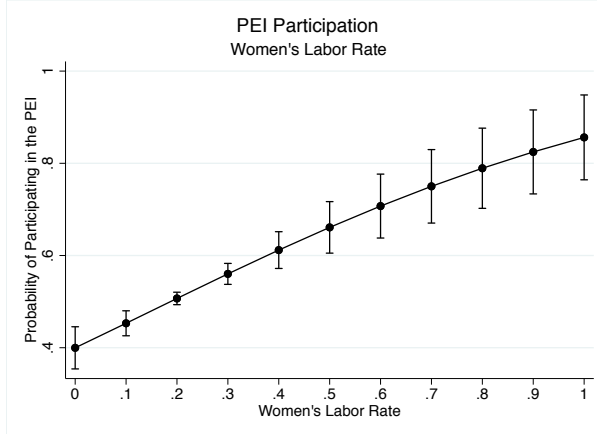
	PEI participation		CWSP participation		Difference on estimated parameters Models 1 & 2	
	(3)		(4)			
	Estimates	p	Estimates	p	Chi2	p
Women's EAP Rate (lagged)	5.063 (1.014)***	0.000	3.573 (0.952)***	0.000	2.490	0.115
Avg Children per Mother	-0.942 (0.264)***	0.000	-1.611 (0.252)***	0.000	7.96***	0.005
Children's Rate (0-4 years)	-2.328 (4.199)	0.579	-3.317 (3.605)	0.357	0.070	0.798
Marginalization Index	0.389 (0.127)***	0.002	0.217 (0.128)*	0.090	1.890	0.170
Women's Avg Years of Schooling	0.672 (0.098)***	0.000	0.622 (0.095)***	0.000	0.310	0.578
Infant Mortality Rate	-0.029 (0.014)**	0.030	-0.008 (0.011)	0.465	3.11*	0.078
Population Logarithm	1.746 (0.078)***	0.000	1.479 (0.073)***	0.000	11.93***	0.001
Constant	-19.475 (1.532)***	0.000	-14.190 (1.340)***	0.000	15.14***	0.000
N	2456		2456			
Pseudo R ²	0.542		0.516			

Note: Logit regression with robust standard errors in parentheses. Levels of statistical significance: * p <.1, ** p <.05, *** p <.01. The dependent variable is equal to 1 in the municipalities that participate with at least one childcare center in the PEI or the CWSP

Based on the sign of the coefficients of models 3 & 4, women's labor rate has a positive impact on the existence of childcare centers in the PEI and in the CWSP. To better illustrate this substantive effect, figures 8.1 and 8.2 show how the probability that a municipality participates in the PEI/CWSP increases as women's labor rate rises, maintaining the rest of the independent variables, in their average values. For the PEI, if the municipality's women's labor rate is 0.1, then there is a 45% probability that the municipality will participate in the PEI. In contrast, when this

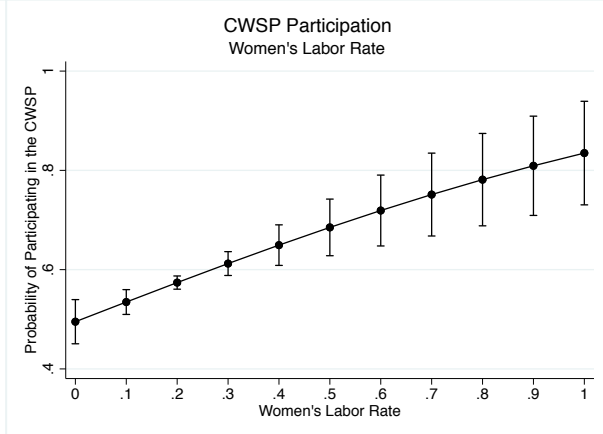
rate is 0.6, there is a 70% probability that the municipality will participate in the program. Regarding the CWSP, if the municipality's women's labor rate is 0.1, then there is a 53% probability that the municipality will participate in the CWSP. In contrast, when this rate is 0.6, there is a 72% probability that the municipality will participate in the program.

Figure 8.1



Predicted probabilities based on model 3, 95% confidence intervals.

Figure 8.2



Predicted probabilities based on model 4, 95% confidence intervals.

Figures 9.1 and 9.2 illustrate how the probability that a municipality participates in the PEI/CWSP decreases as the average number of children per woman increases, maintaining the rest of the independent variables in their average values. For the PEI, if the municipality's average children per woman is 1.0, then there is a 66% probability that the municipality will participate in the PEI. On the contrary, when the average number of children per woman is 5.0, the probability reduces to 28%. Regarding the CWSP, if the municipality's average number of children per woman is 1.0, then there is an 83% probability that the municipality will participate in the PEI. Rather, when the average number of children per woman is 5.0, it decreases to 17%.

Figure 9.1

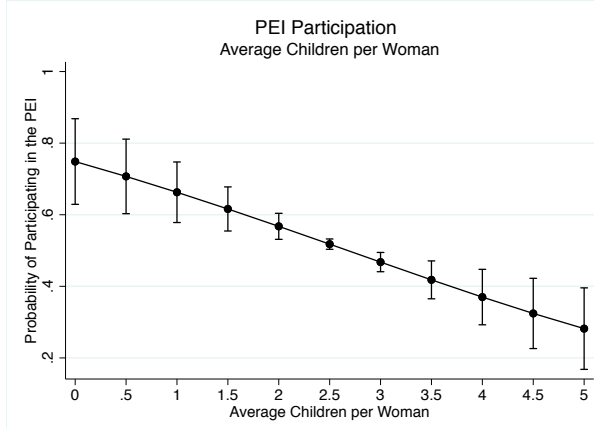
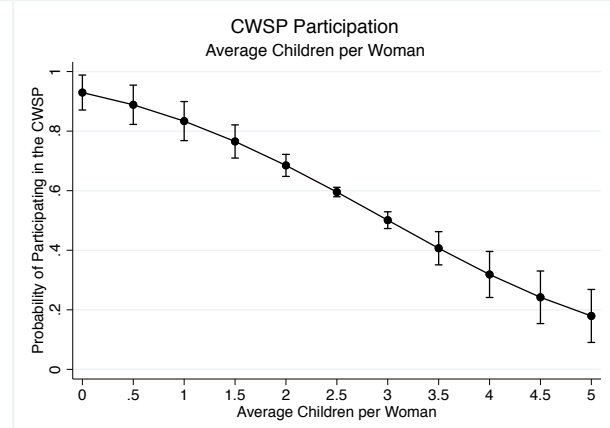


Figure 9.2



Predicted probabilities based on model 3, 95% confidence intervals.

Predicted probabilities based on model 4, 95% confidence intervals

Figures 10.1 and 10.2 display how the probability that a municipality participates in the PEI/CWSP augments as the population logarithm rises, maintaining the rest of the independent variables in their average values. For the PEI, if the population logarithm is 6.4, then there is a 2% probability that the municipality will participate in the PEI. Rather, when population logarithm is 12.4, there is a 98% probability that the municipality will participate in the program. For the CWSP, if the population logarithm is 6.4, then there is a 7% probability that the municipality will participate in the CWSP, but when it is 12.4, there is a 98% probability.

Figure 10.1

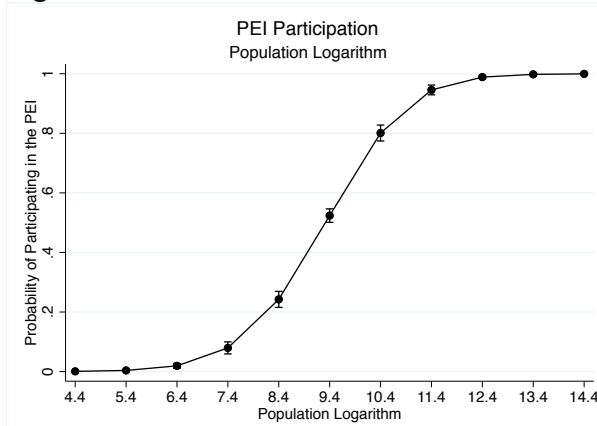
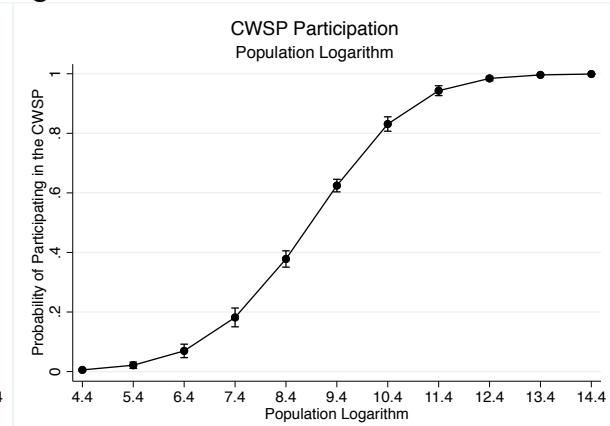


Figure 10.2



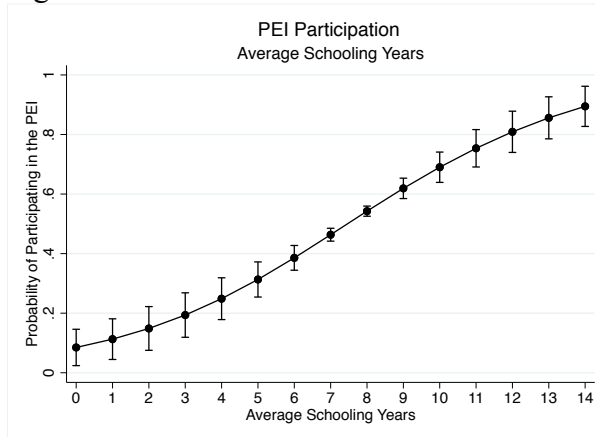
Predicted probabilities based on model 3, 95% confidence intervals.

Predicted probabilities based on model 4, 95% confidence intervals

Figures 11.1 and 11.2 display how the probability that a municipality participates in the PEI/CWSP grows as the average schooling years increases, maintaining the rest of the independent variables in their average values. In relation to the PEI, if the average schooling years is 6 (complete

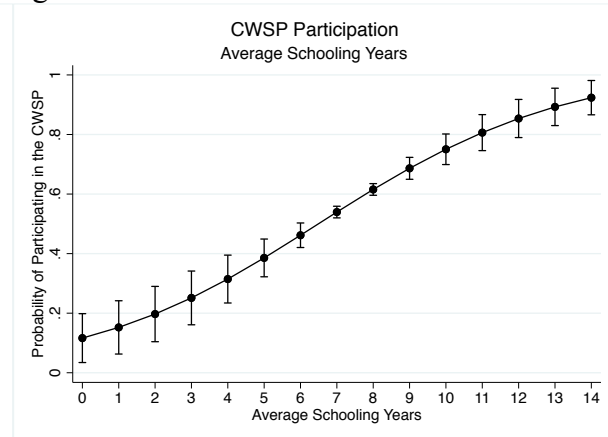
elementary school), then there is a 38 % probability that the municipality will participate in the PEI. Nonetheless, when the average schooling years are 12 (complete high school) the probability that the municipality will participate in the program rises to 80%. As to the CWSP, if the average schooling years are 6, then there is a 46 % probability that the municipality will participate in the PEI, but when it is 12 the probability also rises to 80%.

Figure 11.1



Predicted probabilities based on model 3, 95% confidence intervals.

Figure 11.2



Predicted probabilities based on model 4, 95% confidence intervals.

Heckman Correction Model

The Heckman Correction models intend to evaluate the effect of the PEI and CWSP programs. The first stage estimates the probability of a municipality to offer the programs. It entails a MLE probit regression model. For models 5 and 6 the dependent variable is a dummy variable that takes the value of one if the municipality participated in the program or 0 if it didn't. During the first stage, the independent variable is women's labor rate, and the control variables are the average number of children per mother, MI, women's average years of schooling, children's rate between 0 and 4 years old, population logarithm, and children's mortality rate. The MLE probit models include the same variables as the logistic regression models, but the main difference is that the logistic model uses the lagged women's rate and the MLE probit does not. In consequence, the outcome from the probit regression (first stage) of model 5 and 6 and the logistic models 3 and 4, is very alike.

In models 5 and 6, women's labor participation rate, average years of schooling, and population logarithm have positive and statistically significant coefficients at 1%. MI is only significant at

5% and positive in model 5. The average number of children per mother is negative, but not statistically significant in model 5 and has a 5% statistical significance in model 6. At last, children's rate between 0 and 4 years old, and infant mortality rate have no statistical significance. The inverse Mills ratio, that is included as an additional explanatory variable in the second stage, is -0.057 in model 5 and -0.062 in model 6.

Regarding the second stage, the Heckman Correction Model estimates the (log of) women's employment rate, while controlling for the program selection process (first stage). This stage aims to examine the estimated effect of the program on the labor force rate of the PEI/CWSP beneficiaries' rate. Based on results model 5 (second stage), the beneficiaries' participation rate in the PEI, and the average number of children per mother are negative and statistically significant at 1%. Women's average years of schooling and MI are positive and have a 1% statistical significance. Population logarithm loses its statistical significance, and children's rate continues to be insignificant. The outcome of the second stage of model 6 is very comparable in sign and statistical significance to model 5, but in model 6, population logarithm is positive and significant at 1%. The Wald Chi2 for model 5 is 281.63 and for model 6 is 317.64. Table 11 illustrates both Heckman Correction models that correspond to equations *iv*, *v*, *vi*, and *vii*.

Table 5. Sociodemographic Determinants of the PEI/CWSP and the Effect of their Beneficiaries' Rate on Employment

	PEI (5)				CWSP (6)			
	Participation in the PEI	<i>p</i>	Women's LFP Rate	<i>p</i>	Participation in the CWSP	<i>p</i>	Women's LFP Rate	<i>p</i>
Women's LFP Rate	0.062 (0.008)***	0.000			0.061 (0.006)***	0.000		
Beneficiaries' rate			-0.700 (0.161)***	0.000			-0.795 (0.123)***	0.000
Avg # of children per mother	-0.134 (0.169)	0.428	-0.066 (0.011)***	0.000	-0.365 (0.155)**	0.019	-0.058 (0.011)***	0.000
Marginalization Index	0.194 (0.078)**	0.012	0.018 (0.006)***	0.005	0.123 (0.077)	0.110	0.016 (0.006)***	0.005
Women's avg years of schooling	0.276 (0.068)***	0.000	0.022 (0.004)***	0.000	0.215 (0.062)***	0.001	0.023 (0.004)***	0.000
Children's rate (0-4 years)	0.557 (2.215)	0.801	-0.257 (0.144)*	0.076	-0.097 (1.899)	0.959	-0.188 (0.122)	0.123
Population Logarithm	0.591 (0.070)***	0.000	0.003 (0.002)	0.155	0.447 (0.062)***	0.000	0.007 (0.002)***	0.000
Infant Mortality Rate	-0.008 (0.008)	0.315			0.001 (0.007)	0.842		
Constant	-9.691 (0.873)***	0.000	0.734 (0.060)***	0.000	-7.015 (0.773)***	0.000	0.648 (0.054)***	0.000
Rho		-0.818				-0.846		
Sigma		0.070				0.074		
Lambda		-0.057				-0.062		
Selected observations		1251				1407		
Non selected observations		1205				1049		
N		2456				2456		
Wald Chi2		281.63				317.64		

Note: Heckman Correction Model with robust standard errors in parentheses. Levels of statistical significance: * $p < .1$, ** $p < .05$, *** $p < .01$. The dependent variable of program's participation is equal to 1 in the municipalities that participate with at least one childcare center in the PEI or the CWSP

Discussion

Based on the results of model 1 (OLS/ first stage) it can be concluded that beneficiaries' rate did have a statistically significant decrease after the PEI closed the nurseries abruptly, and the CWSP was established. Despite the effect on the beneficiaries' rate, the ITT effect of the cutoff has no significant effect on the participation rate of women in the labor market, the trend in women's employment rate didn't change, at least in the short run. In consequence, H_0 can be rejected.

One of the reasons why the transition from the PEI to the CWSP had no effect on women's employment rate can be due to the size of the program. Even though the PEI was the main childcare subsidy program in Mexico, it seems to be very insufficient compared to total maternal labor employment. This doesn't mean that the closure of the PEI's nurseries didn't have any consequence on women's labor participation. As this analysis was conducted at the state level, a more precise measurement of women's labor participation rate, for example a measurement at the municipal level, could be more accurate to identify some effect. The problem with doing a panel analysis at the municipal level is that there is no data that measures women's employment rate quarterly by municipality. Unfortunately, the ENOE survey is only representative at the state level.

Another interpretation of the absence of effect that ending the PEI had on women's employment is that the program had permanent effects on labor market behavior of women. As a result, the consequence of retracting the program is not so adverse. A third explanation of why the transition from the PEI to the CWSP had no effect on women's labor rate could be because the transition was successful. This means that the former beneficiaries from the PEI used the new unconditional cash transfer of the CWSP to pay for childcare. Despite the insufficient amount of the unconditional cash transfer (\$1,200.00 MXN per bimester) to pay for private daycare, mothers with young children didn't resume working because the nurseries closed. Instead, they used the money to pay part of the fee of a private daycare or they moved to an informal daycare scheme.

Actually, when President López Obrador announced the CWSP, he also mentioned that the cash transfer could be used by the mothers to pay grandmothers to take care of the young children at home. While informal childcare still promotes women's employment, this might also cause negative externalities. First, assuming that grandmothers should take care of their children perpetuates the gender stereotypes of women as main caregivers, that represents the main reason why women with young children don't participate in the workforce in the first place. Furthermore, moving from formal to informal childcare could also negatively affect children's development. For example, the PEI also had a positive impact on children's nutrition and on the development of children's motor and social skills (CONEVAL, 2017-2018).

Withal, it is relevant to remember that the program dropped by half the number of beneficiaries, so even if the transition could have been successful for half of the PEI' beneficiaries, for the other half there was no transition at all; they were simply expelled from the program. Further analysis should be done of how the PEI's beneficiaries that were left without nurseries and did not get to enter the CWSP responded to the PEI's sudden closure. At last, the CONEVAL evaluated the PEI yearly based on surveys done to the beneficiaries. Based on this information, the evaluations were always positive regarding women's opportunities to enter the labor market (CONEVAL, 2017-2018), but unfortunately the survey information is not available to the public.

In relation to models 2 and 3, the sociodemographic determinants in the municipal participation in the PEI and CWSP are very similar because, as table 5 described, the CWSP was established in 96.17% of the municipalities that participated in the PEI. The CWSP followed the same trend that the PEI had established. In models 3 and 4, the lagged LFP of women has a positive and statistically significant effect. As the women's labor rate increases, the probability that a municipality participates in the PEI/CWSP also grows, so H_{2a} is confirmed. This means that the nurseries of the PEI were established in the places where there were more women working. In consequence, the PEI actually worked based on market laws. The downside is that establishing nurseries can help mothers with young children enter or remain in the labor market when there are employment opportunities, but it might not be useful if there are no sources of employment.

Contrary to the expectations, the children's rate between 0 and 4 years old wasn't statistically significant for either one of models 3 and 4. The number of children seems to be less important than other sociodemographic characteristics, so it doesn't affect the municipal probability of participating or not on the PEI/CWSP. Therefore, H_{2b} can be rejected. With reference to the MI, it has a positive and statistically significant effect on the municipal probability of participating in the PEI and CWSP. These results are compatible with H_{2c} , which implies that the MI program does increase the municipal probability of participating in both programs. This is in line with the operations rules, since the beneficiaries of the PEI had to receive an income that was below the poverty line. This suggests that the focalization was well done.

The average number of children per mother decreases the municipal probability to participate in the PEI. This negative relationship does not necessarily indicate that the program is not well targeted because as the number of children per mother increases, the benefits that mothers earn from entering the labor market can be less than the costs they must pay for childcare. In addition, the burden of housework and being the primary caregivers of so many children don't allow them to even search for a job; the high average number of children per mother systematically excludes them from entering the labor market.

The average years of schooling also increases the municipal probability of participating in both programs. This finding could apparently contradict the positive relationship with the MI and the probability of participating in PEI/CWSP. Nonetheless, the average schooling years is 8.57,

that is equivalent to half of middle school, and in Mexico most establishments require a minimum of middle school degree even for low skilled workers. In consequence, the probability of being employed grows as the average years of schooling increase, and if the probability of being employed rises, then it makes sense that the probability of participating in the PEI/CWSP increases as well. Finally, population has also a positive effect on the probability of participating in the PEI/CWSP because, based on the 2020 Census, 92.5% of the population in Mexico live in urban areas. Therefore, this explains the urban bias that both programs have. As for the programs' focalization, the PEI did reach its target population. The CWSP, as derived from the PEI, also reaches its target population.

At last, models 5 and 6, the sociodemographic determinants of the participation in the PEI/CWSP are consistent with findings in models 3 and 4. The positive and statistically significant outcome of women's labor rate in the first stage of the Heckman Correction Model signifies that municipal probability of participating in the PEI or CWSP intensifies when the women's labor rate is higher. In regards to the second stage of the model, which intends to explain the effect of the intensity of the program in women's employment rate, the principal finding is that the coefficient is negative and statistically significant. The negative coefficient does not imply that there is a negative effect of the beneficiaries' rate on women's employment rate. As figures 7.1 and 7.2 presented, the negative relationship is due to the heterogeneity of the size among the states; there are states where the population density is so high that the program seems to be very small. So, the findings are consistent with H_{3a} because the largest share of women that participate in the labor force is actually in the municipalities where there is a greater share of beneficiaries.

As the children's rate between 0 and 4 years old is not statistically significant, H_{3c} can be rejected. This finding implies that the existence of more or less children between 0 and 4 years old has no effect with the program's participation or its intensity. This result is also in line with the outcome in the previous models. At last, the coefficient of the MI is positive and statistically significant at 5% for the municipalities that participate in PEI & CWSP, so the largest share of women that participate in the labor force is in the municipalities where there is more poverty. These finding are in line with H_{3c} . Where women are more impoverished, their need for employment is greater, but they are also the ones that need subsidies childcare the most. As their marginalization is higher, they have limited labor opportunities and receive the minimum salary.

Conclusion

This thesis analyzed, through a Fuzzy Regression Discontinuity, Logistic Regressions and Heckman Correction models, the effect of the transition from the PEI to the CWSP on women's employment rate in Mexico. Additionally, it studied the sociodemographic characteristics that explain the municipal participation in the PEI and CWSP, and the effect of the programs' beneficiaries' rate in women' labor force participation.

The results suggest that the trend in women's employment rate didn't change after the PEI ended and was substituted with the CWSP, at least in the short run. This result may be due to the fact that the transition from one program to another was successful. The former beneficiaries from the PEI that entered the CWSP used the unconditional cash transfer to pay for formal or informal childcare, and were able to remain in the labor market, which implies that the former beneficiaries from the PEI used the new unconditional cash transfer of the CWSP to pay for childcare. Despite the insufficient amount of the unconditional cash to pay for private daycare, mothers with young children didn't resume working because the nurseries closed. Instead, they used the money to pay part of the fee of a private daycare or they moved to an informal daycare scheme.

Withal, only 50% of the them were able to do the transition from the PEI to the CWSP because the budget was reduced by 50%. Another explanation of why there was no variation in women's employment rate is that, even though the PEI was the main subsidized nursery program in Mexico, was quite small in comparison with women's labor participation rate, and for that reason the effect could not be detected.

Another interpretation of the absence of effect that ending the PEI had on women's employment is that the program had permanent effects on labor market behavior of women. As a result, the consequence of retracting the program is not so adverse. A third explanation of why the closure of the PEI's nurseries didn't have any consequence on women's labor participation is the size of the program. Even though the PEI was the main childcare subsidy program in Mexico, it seems to be very insufficient compared to total maternal labor employment. This doesn't mean that the closure of the PEI's nurseries didn't have any consequence on women's labor participation. Additionally, this analysis was conducted at the state level, so the analysis at the municipal level, could be more accurate to identify some effect. The problem is that there is no quarterly data on employment at the municipal level.

Last but not least, the PEI did reach its objective population. The program was established in the municipalities that were more impoverished, and where women's employment was higher. About the program's intensity, the greater share of beneficiaries was in the municipalities that had the largest share of women that participated in the labor force. As the CWSP derived from the PEI, it also arrived at its target population. Both programs have an urban bias, but it does not represent a focalization problem, 92.5% of the population in Mexico live in urban areas.

The PEI, despite being the principal nursery program in Mexico, was quite small in comparison with women's labor participation rate, so if it was a well focalized program that reached its target population, and had positive impact evaluations of maternal labor supply, there is no rationale why the government cut the program's budget by half. On the contrary, the government should have incremented the program's budget to expand its coverage.

Finally, for future research, it would be interesting to study how the CWSP spends the cash they receive unconditionally; if the CWSP beneficiaries use the cash to pay for formal or informal childcare, or do they use it for something else that is related to the benefit of the children or not. The increase in informal childcare schemes can perpetuate the gender stereotypes of women as main caregivers, that represents the main reason why women with young children don't participate in the workforce in the first place.

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Appendix

Table 7. Variable's Source

Variable	Year	Source
<i>Avg. # Children per Mother</i>	2020	INEGI
CWSP's Beneficiaries (cross section)	2019	Secretaría del Bienestar
CWSP's Beneficiaries (panel)	Quarterly (IV 2017- I 2020)	Secretaría del Bienestar
Infant Mortality Rate	2020	CONAPO
Marginalization Index	2020	CONAPO
PEI's Beneficiaries (cross section)	2016	Secretaría del Bienestar
PEI's Beneficiaries (panel)	Quarterly (IV 2017- I 2020)	Secretaría del Bienestar
Population	2020	INEGI
<i>Total # Children (0-4 years)</i>	2020	INEGI
Women's Avg Schooling Years	2020	INEGI
Women's Labor Force Participation	2020	INEGI
Women's LFP (lagged)	2000	INEGI
Women's LFP (panel)	Quarterly (IV 2017- I 2020)	ENOE

Table 8 Variable's Description

Variable	Description
CWSP Participation Dummy	Municipalities that participate in the CWSP =1; Municipalities that don't participate in the CWSP =0
Trimesters	Number of trimesters before and after the PEI ended and the CWSP began
Children's rate (0-4 years)	1 Total # Children (0-4 years) / Total Population
CWSP Beneficiaries' Rate (cross section)	CWSP Beneficiaries (2019)/ Women's Participation in the Labor Force (2020)
CWSP Beneficiaries' Rate (panel)	CWSP's Beneficiaries Quarterly (IV 2017- I 2020) /Women's Participation in the Labor Force (2020)
Dummy Discontinuity (panel)	0 if quarterly < 2019 II; 1 if quarterly >= 2019 II
PEI Beneficiaries' Rate (cross section)	PEI's Beneficiaries 2016 / Women's Participation in the Labor Force 2020
PEI Beneficiaries' Rate (panel)	PEI's Beneficiaries quarterly (IV 2017- I 2020) /Women's Participation in the Labor Force (2020)
PEI Participation Dummy	Municipalities that participate in the PEI =1; Municipalities that don't participate in the PEI =0
Population Logarithm	Log (total population)
Women's LFP rate	Women's Participation in the Labor Force (2020) / Total Population (2020)
Women's LFP rate (lagged)	Women's Participation in the Labor Force (2000)/ Total Population (2000)