

# Understanding the Effects of Conditional Cash Transfers on Indigenous People in Mexico

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May 15, 2020

## 1. Introduction

The seminal conditional cash transfer (CCT) program, Oportunidades in Mexico, set the stage for future initiatives across the world. Oportunidades aimed to alleviate financial burden for poor households while promoting human capital investment in children in order to break the intergenerational transmission of poverty. As in other CCT programs, cash transfers were given to families if they satisfied a number of different requirements focusing on children’s health and education. Numerous studies have detailed the positive effects of Oportunidades on long-term investment, health, and education, but few have focused on one of Mexico’s largest ethnic groups: indigenous people.

In this paper, I focus on investigating the impact of Oportunidades on indigenous people’s long-term living standards, operating under the hypothesis that poor families invest their cash transfers into entrepreneurial activities – such as purchases of animals or land,

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\*I am grateful to my advisor, Prof. Edward Miguel, for his invaluable guidance and patience. I also thank Matthew Tauzer, Sam Aragon, Zehra Ali, and Daniel Cohen for their helpful discussions and suggestions. All errors are my own. Contact information: arushidesai@berkeley.edu

or creation of a business – which ultimately raise their quality of life. Cash transfers are expected to increase investment for two primary reasons: cash transfers provide a stable income flow which alleviates credit constraint, and if the transfer is perceived to be secure over time, risk-averse households will be willing to invest in riskier investments in the future (Gertler, Martinez, and Rubio-Codina 2012). The income from the cash transfer program was expected to increase investment in productive assets and activities. If returns on investments are maintained over time, poor households would then achieve a higher living standard even in the absence of the cash transfer program. This effect has not been studied for indigenous people, however.

Understanding the impact of a CCT program on indigenous households' spending is an important question, given that these groups are, on average, severely marginalized and impoverished in Mexico. While there are a range of issues that contribute to this systemic problem, geographic and cultural factors are the main contributors (Quiñones and Roy 2016). Geographical isolation, limited access to education and health services, and limited institutional resources further alienate indigenous groups. Culturally, indigenous people continually face language barriers and ethnic discrimination. Therefore, it is unclear whether a CCT program would improve conditions for the indigenous without addressing fundamental barriers to equal opportunity. The Oportunidades program is unique in this aspect: indigenous households compose a significant share of the families randomly chosen to receive a cash transfer. Given that many indigenous households live in rural areas, it is also important to analyze what the differences are, if any, between households with differing eligibility for the cash transfer. Furthermore, Oportunidades was proven to reduce inequality, as it showed larger improvements in children and households with initially worse outcomes (Fiszbein and Schady 2009). It is necessary to understand if the same effect holds for indigenous households.

Using data from the randomized controlled experiment of the Oportunidades CCT pro-

gram in Mexico, I aim to answer four questions: (1) How did indigenous and non-indigenous groups' household characteristics and investments differ in the beginning of the program? (2) What are the differences between eligible and ineligible indigenous households in the baseline period, before receiving cash transfers? (3) What is the impact of Oportunidades on indigenous people's investment in productive assets and investments compared to non-indigenous people, and how did indigenous households benefit? (4) How do I interpret any differences or similarities in impact between the indigenous and non-indigenous recipients, given preprogram conditions? This paper finds that despite initial differences between indigenous and non-indigenous beneficiaries, the cash transfer provided by Oportunidades creates few differences in investment outcomes between the groups, especially five years after the treatment group first received benefits. In some cases, the outcomes for indigenous beneficiaries are not as advantageous as for non-indigenous equivalents; this effect can be attributed mainly to cultural effects, as geographical effects can be ignored in this CCT program.

## **2. Features of the Rural Oportunidades Program**

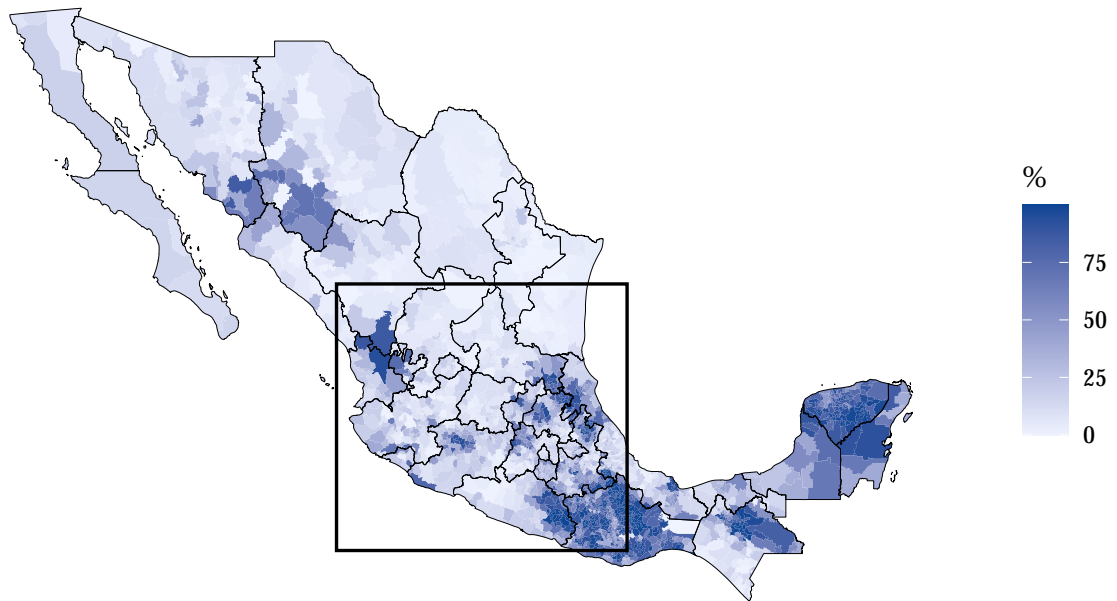
The Mexican Social Development Department (Secretaría de Desarrollo Social, or SEDESOL) established the Oportunidades program in 1997. The rural program focused on impoverished communities with between 50-2,500 people in isolated rural areas. Another geographical requirement of the program was its service access: the locality's access to health and school infrastructure, geographic location, and distance from neighboring localities were key factors in area selection, due to implementation concerns (Skoufias, Davis, and Vega 2001). The program was phased in according to a randomized design based on two-stage targeting: initial targeting of localities, then identification of poor households within those localities (Skoufias, Davis, and Vega 2001). Poor households were determined based on a proxy means test using census data. Thus, a household's eligibility depends on whether it is in an eligible village and its own poverty level.

Cash transfers from Oportunidades were given on a bimonthly basis to the female head of households; the amount was roughly 20 percent of household income. These transfers were conditional on children attending school, family members obtaining preventive medical care, and attending “pláticas,” educational talks regarding nutrition and hygiene. Transfers came in the form of a fixed stipend of 90 pesos (in 1997 prices) for all families, in addition to a variable stipend depending on number of children. Larger payments went to children at higher grade levels in school, and to girls in secondary school, rather than boys at the same level. The rates varied from 60 pesos per month for children in the third grade to 225 pesos per month for females enrolled in their third year of junior high school. Total transfers for any given household were capped at 550 pesos per month; this meant enrolling more than three children per household in school would not increase their transfer limit. Transfers were also only applicable to the people in the household at the time of the baseline survey, in order to prevent migration from occurring during the program.

The identification in this paper relies on experimental variation in program treatment, generated through the Oportunidades randomized evaluation. The evaluation sample included all households in 506 rural communities in seven states (out of Mexico’s 32 states). Through random assignment, 320 communities were designated as the treatment group and 186 communities were designated as the control group. The control group began to receive benefits 1.5 years after the treatment group; the control group was phased in at different points later in time due to the government’s financial constraints. Eligible households in the treatment communities began receiving treatment in March or April of 1998, whereas eligible households in the control communities only received treatment beginning in November or December of 1999. Using this information, I can determine if the treatment group experienced benefits differently given they experienced 36 extra bimonthly payments from the government.

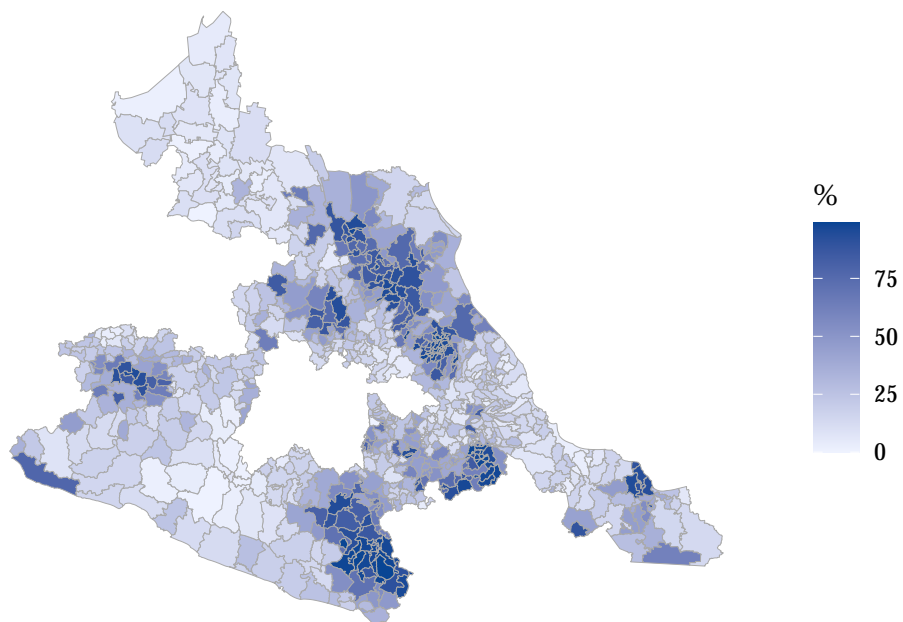
**Figure 1**

**Panel A: Percentage of the Population that Self -Identifies as Indigenous**



Source: 2015 Instituto Nacional de Estadística y Geografía Encuesta Intercensal  
(2015 National Institute of Statistics and Geography Intercensal Survey)

**Panel B: Percentage of the Population that Self -Identifies as Indigenous  
in Oportunidades States**



Source: 2015 National Institute of Statistics and Geography Intercensal Survey

### 3. Literature Review

Indigenous people worldwide live at lower levels of development and face systemic discrimination, despite being stewards of language and biodiversity, the latter of which is increasingly important in combatting climate change (“State of the World’s Indigenous Peoples” 2015). This inequity is particularly important in Mexico, whose population is approximately 21.5% indigenous, of which 80% live in poverty; in contrast, only about 50% of the non-indigenous population lives in poverty (Estadística y Geografía 2019). Indigenous people in Mexico have higher infant mortality, lack access to education and health care, and retire later – these disheartening statistics have not improved over the last 10+ years, despite public programs (Servan-Mori et al. 2014). The Mexican government only established constitutional rights for indigenous people in 2001, and despite its adoption of the UN Declaration on the Rights of Indigenous People in 2007, indigenous Mexicans still face significant institutional challenges (“Indigenous World 2019: Mexico” 2019). Continued ethnic and cultural discrimination, geographical isolation, lack of access to education and health services, nonexistent institutional resources, language barriers, and insufficient engagement are some of the factors that have contributed to the deep-rooted marginalization and persistent impoverishment of indigenous groups in Latin America (Becker 2013). Therefore, it is also critical to understand what types of indigenous people receive the benefits of CCT programs. This is invaluable in understanding if such programs are helping the most disadvantaged groups, if they are designed effectively for indigenous people, and how they may be improved in the future.

There are few papers that study the effects of development programs on indigenous people across the world. Most papers regarding indigenous communities in Mexico detail the importance of their presence for crop diversity and agriculture: indigenous adaptive management practices achieve the highest utilization in conservation, resilience, and sustainability in agriculture, which is relevant for understanding agricultural investment for indigenous households in this paper (Brush and Perales 2007; Toledo et al. 2003). One theoretical

paper argues that Oportunidades may be less effective for indigenous beneficiaries because it does not take into account constraints such as geographic remoteness, social exclusion, and discrimination (Ulrichs and Roelen 2012). There is little quantitative evidence to show how impacts differ, and the existing empirical evidence is mixed. When looking at Oportunidades' effect on educational attainment and child labor status, it was found that in the treatment group there were greater increases in educational attendance and decreases in child labor (Patrinos, Bando, and Lopez-Calva 2005). While this paper implied a reduction in the gap between indigenous and non-indigenous beneficiaries, it fails to address long-term effects of the CCT, and only examines impact two years after the baseline period. One influential paper concludes that, as of November 2000, the health and education impacts of Oportunidades, on the aggregate level, are similar for indigenous and non-indigenous households (Quiñones and Roy 2016). This paper disaggregated subsets of the sample dataset, incorporated more time periods than the prior analysis, and more broadly assessed the impacts of the CCT; it finds that in some subsets (e.g. female head of household's education level), indigenous people did not benefit as greatly as the non-indigenous households. However, this paper also fails to understand impacts of Oportunidades more than two years after the baseline period, and does not address how the cash transfer impacted indigenous households' investment. The latter is a key indicator in understanding if Oportunidades fundamentally improved long-term living standards or not.

This lack of research in the economic development of indigenous communities is surprising given that Oportunidades was a highly successful program which eventually expanded to benefit more than a fifth of families across Mexico, and has been replicated in more than 50 countries ("A Model from Mexico for the World" 2019). It was considered an overwhelming triumph: the cash transfer was associated with higher school enrollment and attendance, and better outcomes in child health, growth, and development (Filmer and Schady 2011; Fernald, Gertler, and Neufeld 2008). Oportunidades was also attributed with decreasing inequity by 21%, according to one study by Zepeda et al. (2019), which decomposed changes in the Gini

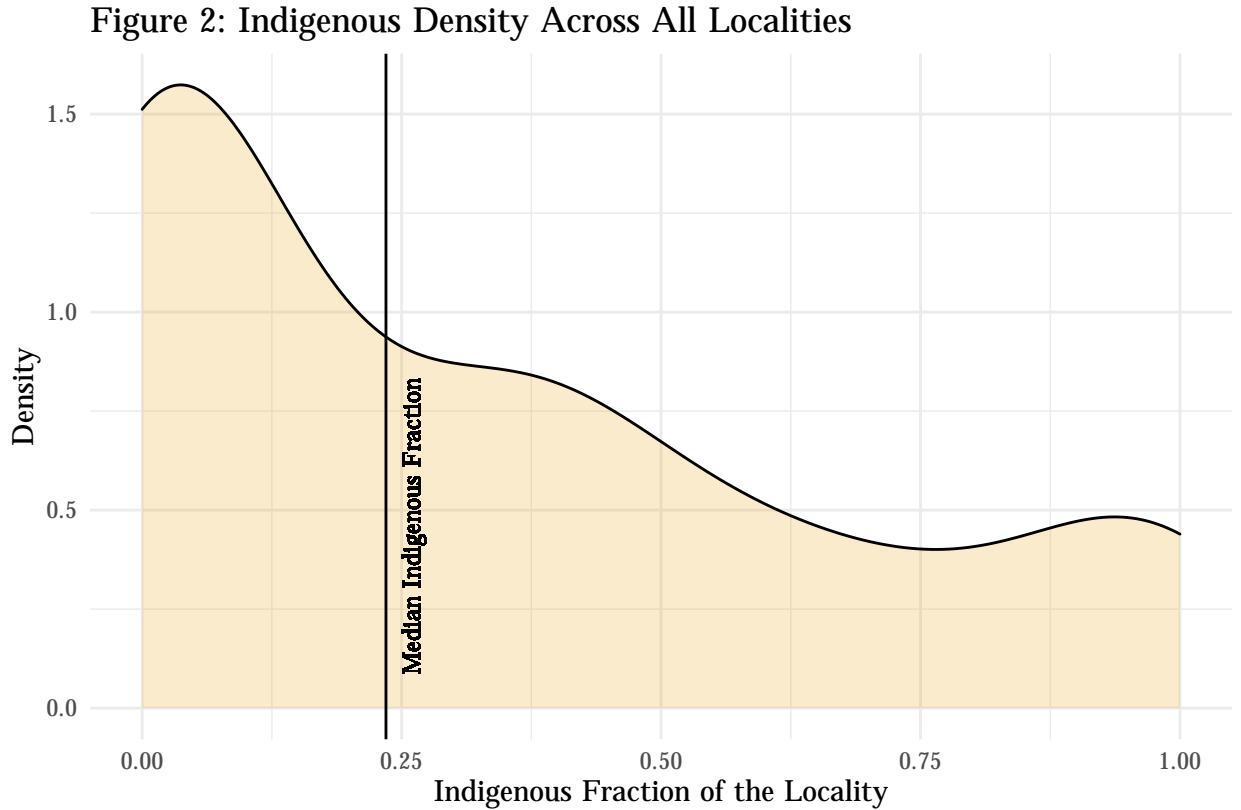
coefficient of Mexico. This program was revolutionary in development economics: its aim was to break the intergenerational cycle of poverty by having a multidimensional approach to poverty with a complex system of identification and selection of qualifying families, in addition to instituting an independent impact evaluation protocol (Niño-Zarazúa 2011).

Given the existing literature, my paper addresses key, unexplored areas in understanding the impact of a CCT on indigenous beneficiaries. I aim to analyze longer-term impacts for indigenous communities (five years after treatment group receives benefits), understand how households differ in long-term investment and assets, and discern the characteristics of eligible indigenous communities which benefit from development programs. These investigations are necessary to understand which types of indigenous households are eligible for such programs, and to understand if Oportunidades succeeds in its goal of increased long-term living standards for poor families.

## 4. Data

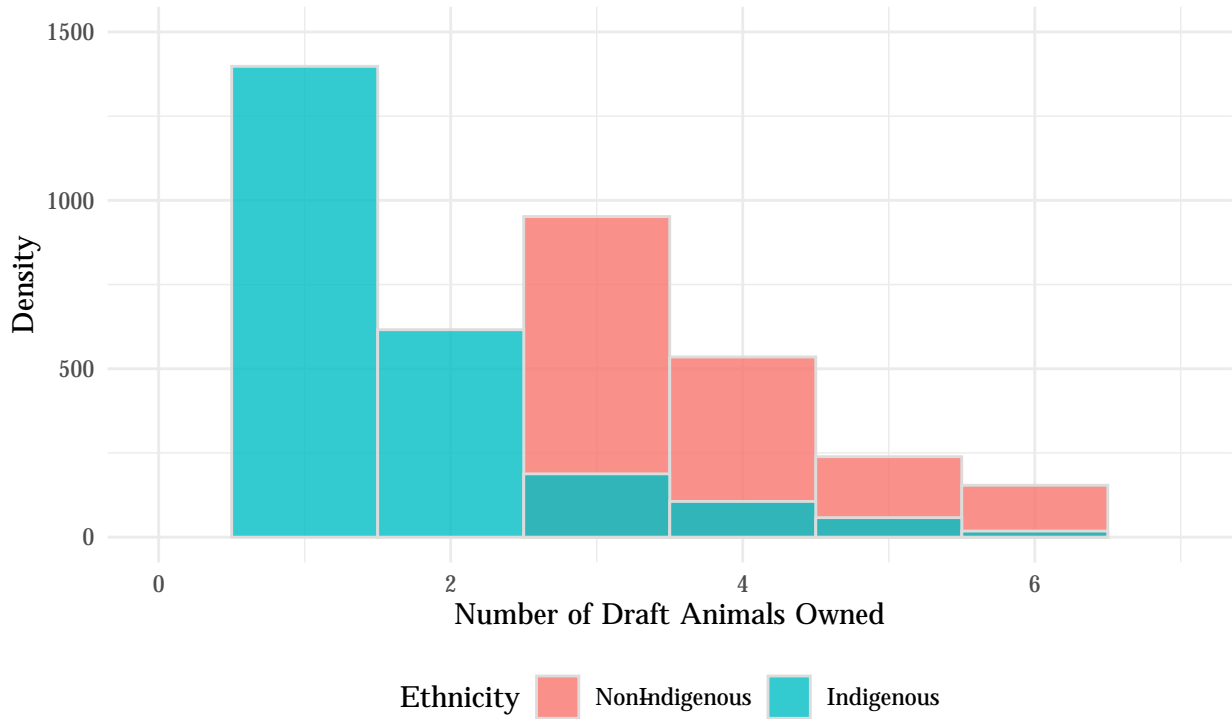
I am using the longitudinal dataset collected for evaluating Oportunidades from 1997 (the baseline period) to 2003. This data is composed of household survey responses to questions in the ENCEL (Encuesta Evaluación de los Hogares, or Household Evaluation Survey) regarding demographics, education, health, consumption, gender issues, migration, assets, poverty, and more. This data includes approximately 12,000 households' information (7,658 eligible and 4,644 ineligible households) from 506 communities (320 treatment and 186 control localities) in seven poor, southern states (Guerrero, Hidalgo, Michoacán, Puebla, Querétaro, San Luis Potosi, and Veracruz). Approximately 52% of the households surveyed self-identified as indigenous. Out of 99 localities, about 21% of localities identified as 50% or more indigenous. As seen in Figure 2, the median fraction of indigenous households in a locality, across all Oportunidades communities, is about 23%.





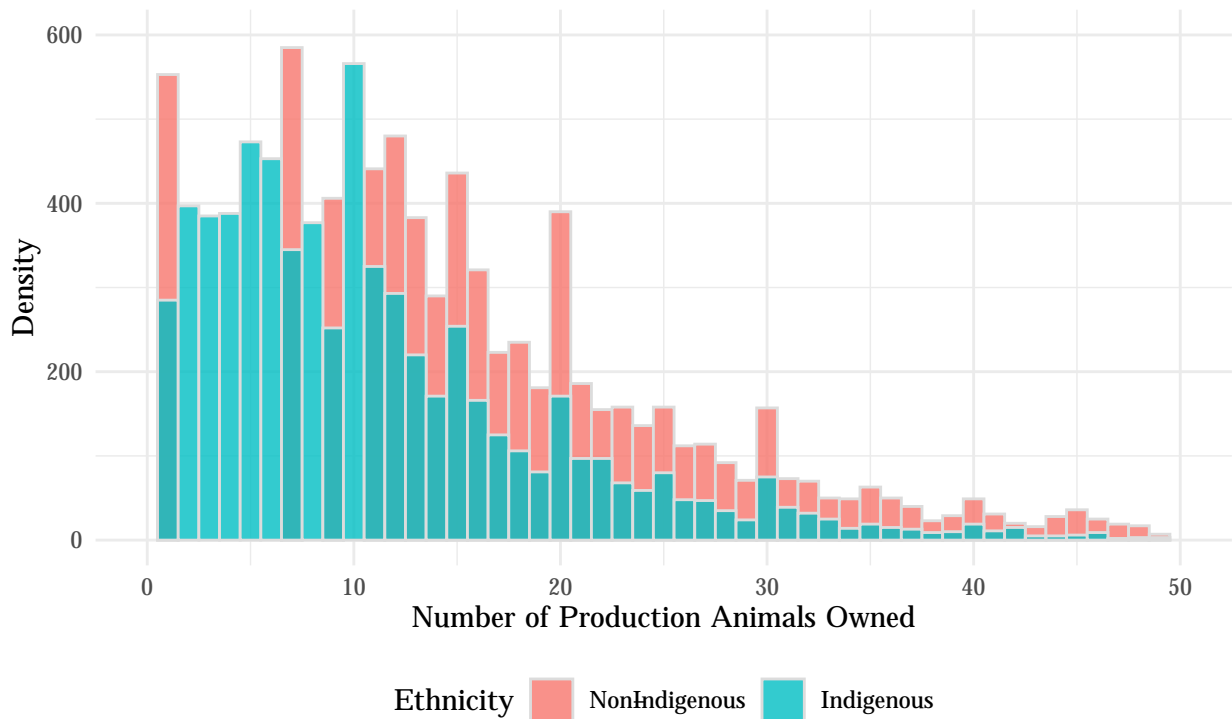
The dependent variables of interest for investment outcomes are animal ownership, animal value, amount of land use, total hectares of land owned, and nonagricultural microenterprise activity. For animal ownership, both draft animal and production animal ownership is relevant, where draft animals are those used for plowing and transportation purposes (donkeys, mules, horses, oxen) and production animals are those whose meat and/or byproducts are sold and eaten (poultry, cows, sheep, goats, rabbits, pigs). Nonagricultural microenterprise activity refers to participation in sewing clothes, making food for sale, carpentry and construction, sale of handcrafts, repair of artifacts or machinery, or other activities done for self-employment. These variables are key indicators of investment for rural households, due to dependence on farmland and local trade, and therefore provide strong signals of investment from households. Levels of these dependent variables at the baseline, for both indigenous and non-indigenous groups, is seen below. In the baseline period, neither indigenous nor non-indigenous households owned any microenterprises.

Figure 3: Draft Animal Distribution Across Ethnicities



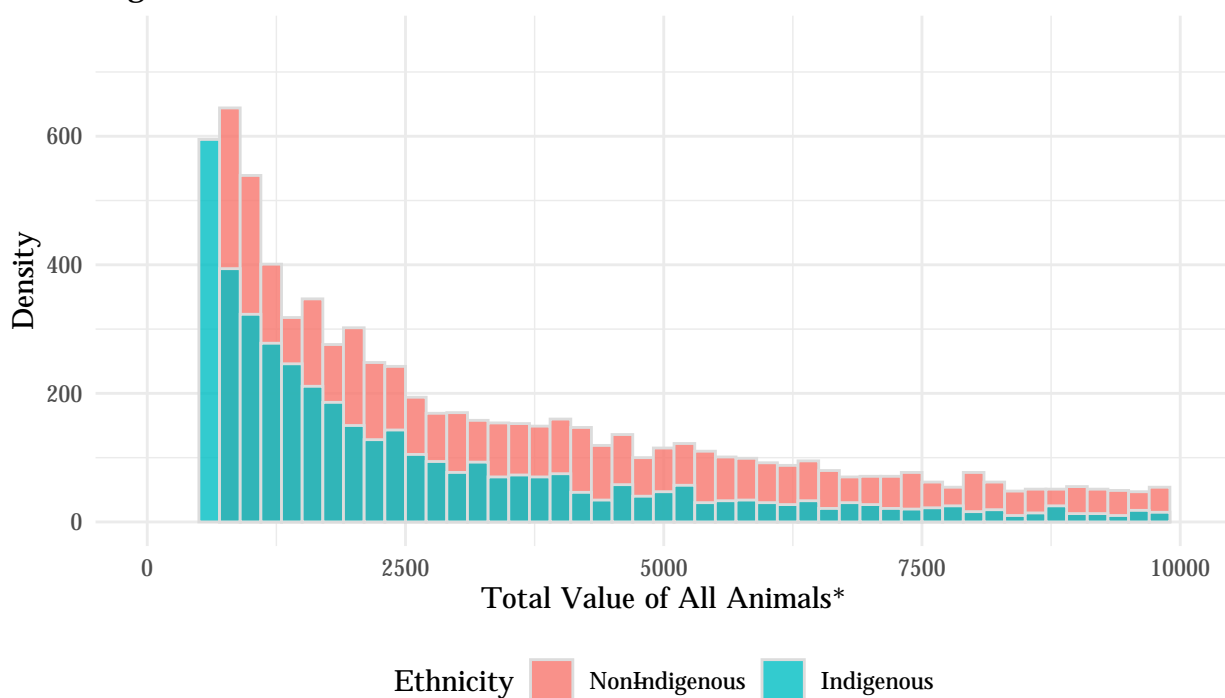
Note: Maximum number of draft animals owned was 23  
Source: 1997 Oportunidades Survey

Figure 4: Production Animal Distribution Across Ethnicities



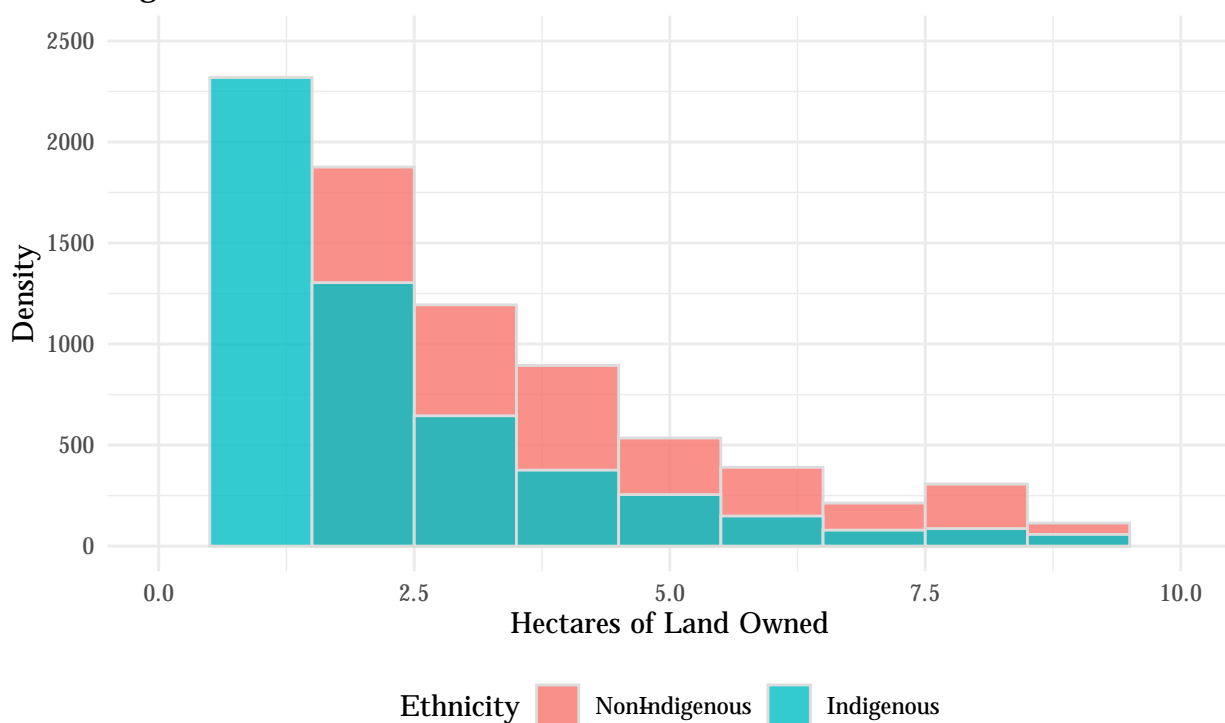
Note: Maximum number of production animals owned was 101  
Source: 1997 Oportunidades Survey

Figure 5: Distribution of Animal Value Across Ethnicities



\*In 1997 prices, using Mexican pesos  
 Note: Maximum value of animals owned was 84,066 pesos  
 Source: 1997 Oportunidades Survey

Figure 6: Land Distribution Across Ethnicities



Note: Maximum hectares of land owned was 24  
 Source: 1997 Oportunidades Survey

The independent variables in my analysis are indigenous status, treatment indicator, and time indicator. In the ENCEL survey, indigenous status is determined by the female head of household. If she speaks an indigenous language, the household is considered indigenous. This is the only indicator of ethnicity in the data.

Finally, there are a number of demographic, household, and community characteristics I use as my control variables from the data. These include: household size and composition; head of household age, education, and ethnicity; binary indicators for home ownership, dirt floor ownership, electricity, agricultural asset ownership; presence of community work associations and distance to large urban center.

## 5. Model and Econometric Strategy

In order to determine initial differences between non-indigenous and indigenous households, and between eligible and ineligible indigenous households, I compare mean pre-intervention characteristics for these groups. The tests for indigenous households and non-indigenous households should confirm that there are no systemic pre-intervention differences between the groups, if Oportunidades was an effectively randomized experiment. I hypothesize, however, that there will be differences in the baseline period between the two ethnic groups. Furthermore, I hypothesize that in the baseline period, ineligible indigenous households will be at lower levels of development than eligible households.

I estimate the program treatment effect on indigenous beneficiaries using a difference-in-difference-in-difference method. I look at two post-program time points for differences: the first of which is six months after the control group begins receiving benefits and the second of which is five years after the treatment group first received benefits, or three years after the control group first received transfers. I interact the treatment indicator, time of intervention indicator, and indigenous indicator variables to determine if treatment impacts

were significantly different between indigenous and non-indigenous households in this CCT program.

I use the following equation to analyze the difference-in-difference-in-difference estimator.

$$Y_i = \alpha + \beta_1 Post_i + \beta_2 T_i + \beta_3 Ind_i + \gamma_1 Post_i T_i + \gamma_2 T_i Ind_i + \gamma_3 Post_i Ind_i + \delta_1 T_i Ind_i Post_i + \eta X_{i,97} + \epsilon_i$$

Where  $Y_i$  indicates our dependent variables of interest in regards to investment outcomes (e.g. draft animal ownership, etc.). We take  $Post_i$  to represent the indicator variable for time of intervention, where *preprogram* = 0 and *postprogram* = 1. We take  $T_i$  to represent the treatment group indicator where *control* = 0 and *treatment* = 1. Finally, we take  $Ind_i$  to be indigenous status where *nonindigenous* = 0 and *indigenous* = 1. We assume the error term,  $\epsilon_i$  to be uncorrelated with the independent variables due to the randomized treatment assignment of Oportunidades. I use ordinary least-squares regression to estimate the other coefficients. The variable  $X_{i,97}$  is a vector of baseline values which we use as our control variables, as mentioned above. The difference-in-difference estimate for the treatment effect for non-indigenous households is  $\gamma_1$  (when  $I_i = 0$ ). The difference-in-difference estimate for treatment effect for indigenous households is  $\gamma_1 + \delta_1$  (when  $I_i = 1$ ). Therefore, the treatment effect for indigenous households and non-indigenous households differs by  $(\gamma_1 + \delta_1) - \gamma_1 = \delta_1$ , which is also the coefficient of the triple interaction term, or the difference-in-difference-in-difference estimate. This coefficient  $\delta_1$  is our variable of interest.

Furthermore, by including the interaction variables between all combinations of the three independent variables – time of intervention indicator, treatment indicator, indigenous status – there is an automatic robustness check, as the interaction variables in my model capture the relationships between the different endogenous variables. The coefficient when  $Time \times Treatment = 1$  implies that households are non-indigenous; when  $Treatment \times Indigenous = 1$ , the coefficient implies the data is pre-cash transfer; and when  $Time \times$

$Indigenous = 1$ , the coefficient implies that households are in the control group. Therefore, when the coefficient  $Time \times Treatment \times Indigenous = 1$ , it reveals the true effect of treatment on indigenous households in the time period post-treatment.

I hypothesize that there will be few differences in program impacts for indigenous beneficiaries and non-indigenous beneficiaries. Since Oportunidades randomized treatment assignment at the locality level, it is unlikely that there was high variation in the geographic characteristics of rural households in the program. Consequently, I believe that the negative geographical factors which affect indigenous households will be limited for those in the program. Therefore, I can assume that differences, if any, between indigenous and non-indigenous households can be attributed mainly to cultural factors, as mentioned before. I will further explore these issues when discussing my findings. It is important to note that while restrictions on size, geography, and service access were necessary given the nature of Oportunidades, these boundaries likely led to the exclusion of localities with a higher concentration of poor households (Skoufias, Davis, and Vega 2001).

## 6. Results

First, I conduct two equality of means test at the baseline period. I want to understand if there are any statistically significant differences between (1) indigenous and non-indigenous households; (2) eligible and ineligible indigenous households. I conduct a two-sided t-test to understand this information.

The difference in means between indigenous and non-indigenous households at the baseline period is highly statistically significant at the 99% level in all of the dependent variables that I am analyzing (Table 1). Therefore, I can conclude that the randomization was not effective at the ethnicity level. For every different indicator of investment, indigenous households have lower levels of ownership, or value of ownership, than non-indigenous households.

At the baseline (pre-treatment), indigenous households are living at lower standards of living.

Table 1: Equality of Means Test at the Baseline – Indigenous and Non-Indigenous Households

Outcome	Indigenous			Non-Indigenous			p-value
	N	Mean	SD	N	Mean	SD	
Draft animals ownership = 1	8185	0.297	0.457	15621	0.421	0.494	0***
Production animals ownership = 1	8184	0.837	0.369	15617	0.811	0.392	0***
Value of draft animals (in pesos)	8185	411.897	1166.987	15621	878.197	2264.042	0***
Value of production animals (in pesos)	8184	1955.738	4372.042	15617	3008.523	6212.508	0***
Land use = 1	8185	0.686	0.464	15621	0.579	0.494	0***
Hectares of land owned	8157	1.896	2.782	15514	2.105	3.298	0***

While the sample size of ineligible indigenous households is not extremely large, the results are surprising (Table 2)<sup>1</sup>. Ineligible indigenous households were excluded from receiving benefits because they were actually at higher standards of living than indigenous households who were eligible for the transfer. This reveals that Oportunidades was effective in its choice of low-income participants. However, it also raises the question: how many of the poorest indigenous people were left out of the CCT program? While I cannot currently answer this question, as I do not have comprehensive demographic data regarding all indigenous households in Mexico, this is a potential avenue for future research. Given that Oportunidades required specific, location-based parameters, it is possible that this CCT program targeted relatively more well-off indigenous households, as eligible households were required to be in the proximity of a health center and a school.

Table 2: Equality of Means Test at the Baseline – Eligible and Ineligible Indigenous Households

Outcome	Eligible			Ineligible			p-value
	N	Mean	SD	N	Mean	SD	
Draft animals ownership = 1	7132	0.287	0.453	1053	0.361	0.48	0***
Production animals ownership = 1	7131	0.839	0.368	1053	0.827	0.378	0.341
Value of draft animals (in pesos)	7132	383.323	1078.632	1053	605.428	1632.501	0***
Value of production animals (in pesos)	7131	1784.91	3978.777	1053	3112.594	6312.969	0***
Land use = 1	7132	0.68	0.466	1053	0.726	0.446	0.002**
Hectares of land owned	7114	1.8	2.604	1043	2.552	3.712	0***

<sup>1</sup>Note: \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$

First looking at draft animal ownership in the short-term – a year after the control group receives cash transfers – indigenous households in the treatment group did not own as many draft animals as non-indigenous households in the control group; this is significant at the 90% level (Table 3). In the long-term, three years after the control group began to receive transfers, indigenous beneficiaries still owned fewer draft animals, and this difference is statistically significant at the 99% level. This is inconsistent with the hypothesis that indigenous households benefit from the CCT in the long-term, and that the benefits of the cash transfer affect the entire treatment group similarly. It is also important to note that the coefficients of *Indigenous* are also statistically significant at the 99% level. The indigenous-specific effect is strong: indigenous households own fewer draft animals compared to non-indigenous households. These results, in the context of results from the following regressions, are surprising. However, this difference in draft animal ownership could be attributed to indigenous households in the treatment group shifting resources away from draft animals to other endeavors, such as microenterprise or production animal ownership.

In regards to production animals, animals whose meat and byproducts are sold, there are no significant differences between the indigenous treatment group and non-indigenous treatment group (Table 4). Surprisingly, in the short-term, there is a small increase in production animal ownership for indigenous beneficiaries; this effect reverses in the long-term, as production animal ownership slightly decreases for indigenous people relative to the non-indigenous. Since this decrease in ownership is minor, it may indicate that indigenous households invested in high-quality production animals in the short-term, whereas non-indigenous households needed to buy more of the same animal to produce the same output quantities in the long-term as in the short-term. I will revisit this point when analyzing the effect of Oportunidades on production animal value. Ultimately, the results from this regression are consistent with the hypothesis that in the long-run, differences between ethnicities in the treatment group is miniscule.



Table 3: Effect of Treatment and Indigenous Status on Draft Animal Ownership

	<i>Dependent variable:</i>	
	Draft Animal Ownership	
	Short-Term Effects (May 2000)	Long-Term Effects (November 2003)
	(1)	(2)
Time	−0.075*** (0.006)	−0.084*** (0.007)
Treatment	−0.011 (0.008)	−0.017** (0.008)
Indigenous	−0.109*** (0.008)	−0.112*** (0.008)
Time × Treatment	0.051*** (0.011)	0.068*** (0.012)
Treatment × Indigenous	0.016 (0.013)	0.017 (0.013)
Time × Indigenous	−0.053*** (0.011)	0.014 (0.011)
Time × Treatment × Indigenous	−0.035* (0.018)	−0.052*** (0.019)
Observations	46,184	44,920
R <sup>2</sup>	0.159	0.144
Adjusted R <sup>2</sup>	0.158	0.143

*Note:*

\*p&lt;0.1; \*\*p&lt;0.05; \*\*\*p&lt;0.01

Table 4: Effect of Treatment and Indigenous Status on Production Animal Ownership

	<i>Dependent variable:</i>	
	Production Animal Ownership	
	Short-Term Effects (May 2000)	Long-Term Effects (November 2003)
	(1)	(2)
Time	−0.075*** (0.005)	−0.131*** (0.006)
Treatment	−0.012* (0.007)	−0.017** (0.007)
Indigenous	0.016** (0.006)	0.018*** (0.007)
Time × Treatment	0.037*** (0.009)	0.066*** (0.010)
Treatment × Indigenous	−0.014 (0.010)	−0.013 (0.011)
Time × Indigenous	−0.069*** (0.009)	0.012 (0.009)
Time × Treatment × Indigenous	0.001 (0.015)	−0.014 (0.016)
Observations	46,184	44,920
R <sup>2</sup>	0.240	0.235
Adjusted R <sup>2</sup>	0.239	0.234

*Note:*

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

Understanding the differences in value of draft animal ownership is essential to understanding the inequity between indigenous and non-indigenous households (Table 5). In the short-term, indigenous beneficiaries own draft animals worth 75 pesos less than non-indigenous counterparts, but this difference is not statistically significant. In the long-term, this disparity decreases, but it is now significant at the 90% level. It is also important to note that the difference in indigenous and non-indigenous draft animal values – regardless of treatment assignment – is significant at the 99% level. Here, we see that the CCT program was successful in increasing the standards of living for treatment groups, but there remains an imbalance between the two ethnicities in the study. One of the reasons that this difference arises may stem from language barriers for indigenous people. Given that many sales occur through a negotiation or bartering system in rural communities, indigenous households could be at a cultural disadvantage due to language barriers. While the gap between indigenous and non-indigenous beneficiaries decreased due to the CCT, indigenous households may still have had to overcome systemic issues to reap the full benefits of the program.

Similar to the above findings, the value of production animals for indigenous beneficiaries is relatively less than non-indigenous beneficiaries in both the short-term and long-term (Table 6). These differences are not statistically significant, which follows the hypothesis detailing the benefits of the CCT program. While there do remain differences in production animal value, possibly for the same cultural barriers as previously stated, there is ultimately not a large discrepancy between the two ethnic groups. This is likely because Oportunidades specifically targeted rural groups. These types of households probably used the transfer from the program towards similar investments. In this perspective, one can assume the lifestyle differences between the two groups to be null, and consider only certain cultural or language barriers to be the root of such variation.

Table 5: Effect of Treatment and Indigenous Status on Value of Draft Animals

	<i>Dependent variable:</i>	
	Draft Animal Value (in pesos)	
	Short-Term Effects (May 2000)	Long-Term Effects (November 2003)
	(1)	(2)
Time	−384.307*** (23.667)	−67.892** (27.534)
Treatment	−13.984 (30.254)	−14.176 (33.714)
Indigenous	−341.566*** (29.741)	−349.208*** (33.059)
Time × Treatment	130.253*** (43.111)	228.121*** (48.041)
Treatment × Indigenous	−16.194 (47.443)	−12.789 (52.832)
Time × Indigenous	44.643 (41.598)	56.612 (45.628)
Time × Treatment × Indigenous	−74.840 (69.632)	−150.684* (77.105)
Observations	46,184	44,920
R <sup>2</sup>	0.078	0.071
Adjusted R <sup>2</sup>	0.077	0.070

*Note:*

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

Table 6: Effect of Treatment and Indigenous Status on Value of Production Animals

	<i>Dependent variable:</i>	
	Production Animal Value (in pesos)	
	Short-Term Effects (May 2000)	Long-Term Effects (November 2003)
	(1)	(2)
Time	−1,248.611*** (66.555)	−1,145.276*** (71.564)
Treatment	−620.845*** (85.079)	−643.031*** (87.628)
Indigenous	−619.205*** (83.635)	−656.346*** (85.924)
Time × Treatment	654.211*** (121.234)	650.736*** (124.864)
Treatment × Indigenous	38.731 (133.418)	42.657 (137.317)
Time × Indigenous	−272.972** (116.981)	237.482** (118.593)
Time × Treatment × Indigenous	−74.805 (195.816)	−169.566 (200.405)
Observations	46,184	44,920
R <sup>2</sup>	0.110	0.099
Adjusted R <sup>2</sup>	0.109	0.099

*Note:*

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

When understanding the impact of treatment on indigenous beneficiaries in regards to land use, there is a small but positive effect in the long-run; this is not statistically significant (Table 7). This is further evidence of the original hypothesis. These results are also notable because there is evidence that indigenous groups use their land more than non-indigenous groups, and that this disparity is significant at the 99% level. Land use is defined as the management and modification of the environment or wilderness around a settlement; this could take the form of an arable field, pasture, or managed woods. Since indigenous households are historically known to “live in balance with the environment,” and are considered leaders of biological diversity, it is unsurprising that such households manage the area surrounding their homes. (United Nations Human Rights Office of the High Commissioner, n.d.) It seems likely that indigenous households also use their land for personal food production and consumption relatively more than non-indigenous households.

Similar results are seen in the total hectares of land owned: indigenous beneficiaries own more hectares of land than non-indigenous beneficiaries, in both the short-term and the long-term (Table 8). While these differences are not statistically significant, they are consistent with the hypothesis that CCT programs affect treatment households, regardless of ethnicity, similarly. Furthermore, these results follow the idea that indigenous households rely on their home and land for sustenance, and that when given higher transfusions of money, invest in their properties.

Table 7: Effect of Treatment and Indigenous Status on Land Use

	<i>Dependent variable:</i>	
	Land Use	
	Short-Term Effects (May 2000)	Long-Term Effects (November 2003)
	(1)	(2)
Time	−0.037*** (0.006)	0.022*** (0.006)
Treatment	−0.017** (0.008)	−0.017** (0.008)
Indigenous	0.055*** (0.008)	0.070*** (0.008)
Time × Treatment	0.053*** (0.011)	0.058*** (0.011)
Treatment × Indigenous	0.029** (0.012)	0.025** (0.012)
Time × Indigenous	0.022** (0.011)	0.009 (0.010)
Time × Treatment × Indigenous	−0.026 (0.018)	0.005 (0.018)
Observations	46,184	44,920
R <sup>2</sup>	0.243	0.247
Adjusted R <sup>2</sup>	0.243	0.247

*Note:*

\*p&lt;0.1; \*\*p&lt;0.05; \*\*\*p&lt;0.01

Table 8: Effect of Treatment and Indigenous Status on Total Hectares of Land Owned

	<i>Dependent variable:</i>	
	Total Hectares of Land	
	Short-Term Effects (May 2000)	Long-Term Effects (November 2003)
	(1)	(2)
Time	−0.795*** (0.031)	0.392*** (0.065)
Treatment	−0.328*** (0.040)	−0.272*** (0.079)
Indigenous	−0.119*** (0.039)	−0.096 (0.077)
Time × Treatment	0.428*** (0.057)	0.130 (0.113)
Treatment × Indigenous	0.185*** (0.062)	0.182 (0.124)
Time × Indigenous	−0.122** (0.055)	0.202* (0.107)
Time × Treatment × Indigenous	0.031 (0.092)	0.198 (0.181)
Observations	46,184	44,920
R <sup>2</sup>	0.368	0.150
Adjusted R <sup>2</sup>	0.367	0.149

*Note:*

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



Microenterprise ownership is the last dependent variable observed to measured economic or production outcomes (Table 9). In the short-term, treatment indigenous households are more likely to own a microenterprise than non-indigenous beneficiaries, and this difference is statistically significant at the 99% level. While this divergence is not statistically significant in the long-term, indigenous beneficiaries are still more likely to own a microenterprise. This could explain why draft animal ownership and value decreased for indigenous recipients relative to the non-indigenous: indigenous households invested the cash transfer towards domestic production involved in a microenterprise. Research shows that this trend for indigenous communities holds across different countries. Indigenous societies throughout the world build unique, community-oriented styles of entrepreneurship, with diverse livelihood outcomes (Cahn 2008). In fact, indigenous cultures and ways of life are intricately interwoven with rural entrepreneurial activity. These results prove that given an infusion of cash, indigenous households can become pioneers in small business, which may be crucial in understanding the economics of rural indigenous life.

Table 9: Effect of Treatment and Indigenous Status on Microenterprise Ownership

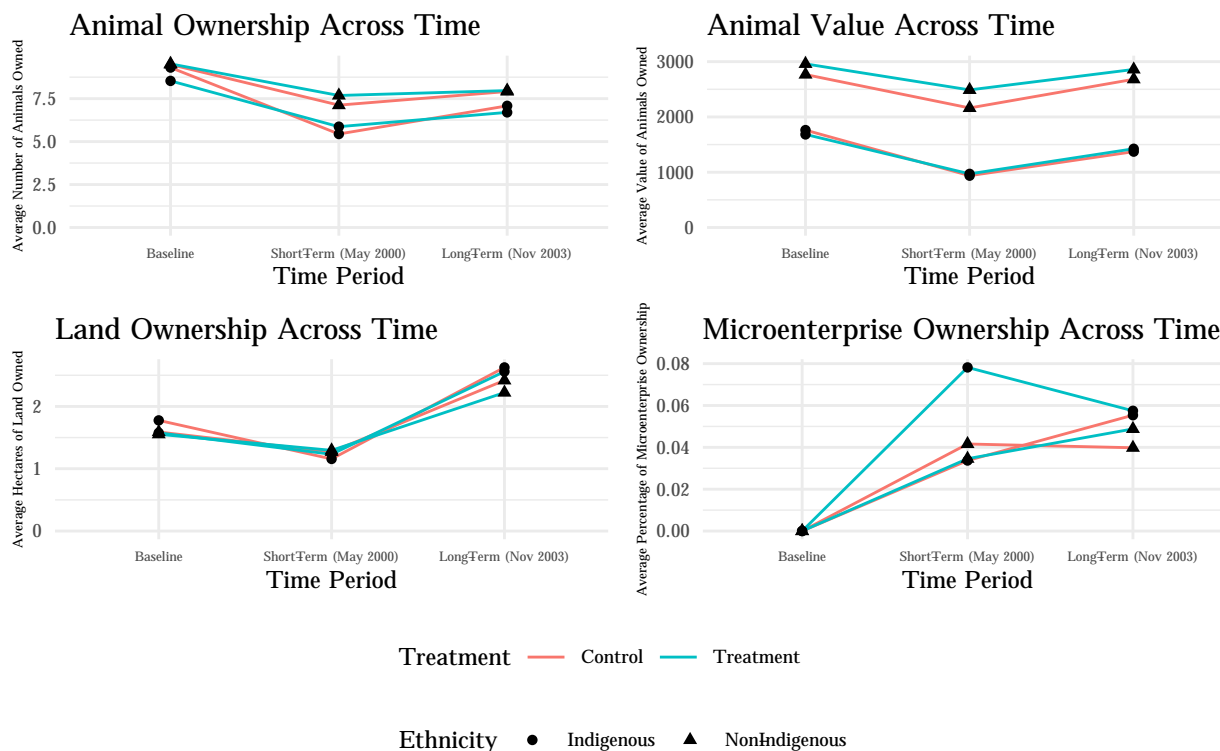
	<i>Dependent variable:</i>	
	Microenterprise Ownership	
	Short-Term Effects (May 2000)	Long-Term Effects (November 2003)
	(1)	(2)
Time	0.046*** (0.002)	0.056*** (0.002)
Treatment	0.001 (0.003)	0.002 (0.003)
Indigenous	0.0001 (0.003)	−0.001 (0.003)
Time × Treatment	−0.013*** (0.004)	−0.010** (0.004)
Treatment × Indigenous	−0.002 (0.004)	0.0003 (0.005)
Time × Indigenous	0.004 (0.004)	0.003 (0.004)
Time × Treatment × Indigenous	0.040*** (0.006)	0.005 (0.007)
Observations	46,184	44,920
R <sup>2</sup>	0.035	0.034
Adjusted R <sup>2</sup>	0.034	0.033

*Note:*

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

These results can be summarized with the following graphs to give a general understanding of the differences between indigenous and non-indigenous investment across time periods. Both groups follow a similar pattern: a dip in ownership and value immediately following the transfer, and rise in these outcomes in the long-term. Microenterprise ownership is the anomaly: ownership increases in the short-term, but decreases in the long-run.

**Figure 7: Outcomes Over Time for Each Group**



*Source: 1997, 2000, and 2003 Oportunidades Surveys*

## 7. Conclusion

In sum, the differences between indigenous beneficiaries and non-indigenous beneficiaries are not statistically significant for the most part, especially in the long-term. The benefits of Oportunidades were roughly the same for households of each ethnicity. In the instances where indigenous households did not benefit as much as non-indigenous parties, the results can be partly attributed to baseline differences between the groups. Given that indigenous

households were at lower levels of development prior to the program, the great strides in equality made through the CCT are notable.

It is important to note that the indigenous-specific results for different variables of investment outcomes were mostly negative. When not accounting for treatment status or time indication, it seems that the baseline differences between indigenous households and non-indigenous households persist. This could be for a number of different reasons pertaining to the cultural differences of the two groups. Indigenous households are more likely to lack exposure to the local market economy, and may find trouble bartering in this type of system due to language barriers, which is especially relevant when understanding animal ownership and value. These households may lack knowledge about the best type of draft animals for farming, or potentially place more value on production animals to take advantage of the meat and byproducts these animals provide. Indigenous people's strong value of land may encourage more investment in land use, land ownership, and microenterprises. While indigenous households' ownership and value of animals is lower relative to non-indigenous beneficiaries, indigenous households actually have higher levels of land use and total hectares of land owned. These findings are consistent with that of Brush and Perales (2007) and Toledo et al. (2003). Indigenous households are proven to have the highest levels of sustainability and biodiversity in their rural communities. The increased investment in land use and total hectares of land owned due to the CCT all follow this claim.

Levels of animal ownership and animal values over time are also interesting to observe in Figure 7. Both indigenous and non-indigenous beneficiaries exhibit declines in these areas three years after the initial cash transfer, but exhibit increases in the six years after the baseline period. I theorize this occurs due to families shifting towards microenterprise investment soon after program inception. As cash transfers dwindled, it may have been more difficult for families to support their small business, resulting in its decreased popularity in 2003, and more balanced investment in the other areas of rural life. The trend of microen-

terprise ownership may be a key aspect of understanding effective development programs for indigenous groups. Given indigenous enthusiasm for these micro-businesses, evidenced through creation during Oportunidades and supporting research, it is useful to consider how such successes can be replicated in the future. The development of these businesses could be significant in increasing the economic outcomes and livelihoods of rural communities not only in Mexico, but in other countries with high indigenous populations.

It is important to realize that many indigenous households were likely excluded from eligibility for this program, and not due to their relatively higher levels of development, as explained in Table 2. Given the stringent locality requirements for eligibility, the poorest indigenous households were likely not helped due to lack of access to certain health and educational centers. This is a limitation of my thesis: due to difficulty obtaining data, I was not able to understand how indigenous beneficiaries within Oportunidades compare to all Mexican indigenous households, and this remains a fundamental question to answer. Furthermore, to garner a more complete understanding of long-term investment by households, exploring how the cash transfers affected total agricultural income and consumption would be helpful. Finally, studying the effects for beneficiaries ten or more years after first receiving stipends would be crucial in determining how communities fare after not receiving cash transfers anymore. Understanding how indigenous beneficiaries' investments fared because of Oportunidades is valuable, and expanding this research to encompass more dependent variables, detail the characteristics of eligible indigenous households, and investigating longer-term effects remains important. To create effective policy measures for the most marginalized, it is necessary to comprehensively understand current inequities and attempted solutions.

I interpret this paper's findings as evidence of a CCT's differential impacts by indigenous status in a context where geographic factors, such as remoteness and service access, did not differ substantially by beneficiaries' indigenous status. When geographic factors are fairly similar between the two ethnic groups, it is clear that a CCT program can have approx-

imately similar impacts for both groups. Therefore, cultural barriers do not pose an intrinsic barrier to a CCT program's effectiveness on indigenous households. Furthermore, there is evidence that cash transfers increase living standards even five years after implementation for indigenous and non-indigenous beneficiaries. Given these findings, it is probable that Oportunidades had a significant effect on raising long-term standards for both indigenous and non-indigenous households.

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