Slum Upgrading: Short Term Results from an Urban Road Pavement Experiment in Mexico*
VERY PRELIMINARY

Marco Gonzalez-Navarro
UC Berkeley †

Climent Quintana-Domeque
Universitat d'Alacant ‡

January 2010

Abstract

Urban peripheries in many developing country cities lack basic local public goods like pavement, water, sewerage and electricity. This is the first paper to obtain welfare impacts of slum infrastructure upgrading using an experimental design. Specifically, the paper reports results from an experiment in urban road pavement provision in Mexico. The results suggest that households living in streets that were paved obtained more credit and increased motor vehicle ownership. They also presented higher income and expenditures and were more likely to have made home improvements. This suggests some channels through which urban slum upgrading can affect growth.

JEL: C92, C93, H41, O15, O12

*We would like to thank Anne Case, Angus Deaton, Alan Krueger, David Lee, Adriana Lleras-Muney, Sam Schulhofer-Wohl, Christina Paxson, and Cecilia Rouse for their help and advice in this research project. The collaboration of the Acayucan 2005-2007 and 2008-2010 Municipal administrations is gratefully acknowledged. We also recognize the effort of José Luis Palma, Luz Uribe and Monica González at INSAD who were in charge of the survey. Financial aid from Princeton University, Princeton Woodrow Wilson Scholars, Princeton Industrial Relations Section, Princeton Research Program in Development Studies, Universitat d'Alacant, and the Lincoln Institute of Land Policy is gratefully acknowledged. Any errors contained in the paper are our own.

†50 University Hall, MC 7360 Berkeley, CA 94720. Email: marcog@berkeley.edu

‡Economics Department, Universitat d'Alacant, Sant Vicent 03690 Alicante, Spain Email:climent@ua.es

1 Introduction

A highly informative picture of many developing countries can be drawn by observing three urban structure stylized facts. First, there is a widespread lack of public services and infrastructure. Second, this absence is mainly located on the outskirts of urban areas. Third, it is precisely in these areas where we tend to observe the worst social welfare indicators. From a development economics perspective, and more generally, from a public policy point of view, it is important to understand to what extent the relationship between poverty and lack of public services reflects a mere correlation, or whether the lack of public services is a bottleneck in the process of development of such areas. In particular, it is important to obtain reliable estimates of the effects of alternative public services and infrastructure investment on people's welfare.

As Gramlich (1994) recognizes, there are surprisingly few available calculations of rates of return of infrastructure investment, even though public spending on infrastructure in developing countries averaged 9% of government spending (World Bank, 1994). While road paving is an important component of government expenditures, its consequences or effects have been rarely explored (One exception is Songco (2002)). The majority of studies on the effects of infrastructure investment are concerned with economic growth and macroeconomic concerns, as in Esfahani and Ramirez (2003), or Aschauer (1989).

In this paper, we describe a randomized control trial in urban road pavement implemented in Acayucan, Mexico between 2006 and 2009. We are interested in measuring the impact the infrastructure had on the benefitted areas in terms of beneficiaries' welfare indicators and economic activity. The experimental design consisted of randomly selecting from a pre-approved set of street projects - defined as contiguous sets of unpaved city blocks connecting to the city's pavement grid - a subset to be treated with the infrastructure.

The randomization was possible thanks to the collaboration of the Acayucan municipal government. We ran a baseline survey in 2006 and a follow up survey in 2009 to obtain information required to measure the effect of the pavement on people's welfare.

The design of such an experiment was motivated because of three distinct reasons. First, accessibility to paved streets is likely to increase house valuation.[1] This increase in the value of physical capital may allow households to use housing as collateral in order to have access to credit, which is a potential source of development and economic growth. Second, the Acayucan Municipal Government was aware of the fact that there was a strong demand for pavement by the inhabitants of the city. This was borne out in our survey: pavement is ranked as inhabitants' first priority regarding the provision of public services. Third, a social experiment is appealing because randomization ensures that, when the sample subject to random assignment is large enough, the control and treatment samples will not be different in the distribution of their observed and unobserved characteristics. Hence, the comparison of post-treatment means can provide a consistent estimate of the average causal effect of this kind of public infrastructure in this setting.

The structure of the paper is as follows. Section 2 presents a review of recent literature on infrastructure and economic development. Section 3 describes the experimental design. Section 4 presents descriptive statistics from the baseline survey conducted in 2006. In Section 5 we present evidence that the randomization produced a balanced sample between treatment and control groups in terms of observables. Section 6 provides results of the experiment, and section 7 concludes.

2 Literature Review

Our study is part of the growing literature studying the impact public infrastructure has in the context of a developing country. Despite a widespread belief that infrastructure is integral to development, evidence on how investment in physical infrastructure affects productivity and individual wellbeing remains limited (see World Bank (1994) and Jimenez (1995) for a review of the literature).

[1] In the baseline survey, for every street block that separates a house from the pavement grid, the value of the house is on average 22% lower.

An important challenge for any study of infrastructure is that a simple comparison of treated to non-treated areas in observational data can be misleading. For example, Duflo and Pande (2007) argue that a comparison of outcomes in regions with and without dams does not provide causal estimates because these regions will differ along other dimensions. The same point is made in Gramlich (1994), which highlights the importance of identification strategies robust to selection issues.

A recent paper studying the microeconomic impact of infrastructure is Dinkelman (2008). Her study of rural household electrification in South Africa exploits variation in timing and location of electrification projects to estimate the impact of electrification on employment and fuel use. Using land gradient as an instrument for electricity project placement, she finds that five years after electrification, households are more likely to use electricity in home production and that females are more likely to be employed outside the home. The link between these two is that by reducing wood collection time, women can dedicate more time to labor market activities.

Another important work is Duflo and Pande (2007), who study the effects of physical infrastructure in the form of dams in India. They are interested in the productivity and distributional effects of large irrigation dams. Using an instrumental variable estimation strategy that exploits the fact that river gradient affects a district's suitability for dams, they distinguish between districts located downstream from those in which the dam is located. They find that, on average, downstream from an irrigation dam agricultural production increases, vulnerability to rainfall shocks declines, and rural poverty falls. In contrast, in districts where the dam is located, on average rural poverty increases.

Other forms of infrastructure investment like roads and railroads are aimed at reducing trading costs. The impact of railroads on trade and welfare in India has been recently analyzed by Donaldson (2008). His study focuses on the impacts of railroad infrastructure created by the British in India in the late XIX$^{\text{th}}$ and early XX$^{\text{th}}$ century, and provides evidence that railroads increased trade between Indian districts, increased income and reduced

income volatility.

The case of rural roads is taken up in Jacoby (2000), who focuses on the case of Nepal. In order to estimate the household level benefits of road projects, he uses the relationship between the value of farmland - understood as an asset whose price equals the net present value of the profits it provides - and its distance to agricultural markets. Combining household survey data with land values and distance to markets, he obtains hypothetical distributional impacts of building roads in Nepal. He concludes that providing extensive road access would confer substantial benefits on average, especially for poor households, but would probably not reduce inequality.

The macroeconomic literature assesses social economic rates of return to infrastructure using a production function. The returns are estimated using a growth regression. Economic returns to roads are estimated at 80-200% (Canning and Bennathan 2000, Briceño, Estache, and Shafik 2004). An extensive tradition in macroeconomics has looked at the impact of infrastructure using growth regressions, see for example Fan and Chan-Kang (2005).

This paper seeks to contribute to the infrastructure literature by describing the results of an experiment in urban infrastructure provision and determining what welfare changes were generated for the affected population. This is an important research area given the debate in the infrastructure literature about the merits of investing in rural or urban infrastructure (Henderson, 2002).

3 Experimental Design

3.1 Institutional Context

Acayucan is a municipality in the southern part of the state of Veracruz, in eastern Mexico. According to the 2005 short Census (Conteo), the municipality has a population of 79,459, with the city accounting for about 50,000. The average altitude is 100 meters above sea level,

with tropical climate. The sex ratio is 0.89 males for every female.[2] 58% of the population lacks health insurance. Of those aged 15 and more, 9% are illiterate. School enrollment is 94% among adolescents aged 12-14 (See column 1 in Table 1).

In terms of household level variables, electricity is enjoyed by almost everyone with 98% of homes having electricity in their property. Tap water is less common: 16% of private inhabited dwellings report not having access to piped water in their lot or home. In terms of assets, 81% of homes have a refrigerator, 55% have a washing machine, and 14% have computers. For comparison purposes, columns 2 and 3 of Table 1 report the same characteristics using the baseline results from the survey we fielded in 2006 in the experiment areas. The outcomes from the survey are close to those of the average for the city, with the exception of computer ownership and number of rooms in the house, which are smaller for inhabitants from our survey. Although census tracts with streets that are part of the experiment have worse indicators than census tracts in the downtown area of the city, there are many areas that were not part of the experiment with even worse socioeconomic indicators. This highlights the fact that although the experiment took place in parts of the city that are relatively poor, they did not contain the poorest households, which tend to live in scarcely populated areas, where the municipal government was not yet interested in providing urban road infrastructure. The selection of the experiment areas and its likely external validity will be discussed in section 3.2 below.

Municipal governments in Mexico have as their main responsibilities garbage collection, paying for public street illumination, providing local public safety, regulating businesses, tending to public gardens, and providing and maintaining public infrastructure including sewerage, road pavement, and sidewalks. Each three-year administration has freedom to choose what it will focus its budget on.

Mexico's government obtains its funds mainly from a national VAT, a national income

[2]Grech et al (2003) have documented a falling male to female ratio in all of Mexico, but well above one. The only explanation we have encountered in the literature for low male to female sex ratios such as the one in Acayucan is the existence of male migrant labor (See Bean, King, and Passel, 1980).

tax, and oil proceeds from the state-run oil company. These funds are shared by the three orders of government: Federal, States and Municipalities. Hence, funding of the municipal government comes mainly from transfers from the Federal and State Government. A significant portion of these transfers is conditional on being spent on things like infrastructure. Local sources of revenue (mainly the urban property tax) account for less than 10% of the total municipality budget.

3.2 The Experiment

The 2005-2007 Acayucan administration campaigned on a platform promising to focus on pavement in city areas lacking these services. However, the infrastructure needs of the city were much larger than what could be provided for with the municipality budget. Under these circumstances, we proposed a randomized evaluation of their urban road pavement infrastructure investments.

Throughout the city, there are many streets without pavement. The administration was interested in upgrading those with higher population densities, and left for the future areas that were not yet heavily populated. The mayor and the public works personnel provided us with a set of 56 "street projects" they were interested in upgrading throughout the city. The administration was responsible for selecting and defining those projects. The street projects consisted of sets of contiguous city blocks that connected to the existing city pavement grid. One condition for being part of the experiment was for the street not to be paved. Once it became part of the experiment, the city determined if the tap water or sewerage lines would be replaced or upgraded.

Given that the administration would not be able to provide infrastructure to the 56 street projects, council members and the mayor voted to let us use random assignment to choose which roads to pave within the set of interest to them. The administration understood the randomization as a fair and transparent way to assign the infrastructure. The randomization also provides a credible strategy to identify the benefits of such a policy because it manages

to overcome the issues of omitted variables bias, reverse causality, and selection, which are important concerns in the infrastructure literature.

One important challenge for the randomization was the many sources of uncertainty the Municipal government would face during the course of the infrastructure construction. These included volatile government income and input cost fluctuations. Two factors could slow down construction: one was unforeseen weather - construction crews could not perform some important tasks on rainy days -, the second was delays in water pipe installation by the State Water Authority, which is not under direct supervision of the Municipality.

Given that the municipal government is free to choose its infrastructure program, the municipality decided there was no need to announce to the population the existence of this study. Although residents would know whether they got the infrastructure or not, the fact that the municipality did not announce the existence of this study or its relationship to the survey sharply reduces experimenter demand. The questionnaire did not mention that its objective was to measure the effects of infrastructure and field workers were trained to not mention this to respondents. The baseline survey was fielded in February-March 2006 and the first set of areas to be treated were announced in the summer of 2006. The second survey was fielded in February-March 2009.

3.2.1 Street Projects

A street project consists of a contiguous set of unpaved urban blocks to be provided pavement connecting them to the grid of paved streets. Acayucan is an urban area with a development pattern typical of Mexico and other Latin American countries. Census tract data show that the central part of the city is where most businesses are located, and where inhabitants with the best socioeconomic indicators reside. The central part of the city has public services including electricity, sewerage, tap water, pavement, public transportation, and garbage collection.

As distance from the city center increases, public infrastructure and services become

less common. Pavement is one of them. With a hilly terrain and substantial precipitation, most unpaved streets are transitable only for pedestrians. This limits the offer of goods - like garbage collection, gas distribution, and bottled water - inhabitants of these areas have access to. Garbage is commonly burned, and wood is used for cooking instead of bottled gas.

The street projects the administration defined were characterized by lack of pavement, but were characterized by being highly populated. It should be noted that there were unpaved streets in remote areas of the city that were scarcely populated (with many vacant lots) that the administration ruled out as infrastructure candidates. Thus, the streets that are part of the study are mainly in the outer parts of the city, but they are not the most deprived. This means that the context in which the experiment took place is a specific one and affects its external validity. The location of experiment areas throughout the city can be found in Figure 1.

3.2.2 Treatment

By March 2009, 17 of the streets in the treatment group had been completely treated, five were in process but unfinished, and six had not been pursued. Table 2 lists all the projects assigned to the treatment group, the infrastructure they got and the date in which this was completed. Out of the six projects that were not pursued, four were due to technical difficulties: Either a rocky bottom that required dynamite to place the sewer line, when the municipality did not have the technical capacity for this, or the proximity to a river that meant that the project would have to be done jointly with the State Water Authority and was left for the future. In section 5 we provide evidence that the treated and the intent to treat groups were indistinguishable from the control group before the intervention took place.

One problem with the administration having treated 17 projects instead of 28 is the loss of statistical power. During the design of the experiment, 28 treatment and 28 control

projects were deemed to provide sufficient power for our purposes. In the second round of the survey, not only were completed projects less than planned, 5 of them had been completed less than 30 days before the survey took place. This means that outcomes such as sales of businesses located in treatment areas could have been disrupted during construction.

The administration did not agree to constructing treated streets in a random order. They did not agree to this because there are efficiencies when treating streets that are near one another, for example by moving machinery around from one street project to another and traveling a very short distance; establishing a common point close to various street projects to distribute construction material; and having constant supervision of workers.

The intent to treat group went from 0% of households having road pavement to 66% in 2009. In the treated group the change was 0 to 100% between 2006 and 2009. The administration argued that the weather and some technical difficulties prevented the administration from finishing all the infrastructure projects in time for the follow-up survey. They did note that they did fulfill the requirement of not treating the projects randomly assigned to the control group. This is important because under one-sided noncompliance, the Bloom (1984) result tells us how to use the IV formula to estimate the average effect of the treatment (pavement) on the treated.

3.3 Sources of Information

The unit of randomization is the street project. Within each street project, the units of analysis are households. The first round survey was collected in 2006 during the second half of February and the beginning of March. The second round was collected in 2009, again during the second half of February and the beginning of March, with the intention of minimizing seasonality effects in variables such as agricultural income or health status, which may vary systematically according to the season.

The target population of the ASLS consisted of all private households or businesses located on the street projects that were part of the experiment. It should be noted that the

target population is not representative of the city. It merely consists of clusters of households in the outskirts of the city with a relatively high population density but without pavement.

We decided to run a baseline survey because it can provide information on lagged outcomes that can be used as control covariates when estimating the effects of treatment on outcomes, which might improve precision of the estimates, but at the cost of bias (see Freedman, 2008). A second reason is that the baseline survey can provide evidence about whether the randomization actually worked or not. When randomization is done at the cluster level instead of individually, there is a non-negligible probability that the randomization produces groups with different average characteristics (See Bloom, 2006). If the baseline survey provided evidence that treatment and control groups were not the same on average to begin with, average follow-up differences would no longer have a causal interpretation.

3.3.1 Baseline Household Survey

The survey firm created a sampling frame from all inhabited residential dwellings found in experiment streets in early 2006. As recognized by Deaton (1997), the use of out-dated or otherwise inaccurate sampling frames is an important source of error in survey estimates. The sampling procedure was clustered sampling: From the list of dwellings in each cluster we randomly chose a pre-specified fraction of them to be interviewed.

Given the uncertainty about the total number of projects the municipality would be able to conclude by the time of the follow-up survey, we decided to sample with a higher intensity in the treated group (70% of dwellings) than in the control group (50% of dwellings).

Given that some dwellings would contain more than one household (defined as a group of one or more people who live in the same house and share food expenditures), the procedure in case of multiple households per dwelling was to interview all of them. It is worth noting that neither quota sampling nor substitution of non-responding households or individuals (whether refusals or non-contacts) were permitted at any stage.

The household questionnaire collects detailed information for each individual in the

household (*ie.* age, sex, etc.) and characteristics at the household level (*ie.* wall material, electricity availability, etc.). Both household and individual questions were answered by a reference person who was targeted to be either the household head or the spouse/partner of the head. In over 95% of cases the respondent was the household head or the spouse as intended. If the household head or the spouse were not going to be available in a second visit, but a knowledgeable adult was willing to participate, the interview took place.

Survey weights (or expansions factors) represent the inverse of the probability that a dwelling or household is included in the sample. They are constructed taking into account the proportion of households that we attempted to interview in each cluster (50% in control projects and 70% in treatment projects) and cluster specific non-response. In the construction of the weights non response is assumed to be random: it simply inflates the weight given to households in a project that were successfully interviewed.

4 Baseline Data Descriptive Statistics

Tables 3 and 4 provide descriptive statistics for the 2006 (baseline) survey. The survey obtained information from 1,231 households, with an average and median of 4 members, suggesting a nuclear family rather than an extensive household with multiple generations. The survey sample is almost exclusively of mixed Mexican race, given that only 3% of individuals speak an indigenous language. Individuals aged 15 and over have a median of 9 years of schooling (mean of 8.6 years) and 88% of them have ever attended school. Lack of schooling is mostly concentrated among the elderly. 88% of individuals aged 5 and over declare to be literate - defined as being able to read and write a note in Spanish.

Home ownership is relatively high: 83% if households declare to be owners of the property they live on. However, only 71% of homeowners have a title of property. Indeed, some homeowners even declared to have acquired the property by invading it. The survey asked for an estimate of property value, and although non-response for this question is quite high,

Gonzalez-Navarro and Quintana-Domeque (2009) have shown that the probability of non-response is uncorrelated with professionally appraised values of these same properties. The median house value estimate is 100,000 2006 Mexican pesos (14,000 PPP-adjusted 2005 US dollars). Houses in the sample are relatively simple, with a median of 2 rooms (mean of 2.3 rooms), 93% of the homes with cement floor (or better) and 92% with cement walls. Cement roof is not the norm, given that only 37% of homes have it. Asbestos or metal sheets were by far the most common form of roofing. 41% of homes have the bathroom located outside the house. 25% of households use wood or charcoal as cooking fuel. In households that cook with wood the kitchen is typically under a roof outside the main structure.

In terms of labor, 51% of the 4,099 individuals aged 8 and over worked the previous week. A person is defined as working if he or she engaged in any income generating activity or worked without pay in the family business or farm. Among those who worked, the median number of days worked was 6 and the average was 5.5 days. Work is usually 8 hours per day. Multiplying *days worked* by the number of *hours worked per day* provides a measure of weekly hours worked. With a median of 48 and an average of 46.5 hours worked last week, part time employment does not seem to play an important role. Average monthly labor income is 2,752 pesos, with a median of 2,000 pesos (280 PPP adjusted 2005 US dollars). An estimate of the unemployment rate, which excludes students, housewives, the elderly and anyone not looking for work, replicates the low unemployment rates observed in Mexico as a whole. This suggests that the inhabitants of the city's outer neighborhoods do not seem to experience the degree of high joblessness encountered in other urban contexts (See Magruder, 2009).

The last panel in Table 3 provides consumption indicators. Household expenditure is on average 3,268 pesos, with a median of 2,800 pesos. Dividing monthly household expenditure by the number of family members provides a measure of per capita expenditure, which is on average 931 pesos with a median of 750 pesos (around 100 PPP-adjusted 2005 US dollars

per month). The median per capita income is slightly lower than the 2 dollar a day[3] poverty line (Banerjee and Duflo). Participation in government welfare programs, such as Progresa-Oportunidades, DIF food aid, is positive in 7% of households. In terms of durable goods, 12% of households have an automobile, and 8% have a pick up truck. The median household does not have either. In terms of other durable goods, 79% of households have a refrigerator, 51% have a washing machine, 38% have a video player, 20% have a microwave oven, 10% have a personal computer, and 6% have air conditioning. Television and radio ownership were not asked because other surveys have showed that they have been almost universally adopted in Mexican households.

The top panel in Table 4 provides a description of public services. Distance to the nearest paved street is on average 1.4 blocks. Street blocks in Acayucan vary in size but are roughly 200 meters long. 78% of households have tap water in their lot. We learned in the the fieldwork that some households do have a tap water line to their property but do not use it because they have not opened an account with the water company. These families either fetch their water from a neighbor, or use a water well. 87% of homes have a sewerage line connected to the city sewerage system. Electricity was available in practically all homes (98%). 22% of homes experienced a flooding of their home in the past year. Regarding garbage collection, although the service is free and supposedly universal, only 58% of homes declared to have refuse collection services. Those without collection service either burn their refuse or take it to a street where the garbage is actually collected. In terms of public safety, 11% of homes experienced a burglary in the past 12 months, and 62% declare to feel safe walking in their street at night.

In 2006, 17% of households had a bank account, and 10% had a credit card. Use of collateral based credit, such as mortgages and private bank loans was positive for 2.6% of individuals aged 18 and over, whereas uncollateralized credit was positive for 0.4% of individuals (Electronic and furniture store credit, credit card, automobile loans, etc.) Credit

[3]The 2 dollar a day poverty line was for 1985, which is 2.92 dollars in 2005.

from informal credit sources and from friends and family was relatively uncommon, as only 0.4 and 0.7% of individuals reported using credit from these sources in the past year.

91% of children aged 5-17 were enrolled in school, and 21% reported missing at least 1 school day in the past month. 87% of children aged 5-17 were reported to be able to read and write a note in Spanish.

In terms of expectations, 45% of individuals in the sample had plans to out migrate for work reasons. In terms of satisfaction living in Acayucan, the average and the median on a 4 point increasing scale was 3: satisfied. Regarding household investments, when asked about 13 different kinds of home improvements performed in the past 6 months, the average number of improvements was 0.45 and the median was 0. Only 5% of households declared to have opened a business in the past year. 64% of those new businesses were located at home. The most common business was a small shop (*tiendita*) selling candy, sodas, chips, beer, etc.

Satisfaction with the three levels of government was obtained on a 4 point increasing scale. State and Federal government had an average score of 2.55, whereas the Local government had a lower average score of 2.35. The median was "not satisfied" (2) for the local government. Meanwhile, the median score for the State and Federal governments was "satisfied" (3).

5 Baseline Balance

The unit of randomization is the street project, because of the complementarity between contiguous paved road blocks. However, we are interested in the effects of paving streets on people's welfare, which is measured in terms of individual and household outcomes. Randomization ensures that, when the sample subject to random assignment is large enough, the control and treatment samples will not be statistically different in their observed and unobserved characteristics. Hence, the simple comparison of the average outcomes between

treatment and control samples will give us a consistent estimate of the average effect of paving a street, provided the randomization worked properly (or as intended).

In order to test if treatment and control groups were similar in observable characteristics before the treatment took place, Table 5 presents average characteristics for three groups: the group originally assigned to treatment (referred to as "intent to treat" or ITT), the group that was treated by March 2009 (referred to as "treated") and the group originally assigned to the control ("control"). The last two columns in the Table report the difference in means between the ITT and the Control groups, as well as the difference in means between the Treated and the Control group. Standard errors are calculated using the survey weights and clustering at the road pavement project level.[4]

The Table reports baseline characteristics by treatment status for over 50 indicators of demographic characteristics, housing quality, credit, consumption, labor, expectations, investment, public services, schooling of children and satisfaction with government. None of the differences are significant at the 10% level and suggest the randomization worked in generating two groups of similar baseline characteristics even though the randomization of treatment took place without knowledge of baseline characteristics, and there was a real possibility of obtaining a bad draw given the small number of clusters involved.

6 Results

The main purpose of the 2009 ASLS was to create a panel data set that would allow comparisons over time for households that had been interviewed in 2006. Households interviewed in 2006 can be partitioned into two groups: those who stayed in the experimental areas and those that moved out between 2006 and 2009. Due to budgetary reasons, the survey only

[4] An alternative test of equality of means is a two sample t-test with unequal variances between groups using Welch's (1947) approximation. This alternative provides a solution to the Fisher-Behrens problem of testing the significance of the difference between the means of two normal populations with different variances. The standard errors using this alternative test are very similar and are thus omitted.

followed up on non-mover households.[5] Although mover households were not contacted, we do have information about them from the 2006 ASLS that allow us to understand along which dimensions they were different from those who stayed.

Creating a panel data set of households creates important challenges for the survey that must be carefully dealt with. Given that the survey observation unit is the household,[6] it naturally changes over time. For example, a household can be subdivided when a son or daughter marries and the dwelling now has two groups with separate meal expenditures. In order to deal with these issues, a module on household integration was added to the 2009 survey.

Field workers had maps with locations of dwellings interviewed in 2006. They approached the dwelling in 2009 with questionnaires that had a pre-filled section with identifying information about the household that was interviewed in 2006. If the head of the household was the same as in 2006, the households were matched.[7] If there were additional households in the dwelling (new households or subdivisions), they were all interviewed, but were coded as new households (with no household counterpart in 2006). Matched households allow an analysis of changes within households over time.

A second purpose of the ASLS 2009 survey was to be able to measure how the infrastructure provision changed the composition of the neighbors that inhabit the road pavement projects. The characteristics of new neighbors were assessed in two ways. First, by interviewing new households living in dwellings vacated by mover households: if a dwelling that was surveyed in 2006 had a different household in 2009, the new household was interviewed (but had no household counterpart in 2006). The purpose of these surveys is to measure if neighbors attracted by the infrastructure have different characteristics than those who were already living there. However, not all new households come to live in pre-existing

[5] If it were of interest in the future to interview mover households, this could be attempted by contacting the reference person each household was asked to provide in the 2006 ASLS.

[6] A household is defined as a group of one or more people who live in the same house and share food expenditures.

[7] The exception to this rule occurs if family members are the same, but now another member is declared to be the household head.

houses, some families build new houses upon arrival. To include them in our measurement, households living in all residential constructions built between 2006 and 2009 were also interviewed.

The matched data set thus contains three types of households: 1- Those interviewed in 2006 and 2009, 2- those interviewed in 2006 only that could not be followed because they out migrated, and 3- new households with information from the 2009 round only (which can be further subdivided into: new households replacing those that out migrated, households inhabiting new constructions, subdivisions of households from 2006, and new households that neither substituted mover households nor were part of the household in 2006).

Table 6 presents a summary of the interview results for the 2006 and 2009 matched data set. The baseline sampling frame was all inhabited residential structures with main entrance facing the proposed road pavement projects found in early 2006. Out of 1,275 inhabited residential structures selected for interview, completed interviews were obtained from 1,193 dwellings. The response rate was thus a very high 94%. In those 1,193 dwellings, 1,231 household interviews were obtained, because in a few cases, there were 2 (and even 3) households living in the same property.

The 2009 survey was intended to follow up on the 1,231 households successfully interviewed in 2006. 900 follow-up households were successfully located and interviewed. In 56 cases the family was located but refused to participate in the survey, and in 271 cases the household had moved. The household was categorized as having moved if neighbors or new dwelling inhabitants had information that the previous family had moved out. This means the 2009 ASLS survey had a recontact rate of 73% of households interviewed in 2006. The main reason for the low recontact rate was household out-migration.

In 2009, 183 new households were interviewed. 120 of the newly interviewed households were families living in the dwellings left by mover households (labeled "Substitution" in the Table). 27 families were interviewed in new inhabited residential constructions. 22 cases were family subdivisions; typically one of the sons got married, had a child, and created a

new household in the same plot because food expenditure was not shared with the parents anymore. 14 cases were simply defined as new households and occurred whenever the 2006 household was contacted, but now there was an additional family in the household. For example if a room in the property was now rented out to another family. The 2009 ASLS round obtained a total of 1,083 completed surveys.

6.1 Outmigrants and Immigrants

Although a substantial amount of households were not interviewed in the follow up round due to the mobile nature of the population in the outer areas of the city, in this section we inquire whether movements in and out of the neighborhoods were affected by the paving of the roads. Table 7 provides evidence that the paving of roads did not generate any significant changes in in and out migration behavior of household.

The dependent variable in the first two columns is a dummy for the household having outmigrated by 2009. The independent variable is an indicator of being in the intent to treat group in column 1, and being in the treated group in column 2. The control group had an average outmigration rate of 23%. The small and insignificant estimated coefficients on the ITT and Treated regressors suggest the treated streets experienced an identical outmigration rate as the control ones. Columns 3 and 4 of the Table inquire if there was more immigration to treated than control streets. 17% of the 2009 sample had immigrated between 2006 and 2009. But this rate is no different in treated than in control streets.[8]

6.2 Non-Mover Household Results

This section focuses only on households that were surveyed in 2006 and again in 2009. By excluding immigrants, and given that neither intensity of outmigration nor characteristics of outmigrants were affected by treatment, this strategy provides estimates of short term impacts of providing paved roads on households in an urban slum context.

[8] A probit estimation yields the same results.

We present our main results in Tables 10-17. For each outcome of interest, we report four regressions. In column 1 the independent variables are an intent to treat group dummy and a constant. In column 2 the independent variable is a treated group dummy and a constant. The two variables differ because some street projects were not finished by the time the 2009 survey round was fielded. In column 2, observations that were untreated but were in the intent to treat group are ignored, resulting in fewer observations. Columns 3 and 4 add as a regressor the baseline value of the dependent variable. Given that the error term in columns 1 and 2 is orthogonal to the baseline treatment values, adding this regressor reduces the standard error on the coefficient of interest without biasing the estimate. The strategy in columns 3 and 4 is standard in the impact evaluation literature (Kling, Liebman, and Katz). All regressions use the survey weights and standard errors are clustered at the street project level.

Table 10 focuses on housing indicators. Around 95% of non-mover households owned their dwelling in 2009, and there was no significant difference across treatment groups. This suggests that home ownership was not affected by the treatment. The same holds for having a property title. The control group had a slightly higher title rate from the beginning, and this was unaffected by treatment. Both in 2006 and 2009, treatment and control groups have an insignificant difference in property title rates.

The log home owner estimate of housing value did go up because of treatment. Treated households estimate an increase in housing value of 21 percentage points due to having the road where their home is located being connected to the pavement grid. For the intent to treat group as a whole, the paved roads are estimated to increase housing value by 12-15%.

As in many developing country contexts, Acayucan households improve and expand their house over time. Hence, home characteristics at any point in time provide a measure of cumulative investments in the house. We asses differences in housing quality by treatment group using a set of house quality indicators. However, in the short run, we find no evidence of changes in the overall housing stock characteristics, as measured by quality of flooring,

walls and roofing.[9] Similarly, having a bathroom inside the house - a good measure of housing quality in this context - is unchanged by treatment status in the short run.

Overall, the housing indicators suggest that people estimate the properties on paved roads to be worth about 20% more than without pavement. But in the short run, we found no differences in overall housing stock quality by treatment group. Given that the wealth of most families is concentrated in their house, an increase of this magnitude in the value of the household's main asset suggests that credit constraints should be relaxed as a result. To inquire about this, Table 11 presents results for credit measures.

Credit from family and friends is unaffected by treatment status. Similarly, informal private credit presents no differences by treatment group. An indicator for the household having a credit card is also uncorrelated with treatment status. This is all uncollateralized credit. However, collateralized credit composed of mortgages and private bank loans increases with treatment status. In particular, individuals in treated street projects are twice as likely to have collateral based credit than individuals from untreated streets. Not only are more individuals using collateralized credit, the average credit size is between two and three times as large in treated than in untreated street projects. This suggests the road pavement increased the value of the households' main asset and relaxed some of the credit constraints treated households face.

In terms of consumption, there is some evidence, although weak, that paving the street was reflected in higher log household or per capita expenditures. The estimated coefficients in Table 12 range from 7-14 percentage point increases for treated households and between 4-9 percentage point increases in consumption for the intent to treat group as a whole. However, the only significant difference at the 10% level is the log household expenditure when controlling for the 2006 value of the dependent variable. This difference is not explained by higher household participation in government welfare programs. The last panel in the

[9]For questions with multiple related outcomes, such as construction materials in the house, durable goods in the household and improvements to the house, we use a summary index of outcomes by adding up dummy variables (For more on this see Kling et al (2007))

Table finds no differences in government program participation by treatment status.

There is stronger evidence that durable goods increased among treated households. Out of 7 durable goods, control households had an average of 2.4 goods. Treated households had around 0.22 more durable goods according to column 4 and 0.37 more goods according to column 2.

Getting a paved street increases the utility of owning a vehicle because it is more likely to be able to reach the house, and be kept safer there. Together with the relaxing of the credit constraints, it makes sense for households to have responded to the treatment by acquiring a vehicle. The magnitude of the change is quite important. Control households had a 10% rate of vehicle ownership in 2009, whereas treated households had a 15.7% likelihood of having an automobile. Similarly, control households had a 9.6% pick up truck ownership rate in 2009, whereas treated households had a 15.7% truck ownership rate. Column 4, in which the initial value of the dependent variable is controlled for, suggests that automobile and truck ownership increased twice as fast in treated than in control households between 2006 and 2009.

Table 13 presents results for changes in labor variables. 51% of individuals aged 8 and over worked the previous week in the control group, statistically the same as in the treatment and intent to treat group. Thus labor outcomes did not differ on the extensive margin. In the intensive margin, there is some evidence that the treatment group worked slightly more hours per day. Although the coefficients are identical using the treated and intent to treat variables, the difference is only significant at the 10% level for the intent to treat group. This positive difference is carried over in the estimate on weekly hours worked. The last panel in Table 13 provides estimates of impact on monthly labor income. The treated group is estimated to make a significantly larger amount of labor income per month. Working individuals in treated street projects were estimated to earn between 400-900 pesos more than those in control streets, a PPP-adjusted difference of around 50-120 2005 US dollars per month.

The results up to now suggest higher labor income, higher vehicle ownership, more credit, but not clearly higher consumption. Questions about home improvements suggest households are using their increased incomes to make improvements to their house. Table 14 shows that in the last 6 months, treated households performed 50% more home improvements than control households. The estimate is statistically significant at the 5% level. In terms of opening a new business, there are no significant differences between groups. However, interestingly, businesses opened households from treated streets were 22-26 percentage points less likely to be located at home rather than in another part of town. We had hypothesized that paving the streets would make opening up businesses at home more attractive. However, the loosening of the credit constraints generated by the treatment may have made opening the business away from home feasible, and this effect could easily be larger than the increased attractiveness of the house as a business location.

Table 14 also contains results regarding expectations. There is a significant reduction in the number households in which there is an individual which plans to outmigrate for work reasons in treated streets, from 47 to 40%. This result suggests that investments in urban infrastructure may be a way for international migrant origin countries to hold on to their human resources. We also report results on satisfaction living in Acayucan, which was unchanged by paving of the street.

Table 15 presents results for public services. Distance to the nearest paved street in terms of street blocks fell from an average of 1.32 in control households to 0 in treated households and 0.33 for the households in the intent to treat group. Tap water in lot presents positive coefficients but is only significant at the 10% level in treated streets when controlling for the baseline value. Given that only 79% of homes in the control group have tap water availability in their lot, and that the treatment guarantees that there is a water line servicing the street, this suggests that some households do not use tap water because of pricing. During the fieldwork, some households mentioned the high cost of opening a contract with the water company as a reason for not using the tap water line that reached their plot but was not

being used. Connection to the sewerage was also unchanged by the treatment.

We initially hypothesized that pavement of the streets would make garbage collection services accessible to treated households. However, there was no significant difference in reported garbage collection services in treated streets. This suggests that either street quality was not a constraint to garbage collection services or that garbage collection routes set by the city did not respond rapidly to the newly accessible streets.

The last two panels in Table 15 suggest that pavement of the street did not make burglaries more likely in treated households, and that actually treated households were 10 percentage points more likely to feel safe while walking in their street at night than control households where only 62% felt safe walking in their street at night.

We report results for schooling of children in Table 16. The results show that the treatment generated no changes in school enrollment, absences to school, or literacy among children aged 5-17.

The study design has the advantage that the infrastructure was allocated independently of whether beneficiaries were constituents of the mayor or not. Indeed, the pre-intervention balance table showed that satisfaction with the local government was identical between the treated/ITT and control groups. Differences in the measures of government satisfaction provide, to our knowledge, the first experimental evidence of the response of beneficiaries to government infrastructure programs. The top panel in Table 17 suggests that providing street pavement generates an increase of 0.3 points on a 4 point scale in local government satisfaction among beneficiaries. This change represents an increase of 0.4 standard deviations in terms of government satisfaction.

Interestingly, paving the road also makes beneficiaries have improved perceptions about the State and Federal government, even though 87% of households are aware that the local government is the one that paved their road. The increases are about 0.15 points for both higher levels of government; around half in magnitude of those obtained by the local government as a result of the pavement. The results on government satisfaction suggest that

direct beneficiaries of government road pavement programs are likely to benefit politicians with their vote in subsequent elections.

6.3 Discussion

This study assesses multiple short-term impacts of street pavement for households located in urban slums in a Mexican city. The results suggest that providing pavement significantly increases the value of the properties located in treated streets and thus the value of the collateral households posses. This is reflected in a loosening of credit constraints for benefitted households. Benefitted households show an increase in the number of home improvements, number of durable goods, and automobile and truck ownership. Paved roads also generated higher incomes, possibly through the expanded labor income opportunities provided by increased vehicle ownership and more collateral-based credit.

These results are important for public policy. They provide evidence that lack of urban public infrastructure such as paved roads in a city slum can reduce available credit, incomes and consumption among households inhabiting those neighborhoods. The results are encouraging because they suggest that provision of public infrastructure in city slums can reduce poverty in an urban context.

Given the results of this study, and the fact that households in the survey declared road pavement as their number 1 priority for local government spending, the issue of why so many streets remain unpaved becomes important. That is, the results bring to the forefront the issue of financing of local public goods such as urban infrastructure in developing countries (See World Bank (2007)).

In Mexico, as in most countries we know of except Colombia, local property taxes go to the general municipal fund and are spent according to the objectives of the municipal authorities. Different constituents spend a lot of effort convincing the mayor and council members about providing them certain public goods. We propose that a targeted local property tax can be effectively used to overcome local public good problems such as financing of urban street

pavement.

The city could estimate the costs of local infrastructure projects such as road paving. The project together with its estimated cost would be submitted to a vote by beneficiaries, and if approved, property taxes on benefitted streets would increase for a specified time. All funds obtained in this fashion would be earmarked to finance the approved public work. This mechanism solves the free rider problem preventing coordination by neighbors to provide their own local public goods because the increased property tax is mandatory for all neighbors. Furthermore, the municipal authorities could provide subsidies to the cost of public work projects in impoverished neighborhoods if they wished to do so.

This mechanism for financing infrastructure projects is democratic, empowers citizens and alleviates the common feeling in developing countries that government authorities are not responsive to people's needs and that taxes provide them with no direct benefits. It solves the free rider problem inherent in local public goods, and can become an important source of financing public works projects for cash-strapped local governments. Furthermore, public works programs that do take place are ones citizens have actively supported, as opposed to projects favored by activists that have time to be lobbying municipal authorities.

7 Conclusion

This study describes results from a small experiment in street pavement provision in the slums of the city of Acayucan, Mexico. The study's purpose was to capture impacts and behavioral changes in treated households. This was done through a baseline survey fielded in 2006, and a follow up survey in 2009.

Characteristics were on average the same between treatment and control groups prior to the intervention. The results suggest that providing pavement significantly increases the value of the properties located in treated streets and thus the value of the collateral households posses. This is reflected in a loosening of credit constraints for benefitted households.

Benefitted households show an increase in the number of home improvements, number of durable goods, and automobile and truck ownership. Paved roads also generate higher incomes, possibly through the expanded labor income opportunities provided by increased vehicle ownership and more collateral-based credit.

These results provide evidence that lack of urban public infrastructure such as paved roads in a city slum can reduce available credit, incomes and consumption among households inhabiting those neighborhoods. The results are encouraging because they suggest that provision of public infrastructure in city slums can reduced poverty in an urban context.

References

Aschauer, D. A. (1989): "Is Public Expenditure Productive?," *Journal of Monetary Economics*, 23(2), 177–200.

Banerjee, A. V., and E. Duflo (2007): "The Economic Lives of the Poor," *Journal of Economic Perspectives*, 21(1), 141–167.

Bean, F. D., A. G. King, and J. S. Passel (1983): "The Number of Illegal Migrants of Mexican Origin in the United States: Sex Ratio-based Estimates for 1980," *Demography*, 20(1), 99–109.

Bloom, H. (2006): *Learning More From Social Experiments*. Russell Sage Foundation.

Bloom, H. S. (1984): "Accounting for No-Shows in Experimental Evaluation Designs," *Evaluation Review*, 8(2), 225–246.

Deaton, A. (1997): *The Analysis of Household Surveys. A Microeconometric Approach to Development Policy*. John Hopkins University Press.

Dinkelman, T. (2008): "The Effects of Rural Electrification on Employment: New Evidence from South Africa," *mimeo*, Princeton University.

Donaldson, D. (2008): "Railroads of the Raj: Estimating the Impact of Transportation Infrastructure," *mimeo*, London School of Economics.

Duflo, E., and R. Pande (2007): "Dams," *Quarterly Journal of Economics*, 122(2), 601–646.

Esfahani, H. S., and M. T. Ramirez (2003): "Institutions, Infrastructure, and Economic Growth," *Journal of Development Economics*, 70(2), 443–477.

Fan, S., and C. Chan-Kang (2005): "Road Development, Economic Growth, and Poverty Reduction in China," *IFPRI Research Report*, 138.

Freedman, D. A. (2008): "On Regression Adjustments to Experimental Data," *Advances in Applied Mathematics*, 40(2), 180 – 193.

Gonzalez-Navarro, M., and C. Quintana-Domeque (2009): "The Reliability of Self-Reported Home Values in a Developing Country Context," *Journal of Housing Economics*, 18(4).

Gramlich, E. M. (1994): "Infrastructure Investment: A Review Essay," *Journal of Economic Literature*, 32(3), 1176–1196.

Grech, V., P. Vassallo-Agius, and C. Savona-Ventura (2003): "Secular Trends in Sex Ratios at Birth in North America and Europe over the Second Half of the 20th Century," *Journal of Epidemiology and Community Health*, 57, 612–615.

Jacoby, H. G. (2000): "Access to Markets and the Benefits of Rural Roads," *The Economic Journal*, 110(465), 713–737.

Jimenez, E. (1995): "Human and Physical Infrastructure: Public Investment and Pricing Policies in Developing Countries," vol. 3 of *Handbook of Development Economics*, chap. 43, pp. 2773–2843. Elsevier.

Kling, J. R., J. B. Liebman, and L. F. Katz (2007): "Experimental Analysis of Neighborhood Effects," *Econometrica*, 75(1), 83–119.

Magruder, J. (2009): "High Unemployment Yet Few Small Firms: The Role of Centralized Bargaining in South Africa," *UC-Berkeley ARE Mimeo*.

Songco, J. A. (2002): "Do Rural Infrastructure Investments Benefit the Poor? Evaluating Linkages: A Global View, a Focus on Vietnam," *World Bank Policy Research Working Paper*, 2796.

Welch, B. L. (1947): "The Generalization of 'Student's' Problem when Several Different Population Variances are Involved," *Biometrika*, 34(1/2), 28–35.

World Bank (1994): "World Development Report 1994 : Infrastructure for Development," *Washington D.C. World Bank.*

——— (2007): *Rethinking Infrastructure for Development.* World Bank.

Figure 1: Acayucan Street Projects

Tables

Table 1: Comparison to City

Individual Level Variables	Acayucan (2005 Census)	Experiment Streets (ASLS 2006)	Experiment Streets (ASLS 2006, Weighted)
Population	49,945	4,973	8,905
Males/Females	89%	89%	89%
Share Aged 0-5	11%	11%	11%
Share Aged 65+	6%	5%	5%
Without Health Insurance	58%	57%	56%
15+ Illiterate	9%	11%	11%
15+ Incomplete Jr. High School	16%	51%	51%
6-14 Not Enrolled in School	4%	4%	4%
12-14 Not Enrolled in School	6%	7%	7%
15-24 Enrolled in School	48%	48%	48%
Household Level Variables			
Families	12,874	1,239	2,220
Dwellings	12,693	1,201	2,155
1 Room Dwelling	22%	27%	27%
2 Room Dwelling	17%	36%	36%
3+ Room Dwelling	60%	37%	37%
No Tap Water in Lot	16%	22%	21%
Electricity	98%	98%	98%
Fridge	81%	80%	80%
Washing Machine	55%	51%	52%
Computer	14%	10%	11%

First column data from locality census Iter 2005 (INEGI). Second and third column data from baseline Acayucan Standards of Living Survey 2006. Weights are the street-project inverse of sampling probability.

Table 2: Treatment Road Pavement Projects Finish Date

Project Name	**Road Pavement Finish Date**
Heroes de Nacozari	Aug. 2007
Belisario Dominguez	Nov. 2007
Calabaza	Dec. 2007
Altamirano	Dec. 2007
Felipe Angeles	Dec. 2007
Salvador Allende	Dec. 2007
Ramon Corona	Dec. 2007
Porvenir	May 2008
Guanajuato	May 2008
Alacio Perez	May 2008
Antonio Plaza-lado izq.	Oct. 2008
Las Arboledas	Dec. 2008
Lombardo Toledano	Feb. 2009
Antonio Plaza	Feb. 2009
David Davila y Bugambilias	Feb. 2009
Lopez Mateos	Feb. 2009
Prol. Murillo Vidal	Feb. 2009
Simon Bolivar	In process
Flores Magon	In process
Cartas Leandro Valle	In process
Gutierrez Zamora	In process
Del Arroyo y del Pantano	No progress
Ignacio Zaragoza	No progress
Prol. Atenogenes Perez y Soto	No progress
Juan de Dios Pesa-lado izq.	No progress
Veracruz	No progress
Cuahutemoc y Calle 6	No progress
Prol. Venustiano Carranza	No progress

Table 3: Baseline Descriptive Statistics (2006)

Variable	Obs.	Mean	Median	SD	Min	Max
Demographic Indicators						
Household members	1,231	4.01	4	1.80	1	16
Female	4,943	0.53	1	0.50	0	1
Age	4,939	28.0	24	19.6	0	96
Literate	4,401	0.88	1	0.33	0	1
Indigenous	4,401	0.03	0	0.15	0	1
Has Ever attended school (age¿15)	3,332	0.88	1	0.32	0	1
Years of schooling (age≥15)	3,289	7.52	8	4.7	0	20
Housing Quality						
Home owner	1,230	0.83	1	0.36	0	1
Property title	1,025	0.71	1	0.45	0	1
House value estimate	730	194,845	100,000	281,241	3,000	300,000
Cement floor	1,231	0.93	1	0.26	0	1
Cement roofing	1,231	0.37	0	0.48	0	1
Cement walls	1,229	0.92	1	0.27	0	1
Rooms	1,231	2.30	2	1.18	1	8
Bathroom inside house	1,231	0.59	1	0.49	0	1
Wood Fuel	1,221	0.25	0	0.44	0	1
Labor						
Worked last week	4,099	0.51	1	0.50	0	1
Days worked last week	2,018	5.54	6	1.55	1	7
Hours per day	2,031	8.10	8	3.18	0	16
Weekly hours worked	2,005	46.5	48	23.8	0	112
Monthly labor income	1,890	2,752	2,000	3,071	0	54,500
Consumption						
Household expenditure	1,203	3,268	2,800	2,218	0	21,800
Per capita expenditure	1,203	931	750	738	0	8,000
Automobile	1,231	0.12	0	0.32	0	1
Pick-up truck	1,231	0.08	0	0.27	0	1
Sum of durables	1,231	2.07	2	1.50	0	7
Refrigerator	1,231	0.79	1	0.40	0	1
Washing machine	1,231	0.51	1	0.50	0	1
Computer	1,231	0.10	0	0.30	0	1
Air conditioning	1,231	0.06	0	0.24	0	1
Microwave oven	1,231	0.20	0	0.40	0	1
Video player	1,231	0.38	0	0.48	0	1
Motorcycle	1,231	0.02	0	0.15	0	1
Government program (=1)	1,231	0.07	0	0.25	0	1

Mean calculation takes survey weights into account.
Literate is defined as being able to read and write a note in Spanish, and is asked for people aged 5 and older.
Indigenous is defined as speaking an indigenous language, reported for individuals aged 5 and older.
Has Ever Attended School and *Years of Education* are for people aged 15 and older.
Property title is not asked for renters.
House value estimate in Mexican pesos.
Rooms is the number of rooms in the house excluding kitchen, unless it is also used for sleeping.
Labor questions are asked for people aged 8 and older. Labor statistics are calculated for the set of people who worked the previous week, except for *Worked last week*. *Hours Per Day* is coded as 0 when the person worked an average of less than 1 hour per day, and is top coded at 16 hours. Weekly hours worked is a multiplication of *hours per day* and *days worked last week* for each individual that works.
PCE is per capita monthly expenditure in Mexican pesos at the household level.
Sum of durables is a sum of indicators for: Refrigerator, washing machine, computer, video player, air conditioning, microwave oven, and motorcycle in the household.
Government welfare programs include: Liconsa, Progresa-Oportunidades, DIF, etc.

Table 4: Baseline Descriptive Statistics II (2006)

Variable	Obs.	Mean	Median	SD	Min	Max
Public services						
Distance to nearest paved street	1,231	1.40	1	1.31	0	9
Water in lot	1,229	0.78	1	0.42	0	1
Sewerage	1,227	0.87	1	0.34	0	1
Electricity	1,230	0.98	1	0.15	0	1
Garbage collection	1,230	0.58	1	0.49	0	1
Burn Garbage	1,230	0.15	0	0.37	0	1
Flooding (12 months)	1,211	0.22	0	0.42	0	1
Burglary (12 months)	1,224	0.11	0	0.30	0	1
Feel safe walking in your street at night	1,231	0.62	1	0.52	0	1
Credit						
Bank Account	1,221	0.17	0	0.37	0	1
Credit Card	1,223	0.10	0	0.30	0	1
Collateral based private credit	2,995	0.026	0	0.16	0	1
Uncollateralized private credit	2,995	0.040	0	0.20	0	1
Family or friends credit	2,995	0.007	0	0.08	0	1
Informal private credit	2,995	0.004	0	0.07	0	1
Schooling (Ages 5-17)						
Literate	1,405	0.87	1	0.33	0	1
Enrolled in School	1,368	0.91	1	0.27	0	1
Absences Last Month (> 0)	1,243	0.21	0	0.40	0	1
Expectations, Investment						
Plans to out migrate for work	1,160	0.45	0	0.55	0	1
Home improvements (6 months)	1,231	0.45	0	1.08	0	10
New business (12 months)	1,231	0.05	0	0.21	0	1
New business at home	61	0.64	1	0.47	0	1
Satisfaction living in city	1,229	3.00	3	0.70	1	4
Satisfaction with Government						
Local government	1,192	2.35	2	0.74	1	4
State government	1,172	2.55	3	0.69	1	4
Federal government	1,186	2.55	3	0.74	1	4

Mean calculation takes survey weights into account.
Distance to nearest paved street in terms of city blocks, each of around 200 meters.
Burn garbage means the household commonly disposes of garbage by burning it.
Credit Card and *Bank Account* are coded as 1 if anyone in the household has them. Other credit questions are asked for all adults 18 and older.
Informal private credit sources are: Money lenders, merchants, and local pawn shops. Collateral based credit sources are private bank loans and mortgages. Uncollateralized credit sources are credit cards, furniture and appliance stores, automobile loans, and casas de crédito popular.
Home improvements is a sum of indicators of improvements in: flooring, walls, roofing, sewerage connection, plumbing, toilets, electrical, room construction, remodeling, air conditioning installation, security measures, and improvements to house front.
Satisfaction with Government is on a 4 point scale where: 1 is very unsatisfied, 2 is unsatisfied, 3 is satisfied and 4 is very satisfied.

Table 5: Pre Intervention Treatment and Control Balance (2006)

Variable	Obs ITT	Mean ITT	Obs Treated	Mean Treated	Obs Control	Mean Control	ITT-C Mean Difference	T-C Mean Difference
Demographic Indicators								
Household members	665	3.97	402	3.89	566	4.04	−0.070	−0.148
		(0.096)		(0.106)		(0.070)	(0.118)	(0.125)
Female (=1)	2,645	0.52	1,567	0.52	2,298	0.54	−0.018	−0.014
		(0.006)		(0.008)		(0.010)	(0.012)	(0.013)
Literate (=1)	2,337	0.88	1,391	0.89	2,064	0.87	0.012	0.016
		(0.012)		(0.016)		(0.008)	(0.014)	(0.018)
Years schooling (Age≥5)	2,312	6.56	1,377	6.75	2,044	6.51	0.066	0.243
		(0.28)		(0.44)		(0.22)	(0.354)	(0.480)
Age adults	1,619	38.99	964	39.34	1,446	39.8	−0.80	−0.45
		(0.42)		(0.62)		(0.32)	(0.52)	(0.68)
Housing Quality								
Homeowner (=1)	640	0.82	388	0.83	552	0.85	−0.03	−0.016
		(0.03)		(0.03)		(0.02)	(0.4)	(0.04)
Property title (=1)	523	0.68	321	0.69	468	0.73	−0.049	−0.043
		(0.029)		(0.036)		(0.03)	(0.043)	(0.048)
Log home owner estimate	351	11.59	228	11.73	354	11.70	−0.10	0.036
of house price		(0.12)		(0.16)		(0.09)	(0.15)	(0.18)
Number of rooms	640	2.27	388	2.36	553	2.34	−0.06	0.02
		(0.06)		(0.08)		(0.07)	(0.9)	(0.10)
Cement roof (=1)	640	0.35	388	0.41	553	0.39	−0.04	0.02
		(0.05)		(0.07)		(0.03)	(0.06)	(0.07)
Cement walls (=1)	638	0.93	388	0.94	553	0.91	0.01	0.02
		(0.01)		(0.02)		(0.02)	(0.02)	(0.02)
Cement floor (=1)	640	0.93	388	0.94	553	0.93	−0.005	0.005
		(0.02)		(0.02)		(0.01)	(0.024)	(0.027)
Cement roof, walls,	638	2.20	388	2.27	553	2.23	−0.037	0.041
floor ([0-3])		(0.07)		(0.09)		(0.05)	(0.085)	(0.101)
Bathroom inside	640	0.57	388	0.60	553	0.61	−0.04	−0.01
house (=1)		(0.04)		(0.05)		(0.04)	(0.05)	(0.06)
Water connection	640	0.44	388	0.48	551	0.50	−0.06	−0.02
inside house (=1)		(0.05)		(0.07)		(0.04)	(0.07)	(0.08)

Table 5: Pre Intervention Treatment and Control Balance (2006)

Variable	Obs ITT	Mean ITT	Obs Treated	Mean Treated	Obs Control	Mean Control	ITT-C Mean Difference	T-C Mean Difference
Credit								
Credit from family	1,576	0.007	939	0.007	1,419	0.006	0.001	0.0009
and friends (=1)		(0.003)		(0.003)		(0.002)	(0.004)	(0.004)
Informal private	1,576	0.003	939	0.005	1,419	0.005	−0.002	−0.000
credit (=1)		(0.001)		(0.001)		(0.002)	(0.002)	(0.002)
Collateral-based	1,576	0.027	939	0.03	1,419	0.026	0.0017	0.003
credit (=1)		(0.005)		(0.008)		(0.005)	(0.007)	(0.010)
Collateral based	1,576	1,051	939	1,465	1,420	374	677	1,091
Credit amount		(506)		(888)		(100)	(511)	(876)
Credit card (=1)	635	0.10	384	0.13	550	0.11	−0.005	0.026
		(0.02)		(0.04)		(0.01)	(0.027)	(0.039)
Bank account (=1)	633	0.17	383	0.20	550	0.18	−0.016	0.018
		(0.03)		(0.04)		(0.02)	(0.032)	(0.042)
Consumption								
Log household	619	7.94	376	7.96	547	7.89	0.05	0.06
expenditure		(0.059)		(0.09)		(0.045)	(0.07)	(0.10)
Log per capita	618	6.6	376	6.70	547	6.6	0.058	0.10
expenditure (PCE)		(0.69)		(0.107)		(0.47)	(0.08)	(0.11)
Durable goods in	640	2.10	388	2.29	553	2.07	0.029	0.22
the household		(0.15)		(0.23)		(0.08)	(0.17)	(0.24)
Car (=1)	640	0.12	388	0.14	553	0.12	0.003	0.02
		(0.02)		(0.04)		(0.02)	(0.03)	(0.04)
Truck (=1)	640	0.07	388	0.11	553	0.08	−0.01	0.02
		(0.02)		(0.03)		(0.01)	(0.03)	(0.04)
Any government	640	0.07	388	0.08	553	0.07	−0.004	0.001
program help (=1)		(0.015)		(0.02)		(0.01)	(0.019)	(0.024)
Labor								
Worked last week (=1)	2,173	0.497	1,287	0.504	1,926	0.512	−0.016	−0.007
		(0.014)		(0.022)		(0.012)	(0.018)	(0.024)
Days worked last	1,064	5.52	637	5.51	954	5.5	−0.026	−0.039
week | worked		(0.07)		(0.086)		(0.06)	(0.092)	(0.104)
Daily hours worked	1,070	8.20	644	8.12	961	8.02	0.18	0.106
last week | worked		(0.098)		(0.112)		(0.11)	(0.14)	(0.155)
Weekly hours worked	1,058	46.7	633	46.13	947	46.27	0.43	−0.13
last week | worked		(0.97)		(1.16)		(0.75)	(1.22)	(1.36)
Monthly labor income	986	2,837	594	3,034	904	2,692	144	341
| labor income >0		245		(377)		(152)	(285)	(399)

Table 5: Pre Intervention Treatment and Control Balance (2006)

Variable	Obs ITT	Mean ITT	Obs Treated	Mean Treated	Obs Control	Mean Control	ITT-C Mean Difference	T-C Mean Difference
Expectations and Investment								
Plans out migration	604	0.45	363	0.46	521	0.45	−0.0008	0.009
for work (=1)		(0.02)		(0.03)		(0.02)	(0.03)	(0.037)
Satisfaction living	638	2.97	388	2.93	553	3.02	−.04	−0.089
in city (1-4)		(0.04)		(0.06)		(0.05)	(0.069)	(0.080)
Number of home	640	0.51	388	0.55	553	0.42	0.085	0.128
improvements (6 months)		(0.06)		(0.09)		(0.047)	(0.076)	(0.100)
New business past	640	0.057	388	0.059	553	0.046	0.010	0.012
year (=1)		(0.012)		(0.018)		(0.008)	(0.014)	(0.019)
New business	36	0.72	22	0.74	25	0.57	0.15	0.17
located at home (=1)		(0.09)		(0.13)		(0.09)	(0.13)	(0.16)
Public Services								
Distance to nearest	640	1.46	388	1.45	552	1.33	0.13	0.12
paved road (blocks)		(0.16)		(0.21)		(0.15)	(0.22)	(0.25)
Tap water	640	0.78	388	0.87	551	0.78	−0.00	0.08
connection in lot (=1)		(0.05)		(0.04)		(0.05)	(0.07)	(0.06)
Sewerage (=1)	639	0.85	388	0.88	550	0.88	−0.03	−0.00
		(0.03)		(0.03)		(0.03)	(0.04)	(0.04)
Electricity (=1)	639	0.97	387	0.97	553	0.98	−0.01	−0.01
		(0.006)		(0.007)		(0.01)	(0.01)	(0.01)
Garbage collection	640	0.53	388	0.61	552	0.61	−0.07	0.002
at house (=1)		(0.05)		(0.06)		(0.05)	(0.08)	(0.090)
Burns garbage (=1)	640	0.19	388	0.13	552	0.13	0.05	−0.00
		(0.04)		(0.04)		(0.03)	(0.05)	(0.05)
Burglary in past	637	0.106	386	0.103	549	0.106	−0.0003	−0.002
12 months (=1)		(0.015)		(0.02)		(0.013)	(0.019)	(0.023)
Feels safe walking in	640	0.639	388	0.678	553	0.625	0.013	0.053
my street at night (=1)		(0.034)		(0.03)		(0.031)	(0.046)	(0.043)
No garbage on road	640	0.37	388	0.39	553	0.47	−0.097	−0.07
outside house (=1)		(0.058)		(0.06)		(0.06)	(0.088)	(0.09)

Table 5: Pre Intervention Treatment and Control Balance (2006)

Variable	Obs ITT	Mean ITT	Obs Treated	Mean Treated	Obs Control	Mean Control	ITT-C Mean Difference	T-C Mean Difference
Schooling of Children (Age 5-17)								
Literate (=1)	760	0.86	451	0.85	645	0.88	−0.0185	−0.022
		(.017)		(0.025)		(0.013)	(0.022)	(0.028)
Enrollment in	736	0.92	439	0.92	632	0.90	0.014	0.020
School (=1)		(0.10)		(0.011)		(0.014)	(0.017)	(0.018)
Absences>0 last	674	0.19	407	0.19	569	0.22	−0.03	−0.03
month (=1)		(0.01)		(0.021)		(0.026)	(0.03)	(0.03)
Satisfaction with Government								
Satisfaction with	623	2.35	383	2.32	532	2.34	0.011	−0.026
local government		(0.046)		(0.059)		(0.041)	(0.061)	(0.071)
Satisfaction with	610	2.51	375	2.50	526	2.58	−0.072	−0.075
State government		(0.037)		(0.049)		(0.029)	(0.041)	(0.057)
Satisfaction with	618	2.55	379	2.58	532	2.56	−0.006	0.025
Federal government		(0.037)		(0.046)		(0.034)	(0.050)	(0.056)

Coefficients from OLS regressions using survey weights. Standard errors clustered at the road pavement project level.

Literate is defined as being able to read and write a note in Spanish, and is asked for people aged 5 and older.

PCE is per capita monthly expenditure in Mexican pesos at the household level.

Estimate of house value in 2006 Mexican Pesos.

Number of Rooms is the number of rooms in the house excluding kitchen, unless it is also used for sleeping.

Informal private credit sources are: Money lenders, merchants, and local pawn shops. Collateral based credit sources are private bank loans and mortgages. Uncollateralized credit sources are credit cards, furniture and appliance stores, automobile loans, and casas de crédito popular.

Credit Card and *Bank Account* are coded as 1 if anyone in the household has them. Other credit questions are asked for all adults 18 and older.

Durable goods in household is a sum of dummies for having: Refrigerator, washing machine, computer, video player, air conditioning, microwave oven, and motorcycle.

Government welfare programs include: Liconsa, Progresa-Oportunidades, DIF, etc.

Labor questions are asked for people aged 8 and older. Labor statistics are calculated for the set of people who worked the previous week, except for *Worked last week*. *Hours Per Day* is coded as 0 when the person worked an average of less than 1 hour per day, and is top coded at 16 hours. Weekly hours worked is a multiplication of *hours per day* and *days worked last week* for each individual that works.

Home improvements is a sum of indicators for improving: flooring, walls, roofing, sewerage connection, plumbing, toilets, electrical, room construction, remodeling, air conditioning, security measures, and house front.

Distance to nearest paved street in terms of city blocks, each of around 200 meters.

Satisfaction with Government on a 4 point scale where: 1 is very unsatisfied, 2 is unsatisfied, 3 is satisfied and 4 is very satisfied.

Table 6: Non Response and Recontact

	2006 Dwellings		2009 Households
Eligible selected	1,275	Follow up	1,231
Completed	1,193	Completed at follow up	900
Response rate	94%	Household moved	271
		Non response	56
		Other	4
		Recontact rate	73%
		New households	183
		of which:	
		Subdivision	22
		Substitution	120
		New household	14
		New construction	27
		Completed in 2009	1,083

Eligible dwelling category excluded plots without a dwelling, unoccupied dwellings or temporary use dwellings.

2006 non response is in terms of dwellings selected from the frame, and the number of dwellings with completed household survey. 2009 recontact is in terms of households. There were 1,231 households in 1,193 dwellings in 2006, so that in some cases there is more than one household per dwelling.

Completed at follow up is defined as having recontacted at least one member of the household interviewed in 2006.

New households defined as not having been interviewed in 2006.

Subdivisions happen when one of the members in 2006 creates a new household living in the same plot, for example if the son gets married and lives in his parent's house but does not share food expenses.

Substitutions are new households found in 2009 that occupy the dwelling inhabited by an interviewed family in 2006, for example if the house is rented.

New household occurs when the interviewed family is still in the dwelling, but now there is an additional household, for example if a room in the house is now rented out.

New constructions are households interviewed in which the residential structure was not there in 2006 but is there in 2009.

Table 7: Outmigration and Immigration

	Household outmigrated	Household outmigrated	Household immigrated	Household immigrated
Intent to treat	0.008		−0.007	
	(0.027)		(0.024)	
Treated		−0.004		−0.012
		(0.03)		(0.025)
Constant	0.23***	0.23***	0.17***	0.17***
	(0.02)	(0.02)	(0.02)	(0.02)
Obs	1,171	920	1,083	857

Dependent variable is a dummy for having outmigrated by 2009.
Sample is households who were surveyed in 2006.
Each column is a different OLS regression in which standard errors are clustered at the road pavement project level and survey weights are used. Probit specification yields same results.

Table 8: Characteristics of in and out migrants

Outmigration	log(PCE)	log(PCE)	Log owner home value estimate	Log owner home value estimate	Apprised home value	Appraised home value	Homeowner (=1)	Homeowner (=1)	Durable goods	Durable goods
ITT	0.059		0.024		0.20		−0.03		−0.03	
	(0.11)		(0.26)		(0.17)		(0.088)		(0.23)	
Treated		0.12		0.42		0.37		−0.008		0.19
		(0.15)		(0.28)		(0.23)		(0.097)		(0.26)
Constant	6.70***	6.70***	11.56***	11.56***	11.23***	11.23***	0.51***	0.51***	1.95***	1.95***
	(0.07)	(0.07)	(0.14)	(0.14)	(0.12)	(0.12)	(0.06)	(0.065)	(0.23)	(0.15)
Obs	266	204	100	79	130	98	271	207	271	207
Immigration										
ITT	−0.03		0.25				−0.0007		0.29	
	(0.09)		(0.27)				(0.098)		(0.22)	
Treated		0.006		0.13				0.045		0.48*
		(0.127)		(0.32)				(0.12)		(0.27)
Constant	6.89***	6.89***	11.67***	11.67***			0.47***	0.47***	2.11***	2.11***
	(0.054)	(0.05)	(0.21)	(0.21)			(0.06)	(0.06)	(0.14)	(0.13)
Obs	181	142	75	60			183	144	183	144

Specification is $y_i = \alpha_1 + \alpha_2 \cdot Treated_i + \epsilon_i$, (or *Intent to treat*) where the sample is restricted to households that outmigrated (top panel) or immigrated (lower panel) by 2009. Immigrant sample includes households from new constructions.
Each column is a different OLS regression in which standard errors are clustered at the road pavement project level and survey weights are used.

Table 9: Characteristics of Households in New Constructions

New Constructions	log(PCE)	log(PCE)	log owner home value estimate	log owner home value estimate	Homeowner (=1)	Homeowner (=1)	Durable goods	Durable goods
ITT	−0.096		0.86*		0.16		0.70	
	(0.23)		(0.40)		(0.14)		(0.44)	
Treated		−0.03		0.57		0.23*		1.14**
		(0.28)		(0.37)		(0.12)		(0.41)
Constant	6.81***	6.81***	11.32***	11.32***	0.76***	0.76***	1.72***	1.72***
	(0.19)	(0.19)	(0.37)	(0.37)	(0.12)	(0.12)	(0.40)	(0.40)
Obs	27	21	21	16	27	21	27	21

Specification is $y_i = \alpha_1 + \alpha_2 \cdot Treated_i + \epsilon_i$, (or *Intent to treat*) where the sample is restricted to households living in new constructions by the 2009 round. Each column is a different OLS regression in which standard errors are clustered at the road pavement project level and survey weights are used.

Table 10: Stayer Results: Housing Quality

Homeowner (=1)				
ITT	−0.018		−0.011	
	(0.022)		(0.008)	
Treated		−0.014		−0.005
		(0.022)		(0.009)
Constant	0.95***	0.95***	0.20***	0.22***
	(0.013)	(0.013)	(0.06)	(0.07)
Y_0 control	No	No	Yes	Yes
Obs	897	710	897	710
R^2	0.001	0.001	0.73	0.72
Household has title to property				
ITT	−0.056		−0.038	
	(0.043)		(0.035)	
Treated		−0.050		−0.03
		(0.047)		(0.04)
Constant	0.73***	0.73***	0.42***	0.42***
	(0.03)	(0.03)	(0.04)	(0.04)
Y_0 control	No	No	Yes	Yes
Obs	831	661	831	661
R^2	0.003	0.002	0.16	0.16
Homeowner log house value estimate				
ITT	0.12		0.155*	
	(0.14)		(0.09)	
Treated		0.21		0.21**
		(0.18)		(0.10)
Constant	12.01***	12.01***	4.91***	4.92***
	(0.08)	(0.08)	(0.70)	(0.76)
Y_0 control	No	No	Yes	Yes
Obs	535	437	535	437
R^2	0.002	0.007	0.30	0.30
Cement floor, wall, roof [0-3]				
ITT	−0.032		−0.009	
	(0.079)		(0.036)	
Treated		0.044		0.016
		(0.096)		(0.043)
Constant	2.24***	2.24***	0.78***	0.82***
	(0.04)	(0.046)	(0.109)	(0.12)
Y_0 control	No	No	Yes	Yes
Obs	894	710	894	710
R^2	0.00	0.001	0.52	0.50
Bathroom inside house				
ITT	−0.01		0.008	0.007
	(0.05)		(0.036)	(0.043)
Treated		0.008		
		(0.068)		
Constant	0.56***	0.56***	0.20***	0.20***
	(0.03)	(0.036)	(0.027)	(0.027)
Y_0 control	No	No	Yes	Yes
Obs	894	709	894	709
R^2	0.00	0.00	0.38	0.37

OLS estimation using survey weights. Standard errors clustered at the road pavement project level.
Property title is not asked for renters.
House value estimate in Mexican pesos.

Table 11: Stayer Results: Credit

Credit from family or friends (=1)				
ITT	0.001		0.001	
	(0.002)		(0.003)	
Treated		0.0027		0.002
		(0.003)		(0.003)
Constant	0.004*	0.004*	0.004*	0.004*
	(0.002)	(0.002)	(0.002)	(0.002)
Y_0 control	No	No	Yes	Yes
Obs	1,984	1,580	1,984	1,580
R^2	0.00	0.00	0.00	0.00
Informal private credit (=1)				
ITT	0.0006		0.0006	
	(0.002)		(0.002)	
Treated		−0.0002		−0.0002
		(0.002)		(0.002)
Constant	0.002	0.002	0.002	0.002
	(0.001)	(0.001)	(0.001)	(0.001)
Y_0 control	No	No	Yes	Yes
Obs	1,984	1,580	1,984	1,580
R^2	0.00	0.00	0.00	0.00
Collateral-based credit (=1)				
ITT	0.017*		0.017*	
	(0.009)		(0.09)	
Treated		0.020*		0.020*
		(0.011)		(0.011)
Constant	0.017***	0.017***	0.017***	0.0167***
	(0.004)	(0.004)	(0.04)	(0.004)
Y_0 control	No	No	Yes	Yes
Obs	1,984	1,580	1,984	1,580
R^2	0.00	0.00	0.00	0.00
Collateral-based credit amount				
ITT	1,081*		1,069*	
	(549)		(539)	
Treated		1,660**		1,645**
		(819)		(804)
Constant	427***	427***	397***	396***
	(91)	(91)	(89)	(91)
Y_0 control	No	No	Yes	Yes
Obs	1,984	1,580	1,984	1,580
R^2	0.00	0.00	0.00	0.00
Credit card				
ITT	0.035		0.033	
	(0.033)		(0.032)	
Treated		0.056		0.047
		(0.038)		(0.037)
Constant	0.15***	0.15***	0.139***	0.136***
	(0.02)	(0.02)	(0.021)	(0.021)
Y_0 control	No	No	Yes	Yes
Obs	890	705	890	705
R^2	0.002	0.004	0.02	0.03

OLS estimation using survey weights. Standard errors clustered at the road pavement project level.

Credit Card and *Bank Account* are coded as 1 if anyone in the household has them. Other credit questions are asked for all adults 18 and older.

Informal private credit sources are: Money lenders, merchants, and local pawn shops.

Collateral based credit sources are private bank loans and mortgages. Uncollateralized credit sources are credit cards, furniture and appli-

Table 12: Stayer Results: Consumption

Log household expenditures				
ITT	0.08		0.036	
	(0.068)		(0.046)	
Treated		0.14		0.087*
		(0.08)		(0.048)
Constant	8.01***	8.01***	3.97***	3.99***
	(0.037)	(0.037)	(0.36)	(0.40)
Y_0 control	No	No	Yes	Yes
Obs	864	691	864	691
R^2	0.004	0.010	0.25	0.26
Log per capita expenditures				
ITT	0.087		0.040	
	(0.075)		(0.045)	
Treated		0.136		0.07
		(0.093)		(0.04)
Constant	6.73***	6.73***	3.42***	3.51***
	(0.039)	(0.039)	(0.28)	(0.29)
Y_0 control	No	No	Yes	Yes
Obs	864	691	864	691
R^2	0.004	0.010	0.26	0.26
Durables [0-7]				
ITT	0.20		0.16*	
	(0.19)		(0.09)	
Treated		0.37		0.22*
		(0.27)		(0.11)
Constant	2.40***	2.40***	1.04***	1.04***
	(0.07)	(0.07)	(0.09)	(0.10)
Y_0 control	No	No	Yes	Yes
Obs	900	713	900	713
R^2	0.004	0.012	0.39	0.41
Car (=1)				
ITT	0.028		0.032	
	(0.032)		(0.023)	
Treated		0.057		0.058*
		(0.044)		(0.030)
Constant	0.10***	0.10***	0.048***	0.048***
	(0.019)	(0.019)	(0.013)	(0.13)
Y_0 control	No	No	Yes	Yes
Obs	900	713	900	713
R^2	0.001	0.006	0.23	0.23
Truck (=1)				
ITT	0.030		0.034	
	(0.027)		(0.022)	
Treated		0.061*		0.053**
		(0.036)		(0.025)
Constant	0.096***	0.096***	0.06***	0.060***
	(0.015)	(0.015)	(0.01)	(0.012)
Y_0 control	No	No	Yes	Yes
Obs	900	713	900	713
R^2	0.002	0.008	0.13	0.15
Any government program help (=1)				
ITT	−0.002		−0.002	−0.001
	(0.011)		(0.011)	(0.013)
Treated		−0.001		
		(0.013)		
Constant	0.03***	0.03***	0.03***	0.03***
	(0.008)	(0.008)	(0.008)	(0.008)
Y_0 control	No	No	Yes	Yes
Obs	897	710	897	710
R^2	0.00	0.00	0.00	0.00

OLS estimation using survey weights. Standard errors clustered at the road pavement project level.

PCE is per capita monthly expenditure in Mexican pesos at the household level.

Durables is a sum of dummies for the household having: Video player, computer, microwave oven, refrigerator, clothes washing machine, air conditioning, and motorcycle.

Government welfare programs include: Liconsa, Progresa-Oportunidades, DIF, etc.

Table 13: Stayer Results: Labor

Worked last week (=1)				
ITT	−0.018		−0.012	
	(0.020)		(0.018)	
Treated		−0.023		−0.022
		(0.024)		(0.020)
Constant	0.51***	0.51***	0.27***	0.275***
	(0.013)	(0.013)	(0.013)	(0.020)
Y_0 control	No	No	Yes	Yes
Obs	2,701	2,148	2,701	2,148
R^2	0.00	0.00	0.24	0.23
Days worked last week | worked=1				
ITT	0.11		0.090	
	(0.09)		(0.085)	
Treated		0.05		0.026
		(0.096)		(0.085)
Constant	5.5***	5.5***	4.15***	4.23***
	(0.07)	(0.07)	(0.20)	(0.22)
Y_0 control	No	No	Yes	Yes
Obs	984	778	984	778
R^2	0.001	0.00	0.06	0.05
Daily hours worked | worked=1				
ITT	0.47*		0.36*	
	(0.25)		(0.20)	
Treated		0.45		0.38
		(0.31)		(0.25)
Constant	8.19***	8.19***	4.68***	4.77***
	(0.18)	(0.184)	(0.32)	(0.34)
Y_0 control	No	No	Yes	Yes
Obs	984	782	984	782
R^2	0.005	0.004	0.18	0.18
Weekly hours worked | worked=1				
ITT	3.37*		2.87*	
	(1.85)		(1.45)	
Treated		2.78		2.38
		(2.36)		(1.82)
Constant	47***	47***	27.3***	27.67***
	(1.26)	(1.26)	(1.83)	(1.94)
Y_0 control	No	No	Yes	Yes
Obs	962	762	962	762
R^2	0.005	0.003	0.17	0.17
Monthly labor income | labor income> 0				
ITT	387		56	
	(353)		(176)	
Treated		932**		411**
		(450)		(202)
Constant	3,196***	3,196***	1,471***	1,471***
	(168)	(169)	(139)	(154)
Y_0 control	No	No	Yes	Yes
Obs	858	679	858	679
R^2	0.004	0.019	0.35	0.36

OLS estimation using survey weights. Standard errors clustered at the road pavement project level.

Labor questions are asked for people aged 8 and older.

Days Worked, Hours Worked and Weekly Hours Worked are calculated for the set of people who worked the previous week, except for *Worked last week*.

Hours Worked is coded as 0 when the person worked an average of less than 1 hour per day, and is top coded at 16 hours.

Weekly hours worked is a multiplication of *hours worked* and *days worked last week* for each individual that works.

Table 14: Stayer Results: Expectations and Investment

Home improvements (last 6 months)				
ITT	0.26**		0.26**	
	(0.11)		(0.11)	
Treated		0.27**		0.26**
		(0.11)		(0.11)
Constant	0.40***	0.40***	0.33***	0.32***
	(0.063)	(0.06)	(0.057)	(0.057)
Y_0 control	No	No	Yes	Yes
Obs	900	713	900	713
R^2	0.01	0.015	0.03	0.04
Opened new business last year (=1)				
ITT	0.023		0.024	
	(0.015)		(0.015)	
Treated		0.026		0.026
		(0.018)		(0.018)
Constant	0.039***	0.039***	0.040***	0.040***
	(0.009)	(0.009)	(0.009)	(0.009)
Y_0 control	No	No	Yes	Yes
Obs	897	710	897	710
R^2	0.002	0.003	0.003	0.004
New business at home vs elsewhere				
ITT	−0.22**			
	(0.10)			
Treated		−0.26**		
		(0.116)		
Constant	0.90***	0.90***		
	(0.05)	(0.05)		
Y_0 control	No	No		
Obs	48	37		
R^2	0.07	0.10		
Plans to out-migrate for work (=1)				
ITT	−0.06*		−0.06	
	(0.035)		(0.033)	
Treated		−0.07*		−0.075**
		(0.040)		(0.036)
Constant	0.47***	0.47***	0.38***	0.38***
	(0.026)	(0.026)	(0.027)	(0.028)
Y_0 control	No	No	Yes	Yes
Obs	801	633	801	633
R^2	0.004	0.005	0.048	0.047
Satisfaction living in city				
ITT	0.002		0.003	
	(0.035)		(0.034)	
Treated		0.006		0.007
		(0.044)		(0.044)
Constant	3.14***	3.14***	3.10***	3.10***
	(0.022)	(0.023)	(0.102)	(0.108)
Y_0 control	No	No	Yes	Yes
Obs	897	712	897	712
R^2	0.00	0.00	0.0003	0.0003

OLS estimation using survey weights. Standard errors clustered at the road pavement project level.

Satisfaction is on a 4 point scale. A higher number means more satisfied.

Due to the scarcity of observations opening a business in both years of survey, regressions with controls for 2006 could not be estimated in the last panel.

Table 15: Stayer Results: Public Services

Distance to nearest paved street				
ITT	−0.33		−0.36	
	(0.72)		(0.74)	
Treated		−1.29***		−1.32***
		(0.32)		(0.34)
Constant	1.32***	1.32***	1.13***	1.05***
	(0.32)	(0.32)	(0.27)	(0.22)
Y_0 control	No	No	Yes	Yes
Obs	893	706	893	706
R^2	0.0003	0.01	0.0006	0.01
Tap water in lot (=1)				
ITT	0.006		0.014	
	(0.061)		(0.029)	
Treated		0.099		0.058*
		(0.06)		(0.033)
Constant	0.79***	0.79***	0.28***	0.32***
	(0.03)	(0.03)	(0.03)	(0.04)
Y_0 control	No	No	Yes	Yes
Obs	898	711	898	711
R^2	0.0001	0.015	0.42	0.37
Sewerage (=1)				
ITT	−0.011		−0.004	
	(0.031)		(0.025)	
Treated		0.024		0.026
		(0.029)		(0.026)
Constant	0.92***	0.92***	0.67***	0.73***
	(0.02)	(0.02)	(0.06)	(0.07)
Y_0 control	No	No	Yes	Yes
Obs	898	711	898	711
R^2	0.0005	0.002	0.13	0.09
Garbage collection (=1)				
ITT	−0.012		0.015	
	(0.07)		(0.055)	
Treated		0.092		0.09
		(0.080)		(0.05)
Constant	0.70***	0.70***	0.47***	0.47***
	(0.052)	(0.05)	(0.05)	(0.05)
Y_0 control	No	No	Yes	Yes
Obs	899	713	899	713
R^2	0.0002	0.009	0.17	0.19
Burglary past 12 months (=1)				
ITT	0.029		0.030	
	(0.019)		(0.019)	
Treated		0.019		0.02
		(0.021)		(0.02)
Constant	0.059***	0.059***	0.046***	0.045***
	(0.011)	(0.011)	(0.11)	(0.011)
Y_0 control	No	No	Yes	Yes
Obs	893	707	893	707
R^2	0.003	0.001	0.02	0.02
Feel safe walking in your street at night (=1)				
ITT	0.030		0.029	
	(0.046)		(0.043)	
Treated		0.100**		0.088**
		(0.046)		(0.043)
Constant	0.62***	0.62***	0.49***	0.50***
	(0.027)	(0.027)	(0.043)	(0.04)
Y_0 control	No	No	Yes	Yes
Obs	888	706	888	706
R^2	0.001	0.009	0.04	0.05

OLS estimation using survey weights. Standard errors clustered at the road pavement project level.
Distance to nearest paved street measured in street blocks.

Table 16: Stayer Results: Schooling of Children

Literate (=1)				
ITT	0.012		0.008	
	(0.013)		(0.012)	
Treated		0.003		−0.0002
		(0.016)		(0.016)
Y_0 control	No	No	Yes	Yes
Age dummy controls	Yes	Yes	Yes	Yes
Obs	716	570	716	570
R^2	0.05	0.02	0.07	0.06
Enrolled in school (=1)				
ITT	0.003		0.0056	
	(0.017)		(0.016)	
Treated		−0.0038		0.001
		(0.020)		(0.020)
Y_0 control	No	No	Yes	Yes
Age dummy controls	Yes	Yes	Yes	Yes
Obs	700	558	700	558
R^2	0.09	0.09	0.15	0.17
> 0 **absences last month (=1)**				
ITT	0.026		0.025	
	(0.035)		(0.035)	
Treated		0.045		0.043
		(0.045)		(0.043)
Y_0 control	No	No	Yes	Yes
Age dummy controls	Yes	Yes	Yes	Yes
Obs	645	509	645	509
R^2	0.03	0.03	0.06	0.09

OLS estimation using survey weights. Standard errors clustered at the road pavement project level.

Sample is children aged between 5-17 from households who were surveyed in 2006 and did not migrate by 2009 nor splintered from households interviewed in 2006.

Table 17: Stayer Results: Satisfaction with government

Satisfaction with local government [1-4]				
ITT	0.205***		0.20***	
	(0.063)		(0.066)	
Treated		0.30***		0.305***
		(0.058)		(0.062)
Constant	2.28***	2.28***	1.99***	2.00***
	(0.043)	(0.04)	(0.101)	(0.109)
Y_0 control	No	No	Yes	Yes
Obs	854	678	854	678
R^2	0.019	0.038	0.03	0.05
Satisfaction with State government [1-4]				
ITT	0.095*		0.096*	
	(0.056)		(0.057)	
Treated		0.14**		0.148**
		(0.063)		(0.64)
Constant	2.56***	2.56***	2.50***	2.47***
	(0.040)	(0.040)	(0.099)	(0.11)
Y_0 control	No	No	Yes	Yes
Obs	829	661	829	661
R^2	0.004	0.010	0.005	0.01
Satisfaction with Federal government [1-4]				
ITT	0.094		0.094	
	(0.056)		(0.055)	
Treated		0.128**		0.126**
		(0.063)		(0.63)
Constant	2.46***	2.46***	2.34***	2.30***
	(0.045)	(0.045)	(0.115)	(0.126)
Y_0 control	No	No	Yes	Yes
Obs	839	668	839	668
R^2	0.003	0.006	0.005	0.010

OLS estimation using survey weights. Standard errors clustered at the road pavement project level.

Satisfaction with Government is on a 4 point scale where: 1 is very unsatisfied, 2 is unsatisfied, 3 is satisfied and 4 is very satisfied.