

PAVE THE WAY

Paving streets in marginalized neighborhoods in Mexico increased property values, allowing households to purchase more home appliances and vehicles and to invest more in home improvements.

Featuring an evaluation by **Marco Gonzalez-Navarro** and **Climent Quintana-Domeque**



MARCO GONZALEZ-NAVARRO

Many developing countries are rapidly urbanizing, but a large portion of the urban poor lives in marginalized neighborhoods that lack access to basic urban services such as running water, electricity, sewage systems, and paved roads. Governments may be less likely to invest in infrastructure projects in these areas for both political and economic reasons: low-income residents may not have the political power to lobby for infrastructure improvements, and politicians may prefer to invest in central business districts, where they believe such projects are more likely to attract businesses and spur economic growth.

At the same time, improving infrastructure in low-income neighborhoods could have dramatic effects on living conditions for the urban poor. For instance, asphaltting currently unpaved roads might increase property values and reduce the time and cost of traveling within the neighborhood or to the city center. Increases in property wealth could, in turn, make households more willing to take out loans to purchase items such as refrigerators or cars,

and smoother transportation could help residents access better-paying jobs or work longer hours. However, there is relatively little research measuring the effects of public infrastructure investments on the lives of the poor.

From 2006 to 2009, J-PAL affiliate Marco Gonzalez-Navarro (University of Toronto) and Climent Quintana-Domeque (University of Oxford) partnered with the government of Acayucan, Mexico to conduct a randomized evaluation to measure the impact of a set of street pavement projects.

KEY RESULTS:

Paving roads increased property values. Values for properties on paved roads increased by 17 percent, according to a professional appraisal, in comparison to properties on roads that remained unpaved.

Households on newly paved roads purchased more home appliances and vehicles and invested more in home improvements. There were no significant effects on transportation costs, hours worked, or earnings.

How did households finance additional purchases? Households on paved streets were more likely to use formal, collateralized credit and take out larger loans, suggesting that increases in property wealth made them more comfortable using credit to finance these improvements in their standard of living.

Road construction costs were approximately equal to the increases in property values. This is considered a favorable ratio of costs to benefits for government-provided public goods.

EVALUATION



MARCO GONZALEZ-NAVARRO

In Mexico, municipal governments are responsible for building and maintaining urban infrastructure. Like many cities in Mexico and throughout Latin America, Acayucan has a central core, with paved streets. Low-income neighborhoods lie in the outskirts of the city and the local government has paved streets in these neighborhoods a few sections at a time.

In 2006, the government of Acayucan identified 56 separate street pavement projects consisting of contiguous, unpaved street segments that connected with the existing grid of paved streets. The municipal budget was only large enough to pay for 28 of these projects, so the mayor and city council decided to randomly select streets to pave, which allowed for a rigorous evaluation. Figure 1 shows the locations of the streets selected for pavement and those that were not supposed to be paved, forming a comparison group.

In addition to surveying households in the project areas before and after streets were paved, researchers hired a professional appraiser to assess the market value of a subset of the properties.

FIGURE 1. LOCATION OF STREET PAVEMENT PROJECTS IN ACAYUCAN, MEXICO



Researchers worked with the government of Acayucan to randomly select 28 of 56 potential street pavement projects. These streets were in low-income, residential areas on the outskirts of the city.

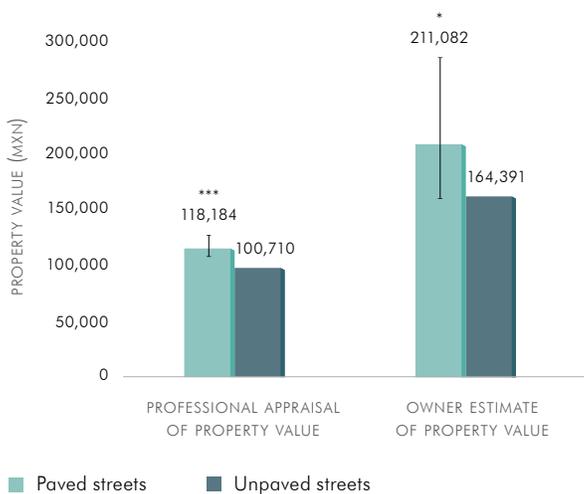
UNDERSTANDING THE RESULTS

By 2009, 17 of the 28 streets selected for pavement had been paved and the other 11 projects were underway. None of the streets in the comparison group had been paved. The results on the next page adjust for non-compliance by looking only at streets that were paved by 2009; these estimates are known as “treatment on the treated.” The average effects for the full group of randomly selected streets (not reported here), regardless of whether they were paved, are smaller in magnitude but still show positive and statistically significant effects.

RESULTS

Paving roads increased property values. According to a professional appraiser, properties on paved roads were worth 17 percent more than an average value of MXN 100,710 (US\$6,898) for properties on roads that remained unpaved. According to homeowners' estimates, these properties were worth 28 percent more than the average of MXN 164,391 (US\$11,260) in the comparison group (see Figure 2). While homeowners¹ overestimated property values and the value gained compared to the professional appraiser, both measures indicate that pavement increased property values in a tangible way. Land values and rents were also higher on paved streets.

FIGURE 2. HOMES ON PAVED STREETS INCREASED IN VALUE

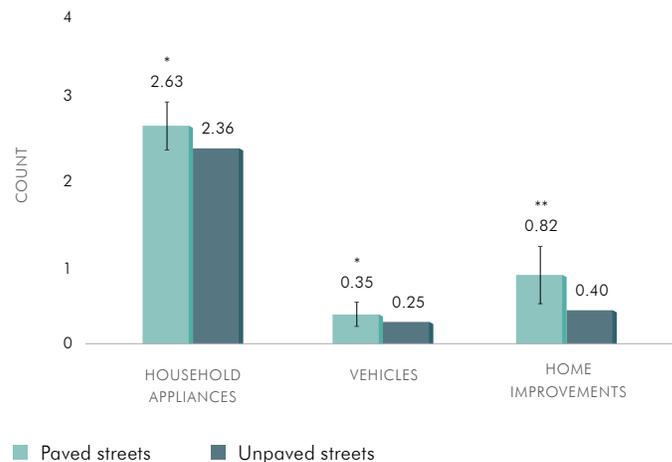


Note: Error bars represent 95% confidence intervals. Statistically significant difference relative to the comparison group is noted at the 1% (***), 5% (**), or 10% (*) level.

Households living on paved roads purchased more home appliances and vehicles and invested more in home improvements. On average, these households had 2.63 appliances out of a list of six common household appliances (refrigerator, washing machine, microwave, air conditioner, video player, and computer), compared to 2.36 appliances in the comparison group. They had an average of 0.35 motor vehicles (cars, trucks, and motorcycles), compared to 0.25 vehicles among households on unpaved streets. They also conducted an average of 0.82 home improvements (such as improvements in flooring, walls, roofing, sewerage connection, plumbing, toilets, electrical installations, room construction, remodeling, security measures, and house façade), an increase from 0.4 improvements (see Figure 3).

There were no statistically significant effects on transportation costs, hours worked, or earnings. The street pavement program did not reduce the time or cost of traveling to the city center in a meaningful way, which might have allowed households to earn more. Furthermore, there were no effects on school attendance or health.

FIGURE 3. HOUSEHOLDS LIVING ON PAVED STREETS INVESTED IN HOUSEHOLD APPLIANCES, VEHICLES, AND HOME IMPROVEMENTS



Note: Households could report a maximum of six types of household appliances, three types of vehicles, and eleven different home improvements. Error bars represent 95% confidence intervals. Statistically significant differences relative to the comparison group are noted at the 1% (***), 5% (**), or 10% (*) levels.

How did households finance additional purchases? Although incomes did not change significantly over the course of the study, households on paved streets were more likely to use formal, collateralized credit² and took out larger loans.

Households on paved streets were 2.8 percentage points more likely to use formal credit (compared to 1.8 percent of households on unpaved streets), and their average loan balances were ten times larger. As the increases in appliances, vehicles, and home improvements were concentrated among households already using formal credit before the program, there was little evidence suggesting that the street paving program made banks more willing to lend to households. Rather, the results suggest that increases in property wealth—often the largest source of wealth for homeowners—made households more comfortable using credit to finance purchases of appliances, vehicles, and home improvements that raised their standard of living.

Road construction costs were approximately equal to the increases in property values. The municipality reported that the total cost of paving the streets was MXN 11,304,642 (US\$774,291). The total gain in property values was MXN 12,275,585 (US\$840,793), which is an underestimate of the benefits as it does not include gains to people who use the newly paved streets but do not live on them. This ratio of benefits to costs—1.09 to one—is considered a favorable ratio for government-provided public goods.

¹ Approximately 95 percent of residents were homeowners.

² Banks in Acayucan offered home equity loans, which allowed homeowners to borrow up to 50 percent of the assessed property value of their home, using the property as collateral. For the purposes of this study, the authors defined “formal credit” to include home equity loans as well as mortgages and other collateralized bank loans.

POLICY LESSONS



MARCO GONZALEZ-NAVARRO

Street pavement may be an effective way to raise standards of living for homeowners in poor, urban neighborhoods. In Acayucan, Mexico, paving streets increased property values by 17 percent. Within two years, residents were able to transform their increased property values into increases in household appliances and motor vehicles, as well as make more home improvements. They also felt comfortable taking out larger loans to finance these purchases. This study is the first to link public infrastructure projects with tangible improvements in standards of living in marginalized neighborhoods.

Improving roads can be a fiscally sound use of public funds. Roads and other infrastructure projects are public goods—many people use them but individuals do not have incentives to develop or maintain them on their own—so providing them is often a government role. Governments aim to carry out projects where the benefits to citizens are at least as large as the costs, and a conservative cost-benefit estimate of this set of projects suggests that road construction costs were

approximately equal to the increases in property values. This estimate does not account for benefits to people who use the newly paved roads but do not live on them. Furthermore, while road construction projects require large initial investments, maintenance costs are generally low, and citizens continue to enjoy the benefits for many years.

In making budget decisions, governments should take into account that infrastructure projects may have benefits beyond the visible physical improvements. The trend toward greater government spending on social programs such as conditional cash transfers sometimes comes at the cost of investment in infrastructure. There are numerous studies showing the benefits of some of these social protection programs but far fewer examining the impacts of more traditional infrastructure projects. With this new evidence on street paving, policymakers can view infrastructure development as an effective approach to raising households' living standards and consider these benefits in deciding how best to use government funds.

For Further Reading: Gonzalez-Navarro, Marco, and Climent Quintana-Domeque. 2016. "Paving Streets for the Poor: Experimental Analysis of Infrastructure Effects." *The Review of Economics and Statistics* 98(2): 254–267.

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