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Local Public Goods and Property Tax Compliance: Evidence from Residential Street Pavement

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Abstract

Does property tax compliance improve when the supply of local public goods expands? This paper uses administrative property tax records and information on the rollout of first-time asphalting of streets in inhabited residential neighborhoods in Mexico to show that the provision of local public goods can improve property tax compliance rates. We put forward a simple explanation to link local public goods and property tax compliance: When citizens observe public goods being delivered, they update their beliefs about the government's quality in public good provision and become more likely to comply.

JEL Classification Codes: H26, H41

Keywords: taxpayer behavior, property tax compliance, local public goods

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Introduction

"Why pay taxes? Why should I send them taxes when they aren't supplying services? It is sickening. ... Every time I see the tax bill come, I think about the times we called and nobody came." Fred Phillips, Incompliant Detroit Resident[1]

The problem of tax compliance is one of paramount importance for the proper functioning of a modern market economy, mainly because tax compliance is a necessary condition to guarantee the efficient provision of public goods.[2] This paper uses administrative property tax records and information on the rollout of first-time asphalting of streets in inhabited residential neighborhoods in Mexico to investigate whether the provision of local public goods affects property tax compliance rates.[3]

The tax compliance literature has traditionally focused on the income tax, where the main issue is whether to report income truthfully and pay the corresponding tax or to underreport income but face a possible fine. In this paper, we present what is to our knowledge the first empirical study on property tax compliance, which differs from the income tax literature in two important ways. The first is that because the government bills households directly, there is no scope for underreporting and the main decision a household faces is whether to pay or not to pay. The second is that property taxes in most—if not all—countries are local government taxes instead of federal ones. Because property taxes are closely linked to local government expenditures, this brings to the fore an often disregarded motive for tax compliance which is the expected benefit in terms of provision of local public goods when taxpayer contributions are non-negligible.

The explanation we put forth in this paper is that localized public good provision can have a signaling value for taxpayers regarding (the unknown) government ability in delivering public goods. In short, when citizens observe public goods being delivered, they update their beliefs about the government's quality in public good provision and in turn become more likely to comply. This simple model predicts improvements in compliance among those directly benefitted by expansions in street pavement supply, which is what we observe in the data using different empirical strategies.

Others have previously studied the role of public good provision and tax compliance, albeit only theoretically (Cowell and Gordon 1988) or in lab experiments (Alm et al. 1992; Becker et al. 1987, to cite just a few). Both strands of the literature suggest that individuals have a motive to pay taxes because they value the public goods that their taxes finance. Here, the combination of both temporal and spatial rollout of street asphalting in the city of Acayucan together with administrative data on the tax compliance histories of every plot in the city allow us to use a plot

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[1] Quote from MacDonald and Wilkinson (2013) page 1.

[2] Samuelson (1954) shows that the private provision of public goods will be inefficiently low because each individual will have an incentive to "free ride" on the private purchases of others.

[3] Asphalting of streets is also known as road surfacing or pavement.

level fixed-effect regression strategy to identify the effects of pavement provision on tax compliance for plots directly affected. Furthermore, because the data cover years before pavement projects were initiated by the local administration, we can test for the parallel trends identification assumption required by the fixed-effect regression strategy.

Our most conservative estimate is that compliance rates increase significantly when pavement is provided by around 2 percentage points from an average compliance rate of 75%.[4] Our results provide support for the hypothesis that providing public goods increases property tax compliance. However, the magnitude of the effect is very small as a proportion of the cost of the infrastructure.

We also merge the tax compliance data at the street segment level to provide new evidence on compliance by household characteristics. We find that while households that own bigger properties (in lot size and building size) are more likely to comply, market values of the property are uncorrelated to compliance. The evidence suggests that compliance is driven more by available resources (as measured by per capita expenditure) than by wealth (as measured by the value of the property).

The paper proceeds as follows. In section 2 we provide a simple model of property tax compliance. In section 3 we describe the data and identification strategy. Section 4 presents the results, and section 5 concludes.

A Model of Property Tax Compliance with Local Public Goods

In the standard model of tax compliance, which uses the Beckerian economics-of-crime approach (1968), an expected utility maximizing taxpayer endowed with an exogenous income y and a well-behaved utility function u facing a tax τ must choose whether to comply and pay the tax τ or not to comply. If the taxpayer does not comply, she is punished with probability $0<\pi<1$ and must pay a fine q. The taxpayer will choose to comply if and only if $u(y-\tau)\geq(1-\pi)u(y)+\pi u(y-\tau-q)$, that is, if the (certain) utility of complying is higher than the (expected) utility of not complying. However, the main puzzle is that with typically observed low audit rates, low fines and reasonable risk aversion, the standard model would predict a much higher tax evasion than observed empirically.[5] Why are so many households honest?

Two main explanations have been put forward to explain why people do pay taxes. One is that people are unwilling to cheat due to social norms and morality constraints (i.e., people dislike being dishonest and hence voluntarily pay taxes). Another argues that taxpayers are unable to cheat because of third-party reporting, which makes the probability of being caught much higher than the observed audit rate. A recent study by Kleven et al. (2011) extends the standard model of (rational) tax evasion to allow for the key distinction between self-reported and third-party

[4] Property valuations for tax assessment purposes were unaffected by the pavement provision. Tax rates were increased by inflation to keep real tax bills constant in real terms throughout the sample period.

[5] The earliest models of tax compliance are those of Allingham and Sandmo (1972) and Srinivasan (1973). In Allingham and Sandmo (1972) the individual taxpayer problem is one of choosing the amount of reported income to maximize the expected utility given a tax rate, a probability of audit and a concave utility function. See Andreoni, Erard and Feinstein (1998), Slemrod and Yitzhaki (2002), and Alm (2012) for excellent surveys and discussions of this model and its extensions.

reported income and, using a tax enforcement field experiment in Denmark, finds evidence supporting the inability to cheat mechanism. Unfortunately, the mechanism of third-party reporting cannot play any role for property tax compliance: While the value of taxpayer income is private information, property tax assessments in a city are known by the local government.

We build upon the theoretical models of Allingham and Sandmo (1972) and Cowell and Gordon (1988) and the lab experiments of Alm et al. (1992) and Becker et al. (1987) to extend the standard model of (property) tax compliance by allowing local public good considerations. Individuals may voluntarily pay taxes to finance local public goods—even if there is no penalty on the failure to pay—because they recognize that they will receive something for their tax payments. Of course, this assumes that the taxpayer contribution to the local public good is not negligible. This is reasonable in our micro context of a city and its local property taxes.

The technology of the local government to provide public goods is very simple: the total amount of resources (taxes) collected from the taxpayers is multiplied by a technological parameter to deliver goods in the future. This parameter is basically the same as the "multiplier" in Alm et al. (1992), however, in our context, is unknown to the taxpayers. The taxpayers learn about this parameter when they receive a signal from the local government which takes the form of a local public good: the technological parameter is perceived to be larger for the group of taxpayers who receive a local public good. *Ceteris paribus*, the expected benefits of tax compliance will be higher for those who receive a local public good than for their counterparts. In other words, the delivery of a local public good affects the trade-off between the present costs and the expected benefits of complying.[6]

Our model has two periods: Present (t=0) and future (t=1). There are n taxpayers, i=1,...,n grouped into s=1,...,S streets. Each taxpayer faces a property tax $\tau_i>0$ and must decide whether to comply ($C_{i,s}=1$) or not ($C_{i,s}=0$). If the taxpayer does not comply, she is punished with probability $0<\pi<1$ and must pay a penalty q_i at t=0. In addition, the taxpayer will receive future benefits from the government, defined as the product of the technological parameter of the government $\Theta(p_s)$ times the total amount of resources (taxes) collected from the taxpayers. While the technology of the government is unobserved by the taxpayers, those taxpayers on a street that receives a local public good (p_s=1) assign a better technology to the local government in providing public goods in the future than those on unpaved streets (p_s=0), that is, $\Theta(1)>\Theta(0)>0$. Hence, in the future, the taxpayer i in street s will receive benefits $\Theta(p_s)\sum_{i=1}^{n}\tau_i$ if she complies, and $\Theta(p_s)\sum_{j\neq i}\tau_j$ if she does not.

The expected utility of the risk-neutral taxpayer i in street s at t=0 if she complies is given by

[6] We assume that the more visibly tax money is spent in improvements in the quality of civic life, the less likely will be the need to resort to aggressive collection methods. See Powers (2008).

$$EU_{i,s}^{C}=-\tau_i+\beta\Theta(p_s)\sum_{i=1}^{n}\tau_i+\varepsilon_{i,s}^{C} \quad (1)$$

where $0<\beta<1$ is the intertemporal discount factor and $\varepsilon_{i,s}^{C}$ captures stochastic (and unobserved to the econometrician) factors that affect compliance behavior. The expected utility of the taxpayer at $t=0$ if she does not comply is given by

$$EU_{i,s}^{NC}=-\pi(\tau_i+q_i)+\beta\Theta(p_s)\sum_{j\neq i}^{n}\tau_j+\varepsilon_{i,s}^{NC} \quad (2)$$

The probability that the taxpayer complies is given by

$$P(C_{i,s}=1|\tau_i,p_s)=P(EU_{i,s}^{C}\geq EU_{i,s}^{NC})=F(\beta\Theta(p_s)\tau_i-(1-\pi)\tau_i+\pi q_i) \quad (3)$$

where F is the *cdf* of $\varepsilon_{i,s}^{C}-\varepsilon_{i,s}^{NC}$. Letting $\Theta(p_s)=\Theta(0)+\delta p_s$ for any $\delta>0$ and given that $q_i=\lambda\tau_i$, equation (3) can be written as

$$P(C_{i,s}=1|\tau_i,p_s)=F(\alpha_1\tau_i+\alpha_2 p_s\tau_i) \quad (4)$$

where $\alpha_1=\beta\Theta(0)-(1-\pi(1+\lambda))$ and $\alpha_2=\beta\delta>0$.

Since $\alpha_2>0$ and F is a *cdf* (i.e., non-decreasing) this model delivers a clear-cut prediction, namely that the provision of the local public good increases the probability of compliance $\forall\ \tau_i>0$:

$$P(C_{i,s}=1|\tau_i,p_s=1)-P(C_{i,s}=1|\tau_i,p_s=0)=F((\alpha_1+\alpha_2)\tau_i)-F(\alpha_1\tau_i)\geq 0 \qquad \forall\tau_i>0 \quad (5)$$

This prediction is the basis for the testing of our model.

The prediction regarding the impact of the property tax on the compliance rate is however ambiguous:

$$\frac{\partial P(C_{i,s}=1|\tau_i,p_s)}{\partial\tau_i}=(\alpha_1+\alpha_2 p_s)f(\alpha_1\tau_i+\alpha_2 p_s\tau_i) \quad (6)$$

where f is the *pdf*. Raising τ has two effects. First, it increases the present cost of complying, so that this change should make people less likely to comply. However, it also increases both the expected present penalty for not complying and the discounted future benefits of complying, so that this should make people more likely to comply. Which effect dominates depends on both the probability of punishment π and the discount rate β.

Empirical Implementation

For our empirical implementation, we first proceed by assuming that

$\varepsilon_{i,s}^{C} - \varepsilon_{i,s}^{NC} | \tau_i, p_s \sim N(\alpha_0, \sigma^2)$. Then, equation (4) can be written as

$$P(C_{i,s}=1|\tau_i,p_s)=\Phi\left(-\left(\frac{\alpha_0}{\sigma}\right)+\left(\frac{\alpha_1}{\sigma}\right)\tau_i+\left(\frac{\alpha_2}{\sigma}\right)p_s\tau_i\right) \qquad (7)$$

where Φ is the standard normal *cdf.*

After estimating the probit coefficients, and defining the difference in the sample probability of property tax compliance between those in paved and those in unpaved streets as $\Delta P_i \equiv P(C_{i,s}=1|\tau_i,p_s=1) - P(C_{i,s}=1|\tau_i,p_s=0)$, our model predicts that:

$$\Delta\hat{P}_i = \Phi\left(-\left(\frac{\hat{\alpha}_0}{\sigma}\right)+\left(\left(\frac{\hat{\alpha}_1}{\sigma}\right)+\left(\frac{\hat{\alpha}_2}{\sigma}\right)\right)\tau_i\right) - \Phi\left(-\left(\frac{\hat{\alpha}_0}{\sigma}\right)+\left(\frac{\hat{\alpha}_1}{\sigma}\right)\tau_i\right) \geq 0 \qquad \forall\ \tau_i > 0 \quad (8)$$

As an alternative to the probit model, we assume that $\varepsilon_{i,s}^{C} - \varepsilon_{i,s}^{NC} | \tau_i, p_s$ follows a logistic distribution with mean zero and variance $\frac{\pi^2}{3}$, and estimate equation (4) using a logit model.[7]

Data

Property tax data

Administrative property tax data were obtained for the city of Acayucan for the years 2005–2012. There are about 16,000 plots in the city. The government-appraised property value is on average 215,092 pesos (17,174 in 2012 USD). Property values were not updated during the study years—including for properties that received pavement. Instead, tax rates were increased for all properties to keep up with the inflation rate. Annual property tax invoices amounted to an average 196 pesos (15 in 2012 USD). For every plot in the city, we observe whether the property tax was paid in the corresponding calendar year. On average 74% of properties paid their property taxes in the calendar year they were due. These summary statistics of survey data are presented in table 1.

These unique administrative tax records reveal some interesting patterns. Figure 1 shows that the property tax schedule is L-shaped. This means that the city charges a minimum tax and only increases it proportionately to income after a certain threshold. Figure 2 shows an increasing

[7] The advantage of the logit model is that it allows us to control for plot fixed effects by means of the conditional logit model (e.g., Chamberlain (1980), and Hamerle and Ronning (1995)).

likelihood of compliance with government-appraised property values. The range is quite large. Among low valued properties compliance rates average 45% whereas they fluctuate around 70% among higher value properties. Figure 3 confirms this relationship: higher taxed properties are more likely to comply.

We use the cross section of 2012 data to analyze these relationships in table 2. Column 1 shows that the average elasticity of taxes with respect to property values is around 10%. In column 2 we estimate a spline regression which shows that the elasticity of the tax with respect to property value is approximately one among the higher value properties (those not being charged the minimum property tax).

Starting in column 3 the dependent variable is whether the tax was paid on time in a given year. Columns 3 and 4 show the positive relationship between property values and probability of compliance. In concordance with figure 2, the relationship is concave according to column 4. Columns 5 and 6 show the positive and concave relationship between log taxes and compliance likelihood. In column 6 we control for both property value and taxes owed. The result is unambiguous: Controlling for property value, a doubling of the property tax bill reduces compliance likelihood by around 10%. This suggests local authorities are on the increasing part of the Laffer curve: They could raise property taxes and still obtain more property tax intake even after accounting for some taxpayers who will stop complying.

Street asphalting

The data we use comes from the city of Acayucan—one of Mexico's 56 metropolitan areas encompassing three municipalities with a combined population of 105,000 (INEGI, 2007). The city has a central core where most streets have been paved, and outer sections where street pavement is gradually rolled out. Residences are built and inhabited long before streets are paved, as shown in figure 4. This situation is common throughout Mexico and other Latin American countries (Fernandes 2011), suggesting that the results from our analysis are potentially relevant for many other countries.

Municipal governments in Mexico are responsible for most of the elements of their urban infrastructure. Each three-year administration has ample leeway as to budgetary allocations. The municipal budget consists mainly of transfers from general funds obtained from the federal value-added tax, the federal income tax, and oil revenues. Less than 10% of the municipal budget derives from local taxes (consisting of the property tax and business-permit fees). Property-tax receipts, especially in small cities, play a less significant role in Mexico than they do in the U.S. Cadastral property valuations are very low and rarely updated.

As in other Mexican cities, the local government expands its pavement grid over time via "street asphalting projects," each defined as a contiguous set of unpaved street segments connecting to the existing pavement grid. The intervention consists of first-time asphalting of residential non-arterial streets, varying in width from 8 to 15 meters, and allowing for two lanes of vehicular traffic and one or two lanes for parking. The pavement material used is either hot-mix asphalt concrete or portland cement reinforced concrete. Like most infrastructure, the lion's share of costs are borne initially: the transportation literature estimates annual cost of maintenance to be only 1.5% of construction costs (BITRE 1978), or 0.3%–0.7% using the cost estimates in Chen, Lin and Luo (2003). After a street is paved, maintenance is a municipal responsibility and is funded from general revenues.

Street pavement in an urban context provides multiple services: it facilitates vehicle, pedestrian and cyclist movement and access, provides accessible space for vehicle parking, allows commercial vehicles to deliver goods, and has a significant impact on the visual appearance of the area. Moreover, fieldwork confirmed that congestion was not a concern—as expected given the residential nature of the streets. A valid question is then why the market does not provide street pavement to begin with. One reason is that residential street pavement is a pure public good (non-rivalrous and non-excludable), and hence, free rider incentives prevent private provision.

The city engaged in 26 street pavement projects between 2007 and 2012. Detailed data on street asphalting completion projects by the municipality allow us to identify plots that present a change in street pavement status using plot addresses from the property tax data database. The pavement projects were rolled out randomly from 2006–2009, and although the experimental rollout ceased in 2009, we can still use the random assignment for an instrumental variables analysis.

Results

We first present estimates using the exogenous allocation to pavement (intent to treat and instrumented pavement) in table 3 Column 1 shows that compliance in the sample was not significantly different in 2005 between assigned to treatment and assigned to control. In 2012, those assigned to treatment had a 4 percentage point higher compliance ($p<.10$). In column 3 we instrument pavement in 2012 with assignment to treatment (a LATE estimate). Note that the instrument is not time varying so we use the cross section in 2012 for estimation. The results in column 3 suggest that pavement increases compliance by 7 percentage points ($p<.10$). In columns 4 and 5 we present analogous estimations controlling for baseline compliance. The results are slightly larger once baseline compliance is controlled for.

The second estimation strategy we pursue uses a panel data plot fixed effect approach. Those results are presented in table 4. Column 1 uses a logit plot fixed effect specification (it drops always-payers and always non-payers from the estimation, hence the change in number of observations) and suggests a significant increase in the likelihood that the household is current with property tax payments ($p<0.1$). Column 2 shows the OLS plot fixed effects estimation on the same sample, while Column 3 shows an OLS plot fixed effect specification with year dummies on the full sample. It provides an estimate of tax compliance changes that occur once pavement takes place. The estimated rate change is a 1.9 percentage point increase, significant at the 5% level.

The regression estimates suggested by the theory are presented in columns 4 and 5. Column 4 provides marginal effects at the sample mean from a probit regression. The coefficient of interest is the interaction of pavement and property tax, which is positive and statistically significant at the 1% level. The same result holds if we use a logit specification, as is shown in column 5. We interpret this as a validation of the model because theory suggested the coefficient would be positive. Note that because tax load is time invariant columns 4 and 5 use the cross sectional variation in tax load by excluding the plot fixed effects. Standard errors are as before clustered at the plot level.

Identifying assumptions

The plot fixed effect identification strategy from table 4 requires that parallel trends in changes in the dependent variable occur among those in the treatment and control groups. Evidence of this is presented in table 5 where it is shown that future pavement is uncorrelated to changes in compliance in years before paving occurred.

Tax compliance and household characteristics

In this section we report correlates of tax compliance from a household survey. Although we tried to do a lot by lot merge, the identification of surveyed households could only be done at the street block level. We have 701 street block observations from this merge. While the power is not high and much of the variation is absorbed when calculating means at the street block level, the correlations are of interest because this has not been done before.

Table 6 provides descriptive statistics. Table 7 shows the correlation between compliance and household characteristics. What emerges is that pavement is still positively correlated to tax compliance even when doing the analysis at the street block level in Column 1. Log per capita expenditures are positively correlated to compliance.

Conclusion

In this paper we provide evidence that delivery of a local public good generates increased property tax compliance. Furthermore, we find support for the hypothesis that delivery of public goods has a larger marginal effect for households with larger property tax bills, as suggested by a simple model of perceived government quality where households update their beliefs when they observe public goods being delivered.

While our results provide support for the hypothesis that providing public goods increases property tax compliance, we also conclude that a substantial portion of infrastructure projects such as road asphalting cannot be automatically financed via ex-post increases in tax compliance. The increase in tax intakes represent an insignificant share of construction costs.

We also provide new evidence on correlates of property tax compliance. Wealth as measured by value of the property is not significantly correlated to compliance. In contrast, current expenditures are.

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Figures

Figure 1

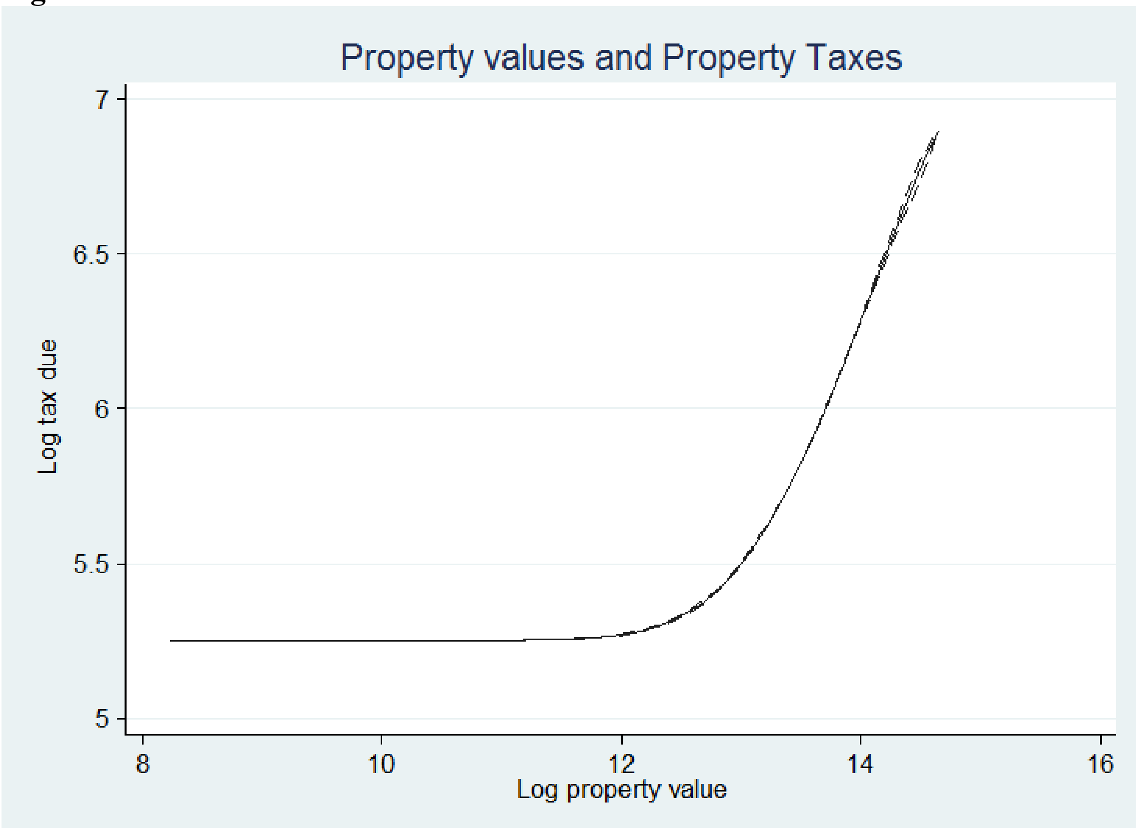
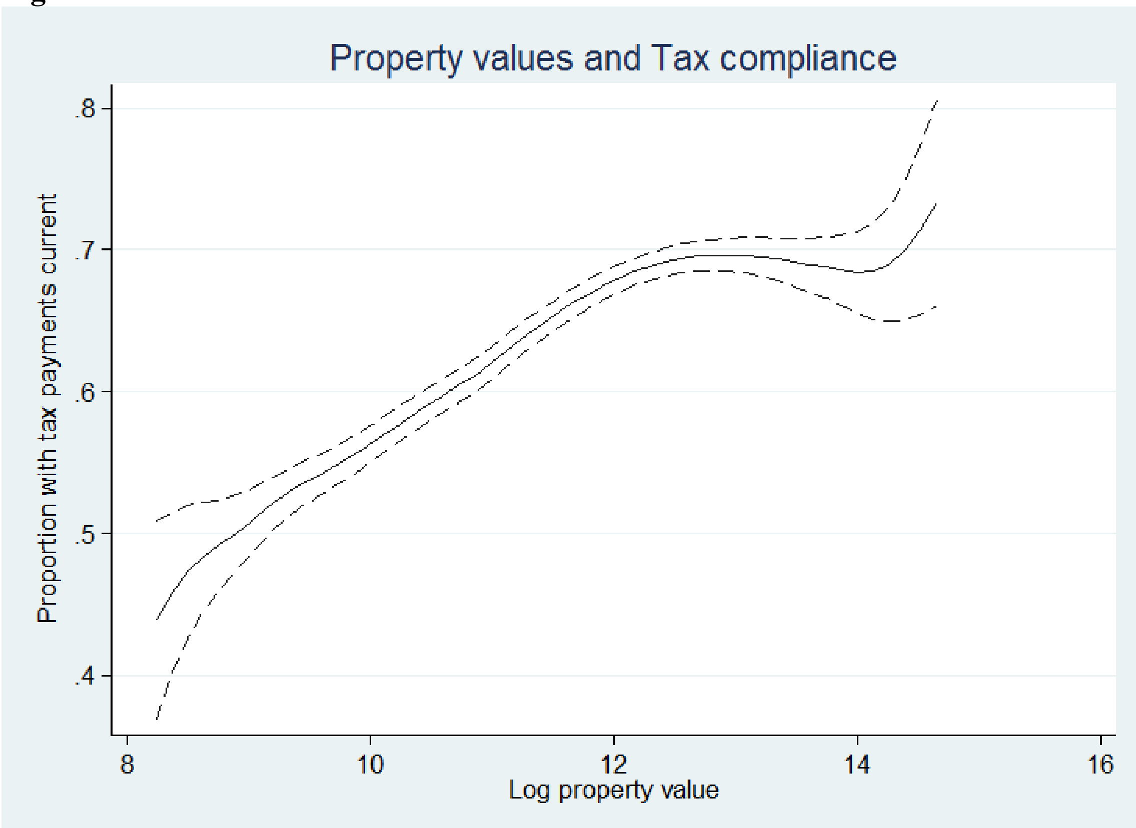


Figure 2



Property values and Tax compliance
Proportion with tax payments current
.8
.7
.6
.5
.4
8
10
12
14
16
Log property value

Figure 3

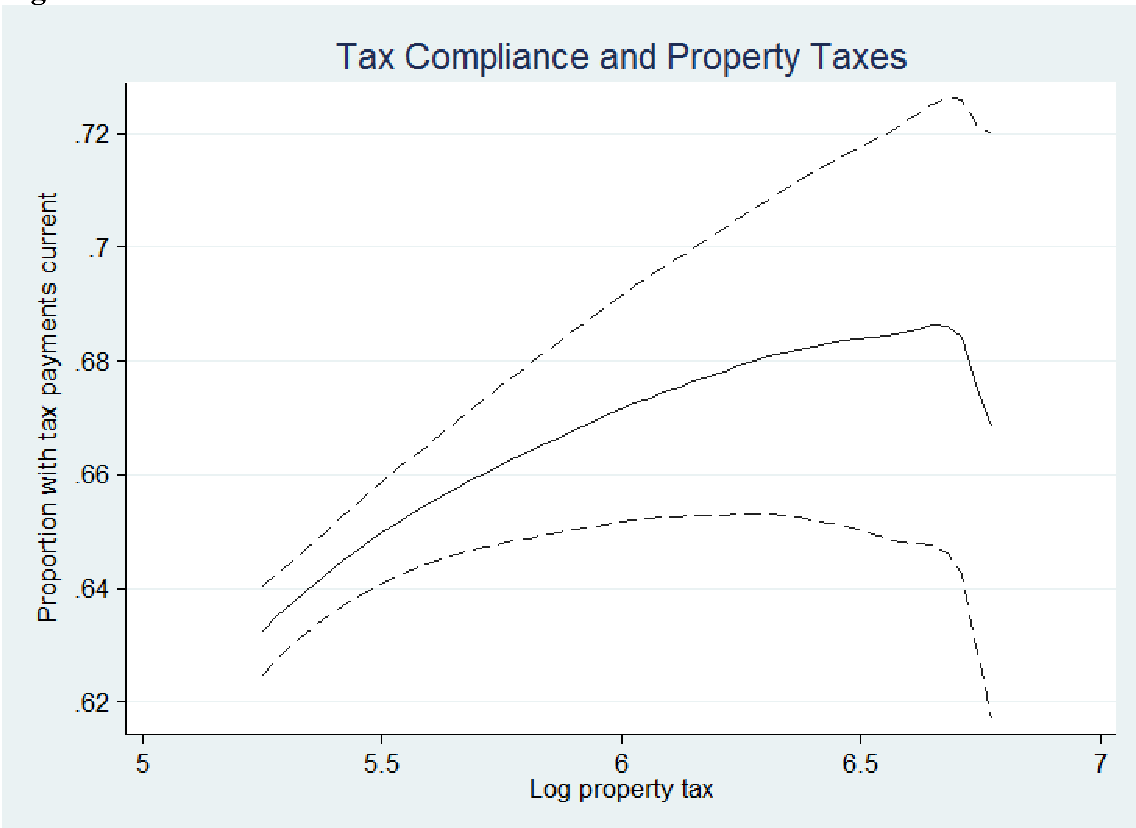

Tax Compliance and Property Taxes
Proportion with tax payments current
.72
.7
.68
.66
.64
.62
5
5.5
6
6.5
7
Log property tax

Figure 4: Before Pavement

Figure 5: After Pavement

Table 1: Summary Statistics

Variable	Mean	Std. Dev.	Min.	Max.
property_value	215092.05	285145.18	3769	2304384
total_tax	196.43	96.54	142.06	874.46
tax_paymt_current	0.74	0.44	0	1
N	129548			

Table 2: Tax Compliance and Property Values (cross-section, 2012)

	ln_total_tax	ln_total_tax	Tax Paid	Tax Paid	Tax Paid	Tax Paid	Tax Paid
ln_property_value	0.0972***	0.0072***	0.0449***	0.2510***			0.0555***
	(0.0019)	(0.0006)	(0.0026)	(0.0405)			(0.0031)
D_high		-12.4722***					
		(0.1636)					
D_high_x_ln_property_value		0.9640***					
		(0.0122)					
ln_property_value_2				-0.0091***			
				(0.0018)			
ln_total_tax					0.0504***	1.2197***	-0.1097***
					(0.0140)	(0.4572)	(0.0165)
ln_total_tax_2						-0.1013**	
						(0.0396)	
Constant	4.2236***	5.1781***	0.1230***	-1.0247***	0.3690***	-2.9791**	0.5862***
	(0.0201)	(0.0062)	(0.0308)	(0.2279)	(0.0751)	(1.3110)	(0.0756)
Observations	16568	16568	16568	16568	16568	16568	16568
R squared	0.2803	0.8903	0.0176	0.0191	0.0007	0.0011	0.0201

Table 3: Tax Compliance and Pavement (Cross sectional ITT and 2SLS)

	ITT 2005	ITT 2012	2SLS 2012	OLS 2012	ITT 2012	2SLS 2012	OLS 2012
intent to treat=1	0.0044	0.0417*			0.0507*		
	(0.0186)	(0.0247)			(0.0288)		
paved in 2012=1			0.0720*	0.0036		0.0932*	0.0321
			(0.0426)	(0.0244)		(0.0530)	(0.0286)
baseline compliance=1					0.4781***	0.4861***	0.4803***
					(0.0406)	(0.0414)	(0.0409)
Constant	0.8743***	0.6499***	0.6318***	0.6653***	0.2312***	0.1994***	0.2338***
	(0.0120)	(0.0161)	(0.0246)	(0.0171)	(0.0395)	(0.0488)	(0.0418)
Observations	1292	1490	1490	1490	962	962	962
R squared	0.0000	0.0019	.	0.0000	0.1256	.	0.1240

Table 4: Tax Compliance, Pavement and Taxes

	Plot F.E.			Theory Specification	
	(1)	(2)	(3)	(4)	(5)
	Logit	OLS	OLS	Dprobit	Logit
Paved X ln total tax				0.0246***	0.0405***
				(0.0089)	(0.0150)
ln_total_tax				-0.4633***	-0.7794***
				(0.0351)	(0.0594)
ln_property_value				0.1768***	0.2966***
				(0.0070)	(0.0118)
Paved	0.1716*	0.0313*	0.0185**		
	(0.1030)	(0.0188)	(0.0087)		
Constant		0.7697***	0.8168***	1.2958***	2.1654***
		(0.0054)	(0.0024)	(0.1505)	(0.2541)
Year F.E.	Yes	Yes	Yes	Yes	Yes
Observations	56139	56139	129548	129548	129548
Plot F.E.	Yes	Yes	Yes	No	No

Notes:

Table 5: Parallel Trends Before Pavement

	Dep.Var: Δ Tax Current				
	(1)	(2)	(3)	(4)	(5)
	OLS	OLS	OLS	OLS	OLS
Paved in future	0.0042	0.0013	0.0056	0.0086	0.0029
	(0.0086)	(0.0067)	(0.0070)	(0.0060)	(0.0066)
Constant	-0.0119***	-0.0119***	-0.0121***	-0.0122***	-0.0119***
	(0.0023)	(0.0023)	(0.0023)	(0.0023)	(0.0023)
Observations	28453	42802	56958	71842	86901
Year F.E.	Yes	Yes	Yes	Yes	Yes
Sample	$t \leq 2007$	$t \leq 2008$	$t \leq 2009$	$t \leq 2010$	$t \leq 2011$

Notes: Dependent variable is change in dummy for current in property tax payment status. Observations exclude years on or after pavement occurred. *Paved in future*=1 if plot eventually gets pavement in the future. Column 1 excludes plots that got pavement before 2007, Column 2 excludes plots that got pavement before 2008, etc.

Table 6: Summary Statistics Survey Data

Variable	Mean	Std. Dev.	Min.	Max.	N
Tax compliance=1	0.83	0.22	0	1	701
House size (m2)	72.08	22.21	17.5	120	516
Lot size (m2)	126.26	43.36	50	250	516
Log owner estimate home value	11.93	0.74	10.45	14.65	613
Log appraised home value	11.73	0.62	10.67	13.04	516
Log per capita expenditure	6.61	0.39	5.82	7.82	693
Years of schooling	6.04	3.54	0	16	701

Table 7: Correlation between Compliance and Household Characteristics (street segment level)

	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS	(6) OLS	(7) OLS
paved	0.0449						
	(0.0299)						
House size (m2)		0.0010					
		(0.0007)					
Lot size (m2)			0.0007				
			(0.0005)				
Log owner estimate home value				0.0119			
				(0.0241)			
Log appraised home value					0.0158		
					(0.0319)		
Log per capita expenditure						0.0708**	
						(0.0272)	
Years of schooling							0.0045
							(0.0041)
Constant	0.8942***	0.8224***	0.8100***	0.7437**	0.7115*	0.4253**	0.8666***
	(0.0171)	(0.0579)	(0.0697)	(0.2904)	(0.3792)	(0.1812)	(0.0307)
Observations	701	516	516	613	516	693	701
R-Squared	0.1314	0.1271	0.1351	0.1214	0.1174	0.1443	0.1310

Notes: Dependent variable is share of street block that is current in property tax payment status.