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Fan Fei
James R. Hines Jr.
Jill R. Horwitz

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ABSTRACT

Nonprofit charitable organizations are exempt from most taxes, including local property taxes, but U.S. cities and towns increasingly request that nonprofits make payments in lieu of taxes (known as PILOTs). Strictly speaking, PILOTs are voluntary, though nonprofits may feel pressure to make them, particularly in high-tax communities. Evidence from Massachusetts indicates that PILOT rates, measured as ratios of PILOTs to the value of local tax-exempt property, are higher in towns with higher property tax rates: a one percent higher property tax rate is associated with a 0.2 percent higher PILOT rate. PILOTs appear to discourage nonprofit activity: a one percent higher PILOT rate is associated with 0.8 percent reduced real property ownership by local nonprofits, 0.2 percent reduced total assets, and 0.2 percent lower revenues of local nonprofits. These patterns are consistent with voluntary PILOTs acting in a manner similar to low-rate, compulsory real estate taxes.

Fan Fei
Department of Economics
University of Michigan
Lorch Hall
611 Tappan Street
Ann Arbor, MI 48109-1220
econfan@umich.edu

James R. Hines Jr.
Department of Economics
University of Michigan
343 Lorch Hall
611 Tappan Street
Ann Arbor, MI 48109-1220
and NBER
jrhines@umich.edu

Jill R. Horwitz
University of California Los Angeles
School of Law
Box 951476
Los Angeles, CA 90095-1476
and NBER
horwitz@law.ucla.edu

1. Introduction

Nonprofit organizations are generally exempt from federal, state, and local taxes.[1] Since nonprofit organizations commonly generate little in the way of net income, one of the primary benefits of their tax-exempt status lies in the exemption from local property taxes (Gentry and Penrod, 2000). This exemption can distress cash-strapped towns and cities with significant numbers of nonprofits. A tax-exempt nonprofit organization that locates in a town may deliver valuable services, provide employment, and attract visitors and tax-paying residents, but its ownership of local real estate lowers the property tax base and thereby reduces resources otherwise available to town governments.

In recent years, local governments have increasingly asked nonprofit organizations to make payments in lieu of taxes, known as PILOTs. Although as a legal matter PILOTs are voluntary – state property tax exemptions for charitable nonprofits are often guaranteed by statute and, sometimes, by state constitutions – in practice they may not exhibit all of the characteristics of truly voluntary transfers. Nonprofits benefit along with others from robust fiscal conditions in their states and localities, and some nonprofits have collaborated with municipalities to develop PILOT programs. But many nonprofits would not voluntarily divert resources from their exempt purposes – indeed it is questionable whether they are permitted legally to do so – in the absence of suasion by local governments. Unhappy governments can make life difficult for nonprofits by limiting access to local public services, refusing to relieve burdensome local regulation, or challenging tax exemptions on the basis of whether nonprofits properly pursue their exempt purposes. In such environments nonprofits may feel pressure to accede to local requests for PILOTs.

[1] Following convention, we use the term nonprofit to mean tax-exempt charities. Although the large majority of nonprofit entities are exempt from federal and state taxes, not all nonprofits benefit from tax exemptions. The Internal Revenue Code grants federal tax exemptions to the subset of nonprofits that have charitable purposes and adhere to other requirements. The list of purposes includes "religious, charitable, scientific, testing for public safety, literary, or educational purposes, or to foster national or international amateur sports competition (but only if no part of its activities involve the provision of athletic facilities or equipment), or for the prevention of cruelty to children or animals…." (Internal Revenue Code §501(c)(3)). State requirements for tax exemption vary. Some follow the same requirements as the IRS; however, the definition of charity under state constitutional and statutory provisions is often more stringent than the requirement for federal exemption.

The purpose of this paper is to examine the determinants of PILOTs and the effect of PILOTs on nonprofit activity. Since nonprofits are not required to disclose PILOTs on any government filing, the available data consist of government financial disclosures identifying PILOT receipts by town. Uniquely, the state of Massachusetts reports data on PILOT receipts by its local jurisdictions, which the study analyzes to identify factors associated with PILOT payments and their effect on the nonprofit sector.

The evidence indicates that PILOT receipts by Massachusetts communities are positively correlated with local property tax rates: a local property tax rate one percent higher is associated with a 0.2 percent higher PILOT rate, controlling for values of taxable and exempt property in a jurisdiction. This pattern suggests that PILOTs function as informal, low-rate substitutes for property taxes to which taxable landowners would ordinarily be subject, and raises the possibility that PILOTs might have other attributes of property taxes, including that they could discourage nonprofit activity, particularly any activity associated with holding tax-exempt property. The evidence from IRS Form 990 filings by Massachusetts nonprofits is consistent with this interpretation of PILOTs, as higher PILOT rates are associated with reduced nonprofit assets and revenues, and most dramatically, reduced real property holdings.

Section 2 of the paper reviews the limited available evidence of the national scope of PILOTs and their impact on the nonprofit sector. Section 3 presents a model of governmental and nonprofit action that reconciles the voluntary nature of PILOTs with a potential effect of PILOTs on nonprofit activity. Section 4 describes the Massachusetts PILOT data, and section 5 presents empirical estimates of the factors determining PILOTs and the effect of the resulting payments on nonprofit activity. Section 6 concludes.

2. PILOTs in Practice

States and localities exempt nonprofits from taxation, thereby encouraging greater nonprofit activity (Hansmann, 1987). In the Commonwealth of Massachusetts, nonprofits that are exempt from federal taxation under I.R.C. §501 are also exempt from Massachusetts excise (income) taxes (Massachusetts General Laws Annotated, 2015). The board of assessors in each

Massachusetts municipality grants exemption from local property taxes according to state law, and administers those exemptions. Roughly speaking, the property of religious entities (Massachusetts General Laws Annotated, 2013a) and charities "established for literary, benevolent, charitable, or temperance purposes," and operated as such, are granted local property and sales tax exemptions (Massachusetts General Laws Annotated, 2013a). Other categories of nonprofits, such as country clubs that are not charities, may be exempt from property taxes under other statutes. For example, statutes that use tax exemptions to protect open spaces are exempt in Massachusetts (Massachusetts General Laws Annotated, 2013b). PILOTs provide a mechanism for returning some of these foregone revenues to local governments.

PILOTs have a long lineage, particularly in Massachusetts, where the Boston PILOT program began in 1925 (Brody, 2010). Harvard University and the Massachusetts Institute of Technology, both tax-exempt, have made voluntary payments to the city of Cambridge since 1928. Although there are no comprehensive data on numbers of PILOTs or PILOT agreements nationally, there is some evidence that the implementation of PILOTs is on the rise (Langley et al., 2012).[2] For example, Boston introduced a new PILOTs program in 2011 in which the city requests payments from charities with property valued at more than $15 million, with the plan that after a ramp up period these charities will make PILOTs equal to 25 percent of the full amount a property owner would owe if the property were taxable; in addition, participating charities may receive up to a 50 percent credit toward their PILOT for providing value in the form of community benefits (Rakow, 2013). In fiscal year 2013 (July 1, 2012 – June 30, 2013), Boston received $23.2 million in cash PILOTs out of $28.2 million requested; in fiscal year 2011, Boston received $15.2 million (City of Boston, 2013).

Most recently, the Governor of Maine proposed a budget plan that would reduce corporate and individual income taxes, repeal the estate tax, and eliminate state payments to municipalities; municipalities would have some of these funds replaced by adhering to a requirement to tax nonprofits, excluding churches and government-owned tax-exempt entities, at

[2] Leland (2002) reports the results of March 1998 surveys of municipal finance directors and community leaders in 73 cities, representing the 50 largest cities in the United States plus the largest cities in states that did not include one of the top 50. Reliable information for 51 of these cities indicates that only seven solicited PILOTs in 1998, and among these only Boston solicited PILOTs from a wide range of nonprofit organizations (for example, Boston collected PILOTs from 38 organizations; Indianapolis only one). PILOTs have increased significantly since then.

fifty percent of the normal tax rate on assessed value over $500,000 in property (Halper, 2015; Levitz, 2015). This proposal would require municipalities to include large nonprofits as part of their tax bases, and is accompanied by withdrawal of state funds.

Most PILOTs represent transfers from nonprofits to the relevant government authority, and they can range greatly in size. In 2005, Harvard University agreed to a 50-year agreement with Cambridge, under which it would pay $2.4 million to Cambridge in 2006, and increase that amount by roughly three percent each year; MIT signed a similar 40-year agreement in 2004, making a base payment of $1.5 million in 2005, with a 2.5 percent annual increase (Tartakoff, 2005). Some PILOTs are made from one level of government to another as compensation for foregone taxes from public and charitable land. For example, the state of Connecticut reimburses its municipalities for foregone taxes on state-owned land, including 100% reimbursement for correctional facility land, some designated Mashantucket Pequot tribal land, and for any town in which more than 50 percent of all property in the town is state-owned real property; 65% for the Connecticut Valley Hospital facility; and 45% for all other property (Connecticut Office of Policy & Management, 2014; Connecticut General Statutes Annotated, 2015a) and nonprofit-owned property (up to 77% for private, nonprofit hospitals and colleges) (Connecticut General Statutes Annotated, 2015b). Massachusetts does not make such payments; for example, in 1997 the Massachusetts legislature declined to pass a bill providing municipalities PILOTs for property owned by nonprofit hospitals and institutions of higher education (Massachusetts H.B. 624, 1997).

State and local governments offer several justifications for their PILOT demands, the primary one being the need for revenue. Removing charitable land from the property tax base leaves local governments short on funds, which affects expenditures and shifts additional financial burden onto other taxpayers (Deitrick and Briem, 2007). For example, in fiscal year 2013, 13.3 percent of the total property value of Andover, Massachusetts was tax exempt (Town of Andover, 2013, pg. 2). According to estimates based on Ohio Department of Taxation data, "[n]onprofit, government, tax-abated property accounted for 20.2 percent of the real property in Cuyahoga County in Tax Year 2012," and 44.9 percent of real property in Cleveland (Schiller and Hileman, 2013). Removing property from the tax rolls is particularly consequential given the importance of property taxes for state and local revenue. In 2010 property taxes accounted

for 35 percent of state and local tax revenues, and 18 percent of all state and local revenues (Urban Institute Tax Policy Center Database) nationwide; in contrast, state and local individual and corporate income taxes together accounted for only 16 percent of state and local tax revenues.

Given this reliance on property taxes, it is not surprising that estimates of foregone taxes are also large. One estimate of foregone taxes from charitable property tax exemptions ranges from $8 to $13 billion annually in 1997, or 1.3-2.1 percent of total U.S. nonprofit revenue (Cordes et al., 2002). Similarly, Cordes et al. (2002) estimates that nonprofit property tax exemptions in Philadelphia equal 6.2 percent of total nonprofit revenue. A Massachusetts Department of Revenue Survey reported that in 2003 "the value of all exempt property, governmental, religious, educational and charitable, was more than $87 billion," or about twelve percent of total property valued by municipalities (Massachusetts Department of Revenue, 2003, p. 4). More specifically, the reported value of all tax-exempt educational and charitable properties was more than $22 billion, or approximately three percent of the total property value of the reporting communities. The same source estimates forgone property taxes of $505.8 million, or 5.8 percent of the total projected levy of Massachusetts communities in Fiscal Year 2003. And Cordes et al. (2002) estimates that for the more than 150,000 U.S. nonprofits with greater than $500,000 of real property in 1997, the annual tax exemption was worth an average of 19 percent of their total revenues.

Aside from the practical need for revenues, some scholars have argued that it is inequitable to offer tax exemptions to nonprofits that provide benefits to those who live elsewhere, such as an urban hospital that provides services to suburban patients (Pomp, 2004; Rokoff, 1973). Pomp (2004) notes that Connecticut makes payments to municipalities to offset this apparent injustice.

There are different ways to characterize PILOT payments. Some PILOTs take the form of payments for services such as police or fire protection. Others are characterized as simple donations, made for example to help a suffering locality get through a tough time, or investments intended to make the locality more attractive and thereby improve the environment for the nonprofit. And some PILOTs are made to forestall government actions that would impose costs

on nonprofits. These different characterizations have legal and perceptual effects that may affect how willingly a nonprofit makes a payment.

PILOTs are typically negotiated on an ad hoc basis, raising the problem that similar charities are treated differently (Brody, 2012). This case-by-case negotiation makes it tempting for localities to turn what are voluntary payments into semi-coerced payments. Charities have complained to courts that tax authorities use PILOTs unfairly, threatening organizations in impermissible ways, such as with challenges to their otherwise-valid tax exemptions or denials of building permits if charities did not make financial payments or payments in kind to the authority. In the 1940s, for example, the local school districts and township agreed to withdraw their challenges to the proposed nonprofit incorporation of the Valley Forge Military Academy Foundation if the Academy agreed to make PILOTs in the amount the Academy would have ordinarily made in property taxes absent the exemption. (Radnor Township v. Valley Forge, 1970). Many years later, when the local government units sued the Academy for attempting to cease payments, the court found for the school, explaining that a taxing body may not collect taxes by contract and a government may not engage in "selling or bartering" its right to oppose an organization seeking nonprofit status.

There are many more recent examples of localities pressuring nonprofits for voluntary payments. In one case, the plaintiff church complained that the town supervisor and commissioners threatened to reject a request for a parking lot permit if the church did not make a PILOT or donate a fire truck (Fortress Bible Church v. Feiner, 2010). In another case, tax-exempt hospitals alleged that the government units were attempting to "coerce" or "force" tax-exempt member hospitals to make payments in lieu of taxes by "indicat[ing] that those [hospitals] which [did] not agree to such payments and/or agreement 'in lieu of taxes' [would] have their tax exempt status challenged, [would] be likely to run into difficulties in obtaining zoning approvals, and [would] not be offered the opportunity to provide services to the taxing authority." (Hospital Council v. City of Pittsburgh, 1991). In 2000, Northwestern University filed a complaint against Evanston, Illinois alleging that the city imposed a historical district ordinance on the university in retaliation for refusing to make PILOTs (Northwestern University v. City of Evanston, 2001).

Much of the previous empirical research on PILOTs is descriptive. In 1998, Leland conducted a survey of public officials in 73 large cities, and identified PILOTs in only seven cities and six states of the 51 respondents (Leland 2005). More recently, Kenyon and Langley (2010) and Langley et al. (2012) report evidence of PILOTs and draw inferences about the characteristics of localities that receive them. Using media accounts, government reports, other sources, and a survey of 599 cities and towns with the largest nonprofit sectors (171 respondents), Langley et al. (2012) report that 218 localities in 28 states received PILOTs. They find that PILOTs are concentrated in the northeastern part of the United States, with Massachusetts and Pennsylvania communities accounting for more than half of the PILOT recipients they identify. Universities and hospitals provide 92 percent of the measured PILOT revenues, which is sensible given their considerable financial resources, though this may partly reflect the survey method.

3. Determination and Impact of PILOTs

In the absence of external pressure nonprofit organizations are unlikely to provide PILOTs to their local communities: despite their interest in the welfare of these communities, nonprofits generally have much greater perceived need for resources than funds available to satisfy those needs. Consequently, towns that seek PILOTs must offer nonprofits valuable services in return, persuade nonprofits of the importance of making such payments, or suggest the possibility of costly regulatory or other measures if they fail to provide PILOTs. Payments received under threat of a worse alternative have much of the character of compulsory taxes, and can be analyzed in a similar fashion.

It is useful to consider the case in which a town approaches a nonprofit with a requested PILOT that is expressed as $(a + b\rho)$, in which a is a minimum payment that is possibly a function of the nonprofit's characteristics, ρ is the nonprofit's property holding in the town, and b is the extent to which PILOT requests rise with property holdings. The town encourages compliance by making the nonprofit aware of the adverse consequences, to the nonprofit and to the town, of failure to provide the PILOT. Failure to make a PILOT would thereby impede the

ability of nonprofits to pursue their missions, and would also be costly to the town, which benefits from nonprofit services; but the town's purpose is to encourage PILOT payments, not to depress the quality of nonprofit performance. Other possible consequences of PILOT demands are that some nonprofits may quit the town altogether, and others will respond by changing the nature and scope of their operations, specifically by holding less real property either by scaling back activities or by substituting into less property-intensive activities.

Nonprofits that make PILOTs do not incur these costs, so the town benefits from the full value of their services as well as from the PILOTs. There is nonetheless the consideration that the nonprofit is still tax exempt, so the town loses the potential tax revenue that might otherwise have been generated in the absence of the nonprofit. Consequently, the town's value from having a PILOT-paying nonprofit is given by: $\left[a + b\rho + \alpha - \tau\rho\right]$, in which α is the value (to the town) generated by a nonprofit, measured relative to the value of additional tax revenue, and $\tau\rho$ is the foregone property taxes on the property held by the (tax-exempt) nonprofit. Alternatively, a nonprofit that refuses to pay a PILOT and whose operations are thereby diminished by loss of good will with (and value to) the community generates value for the town of $\left[\alpha - \beta - \tau\tilde{\rho}\right]$, in which β reflects the loss of value (to the town) from soured relations with the nonprofit, and $\tilde{\rho}$ is property holding by a nonprofit that stays in town but does not make PILOTs. Nonprofits that leave town or do not locate there in the first place because of the threat of pilots generate zero value.

An optimizing town chooses the parameters *a* and *b* of its PILOT demand to maximize total value $\left(\Psi\right)$:

(1) $$\Psi = \left[a + b\rho + \alpha - \tau\rho\right]n_1 + \left[\alpha - \beta - \tau\tilde{\rho}\right]n_2,$$

in which n_1 is the number of PILOT-paying nonprofits in the town and n_2 is the number of nonprofits that remain in town but do not pay PILOTs. Nonprofits differ in the extent to which they are willing to accede to higher PILOT requests or will respond to higher requests by finding alternative locations, reflecting the relative costs and benefits of alternative locations and the differing costs of potential impairment to operations from uncomfortable relations with a town

whose PILOT request an organization refuses to meet. As a result, higher PILOT requests discourage some of a town's potential nonprofits from locating there, and dissuade a portion of a town's existing nonprofits from paying PILOTs. To capture a town's incentives to demand PILOTs it is not necessary to model explicitly a nonprofit's benefits and costs of making PILOTs or locating in different towns, as what matters for a town planner is the responsiveness of the nonprofit sector as a whole.

Differentiating the right side of (1) with respect to *a* and *b* produces:

(2a) $$\frac{\partial \Psi}{\partial a} = n_1 + \left[a + b\rho + \alpha - \tau\rho\right]\frac{\partial n_1}{\partial a} + \left[\alpha - \beta - \tau\tilde{\rho}\right]\frac{\partial n_2}{\partial a}$$

(2b) $$\frac{\partial \Psi}{\partial b} = \rho n_1 + \frac{\partial \rho}{\partial b}\left(b - \tau\right)n_1 + \left[a + b\rho + \alpha - \tau\rho\right]\frac{\partial n_1}{\partial b} + \left[\alpha - \beta - \tau\tilde{\rho}\right]\frac{\partial n_2}{\partial b}.$$

The derivatives of n_1 and n_2 with respect to *a* and *b* on the right sides of (2a) and (2b) reflect the impact of greater PILOT liability on the willingness of nonprofits as a group to locate in a jurisdiction that requires PILOTs, and once there, to be willing to make PILOTs. From the envelope condition, the burden of making a PILOT can be evaluated assuming that the nonprofit does not change its ownership of real property in response, and the derivates of nonprofit activity should reflect this, so $\frac{\partial n_1}{\partial b} = \rho\frac{\partial n_1}{\partial a}$ and $\frac{\partial n_2}{\partial b} = \rho\frac{\partial n_2}{\partial a}$. Making these substitutions, and setting $\frac{\partial \Psi}{\partial a} = \frac{\partial \Psi}{\partial b} = 0$ produces:

(3) $$\frac{\partial \rho}{\partial b}\left(b - \tau\right)n_1 = 0.$$

Since $n_1 > 0$, equation (3) implies either that $\frac{\partial \rho}{\partial b} = 0$ or that $b = \tau$. If governments can use two separate PILOT instruments (*a* and *b*) to extract resources from nonprofit organizations, then as long as conditioning PILOT demands on property holdings effectively encourages nonprofits to economize on real property $\left(\frac{\partial \rho}{\partial b} < 0\right)$, towns have incentives to set $b = \tau$. Real property holdings by nonprofit organizations depress the local tax base, an effect that town

governments can offset – for those nonprofits willing to make PILOTs – by imposing $b = \tau$. The first-best characterized by $\frac{\partial \Psi}{\partial a} = \frac{\partial \Psi}{\partial b} = 0$ entails choosing the optimal combination of *a* and *b* to generate a given total PILOT burden on nonprofits, but one challenge is that the optimum may entail $a < 0$, since in setting $b = \tau$ a town might discourage nonprofits more than it wants to unless it can offer an accompanying subsidy of the form $a < 0$.

Are governments able to offer subsidies to nonprofits by making $a < 0$? If not, and assuming that towns prefer total PILOT burdens to be below $\tau\rho$, then PILOTs will be based entirely on a nonprofit's property holdings. The solution will be characterized by $a = 0$, the right side of equation (2a) being negative, and the right side of equation (2b) being equal to zero. The derivative $\frac{\partial n_2}{\partial b}$ in equation (2b) is the change in the number of local nonprofits refusing to pay as a result of a change in a town's PILOT demand. Since these organizations do not pay PILOTs, the only reason why this derivative will have a nonzero value is that some of the nonprofits that, at low PILOT rates, would make PILOTs and thereby avoid adverse relations with the town, no longer do so as the PILOT rate increases. The nonprofits that stop making PILOTs either leave the jurisdiction or stay and accept the consequences. Hence it is possible to express $\frac{\partial n_2}{\partial b} \equiv -\gamma \frac{\partial n_1}{\partial b}$, in which $1 \geq \gamma \geq 0$ is the rate at which nonprofits that refuse to make PILOTs remain in a jurisdiction.

With this definition of γ, setting *a* and the right side of (2b) both equal to zero produces:

$$b = \tau\left(1 - \gamma\frac{\tilde{\rho}}{\rho}\right) - \frac{\alpha(1-\gamma) + \beta\gamma}{\rho} - \frac{\left[1 + \frac{\partial \rho}{\partial b}\frac{(b-\tau)}{\rho}\right]}{\rho\frac{\partial n_1}{\partial a}\frac{1}{n_1}}. \tag{4}$$

Further simplification is available by defining

(5) $$\phi \equiv \frac{\frac{\partial \rho}{\partial b}\frac{1}{\rho}}{\rho\frac{\partial n_1}{\partial a}\frac{1}{n_1}},$$

which together with (4) yields:

(6) $$b = \tau\left[1-\frac{\gamma\frac{\tilde{\rho}}{\rho}}{(1+\phi)}\right]-\frac{\alpha(1-\gamma)+\beta\gamma}{\rho(1+\phi)}-\frac{1}{\rho\frac{\partial n_1}{\partial a}\frac{1}{n_1}}.$$

The left side of (6) is the PILOT rate (per value of real property) chosen by a government that maximizes Ψ. The first term on the right side of (6) indicates that higher property tax rates are associated with greater PILOT demands, reflecting the costs that nonprofits impose on local governments in removing property from the tax rolls. Higher values of γ, and of $\frac{\tilde{\rho}}{\rho}$, reduce the effect of local property tax rates on PILOT demands, since some nonprofits refusing to make PILOTs will nonetheless remain in the community and thereby depress property tax collections. Greater responsiveness of ρ to *b*, as measured by the semi-elasticity in the numerator of the right side of (5), increases ϕ and thereby (in (6)) increases *b*, reflecting the value of discouraging nonprofits that make PILOTs from large holdings of otherwise-taxable property. A large semi-elasticity of PILOT-compliant nonprofit activity with respect to *a*, which appears in the denominator of the right side of (5), reduces ϕ and thereby reduces *b* due to the potential effect of high rates of *b* in discouraging nonprofit activity. The numerator of the second term on the right side of (6) is a weighted average of α and β, with weights $(1-\gamma)$ on α, reflecting the potential loss of nonprofit value if nonprofits leave a jurisdiction, and γ on β, reflecting the cost of soured relations with a nonprofit that defies the government's request for a PILOT. Higher values of ϕ reduce the importance of these considerations for reasons similar to the effect of ϕ on the first term of the right side of equation (6). And the third term on the right side of (6) indicates that greater responsiveness of the size of the nonprofit sector reduces PILOT demands.

Local jurisdictions with greater revenue needs will generally be more willing than others to demand higher PILOTs at the expense of losing some nonprofit activity. There are two aspects to this implication of the model. The first is that towns that perceive greater benefits of government spending relative to private income will have higher property tax rates. Strictly speaking, τ, *a* and *b* are jointly determined, so the model should not be interpreted to deliver the effect of changes in τ on the values of *a* and *b*. As a practical matter, however, property tax collections greatly exceed PILOT receipts, so τ is a measure of local revenue needs, and one can interpret the effect of τ on PILOTs to reflect the impact of local revenue needs and the property tax mechanism that towns are forced to use largely to meet these needs. The second sense in which equation (6) captures the effect of revenue needs on PILOT demands comes from the inclusion of α and β in the second term on the right side: lower values of α and β increase *b*. Since α and β reflect a community's valuation of nonprofit activity relative to its valuation of tax revenue, greater absolute revenue needs translate into smaller values of α and β, and therefore higher PILOT demands.

The PILOT rate *b* in equation (6) therefore captures the effects of several potentially competing considerations. If town governments had full information and the ability to commit themselves to binding PILOT demands it would not be necessary to impose a PILOT schedule that was a fixed linear function of nonprofit property holdings. Under those conditions a government could instead design a system that discouraged property holding and incentivized nonprofits to make PILOTs that, if they were any greater, would back the nonprofit into refusal. In this scenario all nonprofits in a town would make PILOTs and none would remain as untaxed entities with bad relations with the local government. It is the absence of some combination of full information, ability to commit, and administrative coordination on the part of town governments that makes actual PILOT demands resemble taxes, in that their actions are insufficiently tailored to specific situations and are therefore apt to influence behavior in possibly inefficient ways. Specifically, towns demanding PILOTs may scare away nonprofits that would otherwise have provided valuable services to the community, and may have to live with the consequences of sometimes soured relations with other nonprofits that stay in town but refuse to make PILOTs.

4. PILOTs Data

Massachusetts communities are particularly successful in obtaining PILOTs from their local nonprofits, and the Massachusetts Department of Revenue since 1995 has identified PILOT receipts of each of its 351 local jurisdictions as part of the state's annual financial reports.[3] These financial reports also include information on local property tax levies, assessed values of taxable and tax-exempt properties, and demographic and economic characteristics of local Massachusetts jurisdictions that are culled by Massachusetts state agencies from information reported in the 2000 Census. The demographic variables include total town population, race (African-American and Hispanic populations), and education (numbers of adult residents with high school degrees but no college education, some college education, and college graduates). The economic variables include the town unemployment rate in 2000, sizes of youth (under 20) and aged (over 65) populations, numbers of over-65 residents who live alone and in poverty, numbers of households with annual incomes below $10,000, and numbers of households with incomes above $50,000.

Data on local nonprofit organizations, including their locations and financial information, are based on Internal Revenue Service Form 990 filings assembled by Guidestar and the National Center for Charitable Statistics at the Urban Institute. Financial variables include the total assets of a nonprofit organization, fixed assets (the sum of land, buildings, and equipment; this information is available only since 1998), and total annual revenues. To avoid having the results unduly affected by the crash of 2008 and subsequent recession, the analysis is restricted to 1995-2007. The data provided by Guidestar and the NCCS were aggregated at the municipality level (based on a nonprofit's location as indicated on its Form 990 filling) for Massachusetts jurisdictions for which Massachusetts Department of Revenue data were available.

There are some limitations to these data. First, the data cover only Massachusetts, which may limit the generalizability of the results. However, Massachusetts is a particularly good state

[3] PILOT receipts, property taxes, land values, property tax referenda results, and other characteristics of Massachusetts communities are available on the Department of Revenue web site, http://www.mass.gov/dor/local-officials/municipal-data-and-financial-management/data-bank-reports/. Additional demographic and economic information on Massachusetts communities are reported on the state Health and Human Services web site, http://www.mass.gov/eohhs/researcher/community-health/masschip/census-2000-1990-socio-demographic-trends.html.

to study, as it has a long history of negotiating PILOT agreements, and appears to be one of the top PILOT-receiving states. As PILOTs spread around the country, it is valuable to understand developments in a place where PILOTs have long been established. Moreover, city and town governments are particularly strong in New England, where school districts and other government bodies that rely on local tax receipts are organized at the town level. In other states, where there are unincorporated areas and townships, county governments conduct these functions and are governing equivalents of Massachusetts towns. Therefore, the fiscal issues confronting Massachusetts towns might be treated as roughly equivalent to those facing counties elsewhere, and Massachusetts offers considerable variation, since there are more Massachusetts towns (351) than counties in any other state (e.g., Texas, the state with the greatest number of counties, has only 254).

Second, there are challenges in matching nonprofits to Massachusetts towns. Since a nonprofit may own property and have activities in more than its home jurisdiction, the use of Form 990 data to attribute nonprofit activity to a locality has the potential to introduce measurement error into the classification of the location of nonprofit activity. Another issue is that the data coverage is incomplete, as religious nonprofits, those with annual gross revenues below $25,000, and certain other categories of nonprofits are not required to file Form 990, nor are all the Form 990s submitted to the IRS available in the Guidestar and NCSS data base. Partly as a consequence, there are no Form 990 filings for a small portion of these Massachusetts towns (e.g., 23 out of the 351 towns have no Form 990 filings in 1997), which are treated in the following analysis as though they have no nonprofit assets, despite Massachusetts Department of Revenue data indicating that there positive nonprofit property holdings and in some cases PILOTs. Notwithstanding these limitations, the data afford a reasonably accurate depiction of the distribution of nonprofit activity within Massachusetts.

5. PILOT Experiences in Massachusetts

Table 1 presents descriptive statistics for the sample of Massachusetts communities, distinguished by their history of PILOT receipts: columns 1 and 2 of Table 1 present descriptive statistics for the subset of 47 towns without PILOT receipts from 1995-2007 whereas columns 3

and 4 present descriptive statistics for the entire sample of 351 Massachusetts towns. Towns that never received PILOTs have per capita incomes, land areas, and unemployment in 2000 that are similar to those of the whole sample of Massachusetts communities. Towns receiving PILOTs tend to be more urban, heavily populated, have more diverse populations, and have much higher property tax receipts than other towns. Towns receiving PILOTs have extensive nonprofit activity, though their nonprofits have lower average ratios of fixed assets (land, buildings, and equipment) to total assets than do nonprofits in towns without PILOTs. It is possible to use the Department of Revenue data to calculate average property tax rates by town, the ratios of property tax receipts to market values of taxable properties; similarly, average PILOT rates by town are ratios of PILOTs to market values of tax-exempt property. By these calculations, PILOT rates are considerably lower than property tax rates. PILOT rates average 0.11 percent over the sample period and are of course zero in the 47 towns without PILOTs, while property tax rates average 1.40 percent over the sample period and are higher in the whole sample than they are in towns without PILOTs.

The Massachusetts Department of Revenue data can be used to estimate the extent to which towns with higher average property tax rates also have higher average PILOT rates, as implied by the model sketched in Section 3. Figure 1 depicts median 2007 PILOT rates of 10 groups of Massachusetts towns, distinguished by their average property tax rates in 2007. That is, the leftmost bar in Figure 1 represents the median 2007 PILOT rate of the 35 towns with the lowest property tax rates that year; the rightmost bar is the median PILOT rate of the 35 towns with the highest property tax rates. The figure exhibits a gentle upward slope, and indicates that towns with property tax rates in the three lowest deciles also have the lowest median PILOT rates. The positive association of property tax rates and PILOT rates does not control for other variables, such as town size, that might also influence PILOT rates, but is nonetheless suggestive.

Figure 2 plots median PILOT rates by property tax decile for two equal-sized subsets of Massachusetts communities, distinguished by size: the bars on the left of Figure 2 present data for towns with populations below the median of Massachusetts communities, and the bars on the right of Figure 2 present data for towns with above-median populations. It is evident from the figure that the positive relationship between property tax rates and median PILOT rates is more

pronounced for larger communities than it is for smaller communities, though even among small Massachusetts towns it appears to be the case that higher property tax rates are generally associated with higher PILOT rates. One of the difficulties of analyzing PILOT rate data for small towns is that these ratios can be very sensitive to the behavior of small numbers of nonprofits, and the resulting variability in measured PILOT rates can make it difficult to draw clear inferences about the effect of property tax rates even if there is a strong causal effect. This consideration, together with the reality that larger towns have greater economic and fiscal consequences than smaller towns, motivates the use of regressions in which observations are weighted by town populations. Estimated coefficients from regressions using unweighted observations are presented in appendix tables.

Equation (6) suggests that the determinants of PILOT rates in Massachusetts towns can be estimated the following way:

$$b_{it} = \mu\tau_{it} + \theta X_{it} + \varepsilon_{it}, \quad (7)$$

in which b_{it} is the PILOT rate in town *i* in year *t*, τ_{it} is the property tax rate in town *i* in year *t*, X_{it} is a vector of observable characteristics (population, income, demographics, and others) of town *i* in year *t*, μ is a parameter to be estimated, and θ is a vector of parameters to be estimated; ε_{it} is the residual. The empirical work in Tables 2-4 and Appendix Tables 1-2 presents estimates of equation (7) using data for different years and specifications that include different observable variables in the X_{it} vector.

Table 2 presents estimated coefficients from Tobit specifications of equation (7) for 2007, the most recent of the sample years. The dependent variable in these regressions is the ratio of PILOTs to the market value of real property held by nonprofits in each town, which can be referred to as the "PILOT rate." The 0.210 coefficient in column 1 indicates that a one percent higher property tax rate is associated with a 0.21 percent higher PILOT rate. The regression reported in column 2 adds the log of town population as an independent variable, and the resulting 0.166 coefficient on the property tax rate is a bit smaller in magnitude though still statistically significant. The regression reported in column 3 adds demographic variables to the specification, as result of which the estimated property tax rate coefficient declines further to

0.135, though this coefficient increases in magnitude to 0.178 with the inclusion of additional economic variables in the regression reported in column 4.

The regression coefficients reported in Table 2 are consistent with the model's implication that higher property tax rates are associated with higher PILOT rates. The estimated magnitude of the effect, that one percent higher property tax rates are associated with 0.178 percent higher PILOT rates, should be evaluated in the context of average property tax rates that are almost 13 times higher than average PILOT rates. This corresponds to a 2.3 elasticity of PILOT rates with respect to property tax rates, suggesting that PILOT rates are quite sensitive to property rate differences. Property taxes and PILOTs are likewise positively associated and statistically significant, with slightly smaller coefficient magnitudes, in the regressions unweighted by population reported in Appendix Table 1.

The positive association of property tax rates and PILOT rates in 2007 is repeated in other years. Figure 3 presents data on property tax rates and PILOT rates over the 1995-2007 sample period. Towns are distinguished by average property tax rates over that period, and the heights of the bars reflect median 13-year average PILOT rates of towns in each cell. The patterns in Figure 3 are similar to those in Figure 2: among larger Massachusetts towns there is a marked positive association of property tax rates and PILOT rates, whereas among smaller Massachusetts towns the association, while still somewhat positive, is considerably noisier.

Table 3 presents pooled estimates for 1995-2007 of the same equations estimated in Table 2, including that observations are weighted by town population. The specifications reported in Table 3 include year dummies, and the standard errors are clustered by municipality. The results are quite consistent with those for 2007 reported in Table 2. The 0.289 coefficient in column 1 indicates that one percent higher property tax rates are associated with 0.289 percent higher desired PILOT rates, an effect that falls in magnitude to 0.211 with the addition of town population as an independent variable in the regression reported in column 2, declines to 0.120 with the addition of demographic controls in the regression reported in column 3, and is 0.134 with the further addition of economic controls in the regression reported in column 4. These property tax rate coefficients, while somewhat unstable across specifications, nonetheless are statistically significant and of similar magnitudes to those reported in Table 2, and are also

similar to the corresponding coefficients in the unweighted regressions reported in Appendix Table 2.

The model sketched in section 3 implies not only that towns with higher property tax rates will have higher PILOT rates, but also that towns that can more credibly encourage nonprofits to make PILOTs will have higher rates. In the model, credible encouragement to pay takes the form of greater anticipated costs to nonprofits of soured relationships with towns whose PILOT requests they refuse. It is difficult to obtain fully convincing measures of the credibility of costs of refusing to make PILOTs, but municipal experience with property tax referenda offers one measure. Massachusetts limits the extent to which municipalities can increase property tax rates each year, requiring local referenda for certain rate increases. Over the 1995-2007 period, 141 of the 351 Massachusetts communities never had any property tax override referenda; 54 had one or more referenda all of which failed; 55 had one or more referenda all of which passed; and 101 had multiple referenda, some of which passed and some of which failed. Consistent failure to pass property tax referenda is a sign that voters do not support town administrators who propose these referenda, and may reflect more generally a weakness of town administrators that might empower nonprofits to think that they could resist PILOT requests without incurring significant costs. If so, then towns with failed referenda might have lower PILOT rates.

Figure 4 compares the 1995-2007 property tax override referendum experiences of Massachusetts towns with high and low PILOT rates in 2007. Two groups of towns are considered: those that had one or more referenda, all of which failed, and those that never had referenda. In both cases there was no property tax override, which would presumably have influenced property tax rates and arguably also PILOT rates, so this potential channel of influence is the same for all of the observations. As Figure 4 illustrates, towns in which voters consistently defeat property tax referenda had lower PILOT rates in 2007 than did towns that did not have any property tax referenda from 1995-2007.

Table 4 presents estimated coefficients from population-weighted regressions using 2007 data for the sample of 195 towns that either had referenda from 1995-2007 that all failed, or else never had referenda during that time period. The specifications are similar to those in the regressions presented in Table 2, the only difference being the inclusion of a dummy variable

indicating that a town never had property tax override referenda. The estimated property tax rate coefficients are very similar to those reported in Table 2, and the estimated effect of the absence of failed referenda is positive in all specifications (albeit of marginal statistical significance in columns 2 and 3). The 0.0462 coefficient in column 4 indicates that PILOT rates are significantly higher in towns that never had referenda than in towns with referenda that failed, the difference corresponding to about 33 percent of average PILOT rates for the whole sample as reported in Table 1.

The Massachusetts data also afford some indication of the effect of PILOTs on nonprofit activity. Figure 5 presents ratios of nonprofit fixed asset holdings to nonprofit total assets for 10 groups of Massachusetts towns, distinguished by size of town in 2000 and average PILOT rates from 1998-2007; only towns with some nonprofit activity during this period are included in the data used to construct the figure. The patterns of the bars depicted in the figure suggest that ratios of fixed asset holdings to total assets decline with PILOT rates, which is consistent with incentives created by PILOTs for nonprofits to economize on property holdings that trigger PILOT obligations.[4]

Table 5 presents estimated coefficients from OLS regressions explaining nonprofit assets, revenues, and real property holdings in Massachusetts towns. The regressions reported in columns 3-6 use data for 1995-2007, while the regressions reported in columns 1-2 and 7-8, which use information on real property holdings that start only in 1998, use data for 1998-2005. The observations are pooled, and are weighted by population; the specifications include year dummies and cluster standard errors by municipality. All of the specifications include town population and median household income (in 1999) as control variables; regressions reported in even-numbered columns add the same demographic and economic control variables used in Tables 2-4.

Columns 1-2 of Table 5 report estimated coefficients from regressions in which the dependent variable is the log of aggregate nonprofit fixed asset holdings. The -0.801 coefficient

[4] The pattern in Figure 5 is also consistent with PILOT obligations being increasing functions of nonprofit non-fixed asset holdings, which would induce a negative correlation between measured PILOT rates and ratios of fixed to total assets. While this possibility is not an implication of the model in section 3, it is nonetheless difficult to rule out, and may affect the interpretation of the strength of the pattern in Figure 5 and the coefficient magnitudes in the related regressions reported in columns 7-8 of Table 5.

in column 1 indicates that a one percent higher PILOT rate is associated with a 0.8 percent reduction in nonprofit property holding over the sample period. This regression also includes as independent variables the log of local population and the log of per capita household income in 1999, both of which have positive and significant associations with nonprofit fixed assets. The magnitude of the estimated PILOT rate coefficient falls to -0.662 in the column 2 regression in which additional demographic and economic control variables are included, but remains statistically significant.

The large magnitudes of the estimated PILOT rate effects in the regressions reported in columns 1-2 of Table 5 are consistent with PILOTs significantly influencing nonprofit property holdings, but also raise the possibility that variable construction may influence the estimated coefficients. The PILOT rate is the ratio of PILOT receipts to nonprofit property holdings, so classical measurement error in nonprofit property holdings generates a negative correlation between the measured PILOT rate and nonprofit property. In evaluating the likely role that the resulting bias might play in this regression, it is noteworthy that the data used in constructing the dependent variable in the regressions reported in columns 1-2 (Form 990 data from nonprofit filings) differ from the data used to construct PILOT rates (Massachusetts Department of Revenue data on local property assessments). While this difference addresses part of the potential for bias it does not address all of it, since unexplained differences in true nonprofit property holdings that somehow do not translate directly into differences in PILOTs will affect both measures.

Columns 3-4 of Table 5 report estimated coefficients from regressions in which the dependent variable is the log of total nonprofit assets. The -0.211 coefficient in column 3 indicates that nonprofits in towns with higher PILOT rates have fewer assets, though this effect is between one-quarter and one-third as strong as the effect of PILOTs on fixed asset holdings. The -0.0741 coefficient in the regression reported in column 4 that includes additional demographic and economic controls is considerably smaller in magnitude and not statistically significant.

Columns 5-6 of Table 5 report estimated coefficients from regressions in which the dependent variable is the log of nonprofit revenue. The -0.204 coefficient in column 5 indicates

that one percent higher PILOT rates are associated with 0.2 percent lower nonprofit revenue, an effect that declines significantly in magnitude to 0.08 percent, and becomes statistically insignificant, in the column 6 regression that includes additional control variables. From the evidence presented in columns 3-6 of Table 5 it appears that higher PILOT rates are generally associated with reduced nonprofit activity as reflected in asset holdings and total revenue, but that this effect is considerably weaker than the effect of PILOTs on fixed asset holdings.

The regressions presented in columns 7 and 8 of Table 5 estimate the effect of PILOT rates on ratios of fixed assets to total assets. These regressions omit observations from towns with no nonprofit activity. The -0.661 coefficient in column 7 indicates that fixed asset holdings decline significantly as a fraction of total assets as PILOT rates increase. Inclusion of additional control variables in the regression reported in column 8 has little effect on this estimated association.

Consequently, it appears that one of the primary effects of higher PILOT rates is to change the nature of nonprofit activity in a jurisdiction, moving it away from the use of property that would otherwise be subject to taxation. In the process, higher PILOT rates also appear to discourage nonprofit activity in general. Unfortunately, these regressions are unable to distinguish whether these effects take the form of changing the places in which nonprofit organizations choose to locate, changing the local activities of nonprofits that remain despite higher PILOT rates, or changing the rates at which nonprofits are formed and dissolved, though hopefully that will be a topic for future research.

6. Conclusion

The Massachusetts evidence is consistent with a model in which municipalities make PILOT demands that are increasing functions of local property tax rates, reflecting community needs and the costs that nonprofits impose by reducing the local tax base. These PILOT demands have effects similar to those of property and other taxes in discouraging nonprofit activity, particularly real property holdings of nonprofit organizations. Since PILOTs are individually negotiated and nominally voluntary, it is striking that they would have such effects.

This pattern suggests that Massachusetts communities are unable to tailor their PILOT demands with sufficient precision to be able to extract resources from nonprofits without also influencing their behavior. The pattern also suggests that nonprofits are sufficiently concerned about the cost of current and future PILOT burdens that they adjust their behavior in response.

These tax-like features of PILOTs raise the possibility that, despite their voluntary nature, PILOT payments may share many of the distributional and efficiency characteristics of property taxes, including the impact of fiscal competition. Governments eager to attract nonprofit activity might limit, or avoid making, PILOT demands, much in the way that local governments compete over tax rates (Wilson, 1986; Zodrow and Mieszkowski, 1986; Bucovetsky, 1991; Hoyt, 1991; Wilson and Wildasin, 2004) and in offering business development incentives (Bartik, 1991; Anderson and Wassmer, 1995; Fisher and Peters, 1998; Man, 1999; Gibson, 2003; Felix and Hines, 2013). There has been mixed evidence of the effect of enterprise zones, property tax abatements, and other tax-related incentives on business location decisions and economic development (Papke, 1994; Boarnet and Bogart, 1996; Dye and Merriman, 2000; O'Keefe, 2004; Hanson, 2009; Neumark and Kolko, 2010), though more recent evidence that preferential tax treatment significantly increases economic activity (Busso et al., 2013; Rohlin et al., 2014) is consistent with nonprofits being attracted to locations that make fewer PILOT demands.

In an era of strained public finances it is understandable that towns might seek payments from nonprofits that are otherwise exempt from local property taxes. In doing so it is important for towns to be aware of the possible consequences of PILOTs for the nature and volume of local nonprofit activity, and the extent to which nonprofits respond to PILOTs much in the way that taxable entities respond to real estate taxes. Given the fiscal challenges that many U.S. towns face, there are likely to be growing calls for PILOTs, and quite possibly growing resistance from nonprofit organizations. It remains to be seen what effect this process has on local public finances and on relations between governments and nonprofits.

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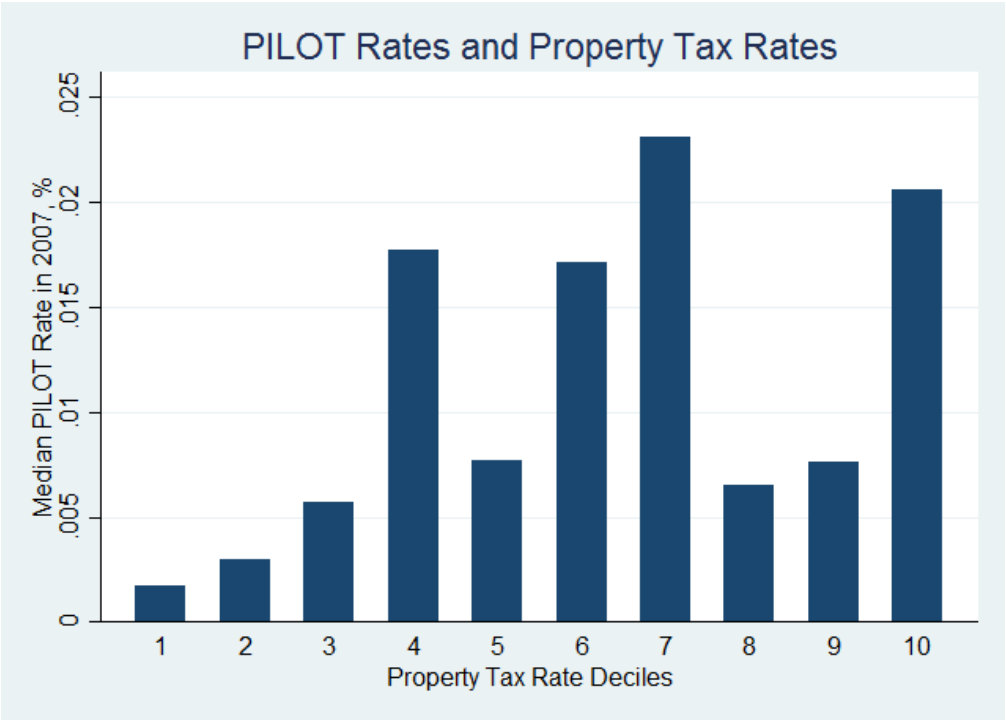
Figure 1

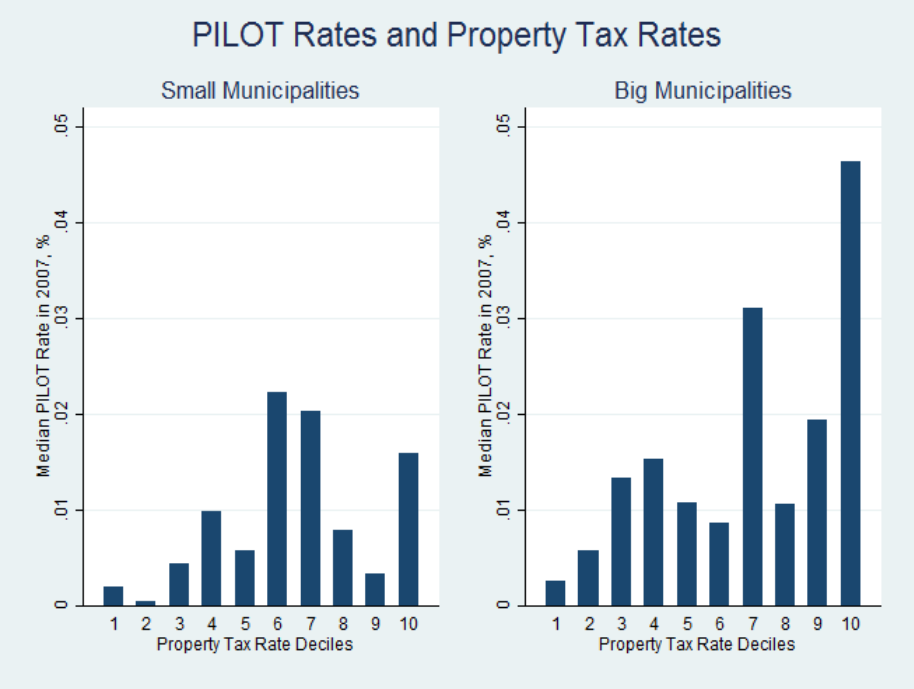
PILOT Rates and Property Tax Rates in 2007



Note to Figure 1: The figure presents median 2007 PILOT rates for 10 groups of Massachusetts towns, distinguished by their average property tax rates in 2007. A town's PILOT rate is the ratio of its PILOT receipts to the market value of nonprofit property; its average property tax rate is the ratio of property tax collections to the market value of taxable property. Towns in the first property tax decile from the left have the lowest property tax rates, whereas those in the tenth property tax decile have the highest property tax rates. The heights of the bars depict the median PILOT rates of towns in each group.

Figure 2

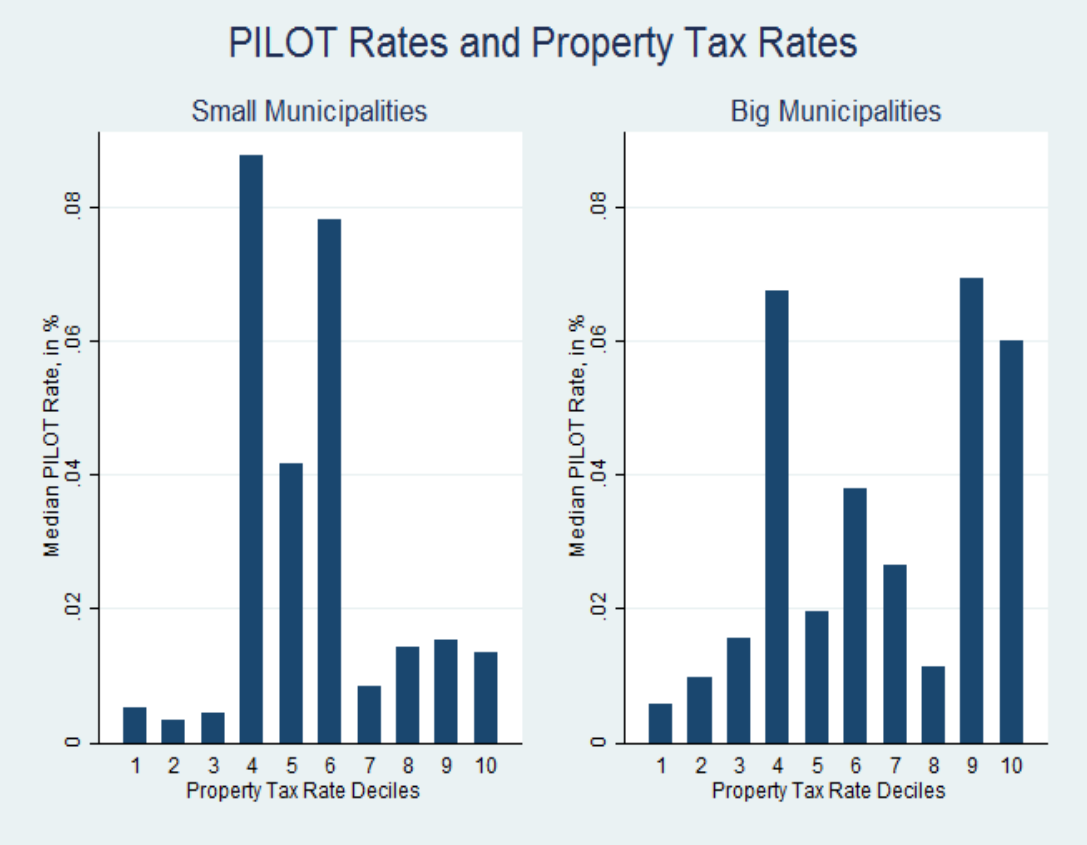
2007 PILOT and Property Tax Rates, by Municipality Size



Note to Figure 2: The figure presents median 2007 PILOT rates for 20 groups of Massachusetts towns, distinguished by size of town in 2000 and average property tax rates in 2007. The left figure depicts data for Massachusetts towns with below-median populations; the right figure depicts data for Massachusetts towns with above-median populations. A town's PILOT rate is the ratio of its PILOT receipts to the market value of nonprofit property; its average property tax rate is the ratio of property tax collections to the market value of taxable property. Towns in the first property tax decile from the left in each of the two graphs have the lowest property tax rates, whereas those in the tenth property tax decile have the highest property tax rates. The heights of the bars depict the median PILOT rates of towns in each group.

Figure 3

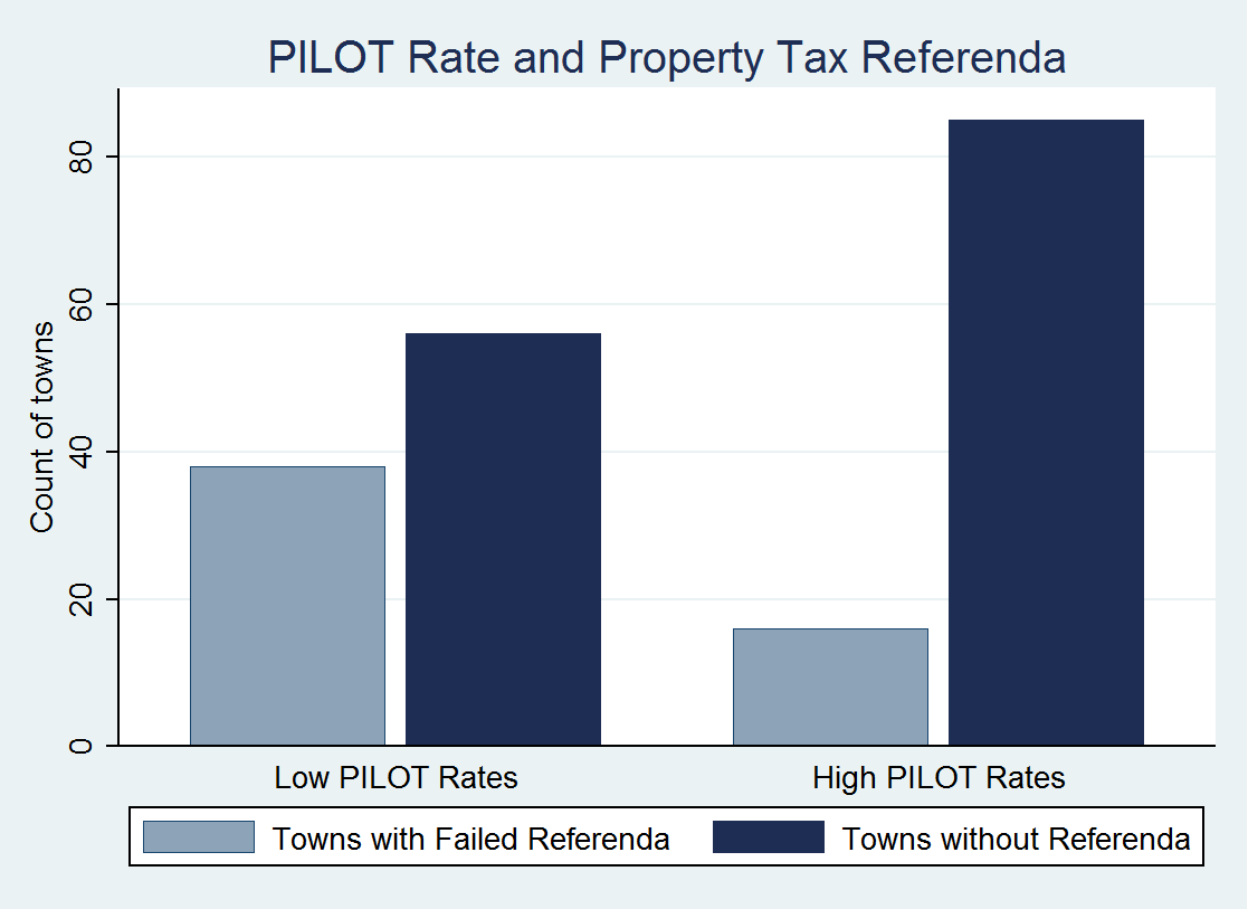
PILOT and Property Tax Rates, 1995-2007, by Municipality Size



Note to Figure 3: The figure presents median PILOT rates for 20 groups of Massachusetts towns, distinguished by size of town in 2000 and average property tax rates from 1995-2007. The left figure depicts data for Massachusetts towns with below-median populations in 2000; the right figure depicts data for Massachusetts towns with above-median populations. A town's average PILOT rate is the average over the 13-year sample of its annual ratios of PILOT receipts to market values of nonprofit property; its average property tax rate is the 13-year average ratio of its property tax collections to the market value of its taxable property. Towns in the first property tax decile from the left in each of the two graphs have the lowest property tax rates, whereas those in the tenth property tax decile have the highest property tax rates. The heights of the bars depict the median PILOT rates (13-year averages) of towns in each group.

Figure 4

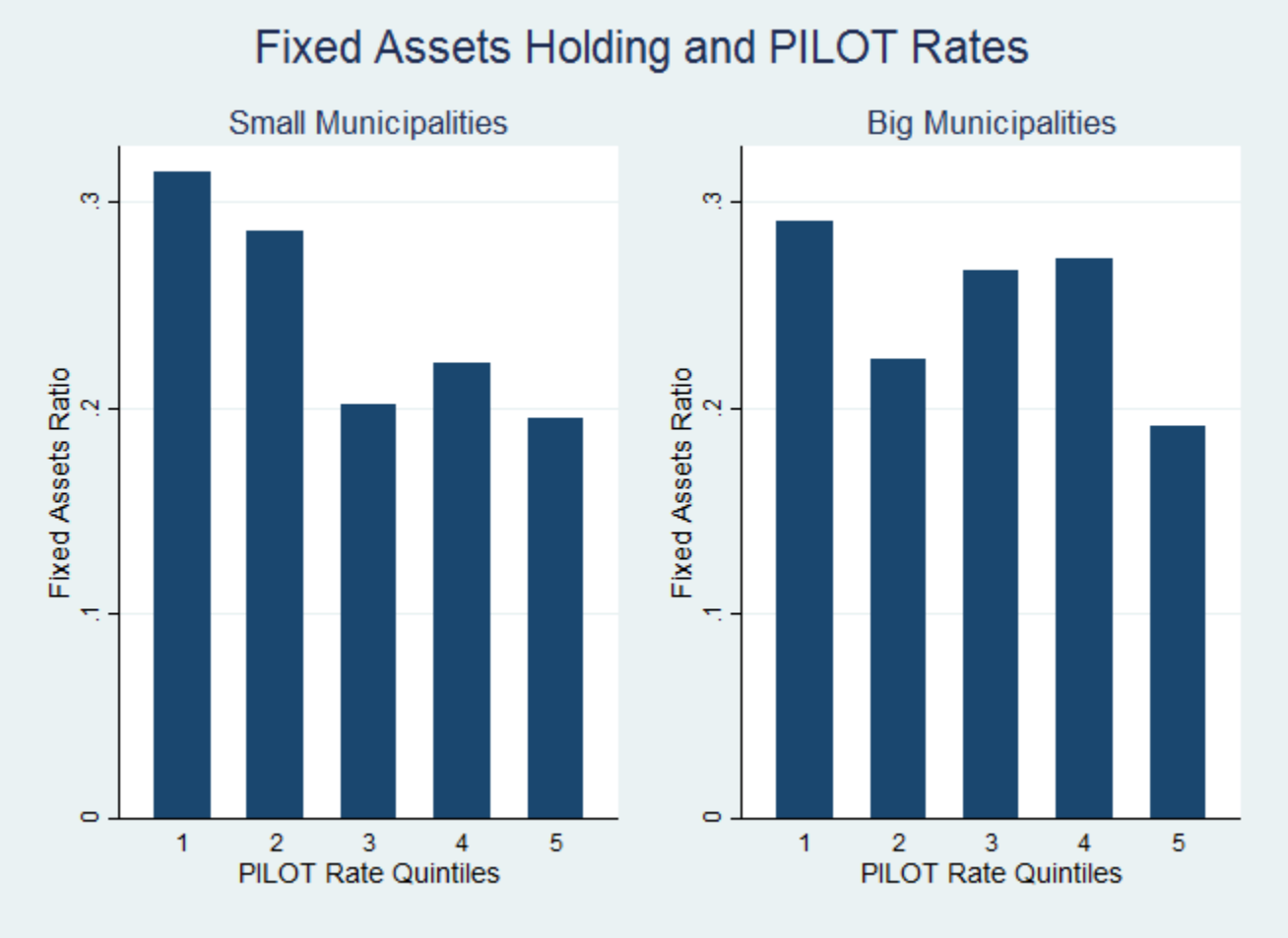
PILOT Rates and Property Tax Referenda, 2007



Note to Figure 4: The figure reports numbers of towns in groups distinguished by average PILOT rates in 2007 and property tax referendum experience from 1995-2007. The two left bars depict towns with below-median PILOT rates, in which the median is calculated based on all 351 Massachusetts towns; the right figure depicts towns with above-median PILOT rates. A town's PILOT rate is the ratio of its PILOT receipts to the market value of nonprofit property. The heights of the lightly shaded bars depict numbers of towns in each group that had property tax referenda that all failed during 1995-2007; the heights of the darkly shaded bars depict numbers of towns that had no property tax referenda at all during 1995-2007.

Figure 5

Fixed Asset Ratios and PILOT Rates, 1998-2007, by Municipality Size



Note to Figure 5: The figure presents ratios of nonprofit fixed asset holdings to nonprofit total assets for 10 groups of Massachusetts towns, distinguished by size of town in 2000 and average PILOT rates from 1998-2007. The left figure depicts data for Massachusetts towns with below-median populations in 2000; the right figure depicts data for Massachusetts towns with above-median populations. A town's average PILOT rate is the average from 1998-2007 of its annual ratios of PILOT receipts to market values of nonprofit property. Towns in the first PILOT quintile from the left in each of the two graphs have the lowest PILOT rates, whereas those in the fifth PILOT quintile have the highest PILOT rates. The heights of the bars depict the median fixed-asset ratios (10-year averages) of towns in each group. Towns without any nonprofit activity from 1998-2007 are omitted from these data.

Table 1:

Variable Means and Standard Deviations

	No PILOTs		All Towns	
Number of Observations	47		351	
	Mean	S.d.	Mean	S.d.
Property and Payments				
PILOT Receipts, in $ m	0	0	0.258	2.073
PILOT Rate, in %	0	0	0.109	0.420
Property Taxes, in $ m	12.822	14.043	25.239	62.341
Property Tax Rate, in %	1.289	0.399	1.402	0.382
% Property Owned by Nonprofits	7.518	3.694	9.914	6.321
Nonprofit Activities				
Total Assets, in $ m	31.028	73.254	374.025	3645.842
Total Revenue, in $ m	15.923	42.665	151.475	1282.39
Fixed Assets, in $ m	8.731	19.271	67.602	502.173
Share of Fixed Assets in Total Assets, in %	32.040	24.738	27.162	21.733
Municipality Characteristics				
Population	8,374	9,390	17,957	36,502
Median Household Income	73,712	25,792	73,782	23,499
Per Capita Income	35,116	11,903	34,455	10,985
City Status (1 if City, 0 if Town)	0.064	0.245	0.157	0.364
Land Area, in sq miles	23.606	10.967	22.336	12.431
Public Road Mileage, in miles	79.734	53.639	103.230	82.433
Demographic Variables				
% of White Population	97.422	2.855	93.868	8.684
% of Black Population	0.754	0.906	1.664	3.042
% of Hispanic Population	1.096	1.560	2.554	5.472
% of High School Graduates	28.843	9.355	28.007	8.460
% of Some College	27.017	6.483	26.148	5.049
% of College Graduates	33.438	15.579	34.515	15.574
Economic Variables				
Unemployment Rate	7.902	2.632	7.831	2.629
% of People under 20	24.058	4.103	24.342	4.173
% of People over 65, Living Alone and in Poverty	0.537	0.410	0.554	0.369
% of People over 65	0.133	0.042	0.134	0.044
% of Households with Income < $10K	5.551	3.370	6.014	3.361
% of Households with Income > $50K	54.145	15.453	55.304	13.256

Note to Table 1: The table presents means and standard deviations of variables used in the regressions presented in Tables 2-5 and Appendix Tables 1-2. The first two columns present means and standard deviations of the regression variables for the 47 towns that never collected

PILOTs from 1995-2007, whereas the third and fourth columns present means and standard deviations of the regression variables for the whole sample of 351 Massachusetts towns. "PILOT receipts, in $ m" is aggregate town PILOT receipts in millions of real 2005 dollars (calculated using the Implicit Price Deflator of State and Local Government Expenditures and Gross Investment provided by the Bureau of Economic Analysis). "PILOT rate" is the ratio of town PILOT receipts to the market value of its nonprofit property, expressed as a percentage. "property taxes, in $ m" is aggregate town property tax receipts in millions of real 2005 dollars. "Property tax rate" is the ratio of town property tax receipts to the market value of its taxable property, expressed as a percentage. "% of property owned by nonprofits" is the ratio of the market value of property owned by nonprofits to the sum of the market value of nonprofit property plus the market value of taxable property. "Total Assets, in $ m" is total assets (in 2005 dollars) reported on Form 990 by nonprofit organizations located in a town; "Total Revenue, in $ m" is total revenue (in 2005 dollars) of the same nonprofit organizations as reported on Form 990; "Fixed Assets, in $ m" is the sum of the market values of land, building, and equipment owned by local nonprofits as reported on Form 990; and "Share of Fixed Assets in Total Assets, in %" is the product of 100 and the ratio of Fixed Assets to Total Assets. "Population" is annual town population; "Median household income" and "Per capita income" are based on data from 2000 census and correspond to calendar year 1999; "City status" takes the value 1 for cities 0 for towns, and "Land area" is measured in square miles, both of these variables corresponding to 2000; and "Public road mileage" is measured in linear miles and reported every year. All of the "Demographic variables and "Economic variables" are Census figures for 2000, with the exception of the town unemployment rate, which is reported every year; they are all expressed as percentages. "% of white population" is the ratio of a town's white population in 2000 to its total population in 2000; "% of black population" is the ratio of a town's black population in 2000 to its total population in 2000; "% of Hispanic population" is the ratio of a town's Hispanic population in 2000 to its total population in 2000; "% of high school graduates" is the ratio of a town's residents in 2000 who graduated from high school but did not attend college to its total population in 2000; "% of some college" is the ratio of a town's residents in 2000 who attended college but did not graduate to its total population in 2000; and "% of college graduates" is the ratio of a town's residents in 2000 who graduated from college to its total population in 2000. "% of people under 20" is the ratio of a town's residents in 2000 younger than 20 to its total population in 2000; "% of people over 65, living alone and in poverty" is the ratio of a town's residents in 2000 younger over 65 and with incomes below the poverty line to its total population in 2000; "% of people over 65" is the ratio of a town's residents in 2000 over 65 to its total population in 2000; "% of households with income < $10K" is the ratio of the number of households with total household incomes below $10,000 in 2000 to the total number of households in 2000; "% of households with income > $50K" is the ratio of the number of households with total household incomes above $50,000 in 2000 to the total number of households in 2000.

Table 2:

Determinants of PILOT Rates in 2007

	(1)	(2)	(3)	(4)
Property Tax Rate, in %	0.210***	0.166***	0.135***	0.178***
	(0.0547)	(0.0553)	(0.0460)	(0.0587)
Log (Population)		0.0246***	0.0201	0.0255
		(0.00535)	(0.0141)	(0.0156)
% of White Population			0.00364	0.00435
			(0.00235)	(0.00332)
% of Black Population			0.00434	0.00673*
			(0.00265)	(0.00403)
% of Hispanic Population			0.00670**	0.00924**
			(0.00267)	(0.00435)
% of High School Graduates			0.00219	-0.00214
			(0.00252)	(0.00573)
% of Some College			-0.000383	-0.00369
			(0.00309)	(0.00614)
% of College Graduates			0.00126	-0.00145
			(0.00142)	(0.00444)
Unemployment Rate				0.00802
				(0.00575)
% of People under 20				-0.00498
				(0.00397)
% of People over 65				0.0782
				(0.335)
% of People over 65, Living Alone and in Poverty				0.000588
				(0.0555)
% of Households with Income < $10K				-0.0168
				(0.0163)
% of Households with Income > $50K				-0.000894
				(0.00267)
Constant	-0.182***	-0.391***	-0.773**	-0.447
	(0.0590)	(0.0693)	(0.342)	(0.551)
Observations	351	351	351	351
Pseudo R-squared	0.169	0.210	0.244	0.280
F-stat	14.68	21.06	8.100	7.421

Note to Table 2: The table presents estimated coefficients from Tobit regressions in which the dependent variable is the ratio of town PILOT receipts in 2007 to the market value of its nonprofit property in 2007, expressed as a percentage. Observations are weighted by town population. Among the independent variables, the town property tax rate, town population, and town unemployment rate are all 2007 values; all other variables correspond to 2000.

Table 3:

Determinants of PILOT Rates, 1995-2007

	(1)	(2)	(3)	(4)
Property Tax Rate, in %	0.289***	0.211**	0.120**	0.134**
	(0.109)	(0.105)	(0.0585)	(0.0577)
Log (Population)		0.0408**	0.0264	0.0351*
		(0.0159)	(0.0198)	(0.0211)
Constant	-0.357**	-0.654**	-1.149*	-0.646
	(0.169)	(0.243)	(0.697)	(0.903)
Demographic Controls	N	N	Y	Y
Economic Controls	N	N	N	Y
Year dummies	Y	Y	Y	Y
Observations	4,547	4,547	4,534	4,534
Pseudo R-squared	0.0673	0.0791	0.104	0.116
F-stat	2.280	1.706	2.180	2.066

Note to Table 3: The table presents estimated coefficients from Tobit regressions in which the dependent variable is the ratio of town PILOT receipts to the market value of its nonprofit property, expressed as a percentage. The sample includes observations from 1995-2007. Observations are weighted by town population, and standard errors are clustered by municipality. All of the regressions include year dummy variables; the regression reported in column 3 includes the six "Demographic Variables" listed in Table 1; and the regression reported in column 4 includes the six "Demographic Variables" listed in Table 1 plus the six "Economic Variables" listed in Table 1. Among the independent variables, the town property tax rate, town population, and town unemployment rate are all 2007 values; all other variables correspond to 2000.

Table 4:

2007 PILOT Rates and Tax Referenda Experience

	(1)	(2)	(3)	(4)
Property Tax Rate, in %	0.200***	0.161**	0.124**	0.172**
	(0.0647)	(0.0721)	(0.0615)	(0.0744)
Dummy (No Referendum)	0.0572**	0.0452*	0.0504*	0.0462**
	(0.0231)	(0.0270)	(0.0280)	(0.0227)
Log (Population)		0.0223***	0.0317*	0.0377*
		(0.00823)	(0.0181)	(0.0210)
% of White Population			0.00619**	0.00548
			(0.00314)	(0.00423)
% of Black Population			0.00548*	0.00902*
			(0.00313)	(0.00514)
% of Hispanic Population			0.00942***	0.0117**
			(0.00333)	(0.00569)
% of High School Graduates			0.000884	-0.00357
			(0.00303)	(0.00715)
% of Some College			0.00160	-0.00495
			(0.00370)	(0.00789)
% of College Graduates			0.00199	-0.00153
			(0.00168)	(0.00549)
Unemployment Rate				0.00880
				(0.00602)
% of People under 20				-0.00032
				(0.00532)
% of People over 65				0.983*
				(0.501)
% of People over 65, Living Alone in Poverty				0.0510
				(0.0683)
% of Households with Income < $10K				-0.0247
				(0.0222)
% of Households with Income > $50K				0.000654
				(0.00335)
Constant	-0.206**	-0.393***	-1.191***	-0.937
	(0.0747)	(0.0835)	(0.454)	(0.701)
Observations	195	195	195	195
Pseudo R-squared	0.276	0.321	0.396	0.519
F-stat	7.740	13.15	6.733	7.962

Note to Table 4: The table presents estimated coefficients from Tobit regressions in which the dependent variable is the ratio of town PILOT receipts in 2007 to the market value of its nonprofit property in 2007, expressed as a percentage. The sample includes only those towns that either never had a property tax referendum from 1995-2007, or else had property tax referenda that failed. Observations are weighted by town population. The "Dummy (No Referendum)" variable takes the value 1 for towns without a property tax referendum from 1995-2007, and is zero for towns with property tax referendums that failed. Among the independent variables, the town property tax rate, town population, and town unemployment rate are all 2007 values; all other variables correspond to 2000.

Table 5:

Effects of PILOT Rates on Nonprofit Activity, 1995-2007

Dependent Variables	log(Fixed Assets)		log(Total Assets)		log(Total Revenue)		log(Fixed Assets Ratio)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PILOT rate (in %)	-0.801***	-0.662***	-0.211**	-0.0741	-0.204**	-0.0826	-0.661***	-0.622***
	(0.237)	(0.193)	(0.103)	(0.0867)	(0.0926)	(0.0765)	(0.191)	(0.177)
Log(population)	2.654***	2.467***	2.420***	2.103***	2.353***	2.169***	0.311***	0.530***
	(0.0607)	(0.0636)	(0.0287)	(0.0397)	(0.0332)	(0.0381)	(0.0499)	(0.0488)
Log household income (1999)	0.745***	6.401***	1.154***	4.048***	0.552***	4.357***	-0.384***	2.684***
	(0.164)	(1.163)	(0.107)	(0.648)	(0.100)	(0.628)	(0.0872)	(0.787)
Constant	-19.55***	-71.69***	-20.02***	-47.38***	-12.94***	-50.44***	-0.937	-31.28***
	(2.198)	(11.63)	(1.378)	(6.496)	(1.332)	(6.352)	(1.293)	(7.854)
Year dummies	Y	Y	Y	Y	Y	Y	Y	Y
Demographic+Economic Controls	N	Y	N	Y	N	Y	N	Y
Observations	3,502	3,492	4,547	4,534	4,544	4,531	3,181	3,171
R-squared	0.510	0.607	0.615	0.709	0.650	0.723	0.052	0.104
F-stat	185.7	199.3	603.1	433.2	428.7	445.4	9.288	16.62

Note to Table 5: The table reports estimated coefficients from OLS regressions. The dependent variable in the regressions reported in columns 1-2 is the natural log of one plus total nonprofit fixed assets (the sum of land, buildings, and equipment) in a town; the dependent variable in the regressions reported in columns 3-4 is the natural log of one plus total nonprofit assets in a town; the dependent variable in the regressions reported in columns 5-6 is the natural log of one plus total nonprofit revenues in a town; and the

dependent variable in the regressions reported in columns 7-8 is the natural log of the ratio of nonprofit fixed assets to nonprofit total assets. The sample used in the regressions reported in columns 3-6 includes observations from 1995-2007. The sample used in the regressions reported in columns 1-2 and 7-8 includes observations from 1998-2007, though observations from towns without any nonprofit activity in a year are excluded from the regressions reported in columns 7-8. Observations are weighted by town population, and standard errors are clustered by municipality. All of the regressions include year dummy variables; the regression reported in even-numbered columns include the six "Demographic Variables" listed in Table 1 plus the six "Economic Variables" listed in Table 1. Among the independent variables, the town PILOT rate, town population, and town unemployment rate are all contemporaneous values; all other variables correspond to 2000.

Appendix Table 1:

Determinants of PILOT Rates in 2007, Unweighted Regressions

	(1)	(2)	(3)	(4)
Property Tax Rate, in %	0.146**	0.142**	0.145**	0.162**
	(0.0626)	(0.0644)	(0.0651)	(0.0747)
Log (Population)		0.0127	0.00436	0.0192
		(0.0112)	(0.0140)	(0.0140)
% of White Population			0.00201	0.00233
			(0.00305)	(0.00456)
% of Black Population			0.00306	0.00253
			(0.00467)	(0.00603)
% of Hispanic Population			0.00544	0.00900*
			(0.00347)	(0.00529)
% of High School Graduates			-0.00395	-0.00555
			(0.00521)	(0.00588)
% of Some College			0.000745	-0.00385
			(0.00345)	(0.00511)
% of College Graduates			-0.000510	-0.00232
			(0.00316)	(0.00438)
Unemployment Rate				0.00478
				(0.00434)
% of People under 20				-0.0102**
				(0.00442)
% of People over 65				-0.651
				(0.467)
% of People over 65, Living Alone in Poverty				0.0535
				(0.0458)
% of Households with Income < $10K				-0.0218*
				(0.0123)
% of Households with Income > $50K				-0.00079
				(0.00297)
Constant	-0.135**	-0.247**	-0.273	0.207
	(0.0667)	(0.0975)	(0.435)	(0.600)
Observations	351	351	351	351
Pseudo R-squared	0.0343	0.0391	0.0542	0.0923
F-stat	5.463	5.254	3.098	1.875

Note to Appendix Table 1: The table presents estimated coefficients from Tobit regressions in which the dependent variable is the ratio of town PILOT receipts in 2007 to the market value of its nonprofit property in 2007, expressed as a percentage. Observations are unweighted. Among the independent variables, the town property tax rate, town population, and town unemployment rate are all 2007 values; all other variables correspond to 2000.

Appendix Table 2:

Determinants of PILOT Rates, 1995-2007, Unweighted Regressions

	(1)	(2)	(3)	(4)
Property Tax Rate, in %	0.156**	0.138**	0.136*	0.132*
	(0.0612)	(0.0680)	(0.0730)	(0.0797)
Log (Population)		0.0170	-0.00331	0.0198
		(0.0188)	(0.0238)	(0.0213)
Constant	-0.190**	-0.317*	-0.424	0.312
	(0.0937)	(0.162)	(0.719)	(0.904)
Demographic Controls	N	N	Y	Y
Economic Controls	N	N	N	Y
Year dummies	Y	Y	Y	Y
Observations	4,547	4,547	4,534	4,534
Pseudo R-squared	0.00743	0.00855	0.0177	0.0256
F-stat	1.102	1.370	1.459	1.183

Note to Appendix Table 2: The table presents estimated coefficients from Tobit regressions in which the dependent variable is the ratio of town PILOT receipts to the market value of its nonprofit property, expressed as a percentage. The sample includes observations from 1995-2007. Observations are unweighted, and standard errors are clustered by municipality. All of the regressions include year dummy variables; the regression reported in column 3 includes the six "Demographic Variables" listed in Table 1; and the regression reported in column 4 includes the six "Demographic Variables" listed in Table 1 plus the six "Economic Variables" listed in Table 1. Among the independent variables, the town property tax rate, town population, and town unemployment rate are all contemporaneous values; all other variables correspond to 2000.