Does the Strength of Incentives Matter for Elected Officials? A Look at Tax Collectors[*]

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Abstract

In Pennsylvania local property taxes are collected by elected officials, known as tax collectors, whose compensation varies widely in both structure and level across municipalities. This paper analyses the existence of a pay-performance relationship for these officials. Using data on the percentage of real estate taxes that are actually collected at the municipal level, the paper finds that as the compensation tax collectors receive goes up, they collect more in taxes. This relationship is however true only for those collectors who are compensated on a commission basis and not for collectors who are compensated on the basis of a flat salary. The paper also finds no relationship between the share of votes received by the tax collector and the percentage of property taxes collected during the previous term. This observation may account for the lack of a positive relationship between pay and performance for collectors compensated on the basis of a salary.

Keywords: Tax Collectors; Politician Salary; Productivity; Politician Quality

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1 Introduction

There is a growing theoretical and empirical literature that examines the effect of politician salary on a variety of measures such as performance of politicians while in office, the decision to run for election, and on the quality of politicians. This paper contributes to that literature by examining the institution of municipal tax collectors in the state of Pennsylvania. These tax collectors are elected officials who are responsible for the collection of property taxes for their respective municipalities. Using two different sources of data on municipal tax collector compensation, this paper finds that an increase in the compensation of tax collectors is associated with an increase in the percentage of property taxes that are collected, but that this relationship holds true only for collectors who are compensated on the basis of a commission and not for collectors compensated on the basis of a salary.

The theoretical literature that examines the effect of politician compensation on the quality and performance of politicians offers ambiguous predictions. Work in the area of efficiency wages suggests that paying workers more reduces shirking because of the higher cost of being fired (Shapiro and Stiglitz, 1984) and enhances the quality of the applicant pool (Weiss 1980). These ideas are also central to the model in Besley (2004) which predicts that a higher salary improves the average quality of politicians. Moreover, by increasing the incumbent's payoff from being re-elected, higher compensation is also likely to spur better performance on the job.

On the other hand, models such as those in Caselli and Morelli (2004) and Messner and Polborn (2004) start off with the plausible assumption that bad candidates have lower opportunity costs than good candidates and predict that high compensation may induce lower quality candidates to run for election and in equilibrium, reduce the quality of candidates elected. More generally, a literature in personnel economics (Gneezy and Rustichini, 2000; Ariely et al., 2009) suggests that workers are often driven by intrinsic motivations and the impact of increasing external rewards might be to reduce the effect of intrinsic motivations via crowd-out. If that is true, increasing politician compensation may have the perverse effect of inducing candidates who are less intrinsically motivated to also run for office. Depending on the voting mechanism at hand, this can reduce the quality of candidates elected in equilibrium. Thus given these ambiguous predictions regarding the effect of politician compensation on quality, the analysis of compensation of elected officials on their quality and performance is an empirical matter.

Examining the relationship between politician compensation and quality empirically however runs into a number of challenges. First, since politicians often play a role in deciding on their salaries, one cannot simply estimate the effect of compensation on politician salary without considering the possibility that causality runs in the opposite direction. For example, politicians who demonstrate better performance may be able to get the broader public to support pay raises for them.[1] Recent papers attempt to overcome this problem either by exploiting large discontinuous changes in policy or by exploiting discontinuities of politicians' salaries with population size. Fisman et al. (2015) and Mocan and Altindag (2013) study politician performance in the European Union, exploiting a pay equalization policy that equalized salaries of Members of the European Parliament (MEP) which had previously differed by as much as a factor of ten. These papers either find no effect of the increase in salaries on attendance and shirking (Fisman et al. (2015)) or that it has a negative effect on attendance and the number of questions asked by the parliamentarians (Mocan and Altindag (2013)).

Ferraz and Finan (2011) and Gagliarducci and Nannicini (2013) use a regression discontinuity research design that exploits the discontinuous change in salaries of municipal officials with a change in the population of their municipalities in Brazil and Italy respectively. Both papers find that higher salaries attract more educated individuals to run for public office and that more well-compensated politicians appear to have better performance in office. Gagliarducci and Nannicini (2013) find that in municipalities with better-paid mayors, the speed of revenue collection (that is, the ratio between collected and assessed revenue within the year) and the speed of payment (that is, the ratio between paid and committed outlays within the year) is higher. Ferraz and Finan (2011) find that higher wages increase legislative productivity, resulting in more legislative bills and the provision of more public goods.

A few studies have looked at the question of a pay-performance relationship for elected officials in the U.S. context. In one of the earliest analyses, Di Tella and Fisman (2004) examine the variation of gubernatorial salary and estimate that governors experience a pay cut for increases in per capita tax payments and a pay increase for an increase in income per capita in their states. They consider various competing theories but find their results most consistent with a "pay for performance" mechanism. More recently however, a comprehensive study of U.S. governors and state legislators by Hoffman and Lyons (2014) shows little correlation between salary changes and changes in politician performance or quality.

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[1]Di Tella and Fisman (2004) present suggestive evidence from the U.S. that better economic performance of their states results in higher salaries for governors.

The second empirical challenge in studying the relationship between pay and performance of politicians is in constructing credible measures of performance for these officials. Papers exploiting the reform that equalized salaries of MEPs focus on measures such as attendance (Fisman et al. (2015)), the number of speeches, written declarations and reports drafted (Braendle, 2015), and number of written and oral questions posed by the parliamentarians (Mocan and Altindag, 2013). It is debatable whether these proxy measures truly capture the performance of MEPs who are enjoined to "act solely in the public interest and conduct their work with disinterest, integrity, openness, diligence, honesty, accountability and respect for the European Parliament's reputation."[2] Similarly, Ferraz and Finan (2011) examine the number of bills submitted for local legislators across Brazil's municipal governments and the provision of public goods in the areas of education, health, and sanitation, even though nearly 85 percent of the funding for these public goods comes from federal transfers. While the measures used by Gagliarducci and Nannicini (2013) in measuring the performance of Italian mayors (such as the level of capital expenditure and current expenditure, the speed of revenue collection and the speed of payment) are comprehensive and arguably superior to some of the other measures used in the literature, they also suffer from a drawback that they are influenced not just by the actions of the mayor but also by actions and decisions made by the municipal council and the entire municipal bureaucracy.

The relationship analyzed in this paper between pay and performance for municipal tax collectors within Pennsylvania potentially offers a number of advantages over some of these settings. First, we observe considerable variation in both the structure and level of compensation of tax collectors across municipalities. While some municipalities compensate their tax collectors on the basis of a flat salary, others use a commission-based structure. For those municipalities that compensate their tax collectors on a commission basis, there is considerable variation in the percentage of the real estate taxes collected paid out as commission which can range from 1 to 5 percent and in some cases, be as high as 10 percent (for the smallest municipalities). Importantly, these variations are largely driven by variations in the codes that enable local government in Pennsylvania such as the Third Class City Code (1931), the Borough Code (1965), the First Class Township Code (1931), the Second Class Township Code (1933), and the Local Tax Collection Law (1945). Although there have been amendments to these codes over the years, the guidelines laid out in the original codes continue to influence

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[2]Code of Conduct for MEPs available at: http://www.europarl.europa.eu/meps/en/about-meps.html-Accessed 12/30/2016.

the structure of tax collector compensation today. The variation in the compensation of tax collectors results in wide variation in the strength of incentives experienced by tax collectors. Few settings in the public-sector demonstrate such considerable heterogeneity in the compensation structure of public officials and one that's not directly influenced by these officials.

Second, we are able to measure the performance of public officials in a manner that is perhaps superior to that of prior work. For the tax collectors that we study, their key responsibility lies in collecting real estate taxes for their municipalities (and typically also the school district and county where the municipality is located). We can estimate the performance of these tax collectors on the basis of what percentage of their municipality's predicted real estate taxes they were actually able to collect. Unlike a state's governor or legislators whose actions may have little influence on aggregate economic output of their state (especially over the time horizons typically considered in the literature), a tax collector is likely to have a greater ability to influence the percentage of real estate taxes that are actually collected in their own municipality. Because we are able to generate a measure of their performance, we can also use it to comment on whether voters reward (or punish) a higher collection of property taxes by the tax collector at the ballot box.

Our findings are as follows: Higher compensation is associated with collection of a higher proportion of predicted real estate taxes. However, this is true only for those tax collectors who are compensated on a commission basis in the form of a percentage of real estate taxes collected. There is no statistically significant relationship for tax collectors compensated on basis of a flat salary between their salaries and the percentage of real estate taxes collected. Furthermore, we do not find any statistically significant relationship between either the incumbent's decision to run for office or her likelihood of facing an opponent or her vote share in the next election cycle and the percent of taxes collected during the prior 4-year period.[3] This suggests that voters do not reward (or punish) higher collection of property taxes by tax collectors and it helps us make sense of the finding that higher pay for salaried tax collectors does *not* induce a higher level of performance from them.

The paper is laid out in the following sections. Section 2 lays out the institutional setting while Section 3 offers a theoretical model which helps motivate the empirical specifications that follow. Section 4 describes the data sources, Section 5 presents the econometric specification, and Section 6 outlines the results. I conclude in Section 7.

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[3]The typical term of a tax collector is 4 years long. In exceptional circumstances, we find terms that are 2 years long. Those are driven by resignations or retirements or deaths. Performance is measured for a 2-year term in such cases.

2 Institutional Setting

Pennsylvania has a complex system of local government with the second highest number of local governments in the country, next only to Illinois. General purpose local governments: cities, boroughs, and townships, total approximately 2,600 units. Like local governments around the country, they rely on a mix of revenue sources, including taxes, transfers from higher levels of government, and user-fees and charges. Among those sources, the property tax and the local earned income tax are the two most important sources with each contributing roughly 40–45 percent of all tax revenue.

Governance of a municipality varies based on the class of municipality and is laid out in the respective codes enabling local government. Municipalities are either classified as cities, boroughs, or townships which can be either of the first class or the second class. Barring the three largest cities – Philadelphia, Pittsburgh, and Scranton, all cities in Pennsylvania are classified as cities of the third class and are governed by a mayor and four councilmen who constitute its governing body. Boroughs have a strong and dominant council and a weak executive (mayor). Townships of the first class are governed by a body of elected commissioners, either five elected at large or up to 15 elected by wards. Townships of the second class are governed by a body composed of three supervisors who are elected at large. Each municipality also has a number of other elected officers with powers that are independent of the city council or borough council or township board. The tax collector is one such elected officer.[4]

As described in the Tax Collector's Manual, "The local tax collector is the municipal officer designated to collect municipal and school real estate and personal taxes levied under the municipal codes, and in most cases, county real estate and personal taxes. In boroughs and second class townships, the office is designated as tax collector; in third class cities[5] and first class townships, the elected treasurer is designated tax collector." This is an elected office; tax collectors are elected for 4-year terms at municipal elections which are held in odd-numbered years in Pennsylvania.

The Tax Collector's Manual also describes the minimal qualifications required for candidates for local tax collector. In third class cities, the city treasurer must be a competent accountant, 21 years of age or more, and a resident of the city for a year before the election.

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[4]There are exceptions to these general principles in the case of home rule municipalities which are allowed to abolish the office of tax collector if that was a part of the charter and approved by voters in a referendum. In such a case, the home rule charter specifies which office is responsible for the collection of municipal property taxes.

[5]All cities in Pennsylvania excepting Philadelphia, Pittsburgh, and Scranton are cities of the third class. The home rule charter or administrative code designates which office is responsible for collecting local property taxes.

An individual does not have to be a certified public accountant; s/he can be a qualified accountant through training and experience. In townships of the first class, the only qualification is being a registered voter of the municipality. In boroughs and townships of the second class, the tax collector must have resided in the municipality for one year before the election and continue to reside there during the term of office.[6]

As was noted earlier, compensation of the tax collector is structured largely based on the codes enabling local government, such as the Third Class City Code and the Borough Code. Within the broad parameters of these codes, the actual compensation of tax collectors is fixed by the local government they collect taxes on behalf of. City treasurers are compensated in the form of an annual salary for collecting taxes. The salary is determined jointly by the city council, school board, and, where applicable, county commissioners. Compensation for treasurers in first class townships is set independently by the taxing districts, typically the municipality, the school district, and the county. Compensation for exercising the responsibilities of the township treasurer is set by an ordinance of the township commissioners with the provision that total compensation for township duties alone cannot exceed $10,000 a year. If the commissioners have not established a rate by ordinance, the treasurer receives the statutory rate of 5 percent of taxes collected and 1 percent of other township funds received, subject to the $10,000 maximum. Finally, in boroughs and townships of the second class, the compensation for the tax collector is again set by the governing body of the municipality – either the borough council or the board of township supervisors independently of other governmental entities for which collectors may be responsible for collecting property taxes such as the school district and the county. Compensation can be in the form of a salary, wages, or a commission, with total compensation not to exceed 5 percent of the amount of taxes collected for each unit *except* for second class townships with populations less than 3,000, where it can go up to 10 percent.

As far as fringe benefits are concerned, city treasurers, like city employees, are eligible to participate in life, health, and accident insurance plans purchased by the city and in their retirement plans. Tax collectors in boroughs and townships are however not eligible for fringe benefits such as health insurance which are limited to employees and elected members of the governing bodies and the mayor (when one exists). Also, as elected officers, tax collectors in boroughs and townships are generally not eligible for participating in municipal retirement plans. State case law takes the position that the tax collector as an elected officer is not an

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[6]The requirement that tax collectors seek the "Qualified Tax Collector" designation offered by Pennsylvania's Department of Community and Economic Development (DCED) was in effect for a brief period of time between October 2015 and December 2016 which falls outside the time period analyzed in this paper.

employee of the supervising governments and is not subject to traditional at-will termination.

3   Theory

In this section I lay out a theoretical model which can inform us of whether the method of compensation (salary vs. commission) should matter for the effort exerted by the tax collector (and hence the percentage of taxes collected) and under what circumstances. It can help guide our thinking regarding what we should expect when we regress our performance measure - percentage of taxes collected - on various measures of compensation.

Four scenarios are constructed below. These scenarios differ along two dimensions. First, whether the re-election probabilty for an incumbent responds to the percentage of taxes collected varies across scenarios. Scenarios 1 and 2 consider the case when re-election probabilities do not depend on the percentage of taxes collected whereas scenarios 3 and 4 make the assumption that re-election probabilities are responsive to the percentage of taxes collected during the previous term. Second, the method of compensation (salary versus commission) varies across scenarios. Scenarios 1 and 3 examine the case where the tax collector is compensated on the basis of a salary and scenarios 2 and 4 examine the case where the tax collector is compensated on the basis of a commission.

In the first scenario, characterized as S1, we consider a tax collector compensated on the basis of a salary whose re-election probability does not depend on the percentage of taxes that are collected. The maximization problem for the incumbent tax collector can then be described with help of the following Bellman equation: $Max._e V = (S - c(e)) + \beta * (q * V + (1 - q) * 0)$ where V is the value function, S is the salary received, e is the effort exerted, $c(e)$ is the cost of effort (and is an increasing convex function of e), q is the re-election probability, and the utility for the tax collector if not re-elected is normalized to 0.[7] In that case, V simplifies to $V = (S - c(e))/(1 - \beta * q)$.

As with any optimization problem, to maximize V w.r.t. e, we set $\partial V/\partial e = 0$. Because salary, S and the re-election probability, q are assumed to be unresponsive to effort exerted, e, this leads to the result that the optimal effort, e^* is 0: that is expected given that neither current period compensation nor the re-election probability respond to effort exerted.

In the second scenario, S2, we consider a tax collector compensated on a commission basis

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[7]Tax collectors are not term-limited and in practice, they do stay in office for multiple terms. Hence our choice to frame this as an infinite-horizon problem.

whose re-election probability does not depend on the percentage of taxes that are collected. The maximization problem for that tax collector can be described with the Bellman equation: $Max._e V = (p * T - c(e)) + \beta * (q * V + (1 - q) * 0)$ where p is the fraction of taxes collected that are paid out in the form of a commission (e.g. 0.03) and T are property taxes actually collected, with the rest of the notations being same as before. In that case, V simplifies to $V = (p * T - c(e))/(1 - \beta * q)$.

To maximize V w.r.t. e, we set $\partial V/\partial e = 0$, which leads us to

$$p * \frac{\partial T}{\partial e} = \frac{\partial c}{\partial e} \tag{3.1}$$

That result makes sense: effort is optimal to the point that the marginal benefit of effort (manifested in the form of a higher compensation) equals the marginal disutility from exerting effort. Also, even though the problem is set up as an infinite-horizon problem, the solution to the infinite-horizon problem is identical to the solution for a single-period optimization because re-election probabilities do not respond to effort.[8]

In scenarios 3 and 4, we introduce the possibility that the re-election probability may respond to effort exerted (and hence percentage of taxes collected). While it may be that tax collectors compensated on a salary are not motivated to exert higher effort as salaries go up if electoral incentives are non-existent, they may be motivated to exert higher effort in a world with electoral incentives. When the re-election probability depends on the percentage of taxes collected, it is reasonable to ask whether that probability goes up or down with an increase in taxes that are collected. Given that the median collection rate of property taxes is about 99%, it is reasonable to assume that from the stand-point of the median voter, she would want the tax collector to faithfully collect all taxes that are due and hence, re-election probabilities should be a weakly increasing (concave) function of the percentage of taxes that are collected.

Thus, in the third scenario, S3, we assume that the tax collector is compensated on a salary basis but her re-election probability depends on the percentage of taxes collected. The maximization problem is given by the identical Bellman equation as in S1: $Max._e V = (S - c(e)) + \beta * (q * V + (1 - q) * 0)$ where notations are as defined earlier. However, now re-election probability, q, goes up with an increase in effort, e, i.e. $\partial q/\partial e > 0$. As before, $V = (S - c(e))/(1 - \beta * q)$ but now when we set $\partial V/\partial e = 0$, we no longer obtain the result that the optimal level of effort is zero. Instead we obtain:

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[8]The solution for (3.1) satisifes the SOC because $p * \frac{\partial^2 T}{\partial e^2} - \frac{\partial^2 c}{\partial e^2} < 0$, under the plausible assumption that T is a concave function of e, while c is a convex function of e, as is typically assumed in the literature.

$$\frac{\partial c}{\partial e} = \frac{\beta}{(1 - \beta * q)} * (S - c(e)) * \frac{\partial q}{\partial e} \tag{3.2}$$

Thus, effort is exerted to the point that it makes a difference to the "rents" from being reelected - the responsiveness of the re-election probability to effort($\frac{\partial q}{\partial e}$) is multiplied with the rents obtained from being a collector $(S - c(e))$, and a factor that sums up these rents from the second period of the model till eternity ($\frac{\beta}{(1-\beta*q)}$).[9] Hence when re-election probabilities go up with effort, a salaried tax collector will exert positive effort even though her current-period compensation *does not* respond to effort.

Finally, in the fourth scenario, S4, we assume that the tax collector is compensated on a commission basis but as in S3, re-election probability depends on the percentage of taxes collected. The maximization problem now is given by the identical Bellman equation as in S2: $Max._e V = (p * T - c(e)) + \beta * (q * V + (1 - q) * 0)$ where notations are as defined earlier but where $\partial q / \partial e > 0$. As before, $V = (p * T - c(e))/(1 - \beta * q)$. To maximize V w.r.t. e, we set $\partial V / \partial e = 0$ and now obtain that:

$$\frac{\partial c}{\partial e} = p * \frac{\partial T}{\partial e} + \frac{\beta}{(1 - \beta * q)} * (p * T - c(e)) * \frac{\partial q}{\partial e} \tag{3.3}$$

Here, the expression follows from what we have seen earlier in scenarios 2 and 3: exerting effort results in a benefit both in the current period - through a higher compensation - but also in subsequent periods through an increase in the re-election probability. The second term of the above expression on the RHS closely parallels the term we see in (3.2), with the difference that the tax collector's compensation in Scenario 3 is in the form of a salary whereas here in Scenario 4, it is in the form of a commission.

What the theoretical discussion helps illuminate is that dynamic motives may induce a tax collector compensated on a salaried basis to exert more effort as salary goes up, as exerting more effort (and hence collecting more in taxes) may lead to an increase in the probability of being re-elected. In our results section, we will therefore examine the responsivness of various proxies of re-election probabilities to the percentage of taxes collected between two consecutive elections. In passing, we also note (and prove formally in the appendix) the intuitive result that increasing compensation has the effort of increasing the optimal effort chosen, when collectors are compensated on basis of a salary (as long as dynamic motives are present) or

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[9]One may ask why these rents are not dissipated through electoral competition. Explaining that is beyond the scope of this paper but may have to do with an incumbency advantage. See also fn. (11).

when compensated on a commission basis (under all circumstances).

4 Data Sources

I utilize a variety of data sources for this study. There are two sources of data on compensation of tax collectors. The first comes from a 2004 survey conducted by the Pennsylvania Economy League (PEL) of municipalities in nine counties in central and eastern Pennsylvania regarding their tax collection practices. Details of the survey conducted by the Pennsylvania Economy League (PEL) are provided in the Appendix. The second source of data on compensation is the Pennsylvania Manual, a comprehensive guide to Pennsylvania's government. This provides information on the compensation of tax collectors from approximately 130 of the largest municipalities within Pennsylvania.

There are a number of advantages of the data included in the 2004 survey by the PEL. First, they include compensation data on a larger number of municipalities compared to the number of municipalities included in the Pennsylvania Manual. Second, because it includes data on a number of smaller municipalities (generally boroughs and townships of the second class), we find more instances in the data where tax collectors are compensated on a commission basis rather than on the basis of a flat salary. Moreover, there is considerable variation in the percentage of real estate taxes paid to the tax collector as compensation in that sample. Data from the Pennsylvania Manual, on the other hand, pertains to the largest municipalities (predominantly cities and townships of the first class) and tax collectors in these municipalities are more likely to be compensated in the form of a flat salary. Furthermore, in a number of instances, townships of the first class bunch at the $10,000 cap imposed by the First Class Township Code. There is however one advantage of the Pennsylvania Manual data: these are available over time making it is possible for us to construct a panel.

In order to obtain a sense of the efficiency of the property tax collection system at the municipal level, I turn to data on municipal finances available from the Pennsylvania Department of Community and Economic Development (DCED). The data most relevant to us pertain to the assessed value of real estate, the millage rate chosen by the municipality, and real estate taxes that were actually collected. We can use these data to define a measure of performance, the percentage of real estate taxes collected as:

$$Percentage\ of\ real\ estate\ taxes\ collected = \frac{Real\ estate\ taxes\ collected}{(Millage\ rate/1000 * Assessed\ Value\ of\ Real\ Estate)} *100$$

For example, consider Lower Merion Township in Montgomery County. For 2007, their tax rate on the assessed value of a property was 3.54 mills and the total assessed value of real estate was \$7,446,874,345. Thus the real estate taxes that should have been collected for the year equal \$26,361,934. However, \$26,203,727 was actually collected, suggesting that 99.4 percent of the taxes that should have been collected were actually collected. The percentage of real estate taxes collected, averaged over the 4-year term of a tax collector, is the dependent variable included in the analysis where I examine the existence of a relationship between pay and performance. It is also worth pointing out that the millage rate is decided by the council or board governing the municipality while a board appointed by the county decides on the assessed value of real estate. The tax collector however is in charge of mailing tax bills, collecting payment, and following up on delinquent taxpayers.

The last source of data I use pertain to elections for tax collectors. These are available from the websites of the Boards of Elections for the counties in which the municipalities are located. Election data prior to the early to mid-2000s are typically not available in electronic form. I pick 2003 as the starting point and look for which of Pennsylvania's 67 counties have data on elections available electronically with the County Boards of Elections. Ultimately I am able to obtain data from sixteen counties that have election data for the period between 2003 and 2009. These data are then subsequently matched with the data on tax collector performance to examine if performance in office has any relationship with the likelihood of an incumbent tax collector being re-elected.

Summary statistics are presented in Table 1. Table 1 clearly indicates the wide variation in the compensation of tax collectors across municipalities. Additionally, one can also discern wide differences in compensation based on the two sources – the 2004 PEL survey and the Pennsylvania Manual. These differences primarily reflect the differences in size of the municipalities covered by the two sources. The largest municipalities which are included in the Pennsylvania Manual are more likely to pay their tax collectors (or treasurers) higher salaries than the smaller municipalities, which are more likely to appear in the PEL survey.[10]

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[10]We also note that collection rate of property taxes is very high. One reason for the existence of collection rates that are higher than 100 percent pertain to how and when penalties get assessed. Bills paid prior to April 30 of each year qualify for a two percent discount whereas a ten percent penalty is assessed for payments made after July 1. Therefore, even when taxes are paid within the same year that they are assessed, they may incur a penalty if payments are made after July 1st. As a result, collection rates may end up being more than 100 percent.

5   Empirical Specification

There are two analyses undertaken to examine the research questions of interest and I lay out the empirical specification used for each.

First, to examine if there is a relationship between tax collector compensation and their performance, I look at the percentage of predicted real estate taxes that were actually collected by the municipality. As there may be considerable year-to-year variation (perhaps because a large owner of real estate was delinquent in a given year but paid off his taxes in the next), I consider the average over a multiple-year window. When using the 2004 data on compensation from the Pennsylvania Economy League, I consider an average of the percentage of real estate taxes collected for the subsequent four-year period from 2005 through 2008. The specification used is:

$$Y_{it} = \alpha + \beta * C_{i(t-1)} + \gamma * W_{it} + \varepsilon_{it}. \tag{5.1}$$

In the equation above, Y_{it} is the percentage of real estate taxes actually collected over a 4-year window between t and (t+3), $C_{i(t-1)}$ refers to compensation at the start of that 4-year window, W_{it} includes municipal-level controls that are likely to have an independent influence on the efficiency of the property tax collection system, and ε_{it} is the error term. In the case of tax collectors who are compensated on a commission basis, C refers to the percentage of real estate taxes paid as commission while in the case of tax collectors who are compensated on the basis of a salary, C refers to the log of annual salary. Standard errors are clustered throughout at the county level to account for arbitrary correlation in error terms for observations within the same county.

To examine whether a higher collection of property taxes is rewarded (or punished) by voters, I examine a number of different margins. I first examine whether the incumbent is more or less likely to run based on her performance in office. In case the incumbent decides to run again for office, I examine whether the collection rate during the period she was in office influences the likelihood that she faces an opponent or her vote share.[11] With all dependent

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[11]One could also examine whether the incumbent wins or loses if she decides to run again, but in our dataset there is only one instance out of 531 possible instances where the incumbent loses her race. Therefore, we cannot meaningfully seek to explain variation in the likelihood of the incumbent winning an election based on her performance in office and instead seek to examine these other margins, which may also be influenced by her performance.

variables, I account for the lagged vote share from the previous electoral cycle in half of the specifications, while in the remaining, I run a simpler specification that does not control for the lagged vote share. When the lagged vote share is controlled for, the specification used is as follows:

$$V_{it} = \alpha + \beta * P_{i(t-1)} + \gamma * V_{i(t-4)} + \varepsilon_{it}. \tag{5.2}$$

In the equation above, V_{it} is the current vote share of an incumbent tax collector, $V_{i(t-4)}$ is the lagged vote share of the incumbent, $P_{i(t-1)}$ is the percentage of real estate taxes actually collected over a 4-year window between (t-3) and t,[12] and ε_{it} is the error term.This analysis is conducted using data on all elections held between 2003 and 2009 for all sixteen counties from the state for which such data were available.

6 Results

6.1 Does higher compensation induce the collection of more taxes?: Evidence from the PEL data

Tables 2 and 3 present the results of this analysis using specification (4.1). Table 2 uses observations from municipalities which compensate their tax collectors on a commission basis while in Table 3, we include municipalities where tax collectors are compensated on the basis of a flat salary. Column (1) of both tables estimates a parsimonious specification with no controls. Column (2) adds controls for the millage rate as well as the log of market value of real estate per capita, as these variables may have an independent influence on the percentage of real estate taxes that are actually collected. For example, a low market value of real estate per capita is likely in municipalities experiencing a challenging economic environment and it may be harder to collect real estate taxes in such a municipality. Columns (3) and (4) replicate columns (1) and (2) but add in county fixed effects as well.

[Table 2 about here]

[Table 3 about here]

When we consider the effect of a higher compensation in Table 2 where our analysis is limited to those municipalities which pay their tax collectors on a commission basis, we find

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[12]Of the 707 decisions to run for office that were analyzed, over 95% of those involved a full 4-year term. Fewer than 5% involved a 2-year term and those are likely to have been driven by deaths, resignations, or removal from the office of the tax collector. In those cases, the percentage of real estate taxes collected is averaged over the 2-year term during which the incumbent was in office.

a positive and statistically significant relationship between the compensation received by tax collectors and the percentage of real estate taxes that are actually collected. This is true across the four columns of the table as progressively more controls are added. Although the coefficients are statistically significant in all cases, the magnitude of the coefficient is well below 1 suggesting that, on average, a compensation policy that incentivizes tax collectors with a higher percentage of taxes collected may not ultimately benefit the tax coffers of the municipality. Subsequently when we examine only municipalities which pay their tax collectors a fixed salary in Table 3, we do not find a statistically significant effect of compensation on the percentage of real estate taxes that are actually collected although one of the coefficients in column (3) is positive and statistically significant at the 10% level. The results in Table 3 suggest that increasing salaries of tax collectors does not induce them to collect a higher fraction of real estate taxes that are due.

6.2 Does higher compensation induce the collection of more taxes?: Evidence from the Pennsylvania Manual data

Data from the Pennsylvania Manual are next used to examine the relationship between pay and performance for tax collectors. Tables 4 and 5 mimic the pattern of Tables 2 and 3 where Table 4 includes municipalities that compensate on the basis of a commission while Table 5 examines municipalities that compensate on the basis of a salary. As was described earlier, data from the Pennsylvania Manual pertain to the largest municipalities within the state and nearly all of these municipalities pay their tax collectors a fixed salary. Therefore, only 14 municipalities in this dataset rely at least partly on a commission-based structure, and of those 14, we know the level of the commission for only six municipalities. The paucity of observations from this data source prevents us from estimating a regression that also includes either county or municipality fixed effects in Table 4 (unlike Table 5) and therefore we only present results from specifications which pools all municipalities from all counties.

[Table 4 about here]

[Table 5 about here]

The findings here parallel the findings from Tables 2 and 3. When we limit our analysis to municipalities which pay their tax collectors on a commission basis, we find a positive and statistically significant relationship between the compensation received by tax collectors and

the percentage of real estate taxes that are actually collected. Where the results in Table 4 differ from those presented earlier in Table 2 is that here the coefficients are larger than 1 suggesting that, on average, a compensation policy that incentivizes tax collectors with a higher percentage of taxes collected would increase the level of property tax collected.

Also, as before, based on the results in Table 5, we do not find a statistically significant effect of compensation on the percentage of real estate taxes that are actually collected when only municipalities that compensate on a salaried basis are included in the estimation suggesting the lack of a pay-performance relationship for such collectors. Since the estimation pools data from mutiple issues of the Pennsylvania Manual spread over two decades, we also look at whether this relationship holds true for each cross-section of the data and confirm that the lack of a relationship between pay and performance holds in each cross-section. Those additional results are available on request.

6.3 Does higher percent collection while in office impact the likelihood of being re-elected?

One of our findings is the lack of a statistically significant positive relationship between pay and performance for tax collectors who are compensated on a salaried basis. In other words, a higher salary does not induce such tax collectors to exert more effort and collect a higher share of taxes that are owed to the municipality. This is contrary to the notion of efficiency wages which suggests that paying workers more reduces shirking because of the higher cost of being fired (Shapiro and Stiglitz, 1984) and the model in Besley (2004) which suggest that by increasing the incumbent's payoff from being re-elected, higher compensation likely spurs better performance on the job. What might help reconcile our finding with the theory of efficiency wages is a lack of recognition by voters of a superior performance by tax collectors at the ballot box.

In order to examine the question of whether better performance by tax collectors induces electoral rewards from voters, we turn to data on elections for the office of tax collector. We narrow our search to elections that were held between the years 2003 and 2009 as the performance measure - percent of taxes collected - can be constructed for this time period and because prior to the 2000s, it is difficult to obtain local election data. Drawing on data available from the various county Boards of Elections, we are able to observe 692 municipalities

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spread across sixteen counties at least once over the sample period.[13] For the municipalities for which we have data, we observe more than one election for 652 municipalities.[14]

Panel A of Table 6 presents the results of a probit which examines whether the likelihood of an incumbent running for office is influenced by her performance or not. This is defined only for the 652 municipalities where we observe the choice of the incumbent tax collector to either run again or step down from office. We examine if this decision is influenced by the percentage of real estate taxes collected between the last election and the current one. Panel B of Table 6 presents the results of another probit which examines whether the likelihood that an incumbent running again for office faces an opponent in the general election is influenced by her performance in office. This is defined only for the 541 cases where we find that the incumbent decides to run again for office.[15]

Finally in Panel C of Table 6, we use specification (5.2)to analyze whether the incumbent tax collector's vote share in the next election cycle is influenced by her performance in office. In column (1), we consider the most parsimonious specification and only include our key independent variable, the percentage of taxes collected during the last term in office.[16] Column (2) adds in a control for the lagged vote share as it is likely that the vote share of candidates is correlated over time because of party allegiances of voters and because of candidates' reputations. Columns (3) and (4) parallel columns (1) and (2) but they add in county fixed effects.

[Table 6 about here]

Based on the results in Panel A, we observe that the decision of the incumbent to run for office again is not influenced by her performance in office, measured as the percentage of real

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[13]These counties are spread across Pennsylvania and include Berks, Butler, Centre, Fulton, Lancaster, Lehigh, Luzerne, Mercer, Monroe, Montgomery, Northampton, Pike, Schuylkill, Venango, Washington, and Westmoreland.

[14]Even though our election data span a 6-year period from 2003 and 2009 and the term of office of a tax collector is only 4 years, we observe election results more than once for 652 of the 692 municipalities. There are primarily two reasons for this dropoff. First, in the construction of the sample (and all subsequent analysis in the paper), write-in candidates are dropped because we do not know the identity of such candidates and cannot comment on how their vote share changes between two consecutive elections. Dropping write-in candidates partly accounts for the drop-off because, in some of those municipalities, write-in candidates won the race for the office at least once. A second reason for the drop-off from 692 to 652 is because in some municipalities no one may have formally run for the office in a particular electoral cycle and in that case the municipality would have *delegated* the task of collecting taxes to someone. Such appointments and delegations (decisions made by the city council or the borough council or the township board) are not captured in our data.

[15]As columns (1) and (2) of Panel B of Table 6 indicate, we only use 531 observations (and not 541) because for the remaining 10 cases, the municipality does not impose a property tax (hence the collection rate is undefined, e.g. for Rapho Township or Martic Township of Lancaster County).

[16]Of the 531 elections analyzed, 481 (or 91%) of elections were held at a 4-year interval while the remaining 50 (or 9%) of elections were held at a 2-year interval. The latter is likely to be explained by special elections which may have resulted from deaths or resignations or removal from office of the incumbent tax collector.

estate taxes collected between the two electoral cycles. It also does not seem to be influenced by the percentage of votes she received in the previous election.

The results in Panel B suggest that while there may be a negative relationship between the likelihood of an incumbent facing an opponent and her performance in office, that relationship is generally not statistically significant. However, the likelihood of an incumbent facing an opponent appears to be negatively related to her vote share in the previous election. The drop-off in the number of observations as we move from columns (1) and (2) to columns (3) and (4) of Panel B is explained by the fact that once county fixed effects are introduced, observations from five counties (Butler, Centre, Lancaster, Pike, and Westmoreland) drop out as incumbent tax collectors did not face any opponents in municipal elections that were held between 2003 and 2009 in those counties. When we use a linear probability model (LPM), these five counties appear in the estimation and our conclusion that the likelihood that an incumbent tax collector faces an opponent is unaffected by her performance in office is reaffirmed. So also is the conclusion that the incumbent's decision to run again is unaffected by her performance in office. Results from those additional specifications involving an LPM are presented in Appendix Table A1.

Finally, in Panel C, we observe that the vote share of incumbents appears to not respond to the percent of taxes collected in the period between the two election cycles as our coefficient of interest is statistically insignificant across all four columns. Not surprisingly, the vote share of the incumbent is positive and statistically significant in columns (2) and (4) indicating persistence in vote shares over successive elections. Overall, based on the sum of evidence presented in Table 6, we conclude that voters are unlikely to reward (or punish) tax collectors for their performance in office and therefore electoral considerations do not influence decisions by the tax collector of how much effort to exert. These results may therefore offer a possible explanation for our earlier finding that the performance of salaried tax collectors does not go up with an increase in their salary.

7 Discussion and Conclusions

This paper presents one of the first analyses of whether a pay-performance relationship exists for elected municipal officials in the United States. Using data on percentage of real estate taxes that are actually collected, the paper suggests that municipal tax collectors collect more in property taxes as the commission they receive goes up. In contrast, there appears to be

no statistically significant relationship for tax collectors who are compensated on the basis of a flat salary. This final observation can perhaps be partly explained by the fact that voters do not seem to reward performance in office, as measured by the percentage of taxes that are collected. The incumbent's likelihood of running for office, the likelihood that she faces a contested general election, and her vote share do not seem to be significantly influenced by the percentage of real estate taxes collected between two successive electoral cycles.

Commenting on the welfare implications of tax collectors collecting more in property taxes when compensated on the basis of a commission is tricky as it involves comparing the marginal benefit of a dollar in private hands with the marginal benefit of a dollar in the hands of the government. That, in turn, is likely to hinge on one's views of government: whether one views it as a benevolent maximizer of social welfare or as a Leviathan, ala Brennan and Buchanan (1980). Tax collectors compensated on a commission can also end up being over-zealous, a fact that undoubtedly contributed to the elimination of the practice of "tax farming" and a sea change in the structure of their compensation over time across most geographies (White 2004; Parrillo 2013).

The work described in the paper sheds some light on the question of whether and how incentives matter in the public sector. Further work on examining the institution of municipal tax collectors would benefit from additional data regarding the compensation that they receive for collecting school district and county taxes beyond what they receive from the municipality for which they collect property taxes. We would also benefit from examining other settings where we can construct credible measures of the performance of these officials and where we can directly examine the quality of elected officials, as measured by their educational background or prior relevant work experience.

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Table 1: Summary Statistics

	N	Mean	p25	Median	p75
Compensation data from the 2004 Pennsylvania Economy League (PEL) survey:					
Overall sample: Amount paid					
In absolute terms	299	$4,986	$1,572	$3,549	$6,957
As a percentage of real estate taxes collected	299	3.57	1.79	4.00	5.00
Municipalities compensating solely on a commission basis: Amount paid					
In absolute terms	202	$4,561	$1,371	$3,003	$6,172
As a percentage of real estate taxes collected	202	4.34	3.17	5.00	5.00
Municipalities compensating solely on a salary basis: Amount paid					
In absolute terms	50	$5,894	$2,500	$4,032	$8,500
As a percentage of real estate taxes collected	50	1.64	0.59	1.27	1.85
Compensation data from the Pennsylvania Manual					
Annual Salary for municipalities compensated on a salary basis					
From the 1985 Manual	115	$ 9,371	$4,500	$ 7,500	$12,000
From the 1989 Manual	116	$10,875	$5,000	$ 8,850	$14,750
From the 1993 Manual	141	$15,032	$6,000	$10,000	$20,025
From the 1997 Manual	127	$17,652	$7,500	$11,968	$25,000
From the 2001 Manual	125	$19,279	$9,400	$15,000	$26,000
From the 2005 Manual	137	$19,599	$9,506	$13,138	$27,000
Amount paid for municipalities compensating on a commission basis					
As a percentage of real estate taxes collected					
(Averaged across all years of the Manual)	38	2.86	2.00	3.00	3.50
Election data from the County Boards of Elections					
Probability incumbent runs again for office	707	0.751	1	1	1
Probability incumbent faces an opponent if she runs	531	0.077	0	0	0
Incumbent's vote share	531	96.9	99.2	99.8	100
Percentage of taxes collected					
Sample matched with the PEL survey	299	100.6	98.6	100.0	101.8
Sample matched with data from Pennsylvania Manual	757	100.3	98.0	99.4	101.5
Sample matched with the election data	707	99.6	98.3	99.3	100.7

Table 2: Effect of higher compensation on percent real estate taxes collected for collectors compensated on basis of a commission (using the PEL survey)

	(1)	(2)	(3)	(4)
Dependent variable: Percentage municipal real estate taxes collected (average for years between 2005 and 2008)				
Compensation	0.231*	0.277*	0.346**	0.321**
(as percent of taxes collected)	(2.02)	(2.00)	(2.92)	(3.07)
Millage rate		0.0350		-0.0552
		(0.37)		(-0.41)
Square of Millage rate(X10^3)		-0.725		0.902
		(-0.39)		(0.32)
Log of market value of real estate per capita		0.629		0.457
		(1.29)		(0.90)
Constant	99.18***	91.90***	98.71***	93.99***
	(292.48)	(17.20)	(201.78)	(17.86)
County Fixed Effects	No	No	Yes	Yes
N	178	178	178	178
R²	0.013	0.022	0.13	0.14

Notes: Data on compensation paid to municipal tax collectors is based on data provided by the Pennsylvania Economy League and pertains to nine counties in Central and Eastern Pennsylvania (Berks, Blair, Dauphin, Lackawanna, Lehigh, Luzerne, Lycoming, Northampton, and York). Data on percentage of predicted real estate taxes actually collected are based on author's calculations using the municipal financial statistics compiled by the Department of Community and Economic Development of Pennsylvania. The predicted real estate taxes for each municipality are calculated as the product of their assessed value of real estate and the municipal millage rate. The dependent variable is the ratio of real estate taxes actually collected to the level of real estate taxes predicted based on assessed value and millage rates multiplied by 100. Data on commissions of municipal tax collectors are for the year 2004 and data on percentage of predicted real estate taxes that were actually collected are the averages for years 2005–2008. To reduce the influence of outliers, only those values of commissions and percent taxes collected that lie within the 5th and 95th percentiles of their respective distributions have been used.

t statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered throughout at the county level.

Table 3: Effect of higher compensation on percent real estate taxes collected for collectors compensated on basis of a salary (using the PEL survey)

	(1)	(2)	(3)	(4)
Dependent variable: Percentage municipal real estate taxes collected (average for years between 2005 and 2008)				
Panel A: Expressing compensation as a percent of taxes collected				
Compensation (Log of salary)	0.797	0.262	1.187*	0.0801
	(1.22)	(0.44)	(2.02)	(0.14)
Millage rate		0.205		0.477***
		(1.37)		(3.74)
Square of Millage rate (X10^2)		-0.284		-0.784***
		(-0.86)		(-3.84)
Log of market value of real estate per capita		3.069***		4.363**
		(4.25)		(3.49)
Constant	93.74***	62.49***	90.51***	47.86**
	(16.35)	(7.28)	(18.64)	(3.02)
County Fixed Effects	No	No	Yes	Yes
N	45	44	45	44
R^2	0.030	0.17	0.18	0.32

Notes: Data on compensation paid to municipal tax collectors is based on data provided by the Pennsylvania Economy League and pertains to nine counties in Central and Eastern Pennsylvania (Berks, Blair, Dauphin, Lackawanna, Lehigh, Luzerne, Lycoming, Northampton, and York). Data on percentage of predicted real estate taxes actually collected are based on author's calculations using the municipal financial statistics compiled by the Department of Community and Economic Development of Pennsylvania. The predicted real estate taxes for each municipality are calculated as the product of their assessed value of real estate and the municipal millage rate. The dependent variable is the ratio of real estate taxes actually collected to the level of real estate taxes predicted based on assessed value and millage rates multiplied by 100. Data on salaries of municipal tax collectors are for the year 2004 and data on percentage of predicted real estate taxes that were actually collected are the averages for years 2005 − 2008. To reduce the influence of outliers, only those values of salaries and percent taxes collected that lie within the 5th and 95th percentiles of their respective distributions have been used.

t statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered throughout at the county level.

Table 4: Effect of higher compensation on percent real estate taxes collected for collectors compensated on basis of a commission (using the Pennsylvania Manual)

	(1)	(2)
Dependent variable: Percentage municipal real estate taxes collected (averaged over a 4-year period)		
Compensation	1.663**	2.164**
(as percent of taxes collected)	(2.41)	(2.32)
Millage rate		-0.280
		(-1.10)
Square of Millage rate		0.0130
		(1.26)
Log of market value of real estate per capita		0.000351
		(0.00)
Constant	95.66***	95.04***
	(52.49)	(15.58)
Fixed Effects	None	None
N	23	23
R²	0.37	0.45

Notes: Data on compensation paid to municipal tax collectors is based on data available from the Pennsylvania Manual. Data on percentage of predicted real estate taxes actually collected are based on author's calculations using the municipal financial statistics compiled by the Department of Community and Economic Development of Pennsylvania. The predicted real estate taxes for each municipality are calculated as the product of their assessed value of real estate and the municipal millage rate. The dependent variable is the ratio of real estate taxes actually collected to the level of real estate taxes predicted based on assessed value and millage rates multiplied by 100. Data on commissions of municipal tax collectors are for years 1985, 1989, 1993, 2001, and 2005 and data on percentage of predicted real estate taxes that were actually collected are the averages for the subsequent 4-year periods (e.g. 1986-1989 for the 1985 compensation data, 1990-1993 for the 1989 compensation data, etc.). To reduce the influence of outliers, only those values of commissions and percent taxes collected that lie within the 5th and 95th percentiles of their respective distributions have been used.
t statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered throughout at the county level.

Table 5: Effect of higher compensation on percent real estate taxes collected for collectors compensated on basis of a salary (using the Pennsylvania Manual)

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Percentage municipal real estate taxes collected (averaged over a 4-year period)					
Compensation (Log of salary)	-0.304	-0.455**	-0.268	-0.440**	0.574	0.383
	(-1.41)	(-2.29)	(-1.37)	(-2.10)	(1.52)	(0.81)
Millage rate		0.000279		-0.0213		-0.0291
		(0.01)		(-0.62)		(-0.81)
Square of Millage rate (X10^4)		-0.956		0.171		0.835
		(-0.43)		(0.07)		(0.33)
Log of market value of real estate per capita		0.699**		0.479*		0.0914
		(2.65)		(1.83)		(0.15)
Constant	102.5***	96.76***	102.2***	99.27***	94.41***	95.79***
	(52.04)	(37.38)	(56.36)	(52.59)	(27.07)	(21.58)
Fixed Effects	None	None	County	County	Municipality	Municipality
N	512	512	512	512	512	512
R²	0.0046	0.049	0.13	0.17	0.50	0.51

Notes: Data on compensation paid to municipal tax collectors is based on data available from the Pennsylvania Manual. Data on percentage of predicted real estate taxes actually collected are based on author's calculations using the municipal financial statistics compiled by the Department of Community and Economic Development of Pennsylvania. The predicted real estate taxes for each municipality are calculated as the product of their assessed value of real estate and the municipal millage rate. The dependent variable is the ratio of real estate taxes actually collected to the level of real estate taxes predicted based on assessed value and millage rates multiplied by 100. Data on salaries of municipal tax collectors are for years 1985, 1989, 1993, 2001, and 2005 and data on percentage of predicted real estate taxes that were actually collected are the averages for the subsequent 4-year periods (e.g. 1986-1989 for the 1985 compensation data, 1990-1993 for the 1989 compensation data, etc.). To reduce the influence of outliers, only those values of salaries and percent taxes collected that lie within the 5th and 95th percentiles of their respective distributions have been used.

t statistics in parentheses * p < 0.10, ** p < 0.05, *** p < 0.01. Standard errors are clustered throughout at the county level.

Table 6: Effect of percent taxes collected on the probability that incumbent runs, the probability that she faces an opponent, and the vote share if she runs

	(1)	(2)	(3)	(4)
Panel A: Probability that the incumbent runs again for office				
Percent taxes collected during the previous term in office	0.00474 (0.33)	0.00448 (0.31)	0.0136 (0.81)	0.0135 (0.79)
Lagged vote share in previous election cycle		-0.000728 (-0.13)		-0.000830 (-0.15)
Constant	0.374 (0.26)	0.469 (0.36)	-0.569 (-0.34)	-0.478 (-0.32)
N	707	706	707	706
Pseudo-R^2	0.11	0.11	0.13	0.13
Panel B: Probability that the incumbent faces an opponent				
Percent taxes collected during the previous term in office	-0.0504* (-1.75)	-0.0473 (-1.63)	-0.0599 (-1.64)	-0.0539 (-1.50)
Lagged vote share in previous election cycle		-0.0123*** (-2.68)		-0.0117*** (-2.76)
Constant	3.549 (1.22)	4.402 (1.40)	4.838 (1.34)	5.304 (1.44)
N	531	531	391	391
Pseudo-R^2	0.017	0.033	0.050	0.062
Panel C: Incumbent's vote share if she runs for office				
Percent taxes collected during the previous term in office	0.168 (0.87)	0.147 (0.79)	0.157 (0.82)	0.126 (0.70)
Lagged vote share in previous election cycle		0.0970* (2.06)		0.0937** (2.22)
Constant	79.70*** (3.88)	74.00*** (3.28)	81.29*** (4.29)	75.39*** (3.65)
N	531	531	531	531
R^2	0.0041	0.020	0.065	0.079
County Fixed Effects	No	No	Yes	Yes

Notes: The analysis is based on data for elections held between 2003 and 2009 for sixteen counties (Berks, Butler, Centre, Fulton, Lancaster, Lehigh, Luzerne, Mercer, Monroe, Montgomery, Northampton, Pike, Schuylkill, Venango, Washington, and Westmoreland) gathered from the respective County Boards of Elections. To reduce the influence of outliers, only those values of the performance measure that lies within the 5th and 95th percentiles of its distribution has been used. Year of election fixed effects are included in all specifications in panels A, B, and C of the table but have not been reported. Standard errors are clustered throughout at the county level. t statistics in parentheses * p < 0.10, ** p < 0.05, *** p < 0.01.

Appendix

A Proof of result that optimal effort exerted increases when compensation goes up

Scenario 3: Tax collector compensated on a salary basis and re-election probability depends on the percentage of taxes that are collected:

Our object of interest is $\frac{\partial e^*}{\partial s}$.

Examine the FOC:

$$\frac{\partial c}{\partial e} = \frac{\beta}{(1 - \beta * q)} * (S - c(e)) * \frac{\partial q}{\partial e} \tag{A.1}$$

Define, $F \equiv \frac{\partial c}{\partial e} - \frac{\beta}{(1-\beta*q)} * (S - c(e)) * \frac{\partial q}{\partial e}$

By the implicit function theorem: $\frac{\partial e^*}{\partial S} = -\frac{\partial F}{\partial S} \big/ \frac{\partial F}{\partial e^*}$

$\frac{\partial F}{\partial S} = -\frac{\beta}{(1-\beta*q)} * \frac{\partial q}{\partial e}$

$\frac{\partial F}{\partial e} = \frac{\partial^2 c}{\partial e^2} - \frac{\beta}{(1-\beta*q)} * (S - c(e)) * \frac{\partial^2 q}{\partial e^2} - \frac{\beta}{(1-\beta*q)} * (-\frac{\partial c}{\partial e}) * \frac{\partial q}{\partial e} - (S - c(e)) * \frac{\partial q}{\partial e} * \frac{\beta^2}{(1-\beta*q)^2}$.

Or, $\frac{\partial F}{\partial e} = \frac{\partial^2 c}{\partial e^2} - \frac{\beta}{(1-\beta*q)} * (S - c(e)) * \frac{\partial^2 q}{\partial e^2} + \frac{\beta}{(1-\beta*q)} * \frac{\partial c}{\partial e} * \frac{\partial q}{\partial e} - (S - c(e)) * \frac{\partial q}{\partial e} * \frac{\beta^2}{(1-\beta*q)^2}$. This needs to be evaluated at $e = e^*$.

Consider the last two terms of this expression:

$\frac{\beta}{(1-\beta*q)} * \frac{\partial c}{\partial e} * \frac{\partial q}{\partial e} - (S - c(e)) * \frac{\partial q}{\partial e} * \frac{\beta^2}{(1-\beta*q)^2}$

Partial out $\frac{\beta}{(1-\beta*q)} * \frac{\partial q}{\partial e}$ from each of the individual terms. What we are left with is:

$\frac{\partial c}{\partial e} - (S - c(e)) * \frac{\beta}{(1-\beta*q)}$

Now, because of the FOC, we can say that this is equal to zero when evaluated at $e = e^*$.

Hence, $\frac{\partial F}{\partial e} = \frac{\partial^2 c}{\partial e^2} - \frac{\beta}{(1-\beta*q)} * (S - c(e)) * \frac{\partial^2 q}{\partial e^2}$ and therefore, $\frac{\partial e^*}{\partial S} = -\frac{\partial F}{\partial S} \big/ \frac{\partial F}{\partial e^*}$ translates to

$\frac{\partial e^*}{\partial S} = \frac{\beta}{(1-\beta*q)} * \frac{\partial q}{\partial e} \big/ [\frac{\partial^2 c}{\partial e^2} - \frac{\beta}{(1-\beta*q)} * (S - c(e)) * \frac{\partial^2 q}{\partial e^2}]$

Because, q, the re-election probability is a concave function of effort, e, $\frac{\partial q}{\partial e} > 0$ and $\frac{\partial^2 q}{\partial e^2} < 0$. As a result, both the numerator and denominator of the above expression are positive and I conclude that $\frac{\partial e^*}{\partial S} > 0$.

Scenario 4: Tax collector compensated on a commission basis and re-election probability depends on the percentage of taxes that are collected:

As before, our object of interest is $\frac{\partial e^*}{\partial s}$.

Examine the FOC:

$$\frac{\partial c}{\partial e} = p * \frac{\partial T}{\partial e} + \frac{\beta}{(1 - \beta * q)} * (p * T - c(e)) * \frac{\partial q}{\partial e} \tag{A.2}$$

Define, G $\equiv \frac{\partial c}{\partial e} - p * \frac{\partial T}{\partial e} - \frac{\beta}{(1 - \beta * q)} * (p * T - c(e)) * \frac{\partial q}{\partial e}$

By the implicit function theorem: $\frac{\partial e^*}{\partial p} = -\frac{\partial G}{\partial p} / \frac{\partial G}{\partial e^*}$

$\frac{\partial G}{\partial p} = -\frac{\partial T}{\partial e} - \frac{\beta}{(1 - \beta * q)} * T * \frac{\partial q}{\partial e}$

$\frac{\partial G}{\partial e} = \frac{\partial^2 c}{\partial e^2} - p * \frac{\partial^2 T}{\partial e^2} - \frac{\beta}{(1 - \beta * q)} * (p * T - c(e)) * \frac{\partial^2 q}{\partial e^2} - \frac{\beta}{(1 - \beta * q)} * (p * \frac{\partial T}{\partial e} - \frac{\partial c}{\partial e}) * \frac{\partial q}{\partial e} - (p * T - c(e)) * \frac{\partial q}{\partial e} * \frac{\beta^2}{(1 - \beta * q)^2}$.

Or, $\frac{\partial G}{\partial e} = \frac{\partial^2 c}{\partial e^2} - p * \frac{\partial^2 T}{\partial e^2} - \frac{\beta}{(1 - \beta * q)} * (p * T - c(e)) * \frac{\partial^2 q}{\partial e^2} + \frac{\beta}{(1 - \beta * q)} * \frac{\partial c}{\partial e} * \frac{\partial q}{\partial e} - \frac{\beta}{(1 - \beta * q)} * p * \frac{\partial T}{\partial e} * \frac{\partial q}{\partial e} - (p * T - c(e)) * \frac{\partial q}{\partial e} * \frac{\beta^2}{(1 - \beta * q)^2}$. This needs to be evaluated at $e = e^*$.

Consider the last three terms of this expression:

$\frac{\beta}{(1 - \beta * q)} * \frac{\partial c}{\partial e} * \frac{\partial q}{\partial e} - \frac{\beta}{(1 - \beta * q)} * p * \frac{\partial T}{\partial e} * \frac{\partial q}{\partial e} - (p * T - c(e)) * \frac{\partial q}{\partial e} * \frac{\beta^2}{(1 - \beta * q)^2}$

Partial out $\frac{\beta}{(1 - \beta * q)} * \frac{\partial q}{\partial e}$ from each of the individual terms. What we are left with is:

$\frac{\partial c}{\partial e} - p * \frac{\partial T}{\partial e} - (p * T - c(e)) * \frac{\beta}{(1 - \beta * q)}$

Now, because of the FOC, when this is evaluated at e=e*, this is zero.

Hence, $\frac{\partial G}{\partial e}$

$= \frac{\partial^2 c}{\partial e^2} - p * \frac{\partial^2 T}{\partial e^2} - \frac{\beta}{(1 - \beta * q)} * (p * T - c(e)) * \frac{\partial^2 q}{\partial e^2}$

Therefore, $\frac{\partial e^*}{\partial p} = -\frac{\partial G}{\partial p} / \frac{\partial G}{\partial e^*}$ translates to

$\frac{\partial e^*}{\partial p} = [\frac{\partial T}{\partial e} + \frac{\beta}{(1 - \beta * q)} * \frac{\partial q}{\partial e}] / [\frac{\partial^2 c}{\partial e^2} - p * \frac{\partial^2 T}{\partial e^2} - \frac{\beta}{(1 - \beta * q)} * (p * T - c(e)) * \frac{\partial^2 q}{\partial e^2}]$

Because, q, the re-election probability is a concave function of effort, e, $\frac{\partial q}{\partial e} > 0$ and $\frac{\partial^2 q}{\partial e^2} < 0$. Likewise, it makes sense for us to assume that T, the taxes that are actually collected are an increasing concave function of e and hence $\frac{\partial T}{\partial e} > 0$ and $\frac{\partial^2 T}{\partial e^2} < 0$.. As a result, both the numerator and denominator of the above expression are positive and I conclude that $\frac{\partial e^*}{\partial p} > 0$.

B   Details of the survey conducted by the Pennsylvania Economy League (PEL)

The Pennsylvania Economy League (PEL) is a regionally based, nonprofit, nonpartisan public policy organization that provides technical assistance to local governments in Pennsylvania.[17]Around October 2004, the Pennsylvania Economy League (PEL) conducted a survey of tax collector compensation in twelve central and eastern Pennsylvania counties: Berks, Blair, Cambria, Cumberland, Dauphin, Lackawanna, Lancaster, Lehigh, Luzerne, Lycoming,

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[17]http://finance.pasenategop.com/files/2015/06/cross.pdf - Accessed 12/28/2016

Northampton, and York for the purposes of informing ongoing discussions regarding the reasonableness of the compensation. The data that was provided by Mr. Gerald Cross, Executive Director of the PEL's Central PA Division correspond to nine of those twelve counties: Berks, Blair, Dauphin, Lackawanna, Lehigh, Luzerne, Lycoming, Northampton, and York. The details that are provided below were taken directly from the notes accompanying that data and give some context for the data that were collected.

B.1   Context for the overall study

The figures on taxes collected and compensation presented in this study were gathered using a short and simple survey form which was mailed to each borough, township, and school district in the county. Its purpose was to identify the methods and rates of compensation of all elected tax collectors, total current real estate taxes collected in 2003, the compensation paid, and other relevant data. The figures utilized in this study are essentially "as reported" by the respective municipal and school officials on the forms returned to PEL by September 30, 2004, although some modifications may have been made by PEL staff after conversations with municipal or school officials.

In addition to providing direct compensation, taxing jurisdictions generally underwrite many of the costs incurred by tax collectors including postage, printing, and stationery, as well as the premiums on the tax collectors' bonds and the cost of auditing their records, and are also responsible for the employer's share of Social Security and Medicare taxes. These expenses and various fringe benefit and other costs—some of which are subject to the February 15 deadline for change[18]—are not included in this study as part of the cost of collecting taxes. It should be noted that in some cases tax collectors incur costs for which they are not reimbursed by the taxing bodies. In these cases the total compensation figures cited in this report would be offset by the unreimbursed expenses, and, therefore, the figures would not be fully comparable with those of tax collectors who have all their costs reimbursed. The costs of compensation presented in this report, however, clearly reflect the amounts which were reported by the municipalities and school districts to have been paid to the elected tax collectors for the collection of real estate taxes in 2003. It should be recognized that in some cases the real

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[18]Elections for tax collectors are held along with elections to other municipal offices on the first Tuesday of November in odd-numbered years. Any changes to tax collector compensation must be made prior to February 15 of the year in which the tax collectors are elected and taxing jurisdictions are not permitted to alter the established rates of compensation during the term of office of the tax collector or treasurer—except under special circumstances in second class townships with a population of less than 3,000.

estate tax collections and the corresponding compensation reported to PEL may include data on other taxes, fees, or charges, and the data reported to PEL may include some delinquent taxes as well as penalties and interest.

B.2   Context specific to each county for which data were provided

1. Berks: This study covers only 58 of the 73 boroughs and townships in Berks County for which data were sought on the real estate taxes collected and compensation paid to the elected tax collectors. Two municipalities did not levy real estate taxes in 2003, in three instances the information provided proved to be insufficient or incomplete, and in 10 cases municipal officials did not respond to PEL's request for data. The primary method of compensation for 40 of the 58 borough and township tax collectors which are covered in this study was commission; four were paid a salary; and 13 were paid on a per bill basis, and one reported a combination of methods.

2. Blair: This study covers only 14 of the 23 boroughs and townships in Blair County for which data were sought on the real estate taxes collected and compensation paid to the elected tax collectors. In eight cases municipal officials did not respond to PEL's request for data, and in one municipality special circumstances prevented use of the data. The method of compensation for each of the 14 borough and township tax collectors which are covered in this study was commission.

3. Dauphin: This study covers only 24 of the 39 boroughs and townships in Dauphin County for which data were sought on the real estate taxes collected and compensation paid to the elected tax collectors. Two municipalities did not levy a real estate tax in 2003; in one case special circumstances prevented use of collection and compensation data; in two instances the information provided proved to be insufficient or incomplete; and in ten cases municipal officials did not respond to PEL's request for data. The primary method of compensation for 13 of the 24 borough and township tax collectors which are covered in this study was commission; six were paid a salary; four were paid on a per bill basis; and for one the compensation was based on a combination of two of these methods.

4. Lackawanna: This study covers only 24 of the 38 boroughs and townships in Lackawanna County for which data were sought on the real estate taxes collected and com-

pensation paid to the elected tax collectors. Two municipalities did not levy real estate taxes in 2003, in one case the information provided proved to be insufficient or incomplete, and 11 municipal officials did not respond to PEL's request for data. The primary method of compensation for 16 of the 24 borough and township tax collectors which are covered in this study was commission; four were paid a salary; two were paid on a per bill basis; two were paid using a combination of methods.

5. Lehigh: This study covers only 20 of the 23 boroughs and townships in Lehigh County for which data were sought on the real estate taxes collected and compensation paid to the elected tax collectors. In one municipality special circumstances prevented use of collection, and in two instances municipal officials did not respond to PEL's request for data. The primary method of compensation for ten of the 20 borough and township tax collectors which are covered in this study was commission; seven were paid a salary; two were paid on a per bill basis; and one was paid a combination of methods.

6. Luzerne: This study covers only 46 of the 72 boroughs and townships in Luzerne County for which data were sought on the real estate taxes collected and compensation paid to the elected tax collectors. Two municipalities did not levy real estate taxes in 2003; in three cases special circumstances prevented use of collection and compensation data; in one instance the data provided proved to be insufficient or incomplete; and 20 municipalities failed to respond to PEL's request for data. The method of compensation for 28 of the 46 borough and township tax collectors which are covered in this study was commission; 14 were paid a salary; three were paid on a per bill basis; and one used a combination of salary and commission.

7. Lycoming: This study covers only 39 of the 51 boroughs and townships in Lycoming County for which data were sought on the real estate taxes collected and compensation paid to the elected tax collectors. The information provided by two municipalities proved to be insufficient or incomplete; in one instance special circumstances prevented the use of data; and in nine cases municipal officials did not respond to PEL's request for data. The primary method of compensation for 33 of the 39 borough and township tax collectors which are covered in this study was commission; two were paid a salary; and four were paid on a per bill basis.

8. Northampton: This study covers only 24 of the 36 boroughs and townships in Northamp-

ton County for which data were sought on the real estate taxes collected and compensation paid to the elected tax collectors. In three municipalities special circumstances prevented use of collection and compensation data, and in nine cases municipal officials did not respond to PEL's request for data. The primary method of compensation for 12 of the 24 borough and township tax collectors which are covered in this study was commission; seven were paid a salary; four were paid on a per bill basis; and for one the compensation involved a combination of methods.

9. York: This study covers only 51 of the 71 boroughs and townships in York County for which data were sought on the real estate taxes collected and compensation paid to the elected tax collectors. One municipality did not levy a real estate tax in 2003; in two instances the information provided proved to be insufficient or incomplete; and in 17 cases municipal officials did not respond to PEL's request for data. The primary method of compensation for 37 of the 51 borough and township tax collectors which are covered in this study was commission; six were paid a salary; six were paid on a per bill basis; and for two, compensation was based on a combination of methods.

Table A1: Effect of percent taxes collected on the probability that incumbent runs and the probability that she faces an opponent (Linear Probability Model)

	(1)	(2)	(3)	(4)
Panel A: Probability that the incumbent runs again for office				
Percent taxes collected during the previous term in office	0.00132 (0.34)	0.00127 (0.32)	0.00376 (0.81)	0.00378 (0.79)
Lagged vote share in previous election cycle		-0.000242 (-0.16)		-0.000298 (-0.18)
Constant	0.0411 (0.10)	0.540 (1.33)	0.426 (0.93)	0.453 (1.09)
N	707	706	707	706
R^2	0.14	0.14	0.16	0.16
Panel B: Probability that the incumbent faces an opponent				
Percent taxes collected during the previous term in office	-0.00656 (-1.49)	-0.00608 (-1.45)	-0.00658 (-1.47)	-0.00594 (-1.41)
Lagged vote share in previous election cycle		-0.00226* (-1.98)		-0.00197* (-2.00)
Constant	0.754 (1.56)	0.887 (1.70)	0.729 (1.63)	0.854* (1.79)
N	531	531	531	531
R^2	0.010	0.021	0.060	0.067
County Fixed Effects	No	No	Yes	Yes

Notes: The analysis is based on data for elections held between 2003 and 2009 for sixteen counties (Berks, Butler, Centre, Fulton, Lancaster, Lehigh, Luzerne, Mercer, Monroe, Montgomery, Northampton, Pike, Schuylkill, Venango, Washington, and Westmoreland) gathered from the respective County Boards of Elections. To reduce the influence of outliers, only those values of the performance measure that lies within the 5th and 95th percentiles of its distribution has been used. Year of election fixed effects are included in all specifications in panels A and B of the table but have not been reported. Standard errors are clustered throughout at the county level. t statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.